[MS-SSAS]:
SQL Server Analysis Services Protocol Specification

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1 Introduction

The [MS-SSAS]: SQL Server Analysis Services Protocol Specification describes the SQL Server Analysis Services Protocol, which provides methods for a client to communicate with, and perform operations on, an analysis server.

1.1 Glossary

The following terms are defined in [MS-GLOS]:

Component Object Model (COM)
data manipulation language (DML)
language code identifier (LCID)
padding
security token
SOAP action
SOAP body
SOAP fault
SOAP header
SOAP message
WSDL message

The following terms are defined in [MS-OFCGLOS]:

complex type
data block
data definition language (DDL)
MIME type
multidimensional expression (MDX)
Online Analytical Processing (OLAP)
simple type
slicer axis
tuple
uniform resource identifier (URI)
XML namespace
XML Schema

The following terms are specific to this document:

action: OLAP objects, such as Cubes, Dimensions, and Cells, can have an action associated with them, so that users can perform that action when browsing OLAP data. For example, users can jump to a URL, execute a command, or drill through to data.

analysis server: A server that provides both OLAP and data mining (DM) services.

assembly: A managed application module containing class metadata and managed code as an object in SQL Server, against which common language runtime (CLR) functions, stored procedures, triggers, user-defined aggregates, and user-defined types can be created in SQL Server.

balanced hierarchy: A **dimension hierarchy** in which all leaf nodes are the same distance from the root node.

cube: A set of data that is organized and summarized into a multidimensional structure defined by a set of **dimensions** and **measures**.

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dimension: A structural attribute of a **cube**, which is an organized **hierarchy** of categories (levels) that describe data in the fact table.

hierarchy: A logical tree structure that organizes the members of a **dimension** such that each member has one parent member and zero or more child members.

Database Mining Extensions (DMX): A syntax that is used for defining data mining objects and for querying and manipulating data mining data.

key attribute: The attribute of a **dimension** that links the non-key attributes in the **dimension** to related **measures**.

lazy aggregations: Aggregations that are rebuilt by the server in the background after the processing step has been completed, instead of during the processing step. This is the process that underlies expressions, such as partitions that are "lazily processed," and aggregations and indexes that are "built lazily."

level: The name of a set of members in a **dimension hierarchy**, such that all members of the set are at the same distance from the root of the **hierarchy**.

locale identifier (LCID): A number that identifies a Windows-based locale.

measure: In a **cube**, a set of values that are usually numeric and are based on a column in the fact table of the **cube**. **Measures** are the central values that are aggregated and analyzed.

measure group: All the **measures** in a **cube** that derive from a single fact table in a data source view.

mining model: An object that contains the definition of a data mining process and the results of the training activity.

mining structure: A data mining object that defines the data domain from which the **mining models** are built.

partition: One of the storage containers for data and aggregations of a **cube**. Every **cube** contains one or more **partitions**. For a **cube** with multiple **partitions**, each **partition** can be stored separately in a different physical location. Each **partition** can be based on a different data source. **Partitions** are not visible to users; the **cube** appears to be a single object.

permission: A rule associated with an object to regulate which users can gain access to the object and in what manner. Permissions are tracked separately for different objects; specifically, Databases, Data Sources, Dimensions, Mining Structures, Mining Models, and Cubes.

proactive caching: A system that manages data obsolescence in a **cube** by which objects in MOLAP storage are automatically updated and processed in the cache, while queries are redirected to ROLAP storage.

remote partition: A **partition** whose data is stored on a server that is running an instance of SQL Server Analysis Services, other than the one used to store the metadata of the **partition**.

repeated base: A base column where the trace provider can reference previous data and therefore omit resending a column again to SQL Server Profiler. The client tool keeps track of all repeatable columns for each new repeated-base column value.

role-playing dimension: A single database **dimension** joined to the fact table on a different foreign key to produce multiple **cube dimensions**.

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unbalanced hierarchy: A **hierarchy** in which one or more levels do not contain members in one or more branches of the hierarchy. This is also known as a **ragged hierarchy**.

MAY, SHOULD, MUST, SHOULD NOT, MUST NOT: These terms (in all caps) are used as described in [RFC2119]. All statements of optional behavior use either MAY, SHOULD, or SHOULD NOT.

1.2 References

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1.3 Protocol Overview (Synopsis)

The [MS-SSAS]: SQL Server Analysis Services Protocol Specification provides methods for a client to communicate with, and perform operations on, an **analysis server**. This protocol is based on SOAP and XML for Analysis (XMLA) [XMLA]. This protocol supports TCP/IP as an underlying transport mechanism in addition to HTTP/HTTPS.

The SQL Server Analysis Services Protocol Specification defines the following operations: **Authenticate**, **Discover**, and **Execute**.

Authenticate is used by the client and server to exchange UTF-8 ([RFC2279]) encoded **security token** data blocks as part of the authentication process. For more information on authentication, see section 4.1.2.

Discover is used to obtain information from an analysis server, such as a list of catalogs on a server. Properties are used to control what data is obtained. This generic interface and the use of properties allow extensibility without rewriting existing functions. For more information, see section 3.1.4.2.

Execute is used to execute commands against a particular analysis server and optionally get back a result set either in a tabular or multidimensional form. For more information, see section 3.1.4.3.

By using the **Authenticate**, **Discover**, and **Execute** operations, the transfer of data between a client and an analysis server can be achieved.

The following diagram illustrates this concept:

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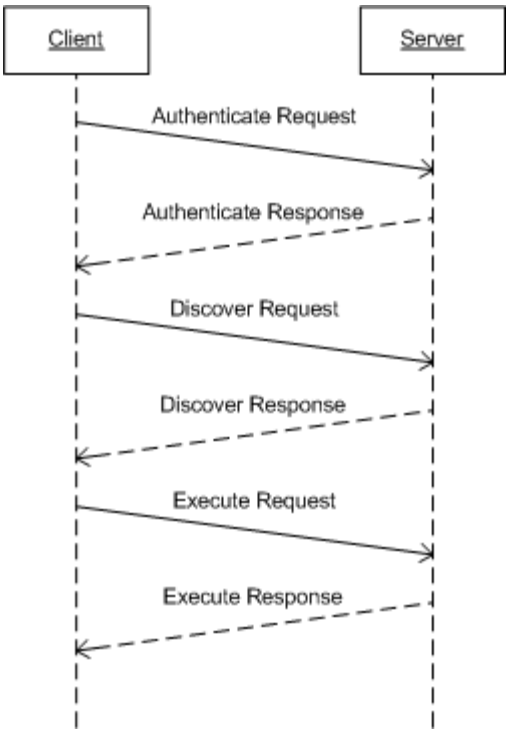

Figure 1: Data transfer between a client and an analysis server via the Authenticate, Discover, and Execute operations

1.4 Relationship to Other Protocols

The SQL Server Analysis Services Protocol uses the SOAP messaging protocol for formatting requests and responses as specified either in [SOAP1.1] or in [SOAP1.2-1/2007] and [SOAP1.2-2/2007]. It transmits these messages using HTTP [RFC2616], HTTPS [RFC2818], or TCP [RFC793].

This protocol uses SOAP over HTTP, as shown in the following layering diagram:

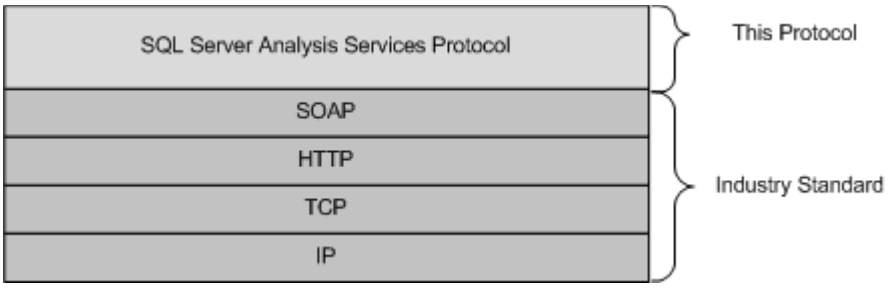

Figure 2: SOAP over HTTP

The SQL Server Analysis Services Protocol uses SOAP over HTTPS, as shown in the following diagram:

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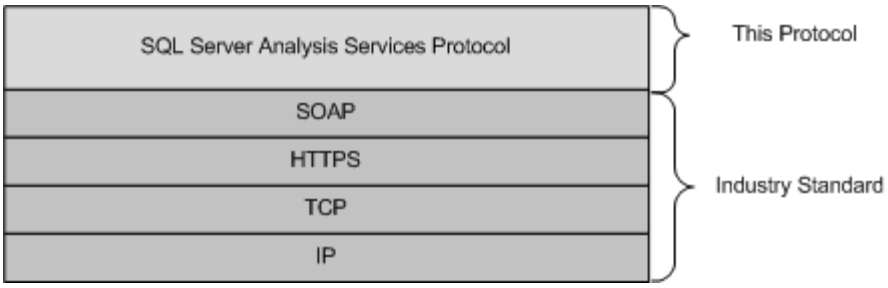

Figure 3: SOAP over HTTPS

The SQL Server Analysis Services Protocol uses SOAP over Direct Internet Message Encapsulation [DIME] and TCP/IP, as shown in the following diagram:

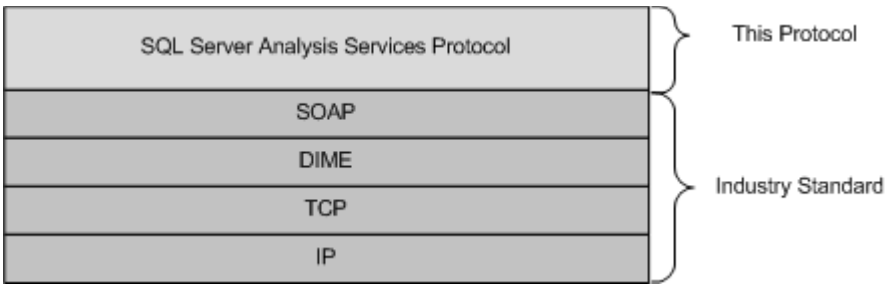

Figure 4: SOAP over DIME and TCP/IP

1.5 Prerequisites/Preconditions

None.

1.6 Applicability Statement

This protocol supports the exchange of messages between a client and an analysis server.

1.7 Versioning and Capability Negotiation

1.7.1 Versioning

This protocol includes capabilities for a client and a server to exchange versioning information by indicating whether XML elements which are sent or received must be understood, or, if not understood, may be ignored. This is specified in section 2.2.4.2.1.3.

1.7.2 Capability Negotiation

This protocol does explicit negotiation between the client and the server for use of binary XML and compression, as specified in section 2.1.1.

1.8 Vendor-Extensible Fields

None.

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1.9 Standards Assignments

None.

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2 Messages

2.1 Transport

The communication between a client and a server MUST be performed either over TCP or HTTP/HTTPS. The message format is a clear text XML [XML10] or binary XML [MS-BINXML] that MAY be compressed. The message MAY also be encrypted by using GSS-API [RFC4178] over TCP or SSL over HTTPS.

In addition, DIME [DIME] is used for messages transmitted using TCP, and all data transferred between client and server is encoded by using UTF-8 [RFC2279]. Section 2.2 specifies the **SOAP message** syntax, regardless of the underlying transport.

Unless otherwise specified, this protocol uses network byte order (big-endian) for all data.

2.1.1 TCP

When using TCP as the transport, the client and server MUST compose messages using DIME [DIME]. A DIME message consists of one or more DIME records. Each DIME message MAY optionally be broken into smaller records.<1>

The following table describes the layout of a DIME record.

Field	Description
VERSION (5 bits)	Specifies the version of the DIME message.
MB (1 bit)	Specifies that this record is the first record of the message.
ME (1 bit)	Specifies that this record is the last record of the message.
CF (1 bit)	Specifies that the contents of the message have been broken into smaller records.
TYPE_T (4 bits)	Specifies whether the DIME record is the first record of a DIME message.
RESERVED (4 bits)	The behavior of this field is undefined (must be set to 0).<2>
OPTIONS_LENGTH (16 bits)	Specifies the length (in bytes) of the OPTIONS field, excluding any necessary **padding** (up to 3 bytes). Padding consists of bytes that are inserted in a data stream to maintain alignment of the protocol requests on natural boundaries.
ID_LENGTH (16 bits)	Specifies the length (in bytes) of the ID field, excluding any necessary padding (up to 3 bytes).
TYPE_LENGTH (16 bits)	Specifies the length (in bytes) of the TYPE field, excluding any necessary padding (up to 3 bytes).
DATA_LENGTH (32 bits)	Specifies the length (in bytes) of the DATA field, excluding any necessary padding (up to 3 bytes).
OPTIONS	Contains any optional information used by a DIME parser
ID	Contains a **uniform resource identifier (URI)** for uniquely identifying a DIME payload with any additional padding. The length of this field is specified by ID_LENGTH. For more information, see [RFC2396].
TYPE	Specifies the encoding for the record based on a type reference URI or a MIME media-type. The reference type is specified by TYPE_T, and the length of this field

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Field	Description
	is specified by TYPE_LENGTH. For more information, see [RFC2396].
DATA	Contains the actual data payload for the record. The format of the data depends on the TYPE specified for the record. The length of this field is specified by DATA_LENGTH.

The VERSION field (5 bits) is used to identify the internal version of DIME parser that is used by both parties. This value MUST be set to 1.

The MB field (1 bit) MUST be set to 1 for every DIME record that is beginning a new DIME message and MUST be set to 0 for all consecutive DIME records.

The ME field (1 bit) MUST be set to 1 for every DIME record that is a last record of every DIME message and MUST be set to 0 for all other DIME records.

The CF field (1 bit) MUST be set to 1 for every chunked DIME record except for the last record. Every chunked sequence is required to be encapsulated entirely within one DIME message and cannot span across multiple DIME messages. Therefore, a first or a middle record MUST NOT have the ME field value set to 1.

The TYPE_T field (4 bits) MUST be set to 1 for every DIME record that is beginning a new DIME message and MUST be set to 0 for all consecutive DIME records.

This protocol allows the optional use of binary XML [MS-BINXML] and compression that the client or server SHOULD apply on the SOAP request or response to reduce network latency. The content types that are supported are described in the following table.<3>

TYPE_LENGTH	TYPE	Description
8	text/xml	Data content is clear text XML.
14	application/sx	Data content is binary XML.
22	application/xml+xpress	Data content is compressed XML.
21	application/sx+xpress	Data content is compressed binary XML.

Because the support for binary XML and compression is optional, the client and server MUST negotiate the content type of the messages for the duration of the connection. This is done using flags in the OPTIONS field. The OPTIONS field consists of 4 bytes of which only the first byte is used. The last three bytes are reserved and MUST be set to zero. The following table describes the bits in the first byte in order from the least significant bit to the most significant bit.

Bit	Description
NEGO	Specifies whether message content type negotiation is complete.
REQ_SX	Specifies whether request from the client should or will be binary XML.
REQ_XPRESS	Specifies whether request from the client should or will be compressed.
RESP_SX	Specifies whether response from the server should or will be binary XML.
RESP_XPRESS	Specifies whether response from the server should or will be compressed.

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Bit	Description
RESERVED	Behavior is undefined (MUST be set to 0).
RESERVED	Behavior is undefined (MUST be set to 0).
RESERVED	Behavior is undefined (MUST be set to 0).

2.1.2 HTTP/HTTPS

When using HTTP/HTTPS as the transport, the client and server MUST set the HTTP headers that are described in the following table.

Field	Description
SOAPAction	Specifies **SOAP action** type "urn:schemas-microsoft-com:xml-analysis:Discover" for Discover requests or "urn:schemas-microsoft-com:xml-analysis:Execute" for Execute requests.
X-Transport-Caps-Negotiation-Flags	Used for content type negotiation. The value is a comma-separated list of five values that correspond to NEGO, REQ_SX, REQ_XPRESS, RESP_SX, and RESP_XPRESS.
Content-Type	Specifies the content type of the payload. The value is one of the following: "text/xml" "application/sx" "application/xml+xpress" "application/sx+xpress"

2.1.3 Encryption

When using TCP as the transport, the client and server SHOULD choose to encrypt or hash messages using [RFC2743]. This is negotiated at the time of authentication after which the client and server can use GSS-API to determine whether encryption or hashing is enabled for the connection.

If encryption or hashing is being used, the message can be composed of one or more encryption data blocks. Each encryption data block has a layout as described in the following table.

Field	Description
DATA_SIZE (16 bit)	Specifies the size of the encrypted data. This field uses little-endian byte order.
TOKEN_SIZE (16 bit)	Specifies the size of the encryption token. This field uses little-endian byte order.
DATA	Encrypted data.
TOKEN	Encryption token.

Note that an encryption data block can span multiple DIME records.

2.1.4 Compression

When using TCP or HTTP/HTTPS as the transport, the client and server SHOULD choose to compress messages. This is first negotiated when the connection is established.

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If compression is being used, the message can be composed of one or more compression data blocks. Each compression data block has a layout as described in the following table.

Field	Description
ORIGINAL_SIZE (32 bit)	Specifies the original size of the data. This field uses little-endian byte order.
COMPRESSED_SIZE (32 bit)	Specifies the size of the data after compression. This field uses little-endian byte order.
DATA	Compressed data.
ORIGINAL_SIZE (32 bit)	Specifies the original size of the data. This field uses little-endian byte order.

Note that a compression data block can span multiple DIME records or encryption data blocks.

2.1.5 Binary XML

When using TCP or HTTP/HTTPS as the transport, the client and server SHOULD choose to encode messages in binary XML [MS-BINXML]. This is first negotiated when the connection is established.

The following table lists the binary XML data types that are supported in this protocol. The client and server MUST NOT use data types outside this list.

XSD Type	Binary XML Type
xsd:boolean	XSD-BOOLEAN
xsd:byte	SQL-TINYINT
xsd:short	SQL-SMALLINT
xsd:int	SQL-INT
xsd:long	SQL-BIGINT
xsd:unsignedByte	XSD-UNSIGNEDBYTE
xsd: unsignedShort	XSD-UNSIGNEDSHORT
xsd: unsignedInt	XSD-UNSIGNEDINT
xsd: unsignedLong	XSD-UNSIGNEDLONG
xsd:double	SQL-REAL
xsd:float	SQL-FLOAT
xsd:decimal	SQL-MONEY
xsd:dateTime	SQL-DATETIME
uuid	SQL-UUID
xsd:string	SQL-NTEXT SQL-NCHAR SQL-NVARCHAR

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XSD Type	Binary XML Type
xsd:base64Binary	SQL-BINARY

2.2 Common Message Syntax

This section contains common definitions used by this protocol. The syntax of the definitions uses **XML Schema** as defined in [XMLSCHEMA1] and [XMLSCHEMA2], and Web Services Description Language (WSDL) as defined in [WSDL].

2.2.1 Namespaces

This specification defines and references various **XML namespaces** using the mechanisms that are specified in [XMLNS3]. Although this specification associates a specific XML namespace prefix for each XML namespace that is used, the choice of any particular XML namespace prefix is implementation-specific and not significant for interoperability.

This section contains common definitions used by this protocol. The syntax of the definitions uses XML Schema as defined in [XMLSCHEMA1] and [XMLSCHEMA2], and Web Services Description Language as defined in [WSDL].

Prefix	Namespace URI	Reference
xsd	http://www.w3.org/2001/XMLSchema	[XMLSCHEMA1] [XMLSCHEMA2]
xsi	http://www.w3.org/2001/XMLSchema-instance	[XMLSCHEMA1] [XMLSCHEMA2]
Sql	urn:schemas-microsoft-com:xml-sql	[MSDN-SQLXML]
xmla	urn:schemas-microsoft-com:xml-analysis	[XMLA]
xmla-ds	urn:schemas-microsoft-com:xml-analysis:mddataset	[XMLA]
xmla-rs	urn:schemas-microsoft-com:xml-analysis:rowset	[XMLA]
xmla-e	urn:schemas-microsoft-com:xml-analysis:empty	[XMLA]
xmla-x	urn:schemas-microsoft-com:xml-analysis:exception	[XMLA]
xmla-m	http://schemas.microsoft.com/analysisservices/2003/xmla-multipleresults	
eng	http://schemas.microsoft.com/analysisservices/2003/engine	
eng2	http://schemas.microsoft.com/analysisservices/2003/engine/2	
eng2_2	http://schemas.microsoft.com/analysisservices/2003/engine/2/2	
eng100	http://schemas.microsoft.com/analysisservices/2008/engine/100	
eng100_100	http://schemas.microsoft.com/analysisservices/2008/engine/100/100	
eng200	http://schemas.microsoft.com/analysisservices/2010/engine/200	

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Prefix	Namespace URI	Reference
eng200_200	http://schemas.microsoft.com/analysisservices/2010/engine/200/200	

2.2.2 Messages

This specification does not define any common XML Schema message definitions.

2.2.3 Elements

This specification does not define any common XML Schema element definitions.

2.2.4 Complex Types

The following table summarizes the set of common XML Schema **complex type** definitions defined by this specification. XML Schema complex type definitions that are specific to a particular operation are described with the operation.

Complex Type	Description
xmla-mddataset	Describes data from a **cube** in a representation consisting of information about the origin of the data, the axes of the cube and the data cells.
xmla-emptyresult	Describes a response to an exception that has occurred at the server during the process of the client request and no further data is available to the client.
xmla-rowset	Describes data from a cube in a tabular representation.
xmla-x:messages	Describes the structure of error and warning messages sent by the server to the client.

2.2.4.1 Return Value Complex Types

2.2.4.1.1 xmla-ds:mddataset Complex Type

An **xmla-ds:mddataset** type is the type that is returned by commands that return an **mddataset** as the return result.

The XML Schema Definition (XSD) complex type definition for the **xmla-ds:mddataset** complex type is as follows.

```
<xsd:complexType name="mddataset" >
  <xsd:sequence>
    <xsd:element ref="xs:Schema" />
    <xsd:element name="OlapInfo" minOccurs="0" type="OlapInfo" />
    <xsd:element name="Axes" minOccurs="0" type="Axes" />
    <xsd:element name="CellData" minOccurs="0" type="CellData" />
    <xsd:element name="Exception" minOccurs="0" type="Exception" />
    <xsd:element name="Messages" minOccurs="0" type="Messages" />
  </xsd:sequence>
</xsd:complexType>
```


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Element	Description
Schema	An XSD schema that describes the rest of the result.
OlapInfo	Describes the structure of the OLAP elements of this result.
Axes	Contains the axes of the result.
CellData	Contains the cell data of the result.
Exception	This optional element is returned if there are exceptions that accompany the result. See section 2.2.4.1.4.
Messages	This optional element is returned if there are messages that accompany the result. See section 2.2.4.1.4.

An example of the **mddataset** return type is shown in section 4.13.

2.2.4.1.1.1 xmla-ds:OlapInfo Complex Type

The **OlapInfo** type contains information describing the multidimensional data that is sent in a specific response. It MUST contain information about the cube or cubes from which these results were extracted, information about all axes involved, and data for the cells returned.

The **xmla-ds:OlapInfo** complex type describes the current schema definition for the result set requested by the client. The **OlapInfo** complex type contains the description of the specific structure of the data that is returned. The result set is described in three major sections:

- **CubeInfo**: Describes the source of the result set.
- **AxesInfo**: Describes the data structure of all axes in the result set, including the **slicer axis**.
- **CellInfo**: Describes the data structure for the cells.

The complex type definition for **OlapInfo** is as follows. The **OlapInfo** element, and all its contained elements, are in the namespace **xmla-ds**.

```
<xsd:complexType name="OlapInfo">
  <xsd:sequence>
    <xsd:element name="CubeInfo" type="CubeInfo" />
    <xsd:element name="AxesInfo" type="AxesInfo" />
    <xsd:element name="CellInfo" type="CellInfo" />
  </xsd:sequence>
</xsd:complexType>
```

Element	Description
CubeInfo	Contains information about the cubes for this result.
AxesInfo	Describes the axes that will be in the **Axes** element of this response.
CellInfo	Describes the cells that will be in the **CellData** element of this response.

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2.2.4.1.1.1.1 xmla-ds:CubeInfo

The **CubeInfo** complex type describes all the sources that are involved in providing the current result set.

```
<xsd:complexType name="CubeInfo">
  <xsd:sequence>
    <xsd:element name="Cube" maxOccurs="unbounded" type="OlapInfoCube" />
  </xsd:sequence>
</xsd:complexType>
```

Element	Description
Cube	A collection of elements of type **OlapInfoCube**, which contains information about the cubes for this result.

2.2.4.1.1.1.1.1 OlapInfoCube

This complex type contains information about the cubes returned in an **mddataset** result.

```
<xsd:complexType name="OlapInfoCube" >
  <xsd:sequence>
    <xsd:element name="CubeName" type="xsd:string" />
    <xsd:element ref="eng:LastDataUpdate" minOccurs="0" />
    <xsd:element ref="eng:LastSchemaUpdate" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>
```

The **Dimension** XSD depends upon element definitions in namespaces other than the default namespace. The following elements are defined in the namespace **eng**:

```
<xsd:element name="LastSchemaUpdate" type="xsd:dateTime" />
<xsd:element name="LastDataUpdate" type="xsd:dateTime" />
```

Element	Description
CubeName	The name of the cube.
LastDataUpdate	Last date and time that the cube data was updated.
LastSchemaupdate	Last date and time that the cube schema was updated.

2.2.4.1.1.1.2 xmla-ds:AxesInfo

The **AxesInfo** complex type describes the axes that will be contained in the **Axes** element of the **mddataset** result.

```
<xsd:complexType name="AxesInfo">
  <xsd:sequence>
    <xsd:element name="AxisInfo" maxOccurs="unbounded" type="AxisInfo">
```


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```
    </xsd:element>
  </xsd:sequence>
</xsd:complexType>
```

Element	Description
AxisInfo	Contains the description of the axes that will appear in the **Axes** element of this **mddataset**.

2.2.4.1.1.1.2.1 xmla-ds:AxisInfo

The **AxisInfo** type describes a single axis that will appear in the **Axes** section of a particular **mddataset** return result.

```
<xsd:complexType name="AxisInfo">
  <xsd:sequence>
    <xsd:element name="HierarchyInfo" type="HierarchyInfo"
                 minOccurs="0" maxOccurs="unbounded" />
  </xsd:sequence>
  <xsd:attribute name="name" type="xsd:string" />
</xsd:complexType>
```

Element	Description
HierarchyInfo	A collection of **HierarchyInfo** elements is returned.

Attribute	Description
Name	The **Name** of the axis that is being described.

2.2.4.1.1.1.2.1.1 xmla-ds:HierarchyInfo

The **HierarchyInfo** type contains information about the hierarchies that appear on an axis of an **mddataset** return result.

```
<xsd:complexType name="HierarchyInfo">
  <xsd:sequence>
    <xsd:any namespace="##targetNamespace" minOccurs="0"
             maxOccurs="unbounded" processContents="skip" />
  </xsd:sequence>
  <xsd:attribute name="name" type="xsd:string" use="required" />
</xsd:complexType>
```

Element	Description
xsd:any	The contents of the **HierarchyInfo** element varies according to the contents of the axis that is being described. There will be one child element within **HierarchyInfo** for each property that is returned on the axis being described. The number of properties returned is variable and depends upon the query that has been executed.

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Attribute	Description
Name	The **Name** of the **hierarchy** that is being described.

2.2.4.1.1.1.3 xmla-ds:CellInfo Complex Type

The **CellInfo** complex type describes the properties of a data cell that will appear in the **CellData** section of a specific **mddataset** return result.

```
<xsd:complexType name="CellInfo">
    <xsd:sequence>
      <xsd:any namespace="##targetNamespace" minOccurs="0"
               maxOccurs="unbounded" processContents="skip" />
    </xsd:sequence>
</xsd:complexType>
```

Element	Description
xsd:any	This complex type is a variable number of elements of type **xsd:any**. There will be one element for each property that is returned in the **CellData** section of this **mddataset** result. The number of elements present depends upon the number of properties that were requested in the query that was executed.

The elements returned also have the following XML attributes, with the following interpretations.

Attribute	Description
Name	The **Name** of the property on the server. This name may not be the same as the element name.
Type	The type that the element in the **CellData** section of the **mddataset** result will have.

2.2.4.1.1.2 xmla-ds:Axes Complex Type

The **xmla-ds:Axes** complex type contains the values and properties of each member in the hierarchy of an axis in the **mddataset** result.

```
<xsd:complexType name="Axes">
  <xsd:sequence>
    <xsd:element name="Axis" type="Axis" maxOccurs="unbounded" />
  </xsd:sequence>
</xsd:complexType>
```

Element	Description
Axis	An **Axis** element contains the values for one axis of an **mddataset** result.

2.2.4.1.1.2.1 Axis

An **Axis** element contains the values for one axis of an **mddataset** result.

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```
<xs:complexType name="Axis">
  <xs:group ref="SetType" minOccurs="0" maxOccurs="unbounded" />
  <xs:attribute name="name" type="xs:string" />
</xs:complexType>
```

The **SetType** model group is described in section 2.2.4.1.1.2.1.1.

Attribute	Description
Name	The name of the axis.

2.2.4.1.1.2.1.1 SetType Model Group

The **SetType** model group describes the possible types of sets that belong to the group. For more information about model groups, see [XMLSCHEMA1].

```
<xsd:group name="SetType">
  <xsd:choice>
    <xsd:element name="Members" type="MembersType" />
    <xsd:element name="Tuples" type="TuplesType" />
    <xsd:element name="CrossProduct" type="SetListType" />
          <xsd:element ref="msxmla:NormTupleSet" />
    <xsd:element name="Union">
      <xsd:complexType>
        <xsd:group ref="SetType" minOccurs="0" maxOccurs="unbounded" />
      </xsd:complexType>
    </xsd:element>
  </xsd:choice>
</xsd:group>
```

Each set type in the group is described independently in its own section:

- MembersType complex type
- TuplesType complex type
- SetListType complex Type
  - msxmla:NormTupleSet complex Type

The **Union** subelement is an invocation of the **SetType** model group defined in section 2.2.4.1.3.1.1.<4>

2.2.4.1.1.2.1.1.1 MembersType Complex Type

The **MembersType** complex type is a collection of **MemberType** elements. For more information, see section 2.2.4.1.1.2.1.1.2.

```
<xsd:complexType name="MembersType">
  <xsd:sequence>
    <xsd:element name="Member" type="MemberType" minOccurs="0" maxOccurs="unbounded" />
  </xsd:sequence>
```


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```
  <xsd:attribute name="Hierarchy" type="xsd:string" use="required" />
</xsd:complexType>
```

Attribute	Description
Hierarchy	The **Hierarchy** of the member.

2.2.4.1.1.2.1.1.2 MemberType Complex Type

The **MemberType** type describes the properties of a simple element in the axis hierarchy. For example, in the Year:Quarter:Month:MonthDay axis **dimension**, the member type describes the Year, the Quarter, the Month, or the MonthDay member of the hierarchy.

The schema definition of the **MemberType** type is defined in the **AxisInfo** specification of this message.

```
<xsd:complexType name="MemberType">
  <xsd:sequence>
    <xsd:any namespace="##targetNamespace" minOccurs="0" maxOccurs="unbounded"
processContents="skip" />
  </xsd:sequence>
  <xsd:attribute name="Hierarchy" type="xsd:string" />
</xsd:complexType>
```

Element	Description
xsd:any	The **memberType** will contain one element for each property of the member that was requested in the query. Therefore, both the content and the count of elements in the **MemberType** are variable.

Attribute	Description
Hierarchy	The **Hierarchy** of the member.

2.2.4.1.1.2.1.1.3 TuplesType Complex Type

The **TuplesType** complex type is a collection of **TupleType** elements. For more information, see section 2.2.4.1.1.2.1.1.4.

```
<xsd:complexType name="TuplesType">
  <xsd:sequence>
    <xsd:element name="Tuple" type="TupleType" minOccurs="0" maxOccurs="unbounded" />
  </xsd:sequence>
</xsd:complexType>
```

2.2.4.1.1.2.1.1.4 TupleType Complex Type

The **TupleType** type describes the set of members that identifies a point in the axis hierarchy. A **TupleType** type is a collection of **MemberType** objects.

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```
<xsd:complexType name="TupleType">
  <xsd:sequence>
    <xsd:element name="Member" type="MemberType" maxOccurs="unbounded" />
  </xsd:sequence>
</xsd:complexType>
```

Element	Description
Member	A collection of **MemberType** elements that form the **tuples** along this axis of the **mddataset** result.

2.2.4.1.1.2.1.1.5 SetListType Complex Type

A **SetListType** type describes a complex type composed of elements that belong to the **SetType** group.

```
<xsd:complexType name="SetListType">
  <xsd:group ref="SetType" minOccurs="0" maxOccurs="unbounded" />
  <xsd:attribute name="Size" type="xsd:unsignedInt" />
</xsd:complexType>
```

2.2.4.1.1.2.1.1.5.1 msxmla:NormTupleSet Complex Type

The **msxmla:NormTupleSet** type provides an optimized format for a **TupleSet**. This format is used when the **DbPropMsmdOptimizeResponse** property is appropriately set (see section 3.1.4.2.2.1.2.1).

```
<xsd:element name="NormTupleSet">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element name="NormTuples" type="msxmla:NormTuplesType" minOccurs="1"
maxOccurs="1"/>
        <xsd:element name="MembersLookup" minOccurs="1" maxOccurs="1">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element ref="mddataset:Members" minOccurs="1" maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
      </xsd:sequence>
    </xsd:complexType>
  </xsd:element>

<xsd:complexType name="NormTuplesType">
    <xsd:sequence>
      <xsd:element name="NormTuple" minOccurs="0" maxOccurs="unbounded">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="MemberRef" minOccurs="0" maxOccurs="unbounded">
              <xsd:complexType>
                <xsd:sequence>
                  <xsd:element name="MemberOrdinal" type="xsd:int" minOccurs="1"
maxOccurs="1"/>
```


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```
                  <xsd:element name="MemberDispInfo" type="xsd:int" minOccurs="0"
maxOccurs="1"/>
                </xsd:sequence>
              </xsd:complexType>
            </xsd:element>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
    </xsd:sequence>
  </xsd:complexType>
```

2.2.4.1.1.3 xmla-ds:CellData Complex Type

The **CellData** type describes a collection of **Cell** elements. The **Cell** element describes the properties of a single cell of data.

The schema definition for the **Cell** element is defined in the **CellInfo** element specification of the current instance of this message.

```
<xsd:complexType name="CellData">
  <xsd:sequence>
    <xsd:element name="Cell" minOccurs="0" maxOccurs="unbounded">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Value" minOccurs="0" maxOccurs="1">
            <xsd:complexType>
              <xsd:sequence>
                <xsd:element name="Error" minOccurs="0" maxOccurs="unbounded">
                  <xsd:element name="ErrorCode" minOccurs="0" maxOccurs="1" />
                  <xsd:element name="Description" minOccurs="0" maxOccurs="1" />
                  <xsd:any namespace="##targetNamespace" minOccurs="0" maxOccurs="unbounded"
/>
                </xsd:element>
              </xsd:sequence>
            </xsd:complexType>
          </xsd:element>
          <xsd:any namespace="##targetNamespace" minOccurs="0" maxOccurs="unbounded"
processContents="skip" />
        </xsd:sequence>
        <xsd:attribute name="CellOrdinal" type="xsd:unsignedInt" use="required" />
      </xsd:complexType>
    </xsd:element>
  </xsd:sequence>
</xsd:complexType>
```

2.2.4.1.1.3.1 CellOrdinal Attribute

The **CellOrdinal** attribute MUST be specified and indicates the ordinal of the cell. **CellOrdinal** is numbered 0 to n-1, for n cells.

The axis reference for a cell can be calculated based on **CellOrdinal**. Conceptually, cells are numbered in a dataset as if the dataset were a p-dimensional array, where p is the number of axes. Cells are addressed in row-major order. The following illustration shows the formula for calculating the ordinal number of a cell.

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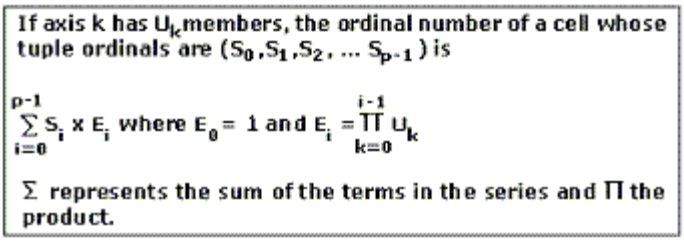

Figure 5: Calculating ordinal number of a cell

The preceding formula will be applied to the result set shown in the following table. The query asked for four **measures** on columns and a crossjoin of two states with four quarters on rows. In the following dataset result, the **CellOrdinal** property for the part of the dataset result shown in the box is the set {9, 10, 11, 13, 14, 15, 17, 18, 19}. This is because the cells are numbered in row-major order, starting with a **CellOrdinal** of zero for the upper left cell.

Next, the preceding formula is applied to the cell that is {CA, Q3, Store Cost}. Axis k=0 has Uk=4 members and axis k=1 has Uk=8 tuples. P is the total number of axes in the query, here equal to 2. So, the initial summation is i=0 to 1. For i=0, the tuple ordinal on axis 0 of {Store Cost} is 1. For i = 1, the tuple ordinal of {CA, Q3} is 2.

For i=0, Ei = 1, so for i = 0 the sum is 1 * 1 = 1 and for i=1, the sum is 2 (tuple ordinal) * 4 (the value of Ei, computed as 1 * 4), or 8, and so the sum is equal to 1 + 8 = 9, the cell ordinal for that cell.

		Unit Sales	Store Cost	Store Sales	Sales Count
CA	Q1	16,890.00	14,431.09	$36,175.20	5498
	Q2	18,052.00	15,332.02	$38,396.75	5915
	Q3	18,370.00	15,672.83	$39,394.05	6014
	Q4	21,436.00	18,094.50	$45,201.84	7015
OR	Q1	19,287.00	16,081.07	$40,170.29	6184
	Q2	15,079.00	12,678.96	$31,772.88	4799
	Q3	16,940.00	14,273.78	$35,880.46	5432
	Q4	16,353.00	13,738.68	$34,453.44	5196

2.2.4.1.1.3.2 Cell Value Errors

Whenever an error occurs trying to return the value of a cell, the server sends an **Error** element, inside the **Value** element of the cell, describing the error. For more information about the corresponding grammar, see section 2.2.4.1.1.3.

The following sample shows a security error when the user tried to get results from a cell to which he or she has restricted access.

```
<CellData>
    …
```


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```
    <Cell CellOrdinal="10">
      <Value>
        <Error>
          <ErrorCode>2148497527</ErrorCode>
          <Description>Security Error.</Description>
        </Error>
      </Value>
    </Cell>
    …
</CellData>
</root>
```

2.2.4.1.2 xmla-e:emptyresult Complex Type

The **xmla-e:emptyresult** complex type is returned if the return result is empty.

The XSD for the **xmla-e:emptyresult** complex type is as follows.

```
<xsd:complexType name="emptyresult" >
  <xsd:sequence>
    <xsd:element name="Exception" minOccurs="0" type="Exception" />
    <xsd:element name="Messages" minOccurs="0" type="Messages" />
  </xsd:sequence>
</xsd:complexType>
```

Element	Description
Exception	This optional element is returned if there are exceptions that accompany the empty result. See section 2.2.4.1.5.1.
Messages	This optional element is returned if there are messages that accompany the empty result. See section 2.2.4.1.5.2.

2.2.4.1.3 xmla-rs:rowset Complex Type

The **xmla-rs:rowset** complex type is returned by commands whose return result is a rowset. The XSD for the **xmla-rs:rowset** complex type is as follows.

```
<xsd:complexType name="rowset" >
  <xsd:sequence>
    <xsd:element ref="xs:Schema" minOccurs="0" />
    <xsd:element name="row" minOccurs="0" maxOccurs="unbounded" type="row" />
    <xsd:element name="Exception" minOccurs="0" type="Exception" />
    <xsd:element name="Messages" minOccurs="0" type="Messages" />
  </xsd:sequence>
</xsd:complexType>
```

Element	Description
Schema	An optional XSD schema that describes the format of the row. Whether it is returned depends on the value of the **Content** server property. See section 4.4.2.
row	Contains the rows with the results.

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Element	Description
Exception	This optional element is returned if there are exceptions that accompany the empty result. See section 2.2.4.1.3.
Messages	This optional element is returned if there are messages that accompany the empty result. See section 2.2.4.1.3.

2.2.4.1.3.1 xmla-rs:row Complex Type

Each row element represents a row of tabular data.

```
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:any namespace="##any" minOccurs="0" maxOccurs ="unbounded" />
  </xsd:sequence>
</xsd:complexType>
```

Element	Description
xsd:any	The content of each row is variable. Each element within each row can be thought of as a column in a tabular return result. There will be one element in each row to represent one column in a tabular presentation. The **Schema** element within the **rs:root** element can be used to obtain a dictionary of elements that will appear within each row, and the types of the elements. Additional rows may be nested within a row result, to a single level. See section 2.2.4.1.3.1.1 for information on nested rows.

2.2.4.1.3.1.1 Nested Rowsets

A special case of the row element is where it is part of a nested rowset, and therefore contains the contents of an additional row. This can be thought of as "a row within a row." However, the nested row does not contain a new Row element. The limit of nesting is to one level. That is, nested rows cannot contain additional nested rows.

The nested rowset does not have a specific XSD. That is because the XSD definition for the **xmla-rs:row** element is **xsd:any**, and therefore, the concept of nested rows is included within the XSD definition of **xmla-rs:row**. However, the restriction is imposed that nesting is limited to one level.

This concept is best illustrated by a fragment of an example. The following code shows the return result of one row from the DISCOVER_SCHEMA_ROWSETS **Discover**.

```
<row>
  <SchemaName>DBSCHEMA_CATALOGS</SchemaName>
  <SchemaGuid>C8B52211-5CF3-11CE-ADE5-00AA0044773D</SchemaGuid>
  <Restrictions>
    <Name>CATALOG_NAME</Name>
    <Type>xsd:string</Type>
  </Restrictions>
  <RestrictionsMask>1</RestrictionsMask>
</row>
```

Note that the **Restrictions** column of the above row contains a nested row within it. The nested row itself contains two elements, **Name** and **Type**. If a return result of **xmla-rs:root** contains a rowset

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with nested rows, this is reflected in the **Schema** element of the particular **xmla-rs:rowset** return result.

2.2.4.1.4 xmla-m:results Complex Type

The **xmla-m:multipleresults** complex type is returned only as a response to a **Batch** command. The **results** element contains one or more **root** elements, one that corresponds to each command that was executed within the **Batch** command. See section 3.1.4.3.2.2.1 for a description of the **root** element and of the different types for the **root** element.

```
<xsd:complexType name="results" >
  <xsd:sequence>
    <xsd:element ref="xmla-e:root" minOccurs="0" maxOccurs="unbounded" />
  </xsd:sequence>
</xsd:complexType>
```

Element	Description
Root	One or more **xmla-e:root** elements are contained by the **results** element. One **xmla-e:root** element is returned for each command result in the **Batch** command stream.

2.2.4.1.5 Error and Warning Complex Types

2.2.4.1.5.1 xmla-x:Exception

The **xmla-x:Exception** complex type is used when the server encounters an error during execution. This element MUST be empty. The XSD for the **xmla-x:Exception** type is as follows.

```
<xsd:complexType name="Exception">
  <xsd:sequence>
    <!--The Exception type MUST be empty-->
  </xsd:sequence>
</xsd:complexType>
```

2.2.4.1.5.2 xmla-x:Messages

Any of the **root** elements may contain a **messages** element.

```
<xsd:complexType name="Messages">
  <xsd:choice minOccurs="1" maxOccurs="2">
    <xsd:element name="Warning" type="WarningType" />
    <xsd:element name="Error" type="WarningType" />
  </xsd:choice>
</xsd:complexType>
```

Element	Description
Warning	Information about the **Warning**.
Error	Information about the **Error**.

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2.2.4.1.5.2.1 WarningType

The XSD for the **WarningType** complex type is as follows.

```
<xsd:complexType name="WarningType">
  <xsd:all>
    <xsd:element name="Location" type="MessageLocation" minOccurs="0" />
  </xsd:all>
  <xsd:attribute name="WarningCode" type="xsd:int" />
  <xsd:attribute name="Description" type="xsd:string" />
  <xsd:attribute name="Source" type="xsd:string" />
  <xsd:attribute name="HelpFile" type="xsd:string" />
</xsd:complexType>
```

Element	Description
Location	Location information for the **Warning** or **Error**.

Attribute	Description
WarningCode	The warning code for the **Warning**.
Description	A description of the **Warning**.
Source	The source of the **Warning**, such as a product name.
HelpFile	A help file that contains information about the **Warning**.

2.2.4.1.5.2.1.1 MessageLocation

The **MessageLocation** type is used to identify the line and column location of a warning or an error within a **Statement** element.

The XSD for the **MessageLocation** complex type is as follows.

```
<xsd:complexType name="MessageLocation">
  <xsd:all>
    <xsd:element name="Start" >
      <xsd:complexType>
        <xsd:all>
          <xsd:element name="Line" type="xsd:int" />
          <xsd:element name="Column" type="xsd:int" />
        </xsd:all>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="End" >
      <xsd:complexType>
        <xsd:all>
          <xsd:element name="Line" type="xsd:int" />
          <xsd:element name="Column" type="xsd:int" />
        </xsd:all>
      </xsd:complexType>
```


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```
      </xsd:element>
      <xsd:element name ="LineOffset" type="xsd:int" minOccurs="0" maxOccurs="1"/>
      <xsd:element name ="TextLength" type="xsd:int" minOccurs="0" maxOccurs="1"/>
      <xsd:element name ="SourceObject" type="eng200:WarningLocationObject" minOccurs="0"
maxOccurs="1"/>
      <xsd:element name ="DependsOnObject" type="eng200:WarningLocationObject" minOccurs="0"
maxOccurs="1"/>
      <xsd:element name ="RowNumber" type="eng200:RowNumber" minOccurs="0" maxOccurs="1"/>


    </xsd:all>
  </xsd:complexType>
```

The **MessageLocation** XSD depends on the following definitions in a namespace other than the default namespace.

The following elements are defined in the **eng200** namespace.

```
<xsd:element name="WarningColumn">
  <xsd:complexType>
    <xsd:all>
      <xsd:element name="Dimension" type="xsd:string"/>
      <xsd:element name="Attribute" type="xsd:string"/>
    </xsd:all>
  </xsd:complexType>
</xsd:element>

<xsd:element name="WarningMeasure">
  <xsd:complexType>
    <xsd:all>
      <xsd:element name="Cube" type="xsd:string"/>
      <xsd:element name="MeasureGroup" type="xsd:string"/>
      <xsd:element name="MemberName" type="xsd:string"/>
    </xsd:all>
  </xsd:complexType>
</xsd:element>

<xsd:complexType name="WarningLocationObject">
  <xsd:choice>
    <xsd:element ref="eng200:WarningColumn"/>
    <xsd:element ref="eng200:WarningMeasure"/>
  </xsd:choice>
</xsd:complexType>
```

Element	Description
Start	The **Start** element contains a **Line** element (integer) and a **Column** element (integer) that indicates the starting point of the **Warning** or **Error**.
End	The **End** element contains a **Line** element (integer) and a **Column** element (integer) that indicates the ending point of the **Warning** or **Error**.
LineOffset	The number of characters from the beginning of the stream to the beginning of the **Start** line.
TextLength	Number of characters in the message location, between **Start** and **End**.

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Element	Description
SourceObject	The **SourceObject** is the object that has the error. The **WarningLocation** object represents either a column or a measure.
DependsOnObject	The **DependsOnObject** is the object on which the **SourceObject** depends in the case of a dependency error. The **WarningLocation** object represents either a column or a measure.
Dimension	Identifies the **Dimension** of the **SourceObject** or **DependsOnObject**.
Attribute	Identifies the **Attribute** of the **SourceObject** or **DependsOnObject**.
Cube	Identifies the **Cube** of the **SourceObject** or **DependsOnObject**.
MeasureGroup	Identifies the **MeasureGroup** of the **SourceObject** or **DependsOnObject**.
MeasureName	Identifies the **MeasureName** of the **SourceObject** or **DependsOnObject**.
RowNumber	For calculation errors, the **RowNumber** in which the error occurred is provided.

2.2.4.2 Object Definition Complex Types

An XML payload is sent to the server within the **Create** command (see section 3.1.4.3.2.1.1.3) or the **Alter** command (see section 3.1.4.3.2.1.1.4) to describe the objects on a server to be created or altered. Each server object is represented by a complex type in the commands that are sent to the server. The entire hierarchy of the complex types that comprise the available hierarchy of objects is described in this section.

All types defined in this section are in the namespace **eng:** unless otherwise specified.

2.2.4.2.1 Rules that Apply to All Complex Types

There are some rules that apply to all of the complex types enumerated in this section. This subsection enumerates rules that apply across all of the complex types.

2.2.4.2.1.1 Names, IDs, and References

Every structural object contains the following properties, as described in the subsequent sections under each complex type description.

- A *Name*. Names of sibling objects MUST be unique, within some scope. The scope is generally within the parent collection. Any exceptions to this are stated in the following, under the description for the complex type. Name is what is exposed to client programmers in the schema rowsets.
- An *ID*. The same restrictions on uniqueness apply to IDs. In addition, they are not changeable. They are assigned upon creation, either by the user/tool, or automatically by the engine (if not specified) to the initial name of the object. ID is considered a management property. ID is not exposed in the schema rowset for client programming.
- A *Description*.

SQL Server Analysis Services has additional rules that apply to names and IDs.<5>

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2.2.4.2.1.2 String Elements

In addition to restrictions on **Name** and **ID** string elements, SQL Server Analysis Services imposes additional restrictions upon handling of all string elements.<6>

2.2.4.2.1.3 Versioning

The protocol defined in this specification uses the http://schemas.microsoft.com/analysisservices/2003/engine XML namespace. Forward/backward compatibility is an important issue with the protocol that is described in this document because new elements MAY be added in any release. When new elements are added in a release, with regard to all previously released releases, the new element can be considered as one of the following:

- Ignorable
- Not ignorable

Ignorable elements are those that MAY be safely ignored by any release for which the element is deemed to be harmless if it is ignored. That release will have been released before the element in question existed. Therefore, that element will be an unexpected element to the component that receives a command that contains that element. However, the receiving component MAY safely ignore the presence of this unknown element and MAY process the rest of the elements as if the unknown element were not present if the new element is not breaking.

If an element is deemed to be not ignorable to the release, that release MUST NOT successfully process a command that contains the unknown element. The release MUST issue an error message because it has encountered an unknown XML element that it cannot process and that it cannot safely ignore.

This protocol does not include a mechanism to negotiate element version compatibility between a client and a server. The only mechanism that is supplied transmits information that indicates when elements MAY be ignored and when elements MAY NOT be ignored.

Information about whether an element is ignorable is obtained by using the namespace. The target namespace for this protocol consists of the following format:

http://schemas.microsoft.com/analysisservices/YYYY/engine[/M[/N

The versioning that is described in this section refers only to this namespace and its derivatives. Other namespaces that are referenced in this protocol definition are not versioned in the way that is described in this section.

The http://schemas.microsoft.com/analysisservices namespace is referred to as "root." The following rules apply to this root namespace:

- "YYYY" is the year of a major protocol release. This protocol was initially released in 2003, and since that time, the only subsequent major release was in 2008. Therefore, YYYY will equal "2003" or "2008" at this time. Subsequent protocol releases will have additional, future YYYY tagging. The YYYY element of the namespace MUST NOT change in minor releases, such as service packs and hotfixes. However, this component is not critical to compatibility issues, and other users of this protocol may use any desired designation for YYYY.
- "M" is the sequence number of the XML element. For every protocol release that introduces new XML elements or new enumeration values for existing elements, a new sequence number for M MUST be used. M MUST always be incremented; that is, every new M must be greater than any previously used M. The very first version of this protocol did not use any value for M, and therefore it is treated as if it were 0.

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- "N" is the smallest and earliest protocol version number, so that a client or a server that was originally released with this sequence number or higher can safely ignore this XML element. If N is unspecified, it is assumed to be 0. This means that the XML element is nonbreaking to the initial protocol release and to all subsequent protocol releases. If N is specified, a component MUST compare N to M for its own release. If N is greater than M for its own release, this element MUST NOT be ignored, and an error MUST be issued.

The namespace for an element is specified by using the "xmlns" attribute within the instance XML. For enumeration values, an XML attribute called "valuens" is used. Clients and servers MUST look for those attributes in order to evaluate whether an element may be ignored.

For example, if a particular component that used this protocol were released and built to protocol version 2, the namespace that it would recognize would be root/2003/engine/2. Therefore, for itself, M = 2. If it receives an XML element with an xmlns attribute or a valuens atttribute that has an N component, and if that N component is greater than 2, then this component must issue an error. If it receives an XML element with an N component that is less than or equal to 2, or if the N component is absent (which means implicitly that N=0), then it may safely process the request.

This protocol also uses elements that do not have the following namespace base format:

http://schemas.microsoft.com/analysisservices/YYYY/engine[/M[/N

For these elements, this protocol does not provide any versioning capability and does not provide a mechanism for determining whether an element is ignorable.

2.2.4.2.2 Complex Type Definitions for Server Object Hierarchy

Each type described in this section will have an XSD fragment that describes the required XML syntax for the type, and a table of additional information about the elements that comprise the type. In addition to a brief description of each element of each type, the table has columns for "Read-Only" and "Default." The Read-Only column indicates whether this property is returned by the server in DISCOVER_XML_METADATA but may not be set by the contents of a Create or Alter command executed on the server. The Default column indicates what value the Server will instantiate for the object if a **Create** or **Alter** command omits that particular element from the definition that is being sent to the server.

Unless noted otherwise, all types described in this section are in the namespace http://schemas.microsoft.com/analysisservices/2003/engine.

2.2.4.2.2.1 MajorObject

Many types in the type hierarchy inherit from the base abstract type **MajorObject**. Any type that inherits from the abstract type **MajorObject** is one that can be created or altered directly in a **Create** or **Alter** command. In contrast, minor objects cannot be directly created or altered, and can be created or altered only as part of the create/alter of the **MajorObject** in which they are included.

The XSD for **MajorObject** indicates only that it is a base, abstract class. All of the elements common to all major objects are enumerated within the XSD for each derived class, in its own XSD section. However, the table in this section presents the elements common to all of the derived classes, and the descriptions of the elements are omitted from the tabular sections for the derived classes.

```
<xsd:complexType name="MajorObject" abstract="true" />
```


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The following elements are common to all classes derived from **MajorObject**.

Element	Read-Only	Default	Description
Name		[Required]	The object name.
ID		Defaults to Name.	The object ID string.
CreatedTimestamp	Yes		A timestamp for the time object was created.
LastSchemaUpdate	Yes		A timestamp for the time that the schema was last updated.
Description		Empty	The object description.
Annotations	Yes	Empty	A collection of Annotation objects.

2.2.4.2.2.2 Server

This complex type represents a **Server** instance.

```
<xsd:complexType name="Server">
  <xsd:complexContent>
    <xsd:extension base="MajorObject">
      <xsd:all>
        <!--These elements are common to each MajorObject-->
        <xsd:element name="Name"  type="xsd:string" />
        <xsd:element name="ID"  type="xsd:string" minOccurs="0" />
        <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="Description" type="xsd:string" minOccurs="0" />
        <xsd:element name="Annotations"  minOccurs="0" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                           maxOccurs="unbounded" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <!--Extended elements for Server object-->
        <xsd:element name="ProductName" type="xsd:string" minOccurs="0" />
        <xsd:element name="Edition" minOccurs="0" >
          <xsd:simpleType>
            <xsd:restriction base="xsd:string">
              <xsd:enumeration value="Standard"/>
              <xsd:enumeration value="Standard64"/>
              <xsd:enumeration value="Enterprise"/>
              <xsd:enumeration value="Enterprise64"/>
              <xsd:enumeration value="Developer"/>
              <xsd:enumeration value="Developer64"/>
              <xsd:enumeration value="Evaluation"/>
              <xsd:enumeration value="Evaluation64"/>
              <xsd:enumeration value="Local"/>
              <xsd:enumeration value="Local64"/>
            </xsd:restriction>
```


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```
        </xsd:simpleType>
      </xsd:element>
      <xsd:element name="EditionID" type="xsd:long" minOccurs="0" />
      <xsd:element name="Version" type="xsd:string" minOccurs="0" />
      <xsd:element name="ProductLevel" type="xsd:string" minOccurs="0" />
      <xsd:element name="Databases " minOccurs="0" >
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="Database" type="Database" minOccurs="0"
                         maxOccurs="unbounded" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:element name="Assemblies" minOccurs="0" >
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="Assembly" type="Assembly" minOccurs="0"
                         maxOccurs="unbounded" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:element name="Traces"  minOccurs="0" >
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="Trace" type="Trace" minOccurs="0"
                         maxOccurs="unbounded" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:element name="Roles"  minOccurs="0">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="Role" type="Role" minOccurs="0"
                         maxOccurs="unbounded" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:element name="ServerProperties"  minOccurs="0" >
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="ServerProperty" type="ServerProperty"
                         minOccurs="0" maxOccurs="unbounded" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
    </xsd:all>
  </xsd:extension >
 </xsd:complexContent>
</xsd:complexType>
```

Also included in the **Server** object are all of the elements from MajorObject. For more information, see section 2.2.4.2.2.1

Element	Read-Only	Default	Description
ProductName	Yes		The product name.

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Element	Read-Only	Default	Description
Edition	Yes		The product edition. The text values of the enumeration describe the edition to which each enumeration value sets this element, respectively.
EditionID	Yes		The ID for the edition.<7>
Version	Yes		The product version.<8>
ProductLevel	Yes		The product level.
Databases		Empty	A collection of **Database** objects.
Assemblies		Empty	A collection of **Assembly** objects.
Traces		Empty	A collection of **Trace** objects.
Roles		Empty	A collection of **Role** objects.
ServerProperties		Empty	A collection of **ServerProperty** objects.

2.2.4.2.2.2.1 ServerProperty

A **ServerProperty** is a name/value pair that contains values for setting server properties.

```
<xsd:complexType name="ServerProperty" >
  <xsd:all>
    <xsd:element name="Name" type="xsd:string" />
    <xsd:element name="Value" type="xsd:string" />
    <xsd:element name="RequiresRestart" type="xsd:boolean" minOccurs="0" />
    <xsd:element name="PendingValue" type="xsd:anySimpleType" minOccurs="0" />
    <xsd:element name="DefaultValue" type="xsd:anySimpleType" minOccurs="0" />
    <xsd:element name="DisplayFlag" type="xsd:boolean" minOccurs="0"/>
    <xsd:element name="Type" minOccurs="0" type="xsd:string" />
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
Name		[Required]	The name of the property.
Value		[Required]	The value of the property.
RequiresRestart	Yes		When true, the server MUST be restarted before the new value takes effect; otherwise, false.
PendingValue	Yes		A value that will be instantiated at next server restart.
DefaultValue	Yes		The default value when the server is installed.
DisplayFlag	Yes		When true, this is a hint provided by the server to the client that indicates that it is recommended to display this property in the user interface; otherwise, false.

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Element	Read-Only	Default	Description
Type	Yes		The type of the server property. This is expressed as an XSD type.

Server properties supported by SQL Server Analysis Services can be found here: <9>

2.2.4.2.2.3 Assembly

The **Assembly** complex type represents a function library that can be invoked from within a **multidimensional expression (MDX)**, **Database Mining Extensions (DMX)**, or SQL query.

Assembly is an abstract type, and will require an instance to identify the type of **Assembly** being sent, ComAssembly or ClrAssembly.

```
<xsd:complexType name="Assembly" abstract="true" >
  <xsd:complexContent>
    <xsd:extension base="MajorObject">
      <xsd:all>
        <!--These elements are common to each MajorObject-->
        <xsd:element name="Name"  type="xsd:string" />
        <xsd:element name="ID"  type="xsd:string" minOccurs="0" />
        <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="Description" type="xsd:string" minOccurs="0" />
        <xsd:element name="Annotation"  minOccurs="0" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                           maxOccurs="unbounded" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <!--Extended elements for Assembly object-->
        <xsd:element name="ImpersonationInfo" type="ImpersonationInfo"
                     minOccurs="0" />
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
```

Also included in the **Assembly** object are all of the elements from **MajorObject**. For more information, see section 2.2.4.2.2.1.

Element	Read-Only	Default	Description
ImpersonationInfo		Empty	User credentials under which to invoke the assembly.

2.2.4.2.2.3.1 ComAssembly

The **ComAssembly** complex type represents a **Component Object Model (COM)** library.

ComAssembly is derived from Assembly.

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COM assemblies treat ImpersonationMode=Default as ImpersonateCurrentUser. COM assemblies do not support impersonation modes other than ImpersonateCurrentUser.

```
<xsd:complexType name="ComAssembly">
  <xsd:complexContent>
    <xsd:extension base="Assembly">
      <xsd:all>
        <xsd:element name="Source" type="xsd:string" minOccurs="0"/>
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
```

Also included in **ComAssembly** are all of the elements from **Assembly**. For more information, see section 2.2.4.2.2.3.

Element	Read-Only	Default	Description
Source		Empty	This element MUST contain either a file name or a PROG ID (program ID).

2.2.4.2.2.3.2 ClrAssembly

The **ClrAssembly** complex type represents a CLR assembly. CLR assemblies treat ImpersonationMode=Default as ImpersonateServiceAccount for the Safe permission set and ImpersonateCurrentUser for the ExternalAccess and Unrestricted permission sets. CLR assemblies support all impersonation modes.

ClrAssembly is derived from Assembly.

```
<xsd:complexType name="ClrAssembly">
  <xsd:complexContent>
    <xsd:extension base="Assembly" >
      <xsd:sequence>
        <xsd:element name="Files" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="File"  type="ClrAssemblyFile" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="PermissionSet" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string">
              <xsd:enumeration value="Safe"/>
              <xsd:enumeration value="ExternalAccess"/>
              <xsd:enumeration value="Unrestricted"/>
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
      </xsd:sequence>
    </xsd:extension>
  </xsd:complexContent>
```


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```
</xsd:complexType>
```

Also included in **ClrAssembly** are all the elements from **Assembly**. For more information, see section 2.2.4.2.2.3.

Element	Read-Only	Default	Description
File		[Required]	The contents of the **Assembly** file.
PermissionSet		"Safe"	The access permission level that the server will apply to this **Assembly** object. The enumeration values are: **Safe** - Only internal computation and local data access is allowed. **Safe** is the most restrictive permission set. Code executed by an assembly with **Safe** permissions cannot access external system resources such as files, the network, environment variables, or the registry. **ExternalAccess** - **Safe**, with the additional ability to access external system resources such as files, networks, environmental variables, and the registry. **Unrestricted** - **Safe**, with the additional ability to access external system resources such as files, networks, environmental variables, and the registry.

2.2.4.2.2.3.2.1 ClrAssemblyFile

ClrAssemblyFile specifies the actual contents of a CLR assembly file.

```
<xsd:complexType name="ClrAssemblyFile">
  <xsd:all>
    <xsd:element name="Name" type="xsd:string"/>
    <xsd:element name="Type" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Main" />
          <xsd:enumeration value="Dependent" />
          <xsd:enumeration value="Debug" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Data" type="DataBlock"  minOccurs="0" />
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
Name		[Required]	The name of the file.
Type		[Required]	The type of the file. The enumeration types are as follows: ▪ Main – This is the main assembly file.

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Element	Read-Only	Default	Description
			▪ Dependent – This is a dependent assembly file. ▪ Debug – This is a debug assembly file version.
Data		Empty	A collection of DataBlock elements that constitute the file contents.

2.2.4.2.2.3.2.2 DataBlock

DataBlock specifies the binary contents of each block of Assembly code.

```
<xsd:complexType name="DataBlock">
  <xsd:sequence>
    <xsd:element name="Block"  type="xsd:base64Binary"
                 minOccurs="0" maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>
```

Element	Read-Only	Default	Description
Block		Empty	A block of data representing a portion of the file contents.

2.2.4.2.2.4 Trace

The **Trace** complex type represents a trace object. A trace consists of a set of server events that a client can subscribe to by using the Subscribe command.

```
<xsd:complexType name="Trace">
  <xsd:complexContent>
    <xsd:extension base="MajorObject">
      <xsd:all>
        <!--These elements are common to each MajorObject-->
        <xsd:element name="Name"  type="xsd:string" />
        <xsd:element name="ID"  type="xsd:string" minOccurs="0" />
        <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="Description" type="xsd:string" minOccurs="0" />
        <xsd:element name="Annotation"  minOccurs="0" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                           maxOccurs="unbounded" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <!--Extended elements for Trace object-->
        <xsd:element name="LogFileName" type="xsd:string" minOccurs="0"/>
        <xsd:element name="LogFileAppend" type="xsd:boolean" minOccurs="0"/>
        <xsd:element name="LogFileSize" type="xsd:long"  minOccurs="0" />
        <xsd:element name="Audit" type="xsd:boolean" minOccurs="0"/>
        <xsd:element name="LogFileRollover" type="xsd:boolean" minOccurs="0"/>
```


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```
        <xsd:element name="AutoRestart" type="xsd:boolean" minOccurs="0"/>
        <xsd:element name="StopTime" type="xsd:dateTime" minOccurs="0"/>
        <xsd:element name="Filter" type="TraceFilter"  minOccurs="0" />
        <xsd:element name="Events" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Event"  type="Event" minOccurs="0"
                           maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
```

Element	Read-Only	Default	Description
LogFileName		Empty	The file name for the log file.
LogFileAppend		True	When true, indicates to append to the existing log file; otherwise, false.
LogFileSize		0	An integer that sets maximum file size in MB. If zero or negative, it means no maximum size.<10>
Audit		False	When true, indicates that a **Trace** element is not allowed to drop events, even if this results in degraded performance on the server; otherwise, false.
LogFileRollover		False	A Boolean that indicates what to do if **LogFileSize** is exceeded. If true, a new file is started; if false, logging stops.
AutoRestart		False	When true, performs a **Trace** auto restart with service stop/start; otherwise, false.
StopTime		No stop time	The time that the server will stop logging to the **Trace** log file.
Filter		Empty	A complex XML type that specifies a logical condition that will determine whether or not the event is included in **Trace** output.<11>
Events		[Required]	A collection of Event objects.

2.2.4.2.2.4.1 Event

```
<xsd:complexType name="Event">
  <xsd:all>
    <xsd:element name="EventID" type="xsd:string"/>
    <xsd:element name="Columns" type="EventColumnID"/>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description

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Element	Read-Only	Default	Description
EventID		[Required]	The ID string for the **Event**.
Columns		[Required]	A collection of objects of type EventColumn.

2.2.4.2.2.4.1.1 EventColumn

Describes the columns for this Event.

```
<xsd:complexType name="EventColumnID">
  <xsd:sequence>
      <xsd:element name="ColumnID" type="xsd:string" maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>
```

Element	Read-Only	Default	Description
ColumnID		[Required]	The ID of the column used for this event.

2.2.4.2.2.4.2 TraceFilter

The **Filter** for a trace is expressed as an XML structure. This structure amounts to a logical expression.

```
<xsd:complexType name="TraceFilter" >
  <xsd:choice minOccurs="1" maxOccurs="1">
    <xsd:element name="Not" type="not_type" minOccurs="0" />
    <xsd:element name="Or" type="and_or_type" minOccurs="0" />
    <xsd:element name="And" type="and_or_type" minOccurs="0" />
    <xsd:element name="Equal" type="bool_binop" minOccurs="0" />
    <xsd:element name="NotEqual" type="bool_binop"  minOccurs="0" />
    <xsd:element name="Less" type="bool_binop"  minOccurs="0" />
    <xsd:element name="LessOrEqual" type="bool_binop"  minOccurs="0" />
    <xsd:element name="Greater" type="bool_binop"  minOccurs="0" />
    <xsd:element name="GreaterOrEqual" type="bool_binop"  minOccurs="0" />
    <xsd:element name="Like" type="bool_binop"  minOccurs="0" />
    <xsd:element name="NotLike" type="bool_binop"  minOccurs="0" />
  </xsd:choice>
</xsd:complexType>
<xsd:complexType name="not_type" >
  <xsd:choice maxOccurs="1" minOccurs="1">
    <xsd:element name="Not" type="not_type" minOccurs="0" />
    <xsd:element name="Or" type="and_or_type" minOccurs="0" />
    <xsd:element name="And" type="and_or_type" minOccurs="0" />
    <xsd:element name="Equal" type="bool_binop" minOccurs="0" />
    <xsd:element name="NotEqual" type="bool_binop"  minOccurs="0" />
    <xsd:element name="Less" type="bool_binop"  minOccurs="0" />
    <xsd:element name="LessOrEqual" type="bool_binop"  minOccurs="0" />
    <xsd:element name="Greater" type="bool_binop"  minOccurs="0" />
    <xsd:element name="GreaterOrEqual" type="bool_binop"  minOccurs="0" />
    <xsd:element name="Like" type="bool_binop"  minOccurs="0" />
    <xsd:element name="NotLike" type="bool_binop"  minOccurs="0" />
  </xsd:choice>
```


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```
</xsd:complexType>
<xsd:complexType name="and_or_type" >
  <xsd:choice maxOccurs="2" minOccurs="2">
    <xsd:element name="Not" type="not_type"  minOccurs="0"/>
    <xsd:element name="Or" type="and_or_type" minOccurs="0" />
    <xsd:element name="And" type="and_or_type" minOccurs="0" />
    <xsd:element name="Equal" type="bool_binop" minOccurs="0" />
    <xsd:element name="NotEqual" type="bool_binop"  minOccurs="0" />
    <xsd:element name="Less" type="bool_binop"  minOccurs="0" />
    <xsd:element name="LessOrEqual" type="bool_binop"  minOccurs="0" />
    <xsd:element name="Greater" type="bool_binop"  minOccurs="0" />
    <xsd:element name="GreaterOrEqual" type="bool_binop"  minOccurs="0" />
    <xsd:element name="Like" type="bool_binop"  minOccurs="0" />
    <xsd:element name="NotLike" type="bool_binop"  minOccurs="0" />
  </xsd:choice>
</xsd:complexType>
<xsd:complexType name="bool_binop" >
  <xsd:all>
    <xsd:element name="ColumnID" type="xsd:string"/>
    <xsd:element name="Value" type="xsd:string" />
  </xsd:all>
</xsd:complexType>
```

2.2.4.2.2.5 Database

The **Database** complex type represents a database.

```
<xsd:complexType name="Database">
  <xsd:complexContent>
    <xsd:extension base="MajorObject">
      <xsd:all>
        <!--These elements are common to each MajorObject-->
        <xsd:element name="Name"  type="xsd:string" />
        <xsd:element name="ID"  type="xsd:string" minOccurs="0" />
        <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="Description" type="xsd:string" minOccurs="0" />
        <xsd:element name="Annotation"  minOccurs="0" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                           maxOccurs="unbounded" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <!--Extended elements for Database object-->
        <xsd:element name="LastUpdate" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="State" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="Processed" />
              <xsd:enumeration value="PartiallyProcessed" />
              <xsd:enumeration value="Unprocessed" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
```


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```
<xsd:element ref="eng100:ReadWriteMode" minOccurs="0" />
<xsd:element ref="eng100_100:DbStorageLocation" minOccurs="0"/>
<xsd:element name="AggregationPrefix" type="xsd:string" />
<xsd:element name="ProcessingPriority" type="xsd:integer" minOccurs="0"/>
<xsd:element name="EstimatedSize" type="xsd:long" minOccurs="0"/>
<xsd:element name="LastProcessed" type="xsd:dateTime" minOccurs="0"/>
<xsd:element name="Language" type="xsd:integer" minOccurs="0"/>
<xsd:element name="Collation" type="xsd:string" minOccurs="0"/>
<xsd:element name="Visible" type="xsd:boolean" minOccurs="0"/>
<xsd:element name="MasterDatasourceID" type="xsd:string" minOccurs="0"/>
<xsd:element name="DataSourceImpersonationInfo" type="ImpersonationInfo"
             minOccurs="0" />
<xsd:element name="Accounts" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Account"  type="Account" minOccurs="0"
                   maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="DataSources" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="DataSource"  type="DataSource" minOccurs="0"
                   maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="DataSourceViews" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="DataSourceView"  type="DataSourceView"
                   minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="Dimensions" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Dimension"  type="Dimension"
                   minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="Cubes" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Cube"  type="Cube" minOccurs="0"
                   maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="MiningStructures" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="MiningStructure"  type="MiningStructure"
                   minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
```


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```
        </xsd:element>
        <xsd:element name="Roles" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Role"  type="Role" minOccurs="0"
                           maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="Assemblies" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Assembly"  type="Assembly" minOccurs="0"
                           maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="DatabasePermissions" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="DatabasePermission"  type="DatabasePermission"
                           minOccurs="0" maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="Translations" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Translation"  type="Translation" minOccurs="0"
                           maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element ref="eng200_200:StorageEngineUsed" minOccurs="0" />
        <xsd:element ref="eng200_200:ImagePath" minOccurs="0" />
        <xsd:element ref="eng200_200:ImageUrl" minOccurs="0" />
        <xsd:element ref="eng200_200:ImageUniqueID" minOccurs="0" />
        <xsd:element ref="eng200_200:ImageVersion" minOccurs="0" />
        <xsd:element ref="eng200:CompatibilityLevel" minOccurs="0" />
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
```

The **Database** XSD depends upon the following definitions in namespaces other than the default namespace.

In the namespace **eng100**:

```
<xsd:element name="ReadWriteMode" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="ReadWrite" />
      <xsd:enumeration value="ReadOnly" />
      <xsd:enumeration value="ReadOnlyExclusive" />
```


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```
      </xsd:restriction>
    </xsd:simpleType>
  </xsd:element>
```

In the namespace **eng100_100**:

```
<xsd:element name="DbStorageLocation" type="xsd:string" />
```

In the namespace **eng200**:

```
<xsd:element name="CompatibilityLevel" type="xsd:integer" />
```

In the namespace **eng200_200**:

```
<xsd:element name="StorageEngineUsed" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="Traditional" />
      <xsd:enumeration value="InMemory" />
      <xsd:enumeration value="Mixed" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="ImagePath" type="xsd:string" />
<xsd:element name="ImageUrl" type="xsd:string" />
<xsd:element name="ImageUniqueID" type="xsd:string" />
<xsd:element name="ImageVersion" type="xsd:string" />
```

Element	Read-Only	Default	Description
Name		[Required]	The object name.
ID		Defaults to Name.	The object ID string.
CreatedTimestamp	Yes		A timestamp that indicates the time that object was created.
LastSchemaUpdate	Yes		A timestamp that indicates the time that the schema was last updated.
LastUpdate	Yes		A timestamp that indicates the last time the database or any of its contained major objects was altered.
Description		Empty	The object description.
State	Yes		The current state of processing within the **Database** objects. The enumeration values

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Element	Read-Only	Default	Description
			are as follows: ▪ **Processed** – The object has been processed. ▪ **PartiallyProcessed** – The object has been partially processed. ▪ **Unprocessed** – The object has not been processed.
ReadWriteMode		"ReadWrite"	An enumeration value that indicates the access modes allowed to the database. The enumeration values are as follows: ▪ **ReadWrite** – Read-write access is allowed. ▪ **ReadOnly** – Read-only access is allowed. ▪ **ReadOnlyExclusive** – Read-only exclusive access is allowed.
DbStorageLocation		Empty	A valid UNC path for where the server will store the data for this database.
AggregationPrefix		Empty	The common prefix that can be used for aggregation names for all the partitions in a database.
ProcessingPriority		0	An integer that indicates the priority for processing, when lazy processing is used. Higher integer values will be processed before lower integer values..
EstimatedSize	Yes		The estimated size of the database in bytes.
LastProcessed	Yes		A timestamp that indicates the date and time when the object was last processed. Updated only if the process command actually processes the database; processing all objects in the database individually will not update it.
Language		Empty	The Language Code Identifier (LCID) of the language to use by default. See [MS-LCID] for information about LCIDs.<12>
Collation		Empty	The collation sequence.
Visible		True	When true, indicates that the database is visible to clients; otherwise, false.
MasterDatasourceID		Empty	A string that specifies the **MasterDatasourceID** of the **Online Analytical Processing (OLAP)** data source that points to the master server for remote partitions.

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Element	Read-Only	Default	Description
DataSourceImpersonationInfo		Empty	The default user credentials to connect to data source.
Accounts		Empty	A collection of objects of type Account.
DataSources		Empty	A collection of objects of type DataSource.
DataSourceViews		Empty	A collection of objects of type DataSourceView.
Dimensions		Empty	A collection of objects of **Dimension** objects.
Cubes		Empty	A collection of Cube objects.
MiningStructures		Empty	A collection of MiningStructure objects.
Roles		Empty	A collection of Role objects.
Assemblies		Empty	A collection of Assembly objects.
DatabasePermissions		Empty	A collection of DatabasePermission objects.
Translations		Empty	A collection of Translation objects.
Annotations		Empty	A collection of Annotation objects.
StorageEngineUsed		"Traditional"	An enumeration value that indicates which of the types of available storage engines to use. The enumeration values are as follows: ▪ **Traditional** – MOLAP storage is used. ▪ **InMemory** – In memory storage is used. ▪ **Mixed** – A mixture of MOLAP and In memory storage is used.
ImagePath	Yes		The UNC path of the file from which this database was loaded. This element will be empty if the database does not come from a local file.
ImageUrl	Yes		The URL of the file from which this database was loaded. This element will be empty if the database is not loaded from a URL.
ImageUniqueID	Yes		The Unique ID assigned to this database, if it was loaded from a URL location. This element will be empty if the database is not loaded from a URL location.
ImageVersion		Empty.	A string that represents a timestamp containing the last time that the file that contains the database was updated. The string format is MM/dd/yyyy HH:mm:ss [AM/PM]. This element will be empty if the database is not loaded from a file.

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Element	Read-Only	Default	Description
CompatibilityLevel			Specifies the compatibility level of the database.<13>

2.2.4.2.2.5.1 Account

Dimensions that are of the type **Accounts** might have an attribute marked as providing the **Account Type** (such as Income, Expense, Balance, and so on). Measures can then have an aggregate function of **ByAccount**. The set of account types defined for a database map the valid account types to the aggregate functions that apply for measures marked with **ByAccount**.

```
<xsd:complexType name="Account">
  <xsd:all>
    <xsd:element name="AccountType" type="xsd:string" />
    <xsd:element name="AggregationFunction" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Sum" />
          <xsd:enumeration value="Count" />
          <xsd:enumeration value="Min" />
          <xsd:enumeration value="Max" />
          <xsd:enumeration value="DistinctCount" />
          <xsd:enumeration value="None" />
          <xsd:enumeration value="AverageOfChildren" />
          <xsd:enumeration value="FirstChild" />
          <xsd:enumeration value="LastChild" />
          <xsd:enumeration value="FirstNonEmpty" />
          <xsd:enumeration value="LastNoneEmpty" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Aliases" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Alias"  type="xsd:string" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
AccountType		[Required]	A string value that represents the name of the account

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Element	Read-Only	Default	Description
			type. The following list of known string values can be extended: "Income" "Expense" "Flow" "Balance" "Asset" "Liability" "Statistical"
AggregationFunction		"Sum"	The aggregation function to use for the **Account Type**. Each enumeration value is the name of the aggregation function that would be set by choosing that value. The possible values for the enumeration are as follows: ▪ **Sum** ▪ **Count** ▪ **Min** ▪ **Max** ▪ **DistinctCount** ▪ **None** – (this value sets no aggregation function) ▪ **AverageOfChildren** ▪ **FirstChild** ▪ **LastChild** ▪ **FirstNonEmpty** ▪ **LastNonEmpty**
Aliases		Empty	A collection of strings, each of which will be treated as an alias for the given **Account Type**.
Annotations		Empty	A collection of Annotation objects.

2.2.4.2.2.6 DataSource

The **DataSource** complex type represents a source of data for cubes, dimensions, and **mining structures**. The following complex types extend this type:

- RelationalDataSource
- OlapDataSource

```
<xsd:complexType name="DataSource" abstract="true" >
  <xsd:complexContent>
```


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```
    <xsd:extension base="MajorObject">
      <xsd:all>
        <!--These elements are common to each MajorObject-->
        <xsd:element name="Name"  type="xsd:string" />
        <xsd:element name="ID"  type="xsd:string" minOccurs="0" />
        <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="Description" type="xsd:string" minOccurs="0" />
        <xsd:element name="Annotation"  minOccurs="0" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                           maxOccurs="unbounded" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <!--Extended elements for DataSource object-->
        <xsd:element name="ManagedProvider" type="xsd:string" minOccurs="0"/>
        <xsd:element name="ConnectionString" type="xsd:string"/>
        <xsd:element name="ConnectionStringSecurity" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="PasswordRemoved" />
              <xsd:enumeration value="Unchanged" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="ImpersonationInfo" type="ImpersonationInfo"
                     minOccurs="0" />
        <xsd:element name="Isolation" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="ReadCommitted" />
              <xsd:enumeration value="Snapshot" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="MaxActiveConnections" type="xsd:integer"
                     minOccurs="0"/>
        <xsd:element name="Timeout" type="xsd:duration"  minOccurs="0" />
        <xsd:element name="DataSourcePermissions" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="DataSourcePermission"  type="DatabasePermission"
                           minOccurs="0" maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
```

Also included in the **DataSource** object are all the elements from MajorObject.

Element	Read-Only	Default	Description

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Element	Read-Only	Default	Description
ManagedProvider		Empty	The managed provider name.
ConnectionString		[Required]	The connection string. The password may be stripped out, depending upon the setting of the **ConnectionStringSecurity** element.
ConnectionStringSecurity	Yes	"Unchanged"	An enumeration value that specifies whether the user's password is stripped from the data source connection string for security purposes. The enumeration values are as follows: ▪ **PasswordRemoved** – The user's password is stripped from the connection string. ▪ **Unchanged** - The connection string text is unchanged.
ImpersonationInfo		Empty	The user credentials that are used to connect to a data source.
Isolation		"ReadCommitted"	An enumeration value that specifies the isolation level for reading data that was modified but not committed by another simultaneous transaction. The enumeration values are as follows: ▪ **ReadCommitted** – ReadCommitted isolation is used. ▪ **Snapshot** – Snapshot isolation is used.
MaxActiveConnections		10	The maximum number of concurrent connections to the data source. A negative number means that there is no limit. A value of zero means the default limit.
Timeout		Server default.	An integer that specifies the time, in seconds, after which an attempt to retrieve data reports a timeout.
DataSourcePermissions		Empty	A collection of objects of type DataSourcePermission.

2.2.4.2.2.6.1 RelationalDataSource

The **RelationalDataSource** complex type represents a relational data source.

```
<xsd:complexType name="RelationalDataSource" >
  <xsd:complexContent>
    <xsd:extension base="DataSource" />
  </xsd:complexContent>
</xsd:complexType>
```


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Element	Read-Only	Default	Description
(None)			

2.2.4.2.2.6.2 OlapDataSource

The **OlapDataSource** complex type represents an OLAP data source.

```
<xsd:complexType name="OlapDataSource" >
  <xsd:complexContent>
    <xsd:extension base="DataSource" />
  </xsd:complexContent>
</xsd:complexType>
```

Element	Read-Only	Default	Description
(None)			

2.2.4.2.2.6.3 PushedDataSource

The **PushedDataSource** complex type represents a chunk of tabular data being pushed into the server. This is in contrast to RelationalDataSource and OlapDataSource, where the server pulls the data by sending queries to the data source.

PushedDataSource cannot be specified in a Create or Alter command. It can be used only within a Process command. For more information, see section 3.1.4.3.2.1.1.6.

```
<xsd:complexType name="PushedDataSource" >
  <xsd:all>
    <xsd:element name="root">
      <xsd:complexType>
        <xsd:attribute name="Parameter">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string">
              <xsd:enumeration value="InputRowset" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:attribute>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="EndOfData" >
      <xsd:complexType>
        <xsd:attribute name="Parameter" >
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="EndOfInputRowset" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:attribute>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```


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Element	Read-Only	Default	Description
root		[Required]	The XML attribute "Parameter" MUST be present, and it MUST be set to the value "InputRowset". When using a **PushedDataSource**, the actual data will be contained in a "Parameter" that is used on the Execute method with name "InputRowset". For a description of how to use an **Execute** parameter, see section 3.1.4.3.2.1.3.1.
EndOfData		[Required]	The XML attribute "Parameter" MUST be present with this element, and its value MUST be set to "EndOfInputRowset". When using a **PushedDataSource**, the command must contain a parameter named "EndOInputRowset", and its value MUST be set to true in order to signal an end of input data.

2.2.4.2.2.7 DataSourceView

The **DataSourceView** complex type represents a view over the schema of a data source.

```
<xsd:complexType name="DataSourceView">
  <xsd:complexContent>
    <xsd:extension base="MajorObject">
      <xsd:all>
        <!--These elements are common to each MajorObject-->
        <xsd:element name="Name"  type="xsd:string" />
        <xsd:element name="ID"  type="xsd:string" minOccurs="0" />
        <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="Description" type="xsd:string" minOccurs="0" />
        <xsd:element name="Annotation"  minOccurs="0" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                           maxOccurs="unbounded" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <!--Extended elements for DataSourceView object-->
        <xsd:element name="DataSourceID" type="xsd:string"/>
        <xsd:element ref="xs:schema" />
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
```

Also included in the **DataSourceView** object are all elements from MajorObject.

Element	Read-Only	Default	Description
DataSourceID		[Required]	The ID of the DataSource for which this is a **DataSourceView**.
Schema		[Required]	The schema of the **DataSource**, for example, the contents of the **DataSource** view. This is defined using the "Schema" element from XMLSchema (XSD), as used in the persistence format of **DataSets**. For more information, see [MSDN-

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Element	Read-Only	Default	Description
			DDRXSD].

2.2.4.2.2.8 Dimension

The **Dimension** complex type represents a dimension object.

```
<xsd:complexType name="Dimension">
  <xsd:complexContent>
    <xsd:extension base="MajorObject">
      <xsd:all>
        <!--These elements are common to each MajorObject-->
        <xsd:element name="Name"  type="xsd:string" />
        <xsd:element name="ID"  type="xsd:string" minOccurs="0" />
        <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="Description" type="xsd:string" minOccurs="0" />
        <xsd:element name="Annotation"  minOccurs="0" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                           maxOccurs="unbounded" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <!--Extended elements for Dimension object-->
        <xsd:element name="Source" minOccurs="0" type="Binding" />
        <xsd:element name="MiningModelID" type="xsd:string" minOccurs="0"/>
        <xsd:element name="Type" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string">
              <xsd:enumeration value="Regular"/>
              <xsd:enumeration value="Time"/>
              <xsd:enumeration value="Geography"/>
              <xsd:enumeration value="Organization"/>
              <xsd:enumeration value="BillOfMaterials"/>
              <xsd:enumeration value="Accounts"/>
              <xsd:enumeration value="Customers"/>
              <xsd:enumeration value="Products"/>
              <xsd:enumeration value="Scenario"/>
              <xsd:enumeration value="Quantitative"/>
              <xsd:enumeration value="Utility"/>
              <xsd:enumeration value="Currency"/>
              <xsd:enumeration value="Rates"/>
              <xsd:enumeration value="Channel"/>
              <xsd:enumeration value="Promotion"/>
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="UnknownMember" minOccurs="0">
          <xsd:complexType>
            <xsd:simpleContent>
              <xsd:extension base="UnknownMemberEnumType">
                <xsd:attribute name="valuens" >
                  <xsd:simpleType>
```


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```
            <xsd:restriction base="xsd:string">
              <xsd:enumeration
                value=
"http://schemas.microsoft.com/analysisservices/2010/engine/200/200" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:attribute>
      </xsd:extension>
    </xsd:simpleContent>
  </xsd:complexType>
</xsd:element>
<xsd:element name="ErrorConfiguration" type="ErrorConfiguration"
             minOccurs="0" />
<xsd:element ref="eng200_200:StorageMode" minOccurs="0" />
<xsd:element name="WriteEnabled" type="xsd:boolean" minOccurs="0"/>
<xsd:element name="ProcessingPriority" type="xsd:integer" minOccurs="0"/>
<xsd:element name="LastProcessed" type="xsd:dateTime" minOccurs="0"/>
<xsd:element name="DimensionPermissions"  minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="DimensionPermission"  type="DimensionPermission"
                   minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="DependsOnDimensionID" type="xsd:string" minOccurs="0"/>
<xsd:element name="Language" type="xsd:integer" minOccurs="0"/>
<xsd:element name="Collation" type="xsd:string" minOccurs="0"/>
<xsd:element name="UnknownMemberName" type="xsd:string" minOccurs="0"/>
<xsd:element name="UnknownMemberTranslations" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="UnknownMemberTranslation"  type="Translation"
                   minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="State" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="Processed"/>
      <xsd:enumeration value="Unprocessed"/>
      <xsd:enumeration value="PartiallyProcessed"/>
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="ProactiveCaching" type="ProactiveCaching"
             minOccurs="0" />
<xsd:element name="ProcessingMode" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="Regular"/>
      <xsd:enumeration value="LazyAggregations"/>
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="ProcessingGroup" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string">
```


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```
            <xsd:enumeration value="ByAttribute"/>
            <xsd:enumeration value="ByTable"/>
          </xsd:restriction>
        </xsd:simpleType>
      </xsd:element>
      <xsd:element name="CurrentStorageMode" minOccurs="0">
        <xsd:complexType>
          <xsd:simpleContent>
            <xsd:extension base="DimensionCurrentStorageModeEnumType">
              <xsd:attribute name="valuens" >
                <xsd:simpleType>
                  <xsd:restriction base="xsd:string">
                    <xsd:enumeration
                      value=
    "http://schemas.microsoft.com/analysisservices/2010/engine/200/200" />
                  </xsd:restriction>
                </xsd:simpleType>
              </xsd:attribute>
            </xsd:extension>
          </xsd:simpleContent>
        </xsd:complexType>
      </xsd:element>
      <xsd:element name="Translations" minOccurs="0">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="Translation"  type="Translation"
                         minOccurs="0" maxOccurs="unbounded"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:element name="Attributes" minOccurs="0">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="Attribute"  type="Attribute" minOccurs="0"
                         maxOccurs="unbounded"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:element name="AttributeAllMemberName" type="xsd:string" minOccurs="0"/>
      <xsd:element name="AttributeAllMemberTranslations" minOccurs="0">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="MemberAllMemberTranslation"  type="Translation"
                         minOccurs="0" maxOccurs="unbounded"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:element name="Hierarchies" minOccurs="0">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="Hierarchy"  type="Hierarchy" minOccurs="0"
                         maxOccurs="unbounded"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:element ref="eng200_200:ProcessingRecommendation" minOccurs="0" />
    </xsd:all>
  </xsd:extension >
</xsd:complexContent>
```


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```
    </xsd:complexType>
      <xsd:simpleType name="DimensionCurrentStorageModeEnumType" >
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="Molap"/>
          <xsd:enumeration value="InMemory"/>
          <xsd:enumeration value="Rolap"/>
        </xsd:restriction>
      </xsd:simpleType>
  <xsd:simpleType name="UnknownMemberEnumType" >
      <xsd:restriction base="xsd:string">
        <xsd:enumeration value="Visible"/>
        <xsd:enumeration value="Hidden"/>
        <xsd:enumeration value="None"/>
        <xsd:enumeration value="AutomaticNull"/>
      </xsd:restriction>
    </xsd:simpleType>
```

The **Dimension** XSD depends upon element definitions in namespaces other than the default namespace.

The following elements are defined in the namespace **eng200_200**:

```
    <xsd:element name="StorageMode" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="Molap"/>
          <xsd:enumeration value="Rolap"/>
          <xsd:enumeration value="InMemory"/>
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="ProcessingRecommendation" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="None"/>
          <xsd:enumeration value="Stale"/>
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
```

Also included in the **Dimension** object are all elements from **MajorObject**. For more information, see section 2.2.4.2.2.1

Element	Read-Only	Default	Description
Source		Empty	The source is of type Binding. However, one of the following derived types MUST be used: ▪ DataSourceViewBinding ▪ DimensionBinding ▪ CubeDimensionBinding

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Element	Read-Only	Default	Description
			▪ TimeBinding
MiningModelID		Empty	The ID of a MiningModel. Used by data mining dimensions.
Type		"Regular"	An enumeration value that provides both the server and client applications with information about the contents of the dimension. Enumeration values MAY be informative only; however, a server MAY implement behavior for specific enumeration values.<14> The enumeration values are as follows: ▪ **Regular** – The dimension is a regular dimension. ▪ **Time** – The dimension is a time dimension. ▪ **Geography** – The dimension contains geographical attributes. ▪ **Organization** – The dimension contains organizational attributes. ▪ **BillOfMaterials** – The dimension contains bill of materials attributes. ▪ **Accounts** – The dimension contains account-related attributes. ▪ **Customers** – The dimension contains customer-related attributes. ▪ **Products** – The dimension contains product-related attributes. ▪ **Scenario** – The dimension contains scenario-related attributes. ▪ **Quantitative** – The dimension contains quantative attributes. ▪ **Utility** – The dimension contains utility attributes. ▪ **Currency** – The dimension contains currency attributes. ▪ **Rates** – The dimension contains exchange rate attributes. ▪ **Channel** – The dimension contains channel attributes. ▪ **Promotion** – The dimension contains

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Element	Read-Only	Default	Description
			promotion-related attributes.
UnknownMember		"None"	When referential integrity violations or null foreign keys are encountered, the server MAY impute an "unknown member". This enumeration defines whether and how the **UnknownMember** is exposed. ▪ **Visible** – The unknown member exists and is displayed. Its value is "Unknown Member". ▪ **AutomaticNull** - If the dimension is a reference dimension and the relationship has an RI violation, the unknown member is visible and is displayed. Otherwise, the unknown member does not exist. Its value is null. The **UnknownMemberName** property is ignored. ▪ **Hidden** – The unknown member exists but is not displayed. ▪ **None** – The unknown member does not exist for the dimension.
MdxMissingMemberMode		"Ignore"	Determines how missing members are handled for multidimensional expression (MDX) statements. For more information, see [MSDN-MDXR].
ErrorConfiguration		Empty	Allows configuration of processing errors.
StorageMode		"Molap"	Determines the storage mode for the dimension. Applies to all attributes of the dimension.
WriteEnabled		False	When true, indicates that dimension writebacks are available (subject to security permissions); otherwise, false.
ProcessingPriority		Zero	An integer that determines the priority for processing.
LastProcessed	Yes		The date and time when the dimension was last processed.
DimensionPermissions		Empty	A collection of objects of type DimensionPermission.
DependsOnDimensionID		Empty	Provides the ID of any other dimension that this dimension is dependent upon.
Language		Empty	The LCID of the language to use by default. See [MS-LCID] for information about LCIDs. If empty, the server will determine the

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Element	Read-Only	Default	Description
			language to use.<15>
Collation		Empty	The collation sequence.
UnknownMemberName		"Unknown"	The caption for **UnknownMember** in **DefaultLanguage**.
UnknownMemberTranslation		Empty	A collection of objects of type Translation that represents the translation for the **UnknownMember** in different languages.
State	Yes		Contains the current processing state of the dimension.
ProactiveCaching		Empty	Defines proactive caching parameters.
ProcessingMode		"Regular"	Indicates whether the instance should index and aggregate during or after processing. The enumeration values are as follows: ▪ Regular - The instance indexes and performs aggregations during processing. ▪ LazyAggregations - The instance indexes and performs aggregations after processing.
ProcessingGroup		"ByAttribute"	Indicates how the dimension is grouped during processing. Controls what kind of SQL queries are sent to the source data repository.
CurrentStorageMode	Yes		The actual current storage mode for dimension.
Translations		Empty	A collection of **Translation** objects.
Attributes		Empty	A collection of **Attribute** objects.
AttributeAllMemberName		Empty	Contains the caption in the default language for the **All** member of a Hierarchy element.
AttributeAllMemberTranslations		Empty	A collection of **Translation** objects for the **AttributeAllMemberName**.
Hierarchies		Empty	A collection of **Hierarchy** objects.
ProcessingRecommendation	Yes		An enumeration value that the system uses to indicate whether the **Dimension** is stale and needs to be processed.

2.2.4.2.2.8.1 DimensionAttribute

This complex type represents an attribute of a dimension.

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```
<xsd:complexType name="DimensionAttribute">
  <xsd:all>
    <xsd:element name="Name" type="xsd:string"/>
    <xsd:element name="ID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Description" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Type" minOccurs="0">
      <xsd:complexType>
        <xsd:simpleContent>
          <xsd:extension base="DimensionAttributeTypeEnumType">
            <xsd:attribute name="valuens" >
              <xsd:simpleType>
                <xsd:restriction base="xsd:string">
                  <xsd:enumeration value=
           "http://schemas.microsoft.com/analysisservices/2010/engine/200/200" />
                </xsd:restriction>
              </xsd:simpleType>
            </xsd:attribute>
          </xsd:extension>
        </xsd:simpleContent>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Usage" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Regular" />
          <xsd:enumeration value="Key" />
          <xsd:enumeration value="Parent" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Source" type="Binding" minOccurs="0" />
    <xsd:element name="EstimatedCount" type="xsd:long" minOccurs="0"/>
    <xsd:element name="KeyColumns" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="KeyColumn"  type="DataItem" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="NameColumn" type="DataItem" minOccurs="0" />
    <xsd:element name="ValueColumn" type="DataItem" minOccurs="0" />
    <xsd:element name="Translations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Translation"  type="AttributeTranslation" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="AttributeRelationships" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="AttributeRelationship"  type="AttributeRelationship"
                       minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="DiscretizationMethod" minOccurs="0">
```


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```
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="None" />
      <xsd:enumeration value="Automatic" />
      <xsd:enumeration value="EqualAreas" />
      <xsd:enumeration value="Clusters" />
      <xsd:enumeration value="Thresholds" />
      <xsd:enumeration value="UserDefined" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="DiscretizationBucketCount" type="xsd:integer" minOccurs="0"/>
<xsd:element name="RootMemberIf" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="ParentIsBlankSelfOrMissing" />
      <xsd:enumeration value="ParentIsBlank" />
      <xsd:enumeration value="ParentIsSelf" />
      <xsd:enumeration value="ParentIsMissing" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="OrderBy" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="Key" />
      <xsd:enumeration value="Name" />
      <xsd:enumeration value="AttributeKey" />
      <xsd:enumeration value="AttributeName" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="DefaultMember" type="xsd:string" minOccurs="0"/>
<xsd:element name="OrderByAttributeID" type="xsd:string" minOccurs="0"/>
<xsd:element name="SkippedLevelsColumn" type="DataItem" minOccurs="0" />
<xsd:element name="NamingTemplate" type="xsd:string" minOccurs="0"/>
<xsd:element name="MembersWithData"  minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="NonLeafDataHidden" />
      <xsd:enumeration value="NonLeafDataVisible" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="MembersWithDataCaption" type="xsd:string" minOccurs="0"/>
<xsd:element name="NamingTemplateTranslations" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="NamingTemplateTranslation"  type="Translation"
                   minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="CustomRollupColumn" type="DataItem" minOccurs="0" />
<xsd:element name="CustomRollupPropertiesColumn" type="DataItem"
             minOccurs="0" />
<xsd:element name="UnaryOperatorColumn" type="DataItem" minOccurs="0" />
<xsd:element name="AttributeHierarchyOrdered" type="xsd:boolean"
             minOccurs="0"/>
```


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```
      <xsd:element name="MemberNamesUnique" type="xsd:boolean" minOccurs="0"/>
      <xsd:element name="IsAggregatable" type="xsd:boolean" minOccurs="0"/>
      <xsd:element name="AttributeHierarchyEnabled" type="xsd:boolean"
                   minOccurs="0"/>
      <xsd:element name="AttributeHierarchyOptimizedState" minOccurs="0">
        <xsd:simpleType>
          <xsd:restriction base="xsd:string" >
            <xsd:enumeration value="FullyOptimized" />
            <xsd:enumeration value="NotOptimized" />
          </xsd:restriction>
        </xsd:simpleType>
      </xsd:element>
      <xsd:element name="AttributeHierarchyVisible" type="xsd:boolean"
                   minOccurs="0"/>
      <xsd:element name="AttributeHierarchyDisplayFolder" type="xsd:string"
                   minOccurs="0"/>
      <xsd:element name="KeyUniquenessGuarantee" type="xsd:boolean"
                   minOccurs="0"/>
      <xsd:element name="GroupingBehavior" minOccurs="0">
        <xsd:simpleType>
          <xsd:restriction base="xsd:string" >
            <xsd:enumeration value="EncourageGrouping" />
            <xsd:enumeration value="DiscourageGrouping" />
          </xsd:restriction>
        </xsd:simpleType>
      </xsd:element>
      <xsd:element name="InstanceSelection" minOccurs="0">
        <xsd:simpleType>
          <xsd:restriction base="xsd:string" >
            <xsd:enumeration value="None" />
            <xsd:enumeration value="DropDown" />
            <xsd:enumeration value="List" />
            <xsd:enumeration value="FilteredList" />
            <xsd:enumeration value="MandatoryFilter" />
          </xsd:restriction>
        </xsd:simpleType>
      </xsd:element>
      <xsd:element name="Annotations" minOccurs="0">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                         maxOccurs="unbounded"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:element name="ProcessingState" minOccurs="0" >
        <xsd:simpleType>
          <xsd:restriction base="xsd:string" >
            <xsd:enumeration value="Processed" />
            <xsd:enumeration value="Unprocessed" />
            <xsd:enumeration value="InvalidExpression" />
            <xsd:enumeration value="CalculationError" />
            <xsd:enumeration value="DependencyError" />
          </xsd:restriction>
        </xsd:simpleType>
      </xsd:element>
    </xsd:all>
  </xsd:complexType>
  <xsd:simpleType name="DimensionAttributeTypeEnumType">
```


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```
<xsd:restriction base="xsd:string" >
  <xsd:enumeration value="Account" />
  <xsd:enumeration value="AccountName" />
  <xsd:enumeration value="AccountNumber" />
  <xsd:enumeration value="AccountType" />
  <xsd:enumeration value="Address" />
  <xsd:enumeration value="AddressBuilding" />
  <xsd:enumeration value="AddressCity" />
  <xsd:enumeration value="AddressCountry" />
  <xsd:enumeration value="AddressFax" />
  <xsd:enumeration value="AddressFloor" />
  <xsd:enumeration value="AddressHouse" />
  <xsd:enumeration value="AddressPhone" />
  <xsd:enumeration value="AddressQuarter" />
  <xsd:enumeration value="AddressRoom" />
  <xsd:enumeration value="AddressStateOrProvince" />
  <xsd:enumeration value="AddressStreet" />
  <xsd:enumeration value="AddressZip" />
  <xsd:enumeration value="BomResource" />
  <xsd:enumeration value="Caption" />
  <xsd:enumeration value="CaptionAbbreviation" />
  <xsd:enumeration value="CaptionDescription" />
  <xsd:enumeration value="Channel" />
  <xsd:enumeration value="City" />
  <xsd:enumeration value="Company" />
  <xsd:enumeration value="Continent" />
  <xsd:enumeration value="Country" />
  <xsd:enumeration value="County" />
  <xsd:enumeration value="CurrencyDestination" />
  <xsd:enumeration value="CurrencyIsoCode" />
  <xsd:enumeration value="CurrencyName" />
  <xsd:enumeration value="CurrencySource" />
  <xsd:enumeration value="CustomerGroup" />
  <xsd:enumeration value="CustomerHousehold" />
  <xsd:enumeration value="Customers" />
  <xsd:enumeration value="Date" />
  <xsd:enumeration value="DateCanceled" />
  <xsd:enumeration value="DateDuration" />
  <xsd:enumeration value="DateEnded" />
  <xsd:enumeration value="DateModified" />
  <xsd:enumeration value="DateStart" />
  <xsd:enumeration value="DayOfHalfYear" />
  <xsd:enumeration value="DayOfMonth" />
  <xsd:enumeration value="DayOfQuarter" />
  <xsd:enumeration value="DayOfTenDays" />
  <xsd:enumeration value="DayOfTrimester" />
  <xsd:enumeration value="DayOfWeek" />
  <xsd:enumeration value="DayOfYear" />
  <xsd:enumeration value="Days" />
  <xsd:enumeration value="DeletedFlag" />
  <xsd:enumeration value="FiscalDate" />
  <xsd:enumeration value="FiscalDayOfHalfYear" />
  <xsd:enumeration value="FiscalDayOfMonth" />
  <xsd:enumeration value="FiscalDayOfQuarter" />
  <xsd:enumeration value="FiscalDayOfTrimester" />
  <xsd:enumeration value="FiscalDayOfWeek" />
  <xsd:enumeration value="FiscalDayOfYear" />
  <xsd:enumeration value="FiscalHalfYears" />
  <xsd:enumeration value="FiscalHalfYearOfYear" />
```


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```
<xsd:enumeration value="FiscalMonths" />
<xsd:enumeration value="FiscalMonthOfHalfYear" />
<xsd:enumeration value="FiscalMonthOfQuarter" />
<xsd:enumeration value="FiscalMonthOfTrimester" />
<xsd:enumeration value="FiscalMonthOfYear" />
<xsd:enumeration value="FiscalQuarters" />
<xsd:enumeration value="FiscalQuarterOfHalfYear" />
<xsd:enumeration value="FiscalQuarterOfYear" />
<xsd:enumeration value="FiscalTrimesters" />
<xsd:enumeration value="FiscalTrimesterOfYear" />
<xsd:enumeration value="FiscalWeeks" />
<xsd:enumeration value="FiscalWeekOfHalfYear" />
<xsd:enumeration value="FiscalWeekOfMonth" />
<xsd:enumeration value="FiscalWeekOfQuarter" />
<xsd:enumeration value="FiscalWeekOfTrimester" />
<xsd:enumeration value="FiscalWeekOfYear" />
<xsd:enumeration value="FiscalYears" />
<xsd:enumeration value="FormattingColor" />
<xsd:enumeration value="FormattingFont" />
<xsd:enumeration value="FormattingFontEffects" />
<xsd:enumeration value="FormattingFontSize" />
<xsd:enumeration value="FormattingOrder" />
<xsd:enumeration value="FormattingSubtotal" />
<xsd:enumeration value="GeoBoundaryBottom" />
<xsd:enumeration value="GeoBoundaryFront" />
<xsd:enumeration value="GeoBoundaryLeft" />
<xsd:enumeration value="GeoBoundaryPolygon" />
<xsd:enumeration value="GeoBoundaryRear" />
<xsd:enumeration value="GeoBoundaryRight" />
<xsd:enumeration value="GeoBoundaryTop" />
<xsd:enumeration value="GeoCentroidX" />
<xsd:enumeration value="GeoCentroidY" />
<xsd:enumeration value="GeoCentroidZ" />
<xsd:enumeration value="HalfYears" />
<xsd:enumeration value="HalfYearOfYear" />
<xsd:enumeration value="Hours" />
<xsd:enumeration value="ID" />
<xsd:enumeration value="Image" />
<xsd:enumeration value="ImageBmp" />
<xsd:enumeration value="ImageGif" />
<xsd:enumeration value="ImageJpg" />
<xsd:enumeration value="ImagePng" />
<xsd:enumeration value="ImageTiff" />
<xsd:enumeration value="IsHoliday" />
<xsd:enumeration value="Iso8601Date" />
<xsd:enumeration value="Iso8601DayOfWeek" />
<xsd:enumeration value="Iso8601DayOfYear" />
<xsd:enumeration value="Iso8601Weeks" />
<xsd:enumeration value="Iso8601WeekOfYear" />
<xsd:enumeration value="Iso8601Years" />
<xsd:enumeration value="IsPeakDay" />
<xsd:enumeration value="IsWeekDay" />
<xsd:enumeration value="IsWorkingDay" />
<xsd:enumeration value="ManufacturingDate" />
<xsd:enumeration value="ManufacturingDayOfHalfYear" />
<xsd:enumeration value="ManufacturingDayOfMonth" />
<xsd:enumeration value="ManufacturingDayOfQuarter" />
<xsd:enumeration value="ManufacturingDayOfWeek" />
<xsd:enumeration value="ManufacturingDayOfYear" />
```


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```
<xsd:enumeration value="ManufacturingHalfYears" />
<xsd:enumeration value="ManufacturingHalfYearOfYear" />
<xsd:enumeration value="ManufacturingMonths" />
<xsd:enumeration value="ManufacturingMonthOfHalfYear" />
<xsd:enumeration value="ManufacturingMonthOfQuarter" />
<xsd:enumeration value="ManufacturingMonthOfYear" />
<xsd:enumeration value="ManufacturingQuarters" />
<xsd:enumeration value="ManufacturingQuarterOfHalfYear" />
<xsd:enumeration value="ManufacturingQuarterOfYear" />
<xsd:enumeration value="ManufacturingWeeks" />
<xsd:enumeration value="ManufacturingWeekOfHalfYear" />
<xsd:enumeration value="ManufacturingWeekOfMonth" />
<xsd:enumeration value="ManufacturingWeekOfQuarter" />
<xsd:enumeration value="ManufacturingWeekOfYear" />
<xsd:enumeration value="ManufacturingYears" />
<xsd:enumeration value="Minutes" />
<xsd:enumeration value="Months" />
<xsd:enumeration value="MonthOfHalfYear" />
<xsd:enumeration value="MonthOfQuarter" />
<xsd:enumeration value="MonthOfTrimester" />
<xsd:enumeration value="MonthOfYear" />
<xsd:enumeration value="OrganizationalUnit" />
<xsd:enumeration value="OrgTitle" />
<xsd:enumeration value="PercentOwnership" />
<xsd:enumeration value="PercentVoteRight" />
<xsd:enumeration value="Person" />
<xsd:enumeration value="PersonContact" />
<xsd:enumeration value="PersonDemographic" />
<xsd:enumeration value="PersonFirstName" />
<xsd:enumeration value="PersonFullName" />
<xsd:enumeration value="PersonLastName" />
<xsd:enumeration value="PersonMiddleName" />
<xsd:enumeration value="PhysicalColor" />
<xsd:enumeration value="PhysicalDensity" />
<xsd:enumeration value="PhysicalDepth" />
<xsd:enumeration value="PhysicalHeight" />
<xsd:enumeration value="PhysicalSize" />
<xsd:enumeration value="PhysicalVolume" />
<xsd:enumeration value="PhysicalWeight" />
<xsd:enumeration value="PhysicalWidth" />
<xsd:enumeration value="Point" />
<xsd:enumeration value="PostalCode" />
<xsd:enumeration value="Product" />
<xsd:enumeration value="ProductBrand" />
<xsd:enumeration value="ProductCategory" />
<xsd:enumeration value="ProductGroup" />
<xsd:enumeration value="ProductSKU" />
<xsd:enumeration value="Project" />
<xsd:enumeration value="ProjectCode" />
<xsd:enumeration value="ProjectCompletion" />
<xsd:enumeration value="ProjectEndDate" />
<xsd:enumeration value="ProjectName" />
<xsd:enumeration value="ProjectStartDate" />
<xsd:enumeration value="Promotion" />
<xsd:enumeration value="QtyRangeHigh" />
<xsd:enumeration value="QtyRangeLow" />
<xsd:enumeration value="Quantitative" />
<xsd:enumeration value="Quarters" />
<xsd:enumeration value="QuarterOfHalfYear" />
```


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```
<xsd:enumeration value="QuarterOfYear" />
<xsd:enumeration value="Rate" />
<xsd:enumeration value="RateType" />
<xsd:enumeration value="Region" />
<xsd:enumeration value="Regular" />
<xsd:enumeration value="RelationToParent" />
<xsd:enumeration value="ReportingDate" />
<xsd:enumeration value="ReportingDayOfHalfYear" />
<xsd:enumeration value="ReportingDayOfMonth" />
<xsd:enumeration value="ReportingDayOfQuarter" />
<xsd:enumeration value="ReportingDayOfTrimester" />
<xsd:enumeration value="ReportingDayOfWeek" />
<xsd:enumeration value="ReportingDayOfYear" />
<xsd:enumeration value="ReportingHalfYears" />
<xsd:enumeration value="ReportingHalfYearOfYear" />
<xsd:enumeration value="ReportingMonths" />
<xsd:enumeration value="ReportingMonthOfHalfYear" />
<xsd:enumeration value="ReportingMonthOfQuarter" />
<xsd:enumeration value="ReportingMonthOfTrimester" />
<xsd:enumeration value="ReportingMonthOfYear" />
<xsd:enumeration value="ReportingQuarters" />
<xsd:enumeration value="ReportingQuarterOfHalfYear" />
<xsd:enumeration value="ReportingQuarterOfYear" />
<xsd:enumeration value="ReportingTrimesters" />
<xsd:enumeration value="ReportingTrimesterOfYear" />
<xsd:enumeration value="ReportingWeeks" />
<xsd:enumeration value="ReportingWeekOfHalfYear" />
<xsd:enumeration value="ReportingWeekOfMonth" />
<xsd:enumeration value="ReportingWeekOfQuarter" />
<xsd:enumeration value="ReportingWeekOfTrimester" />
<xsd:enumeration value="ReportingWeekOfYear" />
<xsd:enumeration value="ReportingYears" />
<xsd:enumeration value="Representative" />
<xsd:enumeration value="RowNumber" />
<xsd:enumeration value="ScdEndDate" />
<xsd:enumeration value="ScdOriginalID" />
<xsd:enumeration value="ScdStartDate" />
<xsd:enumeration value="ScdStatus" />
<xsd:enumeration value="Scenario" />
<xsd:enumeration value="Seconds" />
<xsd:enumeration value="Sequence" />
<xsd:enumeration value="ShortCaption" />
<xsd:enumeration value="StateOrProvince" />
<xsd:enumeration value="TenDay" />
<xsd:enumeration value="TenDayOfHalfYear" />
<xsd:enumeration value="TenDayOfMonth" />
<xsd:enumeration value="TenDayOfQuarter" />
<xsd:enumeration value="TenDayOfTrimester" />
<xsd:enumeration value="TenDayOfYear" />
<xsd:enumeration value="Trimesters" />
<xsd:enumeration value="TrimesterOfYear" />
<xsd:enumeration value="UndefinedTime" />
<xsd:enumeration value="Utility" />
<xsd:enumeration value="Version" />
<xsd:enumeration value="WebHtml" />
<xsd:enumeration value="WebMailAlias" />
<xsd:enumeration value="WebUrl" />
<xsd:enumeration value="WebXmlOrXsl" />
<xsd:enumeration value="WeekOfYear" />
```


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```
      <xsd:enumeration value="Weeks" />
      <xsd:enumeration value="WinterSummerSeason" />
      <xsd:enumeration value="Years" />
      <xsd:enumeration value="RowNumber" />
    </xsd:restriction>
  </xsd:simpleType>
```

Element	Read-Only	Default	Description
Name		[Required]	The object name.
ID		Defaults to **Name**.	The object ID string.
Description		Empty	The object description.
Type		"Regular"	The type of the **Attribute**.
Usage		"Regular"	An enumeration value that indicates whether the **Attribute** is a key, parent, or regular.
Source		Empty	Source is of type **Binding**. However, one of the following types MUST be used: **AttributeBinding** **UserDefinedGroupBinding** **MeasureBinding** **CalculatedMeasureBinding** **CubeAttributeBinding** **TimeAttributeBinding**
EstimatedCount		Empty	The estimated number of distinct values of the attribute.
KeyColumns		[Required]	A collection of objects of type **DataItem**. Every attribute must have at least one **KeyColumn** collection that defines the **KeyColumn**(s) for this **Attribute's** data. The **Source** element within the **DataItem** MUST be one of the following types: **AttributeBinding** **MeasureBinding** **CalculatedMeasureBinding** **CubeAttributeBinding** **TimeAttributeBinding** **RowNumberBinding** **CubeDimensionBinding** **ColumnBinding** **RowBinding**

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Element	Read-Only	Default	Description
			InheritedBinding **ExpressionBinding**
NameColumn		Defaults to **KeyColumn** (if non-composite) with **String** data type.	A collection of objects of type **DataItem**. Defines column(s) that will be used for the **Names** of **Attribute** members. The **Source** element within the **DataItem** MUST be one of the following types: **AttributeBinding** **MeasureBinding** **CalculatedMeasureBinding** **CubeAttributeBinding** **TimeAttributeBinding** **RowNumberBinding** **CubeDimensionBinding** **ColumnBinding** **RowBinding** **InheritedBinding**
ValueColumn		Defaults to **NameColumn** (if specified), or else **KeyColumn** (if non-composite)	A collection of objects of type **DataItem**. Defines column(s) that will be used for the **Names** of **Attribute** members. The **Source** element within the **DataItem** MUST be one of the following types: **AttributeBinding** **MeasureBinding** **CalculatedMeasureBinding** **CubeAttributeBinding** **TimeAttributeBinding** **RowNumberBinding** **CubeDimensionBinding** **ColumnBinding** **RowBinding** **InheritedBinding**
Translations		Empty	A collection of **Translation** objects.
AttributeRelationships		Empty	A collection of **AttributeRelationship** objects.
DiscretizationMethod		"None"	The discretization method that will be applied to the attribute.

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Element	Read-Only	Default	Description
DiscretizationBucketCount		Empty	The number of buckets in which to discretize.
RootMemberIf		"ParentIsBlankSelfOrMissing"	Defines the means of indicating the topmost members of a parent-child hierarchy. Applicable only if **Usage** = **Parent**. The enumeration values are as follows: **ParentIsBlankSelfOrMissing** - Only members that meet one or more of the conditions described for **ParentIsBlank**, **ParentIsSelf**, or **ParentIsMissing** are treated as root members. **ParentIsBlank** - Only members with a null, a zero, or an empty string in the key columns represented by the **KeyColumns** collection of **DimensionAttribute** are treated as root members. **ParentIsSelf** - Only members with themselves as parents are treated as root members. **ParentIsMissing** - Only members with parents that cannot be found are treated as root members.
OrderBy		"Name"	The column by which the attribute will be ordered.
DefaultMember		Empty	An MDX expression describing the **Default Member**.
OrderByAttributeID		Empty	The ID of another attribute by which to order this attribute (only allowed if **OrderBy** = **AttributeKey** or **AttributeName**).
SkippedLevelsColumns		Empty	A collection of objects of type **DataItem** that provides the details of column(s) that stores the number of skipped (empty) levels between each member and its parent. The **Source** element within the **DataItem** MUST be one of the following types: **ColumnBinding**

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Element	Read-Only	Default	Description
			AttributeBinding
NamingTemplate		Empty	A string that defines a template for how levels in a parent-child hierarchy are named. Applicable only if **Usage** = **Parent**.
MembersWithData		"NonLeafDataVisible"	Used only by parent attributes to determine whether to display data members for nonleaf members in the parent attribute. Applicable only if **Usage** = **Parent**.
MembersWithDataCaption		Empty	Provides a template string that is used to create captions for system-generated data members. Applicable only if **Usage** = **Parent**.
NamingTemplateTranslations		Empty	Provides a template for naming levels of a parent-child hierarchy. Applicable only if **Usage** = **Parent**.
CustomRollupColumn		Empty	An object of type **DataItem** that defines the details of a column that provides a custom rollup formula. The **Source** element within the **DataItem** MUST be one of the following types: **ColumnBinding** **AttributeBinding**
CustomRollupPropertiesColumns		Empty	A collection of objects of type **DataItem**. Collection that defines the details of column(s) providing properties of the custom rollup. The **Source** element within the **DataItem** MUST be one of the following types: **ColumnBinding** **AttributeBinding**
UnaryOperatorColumn		Empty	An object of type **DataItem** that defines the details of a column that provides a unary operator. Applicable only if **Usage** = **Parent**. The **Source** element within the **DataItem** MUST be one of the following

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Element	Read-Only	Default	Description
			types: **ColumnBinding** **AttributeBinding**
AttributeHierarchyOrdered		True	When true, indicates that **AttributeHierarchies** are ordered; otherwise, false.
MemberNamesUnique		False	When true, indicates that **Member** names are unique; otherwise, false.
IsAggregatable		True	When true, indicates that this **Attribute** is aggregatable; otherwise, false.
AttributeHierarchyEnabled		True	When true, indicates that an **AttributeHierarchy** is enabled for this attribute; otherwise, false.
AttributeHierarchyOptimizedState		"FullyOptimized"	Indicates the type of optimization for this **AttributeHierarchy**.
AttributeHierarchyVisible		False	When true, indicates that an **AttributeHierarchy** is visible; otherwise, false.
AttributeHierarchyDisplayFolder		Empty	Indicates the name of the **AttributeHierarchy** display folder.
KeyUniquenessGuarantee		False	When true, indicates that the relationship between the attribute key and its name, and the relationship to related attributes, is guaranteed to be valid; otherwise, false.
GroupingBehavior		"EncourageGrouping"	Indicates which type of **GroupingBehavior** will be applied to this **Attribute**.
InstanceSelection		"None"	Provides a hint to client applications to suggest how a list of items should be displayed, based on the expected number of items in the list.
Annotations		Empty	Collection of **Annotation** objects.
ProcessingState	Yes		Represents the processing state of the attribute. For calculated columns, any of the

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Element	Read-Only	Default	Description
			five available enumeration values may appear. **Attributes** that are not calculated columns can have only the values **Processed** or **Unprocessed**.<16>

2.2.4.2.2.8.1.1 AttributeRelationship

This complex type represents a relationship between two attributes in a dimension.

```
<xsd:complexType name="AttributeRelationship">
  <xsd:all>
    <xsd:element name="AttributeID" type="xsd:string" />
    <xsd:element name="RelationshipType" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Rigid" />
          <xsd:enumeration value="Flexible" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Cardinality" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Many" />
          <xsd:enumeration value="One" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Optionality" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Mandatory" />
          <xsd:enumeration value="Optional" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="OverrideBehavior" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="None" />
          <xsd:enumeration value="Strong" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
```


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```
      <xsd:element name="Name" type="xsd:string" minOccurs="0" />
      <xsd:element name="Visible" type="xsd:boolean"  minOccurs="0" />
      <xsd:element name="Translations"  minOccurs="0">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="Translation"  type="Translation" minOccurs="0"
                         maxOccurs="unbounded"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
    </xsd:all>
  </xsd:complexType>
```

Element	Read-Only	Default	Description
AttributeID		[Required]	The ID for the object.
RelationshipType		"Flexible"	Indicates whether the attribute relationship is Flexible or Rigid. Flexible and rigid relationships are enforced. Flexible relationships can change over time. Rigid relationships cannot.
Cardinality		"Many"	Indicates if the related attribute has a many-to-one or one-to-one relationship with this attribute.
Optionality		"Mandatory"	Indicates if each member in a related attribute is associated with at least one member in this attribute.
OverrideBehavior		"Strong"	Indicates the override behavior of the relationship described by an **AttributeRelationship** element. Dictates how positioning on one attribute affects the position of the other.
Annotation		Empty	A collection of **Annotation** objects.
Name		Default is to use Attribute name.	The name of the **AttributeRelationship**.
Visible		True	When true, indicates that the relationship is visible to clients; otherwise, false.
Translations		Empty	A collection of **Translation** objects.

2.2.4.2.2.8.2 Hierarchy

This complex type represents a hierarchy in a dimension.

```
<xsd:complexType name="Hierarchy">
  <xsd:all>
    <xsd:element name="Name" type="xsd:string"/>
    <xsd:element name="ID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Description" type="xsd:string" minOccurs="0"/>
    <xsd:element name="DisplayFolder" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Translations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Translation"  type="Translation" minOccurs="0"
```


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```
                    maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="AllMemberName" type="xsd:string" minOccurs="0"/>
    <xsd:element name="AllMemberTranslations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="AllMemberTranslation"  type="Translation"
                    minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="MemberNamesUnique" type="xsd:boolean" minOccurs="0" />
    <xsd:element ref="eng2:MemberKeysUnique" minOccurs="0" />
    <xsd:element name="AllowDuplicateNames" type="xsd:boolean" minOccurs="0"/>
    <xsd:element name="Levels" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Level"  type="Level" minOccurs="0"
                    maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                    maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

The **Hierarchy** XSD depends upon element definitions in namespaces other than the default namespace.The following elements are defined in the namespace **eng2**:

```
<xsd:element name="MemberKeysUnique" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="NotUnique" />
      <xsd:enumeration value="Unique" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="Version">
  <xsd:complexType>
    <xsd:attribute name="Sequence" type="xsd:int" />
  </xsd:complexType>
</xsd:element>
```


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Element	Read-Only	Default	Description
Name		[Required]	The object name.
ID		Defaults to **Name**.	The object ID string.
Description		Empty	The object description.
DisplayFolder		Empty	Defines the display folder for the hierarchy, for use by clients.
Translations		Empty	A collection of Translation objects.
AllMemberName		Empty	The caption for **AllMember** in **DefaultLanguage**.
AllMemberTranslations		Empty	A collection of **Translation** objects for the **All Member**.
MemberNamesUnique		False	When true, indicates that **MemberNames** are required to be unique; otherwise, false.
MemberKeysUnique		"NotUnique"	Specifies whether member keys are required to be unique.<17>
AllowDuplicateNames		True	When true, determines that duplicate names are allowed in a **Hierarchy** element; otherwise, false.
Levels		Empty	A collection of **Level** objects.
Annotations		Empty	A collection of **Annotation** objects.

2.2.4.2.2.8.2.1 Level

Defines a **level** in a **Hierarchy**.

```
<xsd:complexType name="Level">
  <xsd:all>
    <xsd:element name="Name" type="xsd:string" minOccurs="0"/>
    <xsd:element name="ID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Description" type="xsd:string" minOccurs="0"/>
    <xsd:element name="SourceAttributeID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="HideMemberIf" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Never" />
          <xsd:enumeration value="OnlyChildWithNoName" />
          <xsd:enumeration value="OnlyChildWithParentName" />
          <xsd:enumeration value="NoName" />
          <xsd:enumeration value="ParentName" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Translations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
```


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```
            <xsd:element name="Translation"  type="Translation" minOccurs="0"
                         maxOccurs="unbounded"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:element name="Annotations" minOccurs="0">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                         maxOccurs="unbounded"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
    </xsd:all>
  </xsd:complexType>
```

Element	Read-Only	Default	Description
Name		Defaults to name of the Attribute.	The object name.
ID		Defaults to **Name**.	The object ID string.
Description		Empty	The object description.
SourceAttributeID		Default is for **Level** to be based on the containing Attribute.	The ID of the source attribute on which the level is based. This can be an attribute from a referenced dimension.
HideMemberIf		"Never"	Indicates whether and when a level member should be hidden from client applications. The enumeration values are: ▪ **Never** - Members are never hidden. ▪ **OnlyChildWithNoName** - A member is hidden when it is the only child of its parent and its name is empty. ▪ **OnlyChildWithParentName** - A member is hidden when it is the only child of its parent and its name is identical to that of its parent. ▪ **NoName** - A member is hidden when its name is empty. ▪ **ParentName** - A member is hidden when its name is identical to that of its parent.
Translations		Empty	A collection of **Translation** objects.
Annotations		Empty	A collection of **Annotation** objects.

2.2.4.2.2.9 Cube

The **Cube** complex type represents a cube.

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```
<xsd:complexType name="Cube">
  <xsd:complexContent>
    <xsd:extension base="MajorObject">
      <xsd:all>
        <!--These elements are common to each MajorObject-->
        <xsd:element name="Name"  type="xsd:string" />
        <xsd:element name="ID"  type="xsd:string" minOccurs="0" />
        <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="Description" type="xsd:string" minOccurs="0" />
        <xsd:element name="Annotation"  minOccurs="0" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                           maxOccurs="unbounded" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <!--Extended elements for Cube object-->
        <xsd:element name="Language" type="xsd:integer" minOccurs="0"/>
        <xsd:element name="Collation" type="xsd:string" minOccurs="0"/>
        <xsd:element name="Translations" minOccurs="0" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Translation" type="Translation" minOccurs="0"
                           maxOccurs="unbounded" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="Dimensions"  minOccurs="0" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Dimension"  type="CubeDimension" minOccurs="0"
                           maxOccurs="unbounded" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="CubePermissions"  minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="CubePermission"  minOccurs="0"
                           maxOccurs="unbounded" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="MdxScripts"  minOccurs="0" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="MdxScript"  type="MdxScript" minOccurs="0"
                           maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="Perspectives"  minOccurs="0" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Perspective"  type="Perspective" minOccurs="0"
                           maxOccurs="unbounded"/>
```


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```
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="State"  minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="Processed" />
      <xsd:enumeration value="PartiallyProcessed" />
      <xsd:enumeration value="Unprocessed" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="DefaultMeasure" type="xsd:string" minOccurs="0"/>
<xsd:element name="Visible" type="xsd:boolean" minOccurs="0"/>
<xsd:element name="MeasureGroups" minOccurs="0" >
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="MeasureGroup"  type="MeasureGroup" minOccurs="0"
                   maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="Source" type="DataSourceViewBinding" minOccurs="0"/>
<xsd:element name="AggregationPrefix" type="xsd:string" minOccurs="0"/>
<xsd:element name="ProcessingPriority" type="xsd:integer" minOccurs="0"/>
<xsd:element name="StorageMode" minOccurs="0">
  <xsd:complexType>
    <xsd:simpleContent>
      <xsd:extension base="CubeStorageModeEnumType">
        <xsd:attribute name="valuens" >
          <xsd:simpleType>
            <xsd:restriction base="xsd:string">
              <xsd:enumeration value=
 "http://schemas.microsoft.com/analysisservices/2010/engine/200/200" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:attribute>
      </xsd:extension>
    </xsd:simpleContent>
  </xsd:complexType>
</xsd:element>
<xsd:element name="ProcessingMode" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="Regular" />
      <xsd:enumeration value="LazyAggregations" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="ScriptCacheProcessingMode"  minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="Regular" />
      <xsd:enumeration value="Lazy" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="ScriptErrorHandlingMode" minOccurs="0">
  <xsd:simpleType>
```


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```
            <xsd:restriction base="xsd:string">
              <xsd:enumeration value="IgnoreNone" />
              <xsd:enumeration value="IgnoreAll" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="ProactiveCaching" type="ProactiveCaching"
                     minOccurs="0" />
        <xsd:element name="Kpis" minOccurs="0" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Kpi"  type="Kpi" minOccurs="0"
                           maxOccurs="unbounded" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="ErrorConfiguration" type="ErrorConfiguration"
                     minOccurs="0"/>
        <xsd:element name="Actions" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Action" minOccurs="0" maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="StorageLocation" type="xsd:string" minOccurs="0"/>
        <xsd:element name="EstimatedRows" type="xsd:long" minOccurs="0"/>
        <xsd:element name="LastProcessed" type="xsd:dateTime" minOccurs="0"/>
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
<xsd:simpleType name="CubeStorageModeEnumType">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="Molap" />
    <xsd:enumeration value="Rolap" />
    <xsd:enumeration value="Holap" />
    <xsd:enumeration value="InMemory" />
  </xsd:restriction>
</xsd:simpleType>
```

Also included in the **Cube** object are all elements from MajorObject.

Element	Read-Only	Default	Description
Language		Empty	The LCID of the language to use by default. See [MS-LCID] for information about LCIDs. If empty the server will determine the language to use.<18>
Collation		Empty	The collation to use by default.<19>
Translations		Empty	A collection of Translation objects.
Dimensions		Empty	A collection of CubeDimension objects. A Dimension MUST NOT have same name as a

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Element	Read-Only	Default	Description
			MeasureGroup.
CubePermissions		Empty	A collection of CubePermission objects.
MdxScripts		Empty	A collection of MdxScript objects.
Perspectives		Empty	A collection of Perspective objects. A perspective is a subset of the features of a cube. A perspective contains subsets of objects from a cube.
State	Yes		Represents the **Cube** state on the server.
DefaultMeasure		Empty	The MDX expression that defines the default measure.
Visible		True	When true, indicates that the cube is visible to a client; otherwise, false.
MeasureGroups		Empty	A collection of **MeasureGroup** objects.
Source		Empty	A reference to the source data for the cube. Only for a cube with a relational data source. For a cube with an OLAP data source, this element MUST be empty.
AggregationPrefix		Empty	A text prefix used on tables used for aggregation.
ProcessingPriority		Zero	The priority for processing.
StorageMode		"Molap"	Determines the default storage mode for the cube. MAY be overridden per **measure group** and partition.
ProcessingMode		"Regular"	Indicates whether the server indexes and aggregates during processing or afterward. Provides the default for the cube, and can be overridden per partition.
ScriptCacheProcessingMode		"Regular"	Indicates whether the server should build the script cache during processing or afterwards.
ScriptErrorHandlingMode		"IgnoreNone"	Indicates how MDX script errors are handled by the server.
ProactiveCaching		Empty	This object sets parameters to control proactive caching.
Kpis		Empty	A collection of key performance indicator (KPI) objects. A KPI is a quantifiable measurement for gauging business success.
ErrorConfiguration		Empty	This object sets parameters to control error handling.
Actions		Empty	A collection of Action objects.

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Element	Read-Only	Default	Description
StorageLocation		Empty	The file system storage location for the cube. Provides the default for the cube. The default MAY be overridden for each partition.
EstimatedRows			Contains the estimated number of rows.
LastProcessed	Yes		A timestamp indicating the date and time when the object was last processed.

2.2.4.2.2.9.1 CubeDimension

The **CubeDimension** complex type defines the dimensions that are part of a cube.

```
<xsd:complexType name="CubeDimension">
  <xsd:all>
    <xsd:element name="ID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Name" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Description" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Translations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Translation"  type="Translation" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="DimensionID" type="xsd:string"/>
    <xsd:element name="Visible" type="xsd:boolean" minOccurs="0"/>
    <xsd:element name="AllMemberAggregationUsage" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="Full" />
          <xsd:enumeration value="None" />
          <xsd:enumeration value="UnRestricted" />
          <xsd:enumeration value="Default" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="HierarchyUniqueNameStyle"  minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="IncludeDimensionName" />
          <xsd:enumeration value="ExcludeDimenionName" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="MemberUniqueNameStyle" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="Native" />
          <xsd:enumeration value="NamePath" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
```


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```
      <xsd:element name="Attributes" minOccurs="0">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="Attribute"  type="CubeAttribute" minOccurs="0"
                         maxOccurs="unbounded"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:element name="Hierarchies" minOccurs="0">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="Hierarchy"  type="CubeHierarchy" minOccurs="0"
                         maxOccurs="unbounded"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:element name="Annotations" minOccurs="0">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                         maxOccurs="unbounded"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
    </xsd:all>
  </xsd:complexType>
```

Element	Read-Only	Default	Description
ID		Defaults to Name.	The object ID.
Name		Defaults to Dimension Name pointed to by DimensionID.	The object name.
Description		Empty	The object description.
Translations		Empty	A collection of Translation objects.
DimensionID		[Required]	The ID of the dimension to which this **CubeDimension** points.
Visible		True	When true, specifies that this object is visible; otherwise, false.
AllMemberAggregationUsage		"Default"	Specifies how aggregations should be designed for the All member. The enumeration values are as follows: ▪ Full - Every aggregation for the cube must include the All member. ▪ None - No aggregation for

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Element	Read-Only	Default	Description
			the cube should include the All member. ▪ Unrestricted - No restrictions are placed on the Aggregation Designer. ▪ Default - Same as Unrestricted.
HierarchyUniqueNameStyle		"IncludeDimensionName"	Determines how the system will generate unique names for dimensions.
MemberUniqueNameStyle		"Native"	Determines how the system will generate unique names for members. Enumeration values are as follows: ▪ Native – The instance automatically determines the unique names of members. ▪ NamePath - The instance generates a compound name consisting of each level and the caption of the member.
Attributes		Empty	A collection of CubeAttribute objects.
Hierarchies		Empty	A collection of CubeHierarchy objects.
Annotations		Empty	A collection of Annotation objects.

2.2.4.2.2.9.2 CubeAttribute

The **CubeAttribute** complex type defines details for an attribute on a cube. The server SHOULD implicitly include any attributes not specified in the collection with their default values.<20>

```
<xsd:complexType name="CubeAttribute">
  <xsd:all>
    <xsd:element name="AttributeID" type="xsd:string"/>
    <xsd:element name="AggregationUsage"  minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="Full" />
          <xsd:enumeration value="None" />
          <xsd:enumeration value="UnRestricted" />
          <xsd:enumeration value="Default" />
```


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```
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="AttributeHierarchyOptimizedState" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="FullyOptimized" />
          <xsd:enumeration value="NotOptimized" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="AttributeHierarchyEnabled" type="xsd:boolean" minOccurs="0"/>
    <xsd:element name="AttributeHierarchyVisible" type="xsd:boolean" minOccurs="0"/>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
AttributeID		[Required]	The ID of the attribute that is pointed to by this object.
AggregationUsage		"Default"	A string that specifies how aggregations should be designed for this attribute. Enumeration values are the same as for **AllMemberAggregationUsage**.
AttributeHierarchyOptimizedSta		"FullyOptimized"	Specifies the optimization for **AttributeHierarchy**.
AttributeHierarchyEnabled		True	When true, this Boolean determines that an **AttributeHierarchy** is enabled for this attribute. This value is ignored if AttributeHierarchyEnabled=False on the DimensionAttribute.
AttributeHierarchyVisible		True	When true, this Boolean controls the visibility of this **CubeAttribute**. This value is ignored if the AttributeHierarchyVisible=False on the **DimensionAttribute** that is pointed to by **AttributeID**.
Annotations		Empty	A collection of Annotation objects.

2.2.4.2.2.9.3 CubeHierarchy

The **CubeHierarchy** complex type defines details for a hierarchy on a cube.

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The server SHOULD implicitly include any hierarchies not specified in the collection with their default values.<21>

```
<xsd:complexType name="CubeHierarchy">
  <xsd:all>
    <xsd:element name="HierarchyID" type="xsd:string"/>
    <xsd:element name="OptimizedState" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="FullyOptimized" />
          <xsd:enumeration value="NotOptimized" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Visible" type="xsd:boolean" minOccurs="0"/>
    <xsd:element name="Enabled" type="xsd:boolean" minOccurs="0"/>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
HierarchyID		[Required]	The ID of the hierarchy that this hierarchy points to.
OptimizedState		"FullyOptimized"	Specifies the degree of optimization for this object.
Visible		True	When true, determines that this **CubeHierarchy** is visible; otherwise, false.
Enabled		True	When true, determines that this **CubeHierarchy** is enabled; otherwise, false.
Annotations		Empty	A collection of Annotation objects.

2.2.4.2.2.9.4 Kpi

The **Kpi** complex type represents a KPI.

```
<xsd:complexType name="Kpi">
  <xsd:all>
    <xsd:element name="Name" type="xsd:string"/>
    <xsd:element name="ID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Description" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Translations"  minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Translation"  type="Translation" minOccurs="0"
```


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```
                    maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="DisplayFolder" type="xsd:string" minOccurs="0"/>
    <xsd:element name="AssociatedMeasureGroupID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Value" type="xsd:string"/>
    <xsd:element name="Goal" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Status" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Trend" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Weight" type="xsd:string" minOccurs="0"/>
    <xsd:element name="TrendGraphic" type="xsd:string" minOccurs="0"/>
    <xsd:element name="StatusGraphic" type="xsd:string" minOccurs="0"/>
    <xsd:element name="CurrentTimeMember" type="xsd:string" minOccurs="0"/>
    <xsd:element name="ParentKpiID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Annotations"  minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                    maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
Name		[Required]	The object name.
ID		Defaults to Name.	The ID string for the object.
Description		Empty	The object description.
Translations		Empty	A collection of Translation objects.
DisplayFolder		Empty	The folder in which to display the object.
AssociatedMeasureGroupID		Empty	The MeasureGroup that the object refers to.
Value		[Required]	The value for this KPI. An MDX expression that evaluates to a number.
Goal		Empty	The goal for this KPI. An MDX expression that evaluates to a number.
Status		Empty	The status for this KPI. An MDX expression that evaluates to a number.
Trend		Empty	The trend for this KPI. An MDX expression that evaluates to a number.
Weight		Empty	The weight for this KPI. An MDX numeric expression that assigns a relative importance to a KPI.
TrendGraphic		Empty	The recommended graphic to represent the trend

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Element	Read-Only	Default	Description
			of this KPI.<22>
StatusGraphic		Empty	The recommended graphic to represent the status of this KPI.<23>
CurrentTimeMember		Empty	The **CurrentTimeMember** that applies to this KPI. An MDX expression that returns the member that identifies the temporal context of the KPI.
ParentKpiID		Empty	The ID for a parent KPI (if any) for this KPI.
Annotations		Empty	A collection of Annotation objects.

2.2.4.2.2.9.5 Action

This complex type represents an action.

Action is an abstract type, and types for derived **Action** types are derived from it. Therefore, the XSD for action does not show the elements; instead they are shown within the XSD of each of the derived types. However, all the elements in the base type are explained in the table in this section.

```
<xsd:complexType name="Action" abstract="true" />
```

Element	Read-Only	Default	Description
Name		[Required]	The object name.
ID		Defaults to Name	The object ID string.
Caption		Empty	The caption displayed for the action. Can be an MDX expression.
CaptionIsMdx		False	When true, specifies that the caption is an MDX expression; otherwise, false.
Translations		Empty	A collection of Translation objects.
TargetType		[Required]	The type of OLAP object to which this **Action** applies.
Target		Empty	Identifies the target for this **Action**. The specified **Target** MUST be an object of type **TargetType**.
Condition		Empty	An MDX expression that determines if the action applies. If false, the action does not apply.
Type		[Required]	The type of action. The **Drillthrough** type can only be defined with actions where the target type is Cells. The **Drillthrough** type is referenced in the MDSCHEMA_ACTIONS schema rowset, Action_Type column, as a Rowset action (0x010). The report action is exposed in the MDSCHEMA_ACTIONS schema rowset, Action_Type column, as a URL action(0x01). Note that for the derived types ReportAction and the DrillThroughAction, this value MUST be set to "Report" and "Drillthrough", respectively.

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Element	Read-Only	Default	Description
Invocation		Empty	An enumeration value that determines how the action is invoked.
Application		Empty	Identifies the application associated with an **Action** element.
Description		Empty	The object description.
Annotations		Empty	A collection of **Annotation** objects.

2.2.4.2.2.9.5.1 StandardAction

This complex type represents a standard action.

The **StandardAction** type extends the Action type and also includes all elements of **Action**. The XSD includes all the elements from the base class and the additional elements in the derived class.

```
<xsd:complexType name="StandardAction">
  <xsd:complexContent>
    <xsd:extension base="Action">
      <xsd:all>
        <!--These elements are inherited from Action-->
        <xsd:element name="Name" type="xsd:string"/>
        <xsd:element name="ID" type="xsd:string" minOccurs="0"/>
        <xsd:element name="Caption" type="xsd:string" minOccurs="0"/>
        <xsd:element name="CaptionIsMdx" type="xsd:boolean" minOccurs="0"/>
        <xsd:element name="Translations" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Translation"  type="Translation" minOccurs="0"
                           maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="TargetType" >
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="Cube" />
              <xsd:enumeration value="Cells" />
              <xsd:enumeration value="Set" />
              <xsd:enumeration value="Hierarchy" />
              <xsd:enumeration value="Level" />
              <xsd:enumeration value="DimensionMembers" />
              <xsd:enumeration value="HierarchyMembers" />
              <xsd:enumeration value="LevelMembers" />
              <xsd:enumeration value="AttributeMembers" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="Target" type="xsd:string" minOccurs="0"/>
        <xsd:element name="Condition" type="xsd:string" minOccurs="0"/>
        <xsd:element name="Type" >
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="Url" />
```


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```
              <xsd:enumeration value="Html" />
              <xsd:enumeration value="Statement" />
              <xsd:enumeration value="Drillthrough" />
              <xsd:enumeration value="Dataset" />
              <xsd:enumeration value="Rowset" />
              <xsd:enumeration value="CommandLine" />
              <xsd:enumeration value="Proprietary" />
              <xsd:enumeration value="Report" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="Invocation" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="Interactive" />
              <xsd:enumeration value="OnOpen" />
              <xsd:enumeration value="Batch" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="Application" type="xsd:string" minOccurs="0"/>
        <xsd:element name="Description" type="xsd:string" minOccurs="0"/>
        <xsd:element name="Annotations" minOccurs="0" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                           maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <!--Extended elements for StandardAction object-->
        <xsd:element name="Expression" type="xsd:string"/>
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
```

The following table only includes the elements in **StandardAction** that are in addition to those in the base **Action** class.

Element	Read-Only	Default	Description
Expression		[Required]	An MDX expression that determines the content of the action. If the expression is blank, there is no action on the target.

2.2.4.2.2.9.5.2 ReportAction

This complex type represents an action that invokes a report.

ReportAction extends Action, and includes all the elements in **Action**. The XSD includes all the elements from the base class and the additional elements in the derived class.

```
<xsd:complexType name="ReportAction">
  <xsd:complexContent>
```


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```
<xsd:extension base="Action">
  <xsd:all>
    <!--These elements are inherited from Action-->
    <xsd:element name="Name" type="xsd:string"/>
    <xsd:element name="ID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Caption" type="xsd:string" minOccurs="0"/>
    <xsd:element name="CaptionIsMdx" type="xsd:boolean" minOccurs="0"/>
    <xsd:element name="Translations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Translation"  type="Translation" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="TargetType" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Cube" />
          <xsd:enumeration value="Cells" />
          <xsd:enumeration value="Set" />
          <xsd:enumeration value="Hierarchy" />
          <xsd:enumeration value="Level" />
          <xsd:enumeration value="DimensionMembers" />
          <xsd:enumeration value="HierarchyMembers" />
          <xsd:enumeration value="LevelMembers" />
          <xsd:enumeration value="AttributeMembers" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Target" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Condition" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Type" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Url" />
          <xsd:enumeration value="Html" />
          <xsd:enumeration value="Statement" />
          <xsd:enumeration value="Drillthrough" />
          <xsd:enumeration value="Dataset" />
          <xsd:enumeration value="Rowset" />
          <xsd:enumeration value="CommandLine" />
          <xsd:enumeration value="Proprietary" />
          <xsd:enumeration value="Report" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Invocation" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Interactive" />
          <xsd:enumeration value="OnOpen" />
          <xsd:enumeration value="Batch" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Application" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Description" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Annotations" minOccurs="0" >
```


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```
            <xsd:complexType>
              <xsd:sequence>
                <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                             maxOccurs="unbounded"/>
              </xsd:sequence>
            </xsd:complexType>
          </xsd:element>
          <!--Extended elements for ReportAction object-->
          <xsd:element name="ReportServer" type="xsd:string"/>
          <xsd:element name="Path" type="xsd:string" minOccurs="0"/>
          <xsd:element name="ReportParameters" minOccurs="0">
            <xsd:complexType>
              <xsd:sequence>
                <xsd:element name="ReportParameter" type="ReportParameter"
                             minOccurs="0" maxOccurs="unbounded"/>
              </xsd:sequence>
            </xsd:complexType>
          </xsd:element>
          <xsd:element name="ReportFormatParameters" minOccurs="0">
            <xsd:complexType>
              <xsd:sequence>
                <xsd:element name="ReportFormatParameter"
                             type="ReportFormatParameter"
                             minOccurs="0" maxOccurs="unbounded"/>
              </xsd:sequence>
            </xsd:complexType>
          </xsd:element>
        </xsd:all>
      </xsd:extension >
    </xsd:complexContent>
  </xsd:complexType>
```

ReportAction inherits all elements from **Action**. The following table shows only the elements that are in addition to those contained in the **Action** base class.

Element	Read-Only	Default	Description
ReportServer		[Required]	The name of the computer on which the report server is running.
Path			The path pointing to the report in the report server.
ReportParameters			A collection of type ReportParameter, which is passed to a specific report and handled according to the specification in that report for that parameter.
ReportFormatParameters			A collection of type ReportFormatParameter, which is passed to a specific report to affect the formatting of the report. The parameter is handled according to the specification in that report for that parameter.

2.2.4.2.2.9.5.2.1 ReportParameter

Each **ReportParameter** is a name-value pair. As a collection, it is the parameters needed for a report.

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```
<xsd:complexType name="ReportParameter">
  <xsd:all>
    <xsd:element name="Name" type="xsd:string"/>
    <xsd:element name="Value" type="xsd:string"/>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
Name			The name of the report parameter.
Value			An MDX expression that represents the parameter value.

2.2.4.2.2.9.5.2.2 ReportFormatParameter

Parameter for formatting a report.

```
<xsd:complexType name="ReportFormatParameter">
  <xsd:all>
    <xsd:element name="Name" type="xsd:string"/>
    <xsd:element name="Value" type="xsd:string"/>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
Name			The name of the report format parameter.
Value			The parameter value. (This is not an MDX expression, as it is in the ReportParameter object.)

2.2.4.2.2.9.5.3 DrillThroughAction

This complex type represents an action that returns the underlying detail data associated with a cell.

DrillThroughAction inherits all elements from Action.

```
<xsd:complexType name="DrillThroughAction">
  <xsd:complexContent>
    <xsd:extension base="Action">
      <xsd:all>
        <!--These elements are inherited from Action-->
        <xsd:element name="Name" type="xsd:string"/>
        <xsd:element name="ID" type="xsd:string" minOccurs="0"/>
        <xsd:element name="Caption" type="xsd:string" minOccurs="0"/>
        <xsd:element name="CaptionIsMdx" type="xsd:boolean" minOccurs="0"/>
        <xsd:element name="Translations" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Translation"  type="Translation"
                           minOccurs="0" maxOccurs="unbounded"/>
            </xsd:sequence>
```


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```
  </xsd:complexType>
</xsd:element>
<xsd:element name="TargetType" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="Cube" />
      <xsd:enumeration value="Cells" />
      <xsd:enumeration value="Set" />
      <xsd:enumeration value="Hierarchy" />
      <xsd:enumeration value="Level" />
      <xsd:enumeration value="DimensionMembers" />
      <xsd:enumeration value="HierarchyMembers" />
      <xsd:enumeration value="LevelMembers" />
      <xsd:enumeration value="AttributeMembers" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="Target" type="xsd:string" minOccurs="0"/>
<xsd:element name="Condition" type="xsd:string" minOccurs="0"/>
<xsd:element name="Type" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="Url" />
      <xsd:enumeration value="Html" />
      <xsd:enumeration value="Statement" />
      <xsd:enumeration value="Drillthrough" />
      <xsd:enumeration value="Dataset" />
      <xsd:enumeration value="Rowset" />
      <xsd:enumeration value="CommandLine" />
      <xsd:enumeration value="Proprietary" />
      <xsd:enumeration value="Report" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="Invocation" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="Interactive" />
      <xsd:enumeration value="OnOpen" />
      <xsd:enumeration value="Batch" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="Application" type="xsd:string" minOccurs="0"/>
<xsd:element name="Description" type="xsd:string" minOccurs="0"/>
<xsd:element name="Annotations" minOccurs="0" >
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                   maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<!--Extended elements for DrillThroughAction object-->
<xsd:element name="Default" type="xsd:boolean" minOccurs="0"/>
<xsd:element name="Columns" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Column"  type="Binding" minOccurs="0"
```


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```
                        maxOccurs="unbounded"/>
              </xsd:sequence>
            </xsd:complexType>
          </xsd:element>
          <xsd:element name="MaximumRows" type="xsd:integer" minOccurs="0"/>
        </xsd:all>
      </xsd:extension >
    </xsd:complexContent>
  </xsd:complexType>
```

DrillThroughAction inherits all elements from **Action**. The elements shown in this table are in addition to those contained in the **Action** base class.

Element	Read-Only	Default	Description
Default		False	A Boolean, which, when set to true, sets this **DrillThroughAction** as the default **DrillThroughAction**; otherwise, false.
Columns			A collection of **Column** objects that define the results to be returned in the drillthrough. Each column object is of type **Binding**. However, one of the following derived classes MUST be used: ▪ MeasureBinding ▪ CubeAttributeBinding If no columns are defined, all are returned.
MaximumRows			The maximum number of rows that should be returned in the resulting rowset.

2.2.4.2.2.10 MdxScript

This complex type represents a script containing MDX calculations.

```
<xsd:complexType name="MdxScript">
  <xsd:complexContent>
    <xsd:extension base="MajorObject">
      <xsd:all>
        <!--These elements are common to each MajorObject-->
        <xsd:element name="Name"  type="xsd:string" />
        <xsd:element name="ID"  type="xsd:string" minOccurs="0" />
        <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="Description" type="xsd:string" minOccurs="0" />
        <xsd:element name="Annotation"  minOccurs="0" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                           maxOccurs="unbounded" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <!--Extended elements for MdxScript object-->
```


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```
        <xsd:element name="Commands" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Command"  type="Command" minOccurs="0"
                           maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="DefaultScript" type="xsd:boolean" minOccurs="0"/>
        <xsd:element name="CalculationPropertyies" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="CalculationProperty"  type="CalculationProperty"
                           minOccurs="0" maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
```

Also included in the **MdxScript** object are all elements from MajorObject.

Element	Read-Only	Default	Description
Commands		Empty	A collection of command objects.
DefaultScript		True	When true, indicates that this script is the default script; otherwise, false.
CalculationProperties		Empty	A collection of CalculationProperty objects.

2.2.4.2.2.10.1 CalculationProperty

This complex type represents properties associated with a calculation in the MDX script.

```
<xsd:complexType name="CalculationProperty">
    <xsd:all>
      <xsd:element name="CalculationReference" type="xsd:string"/>
      <xsd:element name="CalculationType">
        <xsd:simpleType>
          <xsd:restriction base="xsd:string">
            <xsd:enumeration value="Member" />
            <xsd:enumeration value="Set" />
            <xsd:enumeration value="Cells" />
          </xsd:restriction>
        </xsd:simpleType>
      </xsd:element>
      <xsd:element name="Translations" minOccurs="0">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="Translation"  type="Translation" minOccurs="0"
                         maxOccurs="unbounded"/>
          </xsd:sequence>
```


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```
        </xsd:complexType>
      </xsd:element>
      <xsd:element name="Description" type="xsd:string" minOccurs="0"/>
      <xsd:element name="Visible" type="xsd:boolean" minOccurs="0"/>
      <xsd:element name="SolveOrder" type="xsd:integer" minOccurs="0"/>
      <xsd:element name="FormatString" type="xsd:string" minOccurs="0"/>
      <xsd:element name="ForeColor" type="xsd:string" minOccurs="0"/>
      <xsd:element name="BackColor" type="xsd:string" minOccurs="0"/>
      <xsd:element name="FontName" type="xsd:string" minOccurs="0"/>
      <xsd:element name="FontSize" type="xsd:string" minOccurs="0"/>
      <xsd:element name="FontFlags" type="xsd:string" minOccurs="0"/>
      <xsd:element name="NonEmptyBehavior" type="xsd:string" minOccurs="0"/>
      <xsd:element name="AssociatedMeasureGroupID" type="xsd:string" minOccurs="0"/>
      <xsd:element name="DisplayFolder" type="xsd:string" minOccurs="0"/>
      <xsd:element name="Language" type="xsd:integer" minOccurs="0"/>
    </xsd:all>
  </xsd:complexType>
```

Element	Read-Only	Default	Description
CalculationReference		[Required]	The name of the object to which the **CalculationProperty** applies.
CalculationType		[Required]	Specifies the type of calculation to which the **CalculationProperty** applies.
Translations		Empty	A collection of objects of type Translation.
Description		Empty	The object description.
Visible		True	When true, indicates that this object is visible to the user; otherwise, false. Applies to **Set** and **Member**.
SolveOrder		Empty	Indicates the solve order in which the **CalculationProperty** element is applied to a calculated member or calculated cell definition. Applies to **Member** and **Cell CalculationType**.
FormatString		Empty	An MDX expression that defines the **FormatString** to be used in the display. Applies to **Member** and **Cell CalculationType**.
ForeColor		Empty	An MDX expression that defines the **ForeColor** to be used in the display. Applies to **Member** and **Cell CalculationType**.
BackColor		Empty	An MDX expression that defines the **BackColor** to be used in the display. Applies to **Member** and **Cell CalculationType**.
FontName		Empty	An MDX expression that defines the **FontName** to be used in the display. Applies to **Member** and **Cell CalculationType**.
FontSize		Empty	An MDX expression that defines the **FontSize** to be used in the display. Applies to **Member** and **Cell CalculationType**.

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Element	Read-Only	Default	Description
FontFlags		Empty	An MDX expression that defines the **FontFlags** to be used in the display. Applies to **Member** and **Cell CalculationType**.
NonEmptyBehavior		Empty	A valid MDX **Set** expression that only applies when **CalculationType** is set to "Member".
AssociatedMeasureGroupID		Empty	The ID of the measure group with which this calculation is associated.
DisplayFolder		Empty	The folder in which to list the parent **CalculationProperty** object. Applies to **Member** and **Set CalculationType**.
Language		Empty	The LCID of the language to use by default. See [MS-LCID] for information about LCIDs. If empty, the server will determine the language to use.<24>

2.2.4.2.2.10.2 Command

This complex type represents command in the MDX script.

```
<xsd:complexType name="Command">
  <xsd:all>
    <xsd:element name="Text" type="xsd:string"/>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
Text		[Required]	The MDX command text.

2.2.4.2.2.11 MeasureGroup

This complex type represents a measure group in the cube.

```
<xsd:complexType name="MeasureGroup">
  <xsd:complexContent>
    <xsd:extension base="MajorObject">
      <xsd:all>
        <!--These elements are common to each MajorObject-->
        <xsd:element name="Name"  type="xsd:string" />
        <xsd:element name="ID"  type="xsd:string" minOccurs="0" />
        <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="Description" type="xsd:string" minOccurs="0" />
        <xsd:element name="Annotation"  minOccurs="0" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Annotation" type="Annotation" minOccurs="0"
```


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```
                maxOccurs="unbounded" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<!--Extended elements for MeasureGroup object-->
<xsd:element name="LastProcessed" type="xsd:dateTime" minOccurs="0"/>
<xsd:element name="Translations" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Translation"  type="Translation" minOccurs="0"
                maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="Type" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="Regular" />
      <xsd:enumeration value="ExchangeRate" />
      <xsd:enumeration value="Sales" />
      <xsd:enumeration value="Budget" />
      <xsd:enumeration value="FinancialReporting" />
      <xsd:enumeration value="Marketing" />
      <xsd:enumeration value="Inventory" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="State" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="Processed" />
      <xsd:enumeration value="PartiallyProcessed" />
      <xsd:enumeration value="Unprocessed" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="Measures" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Measure"  type="Measure" minOccurs="0"
                maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="DataAggregation" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="None" />
      <xsd:enumeration value="DataAggregatable" />
      <xsd:enumeration value="CacheAggregatable" />
      <xsd:enumeration value="DataAndCacheAggregatable" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="Source" type="MeasureGroupBinding" minOccurs="0" />
<xsd:element name="StorageMode" minOccurs="0">
  <xsd:complexType>
    <xsd:simpleContent>
      <xsd:extension base="MeasureGroupStorageModeEnumType">
```


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```
            <xsd:attribute name="valuens" >
              <xsd:simpleType>
                <xsd:restriction base="xsd:string">
                  <xsd:enumeration value=
      "http://schemas.microsoft.com/analysisservices/2010/engine/200/200" />
                </xsd:restriction>
              </xsd:simpleType>
            </xsd:attribute>
          </xsd:extension>
        </xsd:simpleContent>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="StorageLocation" type="xsd:string" minOccurs="0" />
    <xsd:element name="IgnoreUnrelatedDimensions" type="xsd:boolean"
                 minOccurs="0"/>
    <xsd:element name="ProactiveCaching" type="ProactiveCaching"
                 minOccurs="0" />
    <xsd:element name="EstimatedRows" type="xsd:long" minOccurs="0"/>
    <xsd:element name="ErrorConfiguration" type="ErrorConfiguration"
                 minOccurs="0" />
    <xsd:element name="EstimatedSize" type="xsd:long" minOccurs="0"/>
    <xsd:element name="ProcessingMode" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Regular"/>
          <xsd:enumeration value="LazyAggregations"/>
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Dimensions"   minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Dimension"  type="MeasureGroupDimension"
                       minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Partitions" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Partition"  type="Partition" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="AggregationPrefix" type="xsd:string" minOccurs="0"/>
    <xsd:element name="ProcessingPriority" type="xsd:integer" minOccurs="0"/>
    <xsd:element name="AggregationDesigns" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="AggregationDesign"  type="AggregationDesign"
                       minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
 </xsd:extension >
</xsd:complexContent>
</xsd:complexType>
```


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```
<xsd:simpleType name="MeasureGroupStorageModeEnumType">
  <xsd:restriction base="xsd:string" >
    <xsd:enumeration value="Molap" />
    <xsd:enumeration value="Rolap" />
    <xsd:enumeration value="Holap" />
    <xsd:enumeration value="InMemory" />
  </xsd:restriction>
</xsd:simpleType>
```

Also included in the **MeasureGroup** object are all elements from MajorObject.

Element	Read-Only	Default	Description
LastProcessed	Yes		A timestamp indicating the date and time when the **MeasureGroup** was last processed.
Translations		Empty	A collection of Translation objects.
Type		"Regular"	Provides both the server and client applications with information about the contents of the **MeasureGroup**.
State	Yes		The state of processing of the object.
Measures		Empty	A collection of Measure objects.
DataAggregation		"DataAndCacheAggregatable"	Indicates whether the server can aggregate data (persisted on disk or cached in memory).
Source		Empty	The source of data for **MeasureGroup**. MUST NOT be used if **DataSourceID** for cube is not OLAP sourced DataSourceView. If present, MUST be of type MeasureGroupBinding.
StorageMode		Default is the value from the Cube	The storage mode for this object.
StorageLocation		Default is the value from the Cube	The file system storage location.
IgnoreUnrelatedDimensions		True	When true, specifies to ignore dimensions unrelated to this **MeasureGroup** in an MDX query or expression; otherwise, false.
ProactiveCaching		Empty	Proactive caching settings for the **MeasureGroup**.

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Element	Read-Only	Default	Description
EstimatedRows		Empty	The estimated number of rows in the **MeasureGroup**.
ErrorConfiguration		Empty	Error configuration settings for this **MeasureGroup**.
EstimatedSize	Yes		The estimated size of the **MeasureGroup** in bytes.
ProcessingMode		"Regular"	The processing mode for the object.
Dimensions		Empty	A collection of type MeasureGroupDimension. None are allowed if there is a **MeasureGroupBinding** at time of creation. When returned by **DISCOVER_XML_METADATA**, at least one Dimension is always returned.
Partitions		Empty	A collection of Partition objects.
AggregationPrefix		Empty	A prefix used on tables that are used for aggregation. This serves as default for partitions in this **MeasureGroup**.
ProcessingPriority		Zero	An integer that determines the priority for processing.
AggregationDesigns		Empty	A collection of objects of type AggregationDesign.

2.2.4.2.2.11.1 MeasureGroupDimension

This complex type represents the relationship between a CubeDimension and a MeasureGroup. **MeasureGroupDimension** is an abstract class and has derived types for different **MeasureGroupDimension** types. An XML instance always has one of the derived types.

This section does not include the common elements in the XSD; those elements are included within the XSDs for the derived types. However, the table in this section includes the common elements, and those common elements are not included in the tables for the derived types.

```
<xsd:complexType name="MeasureGroupDimension" abstract="true" />
```

Element	Read-Only	Default	Description
CubeDimensionID		[Required]	The ID of the cube dimension for this **MeasureGroupDimension**.
Annotations		Empty	A collection of Annotation objects.

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Element	Read-Only	Default	Description
Source		Empty	The source of data for this **MeasureGroupDimension**.

2.2.4.2.2.11.1.1 ManyToManyMeasureGroupDimension

This complex type represents a many-to-many relationship between a CubeDimension and a MeasureGroup via an intermediate **MeasureGroup**. The XSD is complete for this class and includes all elements from the base type and the extended type. The table includes only additional elements in the extended type.

```
<xsd:complexType name="ManyToManyMeasureGroupDimension">
  <xsd:complexContent>
    <xsd:extension base="MeasureGroupDimension">
      <xsd:all>
        <!--These elements are inherited from MeasureGroupDimension-->
        <xsd:element name="CubeDimensionID" type="xsd:string"/>
        <xsd:element name="Annotations" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                           maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="Source" type="MeasureGroupDimensionBinding"
                     minOccurs="0" />
        <!--Extended elements for ManyToManyMeasureGroupDimension object-->
        <xsd:element name="MeasureGroupID" type="xsd:string" minOccurs="0"/>
        <xsd:element name="DirectSlice" type="xsd:string" minOccurs="0"/>
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
```

The following table includes only those elements in this class that are in addition to those in the base MeasureGroupDimension class.

Element	Read-Only	Default	Description
MeasureGroupID		[Required]	The ID of the intermediate **MeasureGroup** for the many-to-many relationship.
DirectSlice		Empty	An MDX expression that returns a dimension member that is associated with every fact record.

2.2.4.2.2.11.1.2 RegularMeasureGroupDimension

This complex type represents a direct many-to-one or one-to-one relationship between a CubeDimension and a MeasureGroup. The XSD is complete for this class and includes all elements from the base class and the derived class. The table includes only additional elements in the derived class.

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```
<xsd:complexType name="RegularMeasureGroupDimension">
  <xsd:complexContent>
    <xsd:extension base="MeasureGroupDimension">
      <xsd:all>
        <!--These elements are inherited from MeasureGroupDimension-->
        <xsd:element name="CubeDimensionID" type="xsd:string"/>
        <xsd:element name="Annotations" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                           maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="Source" type="MeasureGroupDimensionBinding" minOccurs="0" />
        <!--Extended elements for RegularMeasureGroupDimension object-->
        <xsd:element name="Cardinality" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="Many" />
              <xsd:enumeration value="One" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="Attributes" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Attribute"  type="MeasureGroupAttribute"
                           minOccurs="0" maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
```

The following table has only those elements that are in addition to those in the MeasureGroupDimension abstract base class.

Element	Read-Only	Default	Description
Cardinality		"Many"	Indicates the cardinality of the relationship (many-to-one or one-to-one).
Attributes		Empty	A collection of MeasureGroupAttribute objects. The server SHOULD implicitly add any attribute that is not specified in the collection with the default element values.<25>

2.2.4.2.2.11.1.3 ReferenceMeasureGroupDimension

This complex type represents an indirect many-to-one relationship between a CubeDimension and a MeasureGroup via an intermediate **CubeDimension**. The XSD is complete for this class and includes all elements from the base class and the derived class. The table includes only additional elements in the derived class.

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```
<xsd:complexType name="ReferenceMeasureGroupDimension">
  <xsd:complexContent>
    <xsd:extension base="MeasureGroupDimension">
      <xsd:all>
        <!--These elements are inherited from MeasureGroupDimension-->
        <xsd:element name="CubeDimensionID" type="xsd:string"/>
        <xsd:element name="Annotations" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                           maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="Source" type="MeasureGroupDimensionBinding"
                     minOccurs="0" />
        <!--Extended elements for ReferenceMeasureGroupDimension object-->
        <xsd:element name="IntermediateCubeDimensionID" type="xsd:string"
                     minOccurs="0"/>
        <xsd:element name="IntermediateGranularityAttributeID" type="xsd:string"
                     minOccurs="0"/>
        <xsd:element name="Materialization" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="Regular" />
              <xsd:enumeration value="Indirect" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element ref="eng200_200:ProcessingState" minOccurs="0" />
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
```

The **ReferenceMeasureGroup** XSD depends on the following definitions in a namespace other than the default namespace.

The following element is defined in the **eng200_200** namespace.

```
<xsd:element name="ProcessingState" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="Processed" />
      <xsd:enumeration value="Unprocessed" />
      <xsd:enumeration value="InvalidExpression" />
      <xsd:enumeration value="CalculationError" />
      <xsd:enumeration value="DependencyError" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
```

The following table includes only the elements that are in addition to those contained in the MeasureGroupDimension base class.

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Element	Read-Only	Default	Description
IntermediateCubeDimensionID		Empty	The ID of the intermediate **CubeDimension**.
IntermediateGranularityAttributeID		Empty	The ID of the attribute in the intermediate **CubeDimension** that relates to this **CubeDimension**.
Materialization		"Indirect"	Specifies how the reference dimension relationship is materialized.
ProcessingState	Yes		Represents the processing state of the attribute. For calculated columns, any of the five available enumeration values may appear. Attributes that are not calculated columns can have only the "Processed" or "Unprocessed" values.

2.2.4.2.2.11.1.4 DegenerateMeasureGroupDimension

This complex type represents a degenerate relationship between a CubeDimension and a MeasureGroup in which both are sourced from the same table. The XSD is complete for this class and includes all elements from the base class and the derived class. The table includes only additional elements in the derived class.

```
<xsd:complexType name="DegenerateMeasureGroupDimension">
  <xsd:complexContent>
    <xsd:extension base="MeasureGroupDimension">
      <xsd:all>
        <!--These elements are inherited from MeasureGroupDimension-->
        <xsd:element name="CubeDimensionID" type="xsd:string"/>
        <xsd:element name="Annotations" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                           maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="Source" type="MeasureGroupDimensionBinding"
                     minOccurs="0" />
        <!--Extended elements for DegenerateMeasureGroupDimension object-->
        <xsd:element ref="eng200_200:ShareDimensionStorage" minOccurs="0" />
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
```

The Dimension XSD depends on element definitions in namespaces other than the default namespace.

The following elements are defined in the **eng200_200** namespace.

```
<xsd:element name="ShareDimensionStorage" >
```


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```
    <xsd:simpleType>
      <xsd:restriction base="xsd:string" >
        <xsd:enumeration value="Distinct" />
        <xsd:enumeration value="Shared" />
      </xsd:restriction>
    </xsd:simpleType>
  </xsd:element>
```

The following table shows only the additional elements in **DegenerateMeasureGroupDimension** that are beyond those in MeasureGroupDimension, from which it is derived.

Element	Read-Only	Default	Description
ShareDimensionStorage		"Distinct"	Specifies whether **MeasureGroup** and **Dimension** share storage or use distinct storage.

2.2.4.2.2.11.1.5 DataMiningMeasureGroupDimension

This complex type represents a relationship between a CubeDimension and a MeasureGroup via a MiningModel. The **CubeDimension** is built from the content that is learned by training the **MiningModel** on another **CubeDimension**.

The XSD is complete for this class and includes all elements from the base class and the derived class. The table includes only additional elements in the derived class.

```
<xsd:complexType name="DataMiningMeasureGroupDimension">
  <xsd:complexContent>
    <xsd:extension base="MeasureGroupDimension">
      <xsd:all>
        <!--These elements are inherited from MeasureGroupDimension-->
        <xsd:element name="CubeDimensionID" type="xsd:string"/>
        <xsd:element name="Annotations" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                           maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="Source" type="MeasureGroupDimensionBinding"
                     minOccurs="0" />
        <!--Extended elements for DataMiningMeasureGroupDimension object-->
        <xsd:element name="CaseCubeDimensionID" type="xsd:string" minOccurs="0"/>
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
```

The following table includes only those elements that are in addition to those in the MeasureGroupDimension base abstract class.

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Element	Read-Only	Default	Description
CaseCubeDimensionID		Empty	The ID of the **CubeDimension** from which the **MiningModel** was trained.

2.2.4.2.2.11.2 MeasureGroupAttribute

This complex type represents an attribute in a MeasureGroupDimension.

```
<xsd:complexType name="MeasureGroupAttribute">
  <xsd:all>
    <xsd:element name="AttributeID" type="xsd:string"/>
    <xsd:element name="KeyColumns" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="KeyColumn"  type="DataItem" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Type" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Regular" />
          <xsd:enumeration value="Granularity" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
AttributeID		[Required]	The ID of the attribute.
KeyColumns		KeyColumns from the corresponding DimensionAttribute	A collection of **KeyColumn** elements that have type DataItem. The Source element within the **DataItem** MUST be one of the following types: ColumnBinding, AttributeBinding, or InheritedBinding.
Type		Regular	Specifies the type of the **MeasureGroupAttribute**. It indicates whether the **MeasureGroupAttribute** is a granularity attribute or a regular attribute. There can be only one granularity attribute in a **MeasureGroupDimension**.

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Element	Read-Only	Default	Description
Annotations			A collection of Annotation objects.

2.2.4.2.2.11.3 Measure

This complex type represents a measure.

```
<xsd:complexType name="Measure">
  <xsd:all>
    <xsd:element name="Name" type="xsd:string"/>
    <xsd:element name="ID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Description" type="xsd:string" minOccurs="0"/>
    <xsd:element name="AggregateFunction" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Sum" />
          <xsd:enumeration value="Count" />
          <xsd:enumeration value="Min" />
          <xsd:enumeration value="Max" />
          <xsd:enumeration value="DistinctCount" />
          <xsd:enumeration value="None" />
          <xsd:enumeration value="ByAccount" />
          <xsd:enumeration value="AverageOfChildren" />
          <xsd:enumeration value="FirstChild" />
          <xsd:enumeration value="LastChild" />
          <xsd:enumeration value="FirstNonEmpty" />
          <xsd:enumeration value="LastNoneEmpty" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="DataType" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="WChar" />
          <xsd:enumeration value="Integer" />
          <xsd:enumeration value="BigInt" />
          <xsd:enumeration value="Single" />
          <xsd:enumeration value="Double" />
          <xsd:enumeration value="Date" />
          <xsd:enumeration value="Currency" />
          <xsd:enumeration value="UnsignedTinyInt" />
          <xsd:enumeration value="UnsignedSmallInt" />
          <xsd:enumeration value="UnsignedInt" />
          <xsd:enumeration value="UnsignedBigInt" />
          <xsd:enumeration value="Bool" />
          <xsd:enumeration value="Smallint" />
          <xsd:enumeration value="Tinyint" />
          <xsd:enumeration value="Variant" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Source" type="DataItem" />
    <xsd:element name="Visible" type="xsd:boolean" minOccurs="0"/>
    <xsd:element name="MeasureExpression" type="xsd:string" minOccurs="0"/>
    <xsd:element name="DisplayFolder" type="xsd:string" minOccurs="0"/>
```


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```
      <xsd:element name="FormatString" type="xsd:string" minOccurs="0"/>
      <xsd:element name="BackColor" type="xsd:string" minOccurs="0"/>
      <xsd:element name="ForeColor" type="xsd:string" minOccurs="0"/>
      <xsd:element name="FontName" type="xsd:string" minOccurs="0"/>
      <xsd:element name="FontSize" type="xsd:string" minOccurs="0"/>
      <xsd:element name="FontFlags" type="xsd:string" minOccurs="0"/>
      <xsd:element name="Translations" minOccurs="0">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="Translation"  type="Translation" minOccurs="0"
                         maxOccurs="unbounded"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:element name="Annotations" minOccurs="0">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                         maxOccurs="unbounded"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
    </xsd:all>
  </xsd:complexType>
```

Element	Read-Only	Default	Description
Name		[Required]	The object name. The name of the measure MUST be unique within the Cube, not only within the MeasureGroup.
ID		Defaults to Name	The object ID string.
Description		Empty	The object description.
AggregateFunction		"Sum"	A string that specifies the type of aggregate function used by the measure.
DataType		Empty	The data type.
Source		[Required]	The source of the measure data. Type is DataItem. The Source element within the **DataItem** MUST be one of the following types: RowBinding, ColumnBinding, MeasureBinding, or CubeDimensionBinding.
Visible		True	When true, indicates to the client that the **Measure** should be visible; otherwise, false.
MeasureExpression		Empty	Contains an MDX expression that specifies how the measure value is computed.
DisplayFolder		Empty	Defines the display folder for the measure.
FormatString		Empty	A string that specifies how to format measure values to produce a formatted value. For a description of the content of the string, see [MSDN-FSCMDX].
BackColor		Empty	Specifies the background color of a cell in the red-green-

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Element	Read-Only	Default	Description
			blue (RGB) format.<26> The valid range for an ordinary RGB color is from zero (&H00000000) to 16,777,215 (&H00FFFFFF). The high byte of a number in this range always equals zero. The lower 3 bytes, from least to most significant byte, determine the amount of red, green, and blue, respectively. The red, green, and blue components are each represented by a number between 0 and 255 (&HFF).
ForeColor		Empty	Specifies the foreground color of a cell in the RGB format.<27> The valid range for an ordinary RGB color is from zero (&H00000000) to 16,777,215 (&H00FFFFFF). The high byte of a number in this range always equals zero. The lower 3 bytes, from least to most significant byte, determine the amount of red, green, and blue, respectively. The red, green, and blue components are each represented by a number between 0 and 255 (&HFF).
FontName		Empty	The font to be used to display the value or formatted value of this measure.
FontSize		Empty	The font size to be used to display the value of formatted value of this measure.
FontFlags		Empty	A bitmask that details effects on the font. The value is the result of a bitwise OR operation of one or more of the following constants: BOLD = 1 ITALIC = 2 UNDERLINE = 4 STRIKEOUT = 8
Translations		Empty	A collection of Translation objects.
Annotations		Empty	A collection of Annotation objects.

2.2.4.2.2.12 AggregationDesign

This complex type represents a group of aggregations for the MeasureGroup.

```
<xsd:complexType name="AggregationDesign">
  <xsd:complexContent>
    <xsd:extension base="MajorObject">
      <xsd:all>
        <!--These elements are common to each MajorObject-->
        <xsd:element name="Name"  type="xsd:string" />
        <xsd:element name="ID"  type="xsd:string" minOccurs="0" />
        <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="Description" type="xsd:string" minOccurs="0" />
        <xsd:element name="Annotation"  minOccurs="0" >
          <xsd:complexType>
```


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```
            <xsd:sequence>
              <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                           maxOccurs="unbounded" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <!--Extended elements for AggregationDesign object-->
        <xsd:element name="EstimatedRows" type="xsd:long" minOccurs="0"/>
        <xsd:element name="Dimensions" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Dimension"  type="Dimension" minOccurs="0"
                           maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="Aggregations" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Aggregation"  type="Aggregation" minOccurs="0"
                           maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="EstimatedPerformanceGain" type="xsd:integer"
                     minOccurs="0"/>
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
```

Element	Read-Only	Default	Description
EstimatedRows		0	The estimated average number of rows in the partition for the partitions that share this design.
Dimensions		Empty	A collection of Dimension objects.
Aggregations		Empty	A collection of Aggregation objects.
EstimatedPerformanceGain	Yes		The estimated performance gain of the partition, expressed as a percentage.

2.2.4.2.2.12.1 AggregationDesignDimension

This complex type represents a CubeDimension within an AggregationDesign.

```
<xsd:complexType name="AggregationDesignDimension">
  <xsd:all>
    <xsd:element name="CubeDimensionID" type="xsd:string"/>
    <xsd:element name="Attributes" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Attribute"  type="AggregationDesignAttribute"
                       minOccurs="0" maxOccurs="unbounded"/>
```


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```
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
CubeDimensionID		[Required]	The ID of the **CubeDimension**.
Attributes		Empty	A collection of AggregationDesignAttribute objects.
Annotations		Empty	A collection of Annotation objects.

2.2.4.2.2.12.1.1 AggregationDesignAttribute

This complex type represents an attribute in the AggregationDesignDimension.

```
<xsd:complexType name="AggregationDesignAttribute">
  <xsd:all>
    <xsd:element name="AttributeID" type="xsd:string"/>
    <xsd:element name="EstimatedCount" type="xsd:long" minOccurs="0"/>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
AttributeID		[Required]	The ID of the attribute.
EstimatedCount		Empty	The estimated number of members for the attribute.

2.2.4.2.2.12.2 Aggregation

This complex type represents an aggregation in the AggregationDesign.

```
<xsd:complexType name="Aggregation">
  <xsd:all>
    <xsd:element name="ID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Name" type="xsd:string"/>
    <xsd:element name="Dimensions" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Dimension"  type="AggregationDimension"
                       minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
```


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```
    </xsd:element>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Description" type="xsd:string" minOccurs="0"/>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
ID		Defaults to Name	The object ID string.
Name		[Required]	The object name.
Dimensions		Empty	A collection of objects of type AggregationDimension.
Annotations		Empty	A collection of Annotation objects.
Description		Empty	The object description.

2.2.4.2.2.12.2.1 AggregationDimension

This complex type represents a dimension in the aggregation.

```
<xsd:complexType name="AggregationDimension">
  <xsd:all>
    <xsd:element name="CubeDimensionID" type="xsd:string"/>
    <xsd:element name="Attributes" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Attribute"  type="AggregationAttribute"
                       minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
CubeDimensionID		[Required]	The ID of the cube dimension. For example, a reference to a specific dimension on the owning measure group.

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Element	Read-Only	Default	Description
Attributes		Empty	A collection of objects of type AggregationAttribute.
Annotations		Empty	A collection of **Annotation** objects.

2.2.4.2.2.12.2.1.1 AggregationAttribute

This complex type represents the attribute in the AggregationDimension for which the fact data is aggregated.

```
<xsd:complexType name="AggregationAttribute">
  <xsd:all>
    <xsd:element name="AttributeID" type="xsd:string"/>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
AttributeID		[Required]	The ID of the attribute.
Annotations		Empty	A collection of Annotation objects.

2.2.4.2.2.13 Partition

This complex type represents a partition of a measure group.

```
<xsd:complexType name="Partition">
  <xsd:complexContent>
    <xsd:extension base="MajorObject">
      <xsd:all>
        <!--These elements are common to each MajorObject-->
        <xsd:element name="Name"  type="xsd:string" />
        <xsd:element name="ID"  type="xsd:string" minOccurs="0" />
        <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="Description" type="xsd:string" minOccurs="0" />
        <xsd:element name="Annotation"  minOccurs="0" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                           maxOccurs="unbounded" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
```


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```
<!--Extended elements for Partition object-->
<xsd:element name="Source" type="TabularBinding" minOccurs="0" />
<xsd:element name="ProcessingPriority" type="xsd:integer" minOccurs="0"/>
<xsd:element name="AggregationPrefix" type="xsd:string" minOccurs="0"/>
<xsd:element name="StorageMode" minOccurs="0">
  <xsd:complexType>
    <xsd:simpleContent>
      <xsd:extension base="PartitionStorageModeEnumType">
        <xsd:attribute name="valuens" >
          <xsd:simpleType>
            <xsd:restriction base="xsd:string">
              <xsd:enumeration value=
    "http://schemas.microsoft.com/analysisservices/2010/engine/200/200" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:attribute>
      </xsd:extension>
    </xsd:simpleContent>
  </xsd:complexType>
</xsd:element>
<xsd:element name="ProcessingMode" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="Regular"/>
      <xsd:enumeration value="LazyAggregations"/>
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="ErrorConfiguration" type="ErrorConfiguration"
            minOccurs="0" />
<xsd:element name="StorageLocation" type="xsd:string" minOccurs="0"/>
<xsd:element name="RemoteDatasourceID" type="xsd:string" minOccurs="0"/>
<xsd:element name="Slice" type="xsd:string" minOccurs="0"/>
<xsd:element name="ProactiveCaching" type ="ProactiveCaching"
            minOccurs="0" />
<xsd:element name="Type" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="Data" />
      <xsd:enumeration value="Writeback" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="EstimatedSize" type="xsd:long" minOccurs="0"/>
<xsd:element name="EstimatedRows" type="xsd:long" minOccurs="0"/>
<xsd:element name="CurrentStorageMode" minOccurs="0">
  <xsd:complexType>
    <xsd:simpleContent>
      <xsd:extension base="PartitionCurrentStorageModeEnumType">
        <xsd:attribute name="valuens" >
          <xsd:simpleType>
            <xsd:restriction base="xsd:string">
              <xsd:enumeration value=
    "http://schemas.microsoft.com/analysisservices/2010/engine/200/200" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:attribute>
      </xsd:extension>
    </xsd:simpleContent>
```


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```
            </xsd:complexType>
          </xsd:element>
          <xsd:element name="AggregationDesignID" type="xsd:string" minOccurs="0"/>
          <xsd:element name="AggregationInstances" minOccurs="0">
            <xsd:complexType>
              <xsd:sequence>
                <xsd:element name="AggregationInstance"  type="AggregationInstance"
                             minOccurs="0" maxOccurs="unbounded"/>
              </xsd:sequence>
            </xsd:complexType>
          </xsd:element>
          <xsd:element name="AggregationInstanceSource" type="DataSourceViewBinding"
                       minOccurs="0" />
          <xsd:element name="LastProcessed" type="xsd:dateTime" minOccurs="0"/>
          <xsd:element name="State" minOccurs="0">
            <xsd:simpleType>
              <xsd:restriction base="xsd:string" >
                <xsd:enumeration value="Processed" />
                <xsd:enumeration value="Unprocessed" />
              </xsd:restriction>
            </xsd:simpleType>
          </xsd:element>
        </xsd:all>
      </xsd:extension >
    </xsd:complexContent>
  </xsd:complexType>
  <xsd:simpleType name="PartitionStorageModeEnumType">
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="Molap"/>
      <xsd:enumeration value="Rolap"/>
      <xsd:enumeration value="Holap"/>
      <xsd:enumeration value="InMemory"/>
    </xsd:restriction>
  </xsd:simpleType>
  <xsd:simpleType name="PartitionCurrentStorageModeEnumType">
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="Molap"/>
      <xsd:enumeration value="Rolap"/>
      <xsd:enumeration value="Holap"/>
      <xsd:enumeration value="InMemory"/>
    </xsd:restriction>
  </xsd:simpleType>
```

The **Partition** object also includes all elements from MajorObject.

Element	Read-Only	Default	Description
Source		Empty	Specifies the source of the partition data.
ProcessingPriority		Zero	Integer that determines the priority for processing.
AggregationPrefix		Empty	A prefix that is pre-pended to the names of aggregation tables/views.

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Element	Read-Only	Default	Description
StorageMode		**StorageMode** of the parent **MeasureGroup**	Determines the storage mode for the partition.
ProcessingMode		**ProcessingMode** of the parent **Cube**	A string that specifies whether aggregations and indexes should be built lazily. For more information about lazy aggregations, see section 1.1.
ErrorConfiguration		Empty	Error configuration settings to handle issues in the source data.
StorageLocation		**StorageLocation** of the parent **MeasureGroup**	The file system storage location for the partition.
RemoteDatasourceID		Empty	Specifies the ID of the OLAP data source that points to the remote server where this partition is stored.
Slice		Empty	MDX expression that defines the slice that is contained in the partition.
ProactiveCaching		Empty	Proactive caching settings for this partition.
Type		"Data"	Indicates partition type as either **Data** or Writeback.
EstimatedSize	Yes		The estimated size of the partition in bytes.
EstimatedRows		0	Estimated number of rows.
CurrentStorageMode	Yes		The current storage mode of the partition. Used for proactive caching when **StorageMode** may transiently change.
AggregationDesignID		Empty	The ID of the **Aggregation Design** for the partition.
AggregationInstances		Empty	A collection of AggregationInstance objects.
AggregationInstanceSource		Defaults to **Source** element of the cube.	The source of the aggregation instance data.
LastProcessed	Yes		The date and time when the partition was last processed.
State	Yes		When true, indicates that the partition has been processed; otherwise, false.

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2.2.4.2.2.13.1 AggregationInstance

This complex type represents an aggregation instance in a partition.

```
<xsd:complexType name="AggregationInstance">
  <xsd:all>
    <xsd:element name="ID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Name" type="xsd:string"/>
    <xsd:element name="AggregationType" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="IndexedView" />
          <xsd:enumeration value="Table" />
          <xsd:enumeration value="UserDefined" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Source" type="TabularBinding" minOccurs="0" />
    <xsd:element name="Dimensions" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Dimension"  type="AggregationInstanceDimension"
                       minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Measures" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Measure"  type="AggregationInstanceMeasure"
                       minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Description" type="xsd:string" minOccurs="0"/>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
ID		Defaults to Name	The object ID string.
Name		[Required]	The object name.
AggregationType		[Required]	The type of aggregation stored in the partition. The enumeration values are the following: **IndexedView**: The aggregation is stored in an indexed

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Element	Read-Only	Default	Description
			view. **Table**: The aggregation is stored in a table. **UserDefined**: The aggregation is user-defined.
Source		Empty	The table name that is used if it is different than the name that is associated with column binding. This permits a single aggregation table to be defined in the **DataSourceView** for multiple partitions instead of one per partition.
Dimensions		Empty	A collection of objects of type AggregationInstanceDimension.
Measures		Empty	A collection of objects of type AggregationInstanceMeasure.
Annotations		Empty	A collection of **Annotation** objects.
Description		Empty	The object description.

2.2.4.2.2.13.1.1 AggregationInstanceDimension

This complex type represents a CubeDimension in an AggregationInstance.

```
<xsd:complexType name="AggregationInstanceDimension">
  <xsd:all>
    <xsd:element name="CubeDimensionID" type="xsd:string"/>
    <xsd:element name="Attributes" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Attribute"  type="AggregationInstanceAttribute"
                       minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
CubeDimensionID		[Required]	The ID of the **CubeDimension**.
Attributes		Empty	A collection of objects of type AggregationInstanceAttribute.
Annotations		Empty	A collection of Annotation objects.

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2.2.4.2.2.13.1.2 AggregationInstanceAttribute

This complex type represents the attribute in the AggregationInstanceDimension for which the fact data is aggregated.

```
<xsd:complexType name="AggregationInstanceAttribute">
  <xsd:all>
    <xsd:element name="AttributeID" type="xsd:string"/>
    <xsd:element name="KeyColumns" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="KeyColumn"  type="DataItem" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
AttributeID		[Required]	The ID of the attribute.
KeyColumns		Required. However, if this element is specified as empty, the default is the binding that is specified on the attribute that is pointed to by **AttributeID**.	A collection of **KeyColumn** elements of type **DataItem**. This may be used to override the binding that is specified on the attribute. The **Source** element within the **DataItem** MUST be of type ColumnBinding.
Annotations		Empty	A collection of Annotation objects.

2.2.4.2.2.13.1.3 AggregationInstanceMeasure

This complex type represents a Measure in an AggregationInstance.

```
<xsd:complexType name="AggregationInstanceMeasure">
  <xsd:all>
    <xsd:element name="MeasureID" type="xsd:string"/>
    <xsd:element name="Source" type="ColumnBinding" />
  </xsd:all>
</xsd:complexType>
```


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Element	Read-Only	Default	Description
MeasureID		[Required]	The ID of the **Measure**.
Source		[Required]	The source of the measure data.

2.2.4.2.2.14 Perspective

This complex type represents a perspective of a cube.

```
<xsd:complexType name="Perspective">
  <xsd:complexContent>
    <xsd:extension base="MajorObject">
      <xsd:all>
        <!--These elements are common to each MajorObject-->
        <xsd:element name="Name"  type="xsd:string" />
        <xsd:element name="ID"  type="xsd:string" minOccurs="0" />
        <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="Description" type="xsd:string" minOccurs="0" />
        <xsd:element name="Annotation"  minOccurs="0" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                           maxOccurs="unbounded" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <!--Extended elements for Perspective object-->
        <xsd:element name="Translations" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Translation"  type="Translation" minOccurs="0"
                           maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="DefaultMeasure" type="xsd:string" minOccurs="0"/>
        <xsd:element name="Dimensions" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Dimension"  type="PerspectiveDimension"
                           minOccurs="0" maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="MeasureGroups" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="MeasureGroup"  type="PerspectiveMeasureGroup"
                           minOccurs="0" maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="Calculations" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
```


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```
            <xsd:element name="Calculation"  type="PerspectiveCalculation"
                         minOccurs="0" maxOccurs="unbounded"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:element name="Kpis" minOccurs="0">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="Kpi"  type="PerspectiveKpi" minOccurs="0"
                         maxOccurs="unbounded"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:element name="Actions" minOccurs="0">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="Action"  type="PerspectiveAction"
                         minOccurs="0" maxOccurs="unbounded"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
    </xsd:all>
  </xsd:extension >
 </xsd:complexContent>
</xsd:complexType>
```

The **Perspective** object also includes all elements from MajorObject.

Element	Read-Only	Default	Description
Translations		Empty	A collection of **Translation** objects.
DefaultMeasure		Empty	The default measure for the perspective.
Dimensions		Empty	A collection of PerspectiveDimension objects.
MeasureGroups		Empty	A collection of PerspectiveMeasureGroup objects.
Calculations		Empty	A collection of PerspectiveCalculation objects.
Kpis		Empty	A collection of PerspectiveKpi objects.
Actions		Empty	A collection of PerspectiveAction objects.

2.2.4.2.2.14.1 PerspectiveDimension

This complex type represents a CubeDimension in a Perspective.

```
<xsd:complexType name="PerspectiveDimension">
  <xsd:all>
    <xsd:element name="CubeDimensionID" type="xsd:string"/>
    <xsd:element name="Attributes" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Attribute"  type="PerspectiveAttribute"
                       minOccurs="0" maxOccurs="unbounded"/>
```


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```
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Hierarchies" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Hierarchy"  type="PerspectiveHierarchy"
                       minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
CubeDimensionID		[Required]	The ID of a **CubeDimension**.
Attributes		If no hierarchies are included, the perspective contains all of the attributes from the dimension.	A collection of objects of type PerspectiveAttribute that is included in this PerspectiveDimension.
Hierarchies		If no hierarchies are included, the perspective contains all of the hierarchies from the dimension.	A collection of objects of type PerspectiveHierarchy that is included in this **PerspectiveDimension**.
Annotations		Empty	A collection of Annotation objects.

2.2.4.2.2.14.1.1 PerspectiveAttribute

This complex type represents an attribute in a PerspectiveDimension.

```
<xsd:complexType name="PerspectiveAttribute">
  <xsd:all>
    <xsd:element name="AttributeID" type="xsd:string"/>
    <xsd:element name="AttributeHierarchyVisible" type="xsd:boolean"
                 minOccurs="0"/>
    <xsd:element name="DefaultMember" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
```


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```
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
AttributeID		[Required]	The ID of the attribute.
AttributeHierarchyVisible		True	When true, specifies whether the **AttributeHierarchy** is visible; otherwise, false.
DefaultMember		Empty	An MDX expression specifying the default member for this attribute.<28>
Annotations		Empty	A collection of Annotation objects.

2.2.4.2.2.14.1.2 PerspectiveHierarchy

This complex type represents a hierarchy in a PerspectiveDimension.

```
<xsd:complexType name="PerspectiveHierarchy">
  <xsd:all>
    <xsd:element name="HierarchyID" type="xsd:string"/>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
HierarchyID		[Required]	The ID of the hierarchy.
Annotations		Empty	A collection of Annotation objects.

2.2.4.2.2.14.2 PerspectiveMeasureGroup

This complex type represents a measure group in a Perspective.

```
<xsd:complexType name="PerspectiveMeasureGroup">
  <xsd:all>
    <xsd:element name="MeasureGroupID" type="xsd:string"/>
    <xsd:element name="Measures" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Measure"  type="PerspectiveMeasure" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
```


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```
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
MeasureGroupID		[Required]	The ID of the measure group.
Measures		Empty	A collection of objects of type PerspectiveMeasure.
Annotations		Empty	A collection of Annotation objects.

2.2.4.2.2.14.2.1 PerspectiveMeasure

This complex type represents a measure in a PerspectiveMeasureGroup.

```
<xsd:complexType name="PerspectiveMeasure">
  <xsd:all>
    <xsd:element name="MeasureID" type="xsd:string"/>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
MeasureID		[Required]	The ID of the Measure.
Annotations		Empty	A collection of Annotation objects.

2.2.4.2.2.14.3 PerspectiveCalculation

This complex type represents a calculation in a Perspective.

```
<xsd:complexType name="PerspectiveCalculation">
  <xsd:all>
    <xsd:element name="Name" type="xsd:string"/>
    <xsd:element name="Type" >
      <xsd:simpleType>
```


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```
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Member" />
          <xsd:enumeration value="Set" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
Name		[Required]	Indicates the name of the calculation. This is the **UniqueName** of the calculated member or set.
Type		[Required]	Indicates the type of the calculation. The enumeration values are the following: **Member**: Calculated member **Set**: Named set
Annotations		Empty	A collection of Annotation objects.

2.2.4.2.2.14.4 PerspectiveKpi

This complex type represents a KPI in a Perspective.

```
<xsd:complexType name="PerspectiveKpi">
  <xsd:all>
    <xsd:element name="KpiID" type="xsd:string"/>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
KpiID		[Required]	The ID of the KPI.
Annotations		Empty	A collection of Annotation objects.

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2.2.4.2.2.14.5 PerspectiveAction

This complex type represents an Action in a Perspective.

```
<xsd:complexType name="PerspectiveAction">
  <xsd:all>
    <xsd:element name="ActionID" type="xsd:string"/>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
ActionID		[Required]	The ID of the **Action**.
Annotations		Empty	A collection of Annotation objects.

2.2.4.2.2.15 MiningStructure

This complex type represents a mining structure.

```
<xsd:complexType name="MiningStructure">
    <xsd:complexContent>
      <xsd:extension base="MajorObject">
        <xsd:all>
          <!--These elements are common to each MajorObject-->
          <xsd:element name="Name"  type="xsd:string" />
          <xsd:element name="ID"  type="xsd:string" minOccurs="0" />
          <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
          <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
          <xsd:element name="Description" type="xsd:string" minOccurs="0" />
          <xsd:element name="Annotation"  minOccurs="0" >
            <xsd:complexType>
              <xsd:sequence>
                <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                             maxOccurs="unbounded" />
              </xsd:sequence>
            </xsd:complexType>
          </xsd:element>
          <!--Extended elements for MiningStructure object-->
          <xsd:element name="Source" type="Binding" minOccurs="0" />
          <xsd:element name="LastProcessed" type="xsd:dateTime" minOccurs="0"/>
          <xsd:element name="Translations" minOccurs="0">
            <xsd:complexType>
              <xsd:sequence>
                <xsd:element name="Translation"  type="Translation" minOccurs="0"
                             maxOccurs="unbounded"/>
              </xsd:sequence>
            </xsd:complexType>
```


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```
        </xsd:element>
        <xsd:element name="Language" type="xsd:integer" minOccurs="0"/>
        <xsd:element name="Collation" type="xsd:string" minOccurs="0"/>
        <xsd:element name="ErrorConfiguration" type="ErrorConfiguration"
                     minOccurs="0" />
        <xsd:element name="CacheMode" minOccurs="0" >
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="KeepTrainingCases" />
              <xsd:enumeration value="ClearAfterProcessing" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element ref="eng100_100:HoldoutMaxPercent" minOccurs="0" />
        <xsd:element ref="eng100_100:HoldoutMaxCases" minOccurs="0" />
        <xsd:element ref="eng100_100:HoldoutSeed" minOccurs="0" />
        <xsd:element ref="eng100_100:HoldoutActualSize" minOccurs="0" />
        <xsd:element name="Columns" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Column"  type="MiningStructureColumn"
                           minOccurs="0" maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="State" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="Processed" />
              <xsd:enumeration value="Unprocessed" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="MiningStructurePermissions" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="MiningStructurePermission"
                           type="MiningStructurePermission" minOccurs="0"
                           maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="MiningModels" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="MiningModel"  type="MiningModel"
                           minOccurs="0" maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
```

The **Dimension** XSD depends upon element definitions in namespaces other than the default namespace.The following elements are defined in the namespace **eng100_100**:

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```
<xsd:element name="HoldoutMaxPercent" type="xsd:int" />
<xsd:element name="HoldoutMaxCases" type="xsd:int" />
<xsd:element name="HoldoutSeed" type="xsd:int" />
<xsd:element name="HoldoutActualSize" type="xsd:int" />
```

Also included in the **MiningStructure** object are all elements from MajorObject.

Element	Read-Only	Default	Description
Source		Empty	The source for the **MiningStructure** data. Source is of type "Binding". One of the following derived classes MUST be used: DataSourceViewBinding, DimensionBinding, or CubeDimensionBinding. If **DimensionBinding** or **CubeDimensionBinding** is used, then the **DataSourceID** for **DimensionBinding** and **CubeDimensionBinding** MUST indicate an OLAP source.
LastProcessed	Yes		The date and time when the mining structure was last processed.
Translations		Empty	A collection of Translation objects.
Language		Empty	The LCID of the language to use by default. See [MS-LCID] for information about LCIDs. If empty, the server will determine the language to use.<29>
Collation		Empty	The collation of this **MiningStructure**.
ErrorConfiguration		Empty	Error configuration settings to deal with issues in the source data.
CacheMode		"KeepTrainingCases"	Determines caching mechanism for training data retrieved during mining structure processing.
HoldoutMaxPercent		Zero	An integer value between 0 and 99 that specifies the maximum percentage of the cases that should be held out as the test set. The remaining cases become the training data set. Zero indicates no limit.
HoldoutMaxCases		Zero	An integer value equal to or greater than zero that specifies the maximum number of cases that should be held out as the test set. The remaining cases become the training data set. Zero indicates no limit. If not zero, then the lowest of (**HoldoutMaxCases**,

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Element	Read-Only	Default	Description
			HoldoutMaxPercent) is actually used.
HoldoutSeed		Zero	Used as the seed for repeatable partitioning. If unspecified or set to zero, a hash of the mining structure name is used as the seed.
HoldoutActualSize	Yes		If the mining structure is processed, this indicates the actual size of the test data set, expressed in number of cases. Zero indicates either no test partition or that the structure is not processed.
Columns		[Required]	A collection of **Column** objects for **MiningStructure**.
State	Yes		The state of processing of the object.
MiningStructurePermissions		Empty	A collection of MiningStructurePermission objects. Each **MiningStructurePermission** defines the permissions a role has on this **MiningStructure**.
MiningModels		Empty	A collection of MiningModel objects.
Annotations		Empty	A collection of Annotation objects.

2.2.4.2.2.15.1 MiningStructureColumn

This complex type represents a column in a MiningStructure. This is an abstract type for the ScalarMiningStructureColumn and TableMiningStructureColumn derived types. The XSD in this section has no elements because the derived classes contain the XSD for the elements. However, the common elements to all derived classes are documented in the following table.

```
<xsd:complexType name="MiningStructureColumn" abstract="true" />
```

Element	Read-Only	Default	Description
Name		[Required]	The object name.
ID		Defaults to Name	The object ID string.
Description		Empty	The object description.
Type		[Required]	Contains the data type of the element.
Annotations		Empty	A collection of Annotation objects.

2.2.4.2.2.15.1.1 ScalarMiningStructureColumn

This complex type represents a scalar column in the MiningStructure. **ScalarMiningStructureColumn** extends the base class MiningStructureColumn.

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```
<xsd:complexType name="ScalarMiningStructureColumn">
  <xsd:all>
    <xsd:element name="Name" type="xsd:string"/>
    <xsd:element name="ID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Description" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Type" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="LONG" />
          <xsd:enumeration value="BOOLEAN" />
          <xsd:enumeration value="TEXT" />
          <xsd:enumeration value="DOUBLE" />
          <xsd:enumeration value="DATE" />
          <xsd:enumeration value="TABLE" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation"  type="Annotation"
                       minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="IsKey" type="xsd:boolean" minOccurs="0"/>
    <xsd:element name="Source" type="Binding"  minOccurs="0" />
    <xsd:element name="Distribution" type="xsd:string" minOccurs="0"/>
    <xsd:element name="ModelingFlags"   minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="ModelingFlag"  type="MiningModelingFlag"
                       minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Content" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <!-- This list is user-extensible  -->
          <xsd:enumeration value="Discrete" />
          <xsd:enumeration value="Continuous" />
          <xsd:enumeration value="Discretized" />
          <xsd:enumeration value="Ordered" />
          <xsd:enumeration value="Cyclical" />
          <xsd:enumeration value="Probability" />
          <xsd:enumeration value="Variance" />
          <xsd:enumeration value="StdDev" />
          <xsd:enumeration value="ProbabilityVariance" />
          <xsd:enumeration value="ProbabilityStdDev" />
          <xsd:enumeration value="Support" />
          <xsd:enumeration value="Key" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="ClassifiedColumnIDs" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
```


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```
            <xsd:element name="ClassifiedColumnID"  type="xsd:string"
                         minOccurs="0" maxOccurs="unbounded"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:element name="DiscretizationMethod" type="xsd:string" minOccurs="0"/>
      <xsd:element name="DiscretizationBucketCount" type="xsd:integer" minOccurs="0"/>
      <xsd:element name="KeyColumns" minOccurs="0">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="KeyColumn"  type="DataItem" minOccurs="0"
                         maxOccurs="unbounded"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:element name="NameColumn" type="DataItem"  minOccurs="0" />
      <xsd:element name="Translations"  minOccurs="0">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="Translation"  type="Translation" minOccurs="0"
                         maxOccurs="unbounded"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
    </xsd:all>
  </xsd:complexType>
```

Element	Read-Only	Default	Description
IsKey		False	When true, indicates that the column provides the key of the case; otherwise, false. One or more columns MAY be designated as the key. At least one column MUST be designated as the key.
Source		Empty	The data source for this column, if the mining structure is bound to OLAP objects. **Source** is of type "Binding". This element MAY be empty for mining structures based on relational data, but for OLAP-based mining structures, one of the following derived classes MUST be used: AttributeBinding, CubeAttributeBinding, or MeasureBinding.
Distribution		Empty	An extensible enumeration, such as **Normal**, **Uniform**, and **LogNormal**. Algorithms may not support all possible distribution values.
ModelingFlags		Empty	A collection of MiningModelingFlag objects. If non-empty, the only supported string value is "NotNull".
Content		[Required]	An enumeration that describes the type of content represented by a mining structure column. All values may not necessarily be supported by all algorithms.

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Element	Read-Only	Default	Description
ClassifiedColumnIDs		Empty	A string collection of the ID for any columns classified by this column.
DiscretizationMethod		Empty (Mapped to Automatic for columns where content is discretized)	Defines the method to be used for discretization. Current values supported for this string element are as follows: ▪ "Automatic" ▪ "EqualAreas" ▪ "Thresholds" ▪ "Clusters"
DiscretizationBucketCount		0	The number of buckets in which to discretize.
KeyColumns		[Required]	The data source for this column, for mining structures bound to relational data (or unbound). Collection of objects of type **DataItem** to bind to values of this column. The **Source** element within the **DataItem** MUST be of type ColumnBinding.
NameColumn		Empty	An optional column binding containing the name of the key values (in the **KeyColumns** element). **NameColumn** is of type **DataItem**. The **Source** element within the **DataItem** MUST be of type **ColumnBinding**.
Translations		Empty	A collection of Translation objects.

2.2.4.2.2.15.1.2 TableMiningstructureColumn

This complex type represents a nested table column in the MiningStructure. **TableMiningStructureColumn** extends MiningStructureColumn.

```
<xsd:complexType name="TableMiningStructureColumn">
  <xsd:all>
    <xsd:element name="ForeignKeyColumns" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="ForeignKeyColumn"  type="DataItem"
                       minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="SourceMeasureGroup" type="MeasureGroupBinding"
                 minOccurs="0" />
    <xsd:element name="Columns" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Column"  type="MiningStructureColumn"
                       minOccurs="0" maxOccurs="unbounded"/>
```


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```
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Translations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Translation"  type="Translation"
                       minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
ForeignKeyColumns		Empty	A collection of **DataItem** objects that binds to foreign keys for this column. The **Source** element within the **DataItem** MUST be of type ColumnBinding.
SourceMeasureGroup		Empty	An optional binding to a MeasureGroup if **DataSourceID** for **MiningModelStructure** is OLAP.
Columns		Empty	A collection of bindings to **MiningStructureColumns**. **MiningStructureColumns** may be nested within each other, but it is only recursive to one level. That is, a set of scalar columns can be specified here, but included columns cannot have included columns nested within them.
Translations		Empty	A collection of Translation objects.

2.2.4.2.2.16 MiningModel

This complex type represents a mining model.

```
<xsd:complexType name="MiningModel">
  <xsd:complexContent>
    <xsd:extension base="MajorObject">
      <xsd:all>
        <!--These elements are common to each MajorObject-->
        <xsd:element name="Name"  type="xsd:string" />
        <xsd:element name="ID"  type="xsd:string" minOccurs="0" />
        <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="Description" type="xsd:string" minOccurs="0" />
        <xsd:element name="Annotation"  minOccurs="0" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                           maxOccurs="unbounded" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <!--Extended elements for MiningModel object-->
        <xsd:element name="Algorithm" minOccurs="10">
```


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```
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="Microsoft_Naive_Bayes" />
      <xsd:enumeration value="Microsoft_Decision_Trees" />
      <xsd:enumeration value="Microsoft_Clustering" />
      <xsd:enumeration value="Microsoft_Neural_Network" />
      <xsd:enumeration value="Microsoft_Logistic_Regression" />
      <xsd:enumeration value="Microsoft_Linear_Regression" />
      <xsd:enumeration value="Microsoft_Association_Rules" />
      <xsd:enumeration value="Microsoft_Time_Series" />
      <xsd:enumeration value="Microsoft_Sequence_Clustering" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="LastProcessed" type="xsd:dateTime" minOccurs="0"/>
<xsd:element name="AlgorithmParameters" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="AlgorithmParameter"  type="AlgorithmParameter"
                   minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="AllowDrillThrough" type="xsd:boolean" minOccurs="0"/>
<xsd:element name="Translations" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Translation"  type="AttributeTranslation"
                   minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="Columns" >
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Column"  type="MiningModelColumn" minOccurs="0"
                   maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="State" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="Processed" />
      <xsd:enumeration value="Unprocessed" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="FoldingParameters" type="FoldingParameters"
             minOccurs="0" />
<xsd:element name="Filter"  type="xsd:string" minOccurs="0" />
<xsd:element name="MiningModelPermissions" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="MiningModelPermission"  type="MiningModelPermission"
                   minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
```


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```
        <xsd:element name="Language" type="xsd:string" minOccurs="0"/>
        <xsd:element name="Collation" type="xsd:string" minOccurs="0"/>
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
```

Also included in the Server object are all elements from MajorObject.

Element	Read-Only	Default	Description
Algorithm		[Required]	The protocol does not require any particular algorithms to be supported, and each server developer can support whichever algorithms he or she chooses to support.<30>
LastProcessed	Yes		The date and time when the mining model was last processed.
AlgorithmParameters		Empty	A collection of objects of type AlgorithmParameter. The allowed parameters are different depending on the algorithm.
AllowDrillThrough		False	When true, indicates that drillthrough is allowed; otherwise, false.
Translations		Empty	A collection of Translation objects.
Columns		Empty	A collection of objects of type MiningModelColumn.
State	Yes		When true, indicates that the **MiningModel** has been processed; otherwise, false.
FoldingParameters		Empty	An object of type FoldingParameters. Describes a fold (a partition of the training data) to be used for training this mining model. Used only as part of the multifold cross-validation procedure.<31>
Filter		Empty	The DMX filter statement to be applied to training data for models that are trained only on a part of a structure's data. An empty string or missing element implies no filter.<32>
MiningModelPermissions		Empty	A collection of MiningModelPermission objects.
Language		Empty	The language to use by default.
Collation		Empty	The collation sequence to use.

2.2.4.2.2.16.1 MiningModelingFlag

This complex type represents a flag for a MiningModel algorithm. The flags that can be accepted depend upon the algorithm used in the **MiningModel**.

```
<xsd:complexType name="MiningModelingFlag">
```


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```
    <xsd:all>
      <xsd:element name="ModelingFlag"  type="xsd:string" />
    </xsd:all>
  </xsd:complexType>
```

Element	Read-Only	Default	Description
ModelingFlag		Empty	A flag that is passed to a mining model algorithm. The form and content of flags is specific to each algorithm. Each **ModelingFlag** must be valid for the algorithm chosen. <33> Server vendors can define flags that support their algorithms.

2.2.4.2.2.16.2 MiningModelColumn

This complex type represents a column in a MiningModel.

```
<xsd:complexType name="MiningModelColumn">
  <xsd:all>
    <xsd:element name="Name" type="xsd:string"/>
    <xsd:element name="ID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Description" type="xsd:string" minOccurs="0"/>
    <xsd:element name="SourceColumnID" type="xsd:string"/>
    <xsd:element name="Usage" type="xsd:string" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Key" />
          <xsd:enumeration value="Input" />
          <xsd:enumeration value="Predict" />
          <xsd:enumeration value="PredictOnly" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Filter" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Translations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Translation"  type="Translation" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Columns" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Column"  type="MiningModelColumn" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="ModelingFlags" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="ModelingFlag"  type="MiningModelingFlag" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
```


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```
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
Name		[Required]	The object name.
ID		Defaults to Name	The object ID string.
Description		Empty	The object description.
SourceColumnID		Empty	The ID of the source column in the parent structure.
Usage		"None"	Specifies the usage for this column within the **MiningModel**.
Filter		Empty	A string that contains a valid DMX filter to be applied to nested table columns. An empty string or missing element implies no filter. Must be empty for non-table columns.<34>
Translations		Empty	A collection of Translation objects.
Columns		Empty	A set of **Column** objects. This is a nesting of this same type. It is used only for nested tables.
ModelingFlags		Empty	A collection of **ModelingFlag** objects.
Annotations		Empty	A collection of Annotation objects.

2.2.4.2.2.16.3 AlgorithmParameter

This complex type represents an algorithm parameter for a MiningModel. The parameters that are allowed vary by which algorithm is chosen.

```
<xsd:complexType name="AlgorithmParameter">
  <xsd:all>
    <xsd:element name="Name" type="xsd:string"/>
    <xsd:element name="Value" type="xsd:anySimpleType" />
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description

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Element	Read-Only	Default	Description
Name		[Required]	The parameter name. Algorithm-specific.
Value		[Required]	The parameter value. Algorithm-specific.

2.2.4.2.2.16.4 FoldingParameters

This complex type represents the folding parameters for a MiningModel.<35>

```
<xsd:complexType name="FoldingParameters">
  <xsd:all>
    <xsd:element name="FoldIndex" type="xsd:integer" />
    <xsd:element name="FoldCount" type="xsd:integer" />
    <xsd:element name="MaxFoldCases" type="xsd:long" minOccurs="0"/>
    <xsd:element name="FoldTargetAttribute" type="xsd:string" minOccurs="0"/>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
FoldIndex		[Required]	An integer that indicates the index of the partition to be used for validating this mining model in a multifold cross-validation procedure.<36>
FoldCount		[Required]	An integer that indicates the number of partitions in the multifold cross-validation procedure.<37>
MaxFoldCases		-1	An integer that indicates the maximum number of training cases to be used for cross-validation in this model. A value of -1 indicates that all cases are used.<38>
FoldTargetAttribute		Empty	A string that indicates the ID of the model column that contains the predictable attribute.<39>

2.2.4.2.2.17 Annotation

This complex type represents an **Annotation**.

```
<xsd:complexType name="Annotation">
  <xsd:all>
    <xsd:element name="Name" type="xsd:string"/>
    <xsd:element name="Visibility" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="SchemaRowset" />
          <xsd:enumeration value="None" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Value" type="xsd:anyType" />
  </xsd:all>
```


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```
</xsd:complexType>
```

Element	Read-Only	Default	Description
Name		[Required]	This element SHOULD be in a style that references the vendor's XML namespace, to prevent collisions in sharing of information contained in other **Annotation** objects. The **Name** MUST be unique within the collection of **Annotations** that is contained within an individual object.<40>
Visibility		"None"	This element determines the way in which **Annotation** objects are exposed. By default, **Annotation** objects are exposed only in **DISCOVER_XML_METADATA**, and are not visible to client software. If **Visibility** is set to **SchemaRowset**, then **Annotation** object information is exposed as a column in the schema rowset.
Value		[Required]	The content of the **Annotation**.

2.2.4.2.2.18 Translation

This complex type represents a translation of an object in a specific language.

```
<xsd:complexType name="Translation">
  <xsd:all>
    <xsd:element name="Language" type="xsd:unsignedInt"/>
    <xsd:element name="Caption" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Description" type="xsd:string" minOccurs="0"/>
    <xsd:element name="DisplayFolder" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Annotations"  minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation"  type="Annotation"
                       minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
Language		[Required]	The **locale identifier (LCID)** of the language. For more details on locale identifiers, see [MS-LCID].
Caption		Empty	The caption of the object in the language represented by the **Language** element.
Description		Empty	The description for the object.
DisplayFolder		Empty	The folder in which the object is displayed.
Annotations		Empty	A collection of Annotation objects.

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2.2.4.2.2.18.1 AttributeTranslation

This complex type represents a translation of a DimensionAttribute in a specific language. The **AttributeTranslation** type is an extension of the Translation type, and includes all of its elements.

```
<xsd:complexType name="AttributeTranslation">
  <xsd:all>
    <xsd:element name="Language" type="xsd:unsignedInt"/>
    <xsd:element name="Caption" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Description" type="xsd:string" minOccurs="0"/>
    <xsd:element name="DisplayFolder" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Annotations"  minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="CaptionColumn" type="DataItem"  minOccurs="0" />
    <xsd:element name="MembersWithDataCaption" type="xsd:string"  minOccurs="0" />
  </xsd:all>
</xsd:complexType>
```

The following table includes only the elements that are in addition to the **AttributeTranslation** type. All elements from the **Translation** type are also included.

Element	Read-Only	Default	Description
CaptionColumn		None	The source column for the attribute member captions.
MembersWithDataCaption		None	The caption template for data members. This applies only if **Usage** is set to **Parent** in the **DimensionAttribute**.

2.2.4.2.2.19 DataItem

This complex type represents a scalar data item associated with an object, such as DimensionAttribute and Measure.

The **Source** element of the **DataItem** is of type Binding. However, in a specific instance of the **DataItem**, there are often additional constraints as to what type of **Binding** will be permitted, depending upon the parent of the **DataItem**. Within the tables throughout this document, it is noted exactly which derived types of **Binding** are permitted in each context and MUST be used for that particular context.

```
<xsd:complexType name="DataItem">
  <xsd:all>
    <xsd:element name="DataType">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="WChar" />
          <xsd:enumeration value="Integer" />
```


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```
        <xsd:enumeration value="BigInt" />
        <xsd:enumeration value="Single" />
        <xsd:enumeration value="Double" />
        <xsd:enumeration value="Date" />
        <xsd:enumeration value="Currency" />
        <xsd:enumeration value="UnsignedTinyInt" />
        <xsd:enumeration value="UnsignedSmallInt" />
        <xsd:enumeration value="UnsignedInt" />
        <xsd:enumeration value="UnsignedBigInt" />
        <xsd:enumeration value="Bool" />
        <xsd:enumeration value="Smallint" />
        <xsd:enumeration value="Tinyint" />
        <xsd:enumeration value="Binary" />
      </xsd:restriction>
    </xsd:simpleType>
  </xsd:element>
  <xsd:element name="DataSize" type="xsd:integer" minOccurs="0"/>
  <xsd:element name="MimeType" type="xsd:string" minOccurs="0"/>
  <xsd:element name="NullProcessing" minOccurs="0">
    <xsd:simpleType>
      <xsd:restriction base="xsd:string" >
        <xsd:enumeration value="Preserve" />
        <xsd:enumeration value="Error" />
        <xsd:enumeration value="UnknownMember" />
        <xsd:enumeration value="ZeroOrBlank" />
        <xsd:enumeration value="Automatic" />
      </xsd:restriction>
    </xsd:simpleType>
  </xsd:element>
  <xsd:element name="Trimming" minOccurs="0">
    <xsd:simpleType>
      <xsd:restriction base="xsd:string" >
        <xsd:enumeration value="Left" />
        <xsd:enumeration value="Right" />
        <xsd:enumeration value="LeftRight" />
        <xsd:enumeration value="None" />
      </xsd:restriction>
    </xsd:simpleType>
  </xsd:element>
  <xsd:element name="InvalidXmlCharacters"  minOccurs="0">
    <xsd:simpleType>
      <xsd:restriction base="xsd:string" >
        <xsd:enumeration value="Preserve" />
        <xsd:enumeration value="Remove" />
        <xsd:enumeration value="Replace" />
      </xsd:restriction>
    </xsd:simpleType>
  </xsd:element>
  <xsd:element name="Collation" type="xsd:string" minOccurs="0"/>
  <xsd:element name="Format" minOccurs="0">
    <xsd:simpleType>
      <xsd:restriction base="xsd:string" >
        <xsd:enumeration value="TrimRight" />
        <xsd:enumeration value="TrimLeft" />
        <xsd:enumeration value="TrimAll" />
        <xsd:enumeration value="TrimNone" />
      </xsd:restriction>
    </xsd:simpleType>
  </xsd:element>
```


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```
      <xsd:element name="Source" type="Binding" minOccurs="0"/>
      <xsd:element name="Annotations" minOccurs="0">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="Annotation"  type="Annotation"
                         minOccurs="0" maxOccurs="unbounded"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
    </xsd:all>
  </xsd:complexType>
```

Element	Read-Only	Default	Description
DataType		[Required]	The data type of the column.
DataSize		-1	The data size in bytes. -1 means that the server will determine the **DataSize**.
MimeType		Empty	The MIME type. Only applicable if the **DataType** is **Binary**.
NullProcessing		"Automatic"	Sets the processing of NULL values. "Automatic" – The server determines how null processing is handled.<41> "Preserve" – Preserves the null value. "Error" – Raises an error. Value "Error" is not supported for measures. "UnknownMember" – Generates an unknown member. "ZeroOrBlank" – Converts the null value to zero (for numeric data items) or a blank string (for string data items).
Trimming		"Right"	Specifies how data from the data source is trimmed. Applicable only to string data items.
InvalidXmlCharacters		"Preserve"	Specifies handling for invalid XML characters. If "Replace", replaces invalid characters with "?"
Collation		Empty	The collation of the data item. Applicable only to string data items.
Format		Empty	The format of the data item.
Source		Empty	The source of the data item. Which derived type of **Binding** is permitted is dependent upon the enclosing object, and is explained in the table for each enclosing object.
Annotations		Empty	A collection of **Annotation** objects.

2.2.4.2.2.20 Binding

This complex type represents a binding of an object to a source of data. It is an abstract type that is extended by many binding types.

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```
<xsd:complexType name="Binding" abstract="true" />
```

Element	Read-Only	Default	Description
(None)			

2.2.4.2.2.20.1 ColumnBinding

This complex type represents a binding to a column of a table.

```
<xsd:complexType name="ColumnBinding" >
  <xsd:complexContent>
    <xsd:extension base="Binding">
      <xsd:all>
        <xsd:element name="TableID" type="xsd:string"/>
        <xsd:element name="ColumnID" type="xsd:string"/>
      </xsd:all>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

Element	Read-Only	Default	Description
TableID		[Required]	The ID of the table in the DataSourceView.
ColumnID		[Required]	The ID of the column in the **DataSourceView**.

2.2.4.2.2.20.2 RowBinding

This complex type represents a binding to the rows of a table.

```
<xsd:complexType name="RowBinding">
  <xsd:complexContent>
    <xsd:extension base="Binding">
      <xsd:all>
        <xsd:element name="TableID" type="xsd:string"/>
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
```

Element	Read-Only	Default	Description
TableID			The ID of the table in the DataSourceView.

2.2.4.2.2.20.3 DataSourceViewBinding

This complex type represents a binding to a DataSourceView.

```
<xsd:complexType name="DataSourceViewBinding" >
```


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```
  <xsd:complexContent>
    <xsd:extension base="Binding">
      <xsd:all>
        <xsd:element name="DataSourceViewID" type="xsd:string" />
      </xsd:all>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

Element	Read-Only	Default	Description
DataSourceViewID		[Required]	The ID of the **DataSourceView**.

2.2.4.2.2.20.4 MeasureBinding

This complex type represents a binding to a Measure.

```
<xsd:complexType name="MeasureBinding" >
  <xsd:complexContent>
    <xsd:extension base="Binding">
      <xsd:all>
        <xsd:element name="MeasureID" type="xsd:string"/>
      </xsd:all>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

Element	Read-Only	Default	Description
MeasureID		[Required]	The ID of the **Measure**.

2.2.4.2.2.20.5 AttributeBinding

This complex type represents a binding to a DimensionAttribute.

```
<xsd:complexType name="AttributeBinding" abstract="true">
  <xsd:complexContent>
    <xsd:extension base="Binding">
      <xsd:all>
        <xsd:element name="AttributeID" type="xsd:string"/>
        <xsd:element name="Type" >
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="All" />
              <xsd:enumeration value="Key" />
              <xsd:enumeration value="Name" />
              <xsd:enumeration value="Value" />
              <xsd:enumeration value="Translation" />
              <xsd:enumeration value="UnaryOperator" />
              <xsd:enumeration value="SkippedLevels" />
              <xsd:enumeration value="CustomRollup" />
              <xsd:enumeration value="CustomRollupProperties" />
            </xsd:restriction>
```


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```
            </xsd:simpleType>
          </xsd:element>
          <xsd:element name="Ordinal" type="xsd:integer" minOccurs="0"/>
        </xsd:all>
      </xsd:extension>
    </xsd:complexContent>
  </xsd:complexType>
```

Element	Read-Only	Default	Description
AttributeID		[Required]	The ID of the **Attribute**.
Type		[Required]	Indicates the part of the **Attribute** to bind to. Enumeration values are as follows: **All**: All Level **Key**: Member keys **Name**: Member name **Value**: Member value **Translation**: Member translations **UnaryOperator**: Unary operators **SkippedLevels**: Skipped levels **CustomRollup**: Custom rollup formulas **CustomRollupProperties**: Custom rollup properties
Ordinal		Zero	When the binding is to a collection of objects, the ordinal indicates the ordinal number within that collection to bind to. (Applies to **KeyColumns** and Translation objects).

2.2.4.2.2.20.6 UserDefinedGroupBinding

This complex type represents a binding to a grouping of members from another DimensionAttribute.

```
<xsd:complexType name="UserDefinedGroupBinding" >
  <xsd:complexContent>
    <xsd:extension base="Binding">
      <xsd:all>
        <xsd:element name="AttributeID" type="xsd:string"/>
        <xsd:element name="Groups" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Group"  type="Group" minOccurs="0"
                           maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
      </xsd:all>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```


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Element	Read-Only	Default	Description
AttributeID		[Required]	The ID of the **Attribute** that is being grouped.
Groups		Empty	A collection of objects of type Group.

2.2.4.2.2.20.6.1 Group

This complex type represents a single group within a UserDefinedGroupBinding.

```
<xsd:complexType name="Group">
  <xsd:all>
    <xsd:element name="Name" type="xsd:string"/>
    <xsd:element name="Members" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Member"  type="xsd:string" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
Name		[Required]	Name of the grouping member.
Members		[Required]	A collection of strings that contain MDX expressions that identify the set of members to be grouped.

2.2.4.2.2.20.7 CubeAttributeBinding

This complex type represents a binding to a CubeAttribute.

```
<xsd:complexType name="CubeAttributeBinding" >
  <xsd:complexContent>
    <xsd:extension base="Binding" >
      <xsd:all>
        <xsd:element name="CubeID" type="xsd:string"/>
        <xsd:element name="CubeDimensionID" type="xsd:string"/>
        <xsd:element name="AttributeID" type="xsd:string"/>
        <xsd:element name="Type" >
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="All" />
              <xsd:enumeration value="Key" />
              <xsd:enumeration value="Name" />
              <xsd:enumeration value="Value" />
              <xsd:enumeration value="Translation" />
              <xsd:enumeration value="UnaryOperator" />
              <xsd:enumeration value="SkippedLevels" />
              <xsd:enumeration value="CustomRollup" />
              <xsd:enumeration value="CustomRollupProperties" />
```


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```
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="Ordinal" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Ordinal"  type="xsd:integer"
                           minOccurs="0" maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
      </xsd:all>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

Element	Read-Only	Default	Description
CubeID		[Required]	The ID of the Cube.
CubeDimensionID		[Required]	The ID of the CubeDimension.
AttributeID		[Required]	The ID of the **CubeAttribute**.
Type		[Required]	Indicates the part of the **Attribute** to bind to. For more information about the enumeration values, see section 2.2.4.2.2.20.5.
Ordinal		Zero	When the binding is to a collection of objects, the ordinal indicates the ordinal number within that collection to bind to. (Applies to **KeyColumns** and **Translations**.)

2.2.4.2.2.20.8 DimensionBinding

The **DimensionBinding** complex type represents a binding to a dimension.

```
<xsd:complexType name="DimensionBinding" >
  <xsd:complexContent>
    <xsd:extension base="Binding">
      <xsd:all>
        <xsd:element name="DataSourceID" type="xsd:string"/>
        <xsd:element name="DimensionID" type="xsd:string"/>
        <xsd:element name="Persistence" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="NotPersisted" />
              <xsd:enumeration value="Metadata" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="RefreshPolicy" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="ByQuery" />
              <xsd:enumeration value="ByInterval" />
```


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```
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="RefreshInterval" type="xsd:duration"  minOccurs="0" />
      </xsd:all>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

Element	Read-Only	Default	Description
DataSourceID		[Required]	The ID of the DataSource.
DimensionID		[Required]	The ID of the Dimension.
Persistence		"NotPersisted"	Determines which parts of the bound source data are dynamic and are checked for updates by using the frequency that is specified by the **RefreshPolicy** element. Enumeration values are as follows: ▪ NotPersisted - Source metadata, members, and data are all dynamic. ▪ Metadata - Source metadata is static, but members and data are dynamic.
RefreshPolicy		"ByQuery"	Determines how often the dynamic part of the dimension or measure group (as specified by the **Persistence** element) is checked for changes. Enumeration values are as follows: ▪ ByQuery - Every query checks to see whether the source data has changed. ▪ ByInterval - Source data is checked for changes only at the interval that is specified by the RefreshInterval element.
RefreshInterval			Specifies the interval at which the dynamic part of the dimension or measure group is refreshed. The value -10000000 is interpreted to mean infinite.

2.2.4.2.2.20.9 CubeDimensionBinding

The **CubeDimensionBinding** complex type represents a binding to a CubeDimension.

```
<xsd:complexType name="CubeDimensionBinding" >
  <xsd:complexContent>
    <xsd:extension base="Binding">
      <xsd:all>
        <xsd:element name="DataSourceID" type="xsd:dateTime"/>
        <xsd:element name="CubeID" type="xsd:dateTime"/>
        <xsd:element name="CubeDimensionID" type="xsd:string"/>
        <xsd:element name="Filter" type="xsd:string" minOccurs="0"/>
      </xsd:all>
    </xsd:extension>
```


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```
  </xsd:complexContent>
</xsd:complexType>
```

Element	Read-Only	Default	Description
DataSourceID		[Required]	The ID of the DataSource.
CubeID		[Required]	The ID of the Cube.
CubeDimensionID		[Required]	The ID of the **CubeDimension**.
Filter		Empty	An MDX expression that specifies how to filter the source data.

2.2.4.2.2.20.10 MeasureGroupBinding

The **MeasureGroupBinding** complex type represents a binding to a MeasureGroup.

```
<xsd:complexType name="MesureGroupBinding">
  <xsd:complexContent>
    <xsd:extension base="Binding">
      <xsd:all>
        <xsd:element name="DataSourceID" type="xsd:string"/>
        <xsd:element name="CubeID" type="xsd:string"/>
        <xsd:element name="MeasureGroupID" type="xsd:string"/>
        <xsd:element name="Persistence" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="NotPersisted" />
              <xsd:enumeration value="Metadata" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="RefreshPolicy" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="ByQuery" />
              <xsd:enumeration value="ByInterval" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="RefreshInterval"  type="xsd:duration" minOccurs="0" />
        <xsd:element name="Filter" type="xsd:string" minOccurs="0"/>
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
```

Element	Read-Only	Default	Description
DataSourceID		[Required]	The ID of the DataSource.
CubeID		[Required]	The ID of the Cube.

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Element	Read-Only	Default	Description
MeasureGroupID		[Required]	The ID of the **MeasureGroup**.
Persistence		"NotPersisted"	Determines which parts of the bound source data are dynamic and are checked for updates using the frequency that is specified by the **RefreshPolicy** element. Enumeration values are as follows: ▪ NotPersisted - Source metadata, members, and data are all dynamic. ▪ Metadata - Source metadata is static, but members and data are dynamic.
RefreshPolicy		Empty	Determines how often the dynamic part of the dimension or measure group (as specified by the **Persistence** element) is checked for changes. Enumeration values are as follows: ▪ ByQuery - Every query checks to determine whether the source data has changed. ▪ ByInterval - Source data is checked for changes only at the interval that is specified by the RefreshInterval element.
RefreshInterval		-10000000	A duration that specifies the interval at which the dynamic part of the dimension or measure group is refreshed. The value -10000000 is interpreted to mean infinite.
Filter		Empty	MDX expression that specifies how to filter the source data.

2.2.4.2.2.20.11 MeasureGroupDimensionBinding

The **MeasureGroupDimensionBinding** complex type represents a binding to a MeasureGroupDimension.

```
<xsd:complexType name="MesureGroupDimensionBinding">
  <xsd:complexContent>
    <xsd:extension base="Binding">
      <xsd:all>
        <xsd:element name="CubeDimensionID" type="xsd:string"/>
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
```

Element	Read-Only	Default	Description
CubeDimensionID		[Required]	The ID of the CubeDimension.

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2.2.4.2.2.20.12 TimeBinding

The **TimeBinding** complex type represents a binding to a time calendar.

```
<xsd:complexType name="TimeBinding" >
  <xsd:complexContent>
    <xsd:extension base="Binding">
      <xsd:all>
        <xsd:element name="CalendarStartDate" type="xsd:dateTime"/>
        <xsd:element name="CalendarEndDate" type="xsd:dateTime"/>
        <xsd:element name="FirstDayOfWeek " minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:integer">
              <xsd:minInclusive value="1" />
              <xsd:maxInclusive value="7" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="CalendarLanguage" type="xsd:integer" minOccurs="0"/>
        <xsd:element name="FiscalFirstMonth" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:integer">
              <xsd:minInclusive value="1" />
              <xsd:maxInclusive value="12" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="FiscalFirstDayOfMonth" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:integer">
              <xsd:minInclusive value="1" />
              <xsd:maxInclusive value="31" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="FiscalYearName" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="CalendarYearName" />
              <xsd:enumeration value="NextCalendarYearName" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="ReportingFirstMonth" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:integer">
              <xsd:minInclusive value="1" />
              <xsd:maxInclusive value="12" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="ReportingFirstWeekOfMonth" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="1" />
              <xsd:enumeration value="2" />
              <xsd:enumeration value="3" />
              <xsd:enumeration value="4" />
```


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```
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="ReportingWeekToMonthPattern" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="4-4-5" />
              <xsd:enumeration value="4-5-4" />
              <xsd:enumeration value="5-4-4" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="ManufacturingFirstMonth" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:integer">
              <xsd:minInclusive value="1" />
              <xsd:maxInclusive value="12" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name=" ManufacturingFirstWeekOfMonth" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:integer">
              <xsd:minInclusive value="1" />
              <xsd:maxInclusive value="4" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="ManufacturingExtraMonthQuarter" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:integer">
              <xsd:minInclusive value="1" />
              <xsd:maxInclusive value="4" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
      </xsd:all>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

Element	Read-Only	Default	Description
CalendarStartDate		[Required]	The start date of the calendar.
CalendarEndDate		[Required]	The end date of the calendar. The end date must be on or after the start date.
FirstDayOfWeek		1	The first day of the week. 1=Sunday 7=Saturday
CalendarLanguage		1033 (English-US)	The language in which the dimension member names will be created. This MUST be a **language code identifier**

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Element	Read-Only	Default	Description
			(LCID) code.
FiscalFirstMonth		1	The first month of the fiscal calendar. 1=January 12=December
FiscalFirstDayOfMonth		1	The first day of the fiscal calendar.
FiscalYearName		"NextCalendarYearName"	This enumeration value specifies how the name of the fiscal year is generated.
ReportingFirstMonth		1	The first month of the reporting calendar. 1=January 12=December
ReportingFirstWeekOfMonth		1	The first week of the reporting calendar.
ReportingWeekToMonthPattern		"4-4-5"	The pattern by which to match weeks to months.
ManufacturingFirstMonth		1	The first month of the manufacturing calendar. 1=January 12=December
ManufacturingFirstWeekOfMonth		1	The first week of the manufacturing calendar.
ManufacturingExtraMonthQuarter		4	The quarter of a year that contains the extra month.

2.2.4.2.2.20.13 TimeAttributeBinding

The **TimeAttributeBinding** complex type represents a binding of a DimensionAttribute to a time calendar. It has no additional elements. It is used for the **KeyColumns** of attributes in dimensions that have a Source property with type TimeBinding.

```
<xsd:complexType name="TimeAttributeBinding" >
  <xsd:complexContent>
    <xsd:extension base="Binding" />
  </xsd:complexContent>
</xsd:complexType>
```

Element	Read-Only	Default	Description
(None)			

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2.2.4.2.2.20.14 InheritedBinding

The **InheritedBinding** complex type represents a binding that is inherited from another object. **InheritedBinding** has no elements. It is used to indicate that a MeasureGroupAttribute inherits its bindings from the corresponding DimensionAttribute.

```
<xsd:complexType name="InheritedBinding">
  <xsd:complexContent>
    <xsd:extension base="Binding" />
  </xsd:complexContent>
</xsd:complexType>
```

Element	Read-Only	Default	Description
(None)			

2.2.4.2.2.20.15 TabularBinding

The **TabularBinding** abstract complex type represents a binding to a tabular source of data.

```
<xsd:complexType name="TabularBinding" abstract="true" />
```

Element	Read-Only	Default	Description
(None)			

2.2.4.2.2.20.16 TableBinding

The **TableBinding** complex type represents a binding to a table.

```
<xsd:complexType name="TableBinding" >
  <xsd:complexContent>
    <xsd:extension base="TabularBinding">
      <xsd:all>
        <xsd:element name="DataSourceID" type="xsd:string" minOccurs="0"/>
        <xsd:element name="DbTableName" type="xsd:string"/>
        <xsd:element name="DbSchemaName" type="xsd:string" minOccurs="0"/>
      </xsd:all>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

Element	Read-Only	Default	Description
DataSourceID		Empty	The ID of the DataSource.
DbTableName		[Required]	The name of the table.
DbSchemaName		Empty	The name of the schema.

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2.2.4.2.2.20.17 QueryBinding

The **QueryBinding** complex type represents a binding to a query.

```
<xsd:complexType name="QueryBinding" >
  <xsd:complexContent>
    <xsd:extension base="TabularBinding">
      <xsd:all>
        <xsd:element name="DataSourceID" type="xsd:string" minOccurs="0"/>
        <xsd:element name="QueryDefinition" type="xsd:string"/>
      </xsd:all>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

Element	Read-Only	Default	Description
DataSourceID		Empty	The ID of the DataSource.
QueryDefinition		[Required]	The text of the query.

2.2.4.2.2.20.18 DSVTableBinding

The **DSVTableBinding** complex type represents a binding to a table within a DataSourceView.

```
<xsd:complexType name="DSVTableBinding" >
  <xsd:complexContent>
    <xsd:extension base="TabularBinding">
      <xsd:all>
        <xsd:element name="DataSourceViewID" type="xsd:string" minOccurs="0"/>
        <xsd:element name="TableID" type="xsd:string"/>
      </xsd:all>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

Element	Read-Only	Default	Description
DataSourceViewID		Empty	The ID of the **DataSourceView**.
TableID		[Required]	The ID of the table.

2.2.4.2.2.20.19 ProactiveCachingBinding

The **ProactiveCachingBinding** abstract complex type represents a binding for proactive caching.

```
<xsd:complexType name="ProactiveCachingBinding" abstract="true" />
```

Element	Read-Only	Default	Description
(None)			

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2.2.4.2.2.20.20 ProactiveCachingObjectNotificationBinding

The **ProactiveCachingObjectNotificationBinding** abstract complex type represents an object notification binding for proactive caching.

The XSD does not show the elements for this class; instead the XSD of each derived class shows the elements. However, the elements that are common to all derived classes are shown in the table.

```
<xsd:complexType name="ProactiveCachingObjectNotificationBinding" abstract="true" />
```

Element	Read-Only	Default	Description
NotificationTechnique		"Client"	Specifies the notification technique to be used. **Client** - The client sends notifications by using the NotifyTableChange command. **Server** - The server listens for notifications from the data source.

2.2.4.2.2.20.21 ProactiveCachingInheritedBinding

The **ProactiveCachingInheritedBinding** complex type represents an object notification binding for proactive caching. The XSD includes all elements in the base class and the derived class. The table includes only elements in this subclass that are in addition to elements in the base class.

```
<xsd:complexType name="ProactiveCachingInheritedBinding" >
  <xsd:complexContent>
    <xsd:extension base="ProactiveCachingObjectNotificationBinding">
      <xsd:all>
        <xsd:element name="NotificationTechnique" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="Client" />
              <xsd:enumeration value="Server" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
      </xsd:all>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

Element	Read-Only	Default	Description
(None)			

2.2.4.2.2.20.22 ProactiveCachingTablesBinding

The **ProactiveCachingTablesBinding** complex type represents a binding to a collection of table notifications for proactive caching. The XSD includes the entire class, including elements common with the base class. The table includes only elements in this subclass that are in addition to elements in the base class.

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```
<xsd:complexType name="ProactiveCachingTablesBinding" >
  <xsd:complexContent>
    <xsd:extension base="ProactiveCachingObjectNotificationBinding">
      <xsd:all>
        <xsd:element name="NotificationTechnique" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="Client" />
              <xsd:enumeration value="Server" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="TableNotifications" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="TableNotification"  type="TableNotification"
                           minOccurs="0" maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
      </xsd:all>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

This table includes only elements that are in addition to elements in the base class.

Element	Read-Only	Default	Description
TableNotifications		Empty	Collection of objects of type TableNotification.

2.2.4.2.2.20.22.1 TableNotification

The **TableNotification** complex type represents a table notification for proactive caching.

```
<xsd:complexType name="TableNotification">
  <xsd:all>
    <xsd:element name="DbTableName" type="xsd:string"/>
    <xsd:element name="DbSchemaName" type="xsd:string" minOccurs="0"/>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
DbTableName		[Required]	The name of the table.
DbSchemaName		Empty	The name of the schema.

2.2.4.2.2.20.23 ProactiveCachingQueryBinding

The **ProactiveCachingQueryBinding** complex type represents a binding to a collection of query notifications for proactive caching. The base type has no elements. Therefore, all elements are defined in the following XSD and table.

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```
<xsd:complexType name="ProactiveCachingQueryBinding" >
  <xsd:complexContent>
    <xsd:extension base="ProactiveCachingBinding">
      <xsd:all>
        <xsd:element name="RefreshInterval" type="xsd:duration" />
        <xsd:element name="QueryNotifications" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="QueryNotification"  type="QueryNotification"
                           minOccurs="0" maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
      </xsd:all>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

Element	Read-Only	Default	Description
RefreshInterval		Infinite	The interval for running the queries.
QueryNotifications		[Required]	A collection of objects of type QueryNotification.

2.2.4.2.2.20.23.1 QueryNotification

The **QueryNotification** complex type represents a query notification for proactive caching.

```
<xsd:complexType name="QueryNotification">
  <xsd:all>
    <xsd:element name="Query" type="xsd:string"/>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
Query		Empty	The query text.

2.2.4.2.2.20.24 ProactiveCachingIncrementalProcessingBinding

This complex type represents a binding to a collection of incremental processing notifications for proactive caching.

```
<xsd:complexType name="ProactiveCachingIncrementalProcessingBinding" >
  <xsd:complexContent>
    <xsd:extension base="ProactiveCachingBinding">
      <xsd:all>
        <xsd:element name="RefreshInterval" type="xsd:duration" minOccurs="0" />
        <xsd:element name="IncrementalProcessingNotifications" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="IncrementalProcessingNotification"
```


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```
                        type="IncrementalProcessingNotification"
                        minOccurs="0" maxOccurs="unbounded"/>
              </xsd:sequence>
            </xsd:complexType>
          </xsd:element>
        </xsd:all>
      </xsd:extension>
    </xsd:complexContent>
  </xsd:complexType>
```

Element	Read-Only	Default	Description
RefreshInterval		Infinite	The interval for running the queries.
IncrementalProcessingNotifications		[Required]	A collection of objects of type IncrementalProcessingNotification.

2.2.4.2.2.20.24.1 IncrementalProcessingNotification

This complex type represents an incremental processing notification for proactive caching.

```
<xsd:complexType name="IncrementalProcessingNotification">
  <xsd:all>
    <xsd:element name="TableID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="ProcessingQuery" type="xsd:string"/>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
TableID		[Required]	The ID of the table in the DataSourceView.
ProcessingQuery		[Required]	The processing query text.

2.2.4.2.2.20.25 eng200_200:RowNumberBinding

This complex type represents a binding to the row number of the source table.<42>

The **RowNumberBinding** complex type is not defined in the default namespace. It is defined in the **eng200_200:** namespace.

```
<xsd:complexType name="RowNumberBinding" >
  <xsd:complexContent>
    <xsd:extension base="Binding" />
  </xsd:complexContent>
</xsd:complexType>
```

Element	Read-Only	Default	Description
(None)			

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2.2.4.2.2.20.26 CalculatedMeasureBinding

This complex type represents a binding to a calculated measure.

```
<xsd:complexType name="CalculatedMeasureBinding" >
  <xsd:complexContent>
    <xsd:extension base="Binding">
      <xsd:all>
        <xsd:element name="MeasureName" type="xsd:string" />
      </xsd:all>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

Element	Read-Only	Default	Description
MeasureName		[Required]	The name of the calculated measure.

2.2.4.2.2.20.27 eng200_200:ExpressionBinding

This complex type represents a binding to a calculation expression.

```
<xsd:complexType name="ExpressionBinding">
  <xsd:complexContent>
    <xsd:extension base="Binding">
      <xsd:all>
        <xsd:element name="Expression" type="xsd:string" />
      </xsd:all>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

Element	Read-Only	Default	Description
Expression		[Required]	The expression text.

2.2.4.2.2.21 Permission

The **Permission** complex type represents a set of permissions assigned to a Role.

```
<xsd:complexType name="Permission">
  <xsd:complexContent>
    <xsd:extension base="MajorObject">
      <xsd:all>
        <!--These elements are common to each MajorObject-->
        <xsd:element name="Name"  type="xsd:string" />
        <xsd:element name="ID"  type="xsd:string" minOccurs="0" />
        <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="Description" type="xsd:string" minOccurs="0" />
        <xsd:element name="Annotation"  minOccurs="0" >
          <xsd:complexType>
```


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```
            <xsd:sequence>
              <xsd:element name="Annotation" type="Annotation"
                           minOccurs="0" maxOccurs="unbounded" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <!--Extended elements for Permission object-->
        <xsd:element name="RoleID" type="xsd:string"/>
        <xsd:element name="Process" type="xsd:boolean" minOccurs="0"/>
        <xsd:element name="ReadDefinition" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="None" />
              <xsd:enumeration value="Basic" />
              <xsd:enumeration value="Allowed" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="Read" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="None" />
              <xsd:enumeration value="Allowed" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="Write" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="None" />
              <xsd:enumeration value="Allowed" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
```

Also included in the **Permission** object are all elements from MajorObject.

Element	Read-Only	Default	Description
RoleID		[Required]	The ID of the **Role** for which permissions are being defined.
Process		False	When true, specifies that the role has permission to process the object; otherwise, false.
ReadDefinition		"None" for all objects (except Dimension) where default is value of Read property	A string that specifies whether the role has permission to read the XML definition of the object or any of its contained objects using DISCOVER_XML_METADATA. "None" implies no access to object definition. "Basic" implies limited access to object definition. "Allowed" implies full access to object definition.

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Element	Read-Only	Default	Description
Read		"None"	A string that specifies whether the role has permission to read metadata or data from the object or any of its contained objects. "None" implies no read access to object metadata or data. "Allowed" implies full read access to object metadata or data.
Write		"None"	A string that specifies whether the role has permission to write to the object or any of its contained objects. Database permission cannot have Write="Allowed". Write cannot be set to "Allowed" unless Read is also set to "Allowed". "None" implies no write access to object metadata or data. "Allowed" implies full write access to object metadata or data.

2.2.4.2.2.21.1 CubeDimensionPermission

The **CubeDimensionPermission** complex type represents permissions for a CubeDimension.

```
<xsd:complexType name="CubeDimensionPermission">
  <xsd:all>
    <xsd:element name="CubeDimensionID" type="xsd:string"/>
    <xsd:element name="Description" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Read" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="None" />
          <xsd:enumeration value="Allowed" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Write" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="None" />
          <xsd:enumeration value="Allowed" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="AttributePermissions" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="AttributePermission"  type="AttributePermission"
                       minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
```


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```
            <xsd:element name="Annotation"  type="Annotation"
                         minOccurs="0" maxOccurs="unbounded"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
    </xsd:all>
  </xsd:complexType>
```

Element	Read-Only	Default	Description
CubeDimensionID		[Required]	The ID of the **CubeDimension**. For the **Measures** dimension, this string MUST be set to "Measures".
Description		Empty	The object description.
Read		"Allowed"	Specifies whether the role has permission to read metadata or data from the **CubeDimension**.
Write		"None"	Specifies whether the role has permission to write to the **CubeDimension**.
AttributePermissions		Empty	A collection of AttributePermission objects.
Annotations		Empty	A collection of Annotation objects.

2.2.4.2.2.21.2 AttributePermission

The **AttributePermission** complex type represents permissions for a DimensionAttribute.

```
<xsd:complexType name="AttributePermission">
  <xsd:all>
    <xsd:element name="AttributeID" type="xsd:string"/>
    <xsd:element name="Description" type="xsd:string" minOccurs="0"/>
    <xsd:element name="DefaultMember" type="xsd:string" minOccurs="0"/>
    <xsd:element name="VisualTotals" type="xsd:string" minOccurs="0"/>
    <xsd:element name="AllowedSet" type="xsd:string" minOccurs="0"/>
    <xsd:element name="DeniedSet" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Annotation" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
AttributeID		[Required]	The ID of the attribute. The "Measures" string MUST be used to indicate the **Measures** dimension.
Description		Empty	The object description.

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Element	Read-Only	Default	Description
DefaultMember		Empty	An MDX expression that returns the default member for the attribute.
VisualTotals		Empty	An MDX expression that if true, specifies whether MDX queries should return visual totals for the attribute; otherwise, false.
AllowedSet		Empty	An MDX set expression that specifies the set of allowed members for the attribute.
DeniedSet		Empty	An MDX set expression that defines the set of denied members for the attribute.
Annotations		Empty	A collection of Annotation objects.

2.2.4.2.2.21.3 CellPermission

The **CellPermission** complex type represents permissions for the cells in a Cube.

A maximum of three **CellPermission** objects may exist within a **CellPermissions** collection, one each for the Read, ReadContingent, and ReadWrite values of the **Access** element.

```
<xsd:complexType name="CellPermission">
  <xsd:all>
    <xsd:element name="Access" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Read" />
          <xsd:enumeration value="ReadContingent" />
          <xsd:enumeration value="ReadWrite" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Description" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Expression" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation"  type="Annotation" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
Access		"Read"	An enumeration value that indicates the type of access being granted. The enumeration values are as follows: ▪ **Read** – Read access to the cell is permitted. ▪ **ReadContingent** – ReadContingent access to the cell is

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Element	Read-Only	Default	Description
			permitted. ▪ **ReadWrite** – ReadWrite access to the cell is permitted.
Description		Empty	The object description.
Expression		Empty	An MDX expression that returns a Boolean.
Annotations		Empty	A collection of Annotation objects.

2.2.4.2.2.22 DatabasePermission

The **DatabasePermission** complex type represents permissions for a Database.

```
<xsd:complexType name="DatabasePermission">
  <xsd:complexContent>
    <xsd:extension base="Permission">
      <xsd:all>
        <!--These elements are common to Permission-->
        <xsd:element name="Name"  type="xsd:string" />
        <xsd:element name="ID"  type="xsd:string" minOccurs="0" />
        <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="Description" type="xsd:string" minOccurs="0" />
        <xsd:element name="Annotation"  minOccurs="0" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Annotation" type="Annotation"
                           minOccurs="0" maxOccurs="unbounded" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="RoleID" type="xsd:string"/>
        <xsd:element name="Process" type="xsd:boolean" minOccurs="0"/>
        <xsd:element name="ReadDefinition" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="None" />
              <xsd:enumeration value="Basic" />
              <xsd:enumeration value="Allowed" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="Read" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="None" />
              <xsd:enumeration value="Allowed" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="Write" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
```


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```
              <xsd:enumeration value="None" />
              <xsd:enumeration value="Allowed" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <!--Extended elements for DatabasePermission object-->
        <xsd:element name="Administer" type="xsd:boolean" minOccurs="0"/>
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
```

The following table shows only the additional elements that are not contained in the Permission object.

Element	Read-Only	Default	Description
Administer		False	When true, specifies that the Role has permission to administer the **Database**; otherwise, false.

2.2.4.2.2.23 DataSourcePermission

The **DataSourcePermission** complex type represents permissions for a DataSource.

```
<xsd:complexType name="DataSourcePermission">
  <xsd:complexContent>
    <xsd:extension base="Permission">
      <xsd:all>
        <!--These elements are common to Permission-->
        <xsd:element name="Name"  type="xsd:string" />
        <xsd:element name="ID"  type="xsd:string" minOccurs="0" />
        <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="Description" type="xsd:string" minOccurs="0" />
        <xsd:element name="Annotation"  minOccurs="0" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Annotation" type="Annotation"
                           minOccurs="0" maxOccurs="unbounded" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="RoleID" type="xsd:string"/>
        <xsd:element name="Process" type="xsd:boolean" minOccurs="0"/>
        <xsd:element name="ReadDefinition" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="None" />
              <xsd:enumeration value="Basic" />
              <xsd:enumeration value="Allowed" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="Read" minOccurs="0">
```


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```
            <xsd:simpleType>
              <xsd:restriction base="xsd:string" >
                <xsd:enumeration value="None" />
                <xsd:enumeration value="Allowed" />
              </xsd:restriction>
            </xsd:simpleType>
          </xsd:element>
          <xsd:element name="Write" minOccurs="0">
            <xsd:simpleType>
              <xsd:restriction base="xsd:string" >
                <xsd:enumeration value="None" />
                <xsd:enumeration value="Allowed" />
              </xsd:restriction>
            </xsd:simpleType>
          </xsd:element>
          <!--Extended elements for DataSourcePermission object-->
          <!--(No additional elements)-->
        </xsd:all>
      </xsd:extension >
    </xsd:complexContent>
  </xsd:complexType>
```

DataSourcePermission has no elements that are additional to those that are contained in the Permission object.

Element	Read-Only	Default	Description
(None)			

2.2.4.2.2.24 DimensionPermission

The **DimensionPermission** complex type represents permissions for a Dimension.

```
<xsd:complexType name="DimensionPermission">
  <xsd:complexContent>
    <xsd:extension base="Permission">
      <xsd:all>
        <!--These elements are common to Permission-->
        <xsd:element name="Name"  type="xsd:string" />
        <xsd:element name="ID"  type="xsd:string" minOccurs="0" />
        <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="Description" type="xsd:string" minOccurs="0" />
        <xsd:element name="Annotation"  minOccurs="0" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                           maxOccurs="unbounded" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="RoleID" type="xsd:string"/>
        <xsd:element name="Process" type="xsd:boolean" minOccurs="0"/>
        <xsd:element name="ReadDefinition" minOccurs="0">
          <xsd:simpleType>
```


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```
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="None" />
              <xsd:enumeration value="Basic" />
              <xsd:enumeration value="Allowed" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="Read" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="None" />
              <xsd:enumeration value="Allowed" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="Write" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="None" />
              <xsd:enumeration value="Allowed" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <!--Extended elements for DimensionPermission object-->
        <xsd:element name="AttributePermissions" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="AttributePermission"  type="AttributePermission"
                           minOccurs="0" maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
```

The following table shows only the additional elements in **DimensionPermission** that are not contained in Permission.

Element	Read-Only	Default	Description
AttributePermissions		Empty	A collection of AttributePermission objects.

In **DimensionPermission**, the default for the **Read** element differs from the default for the **Read** element in the base **Permission** class. In **DimensionPermission**, the default for the **Read** element is "Allowed".

2.2.4.2.2.25 MiningStructurePermission

The **MiningStructurePermission** complex type represents permissions for a MiningStructure.

```
<xsd:complexType name="MiningStructurePermission">
  <xsd:complexContent>
    <xsd:extension base="Permission">
```


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```
        <xsd:all>
          <!--These elements are common to Permission-->
          <xsd:element name="Name"  type="xsd:string" />
          <xsd:element name="ID"  type="xsd:string" minOccurs="0" />
          <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
          <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
          <xsd:element name="Description" type="xsd:string" minOccurs="0" />
          <xsd:element name="Annotations"  minOccurs="0" >
            <xsd:complexType>
              <xsd:sequence>
                <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                             maxOccurs="unbounded" />
              </xsd:sequence>
            </xsd:complexType>
          </xsd:element>
          <xsd:element name="RoleID" type="xsd:string"/>
          <xsd:element name="Process" type="xsd:boolean" minOccurs="0"/>
          <xsd:element name="ReadDefinition" minOccurs="0">
            <xsd:simpleType>
              <xsd:restriction base="xsd:string" >
                <xsd:enumeration value="None" />
                <xsd:enumeration value="Basic" />
                <xsd:enumeration value="Allowed" />
              </xsd:restriction>
            </xsd:simpleType>
          </xsd:element>
          <xsd:element name="Read" minOccurs="0">
            <xsd:simpleType>
              <xsd:restriction base="xsd:string" >
                <xsd:enumeration value="None" />
                <xsd:enumeration value="Allowed" />
              </xsd:restriction>
            </xsd:simpleType>
          </xsd:element>
          <xsd:element name="Write" minOccurs="0">
            <xsd:simpleType>
              <xsd:restriction base="xsd:string" >
                <xsd:enumeration value="None" />
                <xsd:enumeration value="Allowed" />
              </xsd:restriction>
            </xsd:simpleType>
          </xsd:element>
          <!--Extended elements for MiningStructurePermission object-->
          <xsd:element name="AllowDrillThrough" type="xsd:boolean" minOccurs="0"/>
        </xsd:all>
      </xsd:extension >
    </xsd:complexContent>
  </xsd:complexType>
```

The following table shows only the additional elements that are not contained in Permission.

Element	Read-Only	Default	Description
AllowDrillThrough		False	A Boolean that indicates whether drillthrough is allowed on the **MiningModel**.

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2.2.4.2.2.26 MiningModelPermission

The **MiningModelPermission** complex type represents permissions for a MiningModel.

```
<xsd:complexType name="MiningModelPermission">
  <xsd:complexContent>
    <xsd:extension base="Permission">
      <xsd:all>
        <!--These elements are common to Permission-->
        <xsd:element name="Name"  type="xsd:string" />
        <xsd:element name="ID"  type="xsd:string" minOccurs="0" />
        <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="Description" type="xsd:string" minOccurs="0" />
        <xsd:element name="Annotation"  minOccurs="0" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                           maxOccurs="unbounded" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="RoleID" type="xsd:string"/>
        <xsd:element name="Process" type="xsd:boolean" minOccurs="0"/>
        <xsd:element name="ReadDefinition" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="None" />
              <xsd:enumeration value="Basic" />
              <xsd:enumeration value="Allowed" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="Read" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="None" />
              <xsd:enumeration value="Allowed" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="Write" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="None" />
              <xsd:enumeration value="Allowed" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <!--Extended elements for MiningModelPermission object-->
        <xsd:element name="AllowDrillThrough" type="xsd:boolean" minOccurs="0"/>
        <xsd:element name="AllowBrowsing" type="xsd:boolean" minOccurs="0"/>
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
```


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The following table shows only the additional elements that are not contained in Permission.

Element	Read-Only	Default	Description
AllowDrillThrough		False	When true, indicates that drillthrough is allowed on the **MiningModel**; otherwise, false.
AllowBrowsing		True	When true, indicates that browsing is allowed on the object; otherwise, false.

2.2.4.2.2.27 CubePermission

The **CubePermission** complex type represents permissions for a Cube.

```
<xsd:complexType name="CubePermission">
  <xsd:complexContent>
    <xsd:extension base="Permission">
      <xsd:all>
        <!--These elements are common to Permission-->
        <xsd:element name="Name"  type="xsd:string" />
        <xsd:element name="ID"  type="xsd:string" minOccurs="0" />
        <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="Description" type="xsd:string" minOccurs="0" />
        <xsd:element name="Annotation"  minOccurs="0" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Annotation" type="Annotation"
                           minOccurs="0" maxOccurs="unbounded" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="RoleID" type="xsd:string"/>
        <xsd:element name="Process" type="xsd:boolean" minOccurs="0"/>
        <xsd:element name="ReadDefinition" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="None" />
              <xsd:enumeration value="Basic" />
              <xsd:enumeration value="Allowed" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="Read" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="None" />
              <xsd:enumeration value="Allowed" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="Write" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="None" />
              <xsd:enumeration value="Allowed" />
```


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```
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <!--Extended elements for CubePermission object-->
        <xsd:element name="ReadSourceData" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="None" />
              <xsd:enumeration value="Allowed" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="DimensionPermissions" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="DimensionPermission"
                           type="CubeDimensionPermission"
                           minOccurs="0" maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="CellPermissions" minOccurs="0" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="CellPermission"  type="CellPermission"
                           minOccurs="0" maxOccurs="3"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
```

CubePermission inherits from Permission. The following table shows only the elements that are in addition to those contained in **Permission**.

Element	Read-Only	Default	Description
ReadSourceData		"None"	Specifies whether the role has permission to read the underlying source data in the **Cube**.
DimensionPermissions		Inherited from **DimensionPermissions** on Dimension.	A collection of CubeDimensionPermission objects.
CellPermissions			A collection of CellPermission objects.

2.2.4.2.2.28 Role

The **Role** complex type represents a role for which permissions MAY be assigned.

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```
<xsd:complexType name="Role">
  <xsd:complexContent>
    <xsd:extension base="MajorObject">
      <xsd:all>
        <!--These elements are common to each MajorObject-->
        <xsd:element name="Name"  type="xsd:string" />
        <xsd:element name="ID"  type="xsd:string" minOccurs="0" />
        <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
        <xsd:element name="Description" type="xsd:string" minOccurs="0" />
        <xsd:element name="Annotation"  minOccurs="0" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Annotation" type="Annotation"
                           minOccurs="0" maxOccurs="unbounded" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <!--Extended elements for Role object-->
        <xsd:element name="Members" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Member"  type="Members" minOccurs="0"
                           maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
```

Also included in the **Role** object are all elements from MajorObject.

Element	Read-Only	Default	Description
Members		Empty	A collection of Member objects.

2.2.4.2.2.28.1 Member

The **Member** complex type represents a member in a role.

```
<xsd:complexType name="Member">
  <xsd:all>
    <xsd:element name="Name" minOccurs="0" type="xsd:string"/>
    <xsd:element name="Sid" minOccurs="0" type="xsd:string"/>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
Name		Empty	The name of the user.
Sid		Empty	The SID of the user.

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2.2.4.2.2.29 ProactiveCaching

The **ProactiveCaching** complex type represents proactive caching settings for an object.

```
<xsd:complexType name="ProactiveCaching">
  <xsd:all>
    <xsd:element name="OnlineMode" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="Immediate" />
          <xsd:enumeration value="OnCacheComplete" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="AggregationStorage" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="Regular" />
          <xsd:enumeration value="MolapOnly" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Source" type="ProactiveCachingBinding" minOccurs="0" />
    <xsd:element name="SilenceInterval" type="xsd:duration" minOccurs="0" />
    <xsd:element name="Latency" type="xsd:duration" minOccurs="0" />
    <xsd:element name="SilenceOverrideInterval" type="xsd:duration"
                 minOccurs="0" />
    <xsd:element name="ForceRebuildInterval" type="xsd:duration" minOccurs="0" />
    <xsd:element name="Enabled" type="xsd:boolean" minOccurs="0"/>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
OnlineMode		"Immediate"	A string that specifies whether the dimension/partition is brought back online immediately when the rebuilding of the cache is initiated or only when the rebuilding of the cache is complete.
AggregationStorage		"Regular"	A string that specifies the storage method for aggregations. Only applies to partitions. On dimension, it MUST be "Regular".
Source		"ProactiveCachingInheritedBinding"	The binding of the proactive caching. This regulates the notification mechanisms as well as the processing options.
SilenceInterval		"Infinite"	The minimum amount of quiet time (in milliseconds) that occurs before the cache rebuild

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Element	Read-Only	Default	Description
			starts.
Latency		"Infinite"	The grace period between the earliest notification and the moment when the current cache is dropped.
SilenceOverrideInterval		"Infinite"	The amount of time that elapses after an initial notification after which the cache rebuild begins unconditionally.
ForceRebuildInterval		"Infinite"	The amount of time that elapses after a cache becomes available after which the cache rebuild begins unconditionally.
Enabled		False	When true, specifies that proactive caching is enabled; otherwise, false.

2.2.4.2.2.30 ErrorConfiguration

The **ErrorConfiguration** complex type represents error configuration settings to deal with issues in the source data.

```
<xsd:complexType name="ErrorConfiguration">
  <xsd:all>
    <xsd:element name="KeyErrorLimit" type="xsd:long" minOccurs="0"/>
    <xsd:element name="KeyErrorLogFile" type="xsd:string" minOccurs="0"/>
    <xsd:element name="KeyErrorAction" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="ConvertToUnknown" />
          <xsd:enumeration value="DiscardRecord" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="KeyErrorLimitAction" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="StopProcessing" />
          <xsd:enumeration value="StopLogging" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="KeyNotFound" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="IgnoreError" />
          <xsd:enumeration value="ReportAndContinue" />
          <xsd:enumeration value="ReportAndStop" />
        </xsd:restriction>
```


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```
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="KeyDuplicate" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="IgnoreError" />
          <xsd:enumeration value="ReportAndContinue" />
          <xsd:enumeration value="ReportAndStop" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="NullKeyConvertedToUnknown" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="IgnoreError" />
          <xsd:enumeration value="ReportAndContinue" />
          <xsd:enumeration value="ReportAndStop" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="NullKeyNotAllowed" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="IgnoreError" />
          <xsd:enumeration value="ReportAndContinue" />
          <xsd:enumeration value="ReportAndStop" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>

    <xsd:element ref="eng200:CalculationError" minOccurs="0" />

  </xsd:all>
</xsd:complexType>
```

The **ErrorConfiguration** XSD depends upon the following definitions in namespaces other than the default namespace.

In the namespace **eng200**:

```
<xsd:element name="CalculationError">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="IgnoreError" />
      <xsd:enumeration value="ReportAndStop" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
```

Element	Read-Only	Default	Description
KeyErrorLimit		Zero	The number of key errors after which processing will fail.
KeyErrorLogFile		Empty	The file path for logging key errors.

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Element	Read-Only	Default	Description
KeyErrorAction		"ConvertToUnknown"	The action to take upon encountering a key error.
KeyErrorLimitAction		'"StopProcessing"	The action to take upon encountering a key error limit.
KeyNotFound		"ReportAndContinue"	The action to take upon encountering a "Key not found" error.
KeyDuplicate		"IgnoreError"	The action to take upon encountering a key duplicate error.
NullKeyConvertedToUnknown		"IgnoreError"	The action to take if a null key is converted to Unknown.
NullKeyNotAllowed		"ReportAndContinue"	The action to take if a null key is encountered and not allowed.

2.2.4.2.2.31 ImpersonationInfo

The **ImpersonationInfo** complex type represents impersonation settings for an object or operation.

```
<xsd:complexType name="ImpersonationInfo">
  <xsd:all>
    <xsd:element name="ImpersonationMode" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Default" />
          <xsd:enumeration value="ImpersonateServiceAccount" />
          <xsd:enumeration value="ImpersonateAnonymous" />
          <xsd:enumeration value="ImpersonateCurrentUser" />
          <xsd:enumeration value="ImpersonateAccount" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Account" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Password" type="xsd:string" minOccurs="0"/>
    <xsd:element name="ImpersonationInfoSecurity" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="PasswordRemoved" />
          <xsd:enumeration value="Unchanged" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```


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Element	Read-Only	Default	Description
ImpersonationMode		[Required]	A string that specifies the credentials to use for impersonation. The enumeration values are as follows: ▪ Default - The server uses the impersonation method that it deems to be appropriate for the context in which impersonation is used. ▪ ImpersonateServiceAccount - Use the user account that the server is running as. ▪ ImpersonateAnonymous - Use the anonymous user account. ▪ ImpersonateCurrentUser - Use the user account that the client is connecting as. ▪ ImpersonateAccount - Use the specified user account.<43>
Account		Empty	The user account to impersonate when ImpersonationMode=ImpersonateAccount.
Password		Empty	The password of the user account when ImpersonationMode=ImpersonateAccount.
ImpersonationInfoSecurity	Read-only		Specifies whether the password was removed.

2.2.4.3 TraceDefinition Complex Types

The specific trace events and columns that are supported by SQL Server Analysis Services can be seen in sections 4.10, 4.11, and 4.12.

2.2.4.3.1 Trace_Definition_ProviderInfo

This complex type contains basic information about the server/trace provider.

```
<xsd:complexType name="Trace_Definition_ProviderInfo" >
  <xsd:sequence>
    <xsd:element name="Data" >
      <xsd:complexType>
        <xsd:all>
          <xsd:element name="Name" type="xsd:string" />
          <xsd:element name="Version" >
            <xsd:complexType>
              <xsd:all>
                <xsd:element name="Major" type="xsd:string" minOccurs="0" />
                <xsd:element name="Minor" type="xsd:string" minOccurs="0" />
                <xsd:element name="BuildNumber" type="xsd:string" minOccurs="0" />
              </xsd:all>
            </xsd:complexType>
          </xsd:element>
          <xsd:element name="Type" type="xsd:string" minOccurs="0" />
```


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```
          <xsd:element name="Description" type="xsd:string" minOccurs="0" />
        </xsd:all>
      </xsd:complexType>
    </xsd:element>
  </xsd:sequence>
</xsd:complexType>
```

Element	Read-Only	Default	Description
Data	Yes	[Required]	This serves as the root element for the XML that it encloses.
Name	Yes	[Required]	The name of the server.
Version	Yes	Empty	A complex type consisting of three separate elements to identify a major version, a minor version, and a build number.
Type	Yes	Empty	The type of the server.
Description	Yes	Empty	The description of the server.

2.2.4.3.2 Trace_Event_Categories

This complex type contains information about the trace events that are available from the server.

```
<xsd:complexType name="Trace_Event_Categories" >
  <xsd:sequence>
    <xsd:element name="Data" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="EventCategory" >
            <xsd:complexType>
              <xsd:all>
                <xsd:element name="Name" type="xsd:string" />
                <xsd:element name="Type" type="xsd:string" minOccurs="0" />
                <xsd:element name="Description" type="xsd:string" minOccurs="0" />
                <xsd:element name="EventList" >
                  <xsd:complexType>
                    <xsd:sequence>
                      <xsd:element name="Event" type="TraceEvent" minOccurs="0"
                                   maxOccurs="unbounded" />
                    </xsd:sequence>
                  </xsd:complexType>
                </xsd:element>
              </xsd:all>
            </xsd:complexType>
          </xsd:element>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:sequence>
</xsd:complexType>
```


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Element	Read-Only	Default	Description
Data	Yes	[Required]	This serves as the root element for the XML that it encloses.
EventCategory	Yes	[Required]	This element encloses the information about each event category.
Name	Yes	[Required]	The name of the event category.
Type	Yes	Empty	A string indicating the type of event category. The enumeration values are as follows: 0=Normal 1=Significant 2=Error
Description	Yes	Empty	The description of the event category.
EventList	Yes	[Required]	A collection of elements of type TraceEvent for each event that belongs to this **EventCategory**.

2.2.4.3.2.1 TraceEvent

This complex type represents a single trace event.

```
<xsd:complexType name="TraceEvent" >
  <xsd:all>
    <xsd:element name="ID" type="xsd:integer" />
    <xsd:element name="Name" type="xsd:string" minOccurs="0" />
    <xsd:element name="Description" type="xsd:string" minOccurs="0" />
    <xsd:element name="EventColumnList" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="EventColumn" type="EventColumn" minOccurs="0"
                       maxOccurs="unbounded" />
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
ID	Yes	[Required]	The ID of the event.
Name	Yes	Empty	The name of the event.
Description	Yes	Empty	A string containing the event description.
EventColumnList	Yes	[Required]	A collection of elements of type EventColumn for each column in this event.

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2.2.4.3.2.1.1 EventColumn

This complex type represents a single trace event column.

```
<xsd:complexType name="EventColumn" >
  <xsd:all>
    <xsd:element name="ID" type="xsd:integer" />
    <xsd:element name="EventColumnSubclassList" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="EventColumnSubclass" minOccurs="0"
                       maxOccurs="unbounded" >
            <xsd:complexType>
              <xsd:all>
                <xsd:element name="ID" type="xsd:integer" />
                <xsd:element name="name" type="xsd:integer" />
              </xsd:all>
            </xsd:complexType>
          </xsd:element>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Element	Read-Only	Default	Description
ID	Yes	[Required]	The ID of the event column.
EventColumnSubclassList	Yes	Empty	A collection of **EventColumnSubclass** elements for each subclass that this event column has.

2.2.4.3.3 Trace_Columns

This complex type contains information about the trace columns that are available from the server. Every TraceEvent may use one or more of these columns.

```
<xsd:complexType name="Trace_Columns" >
  <xsd:sequence>
    <xsd:element name="Data">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Column" >
            <xsd:complexType>
              <xsd:all>
                <xsd:element name="ID" type="xsd:integer" />
                <xsd:element name="Type" type="xsd:integer" />
                <xsd:element name="Name" type="xsd:string" />
                <xsd:element name="Description" type="xsd:integer" minOccurs="0"/>
                <xsd:element name="Filterable" type="xsd:boolean" />
                <xsd:element name="Repeatable" type="xsd:boolean" />
                <xsd:element name="RepeatedBase" type="xsd:boolean" />
              </xsd:all>
            </xsd:complexType>
```


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```
            </xsd:element>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
    </xsd:sequence>
  </xsd:complexType>
```

Element	Read-Only	Default	Description
Data	Yes	[Required]	This serves as the root element for the XML that it encloses.
Column	Yes	[Required]	This element encloses the information about each trace column.
ID	Yes	[Required]	The ID of the column.
Type	Yes	[Required]	The type of the column. The definitions for the integers are not constant and change depending upon the ID of the column. By referring to examples in sections 4.10, 4.11, and 4.12, it can be seen what integers are valid for which particular column IDs.
Name			The name of the column.
Description			The description of the column.
Filterable			When true, indicates that the column may be used in a filtering operation; otherwise, false.
Repeatable			When true, indicates that the server omits the value in this column if it is repeated from the value above it; otherwise, false.
RepeatedBase			When true, indicates that this column is a **repeated base** for another column; otherwise, false.

2.2.5 Simple Types

This specification does not define any common XML Schema **simple type** definitions.

2.2.6 Attributes

This specification does not define any common XML Schema attribute definitions.

2.2.7 Groups

This specification does not define any common XML Schema group definitions.

2.2.8 Attribute Groups

This specification does not define any common XML Schema attribute group definitions.

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3 Protocol Details

The client side of this protocol is simply a pass-through. That is, no additional timers or other state is required on the client side of this protocol. Calls made by the higher-layer protocol or application are passed directly to the transport, and the results that are returned by the transport are passed directly back to the higher-layer protocol or application.

3.1 Server Details

3.1.1 Abstract Data Model

This section describes a conceptual model of possible data organization that an implementation maintains to participate in this protocol. The described organization is provided to facilitate the explanation of how the protocol behaves. This document does not mandate that implementations adhere to this model as long as their external behavior is consistent with that described in this document.

The server SHOULD organize its data as per the OLAP data model and the DM model.

The OLAP model's high-level features are as follows:

- The server contains a collection of databases.
- Each database contains a collection of cubes.
- Each cube contains a collection of dimensions, measure groups, measures, sets, key performance indicators (KPIs), and actions.
- Each dimension contains a collection of hierarchies.
- Each hierarchy contains a collection of levels.
- Each level contains a collection of members.
- Each member contains a collection of properties.
- Each measure group contains a collection of measure group dimensions and measures.

The DM model's high-level features are as follows:

- A collection of MiningStructure complex types is located in the collection of databases on the server.
- Each **MiningStructure** contains a collection of mining structure columns and a collection of mining models.
- Each mining model contains a collection of mining model columns.

For more information about the OLAP data model, see [MSDN-SSAS].

3.1.2 Timers

None. All protocol requests are initiated by the client.

3.1.3 Initialization

The server MUST start and begin listening for requests.

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For stateless connections, no further initialization is required. For stateful connections, the following example shows how **sessions** are supported.

To begin the session, the client adds a **BeginSession** **SOAP header** to the request.

```
<?xml version="1.0" encoding="utf-8"?>
<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Header>
    <BeginSession xmlns="urn:schemas-microsoft-com:xml-analysis" mustUnderstand="1"/>
   </Header>
   <Body>
    ...<!-- Discover or Execute element goes here.-->
   </Body>
</Envelope>
```

The SOAP response message from the server includes the session ID in the SOAP header.

```
<Header>
 <Session
  xmlns="urn:schemas-microsoft-com:xml-analysis"
  SessionId="537C61C6-827C-4305-83A6-C8CE4A91001B"/>
</Header>
```

For each subsequent request, the client MUST include the session ID that is provided by the server.

```
<Header>
 <Session
  xmlns="urn:schemas-microsoft-com:xml-analysis"
  mustUnderstand="1"
  SessionId="537C61C6-827C-4305-83A6-C8CE4A91001B"/>
</Header>
```

To end the session, the client MUST send the **EndSession** header that contains the related session ID value to the server.

```
<Header>
 <EndSession
  xmlns="urn:schemas-microsoft-com:xml-analysis"
  mustUnderstand="1"
  SessionId="537C61C6-827C-4305-83A6-C8CE4A91001B"/>
</Header>
```

Sessions MUST be supported on the server.<44>

Multiple commands MAY be executed in the context of a single session. The server MAY choose to time out an active session after a period of inactivity.<45>

The following tables list the SOAP header elements and attributes that this protocol defines for initiating, maintaining, and closing a session.

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SOAP Header	Description
BeginSession	This header requests that the server create a session. The server should respond by constructing a new session and returning the session ID in the **Session** header in the **SOAP** response.
Session	This header MUST be used for every method call that is to occur in the session. The session ID MUST be included in the header.
EndSession	This header is used to end the session. The session ID MUST be included in the header.

SOAP Header	Attribute	Description
Session	SessionID	The token that was received from the server in response to the BeginSession request.
EndSession	SessionID	The token that was received from the server in response to the BeginSession request.

If the session ID that is specified in the **Session** or **EndSession** SOAP header is not valid or has timed out, then the server MUST return a **SOAP fault**.

3.1.4 Message Processing Events and Sequencing Rules

Operation	Description
Authenticate	Used by the client and server to exchange UTF-8 encoded security token data blocks as a part of the authentication process.
Discover	Used to find information about the server.
Execute	Used to send commands to the server.

3.1.4.1 Authenticate

This operation SHOULD be used by the client and server to exchange UTF-8 encoded security token data blocks as a part of the authentication process. The client MUST send an **Authenticate** request message and the server MUST respond with an AuthenticateResponse message.

The following WSDL describes the **Authenticate** operation.

```
<wsdl:operation name="Authenticate">
  <wsdl:input message="AuthenticateSoapIn" />
  <wsdl:output message="AuthenticateSoapOut" />
</wsdl:operation>
```

3.1.4.1.1 Messages

The following **WSDL message** definitions are specific to this operation.

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3.1.4.1.1.1 AuthenticateSoapIn

This message is the request message for the Authenticate operation.

The SOAP action value of the message is defined as follows.

```
"http://schemas.microsoft.com/analysisservices/2003/ext"
```

The **SOAP body** MUST contain an **Authenticate** element.

```
<message name="AuthenticateSoapIn">
  <part name="parameters" element="xmla:Authenticate" />
</message>
```

3.1.4.1.1.2 AuthenticateSoapOut

This message is the response message for the Authenticate operation.

The SOAP action value of the message is defined as follows.

```
"http://schemas.microsoft.com/analysisservices/2003/ext"
```

The SOAP body MUST contain an AuthenticateResponse element.

```
<message name="AuthenticateSoapOut">
  <part name="parameters" element="xmla:AuthenticateResponse" />
</message>
```

3.1.4.1.2 Elements

The following XML Schema element definitions are specific to this operation.

3.1.4.1.2.1 Authenticate

The **Authenticate** element has the following definition.

```
<xsd:element name="Authenticate">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="SspiHandshake" minOccurs="1" maxOccurs="1"
                   nillable="false" type="xsd:base64Binary" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
```

Element	Default	Description
SspiHandshake	[Required]	This is a Base64-encoded security token data block that contains authentication information for a user.

The following is an example of an **Authenticate** request.

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```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <Authenticate xmlns="http://schemas.microsoft.com/analysisservices/2003/ext">
      <SspiHandshake>[Base64 encoded security token data block here]</SspiHandshake>
    </Authenticate>
  </soap:Body>
</soap:Envelope>
```

3.1.4.1.2.2 AuthenticateResponse

The **AuthenticateResponse** element has the following definition.

```
<xsd:element name="AuthenticateResponse">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="return" minOccurs="1" maxOccurs="1">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="SspiHandshake" minOccurs="1" maxOccurs="1"
                         nillable="false" type="xsd:base64Binary" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
```

The following is an example of the **AuthenticateResponse** response.

```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <AuthenticateResponse xmlns="http://schemas.microsoft.com/analysisservices/2003/ext">
      <return>
        <SspiHandshake>[Base64 encoded security token data block here]</SspiHandshake>
      </return>
    </AuthenticateResponse>
  </soap:Body>
</soap:Envelope>
```

3.1.4.2 Discover

This operation is used to find information about the server.

The following WSDL describes the **Discover** operation.

```
<wsdl:operation name="Discover">
  <wsdl:input message="DiscoverSoapIn" />
  <wsdl:output message="DiscoverSoapOut" />
</wsdl:operation>
```


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The protocol client MUST send a DiscoverSoapIn request message, and the protocol server MUST respond with a DiscoverSoapOut response message.

3.1.4.2.1 Messages

The following XML Schema message definitions are specific to this operation.

3.1.4.2.1.1 DiscoverSoapIn

This message is the request message for the Discover operation.

The SOAP action value of the message is defined as follows.

```
"urn:schemas-microsoft-com:xml-analysis:Discover"
```

The SOAP body MUST contain a schema rowset.

```
<message name="DiscoverSoapIn">
  <part name="parameters" element="xmla:Discover" />
</message>
```

3.1.4.2.1.2 DiscoverSoapOut

This message is the response message for the Discover operation.

The SOAP action value of the message is defined as follows.

```
"urn:schemas-microsoft-com:xml-analysis:Discover"
```

The SOAP body MUST contain a DiscoverResponse element.

```
<message name="DiscoverSoapOut">
  <part name="parameters" element="xmla:DiscoverResponse" />
</message>
```

3.1.4.2.2 Elements

The following XML Schema element definitions are specific to this operation.

3.1.4.2.2.1 Discover

The **Discover** message is used to request information from the server.

The server MUST support each of the enumerated **RequestTypes**.

The schema rowset has the following definition.

```
<xsd:element name="Discover">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="RequestType" minOccurs="1" maxOccurs="1" >
```


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```
<xsd:simpleType>
  <xsd:restriction base="xsd:string" >
    <xsd:enumeration value="DBSCHEMA_CATALOGS" />
    <xsd:enumeration value="MDSCHEMA_CUBES" />
    <xsd:enumeration value="MDSCHEMA_DIMENSIONS" />
    <xsd:enumeration value="MDSCHEMA_HIERARCHIES" />
    <xsd:enumeration value="MDSCHEMA_LEVELS" />
    <xsd:enumeration value="MDSCHEMA_MEASURES" />
    <xsd:enumeration value="MDSCHEMA_PROPERTIES" />
    <xsd:enumeration value="MDSCHEMA_MEMBERS" />
    <xsd:enumeration value="MDSCHEMA_ACTIONS" />
    <xsd:enumeration value="MDSCHEMA_SETS" />
    <xsd:enumeration value="MDSCHEMA_INSTANCES" />
    <xsd:enumeration value="MDSCHEMA_KPIS" />
    <xsd:enumeration value="MDSCHEMA_MEASUREGROUPS" />
    <xsd:enumeration value="MDSCHEMA_MEASUREGROUP_DIMENSIONS" />
    <xsd:enumeration value="DISCOVER_PROPERTIES" />
    <xsd:enumeration value="DISCOVER_LITERALS" />
    <xsd:enumeration value="DISCOVER_SCHEMA_ROWSETS" />
    <xsd:enumeration value="DISCOVER_KEYWORDS" />
    <xsd:enumeration value="DBSCHEMA_TABLES" />
    <xsd:enumeration value="DBSCHEMA_COLUMNS" />
    <xsd:enumeration value="DBSCHEMA_PROVIDER_TYPES" />
    <xsd:enumeration value="MDSCHEMA_INPUT_DATASOURCES" />
    <xsd:enumeration value="DMSCHEMA_MINING_SERVICES" />
    <xsd:enumeration value="DMSCHEMA_MINING_SERVICE_PARAMETERS" />
    <xsd:enumeration value="DMSCHEMA_MINING_FUNCTIONS" />
    <xsd:enumeration value="DMSCHEMA_MINING_MODEL_CONTENT" />
    <xsd:enumeration value="DMSCHEMA_MINING_MODEL_XML" />
    <xsd:enumeration value="DMSCHEMA_MINING_MODEL_CONTENT_PMML" />
    <xsd:enumeration value="DMSCHEMA_MINING_MODELS" />
    <xsd:enumeration value="DMSCHEMA_MINING_COLUMNS" />
    <xsd:enumeration value="DMSCHEMA_MINING_STRUCTURES" />
    <xsd:enumeration value="DMSCHEMA_MINING_STRUCTURE_COLUMNS" />
    <xsd:enumeration value="DISCOVER_DATASOURCES" />


    <xsd:enumeration value="DISCOVER_ENUMERATORS" />
    <xsd:enumeration value="DISCOVER_XML_METADATA" />
    <xsd:enumeration value="DISCOVER_TRACES" />
    <xsd:enumeration value="DISCOVER_TRACE_DEFINITION_PROVIDERINFO" />
    <xsd:enumeration value="DISCOVER_TRACE_COLUMNS" />
    <xsd:enumeration value="DISCOVER_TRACE_EVENT_CATEGORIES" />
    <xsd:enumeration value="DISCOVER_MEMORYUSAGE" />
    <xsd:enumeration value="DISCOVER_MEMORYGRANT" />
    <xsd:enumeration value="DISCOVER_LOCKS" />
    <xsd:enumeration value="DISCOVER_CONNECTIONS" />
    <xsd:enumeration value="DISCOVER_SESSIONS" />
    <xsd:enumeration value="DISCOVER_JOBS" />
    <xsd:enumeration value="DISCOVER_TRANSACTIONS" />
    <xsd:enumeration value="DISCOVER_DB_CONNECTIONS" />
    <xsd:enumeration value="DISCOVER_MASTER_KEY" />
    <xsd:enumeration value="DISCOVER_PERFORMANCE_COUNTERS" />
    <xsd:enumeration value="DISCOVER_LOCATIONS" />
    <xsd:enumeration value="DISCOVER_PARTITION_DIMENSION_STAT" />
    <xsd:enumeration value="DISCOVER_PARTITION_STAT" />
    <xsd:enumeration value="DISCOVER_DIMENSION_STAT" />
    <xsd:enumeration value="DISCOVER_COMMANDS" />
    <xsd:enumeration value="DISCOVER_COMMAND_OBJECTS" />
```


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```
                <xsd:enumeration value="DISCOVER_OBJECT_ACTIVITY" />
                <xsd:enumeration value="DISCOVER_OBJECT_MEMORY_USAGE" />
                <xsd:enumeration value="DISCOVER_STORAGE_TABLES" />
                <xsd:enumeration value="DISCOVER_STORAGE_TABLE_COLUMNS" />
                <xsd:enumeration value="DISCOVER_STORAGE_TABLE_COLUMN_SEGMENTS" />


              </xsd:restriction>
            </xsd:simpleType>
          </xsd:element>
          <xsd:element name="Restrictions" minOccurs="1" maxOccurs="1">
            <xsd:complexType>
              <xsd:sequence>
                <xsd:element name="RestrictionList" minOccurs="0" maxOccurs="1" nillable="true"
>
                  <xsd:complexType>
                    <xsd:sequence>
                      <xsd:any minOccurs="0" maxOccurs="unbounded" />
                    </xsd:sequence>
                  </xsd:complexType>
                </xsd:element>
              </xsd:sequence>
            </xsd:complexType>
          </xsd:element>
          <xsd:element name="Properties" type="Properties" />
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
```

Element	Read-Only	Default	Description
RequestType		[Required]	This enumeration value specifies which of the schema rowsets is being requested.
Restrictions		Empty	This element contains a single RestrictionList element, in which the restrictions on the number of rows to be returned are specified.
Properties		Empty	The Properties type is common to the **Discover** and Execute methods. It is described in section 3.1.4.2.2.1.2.

3.1.4.2.2.1.1 Restrictions and RestrictionList

The **Restrictions** element contains a single **RestrictionList** element. The **RestrictionList** element is of type **xsd:anyType**. This is because the restrictions that are available are variable depending upon the value of the **RequestType** specification.

Each individual **RequestType** is described in section 3.1.4.2.2.1.3, and for each **RequestType**, the available restrictions are specified. The specified restrictions will restrict the number of rows that are returned by the Discover request.

3.1.4.2.2.1.2 Properties Type

The **Properties** type consists of a PropertyList element, which itself consists of a collection of **Request** properties. Each property allows the user to control some aspect of the Discover or the Execute method, such as defining the information required for the connection, specifying the return

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format of the result set, or specifying the locale in which the data should be formatted. The available properties and their values can be obtained by using the DISCOVER_PROPERTIES request type with the **Discover** method. There is no required order for the properties that are listed in the **Properties** element. This element MUST be included, but it MAY be empty.

The **Properties** element MUST contain one and only one **PropertyList** element, of type **PropertyList**. The **PropertyList** type is defined in section 3.1.4.2.2.1.2.1.

3.1.4.2.2.1.2.1 PropertyList

The **PropertyList** type contains the properties that are associated with a Discover or Execute request.

```
<xsd:complexType name="PropertyList" >
  <xsd:all>
    <xsd:element name="DataSourceinfo" type="xsd:string" minOccurs="0" />
    <xsd:element name="Timeout" type="xsd:integer" minOccurs="0" />
    <xsd:element name="UserName" type="xsd:string" minOccurs="0" />
    <xsd:element name="Password" type="xsd:string" minOccurs="0" />
    <xsd:element name="LocaleIdentifier" type="xsd:integer"
                 minOccurs="0" />
    <xsd:element name="Catalog" type="xsd:string" minOccurs="0" />
    <xsd:element name="StateSupport" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="None" />
          <xsd:enumeration value="Sessions" />
        </xsd:restricti
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Content" minOccurs="0" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="None" />
          <xsd:enumeration value="Schema" />
          <xsd:enumeration value="Data" />
          <xsd:enumeration value="SchemaData" />
          <xsd:enumeration value="Metadata" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Format" minOccurs="0" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Tabular" />
          <xsd:enumeration value="Multidimensional" />
          <xsd:enumeration value="Native" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="AxisFormat" minOccurs="0" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="ClusterFormat" />
          <xsd:enumeration value="CustomFormat" />
          <xsd:enumeration value="TupleFormat" />
        </xsd:restriction>
```


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```
  </xsd:simpleType>
</xsd:element>
<xsd:element name="BeginRange" type="xsd:Integer" minOccurs="0" />
<xsd:element name="EndRange" type="xsd:integer" minOccurs="0" />
<xsd:element name="MDXSupport" minOccurs="0" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="Core" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="ProviderName" type="xsd:string" minOccurs="0" />
<xsd:element name="ProviderVersion" type="xsd:string" minOccurs="0" />
<xsd:element name="DBMSVersion" type="xsd:string" minOccurs="0" />
<xsd:element name="ProviderType" type="xsd:integer" minOccurs="0" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer" >
      <xsd:enumeration value="1" />
      <xsd:enumeration value="2" />
      <xsd:enumeration value="3" />
      <xsd:enumeration value="4" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="ShowHiddenCubes" type="xsd:boolean" minOccurs="0" />
<xsd:element name="SQLSupport" type="xsd:integer" minOccurs="0" />
<xsd:element name="TransactionDDL" type="xsd:integer" minOccurs="0" />
<xsd:element name="MaximumRows" type="xsd:integer" minOccurs="0" />
<xsd:element name="Roles" type="xsd:string" minOccurs="0" />
<xsd:element name="VisualMode" minOccurs="0" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer" >
      <xsd:enumeration value="0" />
      <xsd:enumeration value="1" />
      <xsd:enumeration value="2" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="EffectiveRoles" type="xsd:string" minOccurs="0" />
<xsd:element name="EffectiveUserName" type="xsd:string" minOccurs="0" />
<xsd:element name="ServerName" type="xsd:string" minOccurs="0" />
<xsd:element name="CatalogLocation" type="xsd:integer" minOccurs="0" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer">
      <xsd:enumeration value="1" />
      <xsd:enumeration value="2" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="DbpropCatalogTerm" type="xsd:string" minOccurs="0" />
<xsd:element name="DbpropCatalogUsage" type="xsd:integer" minOccurs="0" />
<xsd:element name="DbpropColumnDefinition" type="xsd:integer"
             minOccurs="0" />
<xsd:element name="DbpropConcatNullBehavior" minOccurs="0 " >
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer">
      <xsd:enumeration value="1" />
      <xsd:enumeration value="2" />
    </xsd:restriction>
```


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```
  </xsd:simpleType>
</xsd:element>
<xsd:element name="DbpropDataSourceReadOnly" type="xsd:boolean"
             minOccurs="0" />
<xsd:element name="DbpropGroupBy" minOccurs="0" type="xsd:integer" />
<xsd:element name="DbpropHeterogeneousTables" type="xsd:integer"
             minOccurs="0" />
<xsd:element name="DbpropIdentifierCase" type="xsd:integer"
             minOccurs="0" />
<xsd:element name="DbpropMaxIndexSize" type="xsd:integer" minOccurs="0" />
<xsd:element name="DbpropMaxOpenChapters" type="xsd:integer"
             minOccurs="0" />
<xsd:element name="DbpropMaxRowSize" type="xsd:integer" minOccurs="0" />
<xsd:element name="DbpropMaxRowSizeIncludeBlob" type="xsd:boolean"
             minOccurs="0" />
<xsd:element name="DbpropMaxTablesInSelect" type="xsd:integer"
             minOccurs="0" />
<xsd:element name="DbpropMultiTableUpdate" type="xsd:boolean"
             minOccurs="0" />
<xsd:element name="DbpropNullCollation" minOccurs="0" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer">
      <xsd:enumeration value="1" />
      <xsd:enumeration value="2" />
      <xsd:enumeration value="4" />
      <xsd:enumeration value="8" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="DbpropOrderByColumnsInSelect" type="xsd:boolean"
             minOccurs="0" />
<xsd:element name="DbpropOutputParameterAvailable" minOccurs="0" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer">
      <xsd:enumeration value="1" />
      <xsd:enumeration value="2" />
      <xsd:enumeration value="4" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="DbpropPersistentIdType" minOccurs="0" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer">
      <xsd:enumeration value="1" />
      <xsd:enumeration value="2" />
      <xsd:enumeration value="4" />
      <xsd:enumeration value="8" />
      <xsd:enumeration value="16" />
      <xsd:enumeration value="32" />
      <xsd:enumeration value="64" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="DbpropPrepareAbortBehavior" minOccurs="0" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer">
      <xsd:enumeration value="1" />
      <xsd:enumeration value="2" />
    </xsd:restriction>
```


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```
  </xsd:simpleType>
</xsd:element>
<xsd:element name="DbpropPrepareCommitBehavior" minOccurs="0" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer">
      <xsd:enumeration value="1" />
      <xsd:enumeration value="2" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="DbpropProcedureTerm" type="xsd:string" minOccurs="0" />
<xsd:element name="DbpropQuotedIdentifierCase" minOccurs="0" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer">
      <xsd:enumeration value="1" />
      <xsd:enumeration value="2" />
      <xsd:enumeration value="4" />
      <xsd:enumeration value="8" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="DbpropSchemaUsage" type="xsd:integer" minOccurs="0" />
<xsd:element name="DbpropSqlSupport" type="xsd:integer" minOccurs="0" />
<xsd:element name="DbpropSubqueries" type="xsd:integer" minOccurs="0" />
<xsd:element name="DbpropSupportedTxnDdl" type="xsd:integer"
            minOccurs="0" />
<xsd:element name="MdpropMdxSubqueries" type="xsd:integer"
            minOccurs="0" />
<xsd:element name="DbpropSupportedTxnIsoLevels" type="xsd:integer"
            minOccurs="0" />
<xsd:element name="DbpropSupportedTxnIsoRetain" type="xsd:integer"
            minOccurs="0" />
<xsd:element name="DbpropTableTerm" type="xsd:string" minOccurs="0" />
<xsd:element name="MdpropAggregateCellUpdate" minOccurs="0" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer">
      <xsd:enumeration value="0" />
      <xsd:enumeration value="1" />
      <xsd:enumeration value="2" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="MdpropAxes" type="xsd:integer" minOccurs="0" />
<xsd:element name="MdpropFlatteningSupport"  minOccurs="0" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer">
      <xsd:enumeration value="0" />
      <xsd:enumeration value="1" />
      <xsd:enumeration value="2" />
      <xsd:enumeration value="3" />
      <xsd:enumeration value="4" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="MdpropMdxCaseSupport" type="xsd:integer"
            minOccurs="0" />
<xsd:element name="MdpropMdxDescFlags" type="xsd:integer" minOccurs="0" />
<xsd:element name="MdpropMdxDrillFunctions" type="xsd:integer"
            minOccurs="0" />
```


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```
<xsd:element name="MdpropMdxFormulas" type="xsd:integer" minOccurs="0" />
<xsd:element name="MdpropMdxJoinCubes" type="xsd:integer"
             minOccurs="0" />
<xsd:element name="MdpropMdxMemberFunctions" type="xsd:integer"
             minOccurs="0" />
<xsd:element name="MdpropMdxNonMeasureExpressions" minOccurs="0" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer">
      <xsd:enumeration value="0" />
      <xsd:enumeration value="1" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="MdpropMdxNumericFunctions" type="xsd:integer"
             minOccurs="0" />
<xsd:element name="MdpropMdxObjQualification" type="xsd:integer"
             minOccurs="0" />
<xsd:element name="MdpropMdxOuterReference" type="xsd:integer"
             minOccurs="0" />
<xsd:element name="MdpropMdxQueryByProperty" type="xsd:boolean"
             minOccurs="0" />
<xsd:element name="MdpropMdxRangeRowset" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer" >
      <xsd:enumeration value="1" />
      <xsd:enumeration value="2" />
      <xsd:enumeration value="4" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="MdpropMdxSetFunctions" type="xsd:integer"
             minOccurs="0" />
<xsd:element name="MdpropMdxSlicer" minOccurs="0" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer" >
      <xsd:enumeration value="1" />
      <xsd:enumeration value="2" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="MdpropMdxStringCompop" type="xsd:integer"
             minOccurs="0"/>
<xsd:element name="MdpropNamedLevels" type="xsd:integer" minOccurs="0" />
<xsd:element name="DbpropMsmdMDXCompatibility" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer" >
      <xsd:enumeration  value="0" />
      <xsd:enumeration value="1" />
      <xsd:enumeration value="2" />
      <xsd:enumeration value="3" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="DbpropMsmdSqlCompatibility" type="xsd:integer"
             minOccurs="0" />
<xsd:element name="DbpropMsmdMDXUniqueNameStyle" type="xsd:integer"
           minOccurs="0"/>
<xsd:element name="DbpropMsmdCachePolicy" type="xsd:integer"
             minOccurs="0"/>
```


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```
<xsd:element name="DbpropMsmdCacheRatio" type="xsd:integer"
             minOccurs="0"/>
<xsd:element name="DbpropMsmdCacheMode" type="xsd:integer" minOccurs="0"/>
<xsd:element name="DbpropMsmdCompareCaseSensitiveStringFlags"
             minOccurs="0" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer" >
      <xsd:enumeration value="1" />
      <xsd:enumeration value="2" />
      <xsd:enumeration value="16" />
      <xsd:enumeration value="256" />
      <xsd:enumeration value="4096" />
      <xsd:enumeration value="65536" />
      <xsd:enumeration value="1048576" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="DbpropMsmdCompareCaseNotSensitiveStringFlags"
             Type="xsd:integer" minOccurs="0" />
</xsd:simpleType>
</xsd:element>
<xsd:element name="DbpropMsmdFlattened2" type="xsd:boolean"
             minOccurs="0" />
<xsd:element name="DbpropInitMode" type="xsd:integer" minOccurs="0"/>
<xsd:element name="SspropInitAppName" type="xsd:string" minOccurs="0"/>
<xsd:element name="SspropInitWsid" type="xsd:string" minOccurs="0" />
<xsd:element name="SspropInitPacketsize" type="xsd:integer"
             minOccurs="0"/>
<xsd:element name="ReadOnlySession" type="xsd:integer" minOccurs="0" />
<xsd:element name="SecuredCellValue" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer" >
      <xsd:enumeration value="0" />
      <xsd:enumeration value="1" />
      <xsd:enumeration value="2" />
      <xsd:enumeration value="3" />
      <xsd:enumeration value="4" />
      <xsd:enumeration value="5" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="NonEmptyThreshold" type="xsd:integer" minOccurs="0"/>
<xsd:element name="SafetyOptions" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer" >
      <xsd:enumeration  value="0" />
      <xsd:enumeration  value="1" />
      <xsd:enumeration  value="2" />
      <xsd:enumeration  value="3" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="DbpropMsmdCacheRatio2" type="xsd:double"
             minOccurs="0"/>
<xsd:element name="DbpropMsmdUseFormulaCache" type="xsd:string"
             minOccurs="0"/>
<xsd:element name="DbpropMsmdDynamicDebugLimit" type="xsd:integer"
             minOccurs="0"/>
<xsd:element name="DbpropMsmdDebugMode" type="xsd:string" minOccurs="0"/>
```


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```
<xsd:element name="Dialect" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="MDX" />
      <xsd:enumeration value="DMX" />
      <xsd:enumeration value="SQL" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="ImpactAnalysis" type="xsd:boolean" minOccurs="0" />
<xsd:element name="SQLQueryMode" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="Data" />
      <xsd:enumeration value="Calculated" />
      <xsd:enumeration value="IncludeEmpty" />
      <xsd:enumeration value="DataKeys" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="ClientProcessID" type="xsd:integer"
             minOccurs="0"/>
<xsd:element name="Cube" type="xsd:string" minOccurs="0" />
<xsd:element name="ReturnCellProperties" type="xsd:boolean"
             minOccurs="0" />
<xsd:element name="CommitTimeout" type="xsd:integer" minOccurs="0"/>
<xsd:element name="ForceCommitTimeout" type="xsd:integer"
             minOccurs="0"/>
<xsd:element name="ExecutionMode" type="xsd:string" minOccurs="0"/>
<xsd:element name="RealTimeOlap" type="xsd:boolean" minOccurs="0" />
<xsd:element name="MdxMissingMemberMode" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="Default" />
      <xsd:enumeration value="Ignore" />
      <xsd:enumeration value="Error" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="MdpropMdxNamedSets" type="xsd:integer"
             minOccurs="0" />
<xsd:element name="DbpropMsmdSubqueries" minOccurs="0" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer" >
      <xsd:enumeration value="0" />
      <xsd:enumeration value="1" />
      <xsd:enumeration value="2" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="DbpropMsmdAutoExists" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer" >
      <xsd:enumeration value="0" />
      <xsd:enumeration value="1" />
      <xsd:enumeration value="2" />
      <xsd:enumeration value="3" />
    </xsd:restriction>
  </xsd:simpleType>
```


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```
      </xsd:element>
      <xsd:element name="CustomData" type="xsd:string" minOccurs="0"/>
      <xsd:element name="DisablePrefetchFacts" type="xsd:boolean"
                   minOccurs="0" />
      <xsd:element name="UpdateIsolationLevel" minOccurs="0">
        <xsd:simpleType>
          <xsd:restriction base="xsd:integer" >
            <xsd:enumeration value="1" />
            <xsd:enumeration value="2" />
          </xsd:restriction>
        </xsd:simpleType>
      </xsd:element>
      <xsd:element name="DbpropMsmdErrorMessageMode" type="xsd:integer"
                   minOccurs="0"/>
      <xsd:element name="MdpropMdxDdlExtensions" type="xsd:integer"
                   minOccurs="0" />
      <xsd:element name="ResponseEncoding" minOccurs="0">
        <xsd:simpleType>
          <xsd:restriction base="xsd:string" >
            <xsd:enumeration value="Default" />
            <xsd:enumeration value="UTF-8" />
            <xsd:enumeration value="UTF-16" />
          </xsd:restriction>
        </xsd:simpleType>
      </xsd:element>
      <xsd:element name="MemoryLockingMode" minOccurs="0">
        <xsd:simpleType>
          <xsd:restriction base="xsd:integer" >
            <xsd:enumeration value="0" />"
            <xsd:enumeration value="1" />
          </xsd:restriction>
        </xsd:simpleType>
      </xsd:element>
      <xsd:element name="DbPropMsmdOptimizeResponse" type="xsd:integer"   minOccurs="0">
    </xsd:all>
  </xsd:complexType>
```

Name	Usage	Default	Description
DatasourceInfo	R/W	Empty.	Contains the information, such as the instance name, that is required to connect to the data source.
LocaleIdentifier	R/W		An integer that represents an LCID. This property represents the LCID that is currently in effect.
Timeout	R/W	0	An integer value that specifies, in seconds, the maximum time that the server should wait for a request to be successful before returning an error.
Username	R		The user name.
Catalog	R/W		The current database for the session.
Password	W		The password for the session.

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Name	Usage	Default	Description
StateSupport	R	"Sessions"	Reserved for future use.
Content	W	"SchemaData"	An enumeration value that determines the type of data that is returned from the **Discover** and **Execute** methods. This property can have one of the following values: ▪ None - Allows the structure of the command to be verified but not run. ▪ Schema - Returns the XML schema that relates to the requested command. The XML schema indicates columns and other information. ▪ Data - Returns only the data that was requested. ▪ SchemaData - Returns the schema information and the data. ▪ Metadata - Includes the schema plus the **OlapInfo** result section. See section 2.2.4.1.1.1 for information about the **OlapInfo** result section.
Format	W	"Native"	An enumeration value that determines the type of result set that is returned from the **Discover** and **Execute** methods. This property can have one of the following values: ▪ Tabular - Returns a result set using the **Rowset** data type. See section 2.2.4.1.3 for the definition of the **Rowset** type. ▪ Multidimensional - Returns a rowset using the **MDDataSet** data type. See section 2.2.4.1.1 for the definition of the **MDDataSet** type. ▪ Native - No format is explicitly specified.
AxisFormat	W	"TupleFormat"	An enumeration value that determines the format used within an **MDDataSet** result set to describe the axes of the multidimensional dataset. This property can have one of the following values: ▪ ClusterFormat - The **MDDataSet** axis is made up of one or more **CrossProduct** elements. ▪ CustomFormat - A vendor MAY use

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Name	Usage	Default	Description
			this value to indicate a vendor-specific format. ▪ TupleFormat - The **MDDataSet** axis contains one or more **Tuple** elements.<46>
BeginRange	W	-1	Contains a zero-based integer value corresponding to a CellOrdinal attribute value, which indicates the beginning of the range of cells to include in the result. The **CellOrdinal** attribute is part of the Cell element in the **CellData** section of **MDDataSet**.
EndRange	W	-1	Specifies a zero-based integer value corresponding to a **CellOrdinal** attribute value, indicating the end of the range of cells to include in the result. The **CellOrdinal** attribute is part of the **Cell** element in the **CellData** section of **MDDataSet**.
ProviderName	R		This property is equivalent to the **DBPROP_PROVIDERFRIENDLYNAME** OLE DB property. Indicates the name of the provider.
ProviderVersion	R		This property is equivalent to the **DBPROP_PROVIDERVER** OLE DB property. Indicates the version of the provider.
DBMSVersion	R		This property is equivalent to the **DBPROP_DBMSVER** OLE DB property. Indicates the server version number.
ProviderType	R	6	This property is equivalent to the **DBPROP_DATASOURCE_TYPE** OLE DB property. This property can have one of the following values: ▪ DBPROPVAL_DST_TDP(0x00000001L) - The provider is a tabular data provider. ▪ DBPROPVAL_DST_MDP(0x00000002L) - The provider is a multidimensional provider. ▪ DBPROPVAL_DST_TDPANDMDP(0x00000003L) - The provider is both a TDP and an MDP. ▪ DBPROPVAL_DST_DOCSOURCE(0x000

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Name	Usage	Default	Description
			00004L) - The provider supports direct URL binding and is a document source provider.<47>
ShowHiddenCubes	R/W		This property is reserved for future use.
SQLSupport	R	512 (DBPROPVAL_SQL_SUBMINIMUM)	This property is equivalent to the DBPROP_SQLSUPPORT OLE DB property which is a bitmask displaying the level of support for the SQL language. This property can have a combination of zero or more of the following values: ▪ (0x00000000L)DBPROPVAL_SQL_NONE - SQL is not supported. ▪ (0x00000001L)DBPROPVAL_SQL_ODBC_MINIMUM. ▪ (0x00000002L)DBPROPVAL_SQL_ODBC_CORE. ▪ (0x00000004L)DBPROPVAL_SQL_ODBC_EXTENDED - These levels correspond to the levels of SQL conformance defined in ODBC version 2.5. These levels are cumulative. That is, if the provider supports one level, it also sets the bits for all lower levels. ▪ (0x00000100L)DBPROPVAL_SQL_ESCAPECLAUSES - The provider supports the ODBC escape clause syntax. ▪ (0x00000010L)DBPROPVAL_SQL_ANSI92_ENTRY. ▪ (0x00000020L)DBPROPVAL_SQL_FIPS_TRANSITIONAL. ▪ (0x00000040L)DBPROPVAL_SQL_ANSI92_INTERMEDIATE. ▪ (0x00000080L)DBPROPVAL_SQL_ANSI92_FULL - These levels correspond to the levels in ANSI SQL-92. These levels are cumulative. That is, if the provider supports one level, it also sets the bits for all lower levels. ▪ (0x00000008L)DBPROPVAL_SQL_ANSI89_IEF - The

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Name	Usage	Default	Description
			provider supports the ANSI89 Integrity Enhancement Facility. ▪ (0x00000200L)DBPROPVAL_SQL_SUBMINIMUM - The provider supports the DBGUID_SQL dialect and parses the command text according to SQL rules but does not support either the minimum ODBC level or the ANSI SQL-92 Entry level. This level is not cumulative; providers that support at least the minimal ODBC Level or ANSI SQL-92 Entry Level do not set this bit.<48>
TransactionDDL	R		Reserved for future use.
MaximumRows	W		Reserved for future use.
Roles	R/W		Specifies a comma-delimited string of the role names for this request.
VisualMode	W	0	This property is equivalent to the **MDPROP_VISUALMODE** OLE DB property. Indicates whether the provider is to calculate visual totals, which dynamically totals child members of parent members specified in a set. This property can have one of the following values: ▪ MDPROPVAL_VISUAL_MODE_DEFAULT (0) - Default mode for a server; each server may define this for their server. ▪ MDPROPVAL_VISUAL_MODE_VISUAL (1) - Visual totals on. ▪ MDPROPVAL_VISUAL_MODE_VISUALOFF (2) - Visual totals off.
EffectiveRoles	W		Reserved for future use.
EffectiveUserName	W		Specifies the name of an account to use to override the user name when connecting to the server.
ServerName	R		Indicates the name of the server.
CatalogLocation	R		An integer enumeration value that is equivalent to the **DBPROP_CATALOGLOCATION** OLE DB property and which identifies where the catalog name appears within a text string that represents a fully qualified name.

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Name	Usage	Default	Description
			This property can be one of the following values: ▪ DBPROPVAL_CL_START (0x00000001L) - The catalog name is at the start of the fully qualified name. ▪ DBPROPVAL_CL_END (0x00000002L) - The catalog name is at the end of the fully qualified name.<49>
DbpropCatalogTerm	R		This string property is equivalent to the **DBPROP_CATALOGTERM** OLE DB property which lists the term that the server uses to describe a catalog.<50>
DbpropCatalogUsage	R		This property is equivalent to the **DBPROP_CATALOGUSAGE** OLE DB property. A bitmask that specifies how catalog names can be used in text commands. This property can have a combination of zero or more of the following values: ▪ DBPROPVAL_CU_DML_STATEMENTS(0x00000001L) - Catalog names are supported in all **data manipulation language (DML)** statements. ▪ DBPROPVAL_CU_TABLE_DEFINITION(0x00000002L) - Catalog names are supported in all table definition statements. ▪ DBPROPVAL_CU_INDEX_DEFINITION(0x00000004L) - Catalog names are supported in all index definition statements and may apply only to the table name, not the index name, depending on the SQL implementation. ▪ DBPROPVAL_CU_PRIVILEGE_DEFINITION(0x00000008L) - Catalog names are supported in all privilege definition statements.<51>
DbpropColumnDefinition	R		This property is equivalent to the **DBPROP_COLUMNDEFINITION** OLE DB property. A bitmask defining the valid clauses for the definition of a column. This property can have a combination of zero or more of the following values:

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Name	Usage	Default	Description
			▪ DBPROPVAL_CD_NOTNULL (0x00000001L) Columns can be created non-nullable.<52>
DbpropConcatNullBehavior	R		This property is equivalent to the **DBPROP_CONCATNULLBEHAVIOR** OLE DB property. An enumeration value that indicates how the data source object handles the concatenation of NULL-valued character data type columns with non–NULL-valued character data type columns. This property can have one of the following values: ▪ DBPROPVAL_CB_NULL (1) - The result is NULL-valued. ▪ DBPROPVAL_CB_NON_NULL (2) - The result is the concatenation of the non–NULL-valued column or columns.<53>
DbpropDataSourceReadOnly	R		A Boolean that is equivalent to the **DBPROP_DATASOURCEREADONLY** OLE DB property. When true, indicates that the data store is read-only; otherwise false.<54>
DbpropGroupBy	R		This property is equivalent to the OLE DB property **DBPROP_GROUPBY**. A partial bitmask that indicates the relationship between the columns in a GROUP BY clause and the non-aggregated columns in the select list. The first value in the following list can be used in an OR operation with any of the other values in the list: ▪ DBPROPVAL_GB_COLLATE(0x00000010L) - A COLLATE clause can be specified at the end of each grouping column. ▪ DBPROPVAL_GB_EQUALS_SELECT(0x00000002L) - The GROUP BY clause MUST contain all nonaggregated columns in the select list. It cannot contain any other columns. ▪ DBPROPVAL_GB_CONTAINS_SELECT(0x00000004L) - The GROUP BY clause MUST contain all nonaggregated columns in the select list. It can contain columns that are not in the

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Name	Usage	Default	Description
			select list. ▪ DBPROPVAL_GB_NO_RELATION(0x00000008L) - The columns in the GROUP BY clause and the select list are not related.<55>
DbpropHeterogeneousTables	R		This property is equivalent to the OLE DB property **DBPROP_HETEROGENEOUSTABLES**. A bitmask that specifies whether the provider can join tables from different catalogs or providers. This property can be a combination of zero or more of the following values: ▪ DBPROPVAL_HT_DIFFERENT_CATALOGS(0x00000001L) ▪ DBPROPVAL_HT_DIFFERENT_PROVIDERS(0x00000002L)<56>
DbpropIdentifierCase	R	8	This property is equivalent to the OLE DB property **DBPROP_IDENTIFIERCASE**. A bitmask that indicates how identifiers treat case in data definition commands or interfaces. This property can have one of the following values: ▪ DBPROPVAL_IC_UPPER(0x00000001L) - Identifiers in SQL are case-insensitive and are stored in uppercase. ▪ DBPROPVAL_IC_LOWER(0x00000002L) - Identifiers in SQL are case-insensitive and are stored in lowercase. ▪ DBPROPVAL_IC_SENSITIVE(0x00000004L) - Identifiers in SQL are case-sensitive and are stored in mixed case. ▪ DBPROPVAL_IC_MIXED(0x00000008L) - Identifiers in SQL are case-insensitive and are stored in mixed case.<57>
DbpropMaxIndexSize	R		This property is equivalent to the OLE DB property **DBPROP_MAXINDEXSIZE**. Indicates the maximum number of bytes

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Name	Usage	Default	Description
			allowed in the combined columns of an index. If there is no specified limit or the limit is unknown, this value is set to zero.<58>
DbpropMaxOpenChapters	R		This integer property is equivalent to the OLE DB property **DBPROP_MAXOPENCHAPTERS**. If a chapter MUST be released before a new chapter can be opened, this value is "1"; if the provider has no limit on the number of open chapters or does not support chapters, this value is "0".<59>
DbpropMaxRowSize	R		This integer property is equivalent to the OLE DB property **DBPROP_MAXROWSIZE**. Indicates the maximum length of a single row in a table. If there is no specified limit or the limit is unknown, this value is set to zero.<60>
DbpropMaxRowSizeIncludeBlob	R		This property is equivalent to the OLE DB property **DBPROP_MAXROWSIZEINCLUDESBLOB**. A Boolean that, when true, indicates that the maximum row size includes any blob present in the row; otherwise false.<61>
DbpropMaxTablesInSelect	R		This integer property is equivalent to the OLE DB property **DBPROP_MAXTABLESINSELECT**. Indicates the maximum number of tables allowed in the FROM clause of a SELECT statement. If there is no specified limit or the limit is unknown, this value is set to zero.<62>
DbpropMultiTableUpdate	R		This Boolean property is equivalent to the OLE DB property **DBPROP_MULTITABLEUPDATE**. When true, indicates that the provider can do a multitable update; otherwise false.<63>
DbpropNullCollation	R		This enumeration value is equivalent to the OLE DB property **DBPROP_NULLCOLLATION**. Indicates where NULLs are sorted in a list. This property can have one of the following values: ▪ DBPROPVAL_NC_END(0x00000001L) - NULLs are sorted at the end of the list, regardless of the sort order. ▪ DBPROPVAL_NC_HIGH(0x00000002L)

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Name	Usage	Default	Description
			- NULLs are sorted at the high end of the list. ▪ DBPROPVAL_NC_LOW(0x00000004L) - NULLs are sorted at the low end of the list. ▪ DBPROPVAL_NC_START(0x00000008L) - NULLs are sorted at the start of the list, regardless of the sort order.<64>
DbpropOrderByColumnsInSelect	R		This Boolean property is equivalent to the OLE DB property **DBPROP_ORDERBYCOLUMNSINSELECT**. When true, orders by columns in the select list; otherwise false.<65>
DbpropOutputParameterAvailable	R		This property is equivalent to the OLE DB property **DBPROP_OUTPUTPARAMETERAVAILABILITY**. It is an integer enumeration that indicates the time at which output parameter values become available. This property can have one of the following values: ▪ DBPROPVAL_OA_NOTSUPPORTED(0x00000001L) - Output parameters are not supported. ▪ DBPROPVAL_OA_ATEXECUTE(0x00000002L) - Output parameter data is available immediately after a command is executed. ▪ DBPROPVAL_OA_ATROWRELEASE(0x00000004L) - If a command returns a single result that is a rowset, output parameter data is available at the time the rowset is completely released. If a command returns multiple results, output parameter data is available when a multiple results object is completely released, whichever occurs first.<66>
DbpropPersistentIdType	R		This property is equivalent to the OLE DB property **DBPROP_PERSISTENTIDTYPE**. An integer specifying the type of DBID that the provider uses when persisting DBIDs that name entities in the data store, such as tables, indexes, columns, commands,

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Name	Usage	Default	Description
			or constraints. This is generally the type of DBID that the provider considers the most permanent under schema changes and physical data reorganizations. This property can have one of the following values: ▪ DBPROPVAL_PT_NAME(0x0000004L) ▪ DBPROPVAL_PT_PROPID(0x0000010L) ▪ DBPROPVAL_PT_GUID(0x0000008L) ▪ DBPROPVAL_PT_GUID_NAME(0x0000001L) ▪ DBPROPVAL_PT_GUID_PROPID(0x0000002L) ▪ DBPROPVAL_PT_PGUID_NAME(0x0000020L) ▪ DBPROPVAL_PT_PGUID_PROPID(0x0000040L)<67>
DbpropPrepareAbortBehavior	R		This enumeration value is equivalent to the OLE DB property **DBPROP_PREPAREABORTBEHAVIOR**. It indicates how aborting a transaction affects prepared commands. This property can have one of the following values: ▪ DBPROPVAL_CB_DELETE(0x00000002L) - Aborting a transaction deletes prepared commands. The application MUST reprepare commands before executing them. ▪ DBPROPAL_CB_PRESERVE(0x00000001L) - Aborting a transaction preserves prepared commands. The application can reexecute commands without re-preparing them.<68>
DbpropPrepareCommitBehavior	R		This integer enumeration value is equivalent to the OLE DB property **DBPROP_PREPARECOMMITBEHAVIOR**. It indicates how committing a transaction affects prepared commands. This property can have one of the following values:

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Name	Usage	Default	Description
			▪ DBPROPVAL_CB_DELETE(0x00000002L) - Aborting a transaction deletes prepared commands. The application MUST reprepare commands before executing them. ▪ DBPROPAL_CB_PRESERVE(0x00000001L) - Aborting a transaction preserves prepared commands. The application can re-execute commands without re-preparing them.<69>
DbpropProcedureTerm	R		This property is equivalent to the OLE DB property **DBPROP_PROCEDURETERM**. A character string with the data store vendor's name for a procedure - for example, "database procedure", "stored procedure", or "procedure". This is used for building user interfaces.<70>
DbpropQuotedIdentifierCase	R		This enumeration value is equivalent to the OLE DB property **DBPROP_QUOTEDIDENTIFIERCASE**. It indicates how quoted identifiers treat case. This property can have one of the following values: ▪ DBPROPVAL_IC_UPPER(0x00000001L) - Quoted identifiers in SQL are case-insensitive and are stored in uppercase in the system catalog. ▪ DBPROPVAL_IC_LOWER(0x00000002L) - Quoted identifiers in SQL are case-insensitive and are stored in lowercase in the system catalog. ▪ DBPROPVAL_IC_SENSITIVE(0x00000004L) - Quoted identifiers in SQL are case-sensitive and are stored in mixed case in the system catalog. ▪ DBPROPVAL_IC_MIXED(0x00000008L) - Quoted identifiers in SQL are case-insensitive and are stored in mixed case in the system catalog.<71>
DbpropSchemaUsage	R		This property is equivalent to the OLE DB property **DBPROP_SCHEMAUSAGE**. A bitmask specifying how schema names can be used in text commands. This property can have a combination of zero

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Name	Usage	Default	Description
			or more of the following values: ▪ DBPROPVAL_SU_DML_STATEMENTS(0x00000001L) - Schema names are supported in all data manipulation language (DML) statements. ▪ DBPROPVAL_SU_TABLE_DEFINITION(0x00000002L) - Schema names are supported in all table definition statements. ▪ DBPROPVAL_SU_INDEX_DEFINITION(0x00000004L) - Schema names are supported in all index definition statements and may apply only to the table name, not the index name, depending on the SQL implementation. ▪ DBPROPVAL_SU_PRIVILEGE_DEFINITION(0x00000008L) - Schema names are supported in all privilege definition statements.<72>
DbpropSqlSupport	R	512	This property is equivalent to the OLE DB property **DBPROP_SQLSUPPORT**. A bitmask specifying the level of support for SQL. This property can have a combination of zero or more of the following values: ▪ DBPROPVAL_SQL_NONE(0x00000000L) - SQL is not supported. ▪ DBPROPVAL_SQL_ODBC_MINIMUM(0x00000001L) ▪ DBPROPVAL_SQL_ODBC_CORE(0x00000002L) ▪ DBPROPVAL_SQL_ODBC_EXTENDED(0x00000004L) - These levels correspond to the levels of SQL conformance defined in ODBC version 2.5. These levels are cumulative. That is, if the provider supports one level, it also sets the bits for all lower levels. For example, if the provider sets the DBPROPVAL_SQL_ODBC_CORE bit, it also sets the

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Name	Usage	Default	Description
			DBPROPVAL_SQL_ODBC_MINIMUM bit. ▪ DBPROPVAL_SQL_ESCAPECLAUSES(0x00000100L) - The provider supports the ODBC escape clause syntax. ▪ DBPROPVAL_SQL_ANSI92_ENTRY(0x00000010L) ▪ DBPROPVAL_SQL_FIPS_TRANSITIONAL(0x00000020L) ▪ DBPROPVAL_SQL_ANSI92_INTERMEDIATE(0x00000040L) ▪ DBPROPVAL_SQL_ANSI92_FULL(0x00000080L) - These levels correspond to the levels in ANSI SQL-92. These levels are cumulative. That is, if the provider supports one level, it also sets the bits for all lower levels. ▪ DBPROPVAL_SQL_ANSI89_IEF(0x00000008L) - The provider supports the ANSI89 Integrity Enhancement Facility. ▪ DBPROPVAL_SQL_SUBMINIMUM(0x00000200L)- The provider supports the DBGUID_SQL dialect and parses the command text according to SQL rules but does not support either the minimum ODBC level or the ANSI SQL-92 entry level. This level is not cumulative; providers that support at least the minimal ODBC Level or ANSI SQL-92 entry level do not set this bit. OLE DB consumers can determine whether or not the provider supports the DBGUID_SQL dialect by verifying that the DBPROPVAL_SQL_NONE bit is not set.<73>
DbpropSubqueries	R	0	This property is equivalent to the OLE DB property **DBPROP_SUBQUERIES**. A bitmask specifying the predicates in text commands that support subqueries. This property can have a combination of zero or more of the following values: ▪

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Name	Usage	Default	Description
			DBPROPVAL_SQ_CORRELATEDSUBQUERIES(0x00000001L) ▪ DBPROPVAL_SQ_COMPARISON(0x00000002L) ▪ DBPROPVAL_SQ_EXISTS(0x00000004L) ▪ DBPROPVAL_SQ_IN(0x00000008L) ▪ DBPROPVAL_SQ_QUANTIFIED(0x00000010L) ▪ DBPROPVAL_SQ_TABLE(0x00000020L)<74>
DbpropSupportedTxnDdl	R		This property is equivalent to the OLE DB property **DBPROP_SUPPORTEDTXNDDL**. An integer that indicates the relationship of transactions to table and index modification data definition language (DDL) statements. This property can have one of the following values: ▪ DBPROPVAL_TC_NONE(0x00000000L) - Transactions are not supported. ▪ DBPROPVAL_TC_DML(0x00000001L) - Transactions can contain only data manipulation language (DML) statements. Attempting to modify tables or indexes within a transaction causes an error. ▪ DBPROPVAL_TC_DDL_COMMIT(0x00000002L) - Transactions can contain only DML statements. Modifying tables or indexes within a transaction causes the transaction to be committed. The provider's commit mode remains unchanged in accordance with the value of **DBPROP_COMMITPRESERVE**. If the provider was in auto-commit mode, it remains in auto-commit mode. The same is true for manual-commit mode. ▪ DBPROPVAL_TC_DDL_IGNORE(0x00000004L) - Transactions can contain only

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Name	Usage	Default	Description
			DML statements. Attempts to modify tables or indexes within a transaction are ignored.<75>
DbpropSupportedTxnIsoLevels	R		This property is equivalent to the OLE DB property **DBPROP_SUPPORTEDTXNISOLEVELS**. A bitmask specifying the supported transaction isolation levels. This property can have a combination of zero or more of the following values: ▪ DBPROPVAL_TI_CHAOS(0x00000010L) ▪ DBPROPVAL_TI_READUNCOMMITTED(0x00000100L) ▪ DBPROPVAL_TI_BROWSE(0x00000100L) ▪ DBPROPVAL_TI_CURSORSTABILITY(0x00001000L) ▪ DBPROPVAL_TI_READCOMMITTED(0x00001000L) ▪ DBPROPVAL_TI_REPEATABLEREAD(0x00010000L) ▪ DBPROPVAL_TI_SERIALIZABLE(0x00100000L) ▪ DBPROPVAL_TI_ISOLATED(0x00100000L)<76>
DbpropSupportedTxnIsoRetain	R	292	This property is equivalent to the OLE DB property **DBPROP_SUPPORTEDTXNISORETAIN**. A bitmask specifying the supported transaction isolation retention levels. This property can have a combination of zero or more of the following values: ▪ DBPROPVAL_TR_COMMIT_DC(0x00000001L) - The transaction may either preserve or dispose of isolation context across a retaining commit.

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Name	Usage	Default	Description
			▪ DBPROPVAL_TR_COMMIT(0x00000002L) - The transaction preserves its isolation context (that is, it preserves its locks, if that is how isolation is implemented) across a retaining commit. ▪ DBPROPVAL_TR_COMMIT_NO(0x00000004L) - The transaction is explicitly not to preserve isolation across a retaining commit. ▪ DBPROPVAL_TR_ABORT_DC(0x00000008L) - The transaction may either preserve or dispose of isolation context across a retaining abort. ▪ DBPROPVAL_TR_ABORT(0x00000010L) - The transaction preserves its isolation context across a retaining abort. ▪ DBPROPVAL_TR_ABORT_NO(0x00000020L) - The transaction is explicitly not to preserve isolation across a retaining abort. ▪ DBPROPVAL_TR_DONTCARE (0x00000040L) - The transaction may preserve or dispose of isolation context across a retaining commit or abort. ▪ DBPROPVAL_TR_BOTH(0x00000080L) - Isolation is preserved across both a retaining commit and a retaining abort. ▪ DBPROPVAL_TR_NONE(0x00000100L) - Isolation is explicitly not to be retained across either a retaining commit or a retaining abort. ▪ DBPROPVAL_TR_OPTIMISTIC(0x00000200L) - Optimistic concurrency control is used. When this value is specified, and then whatever isolation technology is in place (such as locking), it MUST be the case that other transactions' ability to make changes to the data and resources manipulated by this transaction is not in any way affected by the data read

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Name	Usage	Default	Description
			or updated by this transaction. That is, optimistic control is used for all data in the transaction.<77>
DbpropTableTerm	R		This property is equivalent to the OLE DB property **DBPROP_TABLETERM**. A string value that indicates the name the data source object uses for a table - for example, "table" or "file". This property is used for building user interfaces.<78>
MdpropAggregateCellUpdate	R		This property is equivalent to the OLE DB property **MDPROP_AGGREGATECELL_UPDATE**. An integer enumeration value that indicates support for updating aggregated cells. This property can have one of the following values: ▪ MDPROPVAL_AU_UNSUPPORTED(0x00000000L) - The provider does not support updating nonatomic cells. ▪ MDPROPVAL_AU_UNCHANGED(0x00000001L) - The provider supports updating of aggregated cells, but the value of cells beneath an aggregated cell remains unchanged. ▪ MDPROPVAL_AU_UNKNOWN(0x00000002L) - The provider supports updating of aggregated cells, and the value of cells beneath an aggregated cell remains undefined.<79>
MdpropAxes	R		This property is equivalent to the OLE DB property **MDPROP_AXES**. This is an OLE DB for OLAP property. The value of this property is the maximum number of axes that the provider supports in the dataset. To be compliant with OLE DB for OLAP, this value MUST be at least 3.<80>
MdpropFlatteningSupport	R		This property is equivalent to the OLE DB property **MDPROP_FLATTENING_SUPPORT**. An integer that indicates if a provider supports flattening, and if so, of what type. This property can have one of the following values: ▪ MDPROPVAL_FS_FULL_SUPPORT(0x00000001L) - The provider supports

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Name	Usage	Default	Description
			flattening as described in [MSDN-FDPR]. ▪ MDPROPVAL_FS_GENERATED_COLUMN(0x00000002L) - The provider supports flattening by using dummy names, as described in [MS-SLNL]. ▪ MDPROPVAL_FS_GENERATED_DIMENSION(0x00000003L) - The provider supports flattening by generating one column per dimension as described in [MS-SLNL]. ▪ MDPROPVAL_FS_NO_SUPPORT(0x00000004L) - The provider does not support flattening.<81>
MdpropMdxCaseSupport	R		This property is equivalent to the OLE DB property **MDPROP_MDX_CASESUPPORT**. A bitmask that represents the type of CASE statement in MDX that the provider supports. This property can have one of the following values: ▪ MDPROPVAL_MC_SINGLECASE(0x00000002L) - The provider supports a simple case expression. ▪ MDPROPVAL_MC_SEARCHEDCASE(0x00000002L) - The provider supports a searched case expression.<82>
MdpropMdxDescFlags	R		This property is equivalent to the OLE DB property **MDPROP_MDX_DESCFLAGS**. It is a bitmask that indicates which desc flag values in the DESCENDANTS MDX function are supported by the provider. This property can have a combination of zero or more of the following values: ▪ MDPROPVAL_MD_BEFORE (0x00000002L) - The provider supports the flag BEFORE. ▪ MDPROPVAL_MD_AFTER(0x00000004L) - The provider supports the flag AFTER. ▪ MDPROPVAL_MD_SELF(0x00000001L) - The provider supports the flag SELF.

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Name	Usage	Default	Description
			This bit MUST be set by all providers because support for SELF is mandatory.<83>
MdpropMdxDrillFunctions	R		A bitmask indicating support for drilldown and drillup groups of functions. These functions indicate provider support for drilldown and drillup on tuples as well as members. This property is a combination of zero or more of the following values: ▪ MDPROPVAL_MDF_BASIC(0x01) - The support operation for the drilldown and drillup groups of functions on members. ▪ MDPROPVAL_MDF_ASYMMETRIC(0x02) - The support operation for the drilldown and drillup groups of functions on tuples as well as members.<84> ▪ MDPROPVAL_MDF_CALC_MEMBERS(0x04) - The support operation for the drilldown and drillup groups of functions returning child calculated members.<85><86>
MdpropMdxFormulas	R	63	This property is equivalent to the OLE DB property **MDPROP_MDX_FORMULAS**. A bitmask that indicates what support the provider has for the creation of named sets and calculated members. This property can have a combination of zero or more of the following values: ▪ MDPROPVAL_MF_WITH_CALCMEMBERS(0x00000001L) - The provider supports the creation of calculated members by using the WITH clause before a SELECT. ▪ MDPROPVAL_MF_WITH_NAMEDSETS(0x00000002L) - The provider supports the creation of named sets by using the WITH clause before a SELECT. ▪ MDPROPVAL_MF_CREATE_CALCMEMBERS(0x00000004L) - The provider supports the creation of named calculated members by using the

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Name	Usage	Default	Description
			CREATE clause. ▪ MDPROPVAL_MF_CREATE_NAMEDSETS(0x00000008L) - The provider supports the creation of named sets by using the CREATE clause. ▪ MDPROPVAL_MF_SCOPE_SESSION(0x00000010L) - The provider supports the scope value of SESSION during the creation of named sets and calculated members. ▪ MDPROPVAL_MF_SCOPE_GLOBAL(0x00000020L) - The provider supports the scope value of GLOBAL during the creation of named sets and calculated members.<87>
MdpropMdxJoinCubes	R	1	This property is equivalent to the OLE DB property **MDPROP_MDX_JOINCUBES**. A bitmask that indicates what support the provider has for queries joining multiple cubes. This property can have a combination of zero or more of the following values: ▪ MDPROPVAL_MJC_IMPLICITCUBE(0x00000004L) - The provider supports an empty FROM clause. The cube is implicitly resolved by the axis and slicer dimensions. ▪ MDPROPVAL_MJC_SINGLECUBE(0x00000001) - The provider supports only one cube in the FROM clause of the MDX statement. ▪ MDPROPVAL_MJC_MULTICUBES(0x00000002L) - The provider supports more than one cube in the FROM clause of the MDX statement.<88>
MdpropMdxMemberFunctions	R	15	This property is equivalent to the OLE DB property **MDPROP_MDX_MEMBER_FUNCTIONS**. A bitmask indicating support for various MDX member functions. This property can have a combination of zero or more of the following values:

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Name	Usage	Default	Description
			▪ MDPROPVAL_MMF_COUSIN(0x00000001L) - The provider supports the function COUSIN. ▪ MDPROPVAL_MMF_PARALLELPERIOD(0x00000002L) - The provider supports the function PARALLELPERIOD. ▪ MDPROPVAL_MMF_OPENINGPERIOD(0x00000004L) - The provider supports the function OPENINGPERIOD. ▪ MDPROPVAL_MMF_CLOSINGPERIOD(0x00000008L) - The provider supports the function CLOSINGPERIOD.<89>
MdpropMdxNonMeasureExpressions	R		This property is equivalent to the OLE DB property **MDPROP_MDX_NONMEASURE_EXPRESSIONS**. An enumeration value that indicates the capabilities in the **numeric_value_expression** argument of MDX set functions. This property can have one of the following values: ▪ MDPROPVAL_NME_MEASURESONLY(0x00000001L) - The provider supports only expressions involving **Measures** dimension members. ▪ MDPROPVAL_NME_ALLDIMENSIONS(0x00000000L) - The provider supports expressions involving members from any dimension.<90>
MdpropMdxNumericFunctions	R		This property is equivalent to the OLE DB property **MDPROP_MDX_NUMERIC_FUNCTIONS**. A bitmask that indicates support for various numeric functions. This property can have a combination of zero or more of the following values: ▪ MDPROPVAL_MNF_MEDIAN(0x00000008L) - The provider supports the function MEDIAN. ▪ MDPROPVAL_MNF_VAR(0x00000002L) - The provider supports the function

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Name	Usage	Default	Description
			VAR. ▪ MDPROPVAL_MNF_STDDEV(0x00000004L) - The provider supports the function STDDEV. ▪ MDPROPVAL_MNF_RANK(0x00000008L) - The provider supports the function RANK. ▪ MDPROPVAL_MNF_AGGREGATE(0x00000010L) - The provider supports the function AGGREGATE. ▪ MDPROPVAL_MNF_COVARIANCE(0x00000020L) - The provider supports the function COVARIANCE. ▪ MDPROPVAL_MNF_CORRELATION(0x00000040L) - The provider supports the function CORRELATION. ▪ MDPROPVAL_MNF_LINREGSLOPE(0x00000080L) - The provider supports the function LINREGSLOPE. ▪ MDPROPVAL_MNF_LINREGVARIANCE(0x00000100L) - The provider supports the function LINREGVARIANCE. ▪ MDPROPVAL_MNF_LINREGR2(0x00000200L) - The provider supports the function LINREGR2. ▪ MDPROPVAL_MNF_LINREGPOINT(0x00000400L) - The provider supports the function LINREGPOINT.<91>
MdpropMdxObjQualification	R		This property is equivalent to the OLE DB property **MDPROP_MDX_OBJQUALIFICATION**. This property is a bitmask specifying how multidimensional schema object names can be qualified in an MDX statement. This property can have a combination of zero or more of the following values: ▪ MDPROPVAL_MOQ_DATASOURCE_CUBE(0x00000001L) - Cubes can be

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Name	Usage	Default	Description
			qualified by the data source name. ▪ MDPROPVAL_MOQ_CATALOG_CUBE(0x00000002L) - Cubes can be qualified by the catalog name. ▪ MDPROPVAL_MOQ_SCHEMA_CUBE(0x00000004L) - Cubes can be qualified by the schema name. ▪ MDPROPVAL_MOQ_CUBE_DIM(0x00000008L) - Dimensions can be qualified by cube name. ▪ MDPROPVAL_MOQ_DIM_HIER(0x00000010L) - Hierarchies can be qualified by dimension names. ▪ MDPROPVAL_MOQ_DIMHIER_LEVEL(0x00000020L) - Levels can be qualified by the dimension name and/or hierarchy name. This property applies only if named levels are supported, which can be checked by the property. ▪ MDPROP_NAMED_LEVELS(0x0000000ffL) - If named levels are not supported, this bit MUST be set. ▪ MDPROPVAL_MOQ_DIMHIER_MEMBER(0x00000100L) -Members can be qualified by a dimension name and/or a hierarchy name. ▪ MDPROPVAL_MOQ_LEVEL_MEMBER(0x00000040L) - Members can be qualified by a level name. ▪ MDPROPVAL_MOQ_MEMBER_MEMBER(0x00000080L) - Members can be qualified by their ancestor names.<92>
MdpropMdxOuterReference	R		This property is equivalent to the OLE DB property **MDPROP_MDX_OUTERREFERENCE**. This integer indicates whether <tuple>[.VALUE] can be qualified by <cube_name> in an MDX value expression. 0 means true and 1 means

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Name	Usage	Default	Description
			false.<93>
MdpropMdxQueryByProperty	R	True	This property is equivalent to the OLE DB property **MDPROP_MDX_QUERYBYPROPERTY**. A Boolean that, when true, indicates that the provider supports for querying by property values in an MDX statement; otherwise false.<94>
MdpropMdxRangeRowset	R		This property is equivalent to the OLE DB property **MDPROP_MDX_RANGEROWSET**. An enumeration value that defines the type of support for cell updates provided by the provider. This property can have one of the following values: ▪ MDPROPVAL_RR_NORANGEROWSET(0x00000001L) - The provider does not support a range rowset. ▪ MDPROPVAL_RR_READONLY(0x00000002L) - The provider supports a read-only range rowset. ▪ MDPROPVAL_RR_UPDATE(0x00000004L) - The provider supports an updatable range rowset.<95>
MdpropMdxSetFunctions	R		This property is equivalent to the OLE DB property **MDPROP_MDX_SET_FUNCTIONS**. A bitmask that indicates support for various set functions. This property can have a combination of zero or more of the following values: ▪ MDPROPVAL_MSF_TOPPERCENT(0x00000001L) - The provider supports the function TOPPERCENT. ▪ MDPROPVAL_MSF_BOTTOMPERCENT(0x00000002L) - The provider supports the function BOTTOMPERCENT. ▪ MDPROPVAL_MSF_TOPSUM(0x00000004L) - The provider supports the function TOPSUM. ▪ MDPROPVAL_MSF_BOTTOMSUM(0x00

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Name	Usage	Default	Description
			000008L) - The provider supports the function BOTTOMSUM. ▪ MDPROPVAL_MSF_DRILLDOWNLEVEL(0x00000800L) - The provider supports the function DRILLDOWNLEVEL. ▪ MDPROPVAL_MSF_DRILLDOWNMEMBER(0x00000400L) - The provider supports the function DRILLDOWNMEMBER. ▪ MDPROPVAL_MSF_DRILLDOWNMEMBERTOP(0x00001000L) - The provider supports the function DRILLDOWNMEMBERTOP. ▪ MDPROPVAL_MSF_DRILLDOWNMEMBERBOTTOM(0x00002000L) - The provider supports the function DRILLDOWNMEMBERBOTTOM. ▪ MDPROPVAL_MSF_DRILLDOWNLEVELTOP(0x00004000L) - The provider supports the function DRILLDOWNLEVELTOP. ▪ MDPROPVAL_MSF_DRILLDOWNLEVELBOTTOM(0x00008000L) - The provider supports the function DRILLDOWNLEVELBOTTOM. ▪ MDPROPVAL_MSF_DRILLUPMEMBER(0x00010000L) - The provider supports the function DRILLUPMEMBER. ▪ MDPROPVAL_MSF_DRILLUPLEVEL(0x00020000L) - The provider supports the function DRILLUPLEVEL. ▪ MDPROPVAL_MSF_PERIODSTODATE(0x00000010L) - The provider supports the function PERIODSTODATE. ▪ MDPROPVAL_MSF_LASTPERIODS(0x00000020L) - The provider supports the function LASTPERIODS. ▪ MDPROPVAL_MSF_YTD(0x00000040L) - The provider supports the function

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Name	Usage	Default	Description
			YTD. ▪ MDPROPVAL_MSF_QTD(0x00000080L) - The provider supports the function QTD. ▪ MDPROPVAL_MSF_MTD(0x00000100L) - The provider supports the function MTD. ▪ MDPROPVAL_MSF_WTD(0x00000200L) - The provider supports the function WTD.<96>
MdpropMdxSlicer	R		This property is equivalent to the OLE DB property **MDPROP_MDX_SLICER**. An enumeration value that indicates the capabilities available in the WHERE clause of an MDX statement. This property can have one of the following values: ▪ MDPROPVAL_MS_SINGLETUPLE(0x00000002L) - The provider supports only one tuple in the WHERE clause. ▪ MDPROPVAL_MS_MULTIPLETUPLES(0x00000001L) - The provider supports more than one tuple in the WHERE clause.<97>
MdpropMdxStringCompop	R		This property is equivalent to the OLE DB property **MDPROP_MDX_STRING_COMPOP**. A bitmask that indicates support for string comparison operators other than equals and not-equals operators. This property can have a combination of zero or more of the following values: ▪ MDPROPVAL_MSC_LESSTHAN(0x00000001L) - The provider supports the less-than operator. ▪ MDPROPVAL_MSC_GREATERTHAN(0x00000002L) - The provider supports the greater-than operator. ▪ MDPROPVAL_MSC_LESSTHANEQUAL(0x00000004L) - The provider supports the less-than-or-equal-to operator. ▪

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Name	Usage	Default	Description
			MDPROPVAL_MSC_GREATERTHANEQUAL(0x00000008L) - The provider supports the greater-than-or-equal-to operator.<98>
MdpropNamedLevels	R		This property is equivalent to the OLE DB property **MDPROP_NAMED_LEVELS**. A bitmask that indicates support for named levels. This property can have a combination of zero or more of the following values: ▪ MDPROPVAL_NL_NAMEDLEVELST(0x00000001L) - The provider supports named levels. ▪ MDPROPVAL_NL_NUMBEREDLEVELS(0x00000002L) - The provider supports numbered levels using the LEVELS(n) function. ▪ MDPROPVAL_NL_SCHEMAONLY(0x00000004L) - The provider supports "dummy" named levels. These level names are for display only and are frequently just provider-generated names for a given level number. These names cannot be used in an MDX statement (such as in <level_name>.MEMBERS). These names appear in the LEVEL_NAME and LEVEL_UNIQUE_NAME columns of the schema rowset; providers may choose to have the same name in both the columns, or they can generate LEVEL_UNIQUE_NAME by appropriately qualifying the LEVEL_NAME. It is provider-specific whether these dummy names also appear in the LEVEL_UNIQUE_NAME column of the MEMBERS and PROPERTIES rowsets.<99>
MDXSupport	R	Core	An enumeration value that specifies the degree of MDX support. This enumeration has only one value, "Core".<100>
DbpropMsmdMDXCompatibility	R/W	0	An enumeration value that determines how placeholder members in a ragged or unbalanced hierarchy are treated. This property can have one of the following values:

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Name	Usage	Default	Description
			▪ 0 - This value is equivalent to 1. ▪ 1 - Hierarchies in role-playing dimensions receive a caption that includes the dimension name and the hierarchy name. The caption has the following format: [Dimension].[Hierarchy] ▪ Placeholder members are exposed. ▪ 2 - Hierarchies in role-playing dimensions receive a caption that includes the dimension name and the hierarchy name. The caption has the following format: [Dimension].[Hierarchy] ▪ Placeholder members are not exposed. ▪ 3 - Placeholder members are not exposed.
DbpropMsmdSQLCompatibility	R/W	0	Reserved for future use.
DbpropMsmdMDXUniqueNameStyle	R/W	0	A bitmask that determines the algorithm for generating the unique names of members in a dimension. This property can have a combination of zero or more of the following values: ▪ 0 - For compatibility with earlier versions of Analysis Services, this value is equivalent to 3. ▪ 1 - Uses a key path algorithm that has the following format: [*dim*].&[*key1*].&[*key2*] **Note** In this algorithm, *dim* is the name of the dimension, and *key1* and *key2* are the attribute keys. ▪ 2 - Uses a name path algorithm that has the following format: [*dim*].[*name1*].&[*name2*] **Note** In this algorithm, *dim* is the name of the dimension, and *name1* and *name2* are the attribute names. ▪ 3 - Uses guaranteed unique names

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Name	Usage	Default	Description
			that are stable over time.
DbpropMsmdCachePolicy	R/W		Reserved for future use.
DbpropMsmdCacheRatio	R/W		Reserved for future use.
DbpropMsmdCacheMode	R/W		Reserved for future use.
DbpropMsmdCompareCaseSensitiveStringFlags	R/W	1	A bitmask that determines case-sensitive string comparison and sort order functionality. This property controls how comparisons are made in character sets that do not support uppercase and lowercase characters, such as Hindi and Japanese katakana. This property can have a combination of zero or more of the following values: ▪ NORM_IGNORECASE(0x00000001) - Case is ignored. ▪ NORM_BINARY(0x00000002) - Binary comparison. Characters are compared based on their underlying value in the character set, not on their order in their particular alphabet. ▪ NORM_IGNORENONSPACE(0x00000010) - Nonspacing characters are ignored. ▪ NORM_IGNORESYMBOLS(0x00000100) - Symbols are ignored. ▪ NORM_IGNOREKANATYPE(0x00001000) - No differentiation is made between hiragana and katakana characters. When compared, corresponding hiragana and katakana characters are considered to be equal. ▪ NORM_IGNOREWIDTH(0x00010000) - No differentiation is made between single-byte and double-byte versions of the same character. ▪ SORT_STRINGSORT(0x00100000) - Punctuation is treated the same as symbols.
DbpropMsmdCompareCaseNotSensitiveStringFlags	R/W	69633	A bitmask that determines case-insensitive string comparison and sort order functionality. This property controls how comparisons are made in character

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Name	Usage	Default	Description
			sets that do not support uppercase and lowercase characters, such as Hindi and Japanese katakana. This property can have a combination of zero or more of the following values: ▪ NORM_IGNORECASE(0x00000001) - Case is ignored. ▪ NORM_BINARY(0x00000002) - Binary comparison. Characters are compared based on their underlying value in the character set, not on their order in their particular alphabet. ▪ NORM_IGNORENONSPACE(0x00000010) - Nonspacing characters are ignored. ▪ NORM_IGNORESYMBOLS(0x00000100) - Symbols are ignored. ▪ NORM_IGNOREKANATYPE(0x00001000) - No differentiation is made between hiragana and katakana characters. When compared, corresponding hiragana and katakana characters are considered to be equal. ▪ NORM_IGNOREWIDTH(0x00010000) - No differentiation is made between single-byte and double-byte versions of the same character. ▪ SORT_STRINGSORT(0x00100000) - Punctuation is treated the same as symbols.
DbpropMsmdFlattened2	R/W	False	A Boolean property that, when true, outputs all members of a parent-child hierarchy in a single table column in the flattened result, unless the parent-child hierarchy is requested on Axis 0; otherwise false. The Level template for output columns is not used.
DbpropInitMode	R/W		This property is a bitmask specifying access permissions, and is equivalent to the OLE DB property **DBPROP_INIT_MODE**. The only supported values for this property are DB_MODE_READWRITE (0x03) and DB_MODE_READ (0x01).<101>

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Name	Usage	Default	Description
SspropInitAppName	R/W		The name of the client application.
SspropInitWsid	R/W		The ID of the client workstation.
SspropInitPacketsize	R/W		The ID of the client application.
ReadOnlySession	R/W		Reserved for future use.
SecuredCellValue	R/W	0	An integer enumeration that specifies the error code and the values for the **Value** and **Formatted Value** cell properties to be returned when a query tries to access a secured cell. This property can have one of the following values: ▪ 0 - this value is the same as 1. ▪ 1 - The return **Value** property of the cell contains the result as a variant data type. The string "#N/A" is returned in the **Formatted Value** property. ▪ 2 - Returns an error in the **Cell** element for this cell, of the mddataset that is returned. ▪ 3 - Returns NULL in both the **Value** and **Formatted Value** properties. ▪ 4 - Returns a numeric zero (0) in the **Value** property and returns a formatted zero in the **Formatted Value** property. For example, 0.00 is returned in the **Formatted Value** property for a cell whose **Format** property is "#.##". ▪ 5 - Returns the string "#SEC" in both the **Value** and **Formatted Value** properties.
NonEmptyThreshold	R/W		Reserved for future use.
SafetyOptions	R/W	0	An enumeration value that determines whether unsafe libraries can be registered and loaded by client applications. This property can have one of the following values: ▪ DBPROPVAL_MSMD_SAFETY_OPTIONS_DEFAULT(0)- This value is treated as DBPROPVAL_MSMD_SAFETY_OPTIONS_ALLOW_SAFE.

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Name	Usage	Default	Description
			▪ DBPROPVAL_MSMD_SAFETY_OPTIONS_ALLOW_ALL(1) -This value enables all user-defined function libraries without verifying that they are safe for initialization and scripting. ▪ DBPROPVAL_MSMD_SAFETY_OPTIONS_ALLOW_SAFE(2) -This value makes sure that all classes for a particular user-defined function library are checked to make sure that they are safe for initialization and scripting. ▪ DBPROPVAL_MSMD_SAFETY_OPTIONS_ALLOW_NONE(3) - This value prevents user-defined functions from being used during the session.
DbpropMsmdCacheRatio2	R/W		Reserved for future use.
DbpropMsmdUseFormulaCache	R/W		Reserved for future use.
DbpropMsmdDynamicDebugLimit	R/W		Reserved for future use.
DbpropMsmdDebugMode	R/W		Reserved for future use.
Dialect	R/W		A server SHOULD attempt to deduce the command dialect from the content of the statement element.<102>The dialect property establishes the dialect used in the following situations: ▪ The dialect that the provider will use the first time that the provider tries to run a query. ▪ The dialect used to return execution errors as the result of query failures. ▪ The dialect that is used when it is ambiguous as to what dialect was used in the query. ▪ If the **Dialect** property is not set, query execution returns errors in the dialect last used. The value of the **Dialect** property identifies the language used for expressing the statement. The value can be one of the following: ▪ "MDX"

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Name	Usage	Default	Description
			▪ "DMX" ▪ "SQL"
ImpactAnalysis	W	False	When this Boolean is set to true, the command will return a rowset that lists the objects that would be impacted if the command were executed; otherwise false.
SQLQueryMode	R/W	"Calculated"	An enumeration value that modifies the behavior of calculations which are included in SQL queries. This property can have one of the following values: ▪ Data - No calculations are included. ▪ Calculated - Calculations are returned. ▪ IncludeEmpty - Calculations and empty rows are returned. ▪ DataKeys - No calculations are included, and keys associated with columns instead of the key captions for the columns are returned.
ClientProcessID	R/W	0	The ID of the client process.
Cube	W	Empty.	The name of the cube that sets the context for the command. If the command itself contains a cube name, such as within the FROM clause of a Multidimensional Expressions (MDX) SELECT statement, the setting of this property is ignored.
ReturnCellProperties	R/W	False	A Boolean that, when true, indicates that cell properties should be returned in query results; otherwise false.
CommitTimeout	W	0	An integer that determines how long, in seconds, the commit phase of a command waits for locks before rolling back. A value of zero (0) indicates that the instance waits indefinitely.
ForceCommitTimeout	W	0	An integer that determines for how long, in seconds, the commit phase of a command waits before forcing previously issued commands to roll back. A value of zero (0) indicates that the instance waits indefinitely.
ExecutionMode	W	"Execute"	Reserved for future use.
RealTimeOlap	R/W	False	A Boolean that, when set to true, indicates that all of the partitions listening

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Name	Usage	Default	Description
			for table notifications are queried in real time, bypassing caching; otherwise false.
MdxMissingMemberMode	W	"Default"	Indicates how missing members are handled in MDX statements. This property can have one of the following values: ▪ Default -Default behavior of the server. ▪ Error - Generate an error. ▪ Ignore - Always ignore missing members.
CustomData	W	Empty.	A string value that defines a value that will be returned by the **customdata()** MDX function.
MdpropMdxSubqueries	R		A bitmask that indicates the level of support for subqueries in MDX. This property can have a combination of zero or more of the following values: ▪ MDPROPVAL_MSQ_BASIC (0x01) – Supports subselects without arbitrary shapes. ▪ MDPROPVAL_MSQ_ARBITRARYSHAPE (0x02) - Supports subselects with arbitrary shapes. ▪ MDPROPVAL_MSQ_NONVISUAL (0x04) – Supports subselects with NON VISUAL keyword. ▪ MDPROPVAL_MSQ_CALCMEMBERS (0x08) - Supports calc members in subselects. This option does not allow use of arbitrary shapes in a subselect.<103> ▪ MDPROPVAL_MSQ_CALCMEMBERS2 (0x10) - Supports calc members in subselects. This option includes support for arbitrary shapes in a subselect.<104><105>
DbpropMsmdErrorMessageMode	W	2	If a cell security MDX expression does not return true or false, but in fact itself returns an error, the integer this property is set to controls what happens. If set to "2", the result returns the error message associated with the error that the evaluation of the cell security expression returns.

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Name	Usage	Default	Description
			If this property is set to any other value, the result is treated the same as if the cell security expression evaluated to false, and access to the cell data is denied. This property will be recognized only for administrator connections.
DisablePrefetchFacts	R/W	False	A Boolean that, when true, indicates to the server that it should disable the prefetching of fact data when executing MDX queries; otherwise false. By default, the server does prefetch fact data, so the default value for this property, false, leaves the server default in effect.
UpdateIsolationLevel	R/W	2	An enumeration value that specifies whether the cells in a single UPDATE CUBE are isolated from each other. When the property is set to isolated, the server evaluates each cell update without any consideration for the others, resulting in better performance. This property is a performance hint and MUST be used with care. Specifying the property as isolated when the cells actually overlap can produce incorrect results. This property can have one of the following values: ▪ 1 - Isolated ▪ 2 - Not isolated
MdpropMdxNamedSets	R	15	A bitmask that indicates the type of support for named sets. This property can be a combination of zero or more of the following values: ▪ MDPROPVAL_MNS_BASIC (0x01) – Supports static named sets. ▪ MDPROPVAL_MNS_DYNAMIC (0x02) – Supports dynamic named sets. ▪ MDPROPVAL_MNS_DISPLAYFOLDER (0x04) – Supports specifying a display folder in a named set. ▪ MDPROPVAL_MNS_CAPTION (0x08) – Supports specifying a caption in a named set.
DbpropMsmdSubqueries	R/W	0	An enumeration value that determines the behavior of subqueries. This property can

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Name	Usage	Default	Description
			have one of the following values:<106> ▪ 0 - Calculated members are not restricted by subselects. ▪ 1 - Calculated members are restricted by subselects. This value does not support arbitrary-shaped subselects. ▪ 2 - Calculated members are restricted by subselects. This value supports arbitrary-shaped subselects.
DbpropMsmdAutoExists	R/W	0	Determines the behavior of autoexists. This property can have one of the following values:<107> ▪ 0 - Default value, same as 1. ▪ 1 - Apply deep autoexists for query axes and named sets. Includes WHERE clauses and subselects. ▪ 2 - Apply deep autoexists for query axes and exclude named sets from autoexists. Includes WHERE clauses and subselects. ▪ 3 - Apply no autoexists for named sets with WHERE clause. Apply shallow autoexists for query axes with WHERE clause. Apply deep autoexists for query axes with subselects and named sets with subselects.
MdpropMdxDdlExtensions	R		A bitmask that indicates one or more of the following:<108> ▪ DBPROPVAL_MDX_DDL_CREATECUBE (0x1). Create Cube is supported. ▪ DBPROPVAL_MDX_DDL_INSERTINTO (0x2). InsertInto is supported. ▪ DBPROPVAL_MDX_DDL_REFRESHCUBE (0x4). Refresh Cube is supported. ▪ DBPROPVAL_MDX_DLL_CREATESESSIONCUBE (0x8). Create Session is supported. ▪ DBPROPVAL_MDX_DLL_CREATEGLOBALCUBE (0x10). Create Global Cube is supported.

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Name	Usage	Default	Description
ResponseEncoding	R/W	"Default"	Specifies the character encoding to use for the server response to a client request.
MemoryLockingMode	R		The server is able to achieve higher performance if it locks memory. However, users may not have permissions to lock memory. In this case, the server executes in a lower-performance, non-locking, mode. This integer indicates which mode is active: ▪ 0 – Low performance (non-locking) ▪ 1 – High performance (locking)
DbPropMsmdOptimizeResponse	R/W	0	▪ A bitmask that indicates which of the following query response optimizations are enabled. ▪ (0x01) – AXIS_NORMALIZATION – Use the **msxmla:NormTupleSet** complex type specified in section 2.2.4.1.1.2.1.1.5.1. ▪ (0x02) – EMPTYSLICERAXIS – The slicer axis in query responses does not contain information.

3.1.4.2.2.1.3 Discover Request Types

One section follows for each of the enumerated request types. The title of each section is the name of the request type. Each section describes the request, specifies the restrictions, and specifies the columns in the rowset that is returned by the server.

Restrictions allow clients to filter **Discover** responses to only those that match the restriction. The client is responsible for ensuring restrictions are valid. For the columns that can be restricted on, only a single restriction is supported.

Restrictions MAY apply unless specifically stated otherwise in the description for a specific **Discover** request type. If any restrictions have default values, they will be explained for the specific **Discover** request type. Except where otherwise indicated, all columns that are listed in the following sections MUST be in the returned rowset.

3.1.4.2.2.1.3.1 DBSCHEMA_CATALOGS

This schema rowset describes the catalogs that are accessible on the server.

3.1.4.2.2.1.3.1.1 Columns

The **DBSCHEMA_CATALOGS** rowset contains the following columns.

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Name	Type	Restrictions	Description
CATALOG_NAME	xsd:string	Yes	The catalog name.
DESCRIPTION	xsd:string		The catalog description.
ROLES	xsd:string		A comma-delimited list of roles to which the current user belongs.<109>
DATE_MODIFIED	xsd:dateTime		The date that the catalog was last modified.

The rowset is sorted on **CATALOG_NAME**.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="CATALOG_NAME" name="CATALOG_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="ROLES" name="ROLES" type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="DATE_MODIFIED" name="DATE_MODIFIED" type="xsd:dateTime"
minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.2 DBSCHEMA_TABLES

This schema rowset returns dimensions, measure groups, or schema rowsets exposed as tables.

3.1.4.2.2.1.3.2.1 Columns

The **DBSCHEMA_TABLES** rowset contains the following columns.

Name	Type	Restrictions	Description
TABLE_CATALOG	xsd:string	Yes	The name of the database.
TABLE_SCHEMA	xsd:string	Yes	The name of the schema.
TABLE_NAME	xsd:string	Yes	The name of the table.
TABLE_TYPE	xsd:string	Yes	The type of table: TABLE for Measure Group. SYSTEM TABLE for Dimension. SCHEMA for schema rowset table.

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Name	Type	Restrictions	Description
TABLE_GUID	uuid		The GUID of the table.
DESCRIPTION	xsd:string		A description of the object.
TABLE_PROPID	xsd:string		The ID of the table.
DATE_CREATED	xsd:dateTime		The date the table was created.
DATE_MODIFIED	xsd:dateTime		The date the table was last modified.
TABLE_OLAP_TYPE	xsd:string	Yes	The OLAP type of the table. Possible values can be one of the following: MEASURE_GROUP for Measure Group CUBE_DIMENSION for Cube Dimension SCHEMA for a schema rowset table

The rowset is sorted on TABLE_TYPE, TABLE_CATALOG, TABLE_SCHEMA, and TABLE_NAME.

The response has the following definition.

```
      <xsd:element name="root">
         <xsd:complexType>
           <xsd:sequence minOccurs="0" maxOccurs="unbounded">
             <xsd:element name="row" type="row" />
           </xsd:sequence>
         </xsd:complexType>
       </xsd:element>
       <xsd:simpleType name="uuid">
         <xsd:restriction base="xsd:string">
           <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-
9a-zA-Z]{12}" />
         </xsd:restriction>
       </xsd:simpleType>
       <xsd:complexType name="row">
         <xsd:sequence>
           <xsd:element sql:field="TABLE_CATALOG" name="TABLE_CATALOG" type="xsd:string"
minOccurs="0" />
           <xsd:element sql:field="TABLE_SCHEMA" name="TABLE_SCHEMA" type="xsd:string"
minOccurs="0" />
           <xsd:element sql:field="TABLE_NAME" name="TABLE_NAME" type="xsd:string"
minOccurs="0" />
           <xsd:element sql:field="TABLE_TYPE" name="TABLE_TYPE" type="xsd:string"
minOccurs="0" />
           <xsd:element sql:field="TABLE_GUID" name="TABLE_GUID" type="uuid" minOccurs="0" />
           <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string"
minOccurs="0" />
           <xsd:element sql:field="TABLE_PROPID" name="TABLE_PROPID" type="xsd:unsignedInt"
minOccurs="0" />
           <xsd:element sql:field="DATE_CREATED" name="DATE_CREATED" type="xsd:dateTime"
minOccurs="0" />
           <xsd:element sql:field="DATE_MODIFIED" name="DATE_MODIFIED" type="xsd:dateTime"
minOccurs="0" />
           <xsd:element sql:field="TABLE_OLAP_TYPE" name="TABLE_OLAP_TYPE" type="xsd:string"
minOccurs="0" />
         </xsd:sequence>
       </xsd:complexType>
```


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3.1.4.2.2.1.3.3 DBSCHEMA_COLUMNS

This schema rowset returns a row for each measure, each cube dimension attribute, and each schema rowset column, exposed as a column.

3.1.4.2.2.1.3.3.1 Columns

The **DBSCHEMA_COLUMNS** rowset contains the following columns.

Name	Type	Restrictions	Description
TABLE_CATALOG	xsd:string	Yes	The name of the database.
TABLE_SCHEMA	xsd:string	Yes	The name of the table schema.
TABLE_NAME	xsd:string	Yes	The name of the table.
COLUMN_NAME	xsd:string	Yes	The name of the attribute hierarchy or measure.
COLUMN_GUID	uuid		The GUID of the column.
COLUMN_PROPID	xsd:string		The property ID of the column.
ORDINAL_POSITION	xsd:string		The column order for each constraint.
COLUMN_HASDEFAULT	xsd:boolean		Indicates whether the column has a default. If true, the column has a default. If false, the column does not have a default.<110>
COLUMN_DEFAULT	xsd:string		The default value of the column.<111>
COLUMN_FLAGS	xsd:unsignedint		A bitmask that indicates column properties. 0x1 - DBCOLUMNFLAGS_ISBOOKMARK – Set if the column is a bookmark. 0x2 - DBCOLUMNFLAGS_MAYDEFER – Set if the column is deferred. 0x4 - DBCOLUMNFLAGS_WRITE – Set if the OLEDB interface IRowsetChange:SetData can be called. 0x8 - DBCOLUMNFLAGS_WRITEUNKNOWN – Set if the column can be updated through some means, but the means is unknown. 0x10 - DBCOLUMNFLAGS_ISFIXEDLENGTH

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Name	Type	Restrictions	Description
			– Set if all data in the column has the same length. 0x20 - DBCOLUMNFLAGS_ISNULLABLE – Set if consumer can set the column to NULL or if the provider cannot determine if the column can be set to NULL. 0x40 - DBCOLUMNFLAGS_MAYBENULL – Set if the column can contain NULL values, or if the provider cannot guarantee that the column cannot contain NULL values. 0x80 - DBCOLUMNFLAGS_ISLONG – Set if the column contains a BLOB that contains very long data. 0x100 - DBCOLUMNFLAGS_ISROWID – Set if the column contains a persistent row identifier that cannot be written to and has no meaningful value except to identify the row. 0x200 - DBCOLUMNFLAGS_ISROWVER – Set if the column contains a timestamp or other versioning mechanism that cannot be written to directly and that is automatically updated to a new increasing value when the row is updated or committed. 0x1000 - DBCOLUMNFLAGS_CACHEDEFERRED – Set if when a deferred column is first read its value the column is cached by the provider.
IS_NULLABLE	xsd:boolean		Indicates whether the column is nullable.<112> If true, indicates that the column is nullable. Otherwise, false.
DATA_TYPE	xsd:string		The data type of the column. Returns a string for dimension columns and a variant for measures.
TYPE_GUID	uuid		The GUID of the column's data type.
CHARACTER_MAXIMUM_LENGTH	xsd:unsignedint		The maximum possible length of a value in the column, expressed as the number of wide characters.
CHARACTER_OCTET_LENGTH	xsd:unsignedint		The maximum length in octets

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Name	Type	Restrictions	Description
			(bytes) of the column, if the type of the column is character or binary. A value of zero means that the column has no maximum length. NULL for all other types of columns.
NUMERIC_PRECISION	xsd:unsignedShort		The maximum precision of the column if the column's data type is of a numeric data type other than DBTYPE_VARNUMERIC.
NUMERIC_SCALE	xsd:short		The number of digits to the right of the decimal point if the column's type indicator is DBTYPE_DECIMAL, DBTYPE_NUMERIC, or DBTYPE_VARNUMERIC. Otherwise, this is NULL.<113>
DATETIME_PRECISION	xsd:unsignedInt		The date/time precision (number of digits in the fractional seconds portion) of the column if the column is a **DateTime** or **Interval** type.
CHARACTER_SET_CATALOG	xsd:string		The catalog name. NULL if the provider does not support catalogs.
CHARACTER_SET_SCHEMA	xsd:string		The unqualified schema name. NULL if the provider does not support schemas.<114>
CHARACTER_SET_NAME	xsd:string		The character set name.
COLLATION_CATALOG	xsd:string		The catalog name in which the collation is defined. NULL if the provider does not support catalogs or different collations.
COLLATION_SCHEMA	xsd:string		The unqualified schema name in which the collation is defined. NULL if the provider does not support schemas or different collations.
COLLATION_NAME	xsd:string		The collation name. NULL if the server does not support different collations.
DOMAIN_CATALOG	xsd:string		The catalog name in which the domain is defined. NULL if the server does not support catalogs or domains.
DOMAIN_SCHEMA	xsd:string		The unqualified schema name in which the domain is defined. NULL if the server does not support schemas or domains.
DOMAIN_NAME	xsd:string		The domain name. NULL if the

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Name	Type	Restrictions	Description
			server does not support domains.
DESCRIPTION	xsd:string		The human-readable description of the column. For example, the description for a column that is named Name in the Employee table might be "Employee name." NULL if this column is not supported by the server, or if there is no description associated with the column.
COLUMN_OLAP_TYPE	xsd:string	Yes	The OLAP type of the object. MEASURE indicates that the object is a measure. ATTRIBUTE indicates that the object is a dimension attribute. SCHEMA indicates that the object is a column in a schema rowset table.

The rowset is sorted on TABLE_CATALOG, TABLE_SCHEMA and, TABLE_NAME.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:simpleType name="uuid">
        <xsd:restriction base="xsd:string">
          <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-
9a-zA-Z]{12}" />
        </xsd:restriction>
      </xsd:simpleType>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="TABLE_CATALOG" name="TABLE_CATALOG" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="TABLE_SCHEMA" name="TABLE_SCHEMA" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="TABLE_NAME" name="TABLE_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="COLUMN_NAME" name="COLUMN_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="COLUMN_GUID" name="COLUMN_GUID" type="uuid" minOccurs="0"
/>
          <xsd:element sql:field="COLUMN_PROPID" name="COLUMN_PROPID" type="xsd:unsignedInt"
minOccurs="0" />
          <xsd:element sql:field="ORDINAL_POSITION" name="ORDINAL_POSITION"
type="xsd:unsignedInt" minOccurs="0" />
          <xsd:element sql:field="COLUMN_HAS_DEFAULT" name="COLUMN_HAS_DEFAULT"
type="xsd:boolean" minOccurs="0" />
          <xsd:element sql:field="COLUMN_DEFAULT" name="COLUMN_DEFAULT" type="xsd:string"
minOccurs="0" />
```


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```
          <xsd:element sql:field="COLUMN_FLAGS" name="COLUMN_FLAGS" type="xsd:unsignedInt"
minOccurs="0" />
          <xsd:element sql:field="IS_NULLABLE" name="IS_NULLABLE" type="xsd:boolean"
minOccurs="0" />
          <xsd:element sql:field="DATA_TYPE" name="DATA_TYPE" type="xsd:unsignedShort"
minOccurs="0" />
          <xsd:element sql:field="TYPE_GUID" name="TYPE_GUID" type="uuid" minOccurs="0" />
          <xsd:element sql:field="CHARACTER_MAXIMUM_LENGTH" name="CHARACTER_MAXIMUM_LENGTH"
type="xsd:unsignedInt" minOccurs="0" />
          <xsd:element sql:field="CHARACTER_OCTET_LENGTH" name="CHARACTER_OCTET_LENGTH"
type="xsd:unsignedInt" minOccurs="0" />
          <xsd:element sql:field="NUMERIC_PRECISION" name="NUMERIC_PRECISION"
type="xsd:unsignedShort" minOccurs="0" />
          <xsd:element sql:field="NUMERIC_SCALE" name="NUMERIC_SCALE" type="xsd:short"
minOccurs="0" />
          <xsd:element sql:field="DATETIME_PRECISION" name="DATETIME_PRECISION"
type="xsd:unsignedInt" minOccurs="0" />
          <xsd:element sql:field="CHARACTER_SET_CATALOG" name="CHARACTER_SET_CATALOG"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="CHARACTER_SET_SCHEMA" name="CHARACTER_SET_SCHEMA"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="CHARACTER_SET_NAME" name="CHARACTER_SET_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="COLLATION_CATALOG" name="COLLATION_CATALOG"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="COLLATION_SCHEMA" name="COLLATION_SCHEMA" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="COLLATION_NAME" name="COLLATION_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="DOMAIN_CATALOG" name="DOMAIN_CATALOG" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="DOMAIN_SCHEMA" name="DOMAIN_SCHEMA" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="DOMAIN_NAME" name="DOMAIN_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="COLUMN_OLAP_TYPE" name="COLUMN_OLAP_TYPE" type="xsd:string"
minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.4 DBSCHEMA_PROVIDER_TYPES

This schema rowset identifies the (base) data types supported by the server.

3.1.4.2.2.1.3.4.1 Columns

The **DBSCHEMA_PROVIDER_TYPES** rowset contains the following columns.

Name	Type	Restrictions	Description
TYPE_NAME	xsd:string		The server-specific data type name.<115>
DATA_TYPE	xsd:unsignedShort	Yes	This enumeration is the same as **LEVEL_DBTYPE** for **MDSCHEMA_LEVELS**. (See section

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Name	Type	Restrictions	Description
			3.1.4.2.2.1.3.8)
COLUMN_SIZE	xsd:unsignedInt		The length of a non-numeric column or parameter that refers to either the maximum or the length defined for this type by the server. For character data, this is the maximum or defined length in characters. For **DateTime** data types, this is the length of the string representation (assuming the maximum allowed precision of the fractional second component). If the data type is numeric, this is the upper bound on the maximum precision of the data type.
LITERAL_PREFIX	xsd:string		The character or characters used to prefix a literal of this type in a text command.
LITERAL_SUFFIX	xsd:string		The character or characters used to suffix a literal of this type in a text command.
CREATE_PARAMS	xsd:string		The creation parameters specified by the consumer when creating a column of this data type. For example, the **SQL DECIMAL** data type needs a precision and a scale. In this case, the creation parameters might be the string "precision,scale". In a text command to create a DECIMAL column with a precision of 10 and a scale of 2, the value of the TYPE_NAME column might be DECIMAL(), and the complete type specification would be DECIMAL(10,2). The creation parameters appear as a comma-separated list of values, in the order they are to be supplied and with no surrounding parentheses. If a creation parameter is length, maximum length, precision, scale, seed, or increment, use "length", "max length", "precision", "scale", "seed", and "increment", respectively. If the creation parameter is some other value, the server determines what text is to be used to describe the creation parameter. If the data type requires creation parameters, "()" usually appears in the type name. This indicates the position at which to insert the creation parameters. If the type name does not include "()", the creation parameters are enclosed in parentheses and appended to the data type name.
IS_NULLABLE	xsd:boolean		A Boolean that indicates whether the

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Name	Type	Restrictions	Description
			data type is nullable. ▪ True indicates that the data type is nullable. ▪ False indicates that the data type is not nullable. NULL indicates that it is not known whether the data type is nullable.<116>
CASE_SENSITIVE	xsd:boolean		A Boolean that indicates whether the data type is a character type and case-sensitive. ▪ True indicates that the data type is a character type and is case-sensitive. ▪ False indicates that the data type is not case-sensitive. ▪ NULL indicates that the data type is not a character type.
SEARCHABLE	xsd:unsignedInt		An integer indicating how the data type can be used in searches if the server supports ICommandText; otherwise, NULL. If the server supports ICommandText, then this column can have the following values: ▪ DB_UNSEARCHABLE (0x01) - indicates that the data type cannot be used in a WHERE clause. ▪ DB_LIKE_ONLY (0x02) - indicates that the data type can be used in a WHERE clause only with the LIKE predicate. ▪ DB_ALL_EXCEPT_LIKE (0x03) - indicates that the data type can be used in a WHERE clause with all comparison operators except LIKE. ▪ DB_SEARCHABLE (0x04) - indicates that the data type can be used in a WHERE clause with any comparison operator.<117>
UNSIGNED_ATTRIBUTE	xsd:boolean		A Boolean that indicates whether the data type is unsigned. ▪ True indicates that the data type is unsigned. ▪ False indicates that the data type is

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Name	Type	Restrictions	Description
			signed. ▪ NULL indicates that this is not applicable to the data type.
FIXED_PREC_SCALE	xsd:boolean		A Boolean that indicates whether the data type has a fixed precision and scale. ▪ True indicates that the data type has a fixed precision and scale. ▪ False indicates that the data type does not have a fixed precision and scale.<118>
AUTO_UNIQUE_VALUE	xsd:boolean		A Boolean that indicates whether the data type can be autoincrementing. ▪ True indicates that values of this type can be autoincrementing. ▪ False indicates that values of this type cannot be autoincrementing. ▪ If this value is true, the server's DBPROP_COL_AUTOINCREMENT column property determines whether a column of this type is always autoincrementing. If the DBPROP_COL_AUTOINCREMENT property is read/write, the setting of the DBPROP_COL_AUTOINCREMENT property determines whether a column of this type is autoincrementing. If DBPROP_COL_AUTOINCREMENT is a read-only property, either all or none of the columns of this type are autoincrementing.<119>
LOCAL_TYPE_NAME	xsd:string		The localized version of TYPE_NAME. NULL is returned if a localized name is not supported by the server.
MINIMUM_SCALE	xds:short		If the type indicator is DBTYPE_VARNUMERIC, DBTYPE_DECIMAL, or DBTYPE_NUMERIC, this column specifies the minimum number of digits allowed to the right of the decimal point. Otherwise, it is NULL.
MAXIMUM_SCALE	xds:short		If the type indicator is DBTYPE_VARNUMERIC, DBTYPE_DECIMAL, or DBTYPE_NUMERIC, this column specifies the maximum number of digits allowed to the right of the decimal point. Otherwise, it is NULL.

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Name	Type	Restrictions	Description
GUID	uuid		(Reserved for future use.) The GUID of the type, if the type is described in a type library. Otherwise, it is NULL.
TYPELIB	xsd:string		The type library that contains the description of the type, if the type is described in a type library. Otherwise, it is NULL.
VERSION	xsd:string		The version of the type definition. Servers might request to create different versions of type definitions. Different servers might use different versioning schemes, such as a timestamp or a number (**Integer** or **Float**). NULL if not supported.
IS_LONG	xsd:boolean		A Boolean that indicates whether the data type is a binary large object (BLOB) and has very long data. ▪ True indicates that the data type is a BLOB that contains very long data; the definition of very long data is server-specific.<120> ▪ False indicates that the data type is a BLOB that does not contain very long data or that is not a BLOB. This column value determines the setting of the DBCOLUMNFLAGS_ISLONG flag that is returned by **GetColumnInfo** in **IColumnsInfo** and the setting of the DBCOLUMNFLAGS_ISLONG flag that is returned by **GetParameterInfo** in **ICommandWithParameters**.
BEST_MATCH	xsd:boolean	Yes	A Boolean that indicates whether the data type is the best match. A value of true indicates that the data type is the best match between all data types in the data store and the OLE DB data type that is indicated by the value in the DATA_TYPE column. For more information, see [MSDN-OLEDB]. A value of false indicates that the data type is not the best match. For each set of rows in which the value of the DATA_TYPE column is the same, the BEST_MATCH column is set to true in only one row.<121>
IS_FIXEDLENGTH	xsd:boolean		A Boolean that indicates whether the column is fixed in length.

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Name	Type	Restrictions	Description
			A value of true indicates that columns of this type that are created by the **data definition language (DDL)** will be of fixed length. A value of false indicates that columns of this type that are created by the DDL will be of variable length. If the field is NULL, it is not known whether the server will map this field with a fixed-length or variable-length column.<122>

The rowset is sorted on DATA_TYPE.

The response has the following definition.

```
      <xsd:element name="root">
         <xsd:complexType>
           <xsd:sequence minOccurs="0" maxOccurs="unbounded">
             <xsd:element name="row" type="row" />
           </xsd:sequence>
         </xsd:complexType>
       </xsd:element>
       <xsd:simpleType name="uuid">
         <xsd:restriction base="xsd:string">
           <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-
9a-zA-Z]{12}" />
         </xsd:restriction>
       </xsd:simpleType>
       <xsd:complexType name="row">
         <xsd:sequence>
           <xsd:element sql:field="TYPE_NAME" name="TYPE_NAME" type="xsd:string" minOccurs="0"
/>
           <xsd:element sql:field="DATA_TYPE" name="DATA_TYPE" type="xsd:unsignedShort"
minOccurs="0" />
           <xsd:element sql:field="COLUMN_SIZE" name="COLUMN_SIZE" type="xsd:unsignedInt"
minOccurs="0" />
           <xsd:element sql:field="LITERAL_PREFIX" name="LITERAL_PREFIX" type="xsd:string"
minOccurs="0" />
           <xsd:element sql:field="LITERAL_SUFFIX" name="LITERAL_SUFFIX" type="xsd:string"
minOccurs="0" />
           <xsd:element sql:field="CREATE_PARAMS" name="CREATE_PARAMS" type="xsd:string"
minOccurs="0" />
           <xsd:element sql:field="IS_NULLABLE" name="IS_NULLABLE" type="xsd:boolean"
minOccurs="0" />
           <xsd:element sql:field="CASE_SENSITIVE" name="CASE_SENSITIVE" type="xsd:boolean"
minOccurs="0" />
           <xsd:element sql:field="SEARCHABLE" name="SEARCHABLE" type="xsd:unsignedInt"
minOccurs="0" />
           <xsd:element sql:field="UNSIGNED_ATTRIBUTE" name="UNSIGNED_ATTRIBUTE"
type="xsd:boolean" minOccurs="0" />
           <xsd:element sql:field="FIXED_PREC_SCALE" name="FIXED_PREC_SCALE"
type="xsd:boolean" minOccurs="0" />
           <xsd:element sql:field="AUTO_UNIQUE_VALUE" name="AUTO_UNIQUE_VALUE"
type="xsd:boolean" minOccurs="0" />
           <xsd:element sql:field="LOCAL_TYPE_NAME" name="LOCAL_TYPE_NAME" type="xsd:string"
minOccurs="0" />
```


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```
          <xsd:element sql:field="MINIMUM_SCALE" name="MINIMUM_SCALE" type="xsd:short"
minOccurs="0" />
          <xsd:element sql:field="MAXIMUM_SCALE" name="MAXIMUM_SCALE" type="xsd:short"
minOccurs="0" />
          <xsd:element sql:field="GUID" name="GUID" type="uuid" minOccurs="0" />
          <xsd:element sql:field="TYPELIB" name="TYPELIB" type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="VERSION" name="VERSION" type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="IS_LONG" name="IS_LONG" type="xsd:boolean" minOccurs="0" />
          <xsd:element sql:field="BEST_MATCH" name="BEST_MATCH" type="xsd:boolean"
minOccurs="0" />
          <xsd:element sql:field="IS_FIXEDLENGTH" name="IS_FIXEDLENGTH" type="xsd:boolean"
minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.5 MDSCHEMA_CUBES RequestType

This schema rowset describes the structure of cubes within a database.

3.1.4.2.2.1.3.5.1 Columns

The **MDSCHEMA_CUBES** rowset contains the following columns.

Name	Type	Restrictions	Description
CATALOG_NAME	xsd:string	Yes	The catalog name.
SCHEMA_NAME	xsd:string	Yes	The name of the schema.<123>
CUBE_NAME	xsd:string	Yes	The name of the cube.
CUBE_TYPE	xsd:string		The type of the cube. Valid values are: ▪ CUBE ▪ DIMENSION
CUBE_GUID	uuid		The GUID of the cube.
CREATED_ON	xsd:dateTime		The date and time the cube was created.<124>
LAST_SCHEMA_UPDATE	xsd:dateTime		The date and time that the cube schema was last updated.<125>
SCHEMA_UPDATED_BY	xsd:string		The name of the user who last updated the cube's schema.<126>
LAST_DATA_UPDATE	xsd:dateTime		The date and time that the cube was last processed.
DATA_UPDATED_BY	xsd:string		The name of the user who last updated the data of the cube.<127>

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Name	Type	Restrictions	Description
LAST_UPDATED_BY	xsd:string		The name of the user who last updated the cube.
DESCRIPTION	xsd:string		A description of the cube.
IS_DRILLTHROUGH_ENABLED	xsd:boolean		When true, indicates that the cube has drillthrough enabled; otherwise false.<128>
IS_LINKABLE	xsd:boolean		When true, indicates that the cube can be used in a linked cube; otherwise false.
IS_WRITE_ENABLED	xsd:boolean		When true, indicates that the cube is write-enabled; otherwise false.
IS_SQL_ENABLED	xsd:boolean		When true, indicates that SQL can be used on the cube; otherwise false.
CUBE_CAPTION	xsd:string		The caption of the cube.
BASE_CUBE_NAME	xsd:string	Yes	The name of the source cube if this cube is a perspective cube.
CUBE_SOURCE	xsd:unsignedShort	Yes	A bitmask with one of these valid values: 0x01-Cube 0x02-Dimension
PREFERRED_QUERY_PATTERNS	xsd:unsignedShort	No	A bitmask<129> that describes query pattern client applications can utilize for higher performance. Valid values are: ▪ 0x00 – Use CrossJoin function to create symmetric sets on an axis. This is the default value for the 0th bit when Analysis Services is running in Traditional mode. ▪ 0x01 – Use DrillDownMember to create a more restrictive, asymmetric axis. This is the default value for the 0th bit when Analysis Services server is running in VertiPaq mode.

The rowset is sorted on CATALOG_NAME, SCHEMA_NAME and CUBE_NAME.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
```


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```
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:simpleType name="uuid">
        <xsd:restriction base="xsd:string">
          <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-
9a-zA-Z]{12}" />
        </xsd:restriction>
      </xsd:simpleType>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="CATALOG_NAME" name="CATALOG_NAME" type="xsd:string" />
          <xsd:element sql:field="SCHEMA_NAME" name="SCHEMA_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="CUBE_TYPE" name="CUBE_TYPE" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="CUBE_GUID" name="CUBE_GUID" type="uuid" minOccurs="0" />
          <xsd:element sql:field="CREATED_ON" name="CREATED_ON" type="xsd:dateTime"
minOccurs="0" />
          <xsd:element sql:field="LAST_SCHEMA_UPDATE" name="LAST_SCHEMA_UPDATE"
type="xsd:dateTime" minOccurs="0" />
          <xsd:element sql:field="SCHEMA_UPDATED_BY" name="SCHEMA_UPDATED_BY"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="LAST_DATA_UPDATE" name="LAST_DATA_UPDATE"
type="xsd:dateTime" minOccurs="0" />
          <xsd:element sql:field="DATA_UPDATED_BY" name="DATA_UPDATED_BY" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="IS_DRILLTHROUGH_ENABLED" name="IS_DRILLTHROUGH_ENABLED"
type="xsd:boolean" minOccurs="0" />
          <xsd:element sql:field="IS_LINKABLE" name="IS_LINKABLE" type="xsd:boolean"
minOccurs="0" />
          <xsd:element sql:field="IS_WRITE_ENABLED" name="IS_WRITE_ENABLED"
type="xsd:boolean" minOccurs="0" />
          <xsd:element sql:field="IS_SQL_ENABLED" name="IS_SQL_ENABLED" type="xsd:boolean"
minOccurs="0" />
          <xsd:element sql:field="CUBE_CAPTION" name="CUBE_CAPTION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="BASE_CUBE_NAME" name="BASE_CUBE_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="CUBE_SOURCE" name="CUBE_SOURCE" type="xsd:unsignedShort"
minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.6 MDSCHEMA_DIMENSIONS

This schema rowset describes the dimensions within a database.

3.1.4.2.2.1.3.6.1 Columns

The **MDSCHEMA_DIMENSIONS** rowset contains the following columns.

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Name	Type	Restrictions	Description
CATALOG_NAME	xsd:string	Yes	The name of the database.
SCHEMA_NAME	xsd:string	Yes	The name of the schema.<130>
CUBE_NAME	xsd:string	Yes	The name of the cube.
DIMENSION_NAME	xsd:string	Yes	The name of the dimension.
DIMENSION_UNIQUE_NAME	xsd:string	Yes	The unique name of the dimension.
DIMENSION_GUID	uuid		The GUID of the dimension.
DIMENSION_CAPTION	xsd:string		The caption of the dimension.
DIMENSION_ORDINAL	xsd:unsignedInt		The position of the dimension within the cube.
DIMENSION_TYPE	xsd:short		The type of the dimension. Valid values are: ▪ 0 - UNKNOWN ▪ 1 - TIME ▪ 2 - MEASURE ▪ 3 - OTHER ▪ 5 - QUANTITATIVE ▪ 6- ACCOUNTS ▪ 7 - CUSTOMERS ▪ 8- PRODUCTS ▪ 9 - SCENARIO ▪ 10- UTILITY ▪ 11 - CURRENCY ▪ 12 - RATES ▪ 13 - CHANNEL ▪ 14 - PROMOTION ▪ 15 - ORGANIZATION ▪ 16 - BILL OF MATERIALS ▪ 17 – GEOGRAPHY
DIMENSION_CARDINALITY	xsd:unsignedInt		The number of members in the key attribute.
DEFAULT_HIERARCHY	xsd:string		The default hierarchy of the

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Name	Type	Restrictions	Description
			dimension.
DESCRIPTION	xsd:string		A description of the dimension.
IS_VIRTUAL	xsd:boolean		When true, indicates that the dimension is virtual; otherwise false.<131>
IS_READWRITE	xsd:boolean		When true, indicates that the dimension is write-enabled; otherwise false.
DIMENSION_UNIQUE_SETTINGS	xsd:int		A bitmask that specifies which columns contain unique values: ▪ 0x00000001 - Member key columns establish uniqueness. ▪ 0x00000002 - Member name columns establish uniqueness.
DIMENSION_MASTER_ NAME	xsd:string		The name of the master dimension.

The rowset is sorted on CATALOG_NAME, CUBE_NAME, and DIMENSION_NAME.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:simpleType name="uuid">
        <xsd:restriction base="xsd:string">
          <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-
9a-zA-Z]{12}" />
        </xsd:restriction>
      </xsd:simpleType>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="CATALOG_NAME" name="CATALOG_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="SCHEMA_NAME" name="SCHEMA_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="DIMENSION_NAME" name="DIMENSION_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="DIMENSION_UNIQUE_NAME" name="DIMENSION_UNIQUE_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="DIMENSION_GUID" name="DIMENSION_GUID" type="uuid"
minOccurs="0" />
          <xsd:element sql:field="DIMENSION_CAPTION" name="DIMENSION_CAPTION"
type="xsd:string" minOccurs="0" />
```


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```
          <xsd:element sql:field="DIMENSION_ORDINAL" name="DIMENSION_ORDINAL"
type="xsd:unsignedInt" minOccurs="0" />
          <xsd:element sql:field="DIMENSION_TYPE" name="DIMENSION_TYPE" type="xsd:short"
minOccurs="0" />
          <xsd:element sql:field="DIMENSION_CARDINALITY" name="DIMENSION_CARDINALITY"
type="xsd:unsignedInt" minOccurs="0" />
          <xsd:element sql:field="DEFAULT_HIERARCHY" name="DEFAULT_HIERARCHY"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="IS_VIRTUAL" name="IS_VIRTUAL" type="xsd:boolean"
minOccurs="0" />
          <xsd:element sql:field="IS_READWRITE" name="IS_READWRITE" type="xsd:boolean"
minOccurs="0" />
          <xsd:element sql:field="DIMENSION_UNIQUE_SETTINGS" name="DIMENSION_UNIQUE_SETTINGS"
type="xsd:int" minOccurs="0" />
          <xsd:element sql:field="DIMENSION_MASTER_NAME" name="DIMENSION_MASTER_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="DIMENSION_IS_VISIBLE" name="DIMENSION_IS_VISIBLE"
type="xsd:boolean" minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.6.2 Additional Restrictions

In addition to the column restrictions indicated in the previous section, the following restrictions MAY apply to this rowset.

Name	Type	Description
CUBE_SOURCE	xsd:unsignedShort	A bitmask with one of these valid values: ▪ 0x01 - Cube ▪ 0x02 - Dimension The default restriction is a value of 1.
DIMENSION_VISIBILITY	xsd:unsignedShort	A bitmask with one of these valid values: ▪ 0x01 - Visible ▪ 0x02 - Not Visible The default restriction is a value of 1.

3.1.4.2.2.1.3.7 MDSCHEMA_HIERARCHIES

This schema rowset describes each hierarchy within a particular dimension.

3.1.4.2.2.1.3.7.1 Columns

The **MDSCHEMA_HIERARCHIES** rowset contains the following columns.

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Name	Type	Restrictions	Description
CATALOG_NAME	xsd:string	Yes	The name of the database.
SCHEMA_NAME	xsd:string	Yes	The name of the schema.<132>
CUBE_NAME	xsd:string	Yes	The name of the cube.
DIMENSION_UNIQUE_NAME	xsd:string	Yes	The unique name of the dimension.<133>
HIERARCHY_NAME	xsd:string	Yes	The name of the hierarchy. This column MAY be blank if there is only a single hierarchy in the dimension.<134>
HIERARCHY_UNIQUE_NAME	xsd:string	Yes	The unique name of the hierarchy.
HIERARCHY_GUID	uuid		The GUID of the hierarchy.
HIERARCHY_CAPTION	xsd:string		The caption of the hierarchy.
DIMENSION_TYPE	xsd:short		The type of the dimension. ▪ 0 - UNKNOWN ▪ 1 - TIME ▪ 2 - MEASURE ▪ 3 - OTHER ▪ 5 - QUANTITATIVE ▪ 6 - ACCOUNTS ▪ 7 - CUSTOMERS ▪ 8 - PRODUCTS ▪ 9 - SCENARIO ▪ 10 - UTILITY ▪ 11 - CURRENCY ▪ 12 - RATES ▪ 13 - CHANNEL ▪ 14 - PROMOTION ▪ 15 - ORGANIZATION ▪ 16 - BILL_OF_MATERIALS

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Name	Type	Restrictions	Description
			▪ 17 - GEOGRAPHY
HIERARCHY_CARDINALITY	xsd:unsignedInt		The number of members in the hierarchy.
DEFAULT_MEMBER	xsd:string		The default member for this hierarchy.
ALL_MEMBER	xsd:string		The member name at the highest level of the hierarchy.
DESCRIPTION	xsd:string		A description of the hierarchy.
STRUCTURE	xsd:short		The structure of the hierarchy. Valid values are defined in the following table. ▪ 0 - Hierarchy is a fully balanced structure. ▪ 1 - Hierarchy is a ragged balanced structure. ▪ 2 - Hierarchy is an unbalanced structure. ▪ 3 - Hierarchy is a network structure. For more information, see the definitions for **balanced hierarchy** and **unbalanced hierarchy** in section 1.1.
IS_VIRTUAL	xsd:boolean		When true, indicates that the hierarchy is a virtual hierarchy; otherwise false.<135>
IS_READWRITE	xsd:boolean		When true, indicates that write back to the hierarchy is enabled; otherwise false.<136>
DIMENSION_UNIQUE_SETTINGS	xsd:int		A list of values that specifies which columns contain unique values:<137> ▪ 0x00000001 - Member key columns establish uniqueness.

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Name	Type	Restrictions	Description
			▪ 0x00000002 - Member name columns establish uniqueness.
DIMENSION_MASTER_UNIQUE_NAME	xsd:string		The unique name of the master dimension.<138>
DIMENSION_IS_VISIBLE	xsd:boolean		When true, indicates that the dimension is visible; otherwise false.<139>
HIERARCHY_ORDINAL	xsd:unsignedInt		The ordinal number of the hierarchy across all hierarchies of the dimension.
DIMENSION_IS_SHARED	xsd:boolean		When true, indicates that the dimension is shared; otherwise false.<140>
HIERARCHY_IS_VISIBLE	xsd:boolean		When true, indicates that the hierarchy is visible; otherwise false.
HIERARCHY_ORIGIN	xsd:unsignedShort	Yes	A bitmask that determines the source of the hierarchy. ▪ 0x0001 - Identifies user-defined hierarchies. ▪ 0x0002 - Identifies attribute hierarchies. ▪ 0x0004 - Identifies key attribute hierarchies. ▪ 0x0008 - Identifies attributes with no attribute hierarchies. ▪ 0x0003 - The default restriction value.
HIERARCHY_DISPLAY_FOLDER	xsd:string		Display folder for the hierarchy.
INSTANCE_SELECTION	xsd:unsignedShort		A list of values that provides a hint to the client application about how to display the hierarchy values. Valid values include the following: ▪ 0 - NONE (No hint is suggested.)

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Name	Type	Restrictions	Description
			▪ 1 - DROPDOWN type of display is suggested. ▪ 2 - LIST type of display is suggested. ▪ 3 - FILTERED LIST type of display is suggested ▪ 4 - MANDATORY FILTER type of display is suggested

The rowset is sorted on CATALOG_NAME, CUBE_NAME, DIMENSION_UNIQUE_NAME, and HIERARCHY_NAME.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:simpleType name="uuid">
        <xsd:restriction base="xsd:string">
          <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-
9a-zA-Z]{12}" />
        </xsd:restriction>
      </xsd:simpleType>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="CATALOG_NAME" name="CATALOG_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="SCHEMA_NAME" name="SCHEMA_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="DIMENSION_UNIQUE_NAME" name="DIMENSION_UNIQUE_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="HIERARCHY_NAME" name="HIERARCHY_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="HIERARCHY_UNIQUE_NAME" name="HIERARCHY_UNIQUE_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="HIERARCHY_GUID" name="HIERARCHY_GUID" type="uuid"
minOccurs="0" />
          <xsd:element sql:field="HIERARCHY_CAPTION" name="HIERARCHY_CAPTION"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="DIMENSION_TYPE" name="DIMENSION_TYPE" type="xsd:short"
minOccurs="0" />
          <xsd:element sql:field="HIERARCHY_CARDINALITY" name="HIERARCHY_CARDINALITY"
type="xsd:unsignedInt" minOccurs="0" />
          <xsd:element sql:field="DEFAULT_MEMBER" name="DEFAULT_MEMBER" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="ALL_MEMBER" name="ALL_MEMBER" type="xsd:string"
minOccurs="0" />
```


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```
          <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="STRUCTURE" name="STRUCTURE" type="xsd:short" minOccurs="0"
/>
          <xsd:element sql:field="IS_VIRTUAL" name="IS_VIRTUAL" type="xsd:boolean"
minOccurs="0" />
          <xsd:element sql:field="IS_READWRITE" name="IS_READWRITE" type="xsd:boolean"
minOccurs="0" />
          <xsd:element sql:field="DIMENSION_UNIQUE_SETTINGS" name="DIMENSION_UNIQUE_SETTINGS"
type="xsd:int" minOccurs="0" />
          <xsd:element sql:field="DIMENSION_MASTER_UNIQUE_NAME"
name="DIMENSION_MASTER_UNIQUE_NAME" type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="DIMENSION_IS_VISIBLE" name="DIMENSION_IS_VISIBLE"
type="xsd:boolean" minOccurs="0" />
          <xsd:element sql:field="HIERARCHY_ORDINAL" name="HIERARCHY_ORDINAL"
type="xsd:unsignedInt" minOccurs="0" />
          <xsd:element sql:field="DIMENSION_IS_SHARED" name="DIMENSION_IS_SHARED"
type="xsd:boolean" minOccurs="0" />
          <xsd:element sql:field="HIERARCHY_IS_VISIBLE" name="HIERARCHY_IS_VISIBLE"
type="xsd:boolean" minOccurs="0" />
          <xsd:element sql:field="HIERARCHY_ORIGIN" name="HIERARCHY_ORIGIN"
type="xsd:unsignedShort" minOccurs="0" />
          <xsd:element sql:field="HIERARCHY_DISPLAY_FOLDER" name="HIERARCHY_DISPLAY_FOLDER"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="INSTANCE_SELECTION" name="INSTANCE_SELECTION"
type="xsd:unsignedShort" minOccurs="0" />
          <xsd:element sql:field="GROUPING_BEHAVIOR" name="GROUPING_BEHAVIOR"
type="xsd:unsignedShort" minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.7.2 Additional Restrictions

In addition to the column restrictions indicated in the previous section, the following restrictions MAY apply to this rowset.

Name	Type	Description
CUBE_SOURCE	xsd:unsignedShort	A bitmask with one of these valid values: ▪ 0x01 - Cube ▪ 0x02 - Dimension The default restriction is a value of 1.
HIERARCHY_VISIBILITY	xsd:unsignedShort	A bitmask with one of these valid values: ▪ 0x01 - Visible ▪ 0x02 - Not Visible The default restriction is a value of 1.

3.1.4.2.2.1.3.8 MDSCHEMA_LEVELS

This schema rowset describes each level within a particular hierarchy.

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3.1.4.2.2.1.3.8.1 Columns

The **MDSCHEMA_LEVELS** rowset contains the following columns.

Name	Type	Restrictions	Description
CATALOG_NAME	xsd:string	Yes	The name of the database.
SCHEMA_NAME	xsd:string	Yes	The name of the schema.<141>
CUBE_NAME	xsd:string	Yes	The name of the cube.
DIMENSION_UNIQUE_NAME	xsd:string	Yes	The unique name of the dimension.<142>
HIERARCHY_UNIQUE_NAME	xsd:string	Yes	The unique name of the hierarchy.
LEVEL_NAME	xsd:string	Yes	The name of the level.
LEVEL_UNIQUE_NAME	xsd:string	Yes	The unique name of the level.
LEVEL_GUID	uuid		The GUID of the level.
LEVEL_CAPTION	xsd:string		The caption of the hierarchy.<143>
LEVEL_NUMBER	xsd:unsignedInt		The level number in the hierarchy. Top level is zero (0).
LEVEL_CARDINALITY	xsd:unsignedInt		The number of members in the level.
LEVEL_TYPE	xsd:int		The type of the level from a list of possible values. ▪ 0x2001 - Geography continent ▪ 0x2002 - Geography region ▪ 0x2003 - Geography country ▪ 0x2004 - Geography state or province ▪ 0x2005 - Geography county ▪ 0x2006 - Geography city ▪ 0x2007 - Geography

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Name	Type	Restrictions	Description
			postalcode ▪ 0x2008 - Geography point ▪ 0x1011 - Organization unit ▪ 0x1012 - Bill of materials resource ▪ 0x1013 - Quantitative ▪ 0x1014 - Account ▪ 0x1021 - Customer ▪ 0x1022 - Customer group ▪ 0x1023 - Customer household ▪ 0x1031 - Product ▪ 0x1032 - Product group ▪ 0x1015 - Scenario ▪ 0x1016 - Utility ▪ 0x1041 - Person ▪ 0x1042 - Company ▪ 0x1051 - Currency source ▪ 0x1052 - Currency destination ▪ 0x1061 - Channel ▪ 0x1062 - Representative ▪ 0x1071 - Promotion
DESCRIPTION	xsd:string		A description of the level.
CUSTOM_ROLLUP_SETTINGS	xsd:int		A bitmask that specifies the custom rollup options: ▪ 0x01 - Indicates that a custom rollup

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Name	Type	Restrictions	Description
			expression exists for this level. ▪ 0x02 - Indicates that members of this level have custom rollup expressions. ▪ 0x04 - Indicates that there is a skipped level associated with members of this level. ▪ 0x08 - Indicates that members of this level have custom member properties. ▪ 0x10 - Indicates that members on this level have unary operators.
LEVEL_UNIQUE_SETTINGS	xsd:int		A bitmask that specifies which columns contain unique values, if the level only has members with unique names or keys: ▪ 0x00000001 - Member key columns establish uniqueness. ▪ 0x00000002 - Member name columns establish uniqueness.
LEVEL_IS_VISIBLE	xsd:boolean		When true, indicates that the level is visible; otherwise false.
LEVEL_ORDERING_PROPERTY	xsd:string		The name of the attribute on which the level is sorted.
LEVEL_DBTYPE	xsd:int		The type of the member key column that is used for the level attribute. It MUST be null if concatenated keys are used as the member key column. Type values are

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Name	Type	Restrictions	Description
			described in the following list: ▪ 0 – (DBTYPE_EMPTY) Indicates that no value was specified. ▪ 2 – (DBTYPE_I2) Indicates a two-byte signed integer. ▪ 3 – (DBTYPE_I4) Indicates a four-byte signed integer. ▪ 4 – (DBTYPE_R4) Indicates a single-precision floating-point value. ▪ 5 – (DBTYPE_R8) Indicates a double-precision floating-point value. ▪ 6 – (DBTYPE_CY) Indicates a currency value. Currency is a fixed-point number with four digits to the right of the decimal point and is stored in an eight-byte signed integer scaled by 10,000. ▪ 7 – (DBTYPE_DATE) Indicates a date value. Date values are stored as **Double**, the whole part of which is the number of days since December 30, 1899, and the fractional part of which is the fraction of a day. ▪ 8 – (DBTYPE_BSTR) Indicates a null-terminated character string (Unicode). ▪ 9 – (DBTYPE_IDISPATCH) Indicates a pointer to an IDispatch interface on an OLE

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Name	Type	Restrictions	Description
			object. ▪ 10 – (DBTYPE_ERROR) Indicates a 32-bit error code. ▪ 11 – (DBTYPE_BOOL) Indicates a Boolean value. ▪ 12 – (DBTYPE_VARIANT) Indicates an Automation variant. ▪ 13 – (DBTYPE_IUNKNOWN) Indicates a pointer to an IUnknown interface on an OLE object. ▪ 14 – (DBTYPE_DECIMAL) Indicates an exact numeric value with a fixed precision and scale. The scale is between 0 and 28. ▪ 16 – (DBTYPE_I1) Indicates a one-byte signed integer. ▪ 17 – (DBTYPE_UI1) Indicates a one-byte unsigned integer. ▪ 18 – (DBTYPE_UI2) Indicates a two-byte unsigned integer. ▪ 19 – (DBTYPE_UI4) Indicates a four-byte unsigned integer. ▪ 20 – (DBTYPE_I8) Indicates an eight-byte signed integer. ▪ 21 – (DBTYPE_UI8) Indicates an eight-byte unsigned integer. ▪ 72 – (DBTYPE_GUID) Indicates a GUID.

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Name	Type	Restrictions	Description
			▪ 128 – (DBTYPE_BYTES) Indicates a binary value. ▪ 129 – (DBTYPE_STR) Indicates a string value. ▪ 130 – (DBTYPE_WSTR) Indicates a null-terminated Unicode character string. ▪ 131 – (DBTYPE_NUMERIC) Indicates an exact numeric value with a fixed precision and scale. The scale is between 0 and 38. ▪ 132 – (DBTYPE_UDT) Indicates a user-defined variable. ▪ 133 – (DBTYPE_DBDATE) Indicates a date value (yyyymmdd). ▪ 134 – (DBTYPE_DBTIME) Indicates a time value (hhmmss). ▪ 135 – (DBTYPE_DBTIMESTAMP) Indicates a date-time stamp (yyyymmddhhmmss plus a fraction in billionths). ▪ 136 - (DBTYPE_HCHAPTER) Indicates a four-byte chapter value used to identify rows in a child rowset.
LEVEL_MASTER_UNIQUE_NAME	xsd:string		The unique name of the master level.
LEVEL_NAME_SQL_COLUMN_NAME	xsd:string		The SQL column name for the level name.

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Name	Type	Restrictions	Description
LEVEL_KEY_SQL_COLUMN_NAME	xsd:string		The SQL column name for the level key.
LEVEL_UNIQUE_NAME_SQL_COLUMN_NAME	xsd:string		The SQL column name for the level unique name.
LEVEL_ATTRIBUTE_HIERARCHY_NAME	xsd:string		The name of the attribute hierarchy providing the source of the level.
LEVEL_KEY_CARDINALITY	xsd:unsignedShort		The number of columns in the level key.
LEVEL_ORIGIN	xsd:unsignedShort	Yes	A bitmask that defines how the level was sourced: ▪ 0x00000001 - Identifies levels in a user defined hierarchy. ▪ 0x00000002 - Identifies levels in an attribute hierarchy. ▪ 0x00000004 - Identifies levels in a key attribute hierarchy. ▪ 0x00000008 - Identifies levels in attribute hierarchies that are not enabled.

The rowset is sorted on CATALOG_NAME, CUBE_NAME, DIMENSION_UNIQUE_NAME, and HIERARCHY_UNIQUE_NAME.

The response has the following definition.

```
        <xsd:element name="root">
          <xsd:complexType>
            <xsd:sequence minOccurs="0" maxOccurs="unbounded">
              <xsd:element name="row" type="row" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:simpleType name="uuid">
          <xsd:restriction base="xsd:string">
            <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-
9a-zA-Z]{12}" />
          </xsd:restriction>
        </xsd:simpleType>
```


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```
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="CATALOG_NAME" name="CATALOG_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="SCHEMA_NAME" name="SCHEMA_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="DIMENSION_UNIQUE_NAME" name="DIMENSION_UNIQUE_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="HIERARCHY_UNIQUE_NAME" name="HIERARCHY_UNIQUE_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="LEVEL_NAME" name="LEVEL_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="LEVEL_UNIQUE_NAME" name="LEVEL_UNIQUE_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="LEVEL_GUID" name="LEVEL_GUID" type="uuid" minOccurs="0" />
          <xsd:element sql:field="LEVEL_CAPTION" name="LEVEL_CAPTION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="LEVEL_NUMBER" name="LEVEL_NUMBER" type="xsd:unsignedInt"
minOccurs="0" />
          <xsd:element sql:field="LEVEL_CARDINALITY" name="LEVEL_CARDINALITY"
type="xsd:unsignedInt" minOccurs="0" />
          <xsd:element sql:field="LEVEL_TYPE" name="LEVEL_TYPE" type="xsd:int" minOccurs="0"
/>
          <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="CUSTOM_ROLLUP_SETTINGS" name="CUSTOM_ROLLUP_SETTINGS"
type="xsd:int" minOccurs="0" />
          <xsd:element sql:field="LEVEL_UNIQUE_SETTINGS" name="LEVEL_UNIQUE_SETTINGS"
type="xsd:int" minOccurs="0" />
          <xsd:element sql:field="LEVEL_IS_VISIBLE" name="LEVEL_IS_VISIBLE"
type="xsd:boolean" minOccurs="0" />
          <xsd:element sql:field="LEVEL_ORDERING_PROPERTY" name="LEVEL_ORDERING_PROPERTY"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="LEVEL_DBTYPE" name="LEVEL_DBTYPE" type="xsd:int"
minOccurs="0" />
          <xsd:element sql:field="LEVEL_MASTER_UNIQUE_NAME" name="LEVEL_MASTER_UNIQUE_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="LEVEL_NAME_SQL_COLUMN_NAME"
name="LEVEL_NAME_SQL_COLUMN_NAME" type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="LEVEL_KEY_SQL_COLUMN_NAME" name="LEVEL_KEY_SQL_COLUMN_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="LEVEL_UNIQUE_NAME_SQL_COLUMN_NAME"
name="LEVEL_UNIQUE_NAME_SQL_COLUMN_NAME" type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="LEVEL_ATTRIBUTE_HIERARCHY_NAME"
name="LEVEL_ATTRIBUTE_HIERARCHY_NAME" type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="LEVEL_KEY_CARDINALITY" name="LEVEL_KEY_CARDINALITY"
type="xsd:unsignedShort" minOccurs="0" />
          <xsd:element sql:field="LEVEL_ORIGIN" name="LEVEL_ORIGIN" type="xsd:unsignedShort"
minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.8.2 Additional Restrictions

In addition to the column restrictions that are indicated in the previous section, the following restrictions MAY apply to this rowset.

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Name	Type	Description
CUBE_SOURCE	xsd:unsignedShort	A bitmask with one of these valid values: ▪ 0x01 - Cube ▪ 0x02 - Dimension The default restriction is a value of 1.
LEVEL_VISIBILITY	xsd:unsignedShort	A bitmask with one of these valid values: ▪ 0x01 - Visible ▪ 0x02 - Not Visible The default restriction is a value of 1.

3.1.4.2.2.1.3.9 MDSCHEMA_MEASURES

This schema rowset describes each measure.

3.1.4.2.2.1.3.9.1 Columns

The **MDSCHEMA_MEASURES** rowset contains the following columns.

Name	Type	Restrictions	Description
CATALOG_NAME	xsd:string	Yes	The name of the catalog to which this measure belongs.
SCHEMA_NAME	xsd:string	Yes	The name of the schema to which this measure belongs.<144>
CUBE_NAME	xsd:string	Yes	The name of the cube to which this measure belongs.
MEASURE_NAME	xsd:string	Yes	The name of the measure.
MEASURE_UNIQUE_NAME	xsd:string	Yes	The unique name of the measure.
MEASURE_CAPTION	xsd:string		A caption associated with the measure.
MEASURE_GUID	uuid		The GUID of the measure.
MEASURE_AGGREGATOR	xsd:int		An enumeration that identifies how a measure was derived. This enumeration can be one of the following values: ▪ 1 – (MDMEASURE_AGGR_SUM) MEASURE aggregates from SUM. ▪ 2 - (MDMEASURE_AGGR_COUNT)

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Name	Type	Restrictions	Description
			MEASURE aggregates from COUNT. ▪ 3 - (MDMEASURE_AGGR_MIN) MEASURE aggregates from MIN. ▪ 4 - (MDMEASURE_AGGR_MAX) MEASURE aggregates from MAX. ▪ 5 - (MDMEASURE_AGGR_AVG) MEASURE aggregates from AVG. ▪ 6 - (MDMEASURE_AGGR_VAR) MEASURE aggregates from VAR. ▪ 7 - (MDMEASURE_AGGR_STD) Identifies that the measure aggregates from STDEV. ▪ 127 - (MDMEASURE_AGGR_CALCULATED) Identifies that the measure was derived from a formula that was not any of the single functions listed in any of the preceding single functions. ▪ 0 - (MDMEASURE_AGGR_UNKNOWN) Identifies that the measure was derived from an unknown aggregation function or formula.
DATA_TYPE	xsd:int		This enumeration is the same as LEVEL_DBTYPE for MDSCHEMA_LEVELS. (See section 3.1.4.2.2.1.3.8.)
NUMERIC_PRECISION	xsd:unsignedShort		The maximum precision of the measure if the measure object's data type is Numeric, Decimal, or Datetime. NULL for all other property types.
NUMERIC_SCALE	xsd:short		The number of digits to the right of the decimal point if the measure object's type indicator is Numeric, Decimal or Datetime. Otherwise, this value is

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Name	Type	Restrictions	Description
			NULL.<145>
MEASURE_UNITS	xsd:string		The units for the measure.
DESCRIPTION	xsd:string		A description of the measure.
EXPRESSION	xsd:string		An expression for the member.
MEASURE_IS_VISIBLE	xsd:boolean		When true, indicates that the measure is visible. Always returns a value of true. If the measure is not visible, it will not be included in the schema rowset.
LEVELS_LIST	xsd:string		Not currently in use.<146>
MEASURE_NAME_SQL_COLUMN_NAME	xsd:string		The name of the column in the SQL query that corresponds to the measure's name.
MEASURE_UNQUALIFIED_CAPTION	xsd:string		The caption of the measure, not qualified with the measure group caption.
MEASUREGROUP_NAME	xsd:string	Yes	The name of the measure group to which the measure belongs.
MEASURE_DISPLAY_FOLDER	xsd:string		The display folder of the measure.<147>
DEFAULT_FORMAT_STRING	xsd:string		The default format string for the measure.

The rowset is sorted on CATALOG_NAME, CUBE_NAME, and MEASURE_NAME.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:simpleType name="uuid">
        <xsd:restriction base="xsd:string">
          <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-
9a-zA-Z]{12}" />
        </xsd:restriction>
      </xsd:simpleType>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="CATALOG_NAME" name="CATALOG_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="SCHEMA_NAME" name="SCHEMA_NAME" type="xsd:string"
minOccurs="0" />
```


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```
          <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="MEASURE_NAME" name="MEASURE_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="MEASURE_UNIQUE_NAME" name="MEASURE_UNIQUE_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="MEASURE_CAPTION" name="MEASURE_CAPTION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="MEASURE_GUID" name="MEASURE_GUID" type="uuid" minOccurs="0"
/>
          <xsd:element sql:field="MEASURE_AGGREGATOR" name="MEASURE_AGGREGATOR"
type="xsd:int" minOccurs="0" />
          <xsd:element sql:field="DATA_TYPE" name="DATA_TYPE" type="xsd:unsignedShort"
minOccurs="0" />
          <xsd:element sql:field="NUMERIC_PRECISION" name="NUMERIC_PRECISION"
type="xsd:unsignedShort" minOccurs="0" />
          <xsd:element sql:field="NUMERIC_SCALE" name="NUMERIC_SCALE" type="xsd:short"
minOccurs="0" />
          <xsd:element sql:field="MEASURE_UNITS" name="MEASURE_UNITS" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="EXPRESSION" name="EXPRESSION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="MEASURE_IS_VISIBLE" name="MEASURE_IS_VISIBLE"
type="xsd:boolean" minOccurs="0" />
          <xsd:element sql:field="LEVELS_LIST" name="LEVELS_LIST" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="MEASURE_NAME_SQL_COLUMN_NAME"
name="MEASURE_NAME_SQL_COLUMN_NAME" type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="MEASURE_UNQUALIFIED_CAPTION"
name="MEASURE_UNQUALIFIED_CAPTION" type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="MEASUREGROUP_NAME" name="MEASUREGROUP_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="MEASURE_DISPLAY_FOLDER" name="MEASURE_DISPLAY_FOLDER"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="DEFAULT_FORMAT_STRING" name="DEFAULT_FORMAT_STRING"
type="xsd:string" minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.9.2 Additional Restrictions

In addition to the column restrictions indicated in the previous section, the following restrictions MAY apply to this rowset.

Name	Type	Description
CUBE_SOURCE	xsd:unsignedShort	A bitmask with one of these valid values: ▪ 0x01 - Cube ▪ 0x02 - Dimension The default restriction is a value of 1.
MEASURE_VISIBILITY	xsd:unsignedShort	A bitmask with one of these valid values:

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Name	Type	Description
		▪ 0x01 - Visible ▪ 0x02 - Not Visible The default restriction is a value of 1.

3.1.4.2.2.1.3.10 MDSCHEMA_PROPERTIES

This schema rowset describes the properties of members and cell properties.

3.1.4.2.2.1.3.10.1 Columns

The **MDSCHEMA_PROPERTIES** rowset contains the following columns.

Name	Type	Restrictions	Description
CATALOG_NAME	xsd:string	Yes	The name of the database.
SCHEMA_NAME	xsd:string	Yes	The name of the schema.<148>
CUBE_NAME	xsd:string	Yes	The name of the cube.
DIMENSION_UNIQUE_NAME	xsd:string	Yes	The unique name of the dimension.
HIERARCHY_UNIQUE_NAME	xsd:string	Yes	The unique name of the hierarchy.
LEVEL_UNIQUE_NAME	xsd:string	Yes	The unique name of the level to which the property belongs.
MEMBER_UNIQUE_NAME	xsd:string	Yes	The unique name of the member to which the property belongs.
PROPERTY_TYPE	xsd:short	Yes	A bitmask that specifies the type of the property, as follows: ▪ 1 - Identifies a property of a member. ▪ 2 - Identifies a property of a cell. ▪ 4 - Identifies an internal property. ▪ 8 - Identifies a property which contains a binary

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Name	Type	Restrictions	Description
			large object (BLOB).
PROPERTY_NAME	xsd:string	Yes	The name of the property.<149>
PROPERTY_CAPTION	xsd:string		A label or caption associated with the property.<150>
DATA_TYPE	xsd:int		This enumeration is the same as LEVEL_DBTYPE for MDSCHEMA_LEVELS. (See 3.1.4.2.2.1.3.8)
CHARACTER_MAXIMUM_LENGTH	xsd:unsignedInt		The maximum possible length of the property, if it is a **Character** or **Binary** type. Zero indicates there is no defined maximum length. Returns NULL for all other data types.
CHARACTER_OCTET_LENGTH	xsd:unsignedInt		The maximum possible length (in bytes) of the property, if it is a **Character** or **Binary** type. Zero indicates there is no defined maximum length. Returns NULL for all other data types.
NUMERIC_PRECISION	xsd:unsignedShort		The maximum precision of the property if the measure object's data type is **Numeric**, **Decimal** or **DateTime**. NULL for all other property types.
NUMERIC_SCALE	xsd:short		The number of digits to the right of the decimal point if the measure object's type indicator is **Numeric**, **Decimal** or **DateTime**.

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Name	Type	Restrictions	Description
			Otherwise, this value is NULL.<151>
DESCRIPTION	xsd:string		A description of the property.
PROPERTY_CONTENT_TYPE	xsd:short		The content type of the property. Built-in values are values listed as follows. This enumeration is extensible and additional values can be added by users. ▪ 0x00 - Regular ▪ 0x01 - Id ▪ 0x02 - Relation to parent ▪ 0x03 - Rollup operator ▪ 0x11 - Organization title ▪ 0x21 - Caption ▪ 0x22 - Caption short ▪ 0x23 - Caption description ▪ 0x24 - Caption abbreviation ▪ 0x31 - Web URL ▪ 0x32 - Web HTML ▪ 0x33 - Web XML or XSL ▪ 0x34 - Web mail alias ▪ 0x41 - Address ▪ 0x42 - Address street ▪ 0x43 - Address house ▪ 0x44 - Address

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Name	Type	Restrictions	Description
			city ▪ 0x45 - Address state or province ▪ 0x46 - Address zip ▪ 0x47 - Address quarter ▪ 0x48 - Address country ▪ 0x49 - Address building ▪ 0x4A - Address room ▪ 0x4B - Address floor ▪ 0x4C - Address fax ▪ 0x4D - Address phone ▪ 0x61 - Geography centroid x ▪ 0x62 - Geography centroid y ▪ 0x63 - Geography centroid z ▪ 0x64 - Geography boundary top ▪ 0x65 - Geography boundary left ▪ 0x66 - Geography boundary bottom ▪ 0x67 - Geography boundary right ▪ 0x68 - Geography boundary front ▪ 0x69 - Geography boundary rear ▪ 0x6A - Geography boundary polygon ▪ 0x71 - Physical size

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Name	Type	Restrictions	Description
			▪ 0x72 - Physical color ▪ 0x73 - Physical weight ▪ 0x74 - Physical height ▪ 0x75 - Physical width ▪ 0x76 - Physical depth ▪ 0x77 - Physical volume ▪ 0x78 - Physical density ▪ 0x82 - Person full name ▪ 0x83 - Person first name ▪ 0x84 - Person last name ▪ 0x85 - Person middle name ▪ 0x86 - Person demographic ▪ 0x87 - Person contact ▪ 0x91 - Quantity range low ▪ 0x92 - Quantity range high ▪ 0xA1 - Formatting color ▪ 0xA2 - Formatting order ▪ 0xA3 - Formatting font ▪ 0xA4 - Formatting font effects ▪ 0xA5 - Formatting font size ▪ 0xA6 - Formatting

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Name	Type	Restrictions	Description
			sub total ▪ 0xB1 - Date ▪ 0xB2 - Date start ▪ 0xB3 - Date ended ▪ 0xB4 - Date canceled ▪ 0xB5 - Date modified ▪ 0xB6 - Date duration ▪ 0xC1 - Version
SQL_COLUMN_NAME	xsd:string		The column name of the property used in SQL queries.
LANGUAGE	xsd:unsignedShort		The language expressed as an LCID. Valid only for property translations.
PROPERTY_ORIGIN	xsd:unsignedShort	Yes	A bitmask that specifies the type of hierarchy to which the property applies, as follows: ▪ 1 - Indicates the property is on a user defined hierarchy. ▪ 2 - Indicates the property is on an attribute hierarchy. ▪ 4 - Indicates the property is on a key attribute hierarchy. ▪ 8 - Indicates the property is on an attribute hierarchy that is not enabled.
PROPERTY_ATTRIBUTE_HIERARCHY_NAME	xsd:string		The name of the attribute hierarchy that is sourcing this

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Name	Type	Restrictions	Description
			property.
PROPERTY_CARDINALITY	xsd:string		The cardinality of the property. Possible values include the following strings: ▪ "ONE" ▪ "MANY"
MIME_TYPE	xsd:string		The MIME type (if this property is of type **Binary**).
PROPERTY_IS_VISIBLE	xsd:boolean		When true, indicates that the property is visible; otherwise false.

This schema rowset is not sorted.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="CATALOG_NAME" name="CATALOG_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="SCHEMA_NAME" name="SCHEMA_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="DIMENSION_UNIQUE_NAME" name="DIMENSION_UNIQUE_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="HIERARCHY_UNIQUE_NAME" name="HIERARCHY_UNIQUE_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="LEVEL_UNIQUE_NAME" name="LEVEL_UNIQUE_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="MEMBER_UNIQUE_NAME" name="MEMBER_UNIQUE_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="PROPERTY_TYPE" name="PROPERTY_TYPE" type="xsd:short"
minOccurs="0" />
          <xsd:element sql:field="PROPERTY_NAME" name="PROPERTY_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="PROPERTY_CAPTION" name="PROPERTY_CAPTION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="DATA_TYPE" name="DATA_TYPE" type="xsd:unsignedShort"
minOccurs="0" />
          <xsd:element sql:field="CHARACTER_MAXIMUM_LENGTH" name="CHARACTER_MAXIMUM_LENGTH"
type="xsd:unsignedInt" minOccurs="0" />
```


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```
          <xsd:element sql:field="CHARACTER_OCTET_LENGTH" name="CHARACTER_OCTET_LENGTH"
type="xsd:unsignedInt" minOccurs="0" />
          <xsd:element sql:field="NUMERIC_PRECISION" name="NUMERIC_PRECISION"
type="xsd:unsignedShort" minOccurs="0" />
          <xsd:element sql:field="NUMERIC_SCALE" name="NUMERIC_SCALE" type="xsd:short"
minOccurs="0" />
          <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="PROPERTY_CONTENT_TYPE" name="PROPERTY_CONTENT_TYPE"
type="xsd:short" minOccurs="0" />
          <xsd:element sql:field="SQL_COLUMN_NAME" name="SQL_COLUMN_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="LANGUAGE" name="LANGUAGE" type="xsd:unsignedShort"
minOccurs="0" />
          <xsd:element sql:field="PROPERTY_ORIGIN" name="PROPERTY_ORIGIN"
type="xsd:unsignedShort" minOccurs="0" />
          <xsd:element sql:field="PROPERTY_ATTRIBUTE_HIERARCHY_NAME"
name="PROPERTY_ATTRIBUTE_HIERARCHY_NAME" type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="PROPERTY_CARDINALITY" name="PROPERTY_CARDINALITY"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="MIME_TYPE" name="MIME_TYPE" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="PROPERTY_IS_VISIBLE" name="PROPERTY_IS_VISIBLE"
type="xsd:boolean" minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.10.2 Additional Restrictions

In addition to the column restrictions indicated in the previous section, the following restrictions MAY apply to this rowset.

Name	Type	Description
CUBE_SOURCE	xsd:unsignedShort	A bitmask with one of these valid values: ▪ 0x01 - Cube ▪ 0x02 - Dimension The default restriction is a value of 1.
PROPERTY_VISIBILITY	xsd:unsignedShort	A bitmask with one of these valid values: ▪ 0x01 - Visible ▪ 0x02 - Not Visible The default restriction is a value of 1.

3.1.4.2.2.1.3.11 MDSCHEMA_MEMBERS

This schema rowset describes the members within a database.

3.1.4.2.2.1.3.11.1 Columns

The **MDSCHEMA_MEMBERS** rowset contains the following columns.

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Name	Type	Restrictions	Description
CATALOG_NAME	xsd:string	Yes	The name of the database.
SCHEMA_NAME	xsd:string	Yes	The name of the schema.<152>
CUBE_NAME	xsd:string	Yes	The name of the cube.
DIMENSION_UNIQUE_NAME	xsd:string	Yes	The unique name of the dimension.
HIERARCHY_UNIQUE_NAME	xsd:string	Yes	The unique name of the hierarchy.
LEVEL_UNIQUE_NAME	xsd:string	Yes	The unique name of the level.
LEVEL_NUMBER	xsd:unsignedInt	Yes	The distance of the member from the root of the hierarchy. The root level is zero (0).
MEMBER_ORDINAL	xsd:unsignedInt		The ordinal of the member in its level.
MEMBER_NAME	xsd:string	Yes	The name of the member.
MEMBER_UNIQUE_NAME	xsd:string	Yes	The unique name of the member.
MEMBER_TYPE	xsd:int	Yes	The type of the member.<153> ▪ 1 - Is a regular member. ▪ 2 - Is the All member. ▪ 3 - Is a measure. ▪ 4 - Is a formula. ▪ 0 - Is of unknown type.
MEMBER_GUID	uuid		The GUID of the member.
MEMBER_CAPTION	xsd:string	Yes	The caption of the member.
CHILDREN_CARDINALITY	xsd:unsignedInt		The number of children that the member has. This can be an estimate.
PARENT_LEVEL	xsd:unsignedInt		The distance of the member's parent from the root level of the hierarchy. The root level is zero (0).
PARENT_UNIQUE_NAME	xsd:string		The unique name of the member's parent. NULL is returned for any members at the root level.
PARENT_COUNT	xsd:unsignedInt		The number of parents that this member has.
DESCRIPTION	xsd:string		The description of the member.
EXPRESSION	xsd:string		The expression for calculations, if the member is of type 4 (Formula).
MEMBER_KEY	xsd:string		The value of the member's key column.

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Name	Type	Restrictions	Description
			Returns NULL if the member has a composite key.
IS_PLACEHOLDERMEMBER	xsd:boolean		When true, indicates that a member is a placeholder member for an empty position in a dimension hierarchy; otherwise false. It is valid only if the MDX Compatibility property has been set to 1.
IS_DATAMEMBER	xsd:boolean		When true, indicates that the member is a data member; otherwise false.
SCOPE	xsd:int		The scope of the member. The member can be a session-calculated member or a global-calculated member. The column returns NULL for non-calculated members. This column can have one of the following values: ▪ 1 – Global ▪ 2 – Session

Additional columns may be returned in this schema rowset for custom member properties.

This rowset is sorted on CATALOG_NAME, CUBE_NAME, DIMENSION_UNIQUE_NAME, HIERARCHY_UNIQUE_NAME, LEVEL_UNIQUE_NAME, LEVEL_NUMBER, MEMBER_ORDINAL.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:simpleType name="uuid">
        <xsd:restriction base="xsd:string">
          <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-
9a-zA-Z]{12}" />
        </xsd:restriction>
      </xsd:simpleType>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="CATALOG_NAME" name="CATALOG_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="SCHEMA_NAME" name="SCHEMA_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="DIMENSION_UNIQUE_NAME" name="DIMENSION_UNIQUE_NAME"
type="xsd:string" minOccurs="0" />
```


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```
          <xsd:element sql:field="HIERARCHY_UNIQUE_NAME" name="HIERARCHY_UNIQUE_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="LEVEL_UNIQUE_NAME" name="LEVEL_UNIQUE_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="LEVEL_NUMBER" name="LEVEL_NUMBER" type="xsd:unsignedInt"
minOccurs="0" />
          <xsd:element sql:field="MEMBER_ORDINAL" name="MEMBER_ORDINAL"
type="xsd:unsignedInt" minOccurs="0" />
          <xsd:element sql:field="MEMBER_NAME" name="MEMBER_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="MEMBER_UNIQUE_NAME" name="MEMBER_UNIQUE_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="MEMBER_TYPE" name="MEMBER_TYPE" type="xsd:int"
minOccurs="0" />
          <xsd:element sql:field="MEMBER_GUID" name="MEMBER_GUID" type="uuid" minOccurs="0"
/>
          <xsd:element sql:field="MEMBER_CAPTION" name="MEMBER_CAPTION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="CHILDREN_CARDINALITY" name="CHILDREN_CARDINALITY"
type="xsd:unsignedInt" minOccurs="0" />
          <xsd:element sql:field="PARENT_LEVEL" name="PARENT_LEVEL" type="xsd:unsignedInt"
minOccurs="0" />
          <xsd:element sql:field="PARENT_UNIQUE_NAME" name="PARENT_UNIQUE_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="PARENT_COUNT" name="PARENT_COUNT" type="xsd:unsignedInt"
minOccurs="0" />
          <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="EXPRESSION" name="EXPRESSION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="MEMBER_KEY" name="MEMBER_KEY" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="IS_PLACEHOLDERMEMBER" name="IS_PLACEHOLDERMEMBER"
type="xsd:boolean" minOccurs="0" />
          <xsd:element sql:field="IS_DATAMEMBER" name="IS_DATAMEMBER" type="xsd:boolean"
minOccurs="0" />
          <xsd:element sql:field="SCOPE" name="SCOPE" type="xsd:int" minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.11.2 Additional Restrictions

In addition to the column restrictions indicated in the previous section, the following restrictions MAY apply to this rowset.

Name	Type	Description
CUBE_SOURCE	xsd:unsignedShort	A bitmask with one of these valid values: ▪ 0x01 - Cube ▪ 0x02 - Dimension The default restriction is a value of 1.
TREE_OP	xsd:int	Only applies to a single member: ▪ 0x20 - Returns all of the ancestors.

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Name	Type	Description
		▪ 0x01 - Returns only the immediate children. ▪ 0x02 - Returns members on the same level. ▪ 0x04 - Returns only the immediate parent. ▪ 0x08 - Returns itself in the list of returned rows. ▪ 0x10 - Returns all of the descendants.

3.1.4.2.2.1.3.12 MDSCHEMA_ACTIONS

This schema rowset describes the actions that may be available to the client application.

3.1.4.2.2.1.3.12.1 Columns

The **MDSCHEMA_ACTIONS** rowset contains the following columns.

Name	Type	Restrictions	Description
CATALOG_NAME	xsd:string	Yes	The name of the database.
SCHEMA_NAME	xsd:string	Yes	The name of the schema.<154>
CUBE_NAME	xsd:string	[Required]	The name of the cube.
ACTION_NAME	xsd:string	Yes	The name of this action.
ACTION_TYPE	xsd:int	Yes	A bitmask that is used to specify the action type. ▪ 0x01 - Action type is **URL**. ▪ 0x02 - Action type is **HTML**. ▪ 0x04 - Action type is **Statement**. ▪ 0x08 - Action type is **Dataset**. ▪ 0x10 - Action type is **Rowset**. ▪ 0x20 - Action type is **Commandline**. ▪ 0x40 - Action type is **Proprietary**. ▪ 0x80 - Action type is **Report**. ▪ 0x100 - Action type is **Drillthrough**. If the action is PROPRIETARY (0x40), then a value MUST be provided in the APPLICATION column.
COORDINATE	xsd:string	[Required]	An MDX expression that specifies an object or a coordinate in the multidimensional space in which the action is performed. The COORDINATE MUST resolve to the object specified in COORDINATE_TYPE.
COORDINATE_TYPE	xsd:int	[Required]	An enumeration that specifies how the COORDINATE

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Name	Type	Restrictions	Description
			restriction column is interpreted. The possible values are as follows: ▪ 1 - Action coordinate refers to the cube. ▪ 2 - Action coordinate refers to a dimension. ▪ 3 - Action coordinate refers to a level. ▪ 4 - Action coordinate refers to a member. ▪ 5 - Action coordinate refers to a set. ▪ 6 - Action coordinate refers to a cell.
ACTION_CAPTION	xsd:string		The caption for the action. The action name is used if no caption was specified and no translations were specified when the action was created or altered.
DESCRIPTION	xsd:string		A description of the action.
CONTENT	xsd:string		The expression or content of the action that is to be run.
APPLICATION	xsd:string		The name of the application that is to be used to run the action.
INVOCATION	xsd:int	Yes	Information about how to invoke the action: ▪ 1 - Indicates a regular action used during normal operations. This is the default value for this column. ▪ 2 - Indicates that the action is performed when the cube is first opened. ▪ 4 - Indicates that the action is performed as part of a batch operation.

The rowset is sorted on CATALOG_NAME, CUBE_NAME, ACTION_NAME.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="CATALOG_NAME" name="CATALOG_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="SCHEMA_NAME" name="SCHEMA_NAME" type="xsd:string"
minOccurs="0" />
```


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```
          <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="ACTION_NAME" name="ACTION_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="ACTION_TYPE" name="ACTION_TYPE" type="xsd:int"
minOccurs="0" />
          <xsd:element sql:field="COORDINATE" name="COORDINATE" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="COORDINATE_TYPE" name="COORDINATE_TYPE" type="xsd:int"
minOccurs="0" />
          <xsd:element sql:field="ACTION_CAPTION" name="ACTION_CAPTION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="CONTENT" name="CONTENT" type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="APPLICATION" name="APPLICATION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="INVOCATION" name="INVOCATION" type="xsd:int" minOccurs="0"
/>
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.12.2 Additional Restrictions

In addition to the column restrictions indicated in the previous section, the following restrictions MAY apply to this rowset.

Name	Type	Description
CUBE_SOURCE	xsd:unsignedShort	A bitmask with one of these valid values: ▪ 0x01 - Cube ▪ 0x02 - Dimension The default restriction is a value of 1.

3.1.4.2.2.1.3.12.3 Remarks

The following table lists the valid COORDINATE and COORDINATE_TYPE combinations.

COORDINATE object type	COORDINATE_TYPE
Cube	MDACTION_COORDINATE_CUBE (1)
Dimension	MDACTION_COORDINATE_DIMENSION (2) MDACTION_COORDINATE_LEVEL (3) MDACTION_COORDINATE_MEMBER (4) MDACTION_COORDINATE_SET (5) MDACTION_COORDINATE_CELL (6)
Hierarchy	MDACTION_COORDINATE_DIMENSION (2)
Level	MDACTION_COORDINATE_LEVEL (3)

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COORDINATE object type	COORDINATE_TYPE
Member	MDACTION_COORDINATE_MEMBER (4)
Set	MDACTION_COORDINATE_SET (5)
Cell	MDACTION_COORDINATE_CELL (6)

3.1.4.2.2.1.3.13 MDSCHEMA_SETS

This **Discover** element describes any sets that are currently defined in a database, including session-scoped sets.

3.1.4.2.2.1.3.13.1 Columns

The **MDSCHEMA_SETS** rowset contains the following columns.

Name	Type	Restrictions	Description
CATALOG_NAME	xsd:string	Yes	The name of the database.
SCHEMA_NAME	xsd:string	Yes	The name of the schema.<155>
CUBE_NAME	xsd:string	Yes	The name of the cube.
SET_NAME	xsd:string	Yes	The name of the set, as specified in the CREATE SET statement.
SCOPE	xsd:int	Yes	The scope of the set. The set can be a session-defined set or a global-defined set. This column can have one of the following values: ▪ 1 - Global ▪ 2 – Session
DESCRIPTION	xsd:string		A description of the set.
EXPRESSION	xsd:string		The expression for the set.
DIMENSIONS	xsd:string		A comma-delimited list of hierarchies included in the set.
SET_CAPTION	xsd:string		A caption associated with the set.
SET_DISPLAY_FOLDER	xsd:string		The display folder.
SET_EVALUATION_CONTEXT	xsd:int		The context for the set. The set can be static or dynamic. This column can have one of the following values: ▪ 1 - STATIC ▪ 2 – DYNAMIC

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The rowset is sorted on CATALOG_NAME and CUBE_NAME.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="CATALOG_NAME" name="CATALOG_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="SCHEMA_NAME" name="SCHEMA_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="SET_NAME" name="SET_NAME" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="SCOPE" name="SCOPE" type="xsd:int" minOccurs="0" />
          <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="EXPRESSION" name="EXPRESSION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="DIMENSIONS" name="DIMENSIONS" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="SET_CAPTION" name="SET_CAPTION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="SET_DISPLAY_FOLDER" name="SET_DISPLAY_FOLDER"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="SET_EVALUATION_CONTEXT" name="SET_EVALUATION_CONTEXT"
type="xsd:int" minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.13.2 Additional Restrictions

In addition to the column restrictions that are indicated in the previous section, the following restrictions MAY apply to this rowset.

Name	Type	Description
CUBE_SOURCE	xsd:unsignedShort	A bitmask with one of the following valid values: ▪ 0x01 - Cube ▪ 0x02 - Dimension The default restriction is a value of 1.
HIERARCHY_UNIQUE_NAME	xsd:string	The unique name of the hierarchy that contains the set.

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3.1.4.2.2.1.3.14 DISCOVER_INSTANCES

This schema rowset describes the instances on the server.

3.1.4.2.2.1.3.14.1 Columns

The **DISCOVER_INSTANCES** rowset contains the following columns.

Name	Type	Restrictions	Description
INSTANCE_NAME	xsd:string	[Required]	The name of the instance.
INSTANCE_PORT_NUMBER	xsd:int		The port number the instance listens on.

INSTANCE_STATE	xsd:int		The state of the server instance. This column can have one of the following values:
			▪ Running (0x00000004)
			▪ Stopped (0x00000001)
			▪ Start Pending (0x00000002)
			▪ Stop Pending (0x00000003)
			▪ Paused (0x00000007)
			  ▪ Pause Pending (0x00000006)
			  ▪ Continue Pending (0x00000005)

This schema rowset is not sorted.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="INSTANCE_NAME" name="INSTANCE_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="INSTANCE_PORT_NUMBER" name="INSTANCE_PORT_NUMBER"
type="xsd:int" minOccurs="0" />
          <xsd:element sql:field="INSTANCE_STATE" name="INSTANCE_STATE" type="xsd:int"
minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.15 MDSCHEMA_KPIS

This schema rowset describes the KPIs within a database.

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3.1.4.2.2.1.3.15.1 Columns

The **MDSCHEMA_KPIS** rowset contains the following columns.

Name	Type	Restrictions	Description
CATALOG_NAME	xsd:string	Yes	The name of the database.
SCHEMA_NAME	xsd:string	Yes	The name of the schema.<156>
CUBE_NAME	xsd:string	Yes	The parent cube for the KPI.
MEASUREGROUP_NAME	xsd:string		The associated measure group for the KPI.
KPI_NAME	xsd:string	Yes	The name of the KPI.
KPI_CAPTION	xsd:string		A label or caption associated with the KPI.
KPI_DESCRIPTION	xsd:string		A description of the KPI.
KPI_DISPLAY_FOLDER	xsd:string		The display folder.
KPI_VALUE	xsd:string		The unique name of the member in the measures dimension for the KPI value.
KPI_GOAL	xsd:string		The unique name of the member in the measures dimension for the KPI goal.
KPI_STATUS	xsd:string		The unique name of the member in the measures dimension for the KPI status.
KPI_TREND	xsd:string		The unique name of the member in the measures dimension for the KPI trend.
KPI_STATUS_GRAPHIC	xsd:string		The default graphical representation of the KPI status.
KPI_TREND_GRAPHIC	xsd:string		The default graphical representation of the KPI trend.
KPI_WEIGHT	xsd:string		The unique name of the member in the measures dimension for the KPI weight.
KPI_CURRENT_TIME_MEMBER	xsd:string		The unique name of the member in the time dimension that defines the temporal context of the KPI.
KPI_PARENT_KPI_NAME	xsd:string		The name of the parent KPI.
ANNOTATIONS	xsd:string		The annotations on the KPI.
SCOPE	xsd:int		The scope of the KPI. The KPI can be a session KPI or global KPI. This column can have one of the following values: ▪ MDKPI_SCOPE_GLOBAL(1) – Global KPI ▪ MDKPI_SCOPE_SESSION(2) – Session

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Name	Type	Restrictions	Description
			based KPI

This schema rowset is not sorted.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="CATALOG_NAME" name="CATALOG_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="SCHEMA_NAME" name="SCHEMA_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="MEASUREGROUP_NAME" name="MEASUREGROUP_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="KPI_NAME" name="KPI_NAME" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="KPI_CAPTION" name="KPI_CAPTION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="KPI_DESCRIPTION" name="KPI_DESCRIPTION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="KPI_DISPLAY_FOLDER" name="KPI_DISPLAY_FOLDER"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="KPI_VALUE" name="KPI_VALUE" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="KPI_GOAL" name="KPI_GOAL" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="KPI_STATUS" name="KPI_STATUS" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="KPI_TREND" name="KPI_TREND" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="KPI_STATUS_GRAPHIC" name="KPI_STATUS_GRAPHIC"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="KPI_TREND_GRAPHIC" name="KPI_TREND_GRAPHIC"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="KPI_WEIGHT" name="KPI_WEIGHT" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="KPI_CURRENT_TIME_MEMBER" name="KPI_CURRENT_TIME_MEMBER"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="KPI_PARENT_KPI_NAME" name="KPI_PARENT_KPI_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="ANNOTATIONS" name="ANNOTATIONS" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="SCOPE" name="SCOPE" type="xsd:int" minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```


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3.1.4.2.2.1.3.15.2 Additional Restrictions

In addition to the column restrictions indicated in the previous section, the following restrictions MAY apply to this rowset.

Name	Type	Description
CUBE_SOURCE	xsd:unsignedShort	A bitmask with one of these valid values: ▪ 0x01 - Cube ▪ 0x02 - Dimension The default restriction is a value of 1.

3.1.4.2.2.1.3.16 MDSCHEMA_MEASUREGROUPS

This schema rowset describes the measure groups within a database.

3.1.4.2.2.1.3.16.1 Columns

The **MDSCHEMA_MEASUREGROUPS** rowset contains the following columns.

Name	Type	Restrictions	Description
CATALOG_NAME	xsd:string	Yes	The name of the catalog.
SCHEMA_NAME	xsd:string	Yes	The name of the schema.<157>
CUBE_NAME	xsd:string	Yes	The name of the cube.
MEASUREGROUP_NAME	xsd:string	Yes	The name of the measure group.
DESCRIPTION	xsd:string		A description of the member.
IS_WRITE_ENABLED	xsd:boolean		When true, indicates that the measure group is write-enabled; otherwise false. Returns a value of true if the measure group is write-enabled.
MEASUREGROUP_CAPTION	xsd:string		The caption for the measure group.

This schema rowset is not sorted.

The response has the following definition.

```
        <xsd:element name="root">
          <xsd:complexType>
            <xsd:sequence minOccurs="0" maxOccurs="unbounded">
              <xsd:element name="row" type="row" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:complexType name="row">
          <xsd:sequence>
            <xsd:element sql:field="CATALOG_NAME" name="CATALOG_NAME" type="xsd:string"
minOccurs="0" />
```


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```
          <xsd:element sql:field="SCHEMA_NAME" name="SCHEMA_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="MEASUREGROUP_NAME" name="MEASUREGROUP_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="IS_WRITE_ENABLED" name="IS_WRITE_ENABLED"
type="xsd:boolean" minOccurs="0" />
          <xsd:element sql:field="MEASUREGROUP_CAPTION" name="MEASUREGROUP_CAPTION"
type="xsd:string" minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.17 MDSCHEMA_MEASUREGROUP_DIMENSIONS

This schema rowset enumerates the dimensions of measure groups.

3.1.4.2.2.1.3.17.1 Columns

The **MDSCHEMA_MEASUREGROUP_DIMENSIONS** rowset contains the following columns.

Name	Type	Restrictions	Description
CATALOG_NAME	xsd:string	Yes	The name of the catalog.
SCHEMA_NAME	xsd:string	Yes	The name of the schema.<158>
CUBE_NAME	xsd:string	Yes	The name of the cube.
MEASUREGROUP_NAME	xsd:string	Yes	The name of the measure group.
MEASUREGROUP_CARDINALITY	xsd:string		The number of instances a measure in the measure group can have for a single dimension member. Possible values include: ▪ ONE ▪ MANY
DIMENSION_UNIQUE_NAME	xsd:string	Yes	The unique name for the dimension.
DIMENSION_CARDINALITY	xsd:string	Yes	The number of instances a dimension member can have for a single instance of a measure group measure. Possible values include: ▪ ONE ▪ MANY
DIMENSION_IS_VISIBLE	xsd:boolean		When true, indicates that hierarchies in the dimension are

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Name	Type	Restrictions	Description
			visible; otherwise false.
DIMENSION_IS_FACT_DIMENSION	xsd:boolean		When true, indicates that the dimension is a fact dimension; otherwise false.
DIMENSION_PATH	nested rowset		A list of dimensions for the reference dimension. The column name of the nested row is "MeasureGroupDimension". For information on nested rowsets, see section 2.2.4.1.3.1.1.
DIMENSION_GRANULARITY	xsd:string		The unique name of the attribute hierarchy that represents the granularity of the dimension.

The rowset supports sorting on CATALOG_NAME, CUBE_NAME, MEASUREGROUP_NAME, DIMENSION_UNIQUE_NAME.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="CATALOG_NAME" name="CATALOG_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="SCHEMA_NAME" name="SCHEMA_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="MEASUREGROUP_NAME" name="MEASUREGROUP_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="MEASUREGROUP_CARDINALITY" name="MEASUREGROUP_CARDINALITY"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="DIMENSION_UNIQUE_NAME" name="DIMENSION_UNIQUE_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="DIMENSION_CARDINALITY" name="DIMENSION_CARDINALITY"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="DIMENSION_IS_VISIBLE" name="DIMENSION_IS_VISIBLE"
type="xsd:boolean" minOccurs="0" />
          <xsd:element sql:field="DIMENSION_IS_FACT_DIMENSION"
name="DIMENSION_IS_FACT_DIMENSION" type="xsd:boolean" minOccurs="0" />
          <xsd:element sql:field="DIMENSION_PATH" name="DIMENSION_PATH" minOccurs="0"
maxOccurs="unbounded">
            <xsd:complexType>
              <xsd:sequence>
                <xsd:element sql:field="MeasureGroupDimension" name="MeasureGroupDimension"
type="xsd:string" minOccurs="0" />
              </xsd:sequence>
            </xsd:complexType>
          </xsd:element>
```


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```
          <xsd:element sql:field="DIMENSION_GRANULARITY" name="DIMENSION_GRANULARITY"
type="xsd:string" minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.17.2 Additional Restrictions

In addition to the column restrictions indicated in the previous section, the following restrictions MAY apply to this rowset.

Name	Type	Description
DIMENSION_VISIBILITY	xsd:unsignedShort	A bitmask with one of these valid values: ▪ 0x01 - Visible ▪ 0x02 - Not Visible The default restriction is a value of 1.

3.1.4.2.2.1.3.18 MDSCHEMA_INPUT_DATASOURCES

This schema rowset request describes the data source objects defined within the database.

3.1.4.2.2.1.3.18.1 Columns

The **MDSCHEMA_INPUT_DATASOURCES** rowset contains the following columns.

Name	Type	Restrictions	Description
CATALOG_NAME	xsd:string	Yes	The name of the catalog.
SCHEMA_NAME	xsd:string	Yes	The name of the schema.<159>
DATASOURCE_NAME	xsd:string	Yes	The name of the data source object.
DATASOURCE_TYPE	xsd:string	Yes	The type of the data source. Valid values include the following: ▪ Relational ▪ Olap
CREATED_ON	xsd:dateTime		The date that the data source was created.
LAST_SCHEMA_UPDATE	xsd:dateTime		The date and time that the data source was last modified.
DESCRIPTION	xsd:string		The description of the action.
TIMEOUT	xsd:unsignedInt		The timeout of the data source in seconds.
DBMS_NAME	xsd:string		The external data source name.
DBMS_VERSION	xsd:string		The external data source version.

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The rowset is not sorted.

The response has the following definition.

```
        <xsd:element name="root">
          <xsd:complexType>
            <xsd:sequence minOccurs="0" maxOccurs="unbounded">
              <xsd:element name="row" type="row" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:complexType name="row">
          <xsd:sequence>
            <xsd:element sql:field="CATALOG_NAME" name="CATALOG_NAME" type="xsd:string"
minOccurs="0" />
            <xsd:element sql:field="SCHEMA_NAME" name="SCHEMA_NAME" type="xsd:string"
minOccurs="0" />
            <xsd:element sql:field="DATASOURCE_NAME" name="DATASOURCE_NAME" type="xsd:string"
minOccurs="0" />
            <xsd:element sql:field="DATASOURCE_TYPE" name="DATASOURCE_TYPE" type="xsd:string"
minOccurs="0" />
            <xsd:element sql:field="CREATED_ON" name="CREATED_ON" type="xsd:dateTime"
minOccurs="0" />
            <xsd:element sql:field="LAST_SCHEMA_UPDATE" name="LAST_SCHEMA_UPDATE"
type="xsd:dateTime" minOccurs="0" />
            <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string"
minOccurs="0" />
            <xsd:element sql:field="TIMEOUT" name="TIMEOUT" type="xsd:unsignedInt"
minOccurs="0" />
            <xsd:element sql:field="DBMS_NAME" name="DBMS_NAME" type="xsd:string" minOccurs="0"
/>
            <xsd:element sql:field="DBMS_VERSION" name="DBMS_VERSION" type="xsd:string"
minOccurs="0" />
          </xsd:sequence>
        </xsd:complexType>
```

3.1.4.2.2.1.3.19 DMSCHEMA_MINING_SERVICES

This schema rowset provides information about each data mining algorithm that the server supports.

3.1.4.2.2.1.3.19.1 Columns

The **DMSCHEMA_MINING_SERVICES** rowset contains the following columns.

Name	Type	Restrictions	Description
SERVICE_NAME	xsd:string	Yes	The name of the algorithm.
SERVICE_TYPE_ID	xsd:unsignedInt	Yes	This column contains a binary value that describes the mining service.<160>
SERVICE_DISPLAY_NAME	xsd:string		A localizable display name for the algorithm.

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Name	Type	Restrictions	Description
SERVICE_GUID	uuid		The GUID for the algorithm.
DESCRIPTION	xsd:string		A human-readable description of the algorithm.
PREDICTION_LIMIT	xsd:unsignedInt		The maximum number of predictions the model and algorithm can provide.
SUPPORTED_DISTRIBUTION_FLAGS	xsd:string		A comma-delimited list of flags that describe the statistical distributions supported by the algorithm. This column contains one or more of the following values: ▪ NORMAL ▪ LOG NORMAL ▪ UNIFORM
SUPPORTED_INPUT_CONTENT_TYPES	xsd:string		A comma-delimited list of flags that describe the input content types that are supported by the algorithm. This column contains one or more of the following values: ▪ KEY – Uniquely identifies a case in a mining model. ▪ DISCRETE – Specifies discrete values. ▪ CONTINUOUS – Specifies continuous values. ▪ DISCRETIZED – Specifies discretized values. ▪ ORDERED – Not supported. ▪ KEY SEQUENCE - Uniquely identifies a step in a sequence of events that constitute the current case. ▪ CYCLICAL – Not supported. ▪ PROBABILITY – Not supported. ▪ VARIANCE – Not supported. ▪ STDEV – Not supported. ▪ SUPPORT – Not supported. ▪ PROBABILITY VARIANCE – Not supported.

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Name	Type	Restrictions	Description
			▪ PROBABILITY STDEV – Not supported. ▪ KEY TIME – Represents a time slice in time series data.
SUPPORTED_PREDICTION_CONTENT_TYPES	xsd:string		A comma-delimited list of flags that describe the prediction content types that are supported by the algorithm. This column contains one or more of the following values: ▪ KEY – Uniquely identifies a case in a mining model. ▪ DISCRETE – Specifies discrete values. ▪ CONTINUOUS – Specifies continuous values. ▪ DISCRETIZED – Specifies discretized values. ▪ ORDERED – Not supported. ▪ KEY SEQUENCE - Uniquely identifies a step in a sequence of events that constitute the current case. ▪ CYCLICAL – Not supported. ▪ PROBABILITY – Not supported. ▪ VARIANCE – Not supported. ▪ STDEV – Not supported. ▪ SUPPORT – Not supported. ▪ PROBABILITY VARIANCE – Not supported. ▪ PROBABILITY STDEV – Not supported. ▪ KEY TIME - Represents a time slice in time series data.
SUPPORTED_MODELING_FLAGS	xsd:string		A comma-delimited list of the modeling flags that are supported by the algorithm. Currently defined flags will include one or more of the following values: ▪ MODEL_EXISTENCE_ONLY - Model the column as a binary ("value

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Name	Type	Restrictions	Description
			exists for this column", "value does not exist for this column"). ▪ REGRESSOR - Mark the column for inclusion as an explicit term in the regression equation for output attributes in the model. Server-specific flags can also appear in this column.
SUPPORTED_SOURCE_QUERY	xsd:string		Reserved for future use.
TRAINING_COMPLEXITY	xsd:int		The length of time that training is expected to take is as follows: ▪ 0 - DM_TRAINING_COMPLEXITY_LOW indicates that the running time is relatively short, and that it is proportional to input. ▪ 1 - DM_TRAINING_COMPLEXITY_MEDIUM indicates that the running time may be long, but that it is generally proportional to input. ▪ 2 - DM_TRAINING_COMPLEXITY_HIGH indicates that the running time is long and that it may grow exponentially in relationship to the number of training cases.
PREDICTION_COMPLEXITY	xsd:int		The length of time that prediction is expected to take is as follows: ▪ 0 - DM_PREDICTION_COMPLEXITY_LOW indicates that the running time is relatively short, and that it is proportional to input. ▪ 1 - DM_PREDICTION_COMPLEXITY_MEDIUM indicates that the running time may be long, but that it is generally proportional to input. ▪ 2 - DM_PREDICTION_COMPLEXITY_HIGH indicates that the running time is long and that it may grow exponentially in relationship to the number of training cases.

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Name	Type	Restrictions	Description
EXPECTED_QUALITY	xsd:int		The expected quality of the model produced with this algorithm is as follows: ▪ 0 - DM_EXPECTED_QUALITY_LOW indicates that the average accuracy of models produced by this algorithm is low. ▪ 1 - DM_EXPECTED_QUALITY_MEDIUM indicates that the average accuracy of models produced by this algorithm is medium. ▪ 2 - DM_EXPECTED_QUALITY_HIGH indicates that the average accuracy of models produced by this algorithm is high.
SCALING	xsd:int		The scalability of the algorithm is as follows: ▪ 0 - DM_SCALING_LOW indicates that the algorithm scales to small data sets. ▪ 1 - DM_SCALING_MEDIUM indicates that the algorithm scales to large data sets. ▪ 2 - DM_SCALING_HIGH indicates that the algorithm scales to very large data sets.
ALLOW_INCREMENTAL_INSERT	xsd:boolean		When true, indicates that the algorithm supports incremental training, that is, updating the discovered patterns based on new factual data, rather than fully rediscovering the patterns; otherwise false.
ALLOW_PMML_INITALIZATION	xsd:boolean		When true, indicates that mining models can be created based on a Predictive Model Markup Language (PMML) 2.1 string; otherwise false. When true, the mining algorithm supports initialization from PMML 2.1 content.
CONTROL	xsd:string		The support given by the service if training is interrupted is as follows: ▪ DM_CONTROL_NONE indicates

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Name	Type	Restrictions	Description
			that the algorithm cannot be canceled after it starts to train the model. ▪ DM_CONTROL_CANCEL indicates that the algorithm can be canceled after it starts to train the model, but that it MUST be restarted to resume training. ▪ DM_CONTROL_SUSPENDRESUME indicates that the algorithm can be canceled and resumed at any time, but that results are not available until training is complete. ▪ DM_CONTROL_SUSPENDWITHRESULT indicates that the algorithm can be canceled and resumed at any time, and that any incremental results can be obtained.
ALLOW_DUPLICATE_KEY	xsd:boolean		When true, indicates that cases are allowed to contain duplicate keys; otherwise false.
VIEWER_TYPE	xsd:string		The recommended viewer for this model.
HELP_FILE	xsd:string		The name of the file that contains the documentation for this service. The HELP_FILE column is optional.
HELP_CONTEXT	xsd:string		The Help context ID for this service. The HELP_CONTEXT column is optional.
MSOLAP_SUPPORTS_ANALYSIS_SERVICES_DDL	xsd:string		The version of DDL supported. The string "zero" indicates no DDL support.
MSOLAP_SUPPORTS_OLAP_MINING_MODELS	xsd:boolean		When true, indicates that OLAP mining models can be created and MSOLAP_SUPPORTS_ANALYSIS_SERVICES_DDL MUST be non-zero; otherwise false.
MSOLAP_SUPPORTS_DATA_MINING_DIMENSIONS	xsd:boolean		When true, indicates that data mining dimensions can be created; otherwise false.
MSOLAP_SUPPORTS_DRILLTHROUGH	xsd:boolean		When true, indicates that the service supports drillthrough capabilities; otherwise false.

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The rowset is sorted on SERVICE_NAME.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:simpleType name="uuid">
        <xsd:restriction base="xsd:string">
          <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-
9a-zA-Z]{12}" />
        </xsd:restriction>
      </xsd:simpleType>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="SERVICE_NAME" name="SERVICE_NAME" type="xsd:string" />
          <xsd:element sql:field="SERVICE_TYPE_ID" name="SERVICE_TYPE_ID"
type="xsd:unsignedInt" />
          <xsd:element sql:field="SERVICE_DISPLAY_NAME" name="SERVICE_DISPLAY_NAME"
type="xsd:string" />
          <xsd:element sql:field="SERVICE_GUID" name="SERVICE_GUID" type="uuid" minOccurs="0"
/>
          <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="PREDICTION_LIMIT" name="PREDICTION_LIMIT"
type="xsd:unsignedInt" />
          <xsd:element sql:field="SUPPORTED_DISTRIBUTION_FLAGS"
name="SUPPORTED_DISTRIBUTION_FLAGS" type="xsd:string" />
          <xsd:element sql:field="SUPPORTED_INPUT_CONTENT_TYPES"
name="SUPPORTED_INPUT_CONTENT_TYPES" type="xsd:string" />
          <xsd:element sql:field="SUPPORTED_PREDICTION_CONTENT_TYPES"
name="SUPPORTED_PREDICTION_CONTENT_TYPES" type="xsd:string" />
          <xsd:element sql:field="SUPPORTED_MODELING_FLAGS" name="SUPPORTED_MODELING_FLAGS"
type="xsd:string" />
          <xsd:element sql:field="SUPPORTED_SOURCE_QUERY" name="SUPPORTED_SOURCE_QUERY"
type="xsd:string" />
          <xsd:element sql:field="TRAINING_COMPLEXITY" name="TRAINING_COMPLEXITY"
type="xsd:int" />
          <xsd:element sql:field="PREDICTION_COMPLEXITY" name="PREDICTION_COMPLEXITY"
type="xsd:int" />
          <xsd:element sql:field="EXPECTED_QUALITY" name="EXPECTED_QUALITY" type="xsd:int" />
          <xsd:element sql:field="SCALING" name="SCALING" type="xsd:int" />
          <xsd:element sql:field="ALLOW_INCREMENTAL_INSERT" name="ALLOW_INCREMENTAL_INSERT"
type="xsd:boolean" />
          <xsd:element sql:field="ALLOW_PMML_INITIALIZATION" name="ALLOW_PMML_INITIALIZATION"
type="xsd:boolean" />
          <xsd:element sql:field="CONTROL" name="CONTROL" type="xsd:int" />
          <xsd:element sql:field="ALLOW_DUPLICATE_KEY" name="ALLOW_DUPLICATE_KEY"
type="xsd:boolean" />
          <xsd:element sql:field="VIEWER_TYPE" name="VIEWER_TYPE" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="HELP_FILE" name="HELP_FILE" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="HELP_CONTEXT" name="HELP_CONTEXT" type="xsd:int"
minOccurs="0" />
          <xsd:element sql:field="MSOLAP_SUPPORTS_ANALYSIS_SERVICES_DDL"
name="MSOLAP_SUPPORTS_ANALYSIS_SERVICES_DDL" type="xsd:string" minOccurs="0" />
```


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```
          <xsd:element sql:field="MSOLAP_SUPPORTS_OLAP_MINING_MODELS"
name="MSOLAP_SUPPORTS_OLAP_MINING_MODELS" type="xsd:boolean" minOccurs="0" />
          <xsd:element sql:field="MSOLAP_SUPPORTS_DATA_MINING_DIMENSIONS"
name="MSOLAP_SUPPORTS_DATA_MINING_DIMENSIONS" type="xsd:boolean" minOccurs="0" />
          <xsd:element sql:field="MSOLAP_SUPPORTS_DRILLTHROUGH"
name="MSOLAP_SUPPORTS_DRILLTHROUGH" type="xsd:boolean" minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.20 DMSCHEMA_MINING_SERVICE_PARAMETERS

This schema rowset provides a list of parameters that can be used to configure the behavior of each data mining algorithm that is installed on the server.

3.1.4.2.2.1.3.20.1 Columns

The **DMSCHEMA_MINING_SERVICE_PARAMETERS** rowset contains the following columns.

Name	Type	Restrictions	Description
SERVICE_NAME	xsd:string	Yes	The name of the algorithm.
PARAMETER_NAME	xsd:string	Yes	The name of the parameter.
PARAMETER_TYPE	xsd:string		The type of the parameter.
IS_REQUIRED	xsd:boolean		Returns true if the parameter is required; otherwise, false.
PARAMETER_FLAGS	xsd:unsignedInt		A bitmask that describes the characteristics of the parameter: ▪ DM_PARAMETER_TRAINING (0x0000001) - Indicates that the parameter is used for training. ▪ DM_PARAMETER_PREDICTION (0x00000002) - Indicates that the parameter is used for prediction. ▪ DM_PARAMETER_CONTENT (0x00000003) - Indicates that the parameter is used for content restriction.
DESCRIPTION	xsd:string		A human-readable description of the parameter.
DEFAULT_VALUE	xsd:string		The default value of the parameter. Returns NULL if the default value is not a simple data type.
VALUE_ENUMERATION	xsd:string		An enumerator of possible values for the parameter.
HELP_FILE	xsd:string		The name of the file that contains documentation for this parameter.

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Name	Type	Restrictions	Description
HELP_CONTEXT	xsd:string		The help context ID for this function.

The rowset is sorted on SERVICE_NAME and then sorted on PARAMETER_NAME.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="SERVICE_NAME" name="SERVICE_NAME" type="xsd:string" />
          <xsd:element sql:field="PARAMETER_NAME" name="PARAMETER_NAME" type="xsd:string" />
          <xsd:element sql:field="PARAMETER_TYPE" name="PARAMETER_TYPE" type="xsd:string" />
          <xsd:element sql:field="IS_REQUIRED" name="IS_REQUIRED" type="xsd:boolean" />
          <xsd:element sql:field="PARAMETER_FLAGS" name="PARAMETER_FLAGS"
type="xsd:unsignedInt" />
          <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="DEFAULT_VALUE" name="DEFAULT_VALUE" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="VALUE_ENUMERATION" name="VALUE_ENUMERATION"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="HELP_FILE" name="HELP_FILE" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="HELP_CONTEXT" name="HELP_CONTEXT" type="xsd:int"
minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.21 DMSCHEMA_MINING_FUNCTIONS

This schema rowset describes the data mining functions that are supported by the data mining algorithms that are available on a server that is running Analysis Services.<161>

3.1.4.2.2.1.3.21.1 Columns

The **DMSCHEMA_MINING_FUNCTIONS** rowset contains the following columns.

Name	Type	Restrictions	Description
SERVICE_NAME	xsd:string	Yes	The name of the algorithm.
FUNCTION_NAME	xsd:string	Yes	The name of the function.
FUNCTION_SIGNATURE	xsd:string		The signature of the function.
RETURNS_TABLE	xsd:boolean		When true, indicates that the function returns a table (such as a histogram table). When false,

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Name	Type	Restrictions	Description
			indicates that the function returns scalar content (such as the length of the character argument).
DESCRIPTION	xsd:string		A human-readable description of the function.
HELP_FILE	xsd:string		The name of the file that contains this function's documentation.
HELP_CONTEXT	xsd:string		The help context ID for this function.

The rowset is sorted on SERVICE_NAME and then sorted on FUNCTION_NAME.

The response has the following definition.

```
        <xsd:element name="root">
          <xsd:complexType>
            <xsd:sequence minOccurs="0" maxOccurs="unbounded">
              <xsd:element name="row" type="row" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:complexType name="row">
          <xsd:sequence>
            <xsd:element sql:field="SERVICE_NAME" name="SERVICE_NAME" type="xsd:string" />
            <xsd:element sql:field="FUNCTION_NAME" name="FUNCTION_NAME" type="xsd:string" />
            <xsd:element sql:field="FUNCTION_SIGNATURE" name="FUNCTION_SIGNATURE"
type="xsd:string" />
            <xsd:element sql:field="RETURNS_TABLE" name="RETURNS_TABLE" type="xsd:boolean" />
            <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string" />
            <xsd:element sql:field="HELP_FILE" name="HELP_FILE" type="xsd:string" minOccurs="0"
/>
            <xsd:element sql:field="HELP_CONTEXT" name="HELP_CONTEXT" type="xsd:int"
minOccurs="0" />
          </xsd:sequence>
        </xsd:complexType>
```

3.1.4.2.2.1.3.22 DMSCHEMA_MINING_MODEL_CONTENT

This schema rowset enables the client application to browse the content of a trained data mining model.

3.1.4.2.2.1.3.22.1 Columns

The **DMSCHEMA_MINING_MODEL_CONTENT** rowset contains the following columns.

Name	Type	Restrictions	Description
MODEL_CATALOG	xsd:string	Yes	The catalog name.
MODEL_SCHEMA	xsd:string	Yes	The unqualified schema name.<162>
MODEL_NAME	xsd:string	Yes	The name of the model with which the

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Name	Type	Restrictions	Description
			content described by this row is associated.
ATTRIBUTE_NAME	xsd:string	Yes	The name of the attribute that corresponds to this node.
NODE_NAME	xsd:string	Yes	The name of the node. Currently, this column contains the same value as NODE_UNIQUE_NAME, although this may change in future releases.
NODE_UNIQUE_NAME	xsd:string	Yes	The unique name of the node.
NODE_TYPE	xsd:int	Yes	The type of the node. Will generate one of the following values (third-party data mining algorithms can extend this list): ▪ DM_NODE_TYPE_CLASSIFICATION_TREE_ROOT (2) - The node corresponds to the root of the tree for an output attribute in a classification model. ▪ DM_NODE_TYPE_TREE_INTERIOR (3) - The node corresponds to an interior node (non-leaf/non-root) in the tree for an output attribute in a classification/regression model (including Decision Trees and Time Series models). ▪ DM_NODE_TYPE_TREE_DISTRIBUTION (4) - The node corresponds to a leaf node in the tree for an output attribute in a classification model that includes the distribution of the output attribute at that branch of the tree. ▪ DM_NODE_TYPE_CLUSTER (5) - The node corresponds to a cluster discovered by a clustering model. ▪ DM_NODE_TYPE_UNKNOWN (6) – Not supported. ▪ DM_NODE_TYPE_ITEMSET (7) – The node represents a frequent itemset in an association rules model. ▪ DM_NODE_TYPE_ASSOCIATION_RULE (8) – The node represents a rule discovered by an association rules model. ▪ DM_NODE_TYPE_NB_PREDICTABLE_ATTRIBUTE (9) – The node represents an output attribute in a Naïve Bayes model. ▪ DM_NODE_TYPE_NB_INPUT_ATTRIBUTE (10) – The node represents an input

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Name	Type	Restrictions	Description
			attribute in a Naïve Bayes model. ▪ DM_NODE_TYPE_NB_INPUT_ATTRIBUTE_STATE (11) – The node represents a specific state of an input attribute in a Naïve Bayes model. ▪ DM_NODE_TYPE_SEQUENCE (13) – The node represents a sequence in a Sequence Clustering model. ▪ DM_NODE_TYPE_TRANSITION (14) – The node represents a state transition in a Sequence Clustering model. ▪ DM_NODE_TYPE_TIME_SERIES (15) – The node represents the summary for a time series model. ▪ DM_NODE_TYPE_TS_TREE (16) – The node represents the root of the regression tree for a Time Series model. ▪ DM_NODE_TYPE_NN_SUBNETWORK (17) - The node represents Neural network, subnetwork. ▪ DM_NODE_TYPE_NN_INPUT_LAYER (18) – The node represents Neural network, input layer (parent of input nodes). ▪ DM_NODE_TYPE_NN_HIDDEN_LAYER (19) The node represents Neural network, hidden layer (parent of hidden nodes). ▪ DM_NODE_TYPE_NN_OUTPUT_LAYER (20) – The node represents Neural network, output layer (parent of output nodes). ▪ DM_NODE_TYPE_NN_INPUT_NODE (21) – The node represents Neural network, input node. ▪ DM_NODE_TYPE_NN_HIDDEN_NODE (22) – The node represents Neural network, hidden node. ▪ DM_NODE_TYPE_NN_OUTPUT_NODE (23) – The node represents Neural network, output node. ▪ DM_NODE_TYPE_NN_MARGINAL_STAT_NODE (24) – The node represents Neural network, marginal stat node. ▪

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Name	Type	Restrictions	Description
			DM_NODE_TYPE_REGRESSION_TREE_ROOT (25) – The node corresponds to the root of the tree for a continuous output attribute in a Decision Tree (regression tree) model. ▪ DM_NODE_TYPE_NB_MARGINAL_STAT_NODE (26) – The node represents Neural network, marginal stat node.
NODE_GUID	uuid	Yes	The node GUID. This column is not supported by Analysis Services; it always contains NULL.
NODE_CAPTION	xsd:string	Yes	A label or a caption associated with the node. This property is primarily for display purposes.
CHILDREN_CARDINALITY	xsd:unsignedInt		An estimate of the number of children that the node has.
PARENT_UNIQUE_NAME	xsd:string		The unique name of the node's parent. NULL is returned for any nodes at the root level.
NODE_DESCRIPTION	xsd:string		The human-readable description of the node.
NODE_RULE	xsd:string		An XML description of the rule that is embedded in the node.
MARGINAL_RULE	xsd:string		An XML description of the rule that is moving to the node from the parent node.
NODE_PROBABILITY	xsd:float		The probability associated with this node.
MARGINAL_PROBABILITY	xsd:float		The probability of reaching the node from the parent node.
NODE_DISTRIBUTION	DBTYPE_HCHAPTER		A table that contains the probability histogram of the node.
SUPPORT	xsd:float		The count of the cases that have this attribute-value pair, or that contain this itemset or rule.
PROBABILITY	xsd:float		Indicates the probability for this specific node within the entire model.
VARIANCE	xsd:float		Indicates the variance of the values within the node. By definition, variance is always zero for discrete values. If the model supports continuous values, variance is computed as σ (sigma), using the denominator n, representing the number of cases in the node.
VALUETYPE	xsd:unsignedInt		Indicates the data type of the value or an

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Name	Type	Restrictions	Description
			attribute, and the usage of the value. Certain value types apply only to certain model types: ▪ 1 - Missing ▪ 2 - Existing ▪ 3 - Continuous ▪ 4 - Discrete ▪ 5 - Discretized ▪ 6 - Existing ▪ 7 - Coefficient ▪ 8 - Score gain ▪ 9 - Statistics ▪ 10 - Node unique name ▪ 11 - Intercept ▪ 12 - Periodicity ▪ 13 - Autoregressive order ▪ 14 - Moving average order ▪ 15 - Difference order ▪ 16 - Boolean ▪ 17 - Other ▪ 18 - Prerendered string
NODE_SUPPORT	xsd:float		The number of cases that support this node.
MSOLAP_MODEL_COLUMN	xsd:string		The name of the column from the model definition to which this node pertains.
MSOLAP_NODE_SCORE	xsd:float		The score that was computed for this node.
MSOLAP_NODE_SHORT_CAPTION	xsd:string		A short caption for the node that can be used for display purposes to improve readability.

The rowset is sorted on MODEL_CATALOG, MODEL_SCHEMA, MODEL_NAME and ATTRIBUTE_NAME.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
```


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```
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:simpleType name="uuid">
        <xsd:restriction base="xsd:string">
          <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-
9a-zA-Z]{12}" />
        </xsd:restriction>
      </xsd:simpleType>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="MODEL_CATALOG" name="MODEL_CATALOG" type="xsd:string" />
          <xsd:element sql:field="MODEL_SCHEMA" name="MODEL_SCHEMA" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="MODEL_NAME" name="MODEL_NAME" type="xsd:string" />
          <xsd:element sql:field="ATTRIBUTE_NAME" name="ATTRIBUTE_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="NODE_NAME" name="NODE_NAME" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="NODE_UNIQUE_NAME" name="NODE_UNIQUE_NAME" type="xsd:string"
/>
          <xsd:element sql:field="NODE_TYPE" name="NODE_TYPE" type="xsd:int" />
          <xsd:element sql:field="NODE_GUID" name="NODE_GUID" type="uuid" minOccurs="0" />
          <xsd:element sql:field="NODE_CAPTION" name="NODE_CAPTION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="CHILDREN_CARDINALITY" name="CHILDREN_CARDINALITY"
type="xsd:unsignedInt" />
          <xsd:element sql:field="PARENT_UNIQUE_NAME" name="PARENT_UNIQUE_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="NODE_DESCRIPTION" name="NODE_DESCRIPTION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="NODE_RULE" name="NODE_RULE" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="MARGINAL_RULE" name="MARGINAL_RULE" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="NODE_PROBABILITY" name="NODE_PROBABILITY" type="xsd:double"
minOccurs="0" />
          <xsd:element sql:field="MARGINAL_PROBABILITY" name="MARGINAL_PROBABILITY"
type="xsd:double" minOccurs="0" />
          <xsd:element sql:field="NODE_DISTRIBUTION" name="NODE_DISTRIBUTION" minOccurs="0"
maxOccurs="unbounded">
            <xsd:complexType>
              <xsd:sequence>
                <xsd:element sql:field="ATTRIBUTE_NAME" name="ATTRIBUTE_NAME"
type="xsd:string" minOccurs="0" />
                <xsd:element sql:field="ATTRIBUTE_VALUE" name="ATTRIBUTE_VALUE" minOccurs="0"
/>
                <xsd:element sql:field="SUPPORT" name="SUPPORT" type="xsd:double"
minOccurs="0" />
                <xsd:element sql:field="PROBABILITY" name="PROBABILITY" type="xsd:double"
minOccurs="0" />
                <xsd:element sql:field="VARIANCE" name="VARIANCE" type="xsd:double"
minOccurs="0" />
                <xsd:element sql:field="VALUETYPE" name="VALUETYPE" type="xsd:int"
minOccurs="0" />
              </xsd:sequence>
            </xsd:complexType>
          </xsd:element>
          <xsd:element sql:field="NODE_SUPPORT" name="NODE_SUPPORT" type="xsd:double"
minOccurs="0" />
```


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```
          <xsd:element sql:field="MSOLAP_MODEL_COLUMN" name="MSOLAP_MODEL_COLUMN"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="MSOLAP_NODE_SCORE" name="MSOLAP_NODE_SCORE"
type="xsd:double" minOccurs="0" />
          <xsd:element sql:field="MSOLAP_NODE_SHORT_CAPTION" name="MSOLAP_NODE_SHORT_CAPTION"
type="xsd:string" minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.22.2 Additional Restrictions

In addition to the column restrictions indicated in the previous section, the following restrictions MAY apply to this rowset.

Name	Type	Description
TREE_OPERATION	xsd:unsignedInt	The TREE_OPERATION restriction does not apply to any particular column of the **DMSCHEMA_MINING_MODEL_CONTENT** rowset; rather, it specifies a tree operator. The consumer can specify a NODE_UNIQUE_NAME restriction and the tree operator (ANCESTORS, CHILDREN, SIBLINGS, PARENT, DESCENDANTS, SELF) to obtain the requested set of members. The SELF operator includes the row for the node itself in the list of returned rows. The following list describes the constants that make up the bitmask definition for the TREE_OPERATION restriction. They can be combined by using the logical OR operator. ▪ DMTREEOP_ANCESTORS = 0x00000020 ▪ DMTREEOP_CHILDREN =0x00000001 ▪ DMTREEOP_SIBLINGS = 0x00000002 ▪ DMTREEOP_PARENT = 0x00000004 ▪ DMTREEOP_SELF = 0x00000008 ▪ DMTREEOP_DESCENDANTS =0x00000010

3.1.4.2.2.1.3.23 DMSCHEMA_MINING_MODEL_XML

This schema rowset returns the XML structure of the mining model. The format of the XML string follows the PMML 2.1 standard.

3.1.4.2.2.1.3.23.1 Columns

The **DMSCHEMA_MINING_MODEL_XML** rowset contains the following columns.

Name	Type	Restrictions	Description
MODEL_CATALOG	xsd:string	Yes	The catalog name.
MODEL_SCHEMA	xsd:string	Yes	The unqualified schema name.<163>
MODEL_NAME	xsd:string	Yes	The model name.

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Name	Type	Restrictions	Description
MODEL_TYPE	xsd:string	Yes	The model type.
MODEL_GUID	uuid		The GUID that identifies the model.
MODEL_PMML	xsd:string		An XML representation of the model's content in PMML format.
SIZE	xsd:unsignedInt		The number of bytes in the XML string.
LOCATION	xsd:string		The location of the XML file. It is NULL if a physical file is not used for storage.

The rowset is not sorted.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:simpleType name="uuid">
        <xsd:restriction base="xsd:string">
          <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-
9a-zA-Z]{12}" />
        </xsd:restriction>
      </xsd:simpleType>
      <xsd:complexType name="xmlDocument">
        <xsd:sequence>
          <xsd:any />
        </xsd:sequence>
      </xsd:complexType>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="MODEL_CATALOG" name="MODEL_CATALOG" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="MODEL_SCHEMA" name="MODEL_SCHEMA" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="MODEL_NAME" name="MODEL_NAME" type="xsd:string" />
          <xsd:element sql:field="MODEL_TYPE" name="MODEL_TYPE" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="MODEL_GUID" name="MODEL_GUID" type="uuid" minOccurs="0" />
          <xsd:element sql:field="MODEL_PMML" name="MODEL_PMML" type="xmlDocument"
minOccurs="0" />
          <xsd:element sql:field="SIZE" name="SIZE" type="xsd:unsignedInt" minOccurs="0" />
          <xsd:element sql:field="LOCATION" name="LOCATION" type="xsd:string" minOccurs="0"
/>
        </xsd:sequence>
      </xsd:complexType>
```


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3.1.4.2.2.1.3.24 DMSCHEMA_MINING_MODEL_CONTENT_PMML

This schema rowset returns the XML structure of the mining model. The format of the XML string follows the PMML 2.1 standard.

3.1.4.2.2.1.3.24.1 Columns

The **DMSCHEMA_MINING_MODEL_CONTENT_PMML** rowset contains the following columns.

Name	Type	Restrictions	Description
MODEL_CATALOG	xsd:string	Yes	The catalog name that is populated with the name of the database of which the model is a member.
MODEL_SCHEMA	xsd:string	Yes	The unqualified schema name.<164>
MODEL_NAME	xsd:string	Yes	The model name. This column cannot contain NULL.
MODEL_TYPE	xsd:string	Yes	The model type. It is a server-specific string. It can be NULL.
MODEL_GUID	uuid		The GUID that identifies the model. Servers that do not use GUIDs to identify tables return NULL.
MODEL_PMML	xsd:string		An XML representation of the model's content in PMML format.
SIZE	xsd:unsignedInt		The number of bytes in the XML string.
LOCATION	xsd:string		The location of the XML file. It is NULL if no location is available.

This rowset is not sorted.

The response has the following definition.

```
        <xsd:element name="root">
          <xsd:complexType>
            <xsd:sequence minOccurs="0" maxOccurs="unbounded">
              <xsd:element name="row" type="row" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:simpleType name="uuid">
          <xsd:restriction base="xsd:string">
            <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-
9a-zA-Z]{12}" />
          </xsd:restriction>
        </xsd:simpleType>
        <xsd:complexType name="xmlDocument">
          <xsd:sequence>
            <xsd:any />
          </xsd:sequence>
        </xsd:complexType>
        <xsd:complexType name="row">
          <xsd:sequence>
```


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```
          <xsd:element sql:field="MODEL_CATALOG" name="MODEL_CATALOG" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="MODEL_SCHEMA" name="MODEL_SCHEMA" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="MODEL_NAME" name="MODEL_NAME" type="xsd:string" />
          <xsd:element sql:field="MODEL_TYPE" name="MODEL_TYPE" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="MODEL_GUID" name="MODEL_GUID" type="uuid" minOccurs="0" />
          <xsd:element sql:field="MODEL_PMML" name="MODEL_PMML" type="xmlDocument"
minOccurs="0" />
          <xsd:element sql:field="SIZE" name="SIZE" type="xsd:unsignedInt" minOccurs="0" />
          <xsd:element sql:field="LOCATION" name="LOCATION" type="xsd:string" minOccurs="0"
/>
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.25 DMSCHEMA_MINING_MODELS

This schema rowset enumerates the data mining models that are deployed on the server.

3.1.4.2.2.1.3.25.1 Columns

The **DMSCHEMA_MINING_MODELS** rowset contains the following columns.

Name	Type	Restrictions	Description
MODEL_CATALOG	xsd:string	Yes	The catalog name.
MODEL_SCHEMA	xsd:string	Yes	The unqualified schema name.<165>
MODEL_NAME	xsd:string	Yes	The mining model name.
MODEL_TYPE	xsd:string	Yes	The model type.
MODEL_GUID	uuid		The GUID of the model.
DESCRIPTION	xsd:string		The human-readable description of the model.
MODEL_PROPID	xsd:unsignedInt		The property ID of the model.
DATE_CREATED	xsd:dateTime		The date on which the model was created.
DATE_MODIFIED	xsd:dateTime		The date on which the model definition was last modified.
SERVICE_TYPE_ID	xsd:unsignedInt	Yes	An enumeration that identifies the type of data mining algorithm that is used by the model. This type can be one of the following values: ▪ DM_SERVICETYPE_CLASSIFICA

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Name	Type	Restrictions	Description
			TION (0x1) ▪ DM_SERVICETYPE_ CLUSTERING (0x2) ▪ DM_SERVICETYPE_ ASSOCIATION (0x4) ▪ DM_SERVICETYPE_ DENSITY_ESTIMATE (0x8) ▪ DM_SERVICETYPE_SEQUENCE (0x10)
SERVICE_NAME	xsd:string	Yes	The server-specific name for the data mining algorithm that is used by the model.
CREATION_STATEMENT	xsd:string		The statement that was used to create the mining model.
PREDICTION_ENTITY	xsd:string		A comma-delimited list that indicates which mining columns can be predicted.
IS_POPULATED	xsd:boolean		Indicates whether the model is populated. The value is true if the model is populated; otherwise, false.
MINING_PARAMETERS	xsd:string		A comma-delimited list of the parameters that were used when the model was created.
MINING_STRUCTURE	xsd:string	Yes	The ID of the mining structure on which the model is based.
LAST_PROCESSED	xsd:dateTime		The date when the model was last processed.
MSOLAP_IS_DRILLTHROUGH_ENABLED	xsd:boolean		When true, indicates that the model supports drillthrough; otherwise false.
FILTER	xsd:string		The filter expression that is associated with the mining model. NULL or empty string indicates that no filter is applied.
TRAINING_SET_SIZE	xsd:unsignedLarge		The number of cases that are contained in the mining model training set after the structure has been processed and any filters have been applied to the model.

The rowset is sorted on MODEL_CATALOG, MODEL_SCHEMA, and MODEL_NAME.

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The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:simpleType name="uuid">
        <xsd:restriction base="xsd:string">
          <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-
9a-zA-Z]{12}" />
        </xsd:restriction>
      </xsd:simpleType>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="MODEL_CATALOG" name="MODEL_CATALOG" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="MODEL_SCHEMA" name="MODEL_SCHEMA" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="MODEL_NAME" name="MODEL_NAME" type="xsd:string" />
          <xsd:element sql:field="MODEL_TYPE" name="MODEL_TYPE" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="MODEL_GUID" name="MODEL_GUID" type="uuid" minOccurs="0" />
          <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="MODEL_PROPID" name="MODEL_PROPID" type="xsd:unsignedInt"
minOccurs="0" />
          <xsd:element sql:field="DATE_CREATED" name="DATE_CREATED" type="xsd:dateTime"
minOccurs="0" />
          <xsd:element sql:field="DATE_MODIFIED" name="DATE_MODIFIED" type="xsd:dateTime"
minOccurs="0" />
          <xsd:element sql:field="SERVICE_TYPE_ID" name="SERVICE_TYPE_ID"
type="xsd:unsignedInt" />
          <xsd:element sql:field="SERVICE_NAME" name="SERVICE_NAME" type="xsd:string" />
          <xsd:element sql:field="CREATION_STATEMENT" name="CREATION_STATEMENT"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="PREDICTION_ENTITY" name="PREDICTION_ENTITY"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="IS_POPULATED" name="IS_POPULATED" type="xsd:boolean" />
          <xsd:element sql:field="MINING_PARAMETERS" name="MINING_PARAMETERS"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="MINING_STRUCTURE" name="MINING_STRUCTURE" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="LAST_PROCESSED" name="LAST_PROCESSED" type="xsd:dateTime"
minOccurs="0" />
          <xsd:element sql:field="MSOLAP_IS_DRILLTHROUGH_ENABLED"
name="MSOLAP_IS_DRILLTHROUGH_ENABLED" type="xsd:boolean" />
          <xsd:element sql:field="FILTER" name="FILTER" type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="TRAINING_SET_SIZE" name="TRAINING_SET_SIZE"
type="xsd:unsignedLong" minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```


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3.1.4.2.2.1.3.26 DMSCHEMA_MINING_COLUMNS

This schema rowset describes the individual columns of all defined data mining models that are deployed on the server.

3.1.4.2.2.1.3.26.1 Columns

The **DMSCHEMA_MINING_COLUMNS** rowset contains the following columns.

Name	Type	Restrictions	Description
MODEL_CATALOG	xsd:string	Yes	The catalog name.
MODEL_SCHEMA	xsd:string	Yes	The unqualified schema name.<166>
MODEL_NAME	xsd:string	Yes	The mining model name.
COLUMN_NAME	xsd:string	Yes	The name of the column.
COLUMN_GUID	uuid		The column GUID.
COLUMN_PROPID	xsd:unsignedInt		The column property ID.
ORDINAL_POSITION	xsd:unsignedInt		The ordinal position of the column. Columns are numbered starting from 1. This column contains NULL if there is no stable ordinal value for the column.
COLUMN_HAS_DEFAULT	xsd:boolean		A Boolean that indicates whether the column has a default value. True if the column has a default value; otherwise false.
COLUMN_DEFAULT	xsd:string		The default value of the column. If the default value is the NULL value, COLUMN_HAS_DEFAULT contains TRUE, and this column contains NULL.
COLUMN_FLAGS	xsd:unsignedInt		A bitmask that describes characteristics of the column. The bitmask is the same as is described for the COLUMN_FLAGS column in section 3.1.4.2.2.1.3.3.This column is never empty.
IS_NULLABLE	xsd:boolean		A Boolean that indicates whether the column is nullable. False if the column is known not to be nullable; otherwise,

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Name	Type	Restrictions	Description
			true.
DATA_TYPE	xsd:unsignedShort		This enumeration is the same as LEVEL_DBTYPE for MDSCHEMA_LEVELS. (See 3.1.4.2.2.1.3.8)
TYPE_GUID	uuid		The GUID of the column's data type.
CHARACTER_MAXIMUM_LENGTH	xsd:unsignedInt		The maximum possible length of a value in the column. For character, binary, or bit columns, this is one of the following: ▪ The maximum length of the column in characters, bytes, or bits, respective to the column type, if a length is defined. For example, a CHAR(5) column in an SQL table has a maximum length of 5. ▪ The maximum length of the data type in characters, bytes, or bits, respective to the column type, if the column does not have a defined length. ▪ Zero (0) if neither the column nor the data type has a defined maximum length. ▪ NULL for all other types of columns.
CHARACTER_OCTET_LENGTH	xsd:unsignedInt		The maximum length in octets (bytes) of the column, if the type of the column is **Character** or **Binary**. A value of zero (0) means the column has no maximum length. This column contains NULL for all other types of columns.
NUMERIC_PRECISION	xsd:unsignedShort		The maximum precision of the column if the column's data type is of a numeric data type other than DBTYPE_VARNUMERIC. NULL if the column's data type is not numeric or is DBTYPE_VARNUMERIC.

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Name	Type	Restrictions	Description
			The precision of columns with a data type of DBTYPE_DECIMAL or DBTYPE_NUMERIC depends on the column definition.
NUMERIC_SCALE	xsd:Short		The number of digits to the right of the decimal point if the column's type indicator is DBTYPE_DECIMAL, DBTYPE_NUMERIC, or DBTYPE_VARNUMERIC. Otherwise, this column contains NULL.<167>
DATETIME_PRECISION	xsd:unsignedInt		The date/time precision (number of digits in the fractional seconds portion) of the column if the column data type is a **DateTime** or **Interval** type; otherwise, NULL.
CHARACTER_SET_CATALOG	xsd:string		The catalog name in which the character set is defined.<168>
CHARACTER_SET_SCHEMA	xsd:string		An unqualified schema name in which the character set is defined.<169>
CHARACTER_SET_NAME	xsd:string		The character set name.
COLLATION_CATALOG	xsd:string		The catalog name in which the collation is defined.<170>
COLLATION_SCHEMA	xsd:string		An unqualified schema name in which the collation is defined.<171>
COLLATION_NAME	xsd:string		The collation name.<172>
DOMAIN_CATALOG	xsd:string		The catalog name in which the domain is defined.<173>
DOMAIN_SCHEMA	xsd:string		The unqualified schema name in which the domain is defined.<174>
DOMAIN_NAME	xsd:string		The domain name.<175>
DESCRIPTION	xsd:string		The human-readable description of the column.<176>
DISTRIBUTION_FLAG	xsd:string		A description of the statistical distribution of the column. This column contains one of

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Name	Type	Restrictions	Description
			the following: ▪ NORMAL ▪ LOG_NORMAL ▪ UNIFORM
CONTENT_TYPE	xsd:string		A description of the content of the column. This column contains one of the following: ▪ KEY ▪ DISCRETE ▪ CONTINUOUS ▪ DISCRETIZED(arguments) ▪ ORDERED ▪ KEY TIME ▪ CYCLICAL ▪ PROBABILITY ▪ VARIANCE ▪ STDEV ▪ SUPPORT ▪ PROBABILITY_VARIANCE ▪ PROBABILITY_STDEV ▪ KEY SEQUENCE
MODELING_FLAG	xsd:string		A comma-delimited list of flags. The defined flags are as follows: MODEL_EXISTENCE_ONLY REGRESSOR Algorithm-specific modeling flags can also be contained in this column.
IS_RELATED_TO_KEY	xsd:boolean		A Boolean that indicates whether the column is related to the key. True if this column is related to the key. If the key is a single column, the RELATED_ATTRIBUTE field can optionally contain its

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Name	Type	Restrictions	Description
			column name; otherwise false.
RELATED_ATTRIBUTE	xsd:string		The name of the target column to which the current column either relates or is a special property.
IS_INPUT	xsd:boolean		A Boolean that indicates whether the column is an input column. True if this is an input column; otherwise false.
IS_PREDICTABLE	xsd:boolean		A Boolean that indicates whether the column is predictable. True if the column is predictable; otherwise false.
CONTAINING_COLUMN	xsd:string		The name of the TABLE column that contains this column. This column contains NULL if the column is not contained in another column.
PREDICTION_SCALAR_FUNCTIONS	xsd:string		A comma-delimited list of scalar functions that can be performed on the column.
PREDICTION_TABLE_FUNCTIONS	xsd:string		A comma-delimited list of functions that can be applied to the column. The functions should return a table. The list has the following format: <function name>(<column1> [, <column2>], ...) The format allows the client application to determine the signature (list of parameters) for the respective function.
IS_POPULATED	xsd:boolean		A Boolean that indicates whether the column has been trained with a set of possible values. True if the column has been trained with a set of possible values. False if the column is not populated.
PREDICTION_SCORE	xsd:double		The score of the model on predicting the column. Score is used to measure the accuracy of a model.

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Name	Type	Restrictions	Description
SOURCE_COLUMN	xsd:string		The name of the source mining structure column for the current mining column.
FILTER	xsd:string		The filter that was used in definition of the nested table. If the column is a scalar column, the value should always be NULL or an empty string. If the column is a nested table, NULL or an empty string indicates that no filter is applied to the nested table.

The rowset is sorted on MODEL_CATALOG, MODEL_SCHEMA, MODEL_NAME, and COLUMN_NAME.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:simpleType name="uuid">
        <xsd:restriction base="xsd:string">
          <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-
9a-zA-Z]{12}" />
        </xsd:restriction>
      </xsd:simpleType>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="MODEL_CATALOG" name="MODEL_CATALOG" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="MODEL_SCHEMA" name="MODEL_SCHEMA" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="MODEL_NAME" name="MODEL_NAME" type="xsd:string" />
          <xsd:element sql:field="COLUMN_NAME" name="COLUMN_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="COLUMN_GUID" name="COLUMN_GUID" type="uuid" minOccurs="0"
/>
          <xsd:element sql:field="COLUMN_PROPID" name="COLUMN_PROPID" type="xsd:unsignedInt"
minOccurs="0" />
          <xsd:element sql:field="ORDINAL_POSITION" name="ORDINAL_POSITION"
type="xsd:unsignedInt" minOccurs="0" />
          <xsd:element sql:field="COLUMN_HAS_DEFAULT" name="COLUMN_HAS_DEFAULT"
type="xsd:boolean" />
          <xsd:element sql:field="COLUMN_DEFAULT" name="COLUMN_DEFAULT" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="COLUMN_FLAGS" name="COLUMN_FLAGS" type="xsd:unsignedInt" />
          <xsd:element sql:field="IS_NULLABLE" name="IS_NULLABLE" type="xsd:boolean" />
          <xsd:element sql:field="DATA_TYPE" name="DATA_TYPE" type="xsd:unsignedShort" />
          <xsd:element sql:field="TYPE_GUID" name="TYPE_GUID" type="uuid" minOccurs="0" />
          <xsd:element sql:field="CHARACTER_MAXIMUM_LENGTH" name="CHARACTER_MAXIMUM_LENGTH"
type="xsd:unsignedInt" minOccurs="0" />
```


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```
          <xsd:element sql:field="CHARACTER_OCTET_LENGTH" name="CHARACTER_OCTET_LENGTH"
type="xsd:unsignedInt" minOccurs="0" />
          <xsd:element sql:field="NUMERIC_PRECISION" name="NUMERIC_PRECISION"
type="xsd:unsignedShort" minOccurs="0" />
          <xsd:element sql:field="NUMERIC_SCALE" name="NUMERIC_SCALE" type="xsd:short"
minOccurs="0" />
          <xsd:element sql:field="DATETIME_PRECISION" name="DATETIME_PRECISION"
type="xsd:unsignedInt" minOccurs="0" />
          <xsd:element sql:field="CHARACTER_SET_CATALOG" name="CHARACTER_SET_CATALOG"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="CHARACTER_SET_SCHEMA" name="CHARACTER_SET_SCHEMA"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="CHARACTER_SET_NAME" name="CHARACTER_SET_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="COLLATION_CATALOG" name="COLLATION_CATALOG"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="COLLATION_SCHEMA" name="COLLATION_SCHEMA" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="COLLATION_NAME" name="COLLATION_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="DOMAIN_CATALOG" name="DOMAIN_CATALOG" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="DOMAIN_SCHEMA" name="DOMAIN_SCHEMA" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="DOMAIN_NAME" name="DOMAIN_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="DISTRIBUTION_FLAG" name="DISTRIBUTION_FLAG"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="CONTENT_TYPE" name="CONTENT_TYPE" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="MODELING_FLAG" name="MODELING_FLAG" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="IS_RELATED_TO_KEY" name="IS_RELATED_TO_KEY"
type="xsd:boolean" />
          <xsd:element sql:field="RELATED_ATTRIBUTE" name="RELATED_ATTRIBUTE"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="IS_INPUT" name="IS_INPUT" type="xsd:boolean" />
          <xsd:element sql:field="IS_PREDICTABLE" name="IS_PREDICTABLE" type="xsd:boolean" />
          <xsd:element sql:field="CONTAINING_COLUMN" name="CONTAINING_COLUMN"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="PREDICTION_SCALAR_FUNCTIONS"
name="PREDICTION_SCALAR_FUNCTIONS" type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="PREDICTION_TABLE_FUNCTIONS"
name="PREDICTION_TABLE_FUNCTIONS" type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="IS_POPULATED" name="IS_POPULATED" type="xsd:boolean" />
          <xsd:element sql:field="PREDICTION_SCORE" name="PREDICTION_SCORE" type="xsd:double"
minOccurs="0" />
          <xsd:element sql:field="SOURCE_COLUMN" name="SOURCE_COLUMN" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="FILTER" name="FILTER" type="xsd:string" minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.27 DMSCHEMA_MINING_STRUCTURES

This schema rowset enumerates information about the mining structures in the current catalog.

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3.1.4.2.2.1.3.27.1 Columns

The **DMSCHEMA_MINING_STRUCTURES** rowset contains the following columns.

Name	Type	Restrictions	Description
STRUCTURE_CATALOG	xsd:string	Yes	The catalog name.
STRUCTURE_SCHEMA	xsd:string	Yes	The unqualified schema name.<177>
STRUCTURE_NAME	xsd:string	Yes	The structure name.
STRUCTURE_GUID	uuid		A GUID that uniquely identifies the structure.
DESCRIPTION	xsd:string		The human-readable description of the structure.
STRUCTURE_PROPID	xsd:unsignedInt		The property ID of the structure. NULL if not supported by the server.
DATE_CREATED	xsd:dateTime		The date when the structure was created. NULL if not available from the server.
DATE_MODIFIED	xsd:dateTime		The date when the structure was last modified. NULL if not available from the server.
CREATION_STATEMENT	xsd:string		This column is optional. The statement that was used to create the original data mining model.
IS_POPULATED	xsd:boolean		A Boolean that indicates whether the structure is populated. True if the structure is populated; false otherwise.
LAST_PROCESSED	xsd:dateTime		The date when the structure was last processed. NULL if not available from the server.
HOLDOUT_MAXPERCENT	xsd:unsignedByte		A user-specified value that indicates the maximum percentage of the input cases that are held out as the test set. Zero or NULL indicates no limit.
HOLDOUT_MAXCASES	xsd:unsignedLarge		A user-specified value that indicates the maximum number of the input cases that are held out as the test set. Zero or NULL indicates no limit.
HOLDOUT_SEED	xsd:unsignedLarge		A user-specified value that is used as the seed for repeatable partitioning. Zero indicates that a hash of the mining structure ID is used as the seed.
HOLDOUT_ACTUAL_SIZE	xsd:unsignedLarge		If the mining structure is processed,

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Name	Type	Restrictions	Description
			this column indicates the actual size of the test data set, expressed in number of cases. NULL indicates that the mining structure is not processed.

The rowset is sorted on STRUCTURE_CATALOG, STRUCTURE_SCHEMA, and STRUCTURE_NAME.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:simpleType name="uuid">
        <xsd:restriction base="xsd:string">
          <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-
9a-zA-Z]{12}" />
        </xsd:restriction>
      </xsd:simpleType>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="STRUCTURE_CATALOG" name="STRUCTURE_CATALOG"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="STRUCTURE_SCHEMA" name="STRUCTURE_SCHEMA" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="STRUCTURE_NAME" name="STRUCTURE_NAME" type="xsd:string" />
          <xsd:element sql:field="STRUCTURE_GUID" name="STRUCTURE_GUID" type="uuid"
minOccurs="0" />
          <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="STRUCTURE_PROPID" name="STRUCTURE_PROPID"
type="xsd:unsignedInt" minOccurs="0" />
          <xsd:element sql:field="DATE_CREATED" name="DATE_CREATED" type="xsd:dateTime"
minOccurs="0" />
          <xsd:element sql:field="DATE_MODIFIED" name="DATE_MODIFIED" type="xsd:dateTime"
minOccurs="0" />
          <xsd:element sql:field="CREATION_STATEMENT" name="CREATION_STATEMENT"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="IS_POPULATED" name="IS_POPULATED" type="xsd:boolean" />
          <xsd:element sql:field="LAST_PROCESSED" name="LAST_PROCESSED" type="xsd:dateTime"
minOccurs="0" />
          <xsd:element sql:field="HOLDOUT_MAXPERCENT" name="HOLDOUT_MAXPERCENT"
type="xsd:unsignedByte" minOccurs="0" />
          <xsd:element sql:field="HOLDOUT_MAXCASES" name="HOLDOUT_MAXCASES"
type="xsd:unsignedLong" minOccurs="0" />
          <xsd:element sql:field="HOLDOUT_SEED" name="HOLDOUT_SEED" type="xsd:unsignedLong"
minOccurs="0" />
          <xsd:element sql:field="HOLDOUT_ACTUAL_SIZE" name="HOLDOUT_ACTUAL_SIZE"
type="xsd:unsignedLong" minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```


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3.1.4.2.2.1.3.28 DMSCHEMA_MINING_STRUCTURE_COLUMNS

This schema rowset describes the individual columns of all mining structures that are deployed on the server.

3.1.4.2.2.1.3.28.1 Columns

The **DMSCHEMA_MINING_STRUCTURE_COLUMNS** rowset contains the following columns.

Name	Type	Restrictions	Description
STRUCTURE_CATALOG	xsd:string	Yes	The catalog name.
STRUCTURE_SCHEMA	xsd:string	Yes	The unqualified schema name.<178>
STRUCTURE_NAME	xsd:string	Yes	The structure name. This column cannot contain a NULL.
COLUMN_NAME	xsd:string	Yes	The name of the column. Uniqueness is guaranteed only among columns that share the same pattern. For example, two nested columns may have the same name if they belong to two different nested tables inside the same structure.
COLUMN_GUID	uuid		The column GUID.
COLUMNS_PROPID	xsd:unsignedInt		The column property ID.
ORDINAL_POSITION	xsd:unsignedInt		The ordinal of the column. Columns are numbered starting from 1. NULL if there is no stable ordinal value for the column.
COLUMN_HASDEFAULT	xsd:boolean		A Boolean that indicates whether this column has a default value. True if the column has a default value. False if the column does not have a default value or if it is unknown whether the column has a default value.<179>
COLUMN_DEFAULT	xsd:string		The default value of the column.<180>
COLUMN_FLAGS	xsd:unsignedInt		A bitmask that describes column characteristics. The DBCOLUMNFLAGS enumerated type specifies the bits in the bitmask. This column cannot contain a NULL value. Valid values include the following: ▪ DBCOLUMNFLAGS_ISNULLABL

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Name	Type	Restrictions	Description
			E (0x20) ▪ DBCOLUMNFLAGS_MAYBENULL (0x40) ▪ DBCOLUMNFLAGS_ISLONG (0x80)
IS_NULLABLE	xsd:boolean		A Boolean that indicates whether this column has a default value. True if the column can contain NULL; otherwise false.
DATA_TYPE	xsd:unsignedShort		The indicator of the column's data type. ▪ "TABLE" = DBTYPE_HCHAPTER (16) ▪ "TEXT" = DBTYPE_WSTR (130) ▪ "LONG" = DBTYPE_I8 (20) ▪ "DOUBLE" = DBTYPE_R8 (5) ▪ "DATE" = DBTYPE_DATE (7)
TYPE_GUID	uuid		The GUID of the column's data type. Servers that do not use GUIDs to identify data types should return NULL in this column.
CHARACTER_MAXIMUM_LENGTH	xsd:unsignedInt		The maximum possible length of a value in the column. For character, binary, or bit columns, this is one of the following: The maximum length of the column in characters, bytes, or bits, respectively, if the length is defined. For example, a CHAR(5) column in an SQL table has a maximum length of 5. The maximum length of the data type in characters, bytes, or bits, respectively, if the column does not have a defined length. Zero (0) if neither the column nor the data type has a defined maximum length. NULL for all other types of columns.
CHARACTER_OCTET_LENGTH	xsd:unsignedInt		The maximum length in octets

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Name	Type	Restrictions	Description
			(bytes) of the column, if the type of the column is character or binary. A value of zero (0) means the column has no maximum length. NULL for all other types of columns.
NUMERIC_PRECISION	xsd:unsignedShort		The maximum precision of the column if the column's data type is of a numeric data type other than DBTYPE_VARNUMERIC; NULL if the column's data type is not numeric or is DBTYPE_VARNUMERIC. The precision of columns with a data type of DBTYPE_DECIMAL or DBTYPE_NUMERIC depends on the definition of the column.
NUMERIC_SCALE	xsd:Short		The number of digits to the right of the decimal point if the column's type indicator is DBTYPE_DECIMAL, DBTYPE_NUMERIC, or DBTYPE_VARNUMERIC. Otherwise, this is NULL.<181>
DATETIME_PRECISION	xsd:unsignedInt		The date/time precision (the number of digits in the fractional seconds portion) of the column if the column is a DateTime or Interval type. If the column's data type is not DateTime, this is NULL.
CHARACTER_SET_CATALOG	xsd:string		The catalog name in which the character set is defined. NULL if the server does not support catalogs or different character sets.
CHARACTER_SET_SCHEMA	xsd:string		The unqualified schema name in which the character set is defined.<182>
CHARACTER_SET_NAME	xsd:string		The character set name. NULL if the server does not support different character sets.
COLLATION_CATALOG	xsd:string		The catalog name in which the collation is defined. NULL if the server does not support catalogs or different collations.
COLLATION_SCHEMA	xsd:string		The unqualified schema name in which the collation is defined. NULL if the server does not support schemas or different

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Name	Type	Restrictions	Description
			collations.
COLLATION_NAME	xsd:string		The collation name. NULL if the server does not support different collations.
DOMAIN_CATALOG	xsd:string		The catalog name in which the domain is defined. NULL if the server does not support catalogs or domains.
DOMAIN_SCHEMA	xsd:string		The unqualified schema name in which the domain is defined. NULL if the server does not support schemas or domains.
DOMAIN_NAME	xsd:string		The domain name. NULL if the server does not support domains.
DESCRIPTION	xsd:string		The human-readable description of the column. NULL if no description is associated with the column.
DISTRIBUTION_FLAG	xsd:string		The distribution of the mining structure column. This value is one of the following: ▪ NORMAL ▪ LOG_NORMAL ▪ UNIFORM
CONTENT_TYPE	xsd:string		The content type of the mining structure column. This value is one of the following: ▪ KEY ▪ DISCRETE ▪ CONTINUOUS ▪ DISCRETIZED(arguments) ▪ ORDERED ▪ SEQUENCE_TIME ▪ CYCLICAL ▪ PROBABILITY ▪ VARIANCE ▪ STDEV

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Name	Type	Restrictions	Description
			▪ SUPPORT ▪ PROBABILITY_VARIANCE ▪ PROBABILITY_STDEV
MODELING_FLAG	xsd:string		A comma-delimited list of modeling flags. The only supported flag for a structure column is "NOT NULL".
IS_RELATED_TO_KEY	xsd:boolean		A Boolean that indicates whether this column is related to the key. True if this column is related to the key; otherwise false. If the key is a single column, the RELATED_ATTRIBUTE field optionally may contain its column name.
RELATED_ATTRIBUTE	xsd:string		The name of the target column that the current column relates to or is a special property of.
CONTAINING_COLUMN	xsd:string		The name of the TABLE column containing this column. NULL if no table contains the column.
IS_POPULATED	xsd:boolean		A Boolean that indicates whether this column has learned a set of possible values. True if the column has learned a set of possible values; otherwise false.

The rowset is sorted on STRUCTURE_CATALOG, STRUCTURE_SCHEMA, STRUCTURE_NAME, and COLUMN_NAME.

The response has the following definition.

```
        <xsd:element name="root">
          <xsd:complexType>
            <xsd:sequence minOccurs="0" maxOccurs="unbounded">
              <xsd:element name="row" type="row" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:simpleType name="uuid">
          <xsd:restriction base="xsd:string">
            <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-
9a-zA-Z]{12}" />
          </xsd:restriction>
        </xsd:simpleType>
        <xsd:complexType name="row">
          <xsd:sequence>
```


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```
          <xsd:element sql:field="STRUCTURE_CATALOG" name="STRUCTURE_CATALOG"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="STRUCTURE_SCHEMA" name="STRUCTURE_SCHEMA" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="STRUCTURE_NAME" name="STRUCTURE_NAME" type="xsd:string" />
          <xsd:element sql:field="COLUMN_NAME" name="COLUMN_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="COLUMN_GUID" name="COLUMN_GUID" type="uuid" minOccurs="0"
/>
          <xsd:element sql:field="COLUMN_PROPID" name="COLUMN_PROPID" type="xsd:unsignedInt"
minOccurs="0" />
          <xsd:element sql:field="ORDINAL_POSITION" name="ORDINAL_POSITION"
type="xsd:unsignedInt" minOccurs="0" />
          <xsd:element sql:field="COLUMN_HASDEFAULT" name="COLUMN_HASDEFAULT"
type="xsd:boolean" />
          <xsd:element sql:field="COLUMN_DEFAULT" name="COLUMN_DEFAULT" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="COLUMN_FLAGS" name="COLUMN_FLAGS" type="xsd:unsignedInt" />
          <xsd:element sql:field="IS_NULLABLE" name="IS_NULLABLE" type="xsd:boolean" />
          <xsd:element sql:field="DATA_TYPE" name="DATA_TYPE" type="xsd:unsignedShort" />
          <xsd:element sql:field="TYPE_GUID" name="TYPE_GUID" type="uuid" minOccurs="0" />
          <xsd:element sql:field="CHARACTER_MAXIMUM_LENGTH" name="CHARACTER_MAXIMUM_LENGTH"
type="xsd:unsignedInt" minOccurs="0" />
          <xsd:element sql:field="CHARACTER_OCTET_LENGTH" name="CHARACTER_OCTET_LENGTH"
type="xsd:unsignedInt" minOccurs="0" />
          <xsd:element sql:field="NUMERIC_PRECISION" name="NUMERIC_PRECISION"
type="xsd:unsignedShort" minOccurs="0" />
          <xsd:element sql:field="NUMERIC_SCALE" name="NUMERIC_SCALE" type="xsd:short"
minOccurs="0" />
          <xsd:element sql:field="DATETIME_PRECISION" name="DATETIME_PRECISION"
type="xsd:unsignedInt" minOccurs="0" />
          <xsd:element sql:field="CHARACTER_SET_CATALOG" name="CHARACTER_SET_CATALOG"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="CHARACTER_SET_SCHEMA" name="CHARACTER_SET_SCHEMA"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="CHARACTER_SET_NAME" name="CHARACTER_SET_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="COLLATION_CATALOG" name="COLLATION_CATALOG"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="COLLATION_SCHEMA" name="COLLATION_SCHEMA" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="COLLATION_NAME" name="COLLATION_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="DOMAIN_CATALOG" name="DOMAIN_CATALOG" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="DOMAIN_SCHEMA" name="DOMAIN_SCHEMA" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="DOMAIN_NAME" name="DOMAIN_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="DISTRIBUTION_FLAG" name="DISTRIBUTION_FLAG"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="CONTENT_TYPE" name="CONTENT_TYPE" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="MODELING_FLAG" name="MODELING_FLAG" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="IS_RELATED_TO_KEY" name="IS_RELATED_TO_KEY"
type="xsd:boolean" />
          <xsd:element sql:field="RELATED_ATTRIBUTE" name="RELATED_ ATTRIBUTE"
type="xsd:string" minOccurs="0" />
```


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```
          <xsd:element sql:field="CONTAINING_COLUMN" name="CONTAINING_COLUMN"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="IS_POPULATED" name="IS_POPULATED" type="xsd:boolean" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.29 DISCOVER_PROPERTIES

This schema rowset returns a list of information and values about the properties that are supported by the server for the specified data source.

3.1.4.2.2.1.3.29.1 Columns

The **DISCOVER_PROPERTIES** rowset contains the following columns.

Name	Type	Restrictions	Description
PropertyName	xsd:string	Yes	The name of the property.
PropertyDescription	xsd:string		A description of the property.
PropertyType	xsd:string		The XSD data type of the property.
PropertyAccessType	xsd:string		The access for the property. The value can be Read, Write, or ReadWrite.
IsRequired	xsd:boolean		When true, indicates that a property is required; otherwise false.

The **Value** element MAY be absent from individual rows, depending on the value of the **IsRequired** element, as follows:

- If the **IsRequired** element has a value of true, the row MUST contain the **Value** element.
- If the **IsRequired** element has a value of false, the row MAY contain the **Value** element.

Name	Type	Restrictions	Description
Value	xsd:string		The current value of the property.

This schema rowset is not sorted.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
```


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```
          <xsd:element sql:field="PropertyName" name="PropertyName" type="xsd:string" />
          <xsd:element sql:field="PropertyDescription" name="PropertyDescription"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="PropertyType" name="PropertyType" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="PropertyAccessType" name="PropertyAccessType"
type="xsd:string" />
          <xsd:element sql:field="IsRequired" name="IsRequired" type="xsd:boolean"
minOccurs="0" />
          <xsd:element sql:field="Value" name="Value" type="xsd:string" minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.30 DISCOVER_LITERALS

This schema rowset returns information about literals supported by the server.

3.1.4.2.2.1.3.30.1 Columns

The **DISCOVER_LITERALS** rowset contains the following columns.

Name	Type	Restrictions	Description
LiteralName	xsd:string	Yes	The name of the literal.
LiteralValue	xsd:string		The literal value.
LiteralInvalidChars	xsd:string		The characters that are not valid in the literal.
LiteralInvalidStartingChars	xsd:string		The characters that are not valid as the first character of the literal.
LiteralMaxLength	xsd:int		The maximum number of characters in the literal. If there is no maximum or the maximum is unknown, the value is -1.
LiteralNameEnumValue	xsd:int		The value is one of the following: ▪ DBLITERAL_INVALID = 0 ▪ DBLITERAL_BINARY_LITERAL = 1 ▪ DBLITERAL_CATALOG_NAME = 2 ▪ DBLITERAL_CATALOG_SEPARATOR = 3 ▪ DBLITERAL_CHAR_LITERAL = 4 ▪ DBLITERAL_COLUMN_ALIAS = 5 ▪ DBLITERAL_COLUMN_NAME = 6 ▪ DBLITERAL_CORRELATION_NAME = 7 ▪ DBLITERAL_CURSOR_NAME = 8

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Name	Type	Restrictions	Description
			▪ DBLITERAL_ESCAPE_PERCENT = 9 ▪ DBLITERAL_ESCAPE_UNDERSCORE = 10 ▪ DBLITERAL_INDEX_NAME = 11 ▪ DBLITERAL_LIKE_PERCENT = 12 ▪ DBLITERAL_LIKE_UNDERSCORE = 13 ▪ DBLITERAL_PROCEDURE_NAME = 14 ▪ DBLITERAL_QUOTE_PREFIX = 15 ▪ DBLITERAL_SCHEMA_NAME = 16 ▪ DBLITERAL_TABLE_NAME = 17 ▪ DBLITERAL_TEXT_COMMAND = 18 ▪ DBLITERAL_USER_NAME = 19 ▪ DBLITERAL_VIEW_NAME = 20 ▪ DBLITERAL_CUBE_NAME = 21 ▪ DBLITERAL_DIMENSION_NAME = 22 ▪ DBLITERAL_HIERARCHY_NAME = 23 ▪ DBLITERAL_LEVEL_NAME = 24 ▪ DBLITERAL_MEMBER_NAME = 25 ▪ DBLITERAL_PROPERTY_NAME = 26 ▪ DBLITERAL_SCHEMA_SEPARATOR = 27 ▪ DBLITERAL_QUOTE_SUFFIX = 28 ▪ DBLITERAL_ESCAPE_PERCENT_SUFFIX = 29 ▪ DBLITERAL_ESCAPE_UNDERSCORE_SUFFIX = 30

This schema rowset is not sorted.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
```


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```
          <xsd:element sql:field="LiteralName" name="LiteralName" type="xsd:string" />
          <xsd:element sql:field="LiteralValue" name="LiteralValue" type="xsd:string" />
          <xsd:element sql:field="LiteralInvalidChars" name="LiteralInvalidChars"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="LiteralInvalidStartingChars"
name="LiteralInvalidStartingChars" type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="LiteralMaxLength" name="LiteralMaxLength" type="xsd:int"
minOccurs="0" />
          <xsd:element sql:field="LiteralNameEnumValue" name="LiteralNameEnumValue"
type="xsd:int" minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.31 DISCOVER_SCHEMA_ROWSETS

This schema rowset returns the names, restrictions, description, and other information for all **Discover** requests.

3.1.4.2.2.1.3.31.1 Columns

The **DISCOVER_SCHEMA_ROWSETS** rowset contains the following columns.

Name	Type	Restrictions	Description
SchemaName	xsd:string	Yes	The name of the **Discover** request.
SchemaGuid	uuid		The GUID of the **Discover** request.
Restrictions	nested rowset		The restrictions supported by the **Discover** request.
Description	xsd:string		The description of the **Discover** request.
RestrictionsMask	xsd:unsignedLong		The lowest N bits set to 1, where N is the number of restrictions.

This schema rowset is not sorted.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:simpleType name="uuid">
        <xsd:restriction base="xsd:string">
          <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-
9a-zA-Z]{12}" />
        </xsd:restriction>
      </xsd:simpleType>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="SchemaName" name="SchemaName" type="xsd:string" />
```


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```
          <xsd:element sql:field="SchemaGuid" name="SchemaGuid" type="uuid" minOccurs="0" />
          <xsd:element sql:field="Restrictions" name="Restrictions" minOccurs="0"
maxOccurs="unbounded">
            <xsd:complexType>
              <xsd:sequence>
                <xsd:element sql:field="Name" name="Name" type="xsd:string" minOccurs="0" />
                <xsd:element sql:field="Type" name="Type" type="xsd:string" minOccurs="0" />
              </xsd:sequence>
            </xsd:complexType>
          </xsd:element>
          <xsd:element sql:field="Description" name="Description" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="RestrictionsMask" name="RestrictionsMask"
type="xsd:unsignedLong" minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.32 DISCOVER_KEYWORDS

This schema rowset returns information about keywords that are reserved by the XMLA server.

If you call the **Discover** method with the **DISCOVER_KEYWORDS** enumeration value in the **RequestType** element, the **Discover** method returns the **DISCOVER_KEYWORDS** rowset.

3.1.4.2.2.1.3.32.1 Columns

The **DISCOVER_KEYWORDS** rowset contains the following columns.

Name	Type	Restrictions	Description
Keyword	xsd:string	Yes	The keyword string.

This schema rowset is not sorted.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="Keyword" name="Keyword" type="xsd:string" />
  </xsd:sequence>
</xsd:complexType>
```

3.1.4.2.2.1.3.33 DISCOVER_DATASOURCES

This schema rowset returns a list of the data sources that are available on the server.

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3.1.4.2.2.1.3.33.1 Columns

The **DISCOVER_DATASOURCES** rowset contains the following columns.

Name	Type	Restrictions	Description
DataSourceName	xsd:string	Yes	The name of the data source.
DataSourceDescription	xsd:string		The description of the data source.
URL	xsd:string	Yes	The unique path of the data source.
DataSourceInfo	xsd:string		A string that contains any additional information required to connect to the data source.
ProviderName	xsd:string	Yes	The name of the provider for the data source.
ProviderType	xsd:string	Yes	This array specifies the types of data supported by the server. It can include one or more of the following types: ▪ MDP: multidimensional data provider. ▪ TDP: tabular data provider. ▪ DMP: data mining provider (implements the OLE for DB for Data Mining specification).<183>
AuthenticationMode	xsd:string	Yes	A string that specifies what type of security mode the data source uses. Values can be one of the following: ▪ "Unauthenticated": No user ID or password has to be sent. ▪ "Authenticated": User ID and password MUST be included in the information required to connect to the data source. ▪ "Integrated": The data source uses the underlying security to determine authorization, such as Integrated Security provided by Microsoft Internet Information Services (IIS).<184>

The rowset is not sorted.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
```


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```
        <xsd:sequence>
          <xsd:element sql:field="DataSourceName" name="DataSourceName" type="xsd:string" />
          <xsd:element sql:field="DataSourceDescription" name="DataSourceDescription"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="URL" name="URL" type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="DataSourceInfo" name="DataSourceInfo" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="ProviderName" name="ProviderName" type="xsd:string" />
          <xsd:element sql:field="ProviderType" name="ProviderType" type="xsd:string"
minOccurs="0" maxOccurs="unbounded" />
          <xsd:element sql:field="AuthenticationMode" name="AuthenticationMode"
type="xsd:string" minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.34 DISCOVER_PROPERTIES

This schema rowset returns a list of information and values about the properties that are supported by the server.

3.1.4.2.2.1.3.34.1 Columns

The **DISCOVER_PROPERTIES** rowset contains the following columns.

Name	Type	Restrictions	Description
PropertyName	xsd:string	Yes	The name of the property.
PropertyDescription	xsd:string		A description of the property.
PropertyType	xsd:string		The XSD data type of the property.
PropertyAccessType	xsd:string		The access for the property. The value can be Read, Write, or ReadWrite.
IsRequired	xsd:boolean		When true, indicates that a property is required; otherwise false.
Value	xsd:string		The current value of the property.

The rowset is not sorted.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="PropertyName" name="PropertyName" type="xsd:string" />
          <xsd:element sql:field="PropertyDescription" name="PropertyDescription"
type="xsd:string" minOccurs="0" />
```


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```
          <xsd:element sql:field="PropertyType" name="PropertyType" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="PropertyAccessType" name="PropertyAccessType"
type="xsd:string" />
          <xsd:element sql:field="IsRequired" name="IsRequired" type="xsd:boolean"
minOccurs="0" />
          <xsd:element sql:field="Value" name="Value" type="xsd:string" minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.35 DISCOVER_ENUMERATORS

This schema rowset returns a list of names, data types, and enumeration values of enumerators supported by the XMLA Provider for a specific data source.

3.1.4.2.2.1.3.35.1 Columns

The **DISCOVER_ENUMERATORS** rowset contains the following columns.

Name	Type	Restrictions	Description
EnumName	xsd:string	Yes	The name of the enumerator that contains a set of values.
EnumDescription	xsd:string		A localizable description of the enumerator.
EnumType	xsd:string		The data type of the enumeration values.
ElementName	xsd:string		The name of one of the value elements in the enumerator set. Example: TDP
ElementDescription	xsd:string		This column is optional. A localizable description of the element.
ElementValue	xsd:string		The value of the element. This is always a string representing a number, and it never has a leading 0. Example: 1

The rowset is not sorted.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="EnumName" name="EnumName" type="xsd:string" />
          <xsd:element sql:field="EnumDescription" name="EnumDescription" type="xsd:string"
minOccurs="0" />
```


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```
            <xsd:element sql:field="EnumType" name="EnumType" type="xsd:string" />
            <xsd:element sql:field="ElementName" name="ElementName" type="xsd:string" />
            <xsd:element sql:field="ElementDescription" name="ElementDescription"
type="xsd:string" minOccurs="0" />
            <xsd:element sql:field="ElementValue" name="ElementValue" type="xsd:string"
minOccurs="0" />
          </xsd:sequence>
        </xsd:complexType>
```

3.1.4.2.2.1.3.36 DISCOVER_XML_METADATA

This schema rowset returns a rowset with one row and one column. The single cell in the rowset contains an XML document that contains the requested XML metadata.

3.1.4.2.2.1.3.36.1 Columns

The **DISCOVER_XML_METADATA** rowset contains the following columns.

Name	Type	Restrictions	Description
METADATA	MajorObject		An XML document that describes the object requested by the restriction.

3.1.4.2.2.1.3.36.2 Additional Restrictions

In addition to the column restrictions that are indicated in the previous section, the following restrictions MAY apply to this rowset.

Name	Type	Description
DatabaseID	xsd:string	The database ID.
DimensionID	xsd:string	The dimension ID.
CubeID	xsd:string	The cube ID.
MeasureGroupID	xsd:string	The measure group ID.
PartitionID	xsd:string	The partition ID.
PerspectiveID	xsd:string	The perspective ID.
DimensionPermissionID	xsd:string	The dimension permission ID.
RoleID	xsd:string	The role ID.
DatabasePermissionID	xsd:string	The database permission ID.
MiningModelID	xsd:string	The mining model ID.
MiningModelPermissionID	xsd:string	The mining model permission ID.
DataSourceID	xsd:string	The data source ID.
MiningStructureID	xsd:string	The mining structure ID.

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Name	Type	Description
AggregationDesignID	xsd:string	The aggregation design ID.
TraceID	xsd:string	The trace ID.
MiningStructurePermissionID	xsd:string	The mining structure permission ID.
CubePermissionID	xsd:string	The cube permission ID.
AssemblyID	xsd:string	The assembly ID.
MdxScriptID	xsd:string	The MDX script ID.
DataSourceViewID	xsd:string	The data source view ID.
DataSourcePermissionID	xsd:string	The data source permission ID.
ObjectExpansion	xsd:string	The degree of expansion that is wanted in the return result. The available values are: ▪ ReferenceOnly - Returns only the name/ID/timestamp/state requested for the requested objects and all descendant major objects recursively. ▪ ObjectProperties - Expands the requested object with no references to contained objects (includes expanded minor contained objects). ▪ ExpandObject - Same as *ObjectProperties*, but also returns the name, ID, and timestamp for contained major objects. ▪ ExpandFull - Fully expands the requested object recursively to the bottom of every contained object.
Metadata	xsd:string	An XML string that describes the object that is requested by the restriction. This document will consist of the objects that are described in 2.2.4.2. The exact objects included depend upon the restrictions in the request.

The rowset is not sorted.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="xmlDocument">
  <xsd:sequence>
    <xsd:any />
  </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="row">
  <xsd:sequence>
```


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```
        <xsd:element sql:field="METADATA" name="METADATA" type="xmlDocument" />
      </xsd:sequence>
    </xsd:complexType>
```

3.1.4.2.2.1.3.37 DISCOVER_TRACES

This schema rowset contains the **DISCOVER_TRACES** schema rowset.

3.1.4.2.2.1.3.37.1 Columns

The **DISCOVER_TRACES** rowset contains the following columns.

Name	Type	Restrictions	Description
TraceID	xsd:string	Yes	The trace ID.
TraceName	xsd:string		The trace name.
LogFileName	xsd:string		The trace log file name.
LogFileSize	xsd:signedLarge		The trace log file size.
LogFileRollover	xsd:boolean		When true, indicates that the log file should be rolled over; otherwise false.
AutoRestart	xsd:boolean		When true, indicates that the auto restart option is enabled; otherwise false.
CreationTime	xsd:dateTime		The date and time that the trace was created.
StopTime	xsd:dateTime		The stop time of a trace.

The rowset is not sorted.

The response has the following definition.

```
    <xsd:element name="root">
      <xsd:complexType>
        <xsd:sequence minOccurs="0" maxOccurs="unbounded">
          <xsd:element name="row" type="row" />
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:complexType name="row">
      <xsd:sequence>
        <xsd:element sql:field="TraceID" name="TraceID" type="xsd:string" minOccurs="0" />
        <xsd:element sql:field="TraceName" name="TraceName" type="xsd:string" minOccurs="0"
/>
        <xsd:element sql:field="LogFileName" name="LogFileName" type="xsd:string"
minOccurs="0" />
        <xsd:element sql:field="LogFileSize" name="LogFileSize" type="xsd:long"
minOccurs="0" />
        <xsd:element sql:field="LogFileRollover" name="LogFileRollover" type="xsd:boolean"
minOccurs="0" />
        <xsd:element sql:field="AutoRestart" name="AutoRestart" type="xsd:boolean"
minOccurs="0" />
```


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```
          <xsd:element sql:field="CreationTime" name="CreationTime" type="xsd:dateTime"
minOccurs="0" />
          <xsd:element sql:field="StopTime" name="StopTime" type="xsd:dateTime" minOccurs="0"
/>
        </xsd:sequence>
```

3.1.4.2.2.1.3.38 DISCOVER_TRACE_DEFINITION_PROVIDERINFO

This schema rowset returns basic information about the trace provider, such as its name and description.

3.1.4.2.2.1.3.38.1 Columns

The **DISCOVER_TRACE_DEFINITION_PROVIDERINFO** rowset contains the following columns.

Name	Type	Restrictions	Description
Data	xsd:string	Yes	This column contains an encoded XML string describing basic information about the trace provider. For information about what this XML string contains, see section 2.2.4.3.1. The DISCOVER response adds an extra **TraceProvider** element as a parent to the content of that cell. However, when sending the complex type for **Create** or **Alter**, it is not used.

The rowset is not sorted.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="Data" name="Data" type="xsd:string" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>
```

3.1.4.2.2.1.3.39 DISCOVER_TRACE_COLUMNS

This schema rowset contains the **DISCOVER_TRACE_COLUMNS** schema rowset.

3.1.4.2.2.1.3.39.1 Columns

The **DISCOVER_TRACE_COLUMNS** rowset contains the following columns.

Name	Type	Restrictions	Description

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Name	Type	Restrictions	Description
Data	xsd:string	Yes	This column contains an encoded XML string describing information about the trace columns provided by the trace provider. It contains the <COLUMN> element of the trace definition. See 2.2.4.3.3 for information about what this XML string contains.

The rowset is not sorted.

The response has the following definition.

```
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="Data" name="Data" type="xsd:string" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>
```

3.1.4.2.2.1.3.40 DISCOVER_TRACE_EVENT_CATEGORIES

This schema rowset contains the **DISCOVER_TRACE_EVENT_CATEGORIES** schema rowset.

3.1.4.2.2.1.3.40.1 Columns

The **DISCOVER_TRACE_EVENT**_CATEGORIES rowset contains the following columns.

Name	Type	Restrictions	Description
Data	xsd:string	Yes	This column contains an encoded XML string describing event category information about the trace provider. See 2.2.4.3.2 for an explanation of what this XML document contains.

The rowset is not sorted.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="Data" name="Data" type="xsd:string" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>
```


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3.1.4.2.2.1.3.41 DISCOVER_MEMORYUSAGE

This schema rowset returns the **DISCOVER_MEMORYUSAGE** statistics for various objects allocated by the server.

3.1.4.2.2.1.3.41.1 Columns

The **DISCOVER_MEMORYUSAGE** rowset contains the following columns.

Name	Type	Restrictions	Description
MemoryID	xsd:unsignedLarge		A number identifying the memory.
MemoryName	xsd:string		The name of the object owning the memory.
SPID	xsd:unsignedInt	Yes	The session that allocated the memory. Zero indicates memory not tied to a specific session.
CreationTime	xsd:dateTime		Either "the time the object was created" or "the time the memory was allocated."
BaseObjectType	xsd:unsignedInt	Yes	This is a number describing the type of the object. Objects with the same BaseObjectType have the same type.
MemoryUsed	xsd:unsignedLarge	Yes	This is the current size of the object, which may be less than the memory allocated for use by the object.
MemoryAllocated	xsd:unsignedLarge		The amount of memory allocated for use by the object, which may be greater than the amount of memory actually used by the object.
MemoryAllocBase	xsd:unsignedLarge		The bytes initially allocated for the object itself (excluding additional allocations for object contents).
MemoryAllocFromAlloc	xsd:unsignedLarge		The memory allocated for the contents of this object.
ElementCount	xsd:unsignedInt		For a container object, this is the number of objects contained by that object.
Shrinkable	xsd:boolean	Yes	A Boolean that indicates if the memory is shrinkable (can be evicted due to memory pressure). If true, the memory is shrinkable; if false, the memory is not shrinkable.
ObjectParentPath	xsd:string		A string identifying the parent object of this object.

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Name	Type	Restrictions	Description
ObjectID	xsd:string		A short identifier describing the object. The full path of this object is represented by the string: (ObjectParentPath + '.' + ObjectID).

The rowset is not sorted.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="MemoryID" name="MemoryID" type="xsd:unsignedLong"
minOccurs="0" />
          <xsd:element sql:field="MemoryName" name="MemoryName" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="SPID" name="SPID" type="xsd:unsignedInt" minOccurs="0" />
          <xsd:element sql:field="CreationTime" name="CreationTime" type="xsd:dateTime"
minOccurs="0" />
          <xsd:element sql:field="BaseObjectType" name="BaseObjectType"
type="xsd:unsignedInt" minOccurs="0" />
          <xsd:element sql:field="MemoryUsed" name="MemoryUsed" type="xsd:unsignedLong"
minOccurs="0" />
          <xsd:element sql:field="MemoryAllocated" name="MemoryAllocated"
type="xsd:unsignedLong" minOccurs="0" />
          <xsd:element sql:field="MemoryAllocBase" name="MemoryAllocBase"
type="xsd:unsignedLong" minOccurs="0" />
          <xsd:element sql:field="MemoryAllocFromAlloc" name="MemoryAllocFromAlloc"
type="xsd:unsignedLong" minOccurs="0" />
          <xsd:element sql:field="ElementCount" name="ElementCount" type="xsd:unsignedInt"
minOccurs="0" />
          <xsd:element sql:field="Shrinkable" name="Shrinkable" type="xsd:boolean"
minOccurs="0" />
          <xsd:element sql:field="ObjectParentPath" name="ObjectParentPath" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="ObjectId" name="ObjectId" type="xsd:string" minOccurs="0"
/>
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.42 DISCOVER_MEMORYGRANT

This rowset returns a list of internal memory quota grants that are taken by jobs that are currently running on the server.

3.1.4.2.2.1.3.42.1 Columns

The **DISCOVER_MEMORYGRANT** rowset contains the following columns.

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Name	Type	Restrictions	Description
MemoryID	xsd:Long		A number that identifies the memory quota grant. Unique within the context of a single **DISCOVER_MEMORYGRANT** request.
SPID	xsd:Int	Yes	The session ID.
CreationTime	xsd:dateTime		The time the quota was granted.
LastRequestTime	xsd:dateTime		The time the quota request was last modified.
MemoryUsed	xsd:Int		The amount of memory used in association with the quota.
MemoryGranted	xsd:Int		The amount of memory granted for use by the job that is obtaining the memory quota.
Blocked	xsd:boolean		A Boolean that indicates the block status of the job. True indicates that the job is blocked waiting for another job to release sufficient quota to grant its quota request. False indicates that the job has received its quota and can execute.

The rowset is not sorted.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="MemoryID" name="MemoryID" type="xsd:long" minOccurs="0" />
          <xsd:element sql:field="SPID" name="SPID" type="xsd:int" minOccurs="0" />
          <xsd:element sql:field="CreationTime" name="CreationTime" type="xsd:dateTime"
minOccurs="0" />
          <xsd:element sql:field="LastRequestTime" name="LastRequestTime" type="xsd:dateTime"
minOccurs="0" />
          <xsd:element sql:field="MemoryUsed" name="MemoryUsed" type="xsd:int" minOccurs="0"
/>
          <xsd:element sql:field="MemoryGranted" name="MemoryGranted" type="xsd:int"
minOccurs="0" />
          <xsd:element sql:field="Blocked" name="Blocked" type="xsd:boolean" minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.43 DISCOVER_LOCKS

This schema rowset provides information about the current standing locks on the server.

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3.1.4.2.2.1.3.43.1 Columns

The **DISCOVER_LOCKS** rowset contains the following columns.

Name	Type	Restrictions	Description
SPID	xsd:Int	Yes	The session ID.
LOCK_ID	uuid		The unique identifier of the lock, as a GUID.
LOCK_TRANSACTION_ID	uuid	Yes	The unique identifier of the transaction, as a GUID.
LOCK_OBJECT_ID	xsd:xmlDocument	Yes	The unique identifier of the object being locked.
LOCK_STATUS	xsd:Int	Yes	The lock status. ▪ 0 - The lock is granted. ▪ 1 - The system is waiting to lock the object.
LOCK_TYPE	xsd:Int	Yes	A bitmask of lock types. ▪ LOCK_NONE (0x0000000) - No lock. ▪ LOCK_SESSION_LOCK (0x0000001) - Inactive session; does not interfere with other locks. ▪ LOCK_READ (0x0000002) - Read lock during processing. ▪ LOCK_WRITE (0x0000004) - Write lock during processing. ▪ LOCK_COMMIT_READ (0x0000008) - Commit lock, shared. ▪ LOCK_COMMIT_WRITE (0x0000010) - Commit lock, exclusive. ▪ LOCK_COMMIT_ABORTABLE (0x0000020) - Abort at commit progress. ▪ LOCK_COMMIT_INPROGRESS (0x0000040) - Commit in progress. ▪ LOCK_INVALID (0x0000080) Invalid lock.
LOCK_CREATION_TIME	xsd:dateTime		The UTC server time at the moment the lock was requested.
LOCK_GRANT_TIME	xsd:dateTime		The UTC server time at the moment the lock was granted on the resource.

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The rowset is not sorted.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:simpleType name="uuid">
        <xsd:restriction base="xsd:string">
          <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-
9a-zA-Z]{12}" />
        </xsd:restriction>
      </xsd:simpleType>
      <xsd:complexType name="xmlDocument">
        <xsd:sequence>
          <xsd:any />
        </xsd:sequence>
      </xsd:complexType>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="SPID" name="SPID" type="xsd:int" minOccurs="0" />
          <xsd:element sql:field="LOCK_ID" name="LOCK_ID" type="uuid" minOccurs="0" />
          <xsd:element sql:field="LOCK_TRANSACTION_ID" name="LOCK_TRANSACTION_ID" type="uuid"
minOccurs="0" />
          <xsd:element sql:field="LOCK_OBJECT_ID" name="LOCK_OBJECT_ID" type="xmlDocument"
minOccurs="0" />
          <xsd:element sql:field="LOCK_STATUS" name="LOCK_STATUS" type="xsd:int"
minOccurs="0" />
          <xsd:element sql:field="LOCK_TYPE" name="LOCK_TYPE" type="xsd:int" minOccurs="0" />
          <xsd:element sql:field="LOCK_CREATION_TIME" name="LOCK_CREATION_TIME"
type="xsd:dateTime" minOccurs="0" />
          <xsd:element sql:field="LOCK_GRANT_TIME" name="LOCK_GRANT_TIME" type="xsd:dateTime"
minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.43.2 Additional Restrictions

In addition to the column restrictions indicated in the previous section, the following restrictions MAY apply to this rowset.

Name	Type	Description
LOCK_MIN_TOTAL_MS	xsd:int	Include only locks that have been held for at least this number of milliseconds.

3.1.4.2.2.1.3.44 DISCOVER_CONNECTIONS

This schema rowset provides resource usage and activity information about the currently opened connections on the server.

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3.1.4.2.2.1.3.44.1 Columns

The **DISCOVER_CONNECTIONS** rowset contains the following columns.

Name	Type	Restrictions	Description
CONNECTION_ID	xsd:Int	Yes	A unique number that identifies the connection.
CONNECTION_USER_NAME	xsd:string	Yes	The user name under which the connection was initiated.
CONNECTION_IMPERSONATED_USER_NAME	xsd:string	Yes	The impersonated user name, if any.
CONNECTION_HOST_NAME	xsd:string	Yes	The name of the machine that initiated the connection.
CONNECTION_HOST_APPLICATION	xsd:string		The name of the application that initiated the connection.
CONNECTION_START_TIME	xsd:dateTime		The server UTC date and time when the connection was initiated.
CONNECTION_ELAPSED_TIME_MS	xsd:Long	Yes	Elapsed time, in milliseconds, since the start of the connection.
CONNECTION_LAST_COMMAND_START_TIME	xsd:dateTime		The server UTC date and time when the last command initiated its execution.
CONNECTION_LAST_COMMAND END_TIME	xsd:dateTime		The server UTC date and time when the last command finished its execution.
CONNECTION_LAST_COMMAND_ELAPSED_TIME_MS	xsd:Long	Yes	The time, in milliseconds, since the end of the last command

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Name	Type	Restrictions	Description
			executed.
CONNECTION_IDLE_TIME_MS	xsd:Long	Yes	The idle time, in milliseconds, since the start of the connection.
CONNECTION_BYTES_SENT	xsd:Long		The accumulated number of bytes sent by the connection since the start of the connection.
CONNECTION_DATA_BYTES_SENT	xsd:Long		The accumulated number of data bytes sent by the connection since the start of the connection. Data travels compressed within the connection; this value represents the expanded data sent.
CONNECTION_BYTES_RECEIVED	xsd:Long		The accumulated number of bytes received by the connection since the start of the connection.
CONNECTION_DATA_BYTES_RECEIVED	xsd:Long		The accumulated number of data bytes received by the connection since the start of the connection. Data travels compressed within the connection; this value represents the expanded data received.

The rowset is not sorted.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
```


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```
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="CONNECTION_ID" name="CONNECTION_ID" type="xsd:int"
minOccurs="0" />
          <xsd:element sql:field="CONNECTION_USER_NAME" name="CONNECTION_USER_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="CONNECTION_IMPERSONATED_USER_NAME"
name="CONNECTION_IMPERSONATED_USER_NAME" type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="CONNECTION_HOST_NAME" name="CONNECTION_HOST_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="CONNECTION_HOST_APPLICATION"
name="CONNECTION_HOST_APPLICATION" type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="CONNECTION_START_TIME" name="CONNECTION_START_TIME"
type="xsd:dateTime" minOccurs="0" />
          <xsd:element sql:field="CONNECTION_ELAPSED_TIME_MS"
name="CONNECTION_ELAPSED_TIME_MS" type="xsd:long" minOccurs="0" />
          <xsd:element sql:field="CONNECTION_LAST_COMMAND_START_TIME"
name="CONNECTION_LAST_COMMAND_START_TIME" type="xsd:dateTime" minOccurs="0" />
          <xsd:element sql:field="CONNECTION_LAST_COMMAND_END_TIME"
name="CONNECTION_LAST_COMMAND_END_TIME" type="xsd:dateTime" minOccurs="0" />
          <xsd:element sql:field="CONNECTION_LAST_COMMAND_ELAPSED_TIME_MS"
name="CONNECTION_LAST_COMMAND_ELAPSED_TIME_MS" type="xsd:long" minOccurs="0" />
          <xsd:element sql:field="CONNECTION_IDLE_TIME_MS" name="CONNECTION_IDLE_TIME_MS"
type="xsd:long" minOccurs="0" />
          <xsd:element sql:field="CONNECTION_BYTES_SENT" name="CONNECTION_BYTES_SENT"
type="xsd:long" minOccurs="0" />
          <xsd:element sql:field="CONNECTION_DATA_BYTES_SENT"
name="CONNECTION_DATA_BYTES_SENT" type="xsd:long" minOccurs="0" />
          <xsd:element sql:field="CONNECTION_BYTES_RECEIVED" name="CONNECTION_BYTES_RECEIVED"
type="xsd:long" minOccurs="0" />
          <xsd:element sql:field="CONNECTION_DATA_BYTES_RECEIVED"
name="CONNECTION_DATA_BYTES_RECEIVED" type="xsd:long" minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.45 DISCOVER_SESSIONS

This schema rowset provides resource usage and activity information about the currently opened sessions on the server.

3.1.4.2.2.1.3.45.1 Columns

The **DISCOVER_SESSIONS** rowset contains the following columns.

Name	Type	Restrictions	Description
SESSION_ID	xsd:string	Yes	The session unique identifier, as a GUID.
SESSION_SPID	xsd:Int	Yes	The session ID.

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Name	Type	Restrictions	Description
SESSION_CONNECTION_ID	xsd:Int	Yes	The connection identifier for the session.
SESSION_USER_NAME	xsd:string	Yes	The session user name.
SESSION_CURRENT_DATABASE	xsd:string	Yes	The name of the database that is being used by the current command execution, or the database that was used by the last command executed.
SESSION_USED_MEMORY	xsd:Int		The current size of memory used by the session in kilobytes.
SESSION_PROPERTIES	xsd:string		Reserved for future use.
SESSION_START_TIME	xsd:dateTime		The date and time the session started as UTC time to the server.
SESSION_ELAPSED_TIME_MS	xsd:unsignedLong	Yes	Elapsed time, in milliseconds, since the start of the session.
SESSION_LAST_COMMAND_START_TIME	xsd:dateTime		The UTC server time at the moment the last command started executing.
SESSION_LAST_COMMAND_END_TIME	xsd:dateTime		The UTC server time at the moment the last command finished executing.
SESSION_LAST_COMMAND_ELAPSED_TIME_MS	xsd:unsignedLong		The time, in milliseconds, since the start of SESSION_LAST_COMMAND.
SESSION_IDLE_TIME_MS	xsd:unsignedLong	Yes	The idle time, in milliseconds, since the start of the session.
SESSION_CPU_TIME_MS	xsd:unsignedLong	Yes	The CPU time, in milliseconds, consumed by all requests since the beginning of the session.
SESSION_LAST_COMMAND	xsd:string		The text of the current command executing or the last command executed.
SESSION_LAST_COMMAND_CPU_TIME_MS	xsd:unsignedLon		The CPU time, in

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Name	Type	Restrictions	Description
	g		milliseconds, consumed by SESSION_LAST_COMMAND.
SESSION_STATUS	xsd:Int	Yes	The activity status of the session. ▪ 0 - Idle: No current activity is ongoing. ▪ 1 - Active: The session is executing some requested task. ▪ 2 - Blocked: The session is waiting for a resource to continue executing the suspended task.
SESSION_READS	xsd:unsignedLong		The accumulated number of disk reads since the start of the session.
SESSION_WRITES	xsd:unsignedLong		The accumulated number of disk writes since the start of the session.
SESSION_READS_KB	xsd:unsignedLong		The accumulated value of data read from disk, in kilobytes, since the start of the session.
SESSION_WRITES_KB	xsd:unsignedLong		The accumulated value of data written to the disk, in kilobytes, since the start of the session.
SESSION_COMMAND_COUNT	xsd:Int		The number of commands that started execution since the beginning of the session.

The rowset is not sorted.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
```


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```
        <xsd:sequence>
          <xsd:element sql:field="SESSION_ID" name="SESSION_ID" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="SESSION_SPID" name="SESSION_SPID" type="xsd:int"
minOccurs="0" />
          <xsd:element sql:field="SESSION_CONNECTION_ID" name="SESSION_CONNECTION_ID"
type="xsd:int" minOccurs="0" />
          <xsd:element sql:field="SESSION_USER_NAME" name="SESSION_USER_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="SESSION_CURRENT_DATABASE" name="SESSION_CURRENT_DATABASE"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="SESSION_USED_MEMORY" name="SESSION_USED_MEMORY"
type="xsd:int" minOccurs="0" />
          <xsd:element sql:field="SESSION_PROPERTIES" name="SESSION_PROPERTIES"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="SESSION_START_TIME" name="SESSION_START_TIME"
type="xsd:dateTime" minOccurs="0" />
          <xsd:element sql:field="SESSION_ELAPSED_TIME_MS" name="SESSION_ELAPSED_TIME_MS"
type="xsd:unsignedLong" minOccurs="0" />
          <xsd:element sql:field="SESSION_LAST_COMMAND_START_TIME"
name="SESSION_LAST_COMMAND_START_TIME" type="xsd:dateTime" minOccurs="0" />
          <xsd:element sql:field="SESSION_LAST_COMMAND_END_TIME"
name="SESSION_LAST_COMMAND_END_TIME" type="xsd:dateTime" minOccurs="0" />
          <xsd:element sql:field="SESSION_LAST_COMMAND_ELAPSED_TIME_MS"
name="SESSION_LAST_COMMAND_ELAPSED_TIME_MS" type="xsd:unsignedLong" minOccurs="0" />
          <xsd:element sql:field="SESSION_IDLE_TIME_MS" name="SESSION_IDLE_TIME_MS"
type="xsd:unsignedLong" minOccurs="0" />
          <xsd:element sql:field="SESSION_CPU_TIME_MS" name="SESSION_CPU_TIME_MS"
type="xsd:unsignedLong" minOccurs="0" />
          <xsd:element sql:field="SESSION_LAST_COMMAND" name="SESSION_LAST_COMMAND"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="SESSION_LAST_COMMAND_CPU_TIME_MS"
name="SESSION_LAST_COMMAND_CPU_TIME_MS" type="xsd:unsignedLong" minOccurs="0" />
          <xsd:element sql:field="SESSION_STATUS" name="SESSION_STATUS" type="xsd:int"
minOccurs="0" />
          <xsd:element sql:field="SESSION_READS" name="SESSION_READS" type="xsd:unsignedLong"
minOccurs="0" />
          <xsd:element sql:field="SESSION_WRITES" name="SESSION_WRITES"
type="xsd:unsignedLong" minOccurs="0" />
          <xsd:element sql:field="SESSION_READ_KB" name="SESSION_READ_KB"
type="xsd:unsignedLong" minOccurs="0" />
          <xsd:element sql:field="SESSION_WRITE_KB" name="SESSION_WRITE_KB"
type="xsd:unsignedLong" minOccurs="0" />
          <xsd:element sql:field="SESSION_COMMAND_COUNT" name="SESSION_COMMAND_COUNT"
type="xsd:int" minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.46 DISCOVER_JOBS

This schema rowset provides information about the active jobs executing on the server. A job is a part of a command that executes a specific task on behalf of the command.

3.1.4.2.2.1.3.46.1 Columns

The **DISCOVER_JOBS** rowset contains the following columns.

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Name	Type	Restrictions	Description
SPID	xsd:Int	Yes	The session ID.
JOB_ID	xsd:Int	Yes	The unique identifier of the job.
JOB_DESCRIPTION	xsd:string	Yes	The job description assigned by the server.
JOB_CREATION_TIME	xsd:dateTime		The server UTC date and time when the job was created.
JOB_TOTAL_TIME_MS	xsd:Long		The time, in milliseconds, since the job started.
JOB_START_TIME	xsd:dateTime		The server UTC date and time when the job was started.
JOB_EXECUTION_TIME_MS	xsd:Long		The time, in milliseconds, that the job is active.
JOB_THREADPOOL_ID	xsd:Int	Yes	The thread pool from which the current job was started.

The rowset is not sorted.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="SPID" name="SPID" type="xsd:int" minOccurs="0" />
          <xsd:element sql:field="JOB_ID" name="JOB_ID" type="xsd:int" minOccurs="0" />
          <xsd:element sql:field="JOB_DESCRIPTION" name="JOB_DESCRIPTION" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="JOB_CREATION_TIME" name="JOB_CREATION_TIME"
type="xsd:dateTime" minOccurs="0" />
          <xsd:element sql:field="JOB_TOTAL_TIME_MS" name="JOB_TOTAL_TIME_MS" type="xsd:long"
minOccurs="0" />
          <xsd:element sql:field="JOB_START_TIME" name="JOB_START_TIME" type="xsd:dateTime"
minOccurs="0" />
          <xsd:element sql:field="JOB_EXECUTION_TIME_MS" name="JOB_EXECUTION_TIME_MS"
type="xsd:long" minOccurs="0" />
          <xsd:element sql:field="JOB_THREADPOOL_ID" name="JOB_THREADPOOL_ID" type="xsd:int"
minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.46.2 Additional Restrictions

In addition to the column restrictions indicated in the previous section, the following restrictions MAY apply to this rowset.

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Name	Type	Description
JOB_MIN_TOTAL_TIME_MS	xsd:Long	The minimum time, in milliseconds, since the job started. If present, results will exclude jobs that have been running for less than the specified amount of time.

3.1.4.2.2.1.3.47 DISCOVER_TRANSACTIONS

This schema rowset returns the current set of pending transactions on the system.

3.1.4.2.2.1.3.47.1 Columns

The **DISCOVER_TRANSACTION** rowset contains the following columns.

Name	Type	Restrictions	Description
TRANSACTION_ID	xsd:string	Yes	The transaction unique identifier, as a GUID.
TRANSACTION_SESSION_ID	xsd:string	Yes	The transaction session unique identifier, as a GUID.
TRANSACTION_START_TIME	xsd:dateTime		The server UTC date and time when the transaction was started.
TRANSACTION_ELAPSED_TIME_MS	xsd:Long		The elapsed time, in milliseconds, since the start of the transaction.
TRANSACTION_CPU_TIME_MS	xsd:Long		The CPU time, in milliseconds, consumed by all requests since the beginning of the transaction.

The rowset is not sorted.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="TRANSACTION_ID" name="TRANSACTION_ID" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="TRANSACTION_SESSION_ID" name="TRANSACTION_SESSION_ID"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="TRANSACTION_START_TIME" name="TRANSACTION_START_TIME"
type="xsd:dateTime" minOccurs="0" />
          <xsd:element sql:field="TRANSACTION_ELAPSED_TIME_MS"
name="TRANSACTION_ELAPSED_TIME_MS" type="xsd:long" minOccurs="0" />
          <xsd:element sql:field="TRANSACTION_CPU_TIME_MS" name="TRANSACTION_CPU_TIME_MS"
type="xsd:long" minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```


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3.1.4.2.2.1.3.48 DISCOVER_DB_CONNECTIONS

This schema rowset provides resource usage and activity information about the currently opened connections from the server to a database.

3.1.4.2.2.1.3.48.1 Columns

The **DISCOVER_DB_CONNECTIONS** rowset contains the following columns.

Name	Type	Restrictions	Description
CONNECTION_ID	xsd:Int	Yes	A unique number that identifies the connection.
CONNECTION_START_TIME	xsd:dateTime		The server UTC date and time when the connection was initiated.
CONNECTION_LAST_COMMAND_START_TIME	xsd:dateTime		The server UTC date and time when the last command initiated its execution.
CONNECTION_LAST_COMMAND_END_TIME	xsd:dateTime		The server UTC date and time when the last command finished its execution.
CONNECTION_IDLE_TIME_MS	xsd:Long		The idle time, in milliseconds, since the start of the connection.
CONNECTION_USAGE_TIME_MS	xsd:Long		The connection active time, in milliseconds, since the start of the connection.
CONNECTION_IN_USE	xsd:Int	Yes	The connection status. This column indicates whether the connection is active (1) or idle (0).
CONNECTION_SERVER_NAME	xsd:string	Yes	The name of the currently connected server.
CONNECTION_CATALOG_NAME	xsd:string	Yes	The database name of the currently connected database.
CONNECTION_SPID	xsd:Int	Yes	The session ID.

The rowset is not sorted.

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The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="CONNECTION_ID" name="CONNECTION_ID" type="xsd:int"
minOccurs="0" />
          <xsd:element sql:field="CONNECTION_START_TIME" name="CONNECTION_START_TIME"
type="xsd:dateTime" minOccurs="0" />
          <xsd:element sql:field="CONNECTION_LAST_COMMAND_START_TIME"
name="CONNECTION_LAST_COMMAND_START_TIME" type="xsd:dateTime" minOccurs="0" />
          <xsd:element sql:field="CONNECTION_LAST_COMMAND_END_TIME"
name="CONNECTION_LAST_COMMAND_END_TIME" type="xsd:dateTime" minOccurs="0" />
          <xsd:element sql:field="CONNECTION_IDLE_TIME_MS" name="CONNECTION_IDLE_TIME_MS"
type="xsd:long" minOccurs="0" />
          <xsd:element sql:field="CONNECTION_USAGE_TIME_MS" name="CONNECTION_USAGE_TIME_MS"
type="xsd:long" minOccurs="0" />
          <xsd:element sql:field="CONNECTION_IN_USE" name="CONNECTION_IN_USE" type="xsd:int"
minOccurs="0" />
          <xsd:element sql:field="CONNECTION_SERVER_NAME" name="CONNECTION_SERVER_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="CONNECTION_CATALOG_NAME" name="CONNECTION_CATALOG_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="CONNECTION_SPID" name="CONNECTION_SPID" type="xsd:int"
minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.49 DISCOVER_MASTER_KEY

This schema rowset returns the server's master encryption key (the key that is used by the server to encrypt sensitive data on disk).

3.1.4.2.2.1.3.49.1 Columns

The **DISCOVER_MASTER_KEY** rowset contains the following columns.

Name	Type	Restrictions	Description
KEY	xsd:string	Yes	The server's master encryption key.

The rowset is not sorted.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
```


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```
      </xsd:complexType>
    </xsd:element>
    <xsd:complexType name="row">
      <xsd:sequence>
        <xsd:element sql:field="KEY" name="KEY" type="xsd:string" minOccurs="0" />
      </xsd:sequence>
    </xsd:complexType>
```

3.1.4.2.2.1.3.50 DISCOVER_PERFORMANCE_COUNTERS

This schema rowset returns the value of one or more specified performance counters. It does not support counters that return information about usage over time (such as disk reads per second and percentage of CPU usage).

3.1.4.2.2.1.3.50.1 Columns

The **DISCOVER_PERFORMANCE_COUNTERS** rowset contains the following columns.

Name	Type	Restrictions	Description
PERF_COUNTER_NAME	xsd:string	[Required]	The name of the PERF_COUNTER.
PERF_COUNTER_VALUE	xsd:Double		The value of the PERF_COUNTER.

The rowset is not sorted.

The response has the following definition.

```
    <xsd:element name="root">
      <xsd:complexType>
        <xsd:sequence minOccurs="0" maxOccurs="unbounded">
          <xsd:element name="row" type="row" />
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:complexType name="row">
      <xsd:sequence>
        <xsd:element sql:field="PERF_COUNTER_NAME" name="PERF_COUNTER_NAME"
type="xsd:string" minOccurs="0" />
        <xsd:element sql:field="PERF_COUNTER_VALUE" name="PERF_COUNTER_VALUE"
type="xsd:double" minOccurs="0" />
      </xsd:sequence>
    </xsd:complexType>
```

3.1.4.2.2.1.3.51 DISCOVER_LOCATIONS

This element returns information about the contents of a backup file. The user issuing the request MUST have access to the backup file location.

3.1.4.2.2.1.3.51.1 Columns

The **DISCOVER_LOCATIONS** rowset contains the following columns.

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Name	Type	Restrictions	Description
LOCATION_BACKUP_FILE_PATHNAME	xsd:string	[Required]	The location of the backup file.
LOCATION_PARTITION_OBJECTPATH	xsd:string		The path to the partition relative to the data folder.
LOCATION_PARTITION_DATASOURCEID	xsd:string		The data source ID used for processing the partition.
LOCATION_PARTITION_DATASOURCENAME	xsd:string		The name of the data source used for processing.
LOCATION_PARTITION_NAME	xsd:string		The partition name.
LOCATION_PARTITION_SIZE	xsd:string		The approximate size of the partition.
LOCATION_CONNECTION_STRING	xsd:string		The connection string for the data source used in processing.
LOCATION_PARTITION_FOLDER	xsd:string		The original location of this partition when the backup file was produced.
LOCATION_PASSWORD	xsd:string	Yes	The password used to encrypt the backup file.

The rowset is not sorted.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="LOCATION_BACKUP_FILE_PATHNAME"
name="LOCATION_BACKUP_FILE_PATHNAME" type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="LOCATION_PARTITION_OBJECTPATH"
name="LOCATION_PARTITION_OBJECTPATH" type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="LOCATION_PARTITION_DATASOURCEID"
name="LOCATION_PARTITION_DATASOURCEID" type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="LOCATION_PARTITION_DATASOURCENAME"
name="LOCATION_PARTITION_DATASOURCENAME" type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="LOCATION_PARTITION_NAME" name="LOCATION_PARTITION_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="LOCATION_PARTITION_SIZE" name="LOCATION_PARTITION_SIZE"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="LOCATION_CONNECTION_STRING"
name="LOCATION_CONNECTION_STRING" type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="LOCATION_PARTITION_FOLDER" name="LOCATION_PARTITION_FOLDER"
type="xsd:string" minOccurs="0" />
```


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```
  </xsd:sequence>
</xsd:complexType>
```

3.1.4.2.2.1.3.51.2 Additional Restrictions

In addition to the column restrictions indicated in the previous section, the following restrictions MAY apply to this rowset.

Name	Type	Description
LOCATION_PASSWORD	xsd:string	The password to access the backup file. This restriction MUST be used.

3.1.4.2.2.1.3.52 DISCOVER_PARTITION_DIMENSION_STAT

This schema rowset returns statistics on the dimension associated with a partition.

3.1.4.2.2.1.3.52.1 Columns

The **DISCOVER_PARTITION_DIMENSION_STAT** rowset contains the following columns.

Name	Type	Restrictions	Description
DATABASE_NAME	xsd:string	[Required]	The name of the database.
CUBE_NAME	xsd:string	[Required]	The name of the cube.
MEASURE_GROUP_NAME	xsd:string	[Required]	The name of the measure group.
PARTITION_NAME	xsd:string	[Required]	The name of the partition.
DIMENSION_NAME	xsd:string		The name of the dimension.
ATTRIBUTE_NAME	xsd:string		The name of the attribute.
ATTRIBUTE_INDEXED	xsd:boolean		When true, indicates that the attribute is indexed; otherwise false.
ATTRIBUTE_COUNT_MIN	xsd:Long		The minimum attribute count.
ATTRIBUTE_COUNT_MAX	xsd:Long		The maximum attribute count.

The rowset is not sorted.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
```


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```
        <xsd:sequence>
          <xsd:element sql:field="DATABASE_NAME" name="DATABASE_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="MEASURE_GROUP_NAME" name="MEASURE_GROUP_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="PARTITION_NAME" name="PARTITION_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="DIMENSION_NAME" name="DIMENSION_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="ATTRIBUTE_NAME" name="ATTRIBUTE_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="ATTRIBUTE_INDEXED" name="ATTRIBUTE_INDEXED"
type="xsd:boolean" minOccurs="0" />
          <xsd:element sql:field="ATTRIBUTE_COUNT_MIN" name="ATTRIBUTE_COUNT_MIN"
type="xsd:long" minOccurs="0" />
          <xsd:element sql:field="ATTRIBUTE_COUNT_MAX" name="ATTRIBUTE_COUNT_MAX"
type="xsd:long" minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.53 DISCOVER_PARTITION_STAT

This schema rowset returns statistics on aggregations in a particular partition.

3.1.4.2.2.1.3.53.1 Columns

The **DISCOVER_PARTITION_STAT** rowset contains the following columns.

Name	Type	Restrictions	Description
DATABASE_NAME	xsd:string	[Required]	The name of the database.
CUBE_NAME	xsd:string	[Required]	The name of the cube.
MEASURE_GROUP_NAME	xsd:string	[Required]	The name of the measure group.
PARTITION_NAME	xsd:string	[Required]	The name of the partition.
AGGREGATION_NAME	xsd:string		The name of the aggregation.
AGGREGATION_SIZE	xsd:Long		The size of the aggregation.

The rowset is not sorted.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
```


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```
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="DATABASE_NAME" name="DATABASE_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="MEASURE_GROUP_NAME" name="MEASURE_GROUP_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="PARTITION_NAME" name="PARTITION_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="AGGREGATION_NAME" name="AGGREGATION_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="AGGREGATION_SIZE" name="AGGREGATION_SIZE" type="xsd:long"
minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.54 DISCOVER_DIMENSION_STAT

This schema rowset returns statistics on the specified dimension.

3.1.4.2.2.1.3.54.1 Columns

The **DISCOVER_DIMENSION_STAT** rowset contains the following columns.

Name	Type	Restrictions	Description
DATABASE_NAME	xsd:string	[Required]	The name of the database.
DIMENSION_NAME	xsd:string	[Required]	The name of the dimension.
ATTRIBUTE_NAME	xsd:string		The name of the attribute.
ATTRIBUTE_COUNT	xsd:Long		The attribute count.

The rowset is not sorted.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="DATABASE_NAME" name="DATABASE_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="DIMENSION_NAME" name="DIMENSION_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="ATTRIBUTE_NAME" name="ATTRIBUTE_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="ATTRIBUTE_COUNT" name="ATTRIBUTE_COUNT" type="xsd:long"
minOccurs="0" />
```


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```
    </xsd:sequence>
  </xsd:complexType>
```

3.1.4.2.2.1.3.55 DISCOVER_COMMANDS

This schema rowset provides resource usage and activity information about the currently executing or last executed commands in the opened connections on the server.

3.1.4.2.2.1.3.55.1 Columns

The **DISCOVER_COMMANDS** rowset contains the following columns.

Name	Type	Restrictions	Description
SESSION_SPID	xsd:Int	Yes	The session ID.
SESSION_COMMAND_COUNT	xsd:Int		The number of commands executed since the start of the session.
COMMAND_START_TIME	xsd:dateTime		The date and time the last command started, expressed as UTC time on the server.
COMMAND_ELAPSED_TIME_MS	xsd:Long		The elapsed time, in milliseconds, since the start of the command.
COMMAND_CPU_TIME_MS	xsd:Long		The CPU time, in milliseconds, consumed by the command since the start of the command execution.
COMMAND_READS	xsd:Long		The accumulated number of disk reads since the start of the command.
COMMAND_READ_KB	xsd:Long		The accumulated value of data read from disk, in kilobytes, since the start of the command.
COMMAND_WRITES	xsd:Long		The accumulated number of disk writes since the start of the command.
COMMAND_WRITE_KB	xsd:Long		The accumulated value of data written to disk, in kilobytes, since the start of the command.
COMMAND_TEXT	xsd:string		The command text.
COMMAND_END_TIME	xsd:dateTime		The server UTC date and time when the command finishes its execution.

The rowset is not sorted.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
```


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```
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="SESSION_SPID" name="SESSION_SPID" type="xsd:int"
minOccurs="0" />
          <xsd:element sql:field="SESSION_COMMAND_COUNT" name="SESSION_COMMAND_COUNT"
type="xsd:int" minOccurs="0" />
          <xsd:element sql:field="COMMAND_START_TIME" name="COMMAND_START_TIME"
type="xsd:dateTime" minOccurs="0" />
          <xsd:element sql:field="COMMAND_ELAPSED_TIME_MS" name="COMMAND_ELAPSED_TIME_MS"
type="xsd:long" minOccurs="0" />
          <xsd:element sql:field="COMMAND_CPU_TIME_MS" name="COMMAND_CPU_TIME_MS"
type="xsd:long" minOccurs="0" />
          <xsd:element sql:field="COMMAND_READS" name="COMMAND_READS" type="xsd:long"
minOccurs="0" />
          <xsd:element sql:field="COMMAND_READ_KB" name="COMMAND_READ_KB" type="xsd:long"
minOccurs="0" />
          <xsd:element sql:field="COMMAND_WRITES" name="COMMAND_WRITES" type="xsd:long"
minOccurs="0" />
          <xsd:element sql:field="COMMAND_WRITE_KB" name="COMMAND_WRITE_KB" type="xsd:long"
minOccurs="0" />
          <xsd:element sql:field="COMMAND_TEXT" name="COMMAND_TEXT" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="COMMAND_END_TIME" name="COMMAND_END_TIME"
type="xsd:dateTime" minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.56 DISCOVER_COMMAND_OBJECTS

This schema rowset provides resource usage and activity information about the objects in use by the referenced command.

3.1.4.2.2.1.3.56.1 Columns

The **DISCOVER_COMMAND_OBJECTS** rowset contains the following columns.

Name	Type	Restrictions	Description
SESSION_SPID	xsd:Int	Yes	The session ID.
SESSION_ID	xsd:string	Yes	The session unique identifier, as a GUID.
SESSION_COMMAND_COUNT	xsd:Int		The command sequence number.
OBJECT_PARENT_PATH	xsd:string	Yes	The path to the parent of the current object.
OBJECT_ID	xsd:string	Yes	The ID of the object as defined when it was created.
OBJECT_VERSION	xsd:Int		The metadata version number of the object. This number changes every time the object is altered.

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Name	Type	Restrictions	Description
OBJECT_DATA_VERSION	xsd:Int		The lineage number of the data in the object. This number increments each time the object is processed.
OBJECT_CPU_TIME_MS	xsd:Long		The CPU time, in milliseconds, consumed by the object since the start of the command.
OBJECTS_READS	xsd:Long		The accumulated number of read operations by the object since the start of the command.
OBJECTS_READ_KB	xsd:Long		The accumulated value of data, in kilobytes, read by the object since the start of the command.
OBJECTS_WRITES	xsd:Long		The accumulated number of write operations by the object since the start of the command.
OBJECTS_WRITE_KB	xsd:Long		The accumulated value of data, in kilobytes, written by the object since the start of the command.
OBJECT_ROWS_SCANNED	xsd:Long		The number of rows scanned by the object since the start of the command.
OBJECT_ROWS_RETURNED	xsd:Long		The number of rows returned by the object to the caller since the start of the command.

The rowset is not sorted.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="SESSION_SPID" name="SESSION_SPID" type="xsd:int"
minOccurs="0" />
          <xsd:element sql:field="SESSION_ID" name="SESSION_ID" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="SESSION_COMMAND_COUNT" name="SESSION_COMMAND_COUNT"
type="xsd:int" minOccurs="0" />
          <xsd:element sql:field="OBJECT_PARENT_PATH" name="OBJECT_PARENT_PATH"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="OBJECT_ID" name="OBJECT_ID" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="OBJECT_VERSION" name="OBJECT_VERSION" type="xsd:int"
minOccurs="0" />
          <xsd:element sql:field="OBJECT_DATA_VERSION" name="OBJECT_DATA_VERSION"
type="xsd:int" minOccurs="0" />
```


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```
          <xsd:element sql:field="OBJECT_CPU_TIME_MS" name="OBJECT_CPU_TIME_MS"
type="xsd:long" minOccurs="0" />
          <xsd:element sql:field="OBJECT_READS" name="OBJECT_READS" type="xsd:long"
minOccurs="0" />
          <xsd:element sql:field="OBJECT_READ_KB" name="OBJECT_READ_KB" type="xsd:long"
minOccurs="0" />
          <xsd:element sql:field="OBJECT_WRITES" name="OBJECT_WRITES" type="xsd:long"
minOccurs="0" />
          <xsd:element sql:field="OBJECT_WRITE_KB" name="OBJECT_WRITE_KB" type="xsd:long"
minOccurs="0" />
          <xsd:element sql:field="OBJECT_ROWS_SCANNED" name="OBJECT_ROWS_SCANNED"
type="xsd:long" minOccurs="0" />
          <xsd:element sql:field="OBJECT_ROWS_RETURNED" name="OBJECT_ROWS_RETURNED"
type="xsd:long" minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.57 DISCOVER_OBJECT_ACTIVITY

This schema rowset provides resource usage per object since the start of the service.

3.1.4.2.2.1.3.57.1 Columns

The **DISCOVER_OBJECT_ACTIVITY** rowset contains the following columns.

Name	Type	Restrictions	Description
OBJECT_PARENT_PATH	xsd:string	Yes	The path to the parent of the current object.
OBJECT_ID	xsd:string	Yes	The ID of the object as defined at creation time.
OBJECT_CPU_TIME_MS	xsd:Long		The CPU time, in milliseconds, consumed by the object since the start of the service.
OBJECT_READS	xsd:Long		The accumulated number of read operations by the object since the start of the service.
OBJECT_READ_KB	xsd:Long		The accumulated value of data read by the object since the start of the service, in kilobytes.
OBJECT_WRITES	xsd:Long		The accumulated number of write operations by the object since the start of the service.
OBJECT_WRITE_KB	xsd:Long		The accumulated value of data written by the object since the start of the service, in kilobytes.
OBJECT_AGGREGATION_HIT	xsd:Long		The number of times an aggregation of the object has been hit since the start of the service.
OBJECT_AGGREGATION_MISS	xsd:Long		The number of times an existing

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Name	Type	Restrictions	Description
			aggregation of the object has not been used since the start of the service.
OBJECT_HIT	xsd:Long		The number of times the object has been hit in the cache since the start of the service.
OBJECT_MISS	xsd:Long		The number of times the object has been missed in the cache since the start of the service.
OBJECT_VERSION	xsd:Int		The metadata version number of the object; this number changes every time the object is altered.
OBJECT_DATA_VERSION	xsd:Int		The lineage number of the data in the object. This number increments each time the object is processed.
OBJECT_ROWS_SCANNED	xsd:Long		The number of rows scanned by the object since the start of the service.
OBJECT_ROWS_RETURNED	xsd:Long		The number of rows returned by the object to the caller since the start of the service.

The rowset is not sorted.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="OBJECT_PARENT_PATH" name="OBJECT_PARENT_PATH"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="OBJECT_ID" name="OBJECT_ID" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="OBJECT_CPU_TIME_MS" name="OBJECT_CPU_TIME_MS"
type="xsd:long" minOccurs="0" />
          <xsd:element sql:field="OBJECT_READS" name="OBJECT_READS" type="xsd:long"
minOccurs="0" />
          <xsd:element sql:field="OBJECT_READ_KB" name="OBJECT_READ_KB" type="xsd:long"
minOccurs="0" />
          <xsd:element sql:field="OBJECT_WRITES" name="OBJECT_WRITES" type="xsd:long"
minOccurs="0" />
          <xsd:element sql:field="OBJECT_WRITE_KB" name="OBJECT_WRITE_KB" type="xsd:long"
minOccurs="0" />
          <xsd:element sql:field="OBJECT_AGGREGATION_HIT" name="OBJECT_AGGREGATION_HIT"
type="xsd:long" minOccurs="0" />
          <xsd:element sql:field="OBJECT_AGGREGATION_MISS" name="OBJECT_AGGREGATION_MISS"
type="xsd:long" minOccurs="0" />
          <xsd:element sql:field="OBJECT_HIT" name="OBJECT_HIT" type="xsd:long" minOccurs="0"
/>
```


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```
          <xsd:element sql:field="OBJECT_MISS" name="OBJECT_MISS" type="xsd:long"
minOccurs="0" />
          <xsd:element sql:field="OBJECT_VERSION" name="OBJECT_VERSION" type="xsd:int"
minOccurs="0" />
          <xsd:element sql:field="OBJECT_DATA_VERSION" name="OBJECT_DATA_VERSION"
type="xsd:int" minOccurs="0" />
          <xsd:element sql:field="OBJECT_ROWS_SCANNED" name="OBJECT_ROWS_SCANNED"
type="xsd:long" minOccurs="0" />
          <xsd:element sql:field="OBJECT_ROWS_RETURNED" name="OBJECT_ROWS_RETURNED"
type="xsd:long" minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.58 DISCOVER_OBJECT_MEMORY_USAGE

This schema rowset provides information about memory resources used by objects.

3.1.4.2.2.1.3.58.1 Columns

The **DISCOVER_OBJECT_MEMORY_USAGE** rowset contains the following columns.

Name	Type	Restrictions	Description
OBJECT_PARENT_PATH	xsd:string	Yes	The path to the parent of the current object. The format of the string is that each ancestor object ID is listed, separated by '.'.
OBJECT_ID	xsd:string	Yes	The ID of the object as defined at creation time.
OBJECT_MEMORY_SHRINKABLE	xsd:Long		The total amount of memory used by all the shrinkable objects that are directly owned by the current object. The current value does not include memory from objects owned by named objects that are owned by the current object.
OBJECT_MEMORY_NONSHRINKABLE	xsd:Long		The amount of memory of all non-shrinkable objects directly owned by current object. The current value does not include memory from objects owned by named objects that are owned by the current object.
OBJECT_VERSION	xsd:Int		The metadata version number of the object. This number changes each time the object is altered.
OBJECT_DATA_VERSION	xsd:Int		The lineage number of the data in the object. This number increments each time the object is processed.

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Name	Type	Restrictions	Description
OBJECT_TYPE_ID	xsd:Int		Reserved for future use.
OBJECT_TIME_CREATED	xsd:dateTime		The UTC server time at the moment the object was created.

The rowset is not sorted.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="OBJECT_PARENT_PATH" name="OBJECT_PARENT_PATH"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="OBJECT_ID" name="OBJECT_ID" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="OBJECT_MEMORY_SHRINKABLE" name="OBJECT_MEMORY_SHRINKABLE"
type="xsd:long" minOccurs="0" />
          <xsd:element sql:field="OBJECT_MEMORY_NONSHRINKABLE"
name="OBJECT_MEMORY_NONSHRINKABLE" type="xsd:long" minOccurs="0" />
          <xsd:element sql:field="OBJECT_VERSION" name="OBJECT_VERSION" type="xsd:int"
minOccurs="0" />
          <xsd:element sql:field="OBJECT_DATA_VERSION" name="OBJECT_DATA_VERSION"
type="xsd:int" minOccurs="0" />
          <xsd:element sql:field="OBJECT_TYPE_ID" name="OBJECT_TYPE_ID" type="xsd:int"
minOccurs="0" />
          <xsd:element sql:field="OBJECT_TIME_CREATED" name="OBJECT_TIME_CREATED"
type="xsd:dateTime" minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.59 DISCOVER_STORAGE_TABLES

This schema rowset returns statistics about in-memory tables available to the server.<185>

3.1.4.2.2.1.3.59.1 Columns

The **DISCOVER_STORAGE_TABLES** rowset contains the following columns.

Name	Type	Restrictions	Description
DATABASE_NAME	xsd:string	Yes	The name of the database.
CUBE_NAME	xsd:string	Yes	The name of the cube.
MEASURE_GROUP_NAME	xsd:string	Yes	The name of the measure group.
PARTITION_NAME	xsd:string	Yes	The name of the partition.

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Name	Type	Restrictions	Description
DIMENSION_NAME	xsd:string		The name of the dimension.
TABLE_ID	xsd:string		The ID of the table.
TABLE_PARTITIONS_COUNT	xsd:long		The table partition count.
HINT_TABLE_TYPE	xsd:string		The hint of the table type.
ROWS_COUNT	xsd:long		The row count.
RIVIOLATIONCOUNT	xsd:long		The number of relationships that have referential integrity violations.

The rowset is not sorted.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="DATABASE_NAME" name="DATABASE_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="MEASURE_GROUP_NAME" name="MEASURE_GROUP_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="PARTITION_NAME" name="PARTITION_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="DIMENSION_NAME" name="DIMENSION_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="TABLE_ID" name="TABLE_ID" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="TABLE_PARTITIONS_COUNT" name="TABLE_PARTITIONS_COUNT"
type="xsd:long" minOccurs="0" />
          <xsd:element sql:field="HINT_TABLE_TYPE" name="HINT_TABLE_TYPE" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="ROWS_COUNT" name="ROWS_COUNT" type="xsd:long" minOccurs="0"
/>
          <xsd:element sql:field="RIVIOLATION_COUNT" name="RIVIOLATION_COUNT" type="xsd:long"
minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.60 DISCOVER_STORAGE_TABLE_COLUMNS

This schema rowset contains information about the columns used for representing the columns of an in-memory table.<186>

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3.1.4.2.2.1.3.60.1 Columns

The **DISCOVER_STORAGE_TABLE_COLUMNS** rowset contains the following columns.

Name	Type	Restrictions	Description
DATABASE_NAME	xsd:string	Yes	The name of the database.
CUBE_NAME	xsd:string	Yes	The name of the cube.
MEASURE_GROUP_NAME	xsd:string	Yes	The name of the measure group.
PARTITION_NAME	xsd:string	Yes	The name of the partition.
DIMENSION_NAME	xsd:string		The name of the dimension.
ATTRIBUTE_NAME	xsd:string		The name of the attribute.
TABLE_ID	xsd:string		The ID of the table.
COLUMN_ID	xsd:string		The ID of the column.
COLUMN_TYPE	xsd:string		The type of the column. The values are as follows: ▪ BASIC_DATA – This column contains data provided by an external data source. ▪ CALCULATED_DATA – This column contains data created by calculations. ▪ RELATIONSHIP – This column contains information about relationship between tables. ▪ HIERARCHY_POSITION_TO_DATAID – This column contains information mapping position of a value in the hierarchy to the Data ID. ▪ HIERARCHY_DATAID_TO_POSITION – This column contains information mapping a Data ID to the position of a value in the hierarchy. ▪ UNKNOWN – The column type is not known.
COLUMN_ENCODING	xsd:long		The encoding method used on the column. The method can be one of the following: ▪ 0 – The system automatically selects a column encoding. ▪ 1 – The column uses hash encoding. ▪ 2 – The column uses value encoding.
DATATYPE	xsd:string	Yes	The type of the column data. The values are as follows:

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Name	Type	Restrictions	Description
			▪ N/A – Indicates that no data type information is available. ▪ DBTYPE_EMPTY - Indicates that no value was specified. ▪ DBTYPE_I2 - Indicates a two-byte signed integer. ▪ DBTYPE_I4 - Indicates a four-byte signed integer. ▪ DBTYPE_R4 - Indicates a single-precision floating-point value. ▪ DBTYPE_R8 - Indicates a double-precision floating-point value. ▪ DBTYPE_CY - Indicates a currency value. Currency is a fixed-point number that has four digits to the right of the decimal point and that is stored in an eight-byte signed integer scaled by 10,000. ▪ DBTYPE_DATE - Indicates a date value. Date values are stored as Double, the whole part of which is the number of days since December 30, 1899, and the fractional part of which is the fraction of a day. ▪ DBTYPE_BSTR - Indicates a null-terminated character string (Unicode). ▪ DBTYPE_ERROR - Indicates a 32-bit error code. ▪ DBTYPE_BOOL - Indicates a Boolean value. ▪ DBTYPE_DECIMAL - Indicates an exact numeric value with a fixed precision and scale. The scale is between 0 and 28. ▪ DBTYPE_I1 - Indicates a one-byte signed integer. ▪ DBTYPE_UI1 - Indicates a one-byte unsigned integer. ▪ DBTYPE_UI2 - Indicates a two-byte unsigned integer. ▪ DBTYPE_UI4 - Indicates a four-byte unsigned integer. ▪ DBTYPE_I8 - Indicates an eight-byte signed integer. ▪ DBTYPE_UI8 - Indicates an eight-byte

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Name	Type	Restrictions	Description
			unsigned integer. ▪ DBTYPE_GUID - Indicates a GUID. ▪ DBTYPE_BYTES - Indicates a binary value. ▪ DBTYPE_STR - Indicates a string value. ▪ DBTYPE_WSTR - Indicates a null-terminated Unicode character string. ▪ DBTYPE_NUMERIC - Indicates an exact numeric value with a fixed precision and scale. The scale is between 0 and 38. ▪ DBTYPE_DBDATE - Indicates a date value (yyyymmdd). ▪ DBTYPE_DBTIME - Indicates a time value (hhmmss). ▪ DBTYPE_DBTIMESTAMP - Indicates a date-time stamp (yyyymmddhhmmss plus a fraction in billionths).
ISKEY	xsd:boolean		Indicates whether the column is a key column.
ISUNIQUE	xsd:boolean		Indicates whether the column contains unique values.
ISNULLABLE	xsd:boolean		Indicates whether the column can contain NULL values.
ISROWNUMBER	xsd:boolean		Indicates whether the column is a Row Number column.

The rowset is not sorted.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="DATABASE_NAME" name="DATABASE_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="MEASURE_GROUP_NAME" name="MEASURE_GROUP_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="PARTITION_NAME" name="PARTITION_NAME" type="xsd:string"
minOccurs="0" />
```


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```
          <xsd:element sql:field="DIMENSION_NAME" name="DIMENSION_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="ATTRIBUTE_NAME" name="ATTRIBUTE_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="TABLE_ID" name="TABLE_ID" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="COLUMN_ID" name="COLUMN_ID" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="COLUMN_TYPE" name="COLUMN_TYPE" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="COLUMN_ENCODING" name="COLUMN_ENCODING" type="xsd:long"
minOccurs="0" />
          <xsd:element sql:field="DATATYPE" name="DATATYPE" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="ISKEY" name="ISKEY" type="xsd:boolean" minOccurs="0" />
          <xsd:element sql:field="ISUNIQUE" name="ISUNIQUE" type="xsd:boolean" minOccurs="0"
/>
          <xsd:element sql:field="ISNULLABLE" name="ISNULLABLE" type="xsd:boolean"
minOccurs="0" />
          <xsd:element sql:field="ISROWNUMBER" name="ISROWNUMBER" type="xsd:boolean"
minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.1.3.61 DISCOVER_STORAGE_TABLE_COLUMN_SEGMENTS

The DISCOVER_STORAGE_TABLE_COLUMN_SEGMENTS schema rowset returns information about the column segments used for storing data for in-memory tables.<187>

3.1.4.2.2.1.3.61.1 Columns

The **DISCOVER_STORAGE_TABLE_COLUMN_SEGMENTS** rowset contains the following columns.

Name	Type	Restrictions	Description
DATABASE_NAME	xsd:string	Yes	The name of the database.
CUBE_NAME	xsd:string	Yes	The name of the cube.
MEASURE_GROUP_NAME	xsd:string	Yes	The name of the measure group.
PARTITION_NAME	xsd:string	Yes	The name of the partition.
DIMENSION_NAME	xsd:string		The name of the dimension.
TABLE_ID	xsd:string		The ID of the table.
COLUMN_ID	xsd:string		The ID of the column.
SEGMENT_NUMBER	xsd:long		The numeric value of the segment.
TABLE_PARTITION_NUMBER	xsd:long		The numeric value of the partition table.
RECORDS_COUNT	xsd:long		The number of records.
ALLOCATED_SIZE	xsd:unsignedLong		The size of allocated data.

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Name	Type	Restrictions	Description
USED_SIZE	xsd:unsignedLong		The size of the data used.
COMPRESSION_TYPE	xsd:string		The type of compression. Currently, this value is always "NOSPLIT".
BITS_COUNT	xsd:long		The count of bits required to store the Data IDs.
BOOKMARK_BITS_COUNT	xsd:long		The bookmark count of BITS.
VERTIPAQ_STATE	xsd:string		The state of the VertiPaq compression for this column segment. The value is one of the following: ▪ COMPLETED – The VertiPaq compression completed successfully. ▪ TIMEBOXED – The VertiPaq compression was timeboxed. ▪ SKIPPED – The VertiPaq compression was skipped.

The rowset is not sorted.

The response has the following definition.

```
      <xsd:element name="root">
        <xsd:complexType>
          <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:complexType name="row">
        <xsd:sequence>
          <xsd:element sql:field="DATABASE_NAME" name="DATABASE_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="MEASURE_GROUP_NAME" name="MEASURE_GROUP_NAME"
type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="PARTITION_NAME" name="PARTITION_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="DIMENSION_NAME" name="DIMENSION_NAME" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="TABLE_ID" name="TABLE_ID" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="COLUMN_ID" name="COLUMN_ID" type="xsd:string" minOccurs="0"
/>
          <xsd:element sql:field="SEGMENT_NUMBER" name="SEGMENT_NUMBER" type="xsd:long"
minOccurs="0" />
          <xsd:element sql:field="TABLE_PARTITION_NUMBER" name="TABLE_PARTITION_NUMBER"
type="xsd:long" minOccurs="0" />
```


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```
          <xsd:element sql:field="RECORDS_COUNT" name="RECORDS_COUNT" type="xsd:long"
minOccurs="0" />
          <xsd:element sql:field="ALLOCATED_SIZE" name="ALLOCATED_SIZE"
type="xsd:unsignedLong" minOccurs="0" />
          <xsd:element sql:field="USED_SIZE" name="USED_SIZE" type="xsd:unsignedLong"
minOccurs="0" />
          <xsd:element sql:field="COMPRESSION_TYPE" name="COMPRESSION_TYPE" type="xsd:string"
minOccurs="0" />
          <xsd:element sql:field="BITS_COUNT" name="BITS_COUNT" type="xsd:long" minOccurs="0"
/>
          <xsd:element sql:field="BOOKMARK_BITS_COUNT" name="BOOKMARK_BITS_COUNT"
type="xsd:long" minOccurs="0" />
          <xsd:element sql:field="VERTIPAQ_STATE" name="VERTIPAQ_STATE" type="xsd:string"
minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
```

3.1.4.2.2.2 DiscoverResponse

The **DiscoverResponse** element has the following definition.

```
<xsd:element name="DiscoverResponse">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="return" minOccurs="0" maxOccurs="1">
        <xsd:complexType>
          <xsd:element name= "root" minOccurs="0"
                       type="xmla-rs:root" maxOccurs="1">
          </xsd:element>
        </xsd:complexType>
      </xsd:element>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
```

3.1.4.2.2.2.1 Return Element

The Discover method returns the return element that is described in section 3.1.4.3.2.2.1. The **root** element that is returned by **Discover** will be of type **xmla-rs:rowset** (for more information, see section 2.2.4.1.3).

3.1.4.3 Execute

This operation is used for sending commands to the server.

The following WSDL describes the **Execute** operation.

```
<wsdl:operation name="Execute">
  <wsdl:input message=" ExecuteSoapIn" />
  <wsdl:output message=" ExecuteSoapOut" />
</wsdl:operation>
```


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The protocol client sends an ExecuteSoapIn request message, and the protocol server responds with an ExecuteSoapOut response message.

3.1.4.3.1 Messages

The following WSDL message definitions are specific to this operation.

3.1.4.3.1.1 ExecuteSoapIn

This message is the request message for the Execute operation.

The SOAP action value of the message is defined as:

```
"urn:schemas-microsoft-com:xml-analysis:Execute"
```

The SOAP body contains an **Execute** element.

```
<message name="ExecuteSoapIn">
  <part name="parameters" element="xmla:Execute" />
</message>
```

3.1.4.3.1.2 ExecuteSoapOut

This message is the response message for the Execute operation.

The SOAP action value of the message is defined as:

```
"urn:schemas-microsoft-com:xml-analysis:Execute"
```

The SOAP body contains an ExecuteResponse element.

```
<message name="ExecuteSoapOut">
  <part name="parameters" element="xmla:ExecuteResponse" />
</message>
```

3.1.4.3.2 Elements

The following XML Schema element definitions are specific to this operation.

3.1.4.3.2.1 Execute

The **Execute** element has the following definition:

```
<xsd:complexType name="Execute">
  <xsd:sequence>
    <xsd:element name="Command" type="Command" />
    <xsd:element name="Properties" minOccurs="1" maxOccurs="1" >
```


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```
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="PropertyList" minOccurs="0" maxOccurs="1" type="PropertyList"
/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:element name="Parameters" minOccurs="0">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="Parameter" type="ExecuteParameter" minOccurs="0"
maxOccurs="unbounded" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
    </xsd:sequence>
  </xsd:complexType>
```

Element	Default	Description
Command	[Required]	The **Command** element is defined in section 3.1.4.3.2.1.1. The available commands are described in the subsections to that section.
Properties	[Required]	The **Properties** element contains a **PropertyList** element. The **PropertyList** element is used to set properties on the server. The available properties to be set are described in section 3.1.4.2.2.1.2.1.
Parameters	Empty	A collection of **Parameter** elements of type **ExecuteParameter**. Some commands accept parameters, and the values for those parameters SHOULD be set in this collection. The **ExecuteParameter** type is defined in section 3.1.4.3.2.1.3.1.

3.1.4.3.2.1.1 Command Element

The **Command** element contains one of the available commands which MAY be sent to the server.

```
<xsd:complexType name="Command">
  <xsd:choice>
    <xsd:element name="Statement" type="xsd:string" minOccurs="0" />
    <xsd:element name="Create" type="Create" minOccurs="0" />
    <xsd:element name="Alter" type="Alter" minOccurs="0" />
    <xsd:element name="Delete" type="Delete" minOccurs="0" />
    <xsd:element name="Process" type="Process" minOccurs="0" />
    <xsd:element name="MergePartitions" type="MergePartitions" minOccurs="0" />
    <xsd:element name="DesignAggregations" type="DesignAggregations" minOccurs="0" />
    <xsd:element name="ClearCache" type="ClearCache" minOccurs="0" />
    <xsd:element name="Subscribe" type="Subscribe" minOccurs="0" />
    <xsd:element name="Cancel" type="Cancel" minOccurs="0" />
    <xsd:element name="BeginTransaction" type="BeginTransaction" minOccurs="0" />
    <xsd:element name="CommitTransaction" type="CommitTransaction" minOccurs="0" />
    <xsd:element name="RollbackTransaction" type="RollbackTransaction" minOccurs="0" />
    <xsd:element name="Lock" type="Lock" minOccurs="0" />
    <xsd:element name="Unlock" type="Unlock" minOccurs="0" />
    <xsd:element name="Backup" type="Backup" minOccurs="0" />
    <xsd:element name="Restore" type="Restore" minOccurs="0" />
    <xsd:element name="Synchronize" type="Synchronize" minOccurs="0" />
    <xsd:element name="Insert" type="Insert" minOccurs="0" />
```


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```
    <xsd:element name="Update" type="Update" minOccurs="0" />
    <xsd:element name="Drop" type="Drop" minOccurs="0" />
    <xsd:element name="UpdateCells" type="UpdateCells" minOccurs="0" />
    <xsd:element name="NotifyTableChange" type="NotifyTableChange" minOccurs="0" />
    <xsd:element name="Batch" type="Batch" minOccurs="0" />
    <xsd:element name="Attach" type="Attach" minOccurs="0" />
    <xsd:element name="Detach" type="Detach" minOccurs="0" />
  </xsd:choice>
</xsd:complexType>
```

The following subsections define the types for all of the commands.

3.1.4.3.2.1.1.1 ObjectReference Type

Many of the commands require an element that is of type **ObjectReference**. An **ObjectReference** consists of a hierarchical list of references that, when concatenated, reference an object by its full path in the server object hierarchy.

Only 2.2.4.2.2.1 can be referenced by an **ObjectReference**.

```
<xsd:complexType name="ObjectReference">
  <xsd:all>
    <xsd:element name="ServerID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="DatabaseID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="RoleID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="TraceID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="AssemblyID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="DimensionID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="DimensionPermissionID" type="xsd:string"
                 minOccurs="0"/>
    <xsd:element name="DataSourceID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="DataSourcePermissionID" type="xsd:string"
                 minOccurs="0"/>
    <xsd:element name="DatabasePermissionID" type="xsd:string"
                 minOccurs="0"/>
    <xsd:element name="DataSourceViewID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="CubeID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="MiningStructureID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="MeasureGroupID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="PerspectiveID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="CubePermissionID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="MdxScriptID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="PartitionID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="AggregationDesignID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="MiningModelID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="MiningModelPermissionID" type="xsd:string"
                 minOccurs="0"/>
    <xsd:element name="MiningStructurePermissionID" type="xsd:string"
                 minOccurs="0"/>
  </xsd:all>
</xsd:complexType>
```

The following table lists the elements that are needed to reference each of the major objects.

ServerID is always optional when referencing a major object, because the current server is used.

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Major object to be referenced	Element to be used
Server	ServerID
Assembly (Server Assembly)	ServerID, AssemblyID
Assembly (Database Assembly)	ServerID, DatabaseID, AssemblyID
Trace	ServerID, TraceID
Database	ServerID, DatabaseID
DatabasePermission	ServerID, DatabaseID, DatabasePermissionID
Role (on Server)	ServerID, RoleID
Role (on Database)	ServerID, RoleID, DatabaseID
DataSource	ServerID, RoleID, DatabaseID, DataSourceID
DataSourcePermission	ServerID, RoleID, DatabaseID, DataSourceID, DataSourcePermissionID
DataSourceView	ServerID, RoleID, DatabaseID, DataSourceViewID
Dimension	ServerID, RoleID, DatabaseID, DimensionID
DimensionPermission	ServerID, RoleID, DatabaseID, DimensionID, DimensionPermissionID
MiningStructure	ServerID, RoleID, DatabaseID, MiningStructureID
MiningStructurePermission	ServerID, RoleID, DatabaseID, MiningStructureID, MiningStructurePermissionID
MiningModel	ServerID, RoleID, DatabaseID, MiningStructureID, MiningModelID
MiningModelPermission	ServerID, RoleID, DatabaseID, MiningStructureID, MiningModelID, MiningModelPermissionID
Cube	ServerID, RoleID, DatabaseID, CubeID
CubePermission	ServerID, RoleID, DatabaseID, CubeID, CubePermissionID
MeasureGroup	ServerID, RoleID, DatabaseID, CubeID, MeasureGroupID
AggregationDesign	ServerID, RoleID, DatabaseID, CubeID, MeasureGroupID, AggregationDesignID
Partition	ServerID, RoleID, DatabaseID, CubeID, MeasureGroupID, PartitionID
Perspective	ServerID, RoleID, DatabaseID, CubeID, PerspectiveID
MdxScript	ServerID, RoleID, DatabaseID, CubeID, MdxScriptID

3.1.4.3.2.1.1.2 Statement

The **Statement** command consists of a string. This MUST be a valid string in a language that is understood by the server, such as MDX, DMX, or SQL.

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```
<xsd:complexType name="Statement" >
  <xsd:all>
    <xsd:element name="Statement" type="xsd:string" minOccurs="0" />
  </xsd:all>
</xsd:complexType>
```

3.1.4.3.2.1.1.3 Create

The **Create** command is used to create an object on a server.

```
<xsd:complexType name="Create">
  <xsd:all>
    <xsd:element name="ParentObject" type="ObjectReference" minOccurs="0" />
    <xsd:element name="ObjectDefinition" type="MajorObject" />
  </xsd:all>
  <xsd:attribute name="Scope" >
    <xsd:simpleType>
      <xsd:restriction base="xsd:string" >
        <xsd:enumeration value="Session" />
      </xsd:restriction>
    </xsd:simpleType>
  </xsd:attribute>
  <xsd:attribute name="AllowOverwrite" type="xsd:boolean" />
</xsd:complexType>
```

The following table describes the elements allowed in the **Create** command.

Element	Default	Description
ParentObject	Server object	The parent object under which the new object is created. The **ObjectReference** type is defined in section 3.1.4.3.2.1.1.1.
ObjectDefinition	[Required]	The full XML that defines an object that is derived from **MajorObject**, as described in section 2.2.4.2.

The following table describes the XML attributes that are allowed in the **Create** command.

Attribute	Default	Description
Scope	Empty	If **Scope** is specified as "Session", the object is created with session scope. If this XML attribute is present, any value other than "Session", including an empty value, will return an error.
AllowOverwrite	False	A Boolean that determines how to handle an object that already exists. If true, the object is overwritten; if false, the server raises an error.

3.1.4.3.2.1.1.4 Alter

The **Alter** command is used to alter an object that already exists on a server.

```
<xsd:complexType name="Alter">
```


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```
    <xsd:all>
      <xsd:element name="Object" type="ObjectReference" minOccurs="0" />
      <xsd:element name="ObjectDefinition" type="MajorObject" />
    </xsd:all>
    <xsd:attribute name="Scope" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Session" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:attribute>
    <xsd:attribute name="AllowCreate" type="xsd:boolean" />
    <xsd:attribute name="ObjectExpansion" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="ObjectProperties" />
          <xsd:enumeration value="ExpandFull" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:attribute>
  </xsd:complexType>
```

The following table describes the XML elements allowed in the **Alter** command.

Element	Default	Description
Object	Server object	The object to alter. The **ObjectReference** type is defined in section 3.1.4.3.2.1.1.1.
ObjectDefinition	[Required]	The **ObjectDefinition** is the full XML that defines an object derived from **MajorObject** (2.2.4.2.2.1). Depending on the value of **ObjectExpansion**, objects contained by a major object MAY be defined with the XML.

The following table describes the XML attributes allowed in the Alter command.

Attribute	Default	Description
Scope	Empty	If **Scope** is specified as "Session", the object is altered as a session object. If this XML attribute is present, any value other than "Session", including an empty value, will return an error.
AllowCreate	False	A Boolean that specifies what to do if the object does not exist. If true, the server creates a new object; if false, the server raises an error.
ObjectExpansion	"ObjectProperties"	An enumeration value that specifies whether to alter only the object, or the object and all of its descendants.

3.1.4.3.2.1.1.5 Delete

The **Delete** command is used to delete an object from a server.

```
  <xsd:complexType name="Delete">
    <xsd:all>
```


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```
    <xsd:element name="Object" type="ObjectReference" />
  </xsd:all>
  <xsd:attribute name="IgnoreFailures" type="xsd:boolean" />
</xsd:complexType>
```

The following table shows the XML elements included in the **Delete** command.

Element	Default	Description
Object	Server object	The object to delete. The **ObjectReference** type is defined in section 3.1.4.3.2.1.1.1.

The following table describes the XML attributes allowed in the **Delete** command.

Attribute	Default	Description
IgnoreFailures	False	A Boolean that indicates how to handle failures related to network and remote partitions. If true, the server ignores failures; if false, the server raises an error.

3.1.4.3.2.1.1.6 Process

The **Process** command is used to process objects on the server.

```
<xsd:complexType name="Process">
  <xsd:all>
    <xsd:element name="Type" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="ProcessFull" />
          <xsd:enumeration value="ProcessAdd" />
          <xsd:enumeration value="ProcessUpdate" />
          <xsd:enumeration value="ProcessIndexes" />
          <xsd:enumeration value="ProcessScriptCache" />
          <xsd:enumeration value="ProcessData" />
          <xsd:enumeration value="ProcessDefault" />
          <xsd:enumeration value="ProcessClear" />
          <xsd:enumeration value="ProcessStructure" />
          <xsd:enumeration value="ProcessClearStructureOnly" />
          <xsd:enumeration value="ProcessClearIndexes" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Object" type="ObjectReference" />
    <xsd:element name="Bindings" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Binding"  type="OutOfLineBinding" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="DataSource" type="DataSource" minOccurs="0"  />
    <xsd:element name="DataSourceView" type="DataSourceView" minOccurs="0" />
    <xsd:element name="ErrorConfiguration" type="ErrorConfiguration"
```


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```
                minOccurs="0" />
      <xsd:element name="WriteBackTableCreation" minOccurs="0" >
        <xsd:simpleType>
          <xsd:restriction base="xsd:string" >
            <xsd:enumeration value="Create" />
            <xsd:enumeration value="CreateAlways" />
            <xsd:enumeration value="UseExisting" />
          </xsd:restriction>
        </xsd:simpleType>
      </xsd:element>
    </xsd:all>
  </xsd:complexType>
```

The following table shows the XML elements included in the **Process** command.

Element	Default	Description
Type	[Required]	An enumeration value that specifies the type of processing being done.
Object	[Required]	The object to process. The **ObjectReference** type is defined in section 3.1.4.3.2.1.1.1.
Bindings	Empty	The optional bindings that can be specified for any of the objects that are to be processed. If any are specified, they override the binding specified for the objects that are stored with the object definition on the server.
DataSource	Empty	The optional data source that may be specified for any of the objects that are to be processed. If any are specified, they override the data source that is specified for the objects that are stored with the object definition on the server. The **DataSource** type is defined in section 2.2.4.2.2.6.
DataSourceView	Empty	The optional data source view that may be specified for any of the objects that are to be processed. If any are specified, they override the data source view that is specified for the objects that are stored with the object definition on the server. The **DataSourceView** type is defined in section 2.2.4.2.2.7.
ErrorConfiguration	Empty	The error configuration used for this processing operation. It overrides any error configuration object that is stored as part of object definitions on the server. The **ErrorConfiguration** type is defined in section 2.2.4.2.2.30.
WriteBackTableCreation	"Create"	An enumeration value that specifies whether to create or use an existing **Writeback** table.

3.1.4.3.2.1.1.6.1 OutOfLineBinding

The **OutOfLineBinding** type is used for overriding the bindings on an object set in a Create or Alter command. It consists of a set of IDs that reference the object and the bindings to be overridden. The bindings have the same restrictions as those on the object that they override.

```
<xsd:complexType name="OutOfLineBinding" >
  <xsd:all>
```


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```
<xsd:element name="DatabaseID" minOccurs="0"  type="xsd:string" />
<xsd:element name="DimensionID" minOccurs="0"  type="xsd:string" />
<xsd:element name="CubeID" minOccurs="0"  type="xsd:string" />
<xsd:element name="MeasureGroupID" minOccurs="0"  type="xsd:string" />
<xsd:element name="PartitionID" minOccurs="0"  type="xsd:string" />
<xsd:element name="MiningModelID" minOccurs="0"  type="xsd:string" />
<xsd:element name="MiningStructureID" minOccurs="0"  type="xsd:string" />
<xsd:element name="AttributeID" minOccurs="0"  type="xsd:string" />
<xsd:element name="CubeDimensionID" minOccurs="0"  type="xsd:string" />
<xsd:element name="MeasureID" minOccurs="0"  type="xsd:string" />
<xsd:element name="ParentColumnID" minOccurs="0"  type="xsd:string" />
<xsd:element name="ColumnID" minOccurs="0"  type="xsd:string" />
<xsd:element name="Source" minOccurs="0"  type="Binding" />
<xsd:element name="NameColumn" minOccurs="0" >
  <xsd:complexType>
    <xsd:all>
      <xsd:element name="Source" minOccurs="0"  type="Binding" />
    </xsd:all>
  </xsd:complexType>
</xsd:element>
<xsd:element name="SkippedLevelsColumn" minOccurs="0" >
  <xsd:complexType>
    <xsd:all>
      <xsd:element name="Source" minOccurs="0"  type="Binding" />
    </xsd:all>
  </xsd:complexType>
</xsd:element>
<xsd:element name="CustomRollupColumn" minOccurs="0" >
  <xsd:complexType>
    <xsd:all>
      <xsd:element name="Source" minOccurs="0"  type="Binding" />
    </xsd:all>
  </xsd:complexType>
</xsd:element>
<xsd:element name="CustomRollupPropertiesColumn" minOccurs="0" >
  <xsd:complexType>
    <xsd:all>
      <xsd:element name="Source" minOccurs="0"  type="Binding" />
    </xsd:all>
  </xsd:complexType>
</xsd:element>
<xsd:element name="ValueColumn" minOccurs="0" >
  <xsd:complexType>
    <xsd:all>
      <xsd:element name="Source" minOccurs="0"  type="Binding" />
    </xsd:all>
  </xsd:complexType>
</xsd:element>
<xsd:element name="UnaryOperatorColumn" minOccurs="0" >
  <xsd:complexType>
    <xsd:all>
      <xsd:element name="Source" minOccurs="0"  type="Binding" />
    </xsd:all>
  </xsd:complexType>
</xsd:element>
<xsd:element name="KeyColumns" minOccurs="0" >
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="KeyColumn" minOccurs="0" maxOccurs="unbounded">
```


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```
            <xsd:complexType>
              <xsd:all>
                <xsd:element name="Source" minOccurs="0"  type="Binding" />
              </xsd:all>
            </xsd:complexType>
          </xsd:element>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="ForeignKeyColumns" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="ForeignKeyColumn" minOccurs="0"
                       maxOccurs="unbounded">
            <xsd:complexType>
              <xsd:all>
                <xsd:element name="Source" minOccurs="0"  type="Binding" />
              </xsd:all>
            </xsd:complexType>
          </xsd:element>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Translations" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Translation" minOccurs="0" maxOccurs="unbounded">
            <xsd:complexType>
              <xsd:all>
                <xsd:element name="Language" type="xsd:int" />
                <xsd:element name="Source" minOccurs="0"  type="Binding" />
              </xsd:all>
            </xsd:complexType>
          </xsd:element>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Element	Default	Description
DatabaseID	Empty	The ID of the Database that this binding applies to.
DimensionID	Empty	The ID of the Dimension that this binding applies to.
CubeID	Empty	The ID of the Cube that this binding applies to.
MeasureGroupID	Empty	The ID of the MeasureGroup that this binding applies to.
PartitionID	Empty	The ID of the Partition that this binding applies to.
MiningModelID	Empty	The ID of the MiningModel that this binding applies to.
MiningStructureID	Empty	The ID of the MiningStructure that this binding applies to.
AttributeID	Empty	The ID of the **Attribute** that this binding applies to.
CubeDimensionID	Empty	The ID of the CubeDimension that this binding applies to.

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Element	Default	Description
MeasureID	Empty	The ID of the Measure that this binding applies to.
ParentColumnID	Empty	The ID of the **Column** that is the parent column in a nested table.
ColumnID	Empty	The ID of the **Column** that this binding applies to.
Source	Empty	The Source binding for the referenced object.
NameColumn	Empty	The **NameColumn** binding for the referenced DimensionAttribute or MiningStructureColumn.
SkippedLevelsColumn	Empty	The **SkippedLevelsColumn** binding for the referenced **DimensionAttribute**.
CustomRollupColumn	Empty	The **CustomRollupColumn** binding for the referenced **DimensionAttribute**.
CustomRollupPropertiesColumn	Empty	The **CustomRollupPropertiesColumn** binding for the referenced **DimensionAttribute**.
ValueColumn	Empty	The **ValueColumn** binding for the referenced **DimensionAttribute**.
UnaryOperatorColumn	Empty	The **UnaryOperatorColumn** binding for the referenced **DimensionAttribute**.
KeyColumns	Empty	A collection of **KeyColumn** bindings for the referenced **DimensionAttribute** or **MiningStructureColumn**.
ForeignKeyColumns	Empty	A collection of **ForeignKeyColumn** bindings for the referenced **MiningStructureColumn**.
Translations	Empty	A collection of **CaptionColumn** bindings for each Translation of the referenced **DimensionAttribute**.

3.1.4.3.2.1.1.7 MergePartitions

This command merges the data of one or more source partitions into a target partition and deletes the source partitions. The Source and **Target** object references MUST point to distinct partitions in the same measure group. Otherwise, an error is raised.

```
<xsd:complexType name="MergePartitions">
  <xsd:all>
    <xsd:element name="Sources" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Source"  type="ObjectReference" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Target" type="ObjectReference" />
  </xsd:all>
</xsd:complexType>
```


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Element	Default	Description
Sources	[Required]	A collection of **ObjectReferences** that define the source partitions for the **MergePartitions** command. This is a collection of Source elements, each of type **ObjectReference**. The **ObjectReference** type is defined in section 3.1.4.3.2.1.1.1.
Target	[Required]	The target partition for the **MergePartitions** command.

3.1.4.3.2.1.1.8 DesignAggregations

This command designs aggregations on an AggregationDesign object and returns a rowset containing the statistics of the design. The Object element MUST point to an existing aggregation design object. Otherwise, an error is raised.

```
<xsd:complexType name="DesignAggregations">
  <xsd:all>
    <xsd:element name="Object" type="ObjectReference" />
    <xsd:element name="Time" type="xsd:duration" minOccurs="0" />
    <xsd:element name="Steps" type="xsd:integer" minOccurs="0" />
    <xsd:element name="Optimization" type="xsd:double" minOccurs="0" />
    <xsd:element name="Storage" type="xsd:long" minOccurs="0" />
    <xsd:element name="Materialize" type="xsd:boolean" minOccurs="0" />
    <xsd:element name="Queries" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Query"  type="xsd:string" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Element	Default	Description
Object	[Required]	An **ObjectReference** to the **AggregationDesign** object for which aggregations are being designed. The **ObjectReference** type is defined in section 3.1.4.3.2.1.1.1.
Time	Zero	A duration that specifies the time limit for aggregation design.
Steps	Zero	An integer that specifies the number of aggregation design steps.
Optimization	Zero	A double that specifies the percent optimization threshold for design of aggregations.
Storage	Zero	A long integer that specifies the storage limit in bytes.
Materialize	False	A Boolean that, when true, indicates that the aggregations should be materialized; otherwise, false.
Queries	Empty	A collection of string elements that represent queries, which are used to optimize the aggregation design.

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3.1.4.3.2.1.1.9 ClearCache

The **ClearCache** command clears the in-memory cache of the specified object.

```
<xsd:complexType name="ClearCache">
  <xsd:all>
    <xsd:element name="Object" type="ObjectReference" />
  </xsd:all>
</xsd:complexType>
```

Element	Default	Description
Object	[Required]	The object to clear from the cache. The object MUST be one of the following: Database, Dimension, Cube, or MeasureGroup. The **ObjectReference** type is defined in section 3.1.4.3.2.1.1.1.

3.1.4.3.2.1.1.10 Subscribe

The **Subscribe** command subscribes to a Trace object for events.

```
<xsd:complexType name="Subscribe">
  <xsd:all>
    <xsd:element name="Object" type="ObjectReference" />
  </xsd:all>
</xsd:complexType>
```

Element	Default	Description
Object	[Required]	The **Trace** object to be subscribed to. The **ObjectReference** type is defined in section 3.1.4.3.2.1.1.1.

3.1.4.3.2.1.1.11 Cancel

The **Cancel** command cancels the currently running command on the specified connection.

```
<xsd:complexType name="Cancel">
  <xsd:all>
    <xsd:element name="ConnectionID" type="xsd:integer" minOccurs="0" />
    <xsd:element name="SessionID" type="xsd:string" minOccurs="0" />
    <xsd:element name="SPID" type="xsd:integer" minOccurs="0" />
    <xsd:element name="CancelAssociated" type="xsd:boolean" minOccurs="0" />
  </xsd:all>
</xsd:complexType>
```

Element	Default	Description
ConnectionID	Empty	The connection ID. -1 means current connection.
SessionID	Empty	The session ID. If neither **ConnectionID**, **SessionID**, nor **SPID** are specified, the current session is canceled.
SPID	Empty	The SPID. -1 means current session.

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Element	Default	Description
CancelAssociated	False	A Boolean that, when true, indicates that the associated sessions are to be canceled; otherwise false.

3.1.4.3.2.1.1.12 BeginTransaction

The **BeginTransaction** command begins a transaction on the current session.

```
<xsd:complexType name="BeginTransaction">
  <xsd:all>
    <xsd:element name="BeginTransaction" >
      <xsd:complexType>
        <xsd:sequence>
          <!--The BeginTransaction command MUST contain NO elements-->
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

The **BeginTransaction** command contains only a **BeginTransaction** element, which MUST be empty. The element has no attributes and no content.

Element	Default	Description
(None.)		

3.1.4.3.2.1.1.13 CommitTransaction

The **CommitTransaction** command commits a transaction on the current session.

```
<xsd:complexType name="CommitTransaction">
  <xsd:all>
    <xsd:element name="CommitTransaction" >
      <xsd:complexType>
        <xsd:sequence>
          <!--The CommitTransaction command MUST contain NO elements-->
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

The **CommitTransaction** command contains only a **CommitTransaction** element, which MUST be empty. The element has no attributes and no content.

Element	Default	Description
(None.)		

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3.1.4.3.2.1.1.14 RollbackTransaction

The **RollbackTransaction** command rolls back a transaction on the current session.

```
<xsd:complexType name="RollbackTransaction">
  <xsd:all>
    <xsd:element name="RollbackTransaction" >
      <xsd:complexType>
        <xsd:sequence>
          <!--The RollbackTransaction command MUST contain NO elements-->
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

The **RollbackTransaction** command contains only a **RollbackTransaction** element, which MUST be empty. The element has no attributes and no content.

Element	Default	Description
(None.)		

3.1.4.3.2.1.1.15 Lock

The **Lock** command locks an object in the context of the current transaction.<188>

```
<xsd:complexType name="Lock">
  <xsd:all>
    <xsd:element name="ID">
      <xsd:simpleType>
        <xsd:restriction base="xsd:token">
          <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]
              {4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}"/>
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Object" type="ObjectReference" />
    <xsd:element name="Mode" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="CommitShared" />
          <xsd:enumeration value="CommitExclusive" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Element	Default	Description
ID	[Required]	The lock ID.

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Element	Default	Description
Object	[Required]	The object to be locked. The **ObjectReference** type is defined in section 3.1.4.3.2.1.1.1.
Mode	[Required]	An enumeration that specifies the type of locking to apply. The possible values are: ▪ CommitShared - A shared lock is established on the specified object. ▪ CommitExclusive - An exclusive lock is established on the specified object.

3.1.4.3.2.1.1.16 Unlock

The **Unlock** command unlocks an object in the context of the current transaction.

```
<xsd:complexType name="Unlock">
  <xsd:all>
    <xsd:element name="ID">
      <xsd:simpleType>
        <xsd:restriction base="xsd:token">
          <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]
              {4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}"/>
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Element	Default	Description
ID	[Required]	The ID of the lock to be released.

3.1.4.3.2.1.1.17 Backup

The **Backup** command backs up the specified database.

```
<xsd:complexType name="Backup">
  <xsd:all>
    <xsd:element name="Object" type="ObjectReference" />
    <xsd:element name="File" type="xsd:string" />
    <xsd:element name="Security" minOccurs="0" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="SkipMembership" />
          <xsd:enumeration value="CopyAll" />
          <xsd:enumeration value="IgnoreSecurity" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="ApplyCompression" type="xsd:boolean" minOccurs="0" />
    <xsd:element name="AllowOverwrite" type="xsd:boolean" minOccurs="0" />
    <xsd:element name="Password" type="xsd:string" minOccurs="0" />
    <xsd:element name="BackupRemotePartitions" type="xsd:boolean"
```


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```
      minOccurs="0" />
      <xsd:element name="Locations" minOccurs="0" >
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="Location"  type="Location_Backup" minOccurs="0"
                         maxOccurs="unbounded"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
    </xsd:all>
  </xsd:complexType>
```

Element	Default	Description
Object	[Required]	The database object to be backed up. The **ObjectReference** type is defined in section 3.1.4.3.2.1.1.1.
File	[Required]	The backup file name/path.
Security	"CopyAll"	An enumeration value that specifies how to back up security definitions, such as roles and permissions.
ApplyCompression	True	A Boolean that, when true, indicates that backup files are compressed; otherwise false.
AllowOverwrite	False	A Boolean that, when true, indicates that a backup file that already exists will be overwritten; otherwise false.
Password	Empty	The password to use for encrypting the backup file.
BackupRemotePartitions	False	A Boolean that, when true, indicates that remote partitions will be backed up; otherwise false.
Locations	Empty	A collection of type Location_Backup that stores the location mappings for remote partitions.

3.1.4.3.2.1.1.17.1 Location_Backup

The **Location_Backup** type identifies remote locations that are to be backed up by a Backup command.

```
<xsd:complexType name="Location_Backup">
  <xsd:all>
    <xsd:element name="File" type="xsd:string" />
    <xsd:element name="DataSourceID" type="xsd:string" />
  </xsd:all>
</xsd:complexType>
```

Element	Default	Description
File	[Required]	The backup file name/path.
DataSourceID	[Required]	The remote partition data source ID.

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3.1.4.3.2.1.1.18 Restore

The **Restore** command restores a database from a backup file.

```
<xsd:complexType name="Restore">
  <xsd:all>
    <xsd:element name="DatabaseName" type="xsd:string" minOccurs="0" />
    <xsd:element name="DatabaseID" type="xsd:string" minOccurs="0" />
    <xsd:element name="File" type="xsd:string" />
    <xsd:element name="Security" minOccurs="0" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="SkipMembership" />
          <xsd:enumeration value="CopyAll" />
          <xsd:enumeration value="IgnoreSecurity" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="AllowOverwrite" type="xsd:boolean" minOccurs="0" />
    <xsd:element name="Password" type="xsd:string" minOccurs="0" />
    <xsd:element ref="eng100_100:DbStorageLocation" minOccurs="0" />
    <xsd:element name="Locations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Location"  type="Location" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

See the **Synchronize** command (section 3.1.4.3.2.1.1.19) for a definition of the **DbStorageLocation** element in the namespace **eng100_100**.

Element	Default	Description
DatabaseName	Empty	The name of the restored database.
DatabaseID	Empty	The ID of the restored database.
File	[Required]	The backup file name/path.
Security	"CopyAll"	An enumeration value that specifies how to restore security definitions.
AllowOverwrite	False	A Boolean that, when true, indicates that a database that already exists will be overwritten; otherwise false.
Password	Empty	The password used to encrypt the backup file when it was created.
DbStorageLocation	Empty	Storage location for the restored database.
Locations	Empty	A collection of objects of type Location that stores the location mappings for remote partitions.

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3.1.4.3.2.1.1.18.1 Location

The **Location** type contains the location mappings for remote partitions. It is used by the Restore and the Synchronize commands. It is an extension of the Location_Backup type.

```
<xsd:complexType name="Location">
  <xsd:complexContent>
    <xsd:extension base="Location_Backup"  >
      <xsd:all>
        <xsd:element name="DataSourceType" minOccurs="0" >
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="Remote" />
              <xsd:enumeration value="Local" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="ConnectionString" type="xsd:string"
                     minOccurs="0" />
        <xsd:element name="Folders" minOccurs="0" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Folder"  type="Folder" minOccurs="0"
                           maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
```

The following table includes only the elements that are extended beyond those that are already contained in **Location_Backup**.

Element	Default	Description
DataSourceType	"Remote"	An enumeration value that indicates whether the DataSource is remote or local.
ConnectionString	Empty	The data source connection string.
Folders	Empty	A collection of objects of type Folder that indicates the mapping of the folder name from the original name to the new name.

3.1.4.3.2.1.1.18.2 Folder

The **Folder** type contains folder mappings for the restored database.

```
<xsd:complexType name="Folder">
  <xsd:all>
    <xsd:element name="Original" type="xsd:string" />
    <xsd:element name="New" type="xsd:string" />
  </xsd:all>
```


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```
</xsd:complexType>
```

Element	Default	Description
Original	[Required]	The path for the original folder.
New	[Required]	The path for the new folder.

3.1.4.3.2.1.1.19 Synchronize

The **Synchronize** command synchronizes the contents of a database from a source server.

```
<xsd:complexType name="Synchronize">
  <xsd:all>
    <xsd:element name="Source" type="Source" />
    <xsd:element name="SynchronizeSecurity" minOccurs="0" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="SkipMembership" />
          <xsd:enumeration value="CopyAll" />
          <xsd:enumeration value="IgnoreSecurity" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="ApplyCompression" type="xsd:boolean" minOccurs="0" />
    <xsd:element ref="eng100_100:DbStorageLocation" minOccurs="0" />
    <xsd:element name="Locations" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Location"  type="Location" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

The XSD for **Synchronize** depends upon the definitions of elements in a namespace other than the default namespace. The following element is defined in the namespace **eng100_100**.

```
<xsd:element name="DbStorageLocation" type="xsd:string" minOccurs="0" />
```

Element	Default	Description
Source	[Required]	An object of type Source that indicates the source of synchronization.
SynchronizeSecurity	"SkipMembership"	An enumeration value that specifies how to restore security definitions, including roles and permissions.
ApplyCompression	True	A Boolean that, when true, indicates that compression will be applied to a backup file; otherwise false.

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Element	Default	Description
DbStorageLocation	Empty	A string that specifies a storage location for the database.
Locations	Empty	A collection of objects of type Location that specifies location mappings for remote partitions.

3.1.4.3.2.1.1.19.1 Source

The **Source** type specifies the source for the Synchronization command.

```
<xsd:complexType name="Source">
  <xsd:all>
    <xsd:element name="Object" type="ObjectReference" />
    <xsd:element name="ConnectionString" type="xsd:string" />
  </xsd:all>
</xsd:complexType>
```

Element	Default	Description
Object	[Required]	An **ObjectReference** to the database that is the source of the synchronization. The **ObjectReference** type is defined in section 3.1.4.3.2.1.1.1.
ConnectionString	[Required]	The connection string to the source server.

3.1.4.3.2.1.1.20 Attach

The **Attach** command attaches a database from a database folder.

```
<xsd:complexType name="Attach">
  <xsd:all>
    <xsd:element name="Folder" type="xsd:string" />
    <xsd:element name="ReadWriteMode" minOccurs="0" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="ReadWrite" />
          <xsd:enumeration value="ReadOnly" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Password" type="xsd:string" minOccurs="0" />
  </xsd:all>
</xsd:complexType>
```

Element	Default	Description
Folder	[Required]	The path to the database folder.
ReadWriteMode	"ReadWrite"	An enumeration value that specifies the ReadWrite mode for the database to be attached.
Password	Empty	An optional password to encrypt secrets.

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3.1.4.3.2.1.1.21 Detach

The **Detach** command detaches a database.

```
<xsd:complexType name="Detach">
  <xsd:all>
    <xsd:element name="Object" type="ObjectReference" />
    <xsd:element name="Password" type="xsd:string" minOccurs="0" />
  </xsd:all>
</xsd:complexType>
```

Element	Default	Description
Object	[Required]	The Database object to detach. The **ObjectReference** type is defined in section 3.1.4.3.2.1.1.1.
Password	Empty	An optional password to encrypt secrets.

3.1.4.3.2.1.1.22 Insert

The **Insert** command inserts a new member into a dimension.

```
<xsd:complexType name="Insert">
  <xsd:all>
    <xsd:element name="Object" type="Object" />
    <xsd:element name="Attributes" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Attribute"  type="Attribute_InsertUpdate"
                       minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Element	Default	Description
Object	[required]	Specifies the dimension.
Attributes	Empty	A collection of objects of type Attribute_InsertUpdate, which describes the member to be inserted.

3.1.4.3.2.1.1.22.1 Object

The **Object** type identifies the dimension that the Insert, Update, and Drop commands operate on. It differs from an ObjectReference Type in that it uses the name of the objects rather than the ID.

```
<xsd:complexType name="Object">
  <xsd:all>
    <xsd:element name="Database" type="xsd:string" />
    <xsd:element name="Cube" type="xsd:string" />
```


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```
      <xsd:element name="Dimension" type="xsd:string" />
    </xsd:all>
  </xsd:complexType>
```

Element	Default	Description
Database	[Required]	The Database name.
Cube	[Required]	The Cube name.
Dimension	[Required]	The Dimension name.

3.1.4.3.2.1.1.22.2 Attribute_InsertUpdate

This type contains the data associated with a member of an attribute being inserted into or updated.

```
<xsd:complexType name="Attribute_InsertUpdate">
  <xsd:all>
    <xsd:element name="AttributeName" type="xsd:string" />
    <xsd:element name="Name" type="xsd:string" />
    <xsd:element name="Keys" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Key" type="xsd:anySimpleType" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Translations" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Translation"  type="Translation_InsertUpdate"
                       minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Value" type="xsd:string" minOccurs="0" />
    <xsd:element name="CustomRollup" type="xsd:string" minOccurs="0" />
    <xsd:element name="CustomRollupProperties" type="xsd:string" minOccurs="0" />
    <xsd:element name="UnaryOperator" type="xsd:string" minOccurs="0" />
    <xsd:element name="SkippedLevels" type="xsd:integer" minOccurs="0" />
  </xsd:all>
</xsd:complexType>
```

Element	Default	Description
AttributeName	[Required]	The name of the attribute.
Name	[Required]	The name of the member.
Keys	Empty	A collection of keys for the member.
Translations	Empty	A collection of objects of type Translation_InsertUpdate.
Value	Empty	The value of the member.

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Element	Default	Description
CustomRollup	Empty	The custom rollup formula of the member.
CustomRollupProperties	Empty	The custom rollup properties of the member.
UnaryOperator	Empty	The unary operator of the member.
SkippedLevels	Zero	The skipped levels of the member.

3.1.4.3.2.1.1.22.3 Translation_InsertUpdate

The **Translation_InsertUpdate** type contains the translation data associated with a member of an attribute being inserted into or updated.

```
<xsd:complexType name="Translation_InsertUpdate">
  <xsd:all>
    <xsd:element name="Language" type="xsd:integer" />
    <xsd:element name="Name" type="xsd:string" minOccurs="0" />
  </xsd:all>
</xsd:complexType>
```

Element	Default	Description
Language	[Required]	The LCID that represents the language/locale of the object.
Name	Empty	The caption of the member in the specified language.

3.1.4.3.2.1.1.23 Update

The **Update** command updates a dimension member.

```
<xsd:complexType name="Update">
  <xsd:all>
    <xsd:element name="Object" type="Object" />
    <xsd:element name="Attributes" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Attribute"  type="Attribute_InsertUpdate"
                       minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="MoveWithDescendants" type="xsd:boolean"
                 minOccurs="0"/>
    <xsd:element name="MoveToRoot" type="xsd:boolean"
                 minOccurs="0"/>
    <xsd:element name="Where"  type="Where" />
  </xsd:all>
</xsd:complexType>
```

Element	Default	Description

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Element	Default	Description
Object	[Required]	Specifies the dimension.
Attributes	Empty	A collection of objects of type Attribute_InsertUpdate that describes the member to be updated.
MoveWithDescendants	False	A Boolean that, when true, indicates that the descendants of the member will be moved along with it; otherwise false. This element can be used only with parent-child dimensions.
MoveToRoot	False	A Boolean that, when true, causes a member to be moved to the root of a parent-child dimension; otherwise false.
Where	[Required]	A collection of objects of type Where that identify the members to be updated.

3.1.4.3.2.1.1.23.1 Where

The **Where** type identifies which members of a dimension are to be updated or dropped.

```
<xsd:complexType name="Where">
  <xsd:all>
    <xsd:element name="Attributes" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Attribute"  type="Where_Attribute" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Element	Default	Description
Attributes	Empty	A collection of objects of type Where_Attribute.

3.1.4.3.2.1.1.23.2 Where_Attribute

The **Where_Attribute** type identifies which members of an attribute are to be updated or dropped.

```
<xsd:complexType name="Where_Attribute">
  <xsd:all>
    <xsd:element name="AttributeName" type="xsd:string" />
    <xsd:element name="Keys" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Key" type="xsd:anySimpleType" minOccurs="0"
                       maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
```


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```
</xsd:complexType>
```

Element	Default	Description
AttributeName	[Required]	The attribute name.
Keys	Empty	The keys for the member. The types that are accepted are a subset of **xsd:anySimpleType**, and are those that are enumerated in the **DataType** element of the DataItem.

3.1.4.3.2.1.1.24 Drop

The **Drop** command deletes a dimension member.

```
<xsd:complexType name="Drop">
  <xsd:all>
    <xsd:element name="Object" type="ObjectReference" />
    <xsd:element name="DeleteWithDescendants" type="xsd:boolean"
                 minOccurs="0" />
    <xsd:element name="Where" type="Where" />
  </xsd:all>
</xsd:complexType>
```

Element	Default	Description
Object	[Required]	Specifies the dimension.
DeleteWithDescendants	False	A Boolean that, when true, causes the descendents of the member to be deleted along with it (parent-child dimensions only); otherwise false.
Where	[Required]	A collection of objects of type Where that identify the members to be dropped.

3.1.4.3.2.1.1.25 UpdateCells

The **UpdateCells** command updates the values of the specified cells.

```
<xsd:complexType name="UpdateCells">
  <xsd:sequence>
    <xsd:element name="Cell"  type="Cell" minOccurs="0"
                 maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>
```

Element	Default	Description
Cell	Empty	A collection of objects of type Cell.

The **UpdateCells** command is stateful and therefore is used in conjunction with SOAP header elements. When the client has defined an mddataset result that the client requests to update by using the **UpdateCells** command, the client MUST tell the server to keep the result available for updating. However, a **KeepResult** element must be added to the SOAP header.

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The XSD Schema definition of the **KeepResult** element is as follows.

```
<xsd:element name="KeepResult" >
  <xsd:complexType >
    <xsd:sequence>
      <!--The KeepResult element MUST be empty-->
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
```

The server responds to the presence of a **KeepResult** element in the SOAP header that it receives with a **Result** element in the SOAP header of the response. The **Result** element contains a **ResultID** attribute. This attribute contains the token that the client and server will use to refer to this **Result** in subsequent commands.

The XSD Schema definition of the **Result** element and its complex type is as follows.

```
<xsd:element name="Result" >
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="ResultId" type="xsd:string" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
```

The client may now include a **Result** element in the SOAP header of subsequent commands that it sends to the server. In this SOAP header, the client may update that result with the **UpdateCells** command.

When the client is finished with the result and will no longer use the result for further **UpdateCells** commands, it includes a **ClearResult** element in the SOAP header.

The XSD Schema definition of the **ClearResult** element and its complex type is as follows.

```
<xsd:element name="ClearResult" >
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="ResultId" type="xsd:string" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
```

3.1.4.3.2.1.1.25.1 Cell

The **Cell** type specifies the ordinal of a cell and its new value.

```
<xsd:complexType name="Cell">
  <xsd:all>
    <xsd:element name="Value" type="xsd:anySimpleType" />
  </xsd:all>
```


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```
    <xsd:attribute name="CellOrdinal" type="xsd:long" />
</xsd:complexType>
```

The following table describes the XML elements of the **Cell** object.

Element	Default	Description
Value	[Required]	The new value to update the cell with.
Attribute	Default	Description.
CellOrdinal	[Required]	The ordinal of a cell to be updated.

3.1.4.3.2.1.1.26 NotifyTableChange

The **NotifyTableChange** command notifies the server about changes in source tables so that the server can drop any cached data from these tables.

```
<xsd:complexType name="NotifyTableChange">
  <xsd:all>
    <xsd:element name="Object" type="ObjectReference" />
    <xsd:element name="TableNotifications"  >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="TableNotification"  type="TableNotification"
                       minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Element	Default	Description
Object	[Required]	The object that is referenced MUST be a DataSource object. The **ObjectReference** type is defined in section 3.1.4.3.2.1.1.1.
TableNotifications	[Required]	A collection of objects of type TableNotification. Each **TableNotification** object gives information about one table.

3.1.4.3.2.1.1.27 Batch

The **Batch** command contains multiple commands that are executed in a single request.

```
<xsd:complexType name="Batch">
  <xsd:sequence>
    <xsd:element name="Parallel" minOccurs="0" maxOccurs="unbounded" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Process" type="Process" minOccurs="0"
                       maxOccurs="unbounded" />
        </xsd:sequence>
        <xsd:attribute name="MaxParallel" type="xsd:int"  default="0" />
```


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```
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Bindings" minOccurs="0" type="OutOfLineBinding" />
    <xsd:element name="DataSource" minOccurs="0" type="DataSource" />
    <xsd:element name="DataSourceView" type="DataSourceView"
                 minOccurs="0" />
    <xsd:element name="ErrorConfiguration" type="ErrorConfiguration"
                 minOccurs="0" />
    <xsd:element name="Create" type="Create" minOccurs="0"
                  maxOccurs="unbounded" />
    <xsd:element name="Alter" type="Alter" minOccurs="0"
                  maxOccurs="unbounded" />
    <xsd:element name="Delete" type="Delete" minOccurs="0"
                  maxOccurs="unbounded" />
    <xsd:element name="Process" type="Process" minOccurs="0"
                 maxOccurs="unbounded" />
    <xsd:element name="MergePartitions" type="MergePartitions"
                 minOccurs="0" maxOccurs="unbounded" />
    <xsd:element name="DesignAggregations" type="DesignAggregations"
                 minOccurs="0" maxOccurs="unbounded" />
    <xsd:element name="NotifyTableChange" type="NotifyTableChange"
                 minOccurs="0" maxOccurs="unbounded" />
    <xsd:element name="Insert" minOccurs="0" type="Insert"
                 maxOccurs="unbounded" />
    <xsd:element name="Update" minOccurs="0" type="Update"
                 maxOccurs="unbounded" />
    <xsd:element name="Drop" minOccurs="0" type="Drop"
                 maxOccurs="unbounded" />
    <xsd:element name="UpdateCells" minOccurs="0" type="UpdateCells"
                 maxOccurs="unbounded" />
    <xsd:element name="Backup" minOccurs="0" type="Backup"
                 maxOccurs="unbounded" />
    <xsd:element name="Restore" minOccurs="0" type="Restore"
                 maxOccurs="unbounded" />
    <xsd:element name="Synchronize" minOccurs="0" type="Synchronize"
                 maxOccurs="unbounded" />
    <xsd:element name="Cancel" minOccurs="0" type="Cancel"
                 maxOccurs="unbounded" />
    <xsd:element name="ClearCache" minOccurs="0" type="ClearCache"
                 maxOccurs="unbounded" />
    <xsd:element name="Detach" minOccurs="0" type="Detach"
                 maxOccurs="unbounded" />
    <xsd:element name="Attach" minOccurs="0" type="Attach"
                 maxOccurs="unbounded" />
    <xsd:element name="Lock" minOccurs="0" type="Lock"
                 maxOccurs="unbounded" />
    <xsd:element name="Unlock" minOccurs="0" type="Unlock"
                 maxOccurs="unbounded" />
  </xsd:sequence>
  <xsd:attribute name="Transaction" type="xsd:boolean" />
  <xsd:attribute name="ProcessAffectedObjects" type="xsd:boolean" />
</xsd:complexType>
```

The following table shows the XML elements for the **Batch** command.

Element	Default	Description

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Element	Default	Description
Parallel	Empty	A **Parallel** element can contain an unbounded number of Process commands. The **Process** commands are executed in parallel, up to the limit in the **maxParallel** XML attribute to this element.
Bindings	Empty	A collection of objects of type OutOfLineBinding. These bindings replace the bindings that may have been specified for the objects at their creation time.
DataSource	Empty	A DataSource that, if specified, replaces a **DataSource** that may have been specified for the objects at their creation time.
DataSourceView	Empty	A DataSourceView that, if specified, replaces a **DataSourceView** that may have been specified for the objects at their creation time.
ErrorConfiguration	Empty	An ErrorConfiguration object that designates the error configuration to be used for processing.

In addition to the above elements, the **Batch** command may contain any number of each of the commands that are defined as available to the Command element, except the **Batch** command itself.<189>

The following table shows the XML attributes for the **Batch** command.

Element	Default	Description
Transaction	True	A Boolean that, when true, indicates that all commands in the batch are executed in a single transaction; otherwise false.
ProcessAffectedObjects	False	A Boolean that, when true, indicates that affected objects should also be processed; otherwise false.

3.1.4.3.2.1.2 Properties Element

The **Properties** element is shared between the Discover and Execute methods and is described in section 3.1.4.2.2.1.2.1.

3.1.4.3.2.1.3 Parameters

The **Parameters** type specifies a list of name-value parameter pairs that MAY be included in an Execute message.

```
        <xsd:element name="Parameters" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Parameter" type="ExecuteParameter" minOccurs="0"
maxOccurs="unbounded" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
```


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3.1.4.3.2.1.3.1 ExecuteParameter

The **ExecuteParameter** type specifies the value of a parameter in a command.

```
<xsd:complexType name="ExecuteParameter">
  <xsd:all>
    <xsd:element name="Name" minOccurs="1" type="xsd:string" />
    <xsd:element name="Value" minOccurs="1" type="xsd:anyType" />
  </xsd:all>
</xsd:complexType>
```

Element	Default	Description
Name	[Required]	The name of the parameter.
Value	[Required]	The value of the parameter. The value can be of type **anySimpleType** or **xmla-rs:root** (see section 2.2.4.1.3).

3.1.4.3.2.2 ExecuteResponse

The server response to an execute request contains the **ExecuteResponse** element as the root of the response. The **ExecuteResponse** element has the following definition.

```
<xsd:complexType name="ExecuteResponse" >
  <xsd:sequence>
    <xsd:element name="return" minOccurs="1" maxOccurs="1" type="return" >
    </xsd:element>
  </xsd:sequence>
</xsd:complexType>
```

The return element is described in the following section.

3.1.4.3.2.2.1 return Element

The **return** element contains the result that is returned by the server. The content of the result that is contained in the **return** element is dependent upon the command and the properties that were specified in the Execute method call.

```
<xsd:complexType name="return">
  <xsd:choice>
    <xsd:element ref="xmla-ds:root" />
    <xsd:element ref="xmla-rs:root" />
    <xsd:element ref="xmla-e:root" />
    <xsd:element ref="xmla-m:results" />
  </xsd:choice>
</xsd:complexType>
```

The definition of the **xmla-ds:root** element is as follows.

```
<xsd:element name="root" type="xmla-ds:mddataset" />
```


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For the definition of the **xmla-ds:mddataset** complex type, see section 2.2.4.1.1.

The definition of the **xmla-rs:root** element is as follows.

```
<xsd:element name="root" type="xmla-rs:rowset" />
```

For the definition of the **xmla-rs:rowset** complex type, see section 2.2.4.1.3.

The definition of the **xmla-e:root** element is as follows.

```
<xsd:element name="root" type="xmla-e:emptyresult" />
```

For the definition of the **xmla-e:emptyresult** complex type, see section 2.2.4.1.2.

The definition of the **xmla-m:results** element is as follows.

```
<xsd:element name="results" type="xmla-m:results" />
```

For the definition of the **xmla-m:results** complex type, see section 2.2.4.1.4.

Element	Description
xmla-m:results	A **results** element is part of the ExecuteResponse only if it is the return result from a Batch command. The **xmla-m:results** element contains a root element for each command in the batch.
xmla-ds:root	The **xmla-ds:root** element is returned if the result of the command is of type **mddataset**. For a description of the **xmla-ds:root** type, see section 2.2.4.1.1.
xmla-rs:root	The **xmla-rs:root** type is returned if the result of the command is of type **rowset**. For a description of the **xmla-rs:root** type, see section 2.2.4.1.3.
xmla-e:root	The **xmla-e:root** element is returned if the return result of the command is empty. For a description of the **xmla-e:root** return type, see section 2.2.4.1.2.

3.1.5 Timer Events

None. All protocol requests are initiated by the client.

3.1.6 Other Local Events

None.

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3.2 Transport-Specific Protocol Details

3.2.1 Connection

To connect to a server using TCP or HTTP/HTTPS, the client MUST know the IP address and port number of the server. The default HTTP port number is 80 and the default HTTPS port number is 443. However, the server MAY be configured to listen on other port numbers.<190>

3.2.2 Authentication and Encryption

To use an authenticated or encrypted connection using TCP, both the client and server MUST use GSS-API [RFC4178]. This requires the exchange of security tokens between the client and server. The client sends its UTF-8 encoded security token using the **Authenticate** request (AuthenticateSoapIn) and the server responds with its UTF-8 encoded security token in the **AuthenticateResponse** message (AuthenticateSoapOut). This exchange of security tokens MUST continue back and forth until GSS-API reports completion or error. After it has completed, the client and server can call the GSS-API to determine if encryption or hashing is turned on for the connection.

When using HTTP/HTTPS, the server MAY support authenticated connections. If the client requires messages to be encrypted, it SHOULD use the HTTPS protocol.

3.2.3 Content Type Negotiation

Because the support for binary XML [MS-BINXML] and compression is optional, the client and server MUST negotiate the content type of the messages for the duration of the connection. The negotiation is based on the preferences and capabilities of the client and server.

The first request sent by the client and the server response are both always text XML. Depending on whether the transport is TCP or HTTP/HTTPS, the **DIME OPTIONS** field or the **HTTP X-Transport-Caps-Negotiation-Flags** header is used by client and server to indicate the content type of the messages for the connection.

The process of negotiation is controlled by the client, and the server does not need to remember the current state of negotiation between requests. The NEGO flag is used by the client to inform the server that negotiation is in progress. The client SHOULD set this flag to 0 in the first request and set it to 1 in all subsequent requests (since the negotiation is complete).

The REQ_SX, REQ_XPRESS, RESP_SX and RESP_XPRESS flags are used for the negotiation to represent binary XML in requests, compression in requests, binary XML in responses and compression in responses. The value 0 indicates that the capability is off or not supported. The value 1 indicates that the capability is on or supported.

The client uses the RESP_SX and RESP_XPRESS flags to inform the server whether it supports responses with binary XML and compression.

The server uses the RESP_SX and RESP_XPRESS flags to inform the client whether it will use binary XML and compression in its responses. This decision is based on what the client supports as well as the server capabilities.

Because the server does not remember the current state of negotiation, the client and server MUST send these flags in every request and response.

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3.2.4 Generating and Parsing Messages

After the connection has been established and authentication and content type negotiation has been completed, the client and server know whether encryption, compression and binary XML are enabled for requests and responses.

To generate a message, the following steps MUST be followed.

TCP

1. Generate the SOAP envelope.
2. If binary XML is enabled, encode the SOAP message as described in 2.1.5 and [MS-BINXML]. Otherwise, encode the SOAP message in text XML.
3. If compression is enabled, compress the message as described in Compression. The message MAY optionally be divided into multiple compression data blocks.
4. If encryption is enabled, encrypt the message using GSS-API. The message MAY optionally be divided into multiple encryption data blocks.
5. Compose the message into DIME records and send it via TCP. The message MAY optionally be divided into multiple DIME records.

HTTP/HTTPS

1. Generate the SOAP envelope.
2. If binary XML is enabled, encode the SOAP message as described in 2.1.5 and **[MS-BINXML]**. Otherwise, encode the SOAP message in text XML.
3. If compression is enabled, compress the message as described in **Compression**. The message MAY optionally be divided into multiple compression data blocks.
4. Send the message via HTTP/HTTPS along with the appropriate HTTP headers.

To parse a message, the following steps MUST be followed.

TCP

1. Combine all the DIME records into a single data block.
2. If encryption is enabled, decrypt all the encryption data blocks and combine them into a single decrypted data block.
3. If compression is enabled, decompress all the compression data blocks as described in **Compression**, and then combine them into a single decompressed data block.
4. If binary XML is enabled, decode the data block as described in 2.1.5 and **[MS-BINXML]**. Otherwise, decode the data block as text XML.
5. Parse the SOAP envelope.

HTTP/HTTPS

1. If compression is enabled, decompress all the compression data blocks as described in **Compression**, and then combine them into a single decompressed data block.

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2. If binary XML is enabled, decode the data block as described in 2.1.5 and **[MS-BINXML]**. Otherwise, decode the data block as text XML.

3. Parse the SOAP envelope.

3.2.5 Compression

The client or server can choose any compression algorithm as long as the compressed data blocks can be decompressed using the following decompression algorithm.

The decompression algorithm takes a buffer of compressed data in the form of a byte array (**InputBuffer**), an output buffer in the form of a byte array (**OutputBuffer**), and the size of the output buffer (**OutputBufferSize**).

```
SET KindBit to 0
SET HaveNibble to FALSE
SET OutputBufferIndex to 0
SET InputBufferIndex to 0
WHILE OutputBufferIndex < OutputBufferSize
    IF KindBit is 0 THEN
        SET Kind to InputBuffer[InputBufferIndex] +
                    (InputBuffer[InputBufferIndex+1] << 8) +
                    (InputBuffer[InputBufferIndex+2] << 16) +
                    (InputBuffer[InputBufferIndex+3] << 24)
        INCREMENT InputBufferIndex by 4
        SET KindBit to 32
    ENDIF
    DECREMENT KindBit
    IF (Kind & (1 << KindBit)) is 0 THEN
        SET OutputBuffer[OutputBufferIndex] to InputBuffer[InputBufferIndex]
        INCREMENT InputBufferIndex
        INCREMENT OutputBufferIndex
    ELSE
        SET Length to InputBuffer[InputBufferIndex] +
                      (InputBuffer[InputBufferIndex+1] << 8)
        INCREMENT InputBufferIndex by 2
        SET Offset to (Length >> 3)
        SET Length to (Length & 7)
        IF Length is 7 THEN
            IF HaveNibble is FALSE THEN
                SET HaveNibble to TRUE
                Set NibbleValue to InputBuffer[InputBufferIndex]
                SET Length to (InputBuffer[InputBufferIndex] & 15)
                INCREMENT InputBufferIndex
            ELSE
                SET Length to (NibbleValue >> 4)
                SET HaveNibble to FALSE
            ENDIF
            IF Length is 15 THEN
                SET Length to InputBuffer[InputBufferIndex]
                INCREMENT InputBufferIndex
                IF Length is 255 THEN
                    SET Length to InputBuffer[InputBufferIndex] +
                                  (InputBuffer[InputBufferIndex+1] << 8)
                    INCREMENT InputBufferIndex by 2
                    DECREMENT Length by 22
                ENDIF
                INCREMENT Length by 15
```


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```
            ENDIF
            INCREMENT Length by 7
        ENDIF
        INCREMENT Length by 3
        WHILE Length is not 0
            SET OutputBuffer[OutputBufferIndex] to
                OutputBuffer[OutputBufferIndex-Offset-1]
            INCREMENT OutputBufferIndex
            DECREMENT Length
        ENDWHILE
    ENDIF
ENDWHILE
```


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4 Protocol Examples

4.1 Client Obtains a List of Databases from the Server over TCP

In this example, the client connects to the server by using TCP and obtains server information by sending a **DBSCHEMA_CATALOGS** request.

4.1.1 Connection

The server listens on a TCP port for incoming requests from clients. The client creates a TCP connection to the server.

4.1.2 Authentication

After the connection is established, the client sends an authentication request to the server:

```
0E 10 00 04  00 00 00 08  00 00 01 3C  00 00 00 00      ...........<....
74 65 78 74  2F 78 6D 6C  EF BB BF 3C  45 6E 76 65      text/xml???<Enve
6C 6F 70 65  20 78 6D 6C  6E 73 3D 22  68 74 74 70      lope xmlns="http
3A 2F 2F 73  63 68 65 6D  61 73 2E 78  6D 6C 73 6F      ://schemas.xmlso
61 70 2E 6F  72 67 2F 73  6F 61 70 2F  65 6E 76 65      ap.org/soap/enve
6C 6F 70 65  2F 22 3E 0D  0A 20 20 3C  42 6F 64 79      lope/">.. <Body
3E 0D 0A 20  20 20 20 3C  41 75 74 68  65 6E 74 69      >..   <Authenti
63 61 74 65  20 78 6D 6C  6E 73 3D 22  68 74 74 70      cate xmlns="http
3A 2F 2F 73  63 68 65 6D  61 73 2E 6D  69 63 72 6F      ://schemas.micro
73 6F 66 74  2E 63 6F 6D  2F 61 6E 61  6C 79 73 69      soft.com/analysi
73 73 65 72  76 69 63 65  73 2F 32 30  30 33 2F 65      sservices/2003/e
78 74 22 3E  0D 0A 20 20  20 20 20 20  3C 53 73 70      xt">..     <Ssp
69 48 61 6E  64 73 68 61  6B 65 3E 54  6C 52 4D 54      iHandshake>TlRMT
56 4E 54 55  41 41 42 41  41 41 41 42  37 49 49 6F      VNTUAABAAAAB7IIo
67 63 41 42  77 41 78 41  41 41 41 43  51 41 4A 41      gcABwAxAAAACQAJA
43 67 41 41  41 41 46 41  73 34 4F 41  41 41 41 44      CgAAAAFAs4OAAAAD
31 5A 42 54  45 56 53 53  55 73 77 4D  31 4A 46 52      1ZBTEVSSUswM1JFR
45 31 50 54  6B 51 3D 3C  2F 53 73 70  69 48 61 6E      E1PTkQ=</SspiHan
64 73 68 61  6B 65 3E 0D  0A 20 20 20  20 3C 2F 41      dshake>..   </A
75 74 68 65  6E 74 69 63  61 74 65 3E  0D 0A 20 20      uthenticate>..
3C 2F 42 6F  64 79 3E 0D  0A 3C 2F 45  6E 76 65 6C      </Body>..</Envel
6F 70 65 3E  .. .. .. .. .. .. .. .. .. .. .. ..      ope>
```

- VERSION: 1

- MB: 1

- ME: 1

- CF: 0

- TYPE_T: 1

- RESERVED: 0

- OPTIONS_LENGTH: 4

- ID_LENGTH: 0

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- TYPE_LENGTH: 8

- DATA_LENGTH: 316

- OPTIONS:

- NEGO: 0

- REQ_SX: 0

- REQ_XPRESS: 0

- RESP_SX: 0

- RESP_XPRESS: 0

- RESERVED: 0

- TYPE: text/xml

The server responds with an authentication handshake response; that is, an initial negotiation between a peer and an authenticator that establishes the parameters of their transactions:

```
0E 10 00 04  00 00 00 08  00 00 02 95  00 00 00 00      ............?....
74 65 78 74  2F 78 6D 6C  3C 73 6F 61  70 3A 45 6E      text/xml<soap:En
76 65 6C 6F  70 65 20 78  6D 6C 6E 73  3A 73 6F 61      velope xmlns:soa
70 3D 22 68  74 74 70 3A  2F 2F 73 63  68 65 6D 61      p="http://schema
73 2E 78 6D  6C 73 6F 61  70 2E 6F 72  67 2F 73 6F      s.xmlsoap.org/so
61 70 2F 65  6E 76 65 6C  6F 70 65 2F  22 3E 3C 73      ap/envelope/"><s
6F 61 70 3A  42 6F 64 79  3E 3C 41 75  74 68 65 6E      oap:Body><Authen
74 69 63 61  74 65 52 65  73 70 6F 6E  73 65 20 78      ticateResponse x
6D 6C 6E 73  3D 22 68 74  74 70 3A 2F  2F 73 63 68      mlns="http://sch
65 6D 61 73  2E 6D 69 63  72 6F 73 6F  66 74 2E 63      emas.microsoft.c
6F 6D 2F 61  6E 61 6C 79  73 69 73 73  65 72 76 69      om/analysisservi
63 65 73 2F  32 30 30 33  2F 65 78 74  22 3E 3C 72      ces/2003/ext"><r
65 74 75 72  6E 3E 3C 53  73 70 69 48  61 6E 64 73      eturn><SspiHands
68 61 6B 65  3E 54 6C 52  4D 54 56 4E  54 55 41 41      hake>TlRMTVNTUAA
43 41 41 41  41 44 67 41  4F 41 44 67  41 41 41 41      CAAAADgAOADgAAAA
46 77 6F 6D  69 30 34 54  6F 55 79 59  54 71 38 70      Fwomi04ToUyYTq8p
67 71 4A 6F  41 41 41 41  41 41 4E 67  41 32 41 42      gqJoAAAAAANgA2AB
47 41 41 41  41 42 51 4C  4F 44 67 41  41 41 41 39      GAAAABQLODgAAAA9
53 20 0A 41  45 55 41 52  41 42 4E 41  45 38 41 54      S .AEUARABNAE8AT
67 42 45 41  41 49 41 44  67 42 53 41  45 55 41 52      gBEAAIADgBSAEUAR
41 42 4E 41  45 38 41 54  67 42 45 41  41 45 41 45      ABNAE8ATgBEAAEAE
67 42 57 41  45 45 41 54  41 42 46 41  46 49 41 53      gBWAEEATABFAFIAS
51 42 4C 41  44 41 41 4D  77 41 45 41  44 51 41 20      QBLADAAMwAEADQA
0A 63 67 42  6C 41 47 51  41 62 51 42  76 41 47 34      .cgBlAGQAbQBvAG4
41 5A 41 41  75 41 47 4D  41 62 77 42  79 41 48 41      AZAAuAGMAbwByAHA
41 4C 67 42  74 41 47 6B  41 59 77 42  79 41 47 38      ALgBtAGkAYwByAG8
41 63 77 42  76 41 47 59  41 64 41 41  75 41 47 4D      AcwBvAGYAdAAuAGM
41 62 77 42  74 41 41 4D  41 53 41 42  32 20 0A 41      AbwBtAAMASAB2 .A
47 45 41 62  41 42 6C 41  48 49 41 61  51 42 72 41      GEAbABlAHIAaQBrA
44 41 41 4D  77 41 75 41  48 49 41 5A  51 42 6B 41      DAAMwAuAHIAZQBkA
47 30 41 62  77 42 75 41  47 51 41 4C  67 42 6A 41      G0AbwBuAGQALgBjA
47 38 41 63  67 42 77 41  43 34 41 62  51 42 70 41      G8AcgBwAC4AbQBpA
47 4D 41 63  67 42 76 41  48 4D 41 20  0A 62 77 42      GMAcgBvAHMA .bwB
6D 41 48 51  41 4C 67 42  6A 41 47 38  41 62 51 41      mAHQALgBjAG8AbQA
46 41 43 51  41 59 77 42  76 41 48 49  41 63 41 41      FACQAYwBvAHIAcAA
```


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```
75 41 47 30  41 61 51 42  6A 41 48 49  41 62 77 42      uAG0AaQBjAHIAbwB
7A 41 47 38  41 5A 67 42  30 41 43 34  41 59 77 42      zAG8AZgB0AC4AYwB
76 41 47 30  41 41 41 41  41 20 0A 41  41 3D 3D 20      vAG0AAAAA .AA==
0A 3C 2F 53  73 70 69 48  61 6E 64 73  68 61 6B 65      .</SspiHandshake
3E 3C 2F 72  65 74 75 72  6E 3E 3C 2F  41 75 74 68      ></return></Auth
65 6E 74 69  63 61 74 65  52 65 73 70  6F 6E 73 65      enticateResponse
3E 3C 2F 73  6F 61 70 3A  42 6F 64 79  3E 3C 2F 73      ></soap:Body></s
6F 61 70 3A  45 6E 76 65  6C 6F 70 65  3E CC CC CC      oap:Envelope>???
```

- VERSION: 1

- MB: 1

- ME: 1

- CF: 0

- TYPE_T: 1

- RESERVED: 0

- OPTIONS_LENGTH: 4

- ID_LENGTH: 0

- TYPE_LENGTH: 8

- DATA_LENGTH: 661

- OPTIONS:

- NEGO: 0

- REQ_SX: 0

- REQ_XPRESS: 0

- RESP_SX: 0

- RESP_XPRESS: 0

- RESERVED: 0

- TYPE: text/xml

The client continues the authentication handshake:

```
0E 10 00 04  00 00 00 08  00 00 01 50  01 00 00 00      ...........P....
74 65 78 74  2F 78 6D 6C  EF BB BF 3C  45 6E 76 65      text/xml???<Enve
6C 6F 70 65  20 78 6D 6C  6E 73 3D 22  68 74 74 70      lope xmlns="http
3A 2F 2F 73  63 68 65 6D  61 73 2E 78  6D 6C 73 6F      ://schemas.xmlso
61 70 2E 6F  72 67 2F 73  6F 61 70 2F  65 6E 76 65      ap.org/soap/enve
6C 6F 70 65  2F 22 3E 0D  0A 20 20 3C  42 6F 64 79      lope/">.. <Body
3E 0D 0A 20  20 20 20 3C  41 75 74 68  65 6E 74 69      >..   <Authenti
63 61 74 65  20 78 6D 6C  6E 73 3D 22  68 74 74 70      cate xmlns="http
3A 2F 2F 73  63 68 65 6D  61 73 2E 6D  69 63 72 6F      ://schemas.micro
73 6F 66 74  2E 63 6F 6D  2F 61 6E 61  6C 79 73 69      soft.com/analysi
```


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```
  73 73 65 72  76 69 63 65  73 2F 32 30  30 33 2F 65      sservices/2003/e
  78 74 22 3E  0D 0A 20 20  20 20 20 20  3C 53 73 70      xt">..      <Ssp
  69 48 61 6E  64 73 68 61  6B 65 3E 54  6C 52 4D 54      iHandshake>TlRMT
  56 4E 54 55  41 41 44 41  41 41 41 41  41 41 41 41      VNTUAADAAAAAAAAA
  45 67 41 41  41 41 41 41  41 41 41 53  41 41 41 41      EgAAAAAAAAASAAAA
  41 41 41 41  41 42 49 41  41 41 41 41  41 41 41 41      AAAAABIAAAAAAAAA
  45 67 41 41  41 41 41 41  41 41 41 53  41 41 41 41      EgAAAAAAAAASAAAA
  41 41 41 41  41 42 49 41  41 41 41 42  63 4B 49 6F      AAAAABIAAAABcKIo
  67 55 43 7A  67 34 41 41  41 41 50 3C  2F 53 73 70      gUCzg4AAAAP</Ssp
  69 48 61 6E  64 73 68 61  6B 65 3E 0D  0A 20 20 20      iHandshake>..
  20 3C 2F 41  75 74 68 65  6E 74 69 63  61 74 65 3E       </Authenticate>
  0D 0A 20 20  3C 2F 42 6F  64 79 3E 0D  0A 3C 2F 45      .. </Body>..</E
  6E 76 65 6C  6F 70 65 3E  .. .. .. .. .. .. .. ..     nvelope>
```

- VERSION: 1

- MB: 1

- ME: 1

- CF: 0

- TYPE_T: 1

- RESERVED: 0

- OPTIONS_LENGTH: 4

- ID_LENGTH: 0

- TYPE_LENGTH: 8

- DATA_LENGTH: 336

- OPTIONS:

- NEGO: 1

- REQ_SX: 0

- REQ_XPRESS: 0

- RESP_SX: 0

- RESP_XPRESS: 0

- RESERVED: 0

- TYPE: text/xml

The server responds with the authentication handshake completion:

```
  0E 10 00 04  00 00 00 08  00 00 00 FA  00 00 00 00      ............?....
  74 65 78 74  2F 78 6D 6C  3C 73 6F 61  70 3A 45 6E      text/xml<soap:En
  76 65 6C 6F  70 65 20 78  6D 6C 6E 73  3A 73 6F 61      velope xmlns:soa
  70 3D 22 68  74 74 70 3A  2F 2F 73 63  68 65 6D 61      p="http://schema
  73 2E 78 6D  6C 73 6F 61  70 2E 6F 72  67 2F 73 6F      s.xmlsoap.org/so
```


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```
61 70 2F 65  6E 76 65 6C  6F 70 65 2F  22 3E 3C 73      ap/envelope/"><s
6F 61 70 3A  42 6F 64 79  3E 3C 41 75  74 68 65 6E      oap:Body><Authen
74 69 63 61  74 65 52 65  73 70 6F 6E  73 65 20 78      ticateResponse x
6D 6C 6E 73  3D 22 68 74  74 70 3A 2F  2F 73 63 68      mlns="http://sch
65 6D 61 73  2E 6D 69 63  72 6F 73 6F  66 74 2E 63      emas.microsoft.c
6F 6D 2F 61  6E 61 6C 79  73 69 73 73  65 72 76 69      om/analysisservi
63 65 73 2F  32 30 30 33  2F 65 78 74  22 3E 3C 72      ces/2003/ext"><r
65 74 75 72  6E 3E 3C 53  73 70 69 48  61 6E 64 73      eturn><SspiHands
68 61 6B 65  2F 3E 3C 2F  72 65 74 75  72 6E 3E 3C      hake/></return><
2F 41 75 74  68 65 6E 74  69 63 61 74  65 52 65 73      /AuthenticateRes
70 6F 6E 73  65 3E 3C 2F  73 6F 61 70  3A 42 6F 64      ponse></soap:Bod
79 3E 3C 2F  73 6F 61 70  3A 45 6E 76  65 6C 6F 70      y></soap:Envelop
65 3E CC CC  .. .. .. .. .. .. .. .. .. .. .. ..      e>??
```

- VERSION: 1

- MB: 1

- ME: 1

- CF: 0

- TYPE_T: 1

- RESERVED: 0

- OPTIONS_LENGTH: 4

- ID_LENGTH: 0

- TYPE_LENGTH: 8

- DATA_LENGTH: 250

- OPTIONS:

- NEGO: 0

- REQ_SX: 0

- REQ_XPRESS: 0

- RESP_SX: 0

- RESP_XPRESS: 0

- RESERVED: 0

- TYPE: text/xml

4.1.3 New Session Request

The client sends a request to start a new session:

```
0E 10 00 04  00 00 00 08  00 00 02 89  01 00 00 00      ............?....
74 65 78 74  2F 78 6D 6C  EF BB BF 3C  45 6E 76 65      text/xml???<Enve
```


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```
6C 6F 70 65  20 78 6D 6C  6E 73 3D 22  68 74 74 70      lope xmlns="http
3A 2F 2F 73  63 68 65 6D  61 73 2E 78  6D 6C 73 6F      ://schemas.xmlso
61 70 2E 6F  72 67 2F 73  6F 61 70 2F  65 6E 76 65      ap.org/soap/enve
6C 6F 70 65  2F 22 3E 0D  0A 20 20 3C  48 65 61 64      lope/">.. <Head
65 72 3E 0D  0A 20 20 20  20 3C 42 65  67 69 6E 53      er>..   <BeginS
65 73 73 69  6F 6E 20 73  6F 61 70 3A  6D 75 73 74      ession soap:must
55 6E 64 65  72 73 74 61  6E 64 3D 22  31 22 20 78      Understand="1" x
6D 6C 6E 73  3A 73 6F 61  70 3D 22 68  74 74 70 3A      mlns:soap="http:
2F 2F 73 63  68 65 6D 61  73 2E 78 6D  6C 73 6F 61      //schemas.xmlsoa
70 2E 6F 72  67 2F 73 6F  61 70 2F 65  6E 76 65 6C      p.org/soap/envel
6F 70 65 2F  22 20 78 6D  6C 6E 73 3D  22 75 72 6E      ope/" xmlns="urn
3A 73 63 68  65 6D 61 73  2D 6D 69 63  72 6F 73 6F      :schemas-microso
66 74 2D 63  6F 6D 3A 78  6D 6C 2D 61  6E 61 6C 79      ft-com:xml-analy
73 69 73 22  20 2F 3E 0D  0A 20 20 20  20 3C 56 65      sis" />..   <Ve
72 73 69 6F  6E 20 53 65  71 75 65 6E  63 65 3D 22      rsion Sequence="
31 30 30 22  20 78 6D 6C  6E 73 3D 22  68 74 74 70      100" xmlns="http
3A 2F 2F 73  63 68 65 6D  61 73 2E 6D  69 63 72 6F      ://schemas.micro
73 6F 66 74  2E 63 6F 6D  2F 61 6E 61  6C 79 73 69      soft.com/analysi
73 73 65 72  76 69 63 65  73 2F 32 30  30 33 2F 65      sservices/2003/e
6E 67 69 6E  65 2F 32 22  20 2F 3E 0D  0A 20 20 3C      ngine/2" />.. <
2F 48 65 61  64 65 72 3E  0D 0A 20 20  3C 42 6F 64      /Header>.. <Bod
79 3E 0D 0A  20 20 20 20  3C 45 78 65  63 75 74 65      y>..   <Execute
20 78 6D 6C  6E 73 3D 22  75 72 6E 3A  73 63 68 65       xmlns="urn:sche
6D 61 73 2D  6D 69 63 72  6F 73 6F 66  74 2D 63 6F      mas-microsoft-co
6D 3A 78 6D  6C 2D 61 6E  61 6C 79 73  69 73 22 3E      m:xml-analysis">
0D 0A 20 20  20 20 20 20  3C 43 6F 6D  6D 61 6E 64      ..     <Command
3E 0D 0A 20  20 20 20 20  20 20 20 3C  53 74 61 74      >..       <Stat
65 6D 65 6E  74 20 2F 3E  0D 0A 20 20  20 20 20 20      ement />..
3C 2F 43 6F  6D 6D 61 6E  64 3E 0D 0A  20 20 20 20      </Command>..
20 20 3C 50  72 6F 70 65  72 74 69 65  73 3E 0D 0A        <Properties>..
20 20 20 20  20 20 20 20  3C 50 72 6F  70 65 72 74              <Propert
79 4C 69 73  74 3E 0D 0A  20 20 20 20  20 20 20 20      yList>..
20 20 3C 4C  6F 63 61 6C  65 49 64 65  6E 74 69 66        <LocaleIdentif
69 65 72 3E  31 30 33 33  3C 2F 4C 6F  63 61 6C 65      ier>1033</Locale
49 64 65 6E  74 69 66 69  65 72 3E 0D  0A 20 20 20      Identifier>..
20 20 20 20  20 3C 2F 50  72 6F 70 65  72 74 79 4C           </PropertyL
69 73 74 3E  0D 0A 20 20  20 20 20 20  3C 2F 50 72      ist>..     </Pr
6F 70 65 72  74 69 65 73  3E 0D 0A 20  20 20 20 3C      operties>..   <
2F 45 78 65  63 75 74 65  3E 0D 0A 20  20 3C 2F 42      /Execute>.. </B
6F 64 79 3E  0D 0A 3C 2F  45 6E 76 65  6C 6F 70 65      ody>..</Envelope
3E CC CC CC  .. .. .. .. .. .. .. .. .. .. .. ..     >???
```

- VERSION: 1

- MB: 1

- ME: 1

- CF: 0

- TYPE_T: 1

- RESERVED: 0

- OPTIONS_LENGTH: 4

- ID_LENGTH: 0

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- TYPE_LENGTH: 8

- DATA_LENGTH: 649

- OPTIONS:

- NEGO: 1

- REQ_SX: 0

- REQ_XPRESS: 0

- RESP_SX: 0

- RESP_XPRESS: 0

- RESERVED: 0

- TYPE: text/xml

The server responds with the ID of a newly created session:

```
0E 10 00 04  00 00 00 08  00 00 01 91  00 00 00 00      ............?....
74 65 78 74  2F 78 6D 6C  3C 73 6F 61  70 3A 45 6E      text/xml<soap:En
76 65 6C 6F  70 65 20 78  6D 6C 6E 73  3A 73 6F 61      velope xmlns:soa
70 3D 22 68  74 74 70 3A  2F 2F 73 63  68 65 6D 61      p="http://schema
73 2E 78 6D  6C 73 6F 61  70 2E 6F 72  67 2F 73 6F      s.xmlsoap.org/so
61 70 2F 65  6E 76 65 6C  6F 70 65 2F  22 3E 3C 73      ap/envelope/"><s
6F 61 70 3A  48 65 61 64  65 72 3E 3C  53 65 73 73      oap:Header><Sess
69 6F 6E 20  78 6D 6C 6E  73 3D 22 75  72 6E 3A 73      ion xmlns="urn:s
63 68 65 6D  61 73 2D 6D  69 63 72 6F  73 6F 66 74      chemas-microsoft
2D 63 6F 6D  3A 78 6D 6C  2D 61 6E 61  6C 79 73 69      -com:xml-analysi
73 22 20 53  65 73 73 69  6F 6E 49 64  3D 22 46 39      s" SessionId="F9
44 37 44 42  37 30 2D 32  42 45 32 2D  34 43 35 32      D7DB70-2BE2-4C52
2D 38 46 46  44 2D 31 31  33 44 39 44  31 46 39 44      -8FFD-113D9D1F9D
32 34 22 2F  3E 3C 2F 73  6F 61 70 3A  48 65 61 64      24"/></soap:Head
65 72 3E 3C  73 6F 61 70  3A 42 6F 64  79 3E 3C 45      er><soap:Body><E
78 65 63 75  74 65 52 65  73 70 6F 6E  73 65 20 78      xecuteResponse x
6D 6C 6E 73  3D 22 75 72  6E 3A 73 63  68 65 6D 61      mlns="urn:schema
73 2D 6D 69  63 72 6F 73  6F 66 74 2D  63 6F 6D 3A      s-microsoft-com:
78 6D 6C 2D  61 6E 61 6C  79 73 69 73  22 3E 3C 72      xml-analysis"><r
65 74 75 72  6E 3E 3C 72  6F 6F 74 20  78 6D 6C 6E      eturn><root xmln
73 3D 22 75  72 6E 3A 73  63 68 65 6D  61 73 2D 6D      s="urn:schemas-m
69 63 72 6F  73 6F 66 74  2D 63 6F 6D  3A 78 6D 6C      icrosoft-com:xml
2D 61 6E 61  6C 79 73 69  73 3A 65 6D  70 74 79 22      -analysis:empty"
2F 3E 3C 2F  72 65 74 75  72 6E 3E 3C  2F 45 78 65      /></return></Exe
63 75 74 65  52 65 73 70  6F 6E 73 65  3E 3C 2F 73      cuteResponse></s
6F 61 70 3A  42 6F 64 79  3E 3C 2F 73  6F 61 70 3A      oap:Body></soap:
45 6E 76 65  6C 6F 70 65  3E CC CC CC  .. .. .. ..     Envelope>???
```

- VERSION: 1

- MB: 1

- ME: 1

- CF: 0

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- TYPE_T: 1

- RESERVED: 0

- OPTIONS_LENGTH: 4

- ID_LENGTH: 0

- TYPE_LENGTH: 8

- DATA_LENGTH: 401

- OPTIONS:

- NEGO: 0

- REQ_SX: 0

- REQ_XPRESS: 0

- RESP_SX: 0

- RESP_XPRESS: 0

- RESERVED: 0

- TYPE: text/xml

4.1.4 Request for List of Catalogs

The client sends a **DBSCHEMA_CATALOGS** request:

```
0E 10 00 04  00 00 00 08  00 00 02 3E  01 00 00 00      ...........>....
74 65 78 74  2F 78 6D 6C  EF BB BF 3C  45 6E 76 65      text/xml???<Enve
6C 6F 70 65  20 78 6D 6C  6E 73 3D 22  68 74 74 70      lope xmlns="http
3A 2F 2F 73  63 68 65 6D  61 73 2E 78  6D 6C 73 6F      ://schemas.xmlso
61 70 2E 6F  72 67 2F 73  6F 61 70 2F  65 6E 76 65      ap.org/soap/enve
6C 6F 70 65  2F 22 3E 0D  0A 20 20 3C  48 65 61 64      lope/">.. <Head
65 72 3E 0D  0A 20 20 20  20 3C 58 41  3A 53 65 73      er>..   <XA:Ses
73 69 6F 6E  20 73 6F 61  70 3A 6D 75  73 74 55 6E      sion soap:mustUn
64 65 72 73  74 61 6E 64  3D 22 31 22  20 53 65 73      derstand="1" Ses
73 69 6F 6E  49 64 3D 22  46 39 44 37  44 42 37 30      sionId="F9D7DB70
2D 32 42 45  32 2D 34 43  35 32 2D 38  46 46 44 2D      -2BE2-4C52-8FFD-
31 31 33 44  39 44 31 46  39 44 32 34  22 20 78 6D      113D9D1F9D24" xm
6C 6E 73 3A  73 6F 61 70  3D 22 68 74  74 70 3A 2F      lns:soap="http:/
2F 73 63 68  65 6D 61 73  2E 78 6D 6C  73 6F 61 70      /schemas.xmlsoap
2E 6F 72 67  2F 73 6F 61  70 2F 65 6E  76 65 6C 6F      .org/soap/envelo
70 65 2F 22  20 78 6D 6C  6E 73 3A 58  41 3D 22 75      pe/" xmlns:XA="u
72 6E 3A 73  63 68 65 6D  61 73 2D 6D  69 63 72 6F      rn:schemas-micro
73 6F 66 74  2D 63 6F 6D  3A 78 6D 6C  2D 61 6E 61      soft-com:xml-ana
6C 79 73 69  73 22 20 2F  3E 0D 0A 20  20 3C 2F 48      lysis" />.. </H
65 61 64 65  72 3E 0D 0A  20 20 3C 42  6F 64 79 3E      eader>.. <Body>
0D 0A 20 20  20 20 3C 44  69 73 63 6F  76 65 72 20      ..   <Discover
78 6D 6C 6E  73 3D 22 75  72 6E 3A 73  63 68 65 6D      xmlns="urn:schem
61 73 2D 6D  69 63 72 6F  73 6F 66 74  2D 63 6F 6D      as-microsoft-com
3A 78 6D 6C  2D 61 6E 61  6C 79 73 69  73 22 3E 0D      :xml-analysis">.
0A 20 20 20  20 20 20 3C  52 65 71 75  65 73 74 54      .     <RequestT
79 70 65 3E  44 42 53 43  48 45 4D 41  5F 43 41 54      ype>DBSCHEMA_CAT
```


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```
41 4C 4F 47  53 3C 2F 52  65 71 75 65  73 74 54 79      ALOGS</RequestTy
70 65 3E 0D  0A 20 20 20  20 20 20 3C  52 65 73 74      pe>..     <Rest
72 69 63 74  69 6F 6E 73  3E 3C 2F 52  65 73 74 72      rictions></Restr
69 63 74 69  6F 6E 73 3E  0D 0A 20 20  20 20 20 20      ictions>..
3C 50 72 6F  70 65 72 74  69 65 73 3E  3C 50 72 6F      <Properties><Pro
70 65 72 74  79 4C 69 73  74 3E 3C 43  6F 6E 74 65      pertyList><Conte
6E 74 3E 44  61 74 61 3C  2F 43 6F 6E  74 65 6E 74      nt>Data</Content
3E 3C 2F 50  72 6F 70 65  72 74 79 4C  69 73 74 3E      ></PropertyList>
3C 2F 50 72  6F 70 65 72  74 69 65 73  3E 0D 0A 20      </Properties>..
20 20 20 3C  2F 44 69 73  63 6F 76 65  72 3E 0D 0A         </Discover>..
20 20 3C 2F  42 6F 64 79  3E 0D 0A 3C  2F 45 6E 76        </Body>..</Env
65 6C 6F 70  65 3E CC CC  .. .. .. .. .. .. .. ..     elope>??
```

- VERSION: 1

- MB: 1

- ME: 1

- CF: 0

- TYPE_T: 1

- RESERVED: 0

- OPTIONS_LENGTH: 4

- ID_LENGTH: 0

- TYPE_LENGTH: 8

- DATA_LENGTH: 574

- OPTIONS:

- NEGO: 1

- REQ_SX: 0

- REQ_XPRESS: 0

- RESP_SX: 0

- RESP_XPRESS: 0

- RESERVED: 0

- TYPE: text/xml

The server responds with the list of catalogs:

```
0E 10 00 04  00 00 00 08  00 00 03 5D  00 00 00 00      ...........]....
74 65 78 74  2F 78 6D 6C  3C 73 6F 61  70 3A 45 6E      text/xml<soap:En
76 65 6C 6F  70 65 20 78  6D 6C 6E 73  3A 73 6F 61      velope xmlns:soa
70 3D 22 68  74 74 70 3A  2F 2F 73 63  68 65 6D 61      p="http://schema
73 2E 78 6D  6C 73 6F 61  70 2E 6F 72  67 2F 73 6F      s.xmlsoap.org/so
61 70 2F 65  6E 76 65 6C  6F 70 65 2F  22 3E 3C 73      ap/envelope/"><s
```


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```
6F 61 70 3A  42 6F 64 79  3E 3C 44 69  73 63 6F 76      oap:Body><Discov
65 72 52 65  73 70 6F 6E  73 65 20 78  6D 6C 6E 73      erResponse xmlns
3D 22 75 72  6E 3A 73 63  68 65 6D 61  73 2D 6D 69      ="urn:schemas-mi
63 72 6F 73  6F 66 74 2D  63 6F 6D 3A  78 6D 6C 2D      crosoft-com:xml-
61 6E 61 6C  79 73 69 73  22 20 78 6D  6C 6E 73 3A      analysis" xmlns:
64 64 6C 32  3D 22 68 74  74 70 3A 2F  2F 73 63 68      ddl2="http://sch
65 6D 61 73  2E 6D 69 63  72 6F 73 6F  66 74 2E 63      emas.microsoft.c
6F 6D 2F 61  6E 61 6C 79  73 69 73 73  65 72 76 69      om/analysisservi
63 65 73 2F  32 30 30 33  2F 65 6E 67  69 6E 65 2F      ces/2003/engine/
32 22 20 78  6D 6C 6E 73  3A 64 64 6C  32 5F 32 3D      2" xmlns:ddl2_2=
22 68 74 74  70 3A 2F 2F  73 63 68 65  6D 61 73 2E      "http://schemas.
6D 69 63 72  6F 73 6F 66  74 2E 63 6F  6D 2F 61 6E      microsoft.com/an
61 6C 79 73  69 73 73 65  72 76 69 63  65 73 2F 32      alysisservices/2
30 30 33 2F  65 6E 67 69  6E 65 2F 32  2F 32 22 20      003/engine/2/2"
78 6D 6C 6E  73 3A 64 64  6C 31 30 30  3D 22 68 74      xmlns:ddl100="ht
74 70 3A 2F  2F 73 63 68  65 6D 61 73  2E 6D 69 63      tp://schemas.mic
72 6F 73 6F  66 74 2E 63  6F 6D 2F 61  6E 61 6C 79      rosoft.com/analy
73 69 73 73  65 72 76 69  63 65 73 2F  32 30 30 38      sisservices/2008
2F 65 6E 67  69 6E 65 2F  31 30 30 22  20 78 6D 6C      /engine/100" xml
6E 73 3A 64  64 6C 31 30  30 5F 31 30  30 3D 22 68      ns:ddl100_100="h
74 74 70 3A  2F 2F 73 63  68 65 6D 61  73 2E 6D 69      ttp://schemas.mi
63 72 6F 73  6F 66 74 2E  63 6F 6D 2F  61 6E 61 6C      crosoft.com/anal
79 73 69 73  73 65 72 76  69 63 65 73  2F 32 30 30      ysisservices/200
38 2F 65 6E  67 69 6E 65  2F 31 30 30  2F 31 30 30      8/engine/100/100
22 3E 3C 72  65 74 75 72  6E 3E 3C 72  6F 6F 74 20      "><return><root
78 6D 6C 6E  73 3D 22 75  72 6E 3A 73  63 68 65 6D      xmlns="urn:schem
61 73 2D 6D  69 63 72 6F  73 6F 66 74  2D 63 6F 6D      as-microsoft-com
3A 78 6D 6C  2D 61 6E 61  6C 79 73 69  73 3A 72 6F      :xml-analysis:ro
77 73 65 74  22 20 78 6D  6C 6E 73 3A  78 73 69 3D      wset" xmlns:xsi=
22 68 74 74  70 3A 2F 2F  77 77 77 2E  77 33 2E 6F      "http://www.w3.o
72 67 2F 32  30 30 31 2F  58 4D 4C 53  63 68 65 6D      rg/2001/XMLSchem
61 2D 69 6E  73 74 61 6E  63 65 22 20  78 6D 6C 6E      a-instance" xmln
73 3A 78 73  64 3D 22 68  74 74 70 3A  2F 2F 77 77      s:xsd="http://ww
77 2E 77 33  2E 6F 72 67  2F 32 30 30  31 2F 58 4D      w.w3.org/2001/XM
4C 53 63 68  65 6D 61 22  3E 3C 72 6F  77 3E 3C 43      LSchema"><row><C
41 54 41 4C  4F 47 5F 4E  41 4D 45 3E  44 44 4C 54      ATALOG_NAME>DDLT
65 73 74 44  42 3C 2F 43  41 54 41 4C  4F 47 5F 4E      estDB</CATALOG_N
41 4D 45 3E  3C 44 45 53  43 52 49 50  54 49 4F 4E      AME><DESCRIPTION
3E 4D 69 63  72 6F 73 6F  66 74 20 53  61 6D 70 6C      >Microsoft Sampl
65 20 44 61  74 61 62 61  73 65 3C 2F  44 45 53 43      e Database</DESC
52 49 50 54  49 4F 4E 3E  3C 52 4F 4C  45 53 3E 2A      RIPTION><ROLES>*
2C 72 61 2C  72 62 3C 2F  52 4F 4C 45  53 3E 3C 44      ,ra,rb</ROLES><D
41 54 45 5F  4D 4F 44 49  46 49 45 44  3E 32 30 30      ATE_MODIFIED>200
38 2D 30 32  2D 30 38 54  30 32 3A 34  37 3A 35 34      8-02-08T02:47:54
3C 2F 44 41  54 45 5F 4D  4F 44 49 46  49 45 44 3E      </DATE_MODIFIED>
3C 2F 72 6F  77 3E 3C 2F  72 6F 6F 74  3E 3C 2F 72      </row></root></r
65 74 75 72  6E 3E 3C 2F  44 69 73 63  6F 76 65 72      eturn></Discover
52 65 73 70  6F 6E 73 65  3E 3C 2F 73  6F 61 70 3A      Response></soap:
42 6F 64 79  3E 3C 2F 73  6F 61 70 3A  45 6E 76 65      Body></soap:Enve
6C 6F 70 65  3E CC CC CC  .. .. .. ..  .. .. .. ..      lope>???
```

- VERSION: 1

- MB: 1

- ME: 1

- CF: 0

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- TYPE_T: 1

- RESERVED: 0

- OPTIONS_LENGTH: 4

- ID_LENGTH: 0

- TYPE_LENGTH: 8

- DATA_LENGTH: 861

- OPTIONS:

- NEGO: 0

- REQ_SX: 0

- REQ_XPRESS: 0

- RESP_SX: 0

- RESP_XPRESS: 0

- RESERVED: 0

- TYPE: text/xml

4.1.5 End of Session

The client sends a request to end this session:

```
0E 10 00 04  00 00 00 08  00 00 02 54  01 00 00 00      ...........T....
74 65 78 74  2F 78 6D 6C  EF BB BF 3C  45 6E 76 65      text/xml???<Enve
6C 6F 70 65  20 78 6D 6C  6E 73 3D 22  68 74 74 70      lope xmlns="http
3A 2F 2F 73  63 68 65 6D  61 73 2E 78  6D 6C 73 6F      ://schemas.xmlso
61 70 2E 6F  72 67 2F 73  6F 61 70 2F  65 6E 76 65      ap.org/soap/enve
6C 6F 70 65  2F 22 3E 0D  0A 20 20 3C  48 65 61 64      lope/">.. <Head
65 72 3E 0D  0A 20 20 20  20 3C 45 6E  64 53 65 73      er>..   <EndSes
73 69 6F 6E  20 73 6F 61  70 3A 6D 75  73 74 55 6E      sion soap:mustUn
64 65 72 73  74 61 6E 64  3D 22 31 22  20 53 65 73      derstand="1" Ses
73 69 6F 6E  49 64 3D 22  46 39 44 37  44 42 37 30      sionId="F9D7DB70
2D 32 42 45  32 2D 34 43  35 32 2D 38  46 46 44 2D      -2BE2-4C52-8FFD-
31 31 33 44  39 44 31 46  39 44 32 34  22 20 78 6D      113D9D1F9D24" xm
6C 6E 73 3A  73 6F 61 70  3D 22 68 74  74 70 3A 2F      lns:soap="http:/
2F 73 63 68  65 6D 61 73  2E 78 6D 6C  73 6F 61 70      /schemas.xmlsoap
2E 6F 72 67  2F 73 6F 61  70 2F 65 6E  76 65 6C 6F      .org/soap/envelo
70 65 2F 22  20 78 6D 6C  6E 73 3D 22  75 72 6E 3A      pe/" xmlns="urn:
73 63 68 65  6D 61 73 2D  6D 69 63 72  6F 73 6F 66      schemas-microsof
74 2D 63 6F  6D 3A 78 6D  6C 2D 61 6E  61 6C 79 73      t-com:xml-analys
69 73 22 20  2F 3E 0D 0A  20 20 3C 2F  48 65 61 64      is" />.. </Head
65 72 3E 0D  0A 20 20 3C  42 6F 64 79  3E 0D 0A 20      er>.. <Body>..
20 20 20 3C  45 78 65 63  75 74 65 20  78 6D 6C 6E         <Execute xmln
73 3D 22 75  72 6E 3A 73  63 68 65 6D  61 73 2D 6D      s="urn:schemas-m
69 63 72 6F  73 6F 66 74  2D 63 6F 6D  3A 78 6D 6C      icrosoft-com:xml
2D 61 6E 61  6C 79 73 69  73 22 3E 0D  0A 20 20 20      -analysis">..
20 20 20 3C  43 6F 6D 6D  61 6E 64 3E  0D 0A 20 20         <Command>..
20 20 20 20  20 20 3C 53  74 61 74 65  6D 65 6E 74            <Statement
```


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```
20 2F 3E 0D  0A 20 20 20  20 20 20 3C  2F 43 6F 6D      />..     </Com
6D 61 6E 64  3E 0D 0A 20  20 20 20 20  20 3C 50 72     mand>..     <Pr
6F 70 65 72  74 69 65 73  3E 0D 0A 20  20 20 20 20     operties>..
20 20 20 3C  50 72 6F 70  65 72 74 79  4C 69 73 74        <PropertyList
3E 0D 0A 20  20 20 20 20  20 20 20 20  20 3C 4C 6F     >..         <Lo
63 61 6C 65  49 64 65 6E  74 69 66 69  65 72 3E 31     caleIdentifier>1
30 33 33 3C  2F 4C 6F 63  61 6C 65 49  64 65 6E 74     033</LocaleIdent
69 66 69 65  72 3E 0D 0A  20 20 20 20  20 20 20 20     ifier>..
3C 2F 50 72  6F 70 65 72  74 79 4C 69  73 74 3E 0D     </PropertyList>.
0A 20 20 20  20 20 20 3C  2F 50 72 6F  70 65 72 74     .     </Propert
69 65 73 3E  0D 0A 20 20  20 20 3C 2F  45 78 65 63     ies>..   </Exec
75 74 65 3E  0D 0A 20 20  3C 2F 42 6F  64 79 3E 0D     ute>.. </Body>.
0A 3C 2F 45  6E 76 65 6C  6F 70 65 3E  .. .. .. ..     .</Envelope>
```

- VERSION: 1

- MB: 1

- ME: 1

- CF: 0

- TYPE_T: 1

- RESERVED: 0

- OPTIONS_LENGTH: 4

- ID_LENGTH: 0

- TYPE_LENGTH: 8

- DATA_LENGTH: 596

- OPTIONS:

- NEGO: 1

- REQ_SX: 0

- REQ_XPRESS: 0

- RESP_SX: 0

- RESP_XPRESS: 0

- RESERVED: 0

- TYPE: text/xml

The server responds with a confirmation:

```
0E 10 00 04  00 00 00 08  00 00 01 0C  00 00 00 00     ................
74 65 78 74  2F 78 6D 6C  3C 73 6F 61  70 3A 45 6E     text/xml<soap:En
76 65 6C 6F  70 65 20 78  6D 6C 6E 73  3A 73 6F 61     velope xmlns:soa
70 3D 22 68  74 74 70 3A  2F 2F 73 63  68 65 6D 61     p="http://schema
73 2E 78 6D  6C 73 6F 61  70 2E 6F 72  67 2F 73 6F     s.xmlsoap.org/so
```


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```
61 70 2F 65  6E 76 65 6C  6F 70 65 2F  22 3E 3C 73      ap/envelope/"><s
6F 61 70 3A  42 6F 64 79  3E 3C 45 78  65 63 75 74      oap:Body><Execut
65 52 65 73  70 6F 6E 73  65 20 78 6D  6C 6E 73 3D      eResponse xmlns=
22 75 72 6E  3A 73 63 68  65 6D 61 73  2D 6D 69 63      "urn:schemas-mic
72 6F 73 6F  66 74 2D 63  6F 6D 3A 78  6D 6C 2D 61      rosoft-com:xml-a
6E 61 6C 79  73 69 73 22  3E 3C 72 65  74 75 72 6E      nalysis"><return
3E 3C 72 6F  6F 74 20 78  6D 6C 6E 73  3D 22 75 72      ><root xmlns="ur
6E 3A 73 63  68 65 6D 61  73 2D 6D 69  63 72 6F 73      n:schemas-micros
6F 66 74 2D  63 6F 6D 3A  78 6D 6C 2D  61 6E 61 6C      oft-com:xml-anal
79 73 69 73  3A 65 6D 70  74 79 22 2F  3E 3C 2F 72      ysis:empty"/></r
65 74 75 72  6E 3E 3C 2F  45 78 65 63  75 74 65 52      eturn></ExecuteR
65 73 70 6F  6E 73 65 3E  3C 2F 73 6F  61 70 3A 42      esponse></soap:B
6F 64 79 3E  3C 2F 73 6F  61 70 3A 45  6E 76 65 6C      ody></soap:Envel
6F 70 65 3E  .. .. .. .. .. .. .. .. .. .. .. ..      ope>
```

- VERSION: 1

- MB: 1

- ME: 1

- CF: 0

- TYPE_T: 1

- RESERVED: 0

- OPTIONS_LENGTH: 4

- ID_LENGTH: 0

- TYPE_LENGTH: 8

- DATA_LENGTH: 268

- OPTIONS:

- NEGO: 0

- REQ_SX: 0

- REQ_XPRESS: 0

- RESP_SX: 0

- RESP_XPRESS: 0

- RESERVED: 0

- TYPE: text/xml

The client disconnects from the server.

4.2 Client Obtains a List of Cubes from the Server over HTTP

In this example, the client creates an unauthenticated connection to the server by using HTTP and sends an **MDSCHEMA_CUBES** request.

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4.2.1 Connection

The server listens on a TCP port for incoming HTTP requests from clients. The client creates a TCP connection to the server.

4.2.2 New Session Request

The client sends an HTTP header with the request to create a session:

```
POST /as/msmdpump.dll HTTP/1.1
User-Agent: XmlaClient
Content-Type: text/xml
SOAPAction: "urn:schemas-microsoft-com:xml-analysis:Execute"
X-Transport-Caps-Negotiation-Flags: 0,0,0,0,1
Host: testserver:2390
Content-Length: 647
Expect: 100-continue
Connection: Keep-Alive
```

The server responds with a confirmation:

```
HTTP/1.1 100 Continue
```

The client sends the payload part of the request:

```
<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Header>
    <BeginSession soap:mustUnderstand="1"
xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/" xmlns="urn:schemas-microsoft-com:xml-
analysis" />
  </Header>
  <Body>
    <Execute xmlns="urn:schemas-microsoft-com:xml-analysis">
      <Command>
        <Statement />
      </Command>
      <Properties>
        <PropertyList>
          <LocaleIdentifier>1033</LocaleIdentifier>
        </PropertyList>
      </Properties>
    </Execute>
  </Body>
</Envelope>
```

The server responds with the newly created session ID:

```
HTTP/1.1 200 OK
Date: Sat, 16 Feb 2008 00:30:34 GMT
Server: Microsoft-IIS/6.0
X-Powered-By: ASP.NET
```


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```
Transfer-Encoding: chunked
X-Transport-Caps-Negotiation-Flags: 0,0,0,0,0
Content-Type: text/xml
191
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Header><Session xmlns="urn:schemas-microsoft-com:xml-analysis" SessionId="537C61C6-
827C-4305-83A6-C8CE4A91001B"/>
  </soap:Header>
  <soap:Body>
    <ExecuteResponse xmlns="urn:schemas-microsoft-com:xml-analysis">
      <return>
        <root xmlns="urn:schemas-microsoft-com:xml-analysis:empty"/>
      </return>
    </ExecuteResponse>
  </soap:Body>
</soap:Envelope>
0
```

4.2.3 Request for List of Cubes

The client sends a header for an **MDSCHEMA_CUBES** request:

```
POST /as/msmdpump.dll HTTP/1.1
User-Agent: XmlaClient
Content-Type: text/xml
SOAPAction: "urn:schemas-microsoft-com:xml-analysis:Discover"
X-Transport-Caps-Negotiation-Flags: 1,0,0,0,0
Host: testserver:2390
Content-Length: 571
Expect: 100-continue
```

The server responds with a confirmation:

```
HTTP/1.1 100 Continue
```

The client sends the payload portion of the request:

```
<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Header>
    <XA:Session soap:mustUnderstand="1" SessionId="537C61C6-827C-4305-83A6-C8CE4A91001B"
xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/" xmlns:XA="urn:schemas-microsoft-
com:xml-analysis" />
  </Header>
  <Body>
    <Discover xmlns="urn:schemas-microsoft-com:xml-analysis">
      <RequestType>MDSCHEMA_CUBES</RequestType>
      <Restrictions></Restrictions>
      <Properties><PropertyList><Content>Data</Content></PropertyList></Properties>
    </Discover>
  </Body>
</Envelope>
```


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The server responds with an empty list of cubes:

```
HTTP/1.1 200 OK
Date: Sat, 16 Feb 2008 00:30:34 GMT
Server: Microsoft-IIS/6.0
X-Powered-By: ASP.NET
Transfer-Encoding: chunked
X-Transport-Caps-Negotiation-Flags: 0,0,0,0,0
Content-Type: text/xml
208
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <DiscoverResponse xmlns="urn:schemas-microsoft-com:xml-analysis"
xmlns:ddl2="http://schemas.microsoft.com/analysisservices/2003/engine/2"
xmlns:ddl2_2="http://schemas.microsoft.com/analysisservices/2003/engine/2/2">
      <return>
        <root xmlns="urn:schemas-microsoft-com:xml-analysis:rowset"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"/>
      </return>
    </DiscoverResponse>
  </soap:Body>
</soap:Envelope>
0
```

4.2.4 End of Session

The client sends a header of the request to end this session:

```
POST /as/msmdpump.dll HTTP/1.1
User-Agent: XmlaClient
Content-Type: text/xml
SOAPAction: "urn:schemas-microsoft-com:xml-analysis:Execute"
X-Transport-Caps-Negotiation-Flags: 1,0,0,0,0
Host: testserver:2390
Content-Length: 596
Expect: 100-continue
```

The server responds with a confirmation:

```
HTTP/1.1 100 Continue
```

The client sends the payload portion of the request:

```
<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Header>
    <EndSession soap:mustUnderstand="1" SessionId="537C61C6-827C-4305-83A6-C8CE4A91001B"
xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/" xmlns="urn:schemas-microsoft-com:xml-
analysis" />
  </Header>
  <Body>
```


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```
    <Execute xmlns="urn:schemas-microsoft-com:xml-analysis">
      <Command>
        <Statement />
      </Command>
      <Properties>
        <PropertyList>
          <LocaleIdentifier>1033</LocaleIdentifier>
        </PropertyList>
      </Properties>
    </Execute>
  </Body>
</Envelope>
```

The server responds with a confirmation:

```
HTTP/1.1 200 OK
Date: Sat, 16 Feb 2008 00:30:35 GMT
Server: Microsoft-IIS/6.0
X-Powered-By: ASP.NET
Transfer-Encoding: chunked
X-Transport-Caps-Negotiation-Flags: 0,0,0,0,0
Content-Type: text/xml
10c
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <ExecuteResponse xmlns="urn:schemas-microsoft-com:xml-analysis">
      <return>
        <root xmlns="urn:schemas-microsoft-com:xml-analysis:empty"/>
      </return>
    </ExecuteResponse>
  </soap:Body>
</soap:Envelope>
0
```

The client closes the connection.

4.3 Client Obtains a List of Measures from the Server

In this example, the client sends an **MDSCHEMA_MEASURES** request.

4.3.1 Client Sends Request

The client sends the following **Discover** request:

```
<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Header>
    <XA:Session soap:mustUnderstand="1" SessionId="24AD6CD1-2341-4BCE-AC06-740B5AA88CA2"
xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/" xmlns:XA="urn:schemas-microsoft-
com:xml-analysis" />
  </Header>
  <Body>
    <Discover xmlns="urn:schemas-microsoft-com:xml-analysis">
      <RequestType>MDSCHEMA_MEASURES</RequestType>
      <Restrictions></Restrictions>
```


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```
      <Properties><PropertyList><Content>Data</Content></PropertyList></Properties>
    </Discover>
  </Body>
</Envelope>
```

4.3.2 Server Response

The server responds with a list of measures:

```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <DiscoverResponse xmlns="urn:schemas-microsoft-com:xml-analysis"
xmlns:ddl2="http://schemas.microsoft.com/analysisservices/2003/engine/2"
xmlns:ddl2_2="http://schemas.microsoft.com/analysisservices/2003/engine/2/2"
xmlns:ddl100="http://schemas.microsoft.com/analysisservices/2008/engine/100"
xmlns:ddl100_100="http://schemas.microsoft.com/analysisservices/2008/engine/100/100">
      <return>
<root xmlns="urn:schemas-microsoft-com:xml-analysis:rowset"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<row>
            <CATALOG_NAME>AdventureWorks_SSAS</CATALOG_NAME>
            <CUBE_NAME>AdventureWorksDW2008Cube</CUBE_NAME>
            <MEASURE_NAME>Order Quantity</MEASURE_NAME>
            <MEASURE_UNIQUE_NAME>[Measures].[Order Quantity]</MEASURE_UNIQUE_NAME>
            <MEASURE_CAPTION>Order Quantity</MEASURE_CAPTION>
            <MEASURE_AGGREGATOR>1</MEASURE_AGGREGATOR>
            <DATA_TYPE>3</DATA_TYPE>
            <NUMERIC_PRECISION>10</NUMERIC_PRECISION>
            <NUMERIC_SCALE>-1</NUMERIC_SCALE>
            <DESCRIPTION />
            <MEASURE_IS_VISIBLE>true</MEASURE_IS_VISIBLE>
            <MEASURE_NAME_SQL_COLUMN_NAME>Order Quantity</MEASURE_NAME_SQL_COLUMN_NAME>
            <MEASURE_UNQUALIFIED_CAPTION>Order Quantity</MEASURE_UNQUALIFIED_CAPTION>
            <MEASUREGROUP_NAME>Fact Internet Sales</MEASUREGROUP_NAME>
            <MEASURE_DISPLAY_FOLDER />
            <DEFAULT_FORMAT_STRING />
          </row>
          <row>
            <CATALOG_NAME>AdventureWorks_SSAS</CATALOG_NAME>
            <CUBE_NAME>AdventureWorksDW2008Cube</CUBE_NAME>
            <MEASURE_NAME>Sales Amount</MEASURE_NAME>
            <MEASURE_UNIQUE_NAME>[Measures].[Sales Amount]</MEASURE_UNIQUE_NAME>
            <MEASURE_CAPTION>Sales Amount</MEASURE_CAPTION>
            <MEASURE_AGGREGATOR>1</MEASURE_AGGREGATOR>
            <DATA_TYPE>5</DATA_TYPE>
            <NUMERIC_PRECISION>16</NUMERIC_PRECISION>
            <NUMERIC_SCALE>-1</NUMERIC_SCALE>
            <DESCRIPTION />
            <MEASURE_IS_VISIBLE>true</MEASURE_IS_VISIBLE>
            <MEASURE_NAME_SQL_COLUMN_NAME>Sales Amount</MEASURE_NAME_SQL_COLUMN_NAME>
            <MEASURE_UNQUALIFIED_CAPTION>Sales Amount</MEASURE_UNQUALIFIED_CAPTION>
            <MEASUREGROUP_NAME>Fact Internet Sales</MEASUREGROUP_NAME>
            <MEASURE_DISPLAY_FOLDER />
            <DEFAULT_FORMAT_STRING />
          </row>
          <row>
```


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```
            <CATALOG_NAME>AdventureWorks_SSAS</CATALOG_NAME>
            <CUBE_NAME>AdventureWorksDW2008Cube</CUBE_NAME>
            <MEASURE_NAME>Tax Amt</MEASURE_NAME>
            <MEASURE_UNIQUE_NAME>[Measures].[Tax Amt]</MEASURE_UNIQUE_NAME>
            <MEASURE_CAPTION>Tax Amt</MEASURE_CAPTION>
            <MEASURE_AGGREGATOR>1</MEASURE_AGGREGATOR>
            <DATA_TYPE>5</DATA_TYPE>
            <NUMERIC_PRECISION>16</NUMERIC_PRECISION>
            <NUMERIC_SCALE>-1</NUMERIC_SCALE>
            <DESCRIPTION />
            <MEASURE_IS_VISIBLE>true</MEASURE_IS_VISIBLE>
            <MEASURE_NAME_SQL_COLUMN_NAME>Tax Amt</MEASURE_NAME_SQL_COLUMN_NAME>
            <MEASURE_UNQUALIFIED_CAPTION>Tax Amt</MEASURE_UNQUALIFIED_CAPTION>
            <MEASUREGROUP_NAME>Fact Internet Sales</MEASUREGROUP_NAME>
            <MEASURE_DISPLAY_FOLDER />
            <DEFAULT_FORMAT_STRING />
          </row>
          <row>
            <CATALOG_NAME>AdventureWorks_SSAS</CATALOG_NAME>
            <CUBE_NAME>AdventureWorksDW2008Cube</CUBE_NAME>
            <MEASURE_NAME>Fact Internet Sales Count</MEASURE_NAME>
            <MEASURE_UNIQUE_NAME>[Measures].[Fact Internet Sales Count]</MEASURE_UNIQUE_NAME>
            <MEASURE_CAPTION>Fact Internet Sales Count</MEASURE_CAPTION>
            <MEASURE_AGGREGATOR>2</MEASURE_AGGREGATOR>
            <DATA_TYPE>3</DATA_TYPE>
            <NUMERIC_PRECISION>10</NUMERIC_PRECISION>
            <NUMERIC_SCALE>-1</NUMERIC_SCALE>
            <DESCRIPTION />
            <MEASURE_IS_VISIBLE>true</MEASURE_IS_VISIBLE>
            <MEASURE_NAME_SQL_COLUMN_NAME>Fact Internet Sales
Count</MEASURE_NAME_SQL_COLUMN_NAME>
            <MEASURE_UNQUALIFIED_CAPTION>Fact Internet Sales
Count</MEASURE_UNQUALIFIED_CAPTION>
            <MEASUREGROUP_NAME>Fact Internet Sales</MEASUREGROUP_NAME>
            <MEASURE_DISPLAY_FOLDER />
            <DEFAULT_FORMAT_STRING />
          </row>
          <row>
            <CATALOG_NAME>AdventureWorks_SSAS</CATALOG_NAME>
            <CUBE_NAME>AdventureWorksDW2008Cube</CUBE_NAME>
            <MEASURE_NAME>Total Amount</MEASURE_NAME>
            <MEASURE_UNIQUE_NAME>[Measures].[Total Amount]</MEASURE_UNIQUE_NAME>
            <MEASURE_CAPTION>Total Amount</MEASURE_CAPTION>
            <MEASURE_AGGREGATOR>1</MEASURE_AGGREGATOR>
            <DATA_TYPE>5</DATA_TYPE>
            <NUMERIC_PRECISION>16</NUMERIC_PRECISION>
            <NUMERIC_SCALE>-1</NUMERIC_SCALE>
            <DESCRIPTION />
            <MEASURE_IS_VISIBLE>true</MEASURE_IS_VISIBLE>
            <MEASURE_NAME_SQL_COLUMN_NAME>Total Amount</MEASURE_NAME_SQL_COLUMN_NAME>
            <MEASURE_UNQUALIFIED_CAPTION>Total Amount</MEASURE_UNQUALIFIED_CAPTION>
            <MEASUREGROUP_NAME>Fact Internet Sales</MEASUREGROUP_NAME>
            <MEASURE_DISPLAY_FOLDER />
            <DEFAULT_FORMAT_STRING />
          </row>
    </root>
        </return>
      </DiscoverResponse>
    </soap:Body>
```


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```
</soap:Envelope>
```

4.4 Client Obtains a List of Properties from the Server

In this example, the client sends a **DISCOVER_PROPERTIES** request.

4.4.1 Client Sends Request

The client sends the following request:

```
<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Header>
    <XA:Session soap:mustUnderstand="1" SessionId="24AD6CD1-2341-4BCE-AC06-740B5AA88CA2"
xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/" xmlns:XA="urn:schemas-microsoft-
com:xml-analysis" />
  </Header>
  <Body>
    <Discover xmlns="urn:schemas-microsoft-com:xml-analysis">
      <RequestType>DISCOVER_PROPERTIES</RequestType>
      <Restrictions></Restrictions>
      <Properties><PropertyList><Content>Data</Content></PropertyList></Properties>
    </Discover>
  </Body>
</Envelope>
```

4.4.2 Server Response

The server responds with a list of properties:

```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <DiscoverResponse xmlns="urn:schemas-microsoft-com:xml-analysis"
xmlns:ddl2="http://schemas.microsoft.com/analysisservices/2003/engine/2"
xmlns:ddl2_2="http://schemas.microsoft.com/analysisservices/2003/engine/2/2"
xmlns:ddl100="http://schemas.microsoft.com/analysisservices/2008/engine/100"
xmlns:ddl100_100="http://schemas.microsoft.com/analysisservices/2008/engine/100/100">
      <return xmlns="urn:schemas-microsoft-com:xml-analysis">
       <root xmlns="urn:schemas-microsoft-com:xml-analysis:rowset"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:msxmla="http://schemas.microsoft.com/analysisservices/2003/xmla">
          <row>
            <PropertyName>Catalog</PropertyName>
            <PropertyDescription>Catalog</PropertyDescription>
            <PropertyType>string</PropertyType>
            <PropertyAccessType>ReadWrite</PropertyAccessType>
            <IsRequired>false</IsRequired>
            <Value>AdventureWorks_SSAS</Value>
          </row>
          <row>
            <PropertyName>Timeout</PropertyName>
            <PropertyDescription>Timeout</PropertyDescription>
            <PropertyType>int</PropertyType>
            <PropertyAccessType>ReadWrite</PropertyAccessType>
```


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```
  <IsRequired>false</IsRequired>
</row>
<row>
  <PropertyName>Content</PropertyName>
  <PropertyDescription>Content</PropertyDescription>
  <PropertyType>string</PropertyType>
  <PropertyAccessType>Write</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>SchemaData</Value>
</row>
<row>
  <PropertyName>Format</PropertyName>
  <PropertyDescription>Format</PropertyDescription>
  <PropertyType>string</PropertyType>
  <PropertyAccessType>Write</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>Native</Value>
</row>
<row>
  <PropertyName>AxisFormat</PropertyName>
  <PropertyDescription>AxisFormat</PropertyDescription>
  <PropertyType>string</PropertyType>
  <PropertyAccessType>Write</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>TupleFormat</Value>
</row>
<row>
  <PropertyName>BeginRange</PropertyName>
  <PropertyDescription>BeginRange</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Write</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>-1</Value>
</row>
<row>
  <PropertyName>EndRange</PropertyName>
  <PropertyDescription>EndRange</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Write</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>-1</Value>
</row>
<row>
  <PropertyName>ShowHiddenCubes</PropertyName>
  <PropertyDescription>ShowHiddenCubes</PropertyDescription>
  <PropertyType>boolean</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>false</Value>
</row>
<row>
  <PropertyName>MaximumRows</PropertyName>
  <PropertyDescription>MaximumRows</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Write</PropertyAccessType>
  <IsRequired>false</IsRequired>
</row>
<row>
  <PropertyName>VisualMode</PropertyName>
```


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```
  <PropertyDescription>VisualMode</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Write</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>0</Value>
</row>
<row>
  <PropertyName>DbpropMsmdCachePolicy</PropertyName>
  <PropertyDescription>DbpropMsmdCachePolicy</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
</row>
<row>
  <PropertyName>DbpropMsmdCacheRatio</PropertyName>
  <PropertyDescription>DbpropMsmdCacheRatio</PropertyDescription>
  <PropertyType>double</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
</row>
<row>
  <PropertyName>DbpropMsmdCacheMode</PropertyName>
  <PropertyDescription>DbpropMsmdCacheMode</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
</row>
<row>
  <PropertyName>DbpropMsmdFlattened2</PropertyName>
  <PropertyDescription>DbpropMsmdFlattened2</PropertyDescription>
  <PropertyType>boolean</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>false</Value>
</row>
<row>
  <PropertyName>DbpropInitMode</PropertyName>
  <PropertyDescription>DbpropInitMode</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
</row>
<row>
  <PropertyName>SspropInitAppName</PropertyName>
  <PropertyDescription>SspropInitAppName</PropertyDescription>
  <PropertyType>string</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
</row>
<row>
  <PropertyName>SecuredCellValue</PropertyName>
  <PropertyDescription>SecuredCellValue</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>0</Value>
</row>
<row>
  <PropertyName>NonEmptyThreshold</PropertyName>
```


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```
  <PropertyDescription>NonEmptyThreshold</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
</row>
<row>
  <PropertyName>SafetyOptions</PropertyName>
  <PropertyDescription>SafetyOptions</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
</row>
<row>
  <PropertyName>DbpropMsmdCacheRatio2</PropertyName>
  <PropertyDescription>DbpropMsmdCacheRatio2</PropertyDescription>
  <PropertyType>double</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
</row>
<row>
  <PropertyName>DbpropMsmdUseFormulaCache</PropertyName>
  <PropertyDescription>DbpropMsmdUseFormulaCache</PropertyDescription>
  <PropertyType>string</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
</row>
<row>
  <PropertyName>DbpropMsmdDynamicDebugLimit</PropertyName>
  <PropertyDescription>DbpropMsmdDynamicDebugLimit</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
</row>
<row>
  <PropertyName>DbpropMsmdDebugMode</PropertyName>
  <PropertyDescription>DbpropMsmdDebugMode</PropertyDescription>
  <PropertyType>string</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
</row>
<row>
  <PropertyName>Dialect</PropertyName>
  <PropertyDescription>Dialect</PropertyDescription>
  <PropertyType>string</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
</row>
<row>
  <PropertyName>ImpactAnalysis</PropertyName>
  <PropertyDescription>ImpactAnalysis</PropertyDescription>
  <PropertyType>boolean</PropertyType>
  <PropertyAccessType>Write</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>0</Value>
</row>
<row>
  <PropertyName>SQLQueryMode</PropertyName>
  <PropertyDescription>SQLQueryMode</PropertyDescription>
  <PropertyType>string</PropertyType>
```


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```
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>Calculated</Value>
</row>
<row>
  <PropertyName>ClientProcessID</PropertyName>
  <PropertyDescription>ClientProcessID</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
</row>
<row>
  <PropertyName>Cube</PropertyName>
  <PropertyDescription>Cube</PropertyDescription>
  <PropertyType>string</PropertyType>
  <PropertyAccessType>Write</PropertyAccessType>
  <IsRequired>false</IsRequired>
</row>
<row>
  <PropertyName>ReturnCellProperties</PropertyName>
  <PropertyDescription>ReturnCellProperties</PropertyDescription>
  <PropertyType>boolean</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>false</Value>
</row>
<row>
  <PropertyName>CommitTimeout</PropertyName>
  <PropertyDescription>CommitTimeout</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Write</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>0</Value>
</row>
<row>
  <PropertyName>ForceCommitTimeout</PropertyName>
  <PropertyDescription>ForceCommitTimeout</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Write</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>0</Value>
</row>
<row>
  <PropertyName>ExecutionMode</PropertyName>
  <PropertyDescription>ExecutionMode</PropertyDescription>
  <PropertyType>string</PropertyType>
  <PropertyAccessType>Write</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>Execute</Value>
</row>
<row>
  <PropertyName>RealTimeOlap</PropertyName>
  <PropertyDescription>RealTimeOlap</PropertyDescription>
  <PropertyType>boolean</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>false</Value>
</row>
<row>
```


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```
    <PropertyName>MdxMissingMemberMode</PropertyName>
    <PropertyDescription>MdxMissingMemberMode</PropertyDescription>
    <PropertyType>string</PropertyType>
    <PropertyAccessType>Write</PropertyAccessType>
    <IsRequired>false</IsRequired>
    <Value>Default</Value>
  </row>
  <row>
    <PropertyName>DisablePrefetchFacts</PropertyName>
    <PropertyDescription>DisablePrefetchFacts</PropertyDescription>
    <PropertyType>boolean</PropertyType>
    <PropertyAccessType>ReadWrite</PropertyAccessType>
    <IsRequired>false</IsRequired>
    <Value>false</Value>
  </row>
  <row>
    <PropertyName>UpdateIsolationLevel</PropertyName>
    <PropertyDescription>UpdateIsolationLevel</PropertyDescription>
    <PropertyType>int</PropertyType>
    <PropertyAccessType>ReadWrite</PropertyAccessType>
    <IsRequired>false</IsRequired>
    <Value>2</Value>
  </row>
  <row>
    <PropertyName>CharacterEncoding</PropertyName>
    <PropertyDescription>CharacterEncoding</PropertyDescription>
    <PropertyType>string</PropertyType>
    <PropertyAccessType>ReadWrite</PropertyAccessType>
    <IsRequired>false</IsRequired>
    <Value>Default</Value>
  </row>
  <row>
   <PropertyName>DbpropMsmdOptimizeResponse</PropertyName>
 <PropertyDescription>DbpropMsmdOptimizeResponse</PropertyDescription>
   <PropertyType>long</PropertyType>
   <PropertyAccessType>ReadWrite</PropertyAccessType>
   <IsRequired>false</IsRequired>
   <Value>0</Value>
  </row>
  <row>
    <PropertyName>DataSourceInfo</PropertyName>
    <PropertyDescription>DataSourceInfo</PropertyDescription>
    <PropertyType>string</PropertyType>
    <PropertyAccessType>ReadWrite</PropertyAccessType>
    <IsRequired>true</IsRequired>
  </row>
  <row>
    <PropertyName>Password</PropertyName>
    <PropertyDescription>Password</PropertyDescription>
    <PropertyType>string</PropertyType>
    <PropertyAccessType>Write</PropertyAccessType>
    <IsRequired>false</IsRequired>
  </row>
  <row>
    <PropertyName>LocaleIdentifier</PropertyName>
    <PropertyDescription>LocaleIdentifier</PropertyDescription>
    <PropertyType>int</PropertyType>
    <PropertyAccessType>ReadWrite</PropertyAccessType>
    <IsRequired>false</IsRequired>
```


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```
            <Value>1033</Value>
          </row>
          <row>
            <PropertyName>Roles</PropertyName>
            <PropertyDescription>Roles</PropertyDescription>
            <PropertyType>string</PropertyType>
            <PropertyAccessType>ReadWrite</PropertyAccessType>
            <IsRequired>false</IsRequired>
          </row>
          <row>
            <PropertyName>EffectiveRoles</PropertyName>
            <PropertyDescription>EffectiveRoles</PropertyDescription>
            <PropertyType>string</PropertyType>
            <PropertyAccessType>Write</PropertyAccessType>
            <IsRequired>false</IsRequired>
          </row>
          <row>
            <PropertyName>EffectiveUserName</PropertyName>
            <PropertyDescription>EffectiveUserName</PropertyDescription>
            <PropertyType>string</PropertyType>
            <PropertyAccessType>Write</PropertyAccessType>
            <IsRequired>false</IsRequired>
          </row>
          <row>
            <PropertyName>DbpropMsmdMDXCompatibility</PropertyName>
            <PropertyDescription>DbpropMsmdMDXCompatibility</PropertyDescription>
            <PropertyType>int</PropertyType>
            <PropertyAccessType>ReadWrite</PropertyAccessType>
            <IsRequired>false</IsRequired>
            <Value>0</Value>
          </row>
          <row>
            <PropertyName>DbpropMsmdSQLCompatibility</PropertyName>
            <PropertyDescription>DbpropMsmdSQLCompatibility</PropertyDescription>
            <PropertyType>int</PropertyType>
            <PropertyAccessType>ReadWrite</PropertyAccessType>
            <IsRequired>false</IsRequired>
            <Value>0</Value>
          </row>
          <row>
            <PropertyName>DbpropMsmdMDXUniqueNameStyle</PropertyName>
            <PropertyDescription>DbpropMsmdMDXUniqueNameStyle</PropertyDescription>
            <PropertyType>int</PropertyType>
            <PropertyAccessType>ReadWrite</PropertyAccessType>
            <IsRequired>false</IsRequired>
            <Value>0</Value>
          </row>
          <row>
            <PropertyName>DbpropMsmdCompareCaseSensitiveStringFlags</PropertyName>

  <PropertyDescription>DbpropMsmdCompareCaseSensitiveStringFlags</PropertyDescription>
            <PropertyType>int</PropertyType>
            <PropertyAccessType>ReadWrite</PropertyAccessType>
            <IsRequired>false</IsRequired>
          </row>
          <row>
            <PropertyName>DbpropMsmdCompareCaseNotSensitiveStringFlags</PropertyName>

  <PropertyDescription>DbpropMsmdCompareCaseNotSensitiveStringFlags</PropertyDescription>
```


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```
  <PropertyType>int</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
</row>
<row>
  <PropertyName>SspropInitWsid</PropertyName>
  <PropertyDescription>SspropInitWsid</PropertyDescription>
  <PropertyType>string</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
</row>
<row>
  <PropertyName>SspropInitPacketsize</PropertyName>
  <PropertyDescription>SspropInitPacketsize</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
</row>
<row>
  <PropertyName>ReadOnlySession</PropertyName>
  <PropertyDescription>ReadOnlySession</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
</row>
<row>
  <PropertyName>CustomData</PropertyName>
  <PropertyDescription>CustomData</PropertyDescription>
  <PropertyType>string</PropertyType>
  <PropertyAccessType>Write</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value />
</row>
<row>
  <PropertyName>DbpropMsmdErrorMessageMode</PropertyName>
  <PropertyDescription>DbpropMsmdErrorMessageMode</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Write</PropertyAccessType>
  <IsRequired>false</IsRequired>
</row>
<row>
  <PropertyName>DbpropMsmdSubqueries</PropertyName>
  <PropertyDescription>DbpropMsmdSubqueries</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>0</Value>
</row>
<row>
  <PropertyName>DbpropMsmdAutoExists</PropertyName>
  <PropertyDescription>DbpropMsmdAutoExists</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>0</Value>
</row>
<row>
  <PropertyName>UserName</PropertyName>
  <PropertyDescription>UserName</PropertyDescription>
```


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```
  <PropertyType>string</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>NY-SQL-02\Student</Value>
</row>
<row>
  <PropertyName>StateSupport</PropertyName>
  <PropertyDescription>StateSupport</PropertyDescription>
  <PropertyType>string</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>Sessions</Value>
</row>
<row>
  <PropertyName>MDXSupport</PropertyName>
  <PropertyDescription>MDXSupport</PropertyDescription>
  <PropertyType>string</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>Core</Value>
</row>
<row>
  <PropertyName>MemoryLockingMode</PropertyName>
  <PropertyDescription>MemoryLockingMode</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>1</Value>
</row>
<row>
  <PropertyName>ProviderName</PropertyName>
  <PropertyDescription>ProviderName</PropertyDescription>
  <PropertyType>string</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>OLAP Server</Value>
</row>
<row>
  <PropertyName>ProviderVersion</PropertyName>
  <PropertyDescription>ProviderVersion</PropertyDescription>
  <PropertyType>string</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>10.0.1600.22</Value>
</row>
<row>
  <PropertyName>DBMSVersion</PropertyName>
  <PropertyDescription>DBMSVersion</PropertyDescription>
  <PropertyType>string</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>10.0.1600.22</Value>
</row>
<row>
  <PropertyName>ProviderType</PropertyName>
  <PropertyDescription>ProviderType</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
```


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```
  <Value>6</Value>
</row>
<row>
  <PropertyName>SQLSupport</PropertyName>
  <PropertyDescription>SQLSupport</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>512</Value>
</row>
<row>
  <PropertyName>TransactionDDL</PropertyName>
  <PropertyDescription>TransactionDDL</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>0</Value>
</row>
<row>
  <PropertyName>ServerName</PropertyName>
  <PropertyDescription>ServerName</PropertyDescription>
  <PropertyType>string</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>NY-SQL-02</Value>
</row>
<row>
  <PropertyName>CatalogLocation</PropertyName>
  <PropertyDescription>CatalogLocation</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>1</Value>
</row>
<row>
  <PropertyName>DbpropCatalogTerm</PropertyName>
  <PropertyDescription>DbpropCatalogTerm</PropertyDescription>
  <PropertyType>string</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>Database</Value>
</row>
<row>
  <PropertyName>DbpropCatalogUsage</PropertyName>
  <PropertyDescription>DbpropCatalogUsage</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>0</Value>
</row>
<row>
  <PropertyName>DbpropColumnDefinition</PropertyName>
  <PropertyDescription>DbpropColumnDefinition</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>0</Value>
</row>
<row>
```


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```
  <PropertyName>DbpropConcatNullBehavior</PropertyName>
  <PropertyDescription>DbpropConcatNullBehavior</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>1</Value>
</row>
<row>
  <PropertyName>DbpropDataSourceReadOnly</PropertyName>
  <PropertyDescription>DbpropDataSourceReadOnly</PropertyDescription>
  <PropertyType>boolean</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>false</Value>
</row>
<row>
  <PropertyName>DbpropGroupBy</PropertyName>
  <PropertyDescription>DbpropGroupBy</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>2</Value>
</row>
<row>
  <PropertyName>DbpropHeterogeneousTables</PropertyName>
  <PropertyDescription>DbpropHeterogeneousTables</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>0</Value>
</row>
<row>
  <PropertyName>DbpropIdentifierCase</PropertyName>
  <PropertyDescription>DbpropIdentifierCase</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>8</Value>
</row>
<row>
  <PropertyName>DbpropMaxIndexSize</PropertyName>
  <PropertyDescription>DbpropMaxIndexSize</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>0</Value>
</row>
<row>
  <PropertyName>DbpropMaxOpenChapters</PropertyName>
  <PropertyDescription>DbpropMaxOpenChapters</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>0</Value>
</row>
<row>
  <PropertyName>DbpropMaxRowSize</PropertyName>
  <PropertyDescription>DbpropMaxRowSize</PropertyDescription>
  <PropertyType>int</PropertyType>
```


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```
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>0</Value>
</row>
<row>
  <PropertyName>DbpropMaxRowSizeIncludeBlob</PropertyName>
  <PropertyDescription>DbpropMaxRowSizeIncludeBlob</PropertyDescription>
  <PropertyType>boolean</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>true</Value>
</row>
<row>
  <PropertyName>DbpropMaxTablesInSelect</PropertyName>
  <PropertyDescription>DbpropMaxTablesInSelect</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>1</Value>
</row>
<row>
  <PropertyName>DbpropMultiTableUpdate</PropertyName>
  <PropertyDescription>DbpropMultiTableUpdate</PropertyDescription>
  <PropertyType>boolean</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>false</Value>
</row>
<row>
  <PropertyName>DbpropNullCollation</PropertyName>
  <PropertyDescription>DbpropNullCollation</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>4</Value>
</row>
<row>
  <PropertyName>DbpropOrderByColumnsInSelect</PropertyName>
  <PropertyDescription>DbpropOrderByColumnsInSelect</PropertyDescription>
  <PropertyType>boolean</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>false</Value>
</row>
<row>
  <PropertyName>DbpropOutputParameterAvailable</PropertyName>
  <PropertyDescription>DbpropOutputParameterAvailable</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>1</Value>
</row>
<row>
  <PropertyName>DbpropPersistentIdType</PropertyName>
  <PropertyDescription>DbpropPersistentIdType</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>4</Value>
```


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```
</row>
<row>
  <PropertyName>DbpropPrepareAbortBehavior</PropertyName>
  <PropertyDescription>DbpropPrepareAbortBehavior</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>1</Value>
</row>
<row>
  <PropertyName>DbpropPrepareCommitBehavior</PropertyName>
  <PropertyDescription>DbpropPrepareCommitBehavior</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>1</Value>
</row>
<row>
  <PropertyName>DbpropProcedureTerm</PropertyName>
  <PropertyDescription>DbpropProcedureTerm</PropertyDescription>
  <PropertyType>string</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>Calculated member</Value>
</row>
<row>
  <PropertyName>DbpropQuotedIdentifierCase</PropertyName>
  <PropertyDescription>DbpropQuotedIdentifierCase</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>8</Value>
</row>
<row>
  <PropertyName>DbpropSchemaUsage</PropertyName>
  <PropertyDescription>DbpropSchemaUsage</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>0</Value>
</row>
<row>
  <PropertyName>DbpropSqlSupport</PropertyName>
  <PropertyDescription>DbpropSqlSupport</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>512</Value>
</row>
<row>
  <PropertyName>DbpropSubqueries</PropertyName>
  <PropertyDescription>DbpropSubqueries</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>0</Value>
</row>
<row>
  <PropertyName>DbpropSupportedTxnDdl</PropertyName>
```


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```
  <PropertyDescription>DbpropSupportedTxnDdl</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>0</Value>
</row>
<row>
  <PropertyName>DbpropSupportedTxnIsoLevels</PropertyName>
  <PropertyDescription>DbpropSupportedTxnIsoLevels</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>4096</Value>
</row>
<row>
  <PropertyName>DbpropSupportedTxnIsoRetain</PropertyName>
  <PropertyDescription>DbpropSupportedTxnIsoRetain</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>292</Value>
</row>
<row>
  <PropertyName>DbpropTableTerm</PropertyName>
  <PropertyDescription>DbpropTableTerm</PropertyDescription>
  <PropertyType>string</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>Cube</Value>
</row>
<row>
  <PropertyName>MdpropAggregateCellUpdate</PropertyName>
  <PropertyDescription>MdpropAggregateCellUpdate</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>4</Value>
</row>
<row>
  <PropertyName>MdpropAxes</PropertyName>
  <PropertyDescription>MdpropAxes</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>2147483647</Value>
</row>
<row>
  <PropertyName>MdpropFlatteningSupport</PropertyName>
  <PropertyDescription>MdpropFlatteningSupport</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>1</Value>
</row>
<row>
  <PropertyName>MdpropMdxCaseSupport</PropertyName>
  <PropertyDescription>MdpropMdxCaseSupport</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
```


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```
  <IsRequired>false</IsRequired>
  <Value>3</Value>
</row>
<row>
  <PropertyName>MdpropMdxDescFlags</PropertyName>
  <PropertyDescription>MdpropMdxDescFlags</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>7</Value>
</row>
<row>
  <PropertyName>MdpropMdxDrillFunctions</PropertyName>
  <PropertyDescription>MdpropMdxDrillFunctions</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>7</Value>
</row>
<row>
  <PropertyName>MdpropMdxFormulas</PropertyName>
  <PropertyDescription>MdpropMdxFormulas</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>63</Value>
</row>
<row>
  <PropertyName>MdpropMdxJoinCubes</PropertyName>
  <PropertyDescription>MdpropMdxJoinCubes</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>1</Value>
</row>
<row>
  <PropertyName>MdpropMdxMemberFunctions</PropertyName>
  <PropertyDescription>MdpropMdxMemberFunctions</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>15</Value>
</row>
<row>
  <PropertyName>MdpropMdxNonMeasureExpressions</PropertyName>
  <PropertyDescription>MdpropMdxNonMeasureExpressions</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>0</Value>
</row>
<row>
  <PropertyName>MdpropMdxNumericFunctions</PropertyName>
  <PropertyDescription>MdpropMdxNumericFunctions</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>2047</Value>
</row>
```


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```
<row>
  <PropertyName>MdpropMdxObjQualification</PropertyName>
  <PropertyDescription>MdpropMdxObjQualification</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>496</Value>
</row>
<row>
  <PropertyName>MdpropMdxOuterReference</PropertyName>
  <PropertyDescription>MdpropMdxOuterReference</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>0</Value>
</row>
<row>
  <PropertyName>MdpropMdxQueryByProperty</PropertyName>
  <PropertyDescription>MdpropMdxQueryByProperty</PropertyDescription>
  <PropertyType>boolean</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>true</Value>
</row>
<row>
  <PropertyName>MdpropMdxRangeRowset</PropertyName>
  <PropertyDescription>MdpropMdxRangeRowset</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>4</Value>
</row>
<row>
  <PropertyName>MdpropMdxSetFunctions</PropertyName>
  <PropertyDescription>MdpropMdxSetFunctions</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>524287</Value>
</row>
<row>
  <PropertyName>MdpropMdxSlicer</PropertyName>
  <PropertyDescription>MdpropMdxSlicer</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>2</Value>
</row>
<row>
  <PropertyName>MdpropMdxStringCompop</PropertyName>
  <PropertyDescription>MdpropMdxStringCompop</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>15</Value>
</row>
<row>
  <PropertyName>MdpropNamedLevels</PropertyName>
  <PropertyDescription>MdpropNamedLevels</PropertyDescription>
```


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```
            <PropertyType>int</PropertyType>
            <PropertyAccessType>Read</PropertyAccessType>
            <IsRequired>false</IsRequired>
            <Value>3</Value>
          </row>
          <row>
            <PropertyName>MdpropMdxSubqueries</PropertyName>
            <PropertyDescription>MdpropMdxSubqueries</PropertyDescription>
            <PropertyType>int</PropertyType>
            <PropertyAccessType>Read</PropertyAccessType>
            <IsRequired>false</IsRequired>
            <Value>15</Value>
          </row>
          <row>
            <PropertyName>MdpropMdxNamedSets</PropertyName>
            <PropertyDescription>MdpropMdxNamedSets</PropertyDescription>
            <PropertyType>int</PropertyType>
            <PropertyAccessType>Read</PropertyAccessType>
            <IsRequired>false</IsRequired>
            <Value>15</Value>
          </row>
          <row>
            <PropertyName>MdpropMdxDdlExtensions</PropertyName>
            <PropertyDescription>MdpropMdxDdlExtensions</PropertyDescription>
            <PropertyType>int</PropertyType>
            <PropertyAccessType>Read</PropertyAccessType>
            <IsRequired>false</IsRequired>
            <Value>31</Value>
          </row>
        </root>
      </return>
    </DiscoverResponse>
  </soap:Body>
</soap:Envelope>
```

4.5 Client Obtains a List of Mining Models from the Server

In this example, the client sends a **DMSCHEMA_MINING_MODELS** request.

4.5.1 Client Sends Request

The client sends the following request:

```
<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Header>
    <XA:Session soap:mustUnderstand="1" SessionId="7F865E20-41AE-4156-8B38-B6D90D7134E8"
xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/" xmlns:XA="urn:schemas-microsoft-
com:xml-analysis" />
  </Header>
  <Body>
    <Discover xmlns="urn:schemas-microsoft-com:xml-analysis">
      <RequestType>DMSCHEMA_MINING_MODELS</RequestType>
      <Restrictions></Restrictions>
      <Properties><PropertyList><Content>Data</Content></PropertyList></Properties>
    </Discover>
  </Body>
```


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```
</Envelope>
```

4.5.2 Server Response

The server responds with a list of mining models:

```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <DiscoverResponse xmlns="urn:schemas-microsoft-com:xml-analysis"
xmlns:ddl2="http://schemas.microsoft.com/analysisservices/2003/engine/2"
xmlns:ddl2_2="http://schemas.microsoft.com/analysisservices/2003/engine/2/2"
xmlns:ddl100="http://schemas.microsoft.com/analysisservices/2008/engine/100"
xmlns:ddl100_100="http://schemas.microsoft.com/analysisservices/2008/engine/100/100">
      <return>
        <root xmlns="urn:schemas-microsoft-com:xml-analysis:rowset"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
          <row>
            <MODEL_CATALOG>AdventureWorks_SSAS</MODEL_CATALOG>
            <MODEL_NAME>Dim Product</MODEL_NAME>
            <MODEL_GUID>BC9EA693-C163-4609-89F2-FD38A498B43E</MODEL_GUID>
            <DESCRIPTION />
            <DATE_CREATED>2009-03-08T08:50:23</DATE_CREATED>
            <DATE_MODIFIED>2009-03-10T06:53:43</DATE_MODIFIED>
            <SERVICE_TYPE_ID>1</SERVICE_TYPE_ID>
            <SERVICE_NAME>Microsoft_Decision_Trees</SERVICE_NAME>
            <PREDICTION_ENTITY>Sales Amount</PREDICTION_ENTITY>
            <IS_POPULATED>true</IS_POPULATED>

<MINING_PARAMETERS>COMPLEXITY_PENALTY=0.5,MAXIMUM_INPUT_ATTRIBUTES=255,MAXIMUM_OUTPUT_ATTRIBU
TES=255,MINIMUM_SUPPORT=10,SCORE_METHOD=4,SPLIT_METHOD=3,FORCE_REGRESSOR=</MINING_PARAMETERS>
            <MINING_STRUCTURE>Dim Product Mining</MINING_STRUCTURE>
            <LAST_PROCESSED>2009-03-08T08:50:33</LAST_PROCESSED>
            <MSOLAP_IS_DRILLTHROUGH_ENABLED>true</MSOLAP_IS_DRILLTHROUGH_ENABLED>
            <FILTER />
            <TRAINING_SET_SIZE>354</TRAINING_SET_SIZE>
          </row>
        </root>
      </return>
    </DiscoverResponse>
  </soap:Body>
</soap:Envelope>
```

4.6 Client Obtains a List of Traces from the Server

In this example, the client sends a **DISCOVER_TRACES** request.

4.6.1 Client Sends Request

The client sends the following request:

```
<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Header>
```


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```
    <XA:Session soap:mustUnderstand="1" SessionId="65F72973-83ED-4F34-9C55-EA577E7BFBD8"
xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/" xmlns:XA="urn:schemas-microsoft-
com:xml-analysis" />
  </Header>
  <Body>
    <Discover xmlns="urn:schemas-microsoft-com:xml-analysis">
      <RequestType>DISCOVER_TRACES</RequestType>
      <Restrictions></Restrictions>
      <Properties>
        <PropertyList>
          <Content>Data</Content>
        </PropertyList>
      </Properties>
    </Discover>
  </Body>
</Envelope>
```

4.6.2 Server Response

The server responds with a list of traces:

```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <DiscoverResponse xmlns="urn:schemas-microsoft-com:xml-analysis"
xmlns:ddl2="http://schemas.microsoft.com/analysisservices/2003/engine/2"
xmlns:ddl2_2="http://schemas.microsoft.com/analysisservices/2003/engine/2/2"
xmlns:ddl100="http://schemas.microsoft.com/analysisservices/2008/engine/100"
xmlns:ddl100_100="http://schemas.microsoft.com/analysisservices/2008/engine/100/100">
      <return>
        <root xmlns="urn:schemas-microsoft-com:xml-analysis:rowset"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
          <row>
            <TraceID>FlightRecorder</TraceID>
            <TraceName>FlightRecorder</TraceName>
            <LogFileName>\\?\C:\Program Files\Microsoft SQL
Server\MSAS10.MSSQLSERVER\OLAP\Log\FlightRecorderCurrent.trc</LogFileName>
            <LogFileSize>10485760</LogFileSize>
            <LogFileRollover>true</LogFileRollover>
            <AutoRestart>false</AutoRestart>
            <CreationTime>2009-03-16T02:13:25</CreationTime>
          </row>
        </root>
      </return>
    </DiscoverResponse>
  </soap:Body>
</soap:Envelope>
```

4.7 Client Obtains a List of Connections from the Server

In this example, the client sends a **DISCOVER_CONNECTIONS** request.

4.7.1 Client Sends Request

The client sends the following request:

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```
<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Header>
    <XA:Session soap:mustUnderstand="1" SessionId="09157399-DA20-4FB7-A316-E7EC153F3BE6"
xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/" xmlns:XA="urn:schemas-microsoft-
com:xml-analysis" />
  </Header>
  <Body>
    <Discover xmlns="urn:schemas-microsoft-com:xml-analysis">
      <RequestType>DISCOVER_CONNECTIONS</RequestType>
      <Restrictions></Restrictions>
      <Properties>
        <PropertyList>
          <Content>Data</Content>
        </PropertyList>
      </Properties>
    </Discover>
  </Body>
</Envelope>
```

4.7.2 Server Response

The server responds with a list of connections.

```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <DiscoverResponse xmlns="urn:schemas-microsoft-com:xml-analysis"
xmlns:ddl2="http://schemas.microsoft.com/analysisservices/2003/engine/2"
xmlns:ddl2_2="http://schemas.microsoft.com/analysisservices/2003/engine/2/2"
xmlns:ddl100="http://schemas.microsoft.com/analysisservices/2008/engine/100"
xmlns:ddl100_100="http://schemas.microsoft.com/analysisservices/2008/engine/100/100">
      <return>
        <root xmlns="urn:schemas-microsoft-com:xml-analysis:rowset"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
          <row>
            <CONNECTION_ID>2</CONNECTION_ID>
            <CONNECTION_USER_NAME>NY-SQL-02\Student</CONNECTION_USER_NAME>
            <CONNECTION_HOST_NAME>[::1]:49168</CONNECTION_HOST_NAME>
            <CONNECTION_HOST_APPLICATION>Microsoft SQL Server Management Studio -
Query</CONNECTION_HOST_APPLICATION>
            <CONNECTION_START_TIME>2009-03-16T02:21:46</CONNECTION_START_TIME>
            <CONNECTION_ELAPSED_TIME_MS>6520603</CONNECTION_ELAPSED_TIME_MS>
            <CONNECTION_LAST_COMMAND_START_TIME>2009-03-
16T03:32:30</CONNECTION_LAST_COMMAND_START_TIME>
            <CONNECTION_LAST_COMMAND_END_TIME>2009-03-
16T03:32:30</CONNECTION_LAST_COMMAND_END_TIME>

<CONNECTION_LAST_COMMAND_ELAPSED_TIME_MS>3</CONNECTION_LAST_COMMAND_ELAPSED_TIME_MS>
            <CONNECTION_IDLE_TIME_MS>2276705</CONNECTION_IDLE_TIME_MS>
            <CONNECTION_BYTES_SENT>11036</CONNECTION_BYTES_SENT>
            <CONNECTION_DATA_BYTES_SENT>22252</CONNECTION_DATA_BYTES_SENT>
            <CONNECTION_BYTES_RECEIVED>12416</CONNECTION_BYTES_RECEIVED>
            <CONNECTION_DATA_BYTES_RECEIVED>12416</CONNECTION_DATA_BYTES_RECEIVED>
          </row>
          <row>
            <CONNECTION_ID>5</CONNECTION_ID>
```


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```
            <CONNECTION_USER_NAME>NY-SQL-02\Student</CONNECTION_USER_NAME>
            <CONNECTION_HOST_NAME>[::1]:49169</CONNECTION_HOST_NAME>
            <CONNECTION_HOST_APPLICATION>Microsoft SQL Server Management Studio -
Query</CONNECTION_HOST_APPLICATION>
            <CONNECTION_START_TIME>2009-03-16T02:22:02</CONNECTION_START_TIME>
            <CONNECTION_ELAPSED_TIME_MS>6504734</CONNECTION_ELAPSED_TIME_MS>
            <CONNECTION_LAST_COMMAND_START_TIME>2009-03-
16T04:10:26</CONNECTION_LAST_COMMAND_START_TIME>
            <CONNECTION_LAST_COMMAND_END_TIME>2009-03-
16T04:10:26</CONNECTION_LAST_COMMAND_END_TIME>

<CONNECTION_LAST_COMMAND_ELAPSED_TIME_MS>5</CONNECTION_LAST_COMMAND_ELAPSED_TIME_MS>
            <CONNECTION_IDLE_TIME_MS>764</CONNECTION_IDLE_TIME_MS>
            <CONNECTION_BYTES_SENT>39804</CONNECTION_BYTES_SENT>
            <CONNECTION_DATA_BYTES_SENT>84863</CONNECTION_DATA_BYTES_SENT>
            <CONNECTION_BYTES_RECEIVED>43388</CONNECTION_BYTES_RECEIVED>
            <CONNECTION_DATA_BYTES_RECEIVED>43388</CONNECTION_DATA_BYTES_RECEIVED>
          </row>
          <row>
            <CONNECTION_ID>6</CONNECTION_ID>
            <CONNECTION_USER_NAME>NY-SQL-02\Student</CONNECTION_USER_NAME>
            <CONNECTION_HOST_NAME>[::1]:49173</CONNECTION_HOST_NAME>
            <CONNECTION_HOST_APPLICATION>Microsoft SQL Server Management Studio -
Query</CONNECTION_HOST_APPLICATION>
            <CONNECTION_START_TIME>2009-03-16T02:22:20</CONNECTION_START_TIME>
            <CONNECTION_ELAPSED_TIME_MS>6486485</CONNECTION_ELAPSED_TIME_MS>
            <CONNECTION_LAST_COMMAND_START_TIME>2009-03-
16T04:09:44</CONNECTION_LAST_COMMAND_START_TIME>
            <CONNECTION_LAST_COMMAND_END_TIME>2009-03-
16T04:09:44</CONNECTION_LAST_COMMAND_END_TIME>

<CONNECTION_LAST_COMMAND_ELAPSED_TIME_MS>3</CONNECTION_LAST_COMMAND_ELAPSED_TIME_MS>
            <CONNECTION_IDLE_TIME_MS>43001</CONNECTION_IDLE_TIME_MS>
            <CONNECTION_BYTES_SENT>26908</CONNECTION_BYTES_SENT>
            <CONNECTION_DATA_BYTES_SENT>56796</CONNECTION_DATA_BYTES_SENT>
            <CONNECTION_BYTES_RECEIVED>29504</CONNECTION_BYTES_RECEIVED>
            <CONNECTION_DATA_BYTES_RECEIVED>29504</CONNECTION_DATA_BYTES_RECEIVED>
          </row>
          <row>
            <CONNECTION_ID>142</CONNECTION_ID>
            <CONNECTION_USER_NAME>NY-SQL-02\Student</CONNECTION_USER_NAME>
            <CONNECTION_HOST_NAME>[::1]:49319</CONNECTION_HOST_NAME>
            <CONNECTION_HOST_APPLICATION>Microsoft SQL Server Management Studio -
Query</CONNECTION_HOST_APPLICATION>
            <CONNECTION_START_TIME>2009-03-16T04:10:26</CONNECTION_START_TIME>
            <CONNECTION_ELAPSED_TIME_MS>651</CONNECTION_ELAPSED_TIME_MS>
            <CONNECTION_LAST_COMMAND_START_TIME>2009-03-
16T04:10:26</CONNECTION_LAST_COMMAND_START_TIME>
            <CONNECTION_LAST_COMMAND_END_TIME>2009-03-
16T04:10:26</CONNECTION_LAST_COMMAND_END_TIME>

<CONNECTION_LAST_COMMAND_ELAPSED_TIME_MS>23</CONNECTION_LAST_COMMAND_ELAPSED_TIME_MS>
            <CONNECTION_IDLE_TIME_MS>605</CONNECTION_IDLE_TIME_MS>
            <CONNECTION_BYTES_SENT>6444</CONNECTION_BYTES_SENT>
            <CONNECTION_DATA_BYTES_SENT>28584</CONNECTION_DATA_BYTES_SENT>
            <CONNECTION_BYTES_RECEIVED>2628</CONNECTION_BYTES_RECEIVED>
            <CONNECTION_DATA_BYTES_RECEIVED>2628</CONNECTION_DATA_BYTES_RECEIVED>
          </row>
          <row>
            <CONNECTION_ID>141</CONNECTION_ID>
```


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```
            <CONNECTION_USER_NAME>NY-SQL-02\Student</CONNECTION_USER_NAME>
            <CONNECTION_HOST_NAME>[::1]:49320</CONNECTION_HOST_NAME>
            <CONNECTION_HOST_APPLICATION>Microsoft SQL Server Management Studio -
Query</CONNECTION_HOST_APPLICATION>
            <CONNECTION_START_TIME>2009-03-16T04:10:26</CONNECTION_START_TIME>
            <CONNECTION_ELAPSED_TIME_MS>573</CONNECTION_ELAPSED_TIME_MS>
            <CONNECTION_LAST_COMMAND_START_TIME>2009-03-
16T04:10:26</CONNECTION_LAST_COMMAND_START_TIME>
            <CONNECTION_LAST_COMMAND_END_TIME>2009-03-
16T04:10:26</CONNECTION_LAST_COMMAND_END_TIME>

<CONNECTION_LAST_COMMAND_ELAPSED_TIME_MS>562</CONNECTION_LAST_COMMAND_ELAPSED_TIME_MS>
            <CONNECTION_IDLE_TIME_MS>0</CONNECTION_IDLE_TIME_MS>
            <CONNECTION_BYTES_SENT>1980</CONNECTION_BYTES_SENT>
            <CONNECTION_DATA_BYTES_SENT>7949</CONNECTION_DATA_BYTES_SENT>
            <CONNECTION_BYTES_RECEIVED>1640</CONNECTION_BYTES_RECEIVED>
            <CONNECTION_DATA_BYTES_RECEIVED>1640</CONNECTION_DATA_BYTES_RECEIVED>
          </row>
          <row>
            <CONNECTION_ID>143</CONNECTION_ID>
            <CONNECTION_USER_NAME>NY-SQL-02\Student</CONNECTION_USER_NAME>
            <CONNECTION_HOST_NAME>[::1]:49321</CONNECTION_HOST_NAME>
            <CONNECTION_HOST_APPLICATION />
            <CONNECTION_START_TIME>2009-03-16T04:10:27</CONNECTION_START_TIME>
            <CONNECTION_ELAPSED_TIME_MS>25</CONNECTION_ELAPSED_TIME_MS>
            <CONNECTION_LAST_COMMAND_START_TIME>2009-03-
16T04:10:27</CONNECTION_LAST_COMMAND_START_TIME>
            <CONNECTION_LAST_COMMAND_END_TIME>2009-03-
16T04:10:27</CONNECTION_LAST_COMMAND_END_TIME>

<CONNECTION_LAST_COMMAND_ELAPSED_TIME_MS>2</CONNECTION_LAST_COMMAND_ELAPSED_TIME_MS>
            <CONNECTION_IDLE_TIME_MS>0</CONNECTION_IDLE_TIME_MS>
            <CONNECTION_BYTES_SENT>780</CONNECTION_BYTES_SENT>
            <CONNECTION_DATA_BYTES_SENT>250</CONNECTION_DATA_BYTES_SENT>
            <CONNECTION_BYTES_RECEIVED>1412</CONNECTION_BYTES_RECEIVED>
            <CONNECTION_DATA_BYTES_RECEIVED>1412</CONNECTION_DATA_BYTES_RECEIVED>
          </row>
        </root>
      </return>
    </DiscoverResponse>
  </soap:Body>
</soap:Envelope>
```

4.8 Client Obtains a List of Locks from the Server

In this example, the client sends a **DISCOVER_LOCKS** request.

4.8.1 Client Sends Request

The client sends the following request:

```
<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Header>
    <XA:Session soap:mustUnderstand="1" SessionId="34EDB056-482C-48FE-B4A1-720CB76301B5"
xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/" xmlns:XA="urn:schemas-microsoft-
com:xml-analysis" />
  </Header>
```


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```
  <Body>
    <Discover xmlns="urn:schemas-microsoft-com:xml-analysis">
      <RequestType>DISCOVER_LOCKS</RequestType>
      <Restrictions></Restrictions>
      <Properties><PropertyList><Content>Data</Content></PropertyList></Properties>
    </Discover>
  </Body>
</Envelope>
```

4.8.2 Server Response

The server responds with a list of locks:

```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <DiscoverResponse xmlns="urn:schemas-microsoft-com:xml-analysis"
xmlns:ddl2="http://schemas.microsoft.com/analysisservices/2003/engine/2"
xmlns:ddl2_2="http://schemas.microsoft.com/analysisservices/2003/engine/2/2"
xmlns:ddl100="http://schemas.microsoft.com/analysisservices/2008/engine/100"
xmlns:ddl100_100="http://schemas.microsoft.com/analysisservices/2008/engine/100/100">
      <return>
        <root xmlns="urn:schemas-microsoft-com:xml-analysis:rowset"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
          <row>
            <SPID>1082</SPID>
            <LOCK_ID>BF4953EF-C616-4400-93CC-E025C774651B</LOCK_ID>
            <LOCK_TRANSACTION_ID>D140962E-4660-4C98-BB6D-9F32E1F32A64</LOCK_TRANSACTION_ID>
            <LOCK_OBJECT_ID>
              <Object>
                <DatabaseID>Adventure_SSAS</DatabaseID>
                <CubeID>Dim Product Mining ~MC</CubeID>
              </Object>
            </LOCK_OBJECT_ID>
            <LOCK_STATUS>1</LOCK_STATUS>
            <LOCK_TYPE>4</LOCK_TYPE>
            <LOCK_CREATION_TIME>2009-04-13T17:39:47</LOCK_CREATION_TIME>
            <LOCK_GRANT_TIME>2009-04-13T17:39:47</LOCK_GRANT_TIME>
          </row>
          <row>
            <SPID>1082</SPID>
            <LOCK_ID>0277E1A7-0685-4741-996E-A7AEE9ECF868</LOCK_ID>
            <LOCK_TRANSACTION_ID>D140962E-4660-4C98-BB6D-9F32E1F32A64</LOCK_TRANSACTION_ID>
            <LOCK_OBJECT_ID>
              <Object>
                <DatabaseID>Adventure_SSAS</DatabaseID>
                <DimensionID>Dim Product</DimensionID>
              </Object>
            </LOCK_OBJECT_ID>
            <LOCK_STATUS>1</LOCK_STATUS>
            <LOCK_TYPE>4</LOCK_TYPE>
            <LOCK_CREATION_TIME>2009-04-13T17:39:47</LOCK_CREATION_TIME>
            <LOCK_GRANT_TIME>2009-04-13T17:39:47</LOCK_GRANT_TIME>
          </row>
          <row>
            <SPID>1082</SPID>
            <LOCK_ID>0B6E6372-6274-4F9F-9FD1-D8BB73AFE074</LOCK_ID>
```


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```
  <LOCK_TRANSACTION_ID>D140962E-4660-4C98-BB6D-9F32E1F32A64</LOCK_TRANSACTION_ID>
  <LOCK_OBJECT_ID>
    <Object>
      <DatabaseID>Adventure_SSAS</DatabaseID>
      <DimensionID>Dim Sales Territory</DimensionID>
    </Object>
  </LOCK_OBJECT_ID>
  <LOCK_STATUS>1</LOCK_STATUS>
  <LOCK_TYPE>4</LOCK_TYPE>
  <LOCK_CREATION_TIME>2009-04-13T17:39:47</LOCK_CREATION_TIME>
  <LOCK_GRANT_TIME>2009-04-13T17:39:47</LOCK_GRANT_TIME>
</row>
<row>
  <SPID>1082</SPID>
  <LOCK_ID>EDC8CFCA-3EEA-4977-9D0E-95F1BFE8465E</LOCK_ID>
  <LOCK_TRANSACTION_ID>D140962E-4660-4C98-BB6D-9F32E1F32A64</LOCK_TRANSACTION_ID>
  <LOCK_OBJECT_ID>
    <Object>
      <DatabaseID>Adventure_SSAS</DatabaseID>
      <CubeID>Dim Product Mining ~MC</CubeID>
      <MeasureGroupID>~CaseDetail ~MG</MeasureGroupID>
      <PartitionID>~CaseDetail ~MG</PartitionID>
    </Object>
  </LOCK_OBJECT_ID>
  <LOCK_STATUS>1</LOCK_STATUS>
  <LOCK_TYPE>4</LOCK_TYPE>
  <LOCK_CREATION_TIME>2009-04-13T17:39:47</LOCK_CREATION_TIME>
  <LOCK_GRANT_TIME>2009-04-13T17:39:47</LOCK_GRANT_TIME>
</row>
<row>
  <SPID>1082</SPID>
  <LOCK_ID>B852030E-51BE-4DC5-AC0E-A73188AE50F3</LOCK_ID>
  <LOCK_TRANSACTION_ID>D140962E-4660-4C98-BB6D-9F32E1F32A64</LOCK_TRANSACTION_ID>
  <LOCK_OBJECT_ID>
    <Object>
      <DatabaseID>Adventure_SSAS</DatabaseID>
      <DataSourceID>dsAdventureWorksDW2008</DataSourceID>
    </Object>
  </LOCK_OBJECT_ID>
  <LOCK_STATUS>1</LOCK_STATUS>
  <LOCK_TYPE>2</LOCK_TYPE>
  <LOCK_CREATION_TIME>2009-04-13T17:39:47</LOCK_CREATION_TIME>
  <LOCK_GRANT_TIME>2009-04-13T17:39:47</LOCK_GRANT_TIME>
</row>
<row>
  <SPID>1082</SPID>
  <LOCK_ID>B0402B00-17B2-4D0B-940D-C56B247ED3CF</LOCK_ID>
  <LOCK_TRANSACTION_ID>D140962E-4660-4C98-BB6D-9F32E1F32A64</LOCK_TRANSACTION_ID>
  <LOCK_OBJECT_ID>
    <Object>
      <DatabaseID>Adventure_SSAS</DatabaseID>
      <DimensionID>Dim Customer</DimensionID>
    </Object>
  </LOCK_OBJECT_ID>
  <LOCK_STATUS>1</LOCK_STATUS>
  <LOCK_TYPE>4</LOCK_TYPE>
  <LOCK_CREATION_TIME>2009-04-13T17:39:47</LOCK_CREATION_TIME>
  <LOCK_GRANT_TIME>2009-04-13T17:39:47</LOCK_GRANT_TIME>
</row>
```


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```
<row>
  <SPID>1082</SPID>
  <LOCK_ID>B0BA172A-83F2-408F-BC41-A5A476869E85</LOCK_ID>
  <LOCK_TRANSACTION_ID>D140962E-4660-4C98-BB6D-9F32E1F32A64</LOCK_TRANSACTION_ID>
  <LOCK_OBJECT_ID>
    <Object>
      <DatabaseID>Adventure_SSAS</DatabaseID>
      <CubeID>AdventureWorksDW2008Cube</CubeID>
      <MeasureGroupID>Fact Internet Sales</MeasureGroupID>
      <PartitionID>Fact Internet Sales</PartitionID>
    </Object>
  </LOCK_OBJECT_ID>
  <LOCK_STATUS>1</LOCK_STATUS>
  <LOCK_TYPE>4</LOCK_TYPE>
  <LOCK_CREATION_TIME>2009-04-13T17:39:47</LOCK_CREATION_TIME>
  <LOCK_GRANT_TIME>2009-04-13T17:39:47</LOCK_GRANT_TIME>
</row>
<row>
  <SPID>1082</SPID>
  <LOCK_ID>AD3FA52F-8AD3-401E-AE5C-B69AC764C5BD</LOCK_ID>
  <LOCK_TRANSACTION_ID>D140962E-4660-4C98-BB6D-9F32E1F32A64</LOCK_TRANSACTION_ID>
  <LOCK_OBJECT_ID>
    <Object>
      <DatabaseID>Adventure_SSAS</DatabaseID>
    </Object>
  </LOCK_OBJECT_ID>
  <LOCK_STATUS>1</LOCK_STATUS>
  <LOCK_TYPE>4</LOCK_TYPE>
  <LOCK_CREATION_TIME>2009-04-13T17:39:47</LOCK_CREATION_TIME>
  <LOCK_GRANT_TIME>2009-04-13T17:39:47</LOCK_GRANT_TIME>
</row>
<row>
  <SPID>1082</SPID>
  <LOCK_ID>F5479F08-CE88-4FD9-B2AF-6D466939DAAA</LOCK_ID>
  <LOCK_TRANSACTION_ID>D140962E-4660-4C98-BB6D-9F32E1F32A64</LOCK_TRANSACTION_ID>
  <LOCK_OBJECT_ID>
    <Object>
      <DatabaseID>Adventure_SSAS</DatabaseID>
      <CubeID>Dim Product Mining ~MC</CubeID>
      <MeasureGroupID>~CaseDetail ~MG</MeasureGroupID>
    </Object>
  </LOCK_OBJECT_ID>
  <LOCK_STATUS>1</LOCK_STATUS>
  <LOCK_TYPE>4</LOCK_TYPE>
  <LOCK_CREATION_TIME>2009-04-13T17:39:47</LOCK_CREATION_TIME>
  <LOCK_GRANT_TIME>2009-04-13T17:39:47</LOCK_GRANT_TIME>
</row>
<row>
  <SPID>1082</SPID>
  <LOCK_ID>A8E932B1-ED39-41FF-8020-9AFF95768129</LOCK_ID>
  <LOCK_TRANSACTION_ID>D140962E-4660-4C98-BB6D-9F32E1F32A64</LOCK_TRANSACTION_ID>
  <LOCK_OBJECT_ID>
    <Object>
      <DatabaseID>Adventure_SSAS</DatabaseID>
      <CubeID>AdventureWorksDW2008Cube</CubeID>
    </Object>
  </LOCK_OBJECT_ID>
  <LOCK_STATUS>1</LOCK_STATUS>
  <LOCK_TYPE>4</LOCK_TYPE>
```


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```
  <LOCK_CREATION_TIME>2009-04-13T17:39:47</LOCK_CREATION_TIME>
  <LOCK_GRANT_TIME>2009-04-13T17:39:47</LOCK_GRANT_TIME>
</row>
<row>
  <SPID>1082</SPID>
  <LOCK_ID>21FE086C-52E8-4090-A310-8943C3B1A554</LOCK_ID>
  <LOCK_TRANSACTION_ID>D140962E-4660-4C98-BB6D-9F32E1F32A64</LOCK_TRANSACTION_ID>
  <LOCK_OBJECT_ID>
    <Object>
      <DatabaseID>Adventure_SSAS</DatabaseID>
      <CubeID>AdventureWorksDW2008Cube</CubeID>
      <MeasureGroupID>Fact Internet Sales</MeasureGroupID>
      <AggregationDesignID>AggregationDesign</AggregationDesignID>
    </Object>
  </LOCK_OBJECT_ID>
  <LOCK_STATUS>1</LOCK_STATUS>
  <LOCK_TYPE>2</LOCK_TYPE>
  <LOCK_CREATION_TIME>2009-04-13T17:39:47</LOCK_CREATION_TIME>
  <LOCK_GRANT_TIME>2009-04-13T17:39:47</LOCK_GRANT_TIME>
</row>
<row>
  <SPID>1082</SPID>
  <LOCK_ID>FDA4A3D2-93EE-4794-8408-15DFA4616EAD</LOCK_ID>
  <LOCK_TRANSACTION_ID>D140962E-4660-4C98-BB6D-9F32E1F32A64</LOCK_TRANSACTION_ID>
  <LOCK_OBJECT_ID>
    <Object>
      <DatabaseID>Adventure_SSAS</DatabaseID>
      <MiningStructureID>Dim Product Mining</MiningStructureID>
    </Object>
  </LOCK_OBJECT_ID>
  <LOCK_STATUS>1</LOCK_STATUS>
  <LOCK_TYPE>4</LOCK_TYPE>
  <LOCK_CREATION_TIME>2009-04-13T17:39:47</LOCK_CREATION_TIME>
  <LOCK_GRANT_TIME>2009-04-13T17:39:47</LOCK_GRANT_TIME>
</row>
<row>
  <SPID>1082</SPID>
  <LOCK_ID>85B5F285-1DE1-4278-B5BD-F648624D414F</LOCK_ID>
  <LOCK_TRANSACTION_ID>D140962E-4660-4C98-BB6D-9F32E1F32A64</LOCK_TRANSACTION_ID>
  <LOCK_OBJECT_ID>
    <Object>
      <DatabaseID>Adventure_SSAS</DatabaseID>
      <CubeID>AdventureWorksDW2008Cube</CubeID>
      <MeasureGroupID>Fact Internet Sales</MeasureGroupID>
    </Object>
  </LOCK_OBJECT_ID>
  <LOCK_STATUS>1</LOCK_STATUS>
  <LOCK_TYPE>4</LOCK_TYPE>
  <LOCK_CREATION_TIME>2009-04-13T17:39:47</LOCK_CREATION_TIME>
  <LOCK_GRANT_TIME>2009-04-13T17:39:47</LOCK_GRANT_TIME>
</row>
<row>
  <SPID>1082</SPID>
  <LOCK_ID>216C80EC-0DA2-4A97-8664-5B618052D3C5</LOCK_ID>
  <LOCK_TRANSACTION_ID>D140962E-4660-4C98-BB6D-9F32E1F32A64</LOCK_TRANSACTION_ID>
  <LOCK_OBJECT_ID>
    <Object>
      <DatabaseID>Adventure_SSAS</DatabaseID>
      <MiningModelID>Dim Product</MiningModelID>
```


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```
            <MiningStructureID>Dim Product Mining</MiningStructureID>
          </Object>
        </LOCK_OBJECT_ID>
        <LOCK_STATUS>1</LOCK_STATUS>
        <LOCK_TYPE>4</LOCK_TYPE>
        <LOCK_CREATION_TIME>2009-04-13T17:39:47</LOCK_CREATION_TIME>
        <LOCK_GRANT_TIME>2009-04-13T17:39:47</LOCK_GRANT_TIME>
      </row>
      <row>
        <SPID>1082</SPID>
        <LOCK_ID>2F87CDAE-51F3-4628-B30E-0E8107FAFF69</LOCK_ID>
        <LOCK_TRANSACTION_ID>D140962E-4660-4C98-BB6D-9F32E1F32A64</LOCK_TRANSACTION_ID>
        <LOCK_OBJECT_ID>
          <Object>
            <DatabaseID>Adventure_SSAS</DatabaseID>
            <DataSourceViewID>dsvAdventureWorksDW2008</DataSourceViewID>
          </Object>
        </LOCK_OBJECT_ID>
        <LOCK_STATUS>1</LOCK_STATUS>
        <LOCK_TYPE>2</LOCK_TYPE>
        <LOCK_CREATION_TIME>2009-04-13T17:39:47</LOCK_CREATION_TIME>
        <LOCK_GRANT_TIME>2009-04-13T17:39:47</LOCK_GRANT_TIME>
      </row>
      <row>
        <SPID>1082</SPID>
        <LOCK_ID>32D7E6AC-4DD1-4A53-B60A-7C9C6D54AA41</LOCK_ID>
        <LOCK_TRANSACTION_ID>D140962E-4660-4C98-BB6D-9F32E1F32A64</LOCK_TRANSACTION_ID>
        <LOCK_OBJECT_ID>
          <Object>
            <DatabaseID>Adventure_SSAS</DatabaseID>
            <DimensionID>Dim Date</DimensionID>
          </Object>
        </LOCK_OBJECT_ID>
        <LOCK_STATUS>1</LOCK_STATUS>
        <LOCK_TYPE>4</LOCK_TYPE>
        <LOCK_CREATION_TIME>2009-04-13T17:39:47</LOCK_CREATION_TIME>
        <LOCK_GRANT_TIME>2009-04-13T17:39:47</LOCK_GRANT_TIME>
      </row>
    </root>
  </return>
</DiscoverResponse>
</soap:Body>
</soap:Envelope>
```

4.9 Client Obtains a List of Commands from the Server

In this example, the client sends a **DISCOVER_COMMANDS** request.

4.9.1 Client Sends Request

The client sends the following request:

```
<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Header>
```


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```
    <XA:Session soap:mustUnderstand="1" SessionId="93B50BA3-307A-40D4-8E2D-E3184EFD19A1"
xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/" xmlns:XA="urn:schemas-microsoft-
com:xml-analysis" />
  </Header>
  <Body>
    <Discover xmlns="urn:schemas-microsoft-com:xml-analysis">
      <RequestType>DISCOVER_COMMANDS</RequestType>
      <Restrictions></Restrictions>
      <Properties>
        <PropertyList>
          <Content>Data</Content>
        </PropertyList>
      </Properties>
    </Discover>
  </Body>
</Envelope>
```

4.9.2 Server Response

The server responds with a list of commands:

```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <DiscoverResponse xmlns="urn:schemas-microsoft-com:xml-analysis"
xmlns:ddl2="http://schemas.microsoft.com/analysisservices/2003/engine/2"
xmlns:ddl2_2="http://schemas.microsoft.com/analysisservices/2003/engine/2/2"
xmlns:ddl100="http://schemas.microsoft.com/analysisservices/2008/engine/100"
xmlns:ddl100_100="http://schemas.microsoft.com/analysisservices/2008/engine/100/100">
      <return>
        <root xmlns="urn:schemas-microsoft-com:xml-analysis:rowset"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
          <row>
            <SESSION_SPID>143</SESSION_SPID>
            <SESSION_COMMAND_COUNT>32</SESSION_COMMAND_COUNT>
            <COMMAND_START_TIME>2009-03-16T04:21:05</COMMAND_START_TIME>
            <COMMAND_ELAPSED_TIME_MS>0</COMMAND_ELAPSED_TIME_MS>
            <COMMAND_CPU_TIME_MS>10</COMMAND_CPU_TIME_MS>
            <COMMAND_READS>0</COMMAND_READS>
            <COMMAND_READ_KB>0</COMMAND_READ_KB>
            <COMMAND_WRITES>0</COMMAND_WRITES>
            <COMMAND_WRITE_KB>0</COMMAND_WRITE_KB>
            <COMMAND_TEXT>DISCOVER_PROPERTIES</COMMAND_TEXT>
            <COMMAND_END_TIME>2009-03-16T04:21:05</COMMAND_END_TIME>
          </row>
          <row>
            <SESSION_SPID>148</SESSION_SPID>
            <SESSION_COMMAND_COUNT>86</SESSION_COMMAND_COUNT>
            <COMMAND_START_TIME>2009-03-16T04:31:02</COMMAND_START_TIME>
            <COMMAND_ELAPSED_TIME_MS>0</COMMAND_ELAPSED_TIME_MS>
            <COMMAND_CPU_TIME_MS>0</COMMAND_CPU_TIME_MS>
            <COMMAND_READS>0</COMMAND_READS>
            <COMMAND_READ_KB>0</COMMAND_READ_KB>
            <COMMAND_WRITES>0</COMMAND_WRITES>
            <COMMAND_WRITE_KB>0</COMMAND_WRITE_KB>
            <COMMAND_TEXT>DISCOVER_PROPERTIES</COMMAND_TEXT>
            <COMMAND_END_TIME>2009-03-16T04:31:02</COMMAND_END_TIME>
```


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```
            </row>
            <row>
              <SESSION_SPID>153</SESSION_SPID>
              <SESSION_COMMAND_COUNT>64</SESSION_COMMAND_COUNT>
              <COMMAND_START_TIME>2009-03-16T04:30:21</COMMAND_START_TIME>
              <COMMAND_ELAPSED_TIME_MS>0</COMMAND_ELAPSED_TIME_MS>
              <COMMAND_CPU_TIME_MS>10</COMMAND_CPU_TIME_MS>
              <COMMAND_READS>0</COMMAND_READS>
              <COMMAND_READ_KB>0</COMMAND_READ_KB>
              <COMMAND_WRITES>0</COMMAND_WRITES>
              <COMMAND_WRITE_KB>0</COMMAND_WRITE_KB>
              <COMMAND_TEXT>DISCOVER_PROPERTIES</COMMAND_TEXT>
              <COMMAND_END_TIME>2009-03-16T04:30:21</COMMAND_END_TIME>
            </row>
            <row>
              <SESSION_SPID>2089</SESSION_SPID>
              <SESSION_COMMAND_COUNT>2</SESSION_COMMAND_COUNT>
              <COMMAND_START_TIME>2009-03-16T04:31:02</COMMAND_START_TIME>
              <COMMAND_ELAPSED_TIME_MS>33</COMMAND_ELAPSED_TIME_MS>
              <COMMAND_CPU_TIME_MS>0</COMMAND_CPU_TIME_MS>
              <COMMAND_READS>0</COMMAND_READS>
              <COMMAND_READ_KB>0</COMMAND_READ_KB>
              <COMMAND_WRITES>0</COMMAND_WRITES>
              <COMMAND_WRITE_KB>0</COMMAND_WRITE_KB>
              <COMMAND_TEXT>DISCOVER_COMMANDS</COMMAND_TEXT>
            </row>
            <row>
              <SESSION_SPID>2099</SESSION_SPID>
              <SESSION_COMMAND_COUNT>3</SESSION_COMMAND_COUNT>
              <COMMAND_START_TIME>2009-03-16T04:31:02</COMMAND_START_TIME>
              <COMMAND_ELAPSED_TIME_MS>0</COMMAND_ELAPSED_TIME_MS>
              <COMMAND_CPU_TIME_MS>10</COMMAND_CPU_TIME_MS>
              <COMMAND_READS>0</COMMAND_READS>
              <COMMAND_READ_KB>0</COMMAND_READ_KB>
              <COMMAND_WRITES>0</COMMAND_WRITES>
              <COMMAND_WRITE_KB>0</COMMAND_WRITE_KB>
              <COMMAND_TEXT>&lt;Subscribe
xmlns="http://schemas.microsoft.com/analysisservices/2003/engine"/&gt;</COMMAND_TEXT>
              <COMMAND_END_TIME>2009-03-16T04:31:02</COMMAND_END_TIME>
            </row>
          </root>
        </return>
      </DiscoverResponse>
    </soap:Body>
  </soap:Envelope>
```

4.10 Client Obtains Trace Provider Information

In this example, the client sends a **DISCOVER_TRACE_DEFINITION_PROVIDERINFO** request. The results of this request represent the actual Trace Provider information sent from Microsoft® SQL Server® 2008 Analysis Services.

4.10.1 Client Sends Request

The client sends the following request:

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```
<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Body>
    <Discover xmlns="urn:schemas-microsoft-com:xml-analysis">
      <RequestType>DISCOVER_TRACE_DEFINITION_PROVIDERINFO</RequestType>
      <Restrictions>
        <RestrictionList></RestrictionList>
      </Restrictions>
      <Properties>
        <PropertyList>
          <Catalog>Adventure Works DW 2008</Catalog>
        </PropertyList>
      </Properties>
    </Discover>
  </Body>
</Envelope>
```

4.10.2 Server Response

The server responds with a list of trace providers:

```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <DiscoverResponse xmlns="urn:schemas-microsoft-com:xml-analysis"

xmlns:ddl2="http://schemas.microsoft.com/analysisservices/2003/engine/2"

xmlns:ddl2_2="http://schemas.microsoft.com/analysisservices/2003/engine/2/2"

xmlns:ddl100="http://schemas.microsoft.com/analysisservices/2008/engine/100"

xmlns:ddl100_100="http://schemas.microsoft.com/analysisservices/2008/engine/100/100">
      <return>
        <root xmlns="urn:schemas-microsoft-com:xml-analysis:rowset"
              xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
              xmlns:xsd="http://www.w3.org/2001/XMLSchema">
          <xsd:schema targetNamespace="urn:schemas-microsoft-com:xml-analysis:rowset"
                      xmlns:sql="urn:schemas-microsoft-com:xml-sql"
                      elementFormDefault="qualified">
            <xsd:element name="root">
              <xsd:complexType>
                <xsd:sequence minOccurs="0" maxOccurs="unbounded">
                  <xsd:element name="row" type="row" />
                </xsd:sequence>
              </xsd:complexType>
            </xsd:element>
            <xsd:simpleType name="uuid">
              <xsd:restriction base="xsd:string">
                <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}
                            -[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
              </xsd:restriction>
            </xsd:simpleType>
            <xsd:complexType name="xmlDocument">
              <xsd:sequence>
                <xsd:any />
              </xsd:sequence>
            </xsd:complexType>
            <xsd:complexType name="row">
```


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```
            <xsd:sequence>
              <xsd:element sql:field="Data" name="Data"
                           type="xsd:string" minOccurs="0" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:schema>
        <row>
          <Data>
            &lt;TRACEPROVIDER&gt;
            &lt;NAME&gt;Microsoft Analysis Services&lt;/NAME&gt;
            &lt;VERSION&gt;
            &lt;MAJOR&gt;10&lt;/MAJOR&gt;
            &lt;MINOR&gt;0&lt;/MINOR&gt;
            &lt;BUILDNUMBER&gt;1600&lt;/BUILDNUMBER&gt;
            &lt;/VERSION&gt;
            &lt;TYPE&gt;RTM&lt;/TYPE&gt;
            &lt;DESCRIPTION&gt;Normal trace definition&lt;/DESCRIPTION&gt;
            &lt;/TRACEPROVIDER&gt;
          </Data>
        </row>
      </root>
    </return>
  </DiscoverResponse>
 </soap:Body>
</soap:Envelope>
```

4.11 Client Obtains List of Trace Column Definitions

In this example, the client sends a **DISCOVER_TRACE_COLUMNS** request. The results of this request represent the actual Trace Columns supported by Microsoft® SQL Server® 2008 Analysis Services.

4.11.1 Client Sends Request

The client sends the following request:

```
<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Body>
    <Discover xmlns="urn:schemas-microsoft-com:xml-analysis">
      <RequestType>DISCOVER_TRACE_COLUMNS</RequestType>
      <Restrictions>
        <RestrictionList></RestrictionList>
      </Restrictions>
      <Properties>
        <PropertyList>
          <Catalog>Adventure Works DW 2008</Catalog>
        </PropertyList>
      </Properties>
    </Discover>
  </Body>
</Envelope>
```


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4.11.2 Server Response

The server responds with a list of trace column definitions:

```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <DiscoverResponse xmlns="urn:schemas-microsoft-com:xml-analysis"

xmlns:ddl2="http://schemas.microsoft.com/analysisservices/2003/engine/2"

xmlns:ddl2_2="http://schemas.microsoft.com/analysisservices/2003/engine/2/2"

xmlns:ddl100="http://schemas.microsoft.com/analysisservices/2008/engine/100"

xmlns:ddl100_100="http://schemas.microsoft.com/analysisservices/2008/engine/100/100">
      <return>
        <root xmlns="urn:schemas-microsoft-com:xml-analysis:rowset"
              xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
              xmlns:xsd="http://www.w3.org/2001/XMLSchema">
          <xsd:schema targetNamespace="urn:schemas-microsoft-com:xml-analysis:rowset"
                      xmlns:sql="urn:schemas-microsoft-com:xml-sql"
                      elementFormDefault="qualified">
            <xsd:element name="root">
              <xsd:complexType>
                <xsd:sequence minOccurs="0" maxOccurs="unbounded">
                  <xsd:element name="row" type="row" />
                </xsd:sequence>
              </xsd:complexType>
            </xsd:element>
            <xsd:simpleType name="uuid">
              <xsd:restriction base="xsd:string">
                <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-
                            [0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
              </xsd:restriction>
            </xsd:simpleType>
            <xsd:complexType name="xmlDocument">
              <xsd:sequence>
                <xsd:any />
              </xsd:sequence>
            </xsd:complexType>
            <xsd:complexType name="row">
              <xsd:sequence>
                <xsd:element sql:field="Data" name="Data"
                            type="xsd:string" minOccurs="0" />
              </xsd:sequence>
            </xsd:complexType>
          </xsd:schema>
          <row>
            <Data>
              &lt;COLUMN&gt;
              &lt;ID&gt;0&lt;/ID&gt;
              &lt;TYPE&gt;1&lt;/TYPE&gt;
              &lt;NAME&gt;EventClass&lt;/NAME&gt;
              &lt;DESCRIPTION&gt;Event Class is used to categorize events.
              &lt;/DESCRIPTION&gt;
              &lt;FILTERABLE&gt;false&lt;/FILTERABLE&gt;
              &lt;REPEATABLE&gt;false&lt;/REPEATABLE&gt;
              &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
```


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```
    &lt;/COLUMN&gt;
  </Data>
</row>
<row>
  <Data>
    &lt;COLUMN&gt;
    &lt;ID&gt;1&lt;/ID&gt;
    &lt;TYPE&gt;1&lt;/TYPE&gt;
    &lt;NAME&gt;EventSubclass&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Event Subclass provides additional
    information about each event class.&lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;false&lt;/REPEATABLE&gt;
    &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
    &lt;/COLUMN&gt;
  </Data>
</row>
<row>
  <Data>
    &lt;COLUMN&gt;
    &lt;ID&gt;2&lt;/ID&gt;
    &lt;TYPE&gt;5&lt;/TYPE&gt;
    &lt;NAME&gt;CurrentTime&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Time at which the event started, when available.
    For filtering, expected formats are 'YYYY-MM-DD' and 'YYYY-MM-DD HH:MM:SS'.
    &lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;false&lt;/REPEATABLE&gt;
    &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
    &lt;/COLUMN&gt;
  </Data>
</row>
<row>
  <Data>
    &lt;COLUMN&gt;
    &lt;ID&gt;3&lt;/ID&gt;
    &lt;TYPE&gt;5&lt;/TYPE&gt;
    &lt;NAME&gt;StartTime&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Time at which the event started, when available.
    For filtering, expected formats are 'YYYY-MM-DD' and 'YYYY-MM-DD HH:MM:SS'.
    &lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;false&lt;/REPEATABLE&gt;
    &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
    &lt;/COLUMN&gt;
  </Data>
</row>
<row>
  <Data>
    &lt;COLUMN&gt;
    &lt;ID&gt;4&lt;/ID&gt;
    &lt;TYPE&gt;5&lt;/TYPE&gt;
    &lt;NAME&gt;EndTime&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Time at which the event ended.
    This column is not populated for starting event classes, such as
    SQL:BatchStarting or SP:Starting. For filtering, expected formats are
    'YYYY-MM-DD' and 'YYYY-MM-DD HH:MM:SS'.&lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;false&lt;/REPEATABLE&gt;
```


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```
    &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
    &lt;/COLUMN&gt;
  </Data>
</row>
<row>
  <Data>
    &lt;COLUMN&gt;
    &lt;ID&gt;5&lt;/ID&gt;
    &lt;TYPE&gt;2&lt;/TYPE&gt;
    &lt;NAME&gt;Duration&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Amount of time (in milliseconds) taken by the event.
    &lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;false&lt;/REPEATABLE&gt;
    &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
    &lt;/COLUMN&gt;
  </Data>
</row>
<row>
  <Data>
    &lt;COLUMN&gt;
    &lt;ID&gt;6&lt;/ID&gt;
    &lt;TYPE&gt;2&lt;/TYPE&gt;
    &lt;NAME&gt;CPUTime&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Amount of CPU time (in milliseconds) used by the event.
    &lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;false&lt;/REPEATABLE&gt;
    &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
    &lt;/COLUMN&gt;
  </Data>
</row>
<row>
  <Data>
    &lt;COLUMN&gt;
    &lt;ID&gt;7&lt;/ID&gt;
    &lt;TYPE&gt;1&lt;/TYPE&gt;
    &lt;NAME&gt;JobID&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Job ID for progress.&lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;false&lt;/REPEATABLE&gt;
    &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
    &lt;/COLUMN&gt;
  </Data>
</row>
<row>
  <Data>
    &lt;COLUMN&gt;
    &lt;ID&gt;8&lt;/ID&gt;
    &lt;TYPE&gt;8&lt;/TYPE&gt;
    &lt;NAME&gt;SessionType&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Session type (what entity caused the operation).
    &lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;false&lt;/REPEATABLE&gt;
    &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
    &lt;/COLUMN&gt;
  </Data>
</row>
```


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```
<row>
  <Data>
    &lt;COLUMN&gt;
    &lt;ID&gt;9&lt;/ID&gt;
    &lt;TYPE&gt;1&lt;/TYPE&gt;
    &lt;NAME&gt;ProgressTotal&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Progress total.&lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;false&lt;/REPEATABLE&gt;
    &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
    &lt;/COLUMN&gt;
  </Data>
</row>
<row>
  <Data>
    &lt;COLUMN&gt;
    &lt;ID&gt;10&lt;/ID&gt;
    &lt;TYPE&gt;1&lt;/TYPE&gt;
    &lt;NAME&gt;IntegerData&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Integer data.&lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;false&lt;/REPEATABLE&gt;
    &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
    &lt;/COLUMN&gt;
  </Data>
</row>
<row>
  <Data>
    &lt;COLUMN&gt;
    &lt;ID&gt;11&lt;/ID&gt;
    &lt;TYPE&gt;8&lt;/TYPE&gt;
    &lt;NAME&gt;ObjectID&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Object ID (note this is a string).&lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;false&lt;/REPEATABLE&gt;
    &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
    &lt;/COLUMN&gt;
  </Data>
</row>
<row>
  <Data>
    &lt;COLUMN&gt;
    &lt;ID&gt;12&lt;/ID&gt;
    &lt;TYPE&gt;1&lt;/TYPE&gt;
    &lt;NAME&gt;ObjectType&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Object type.&lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;false&lt;/REPEATABLE&gt;
    &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
    &lt;/COLUMN&gt;
  </Data>
</row>
<row>
  <Data>
    &lt;COLUMN&gt;
    &lt;ID&gt;13&lt;/ID&gt;
    &lt;TYPE&gt;8&lt;/TYPE&gt;
    &lt;NAME&gt;ObjectName&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Object name.&lt;/DESCRIPTION&gt;
```


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```
            &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
            &lt;REPEATABLE&gt;false&lt;/REPEATABLE&gt;
            &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
            &lt;/COLUMN&gt;
          </Data>
        </row>
        <row>
          <Data>
            &lt;COLUMN&gt;
            &lt;ID&gt;14&lt;/ID&gt;
            &lt;TYPE&gt;8&lt;/TYPE&gt;
            &lt;NAME&gt;ObjectPath&lt;/NAME&gt;
            &lt;DESCRIPTION&gt;Object path. A comma-separated list of parents,
            starting with the object's parent.&lt;/DESCRIPTION&gt;
            &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
            &lt;REPEATABLE&gt;false&lt;/REPEATABLE&gt;
            &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
            &lt;/COLUMN&gt;
          </Data>
        </row>
        <row>
          <Data>
            &lt;COLUMN&gt;
            &lt;ID&gt;15&lt;/ID&gt;
            &lt;TYPE&gt;8&lt;/TYPE&gt;
            &lt;NAME&gt;ObjectReference&lt;/NAME&gt;
            &lt;DESCRIPTION&gt;Object reference. Encoded as XML for all parents,
            using tags to describe the object.&lt;/DESCRIPTION&gt;
            &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
            &lt;REPEATABLE&gt;false&lt;/REPEATABLE&gt;
            &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
            &lt;/COLUMN&gt;
          </Data>
        </row>
        <row>
          <Data>
            &lt;COLUMN&gt;
            &lt;ID&gt;22&lt;/ID&gt;
            &lt;TYPE&gt;1&lt;/TYPE&gt;
            &lt;NAME&gt;Severity&lt;/NAME&gt;
            &lt;DESCRIPTION&gt;Severity level of an exception.&lt;/DESCRIPTION&gt;
            &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
            &lt;REPEATABLE&gt;false&lt;/REPEATABLE&gt;
            &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
            &lt;/COLUMN&gt;
          </Data>
        </row>
        <row>
          <Data>
            &lt;COLUMN&gt;
            &lt;ID&gt;23&lt;/ID&gt;
            &lt;TYPE&gt;1&lt;/TYPE&gt;
            &lt;NAME&gt;Success&lt;/NAME&gt;
            &lt;DESCRIPTION&gt;1 = success. 0 = failure (for example,
            a 1 means success of a permissions check and a 0 means a failure of that
check).
            &lt;/DESCRIPTION&gt;
            &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
            &lt;REPEATABLE&gt;false&lt;/REPEATABLE&gt;
```


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```
    &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
    &lt;/COLUMN&gt;
  </Data>
</row>
<row>
  <Data>
    &lt;COLUMN&gt;
    &lt;ID&gt;24&lt;/ID&gt;
    &lt;TYPE&gt;1&lt;/TYPE&gt;
    &lt;NAME&gt;Error&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Error number of a given event.&lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;false&lt;/REPEATABLE&gt;
    &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
    &lt;/COLUMN&gt;
  </Data>
</row>
<row>
  <Data>
    &lt;COLUMN&gt;
    &lt;ID&gt;25&lt;/ID&gt;
    &lt;TYPE&gt;1&lt;/TYPE&gt;
    &lt;NAME&gt;ConnectionID&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Unique connection ID.&lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;false&lt;/REPEATABLE&gt;
    &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
    &lt;/COLUMN&gt;
  </Data>
</row>
<row>
  <Data>
    &lt;COLUMN&gt;
    &lt;ID&gt;28&lt;/ID&gt;
    &lt;TYPE&gt;8&lt;/TYPE&gt;
    &lt;NAME&gt;DatabaseName&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Name of the database in which the
    statement of the user is running.&lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;false&lt;/REPEATABLE&gt;
    &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
    &lt;/COLUMN&gt;
  </Data>
</row>
<row>
  <Data>
    &lt;COLUMN&gt;
    &lt;ID&gt;32&lt;/ID&gt;
    &lt;TYPE&gt;8&lt;/TYPE&gt;
    &lt;NAME&gt;NTUserName&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Windows user name.&lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;true&lt;/REPEATABLE&gt;
    &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
    &lt;/COLUMN&gt;
  </Data>
</row>
<row>
  <Data>
```


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```
    &lt;COLUMN&gt;
    &lt;ID&gt;33&lt;/ID&gt;
    &lt;TYPE&gt;8&lt;/TYPE&gt;
    &lt;NAME&gt;NTDomainName&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Windows domain to which the user belongs.
    &lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;true&lt;/REPEATABLE&gt;
    &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
    &lt;/COLUMN&gt;
  </Data>
</row>
<row>
  <Data>
    &lt;COLUMN&gt;
    &lt;ID&gt;35&lt;/ID&gt;
    &lt;TYPE&gt;8&lt;/TYPE&gt;
    &lt;NAME&gt;ClientHostName&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Name of the computer on which the client is running.
    This data column is populated if the host name is provided by the client.
    &lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;true&lt;/REPEATABLE&gt;
    &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
    &lt;/COLUMN&gt;
  </Data>
</row>
<row>
  <Data>
    &lt;COLUMN&gt;
    &lt;ID&gt;36&lt;/ID&gt;
    &lt;TYPE&gt;1&lt;/TYPE&gt;
    &lt;NAME&gt;ClientProcessID&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;The process ID of the client application.
    &lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;true&lt;/REPEATABLE&gt;
    &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
    &lt;/COLUMN&gt;
  </Data>
</row>
<row>
  <Data>
    &lt;COLUMN&gt;
    &lt;ID&gt;37&lt;/ID&gt;
    &lt;TYPE&gt;8&lt;/TYPE&gt;
    &lt;NAME&gt;ApplicationName&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Name of the client application that created the
    connection to the server. This column is populated with the values
    passed by the application rather than the displayed name of the program.
    &lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;true&lt;/REPEATABLE&gt;
    &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
    &lt;/COLUMN&gt;
  </Data>
</row>
<row>
  <Data>
```


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```
    &lt;COLUMN&gt;
    &lt;ID&gt;39&lt;/ID&gt;
    &lt;TYPE&gt;8&lt;/TYPE&gt;
    &lt;NAME&gt;SessionID&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Session GUID.&lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;false&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;true&lt;/REPEATABLE&gt;
    &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
    &lt;/COLUMN&gt;
  </Data>
</row>
<row>
  <Data>
    &lt;COLUMN&gt;
    &lt;ID&gt;40&lt;/ID&gt;
    &lt;TYPE&gt;8&lt;/TYPE&gt;
    &lt;NAME&gt;NTCanonicalUserName&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;User name in canonical form. For example,
    engineering.microsoft.com/software/someone.&lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;true&lt;/REPEATABLE&gt;
    &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
    &lt;/COLUMN&gt;
  </Data>
</row>
<row>
  <Data>
    &lt;COLUMN&gt;
    &lt;ID&gt;41&lt;/ID&gt;
    &lt;TYPE&gt;1&lt;/TYPE&gt;
    &lt;NAME&gt;SPID&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Server process ID. This uniquely identifies a
    user session. This directly corresponds to the session GUID used by XML/A.
    &lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;true&lt;/REPEATABLE&gt;
    &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
    &lt;/COLUMN&gt;
  </Data>
</row>
<row>
  <Data>
    &lt;COLUMN&gt;
    &lt;ID&gt;42&lt;/ID&gt;
    &lt;TYPE&gt;9&lt;/TYPE&gt;
    &lt;NAME&gt;TextData&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Text data associated with the event.
    &lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;true&lt;/REPEATABLE&gt;
    &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
    &lt;/COLUMN&gt;
  </Data>
</row>
<row>
  <Data>
    &lt;COLUMN&gt;
    &lt;ID&gt;43&lt;/ID&gt;
    &lt;TYPE&gt;8&lt;/TYPE&gt;
```


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```
              &lt;NAME&gt;ServerName&lt;/NAME&gt;
              &lt;DESCRIPTION&gt;Name of the server producing the event.
              &lt;/DESCRIPTION&gt;
              &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
              &lt;REPEATABLE&gt;true&lt;/REPEATABLE&gt;
              &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
              &lt;/COLUMN&gt;
            </Data>
          </row>
          <row>
            <Data>
              &lt;COLUMN&gt;
              &lt;ID&gt;44&lt;/ID&gt;
              &lt;TYPE&gt;9&lt;/TYPE&gt;
              &lt;NAME&gt;RequestParameters&lt;/NAME&gt;
              &lt;DESCRIPTION&gt;Parameters for parameterized queries and commands.
              &lt;/DESCRIPTION&gt;
              &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
              &lt;REPEATABLE&gt;true&lt;/REPEATABLE&gt;
              &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
              &lt;/COLUMN&gt;
            </Data>
          </row>
          <row>
            <Data>
              &lt;COLUMN&gt;
              &lt;ID&gt;45&lt;/ID&gt;
              &lt;TYPE&gt;9&lt;/TYPE&gt;
              &lt;NAME&gt;RequestProperties&lt;/NAME&gt;
              &lt;DESCRIPTION&gt;XMLA request properties.&lt;/DESCRIPTION&gt;
              &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
              &lt;REPEATABLE&gt;true&lt;/REPEATABLE&gt;
              &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
              &lt;/COLUMN&gt;
            </Data>
          </row>
        </root>
      </return>
    </DiscoverResponse>
  </soap:Body>
</soap:Envelope>
```

4.12 Client Obtains List of Trace Event Categories

In this example, the client sends a **DISCOVER_TRACE_EVENT_CATEGORIES** request. The results of this request represent the actual Trace Event Categories supported by Microsoft® SQL Server® 2008 Analysis Services.

4.12.1 Client Sends Request

The client sends the following request:

```
<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Body>
    <Discover xmlns="urn:schemas-microsoft-com:xml-analysis">
      <RequestType>DISCOVER_TRACE_EVENT_CATEGORIES</RequestType>
```


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```
      <Restrictions>
        <RestrictionList></RestrictionList>
      </Restrictions>
      <Properties>
        <PropertyList>
          <Catalog>Adventure Works DW 2008</Catalog>
        </PropertyList>
      </Properties>
    </Discover>
  </Body>
</Envelope>
```

4.12.2 Server Response

The server responds with a list of trace event categories:

```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <DiscoverResponse xmlns="urn:schemas-microsoft-com:xml-analysis"

xmlns:ddl2="http://schemas.microsoft.com/analysisservices/2003/engine/2"

xmlns:ddl2_2="http://schemas.microsoft.com/analysisservices/2003/engine/2/2"

xmlns:ddl100="http://schemas.microsoft.com/analysisservices/2008/engine/100"

xmlns:ddl100_100="http://schemas.microsoft.com/analysisservices/2008/engine/100/100">
      <return>
        <root xmlns="urn:schemas-microsoft-com:xml-analysis:rowset"
              xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
              xmlns:xsd="http://www.w3.org/2001/XMLSchema">
          <xsd:schema targetNamespace="urn:schemas-microsoft-com:xml-analysis:rowset"
                      xmlns:sql="urn:schemas-microsoft-com:xml-sql"
                      elementFormDefault="qualified">
            <xsd:element name="root">
              <xsd:complexType>
                <xsd:sequence minOccurs="0" maxOccurs="unbounded">
                  <xsd:element name="row" type="row" />
                </xsd:sequence>
              </xsd:complexType>
            </xsd:element>
            <xsd:simpleType name="uuid">
              <xsd:restriction base="xsd:string">
                <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}
                            -[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
              </xsd:restriction>
            </xsd:simpleType>
            <xsd:complexType name="xmlDocument">
              <xsd:sequence>
                <xsd:any />
              </xsd:sequence>
            </xsd:complexType>
            <xsd:complexType name="row">
              <xsd:sequence>
                <xsd:element sql:field="Data" name="Data" type="xsd:string"
                            minOccurs="0" />
              </xsd:sequence>
```


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```
  </xsd:complexType>
</xsd:schema>
<row>
  <Data>
    &lt;EVENTCATEGORY&gt;
    &lt;NAME&gt;Security Audit&lt;/NAME&gt;
    &lt;TYPE&gt;0&lt;/TYPE&gt;
    &lt;DESCRIPTION&gt;Collection of database audit event classes.
    &lt;/DESCRIPTION&gt;
    &lt;EVENTLIST&gt;
    &lt;EVENT&gt;
    &lt;ID&gt;1&lt;/ID&gt;
    &lt;NAME&gt;Audit Login&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Collects all new connection events since
    the trace was started, such as when a client requests a connection
    to a server running an instance of SQL Server.&lt;/DESCRIPTION&gt;
    &lt;EVENTCOLUMNLIST&gt;
    &lt;EVENTCOLUMN&gt;
    &lt;ID&gt;0&lt;/ID&gt;
    &lt;/EVENTCOLUMN&gt;
    &lt;EVENTCOLUMN&gt;
    &lt;ID&gt;2&lt;/ID&gt;
    &lt;/EVENTCOLUMN&gt;
    &lt;EVENTCOLUMN&gt;
    &lt;ID&gt;3&lt;/ID&gt;
    &lt;/EVENTCOLUMN&gt;
    &lt;EVENTCOLUMN&gt;
    &lt;ID&gt;22&lt;/ID&gt;
    &lt;/EVENTCOLUMN&gt;
    &lt;EVENTCOLUMN&gt;
    &lt;ID&gt;23&lt;/ID&gt;
    &lt;/EVENTCOLUMN&gt;
    &lt;EVENTCOLUMN&gt;
    &lt;ID&gt;24&lt;/ID&gt;
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    &lt;ID&gt;25&lt;/ID&gt;
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    &lt;EVENTCOLUMN&gt;
    &lt;ID&gt;40&lt;/ID&gt;
    &lt;/EVENTCOLUMN&gt;
    &lt;EVENTCOLUMN&gt;
    &lt;ID&gt;43&lt;/ID&gt;
    &lt;/EVENTCOLUMN&gt;
```


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```
&lt;/EVENTCOLUMNLIST&gt;
&lt;/EVENT&gt;
&lt;EVENT&gt;
&lt;ID&gt;2&lt;/ID&gt;
&lt;NAME&gt;Audit Logout&lt;/NAME&gt;
&lt;DESCRIPTION&gt;Collects all new disconnect events
since the trace was started, such as when a client issues a
disconnect command.&lt;/DESCRIPTION&gt;
&lt;EVENTCOLUMNLIST&gt;
&lt;EVENTCOLUMN&gt;
&lt;ID&gt;0&lt;/ID&gt;
&lt;/EVENTCOLUMN&gt;
&lt;EVENTCOLUMN&gt;
&lt;ID&gt;2&lt;/ID&gt;
&lt;/EVENTCOLUMN&gt;
&lt;EVENTCOLUMN&gt;
&lt;ID&gt;4&lt;/ID&gt;
&lt;/EVENTCOLUMN&gt;
&lt;EVENTCOLUMN&gt;
&lt;ID&gt;5&lt;/ID&gt;
&lt;/EVENTCOLUMN&gt;
&lt;EVENTCOLUMN&gt;
&lt;ID&gt;6&lt;/ID&gt;
&lt;/EVENTCOLUMN&gt;
&lt;EVENTCOLUMN&gt;
&lt;ID&gt;23&lt;/ID&gt;
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&lt;EVENTCOLUMN&gt;
&lt;ID&gt;25&lt;/ID&gt;
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&lt;/EVENTCOLUMN&gt;
&lt;EVENTCOLUMN&gt;
&lt;ID&gt;43&lt;/ID&gt;
&lt;/EVENTCOLUMN&gt;
&lt;/EVENTCOLUMNLIST&gt;
&lt;/EVENT&gt;
&lt;EVENT&gt;
&lt;ID&gt;4&lt;/ID&gt;
&lt;NAME&gt;Audit Server Starts And Stops&lt;/NAME&gt;
&lt;DESCRIPTION&gt;Records service shut down, start, and
pause activities.&lt;/DESCRIPTION&gt;
&lt;EVENTCOLUMNLIST&gt;
```


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&lt;EVENTCOLUMN&gt;
&lt;ID&gt;0&lt;/ID&gt;
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&lt;ID&gt;1&lt;/ID&gt;
&lt;EVENTCOLUMNSUBCLASSLIST&gt;
&lt;EVENTCOLUMNSUBCLASS&gt;
&lt;ID&gt;1&lt;/ID&gt;
&lt;NAME&gt;Instance Shutdown&lt;/NAME&gt;
&lt;/EVENTCOLUMNSUBCLASS&gt;
&lt;EVENTCOLUMNSUBCLASS&gt;
&lt;ID&gt;2&lt;/ID&gt;
&lt;NAME&gt;Instance Started&lt;/NAME&gt;
&lt;/EVENTCOLUMNSUBCLASS&gt;
&lt;EVENTCOLUMNSUBCLASS&gt;
&lt;ID&gt;3&lt;/ID&gt;
&lt;NAME&gt;Instance Paused&lt;/NAME&gt;
&lt;/EVENTCOLUMNSUBCLASS&gt;
&lt;EVENTCOLUMNSUBCLASS&gt;
&lt;ID&gt;4&lt;/ID&gt;
&lt;NAME&gt;Instance Continued&lt;/NAME&gt;
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&lt;ID&gt;43&lt;/ID&gt;
&lt;/EVENTCOLUMN&gt;
&lt;/EVENTCOLUMNLIST&gt;
&lt;/EVENT&gt;
&lt;EVENT&gt;
&lt;ID&gt;18&lt;/ID&gt;
&lt;NAME&gt;Audit Object Permission Event&lt;/NAME&gt;
&lt;DESCRIPTION&gt;Records object permission changes.
&lt;/DESCRIPTION&gt;
&lt;EVENTCOLUMNLIST&gt;
&lt;EVENTCOLUMN&gt;
&lt;ID&gt;11&lt;/ID&gt;
&lt;/EVENTCOLUMN&gt;
&lt;EVENTCOLUMN&gt;
&lt;ID&gt;12&lt;/ID&gt;
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&lt;ID&gt;42&lt;/ID&gt;
&lt;/EVENTCOLUMN&gt;
&lt;EVENTCOLUMN&gt;
&lt;ID&gt;43&lt;/ID&gt;
&lt;/EVENTCOLUMN&gt;
&lt;/EVENTCOLUMNLIST&gt;
&lt;/EVENT&gt;
&lt;EVENT&gt;
&lt;ID&gt;19&lt;/ID&gt;
&lt;NAME&gt;Audit Backup/Restore Event&lt;/NAME&gt;
&lt;DESCRIPTION&gt;Records server backup/restore.&lt;/DESCRIPTION&gt;
&lt;EVENTCOLUMNLIST&gt;
&lt;EVENTCOLUMN&gt;
```


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&lt;ID&gt;1&lt;/ID&gt;
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&lt;ID&gt;1&lt;/ID&gt;
&lt;NAME&gt;Backup&lt;/NAME&gt;
&lt;/EVENTCOLUMNSUBCLASS&gt;
&lt;EVENTCOLUMNSUBCLASS&gt;
&lt;ID&gt;2&lt;/ID&gt;
&lt;NAME&gt;Restore&lt;/NAME&gt;
&lt;/EVENTCOLUMNSUBCLASS&gt;
&lt;EVENTCOLUMNSUBCLASS&gt;
&lt;ID&gt;3&lt;/ID&gt;
&lt;NAME&gt;Synchronize&lt;/NAME&gt;
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&lt;EVENTCOLUMNSUBCLASS&gt;
&lt;ID&gt;4&lt;/ID&gt;
&lt;NAME&gt;Detach&lt;/NAME&gt;
&lt;/EVENTCOLUMNSUBCLASS&gt;
&lt;EVENTCOLUMNSUBCLASS&gt;
&lt;ID&gt;5&lt;/ID&gt;
&lt;NAME&gt;Attach&lt;/NAME&gt;
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      &lt;/EVENTCATEGORY&gt;
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  <row>
    <Data>
      &lt;EVENTCATEGORY&gt;
      &lt;NAME&gt;Progress Reports&lt;/NAME&gt;
      &lt;TYPE&gt;0&lt;/TYPE&gt;
      &lt;DESCRIPTION&gt;Collection of events for progress reporting.
      &lt;/DESCRIPTION&gt;
      &lt;EVENTLIST&gt;
      &lt;EVENT&gt;
      &lt;ID&gt;5&lt;/ID&gt;
      &lt;NAME&gt;Progress Report Begin&lt;/NAME&gt;
      &lt;DESCRIPTION&gt;Progress report begin.&lt;/DESCRIPTION&gt;
      &lt;EVENTCOLUMNLIST&gt;
      &lt;EVENTCOLUMN&gt;
      &lt;ID&gt;0&lt;/ID&gt;
      &lt;/EVENTCOLUMN&gt;
      &lt;EVENTCOLUMN&gt;
      &lt;ID&gt;1&lt;/ID&gt;
      &lt;EVENTCOLUMNSUBCLASSLIST&gt;
      &lt;EVENTCOLUMNSUBCLASS&gt;
      &lt;ID&gt;1&lt;/ID&gt;
      &lt;NAME&gt;Process&lt;/NAME&gt;
      &lt;/EVENTCOLUMNSUBCLASS&gt;
      &lt;EVENTCOLUMNSUBCLASS&gt;
      &lt;ID&gt;2&lt;/ID&gt;
      &lt;NAME&gt;Merge&lt;/NAME&gt;
      &lt;/EVENTCOLUMNSUBCLASS&gt;
      &lt;EVENTCOLUMNSUBCLASS&gt;
      &lt;ID&gt;3&lt;/ID&gt;
      &lt;NAME&gt;Delete&lt;/NAME&gt;
      &lt;/EVENTCOLUMNSUBCLASS&gt;
      &lt;EVENTCOLUMNSUBCLASS&gt;
      &lt;ID&gt;4&lt;/ID&gt;
      &lt;NAME&gt;DeleteOldAggregations&lt;/NAME&gt;
      &lt;/EVENTCOLUMNSUBCLASS&gt;
      &lt;EVENTCOLUMNSUBCLASS&gt;
      &lt;ID&gt;5&lt;/ID&gt;
      &lt;NAME&gt;Rebuild&lt;/NAME&gt;
      &lt;/EVENTCOLUMNSUBCLASS&gt;
      &lt;EVENTCOLUMNSUBCLASS&gt;
      &lt;ID&gt;6&lt;/ID&gt;
      &lt;NAME&gt;Commit&lt;/NAME&gt;
      &lt;/EVENTCOLUMNSUBCLASS&gt;
```


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&lt;EVENTCOLUMNSUBCLASS&gt;
&lt;ID&gt;7&lt;/ID&gt;
&lt;NAME&gt;Rollback&lt;/NAME&gt;
&lt;/EVENTCOLUMNSUBCLASS&gt;
&lt;EVENTCOLUMNSUBCLASS&gt;
&lt;ID&gt;8&lt;/ID&gt;
&lt;NAME&gt;CreateIndexes&lt;/NAME&gt;
&lt;/EVENTCOLUMNSUBCLASS&gt;
&lt;EVENTCOLUMNSUBCLASS&gt;
&lt;ID&gt;9&lt;/ID&gt;
&lt;NAME&gt;CreateTable&lt;/NAME&gt;
&lt;/EVENTCOLUMNSUBCLASS&gt;
&lt;EVENTCOLUMNSUBCLASS&gt;
&lt;ID&gt;10&lt;/ID&gt;
&lt;NAME&gt;InsertInto&lt;/NAME&gt;
&lt;/EVENTCOLUMNSUBCLASS&gt;
&lt;EVENTCOLUMNSUBCLASS&gt;
&lt;ID&gt;11&lt;/ID&gt;
&lt;NAME&gt;Transaction&lt;/NAME&gt;
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&lt;NAME&gt;Initialize&lt;/NAME&gt;
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&lt;EVENTCOLUMNSUBCLASS&gt;
&lt;ID&gt;13&lt;/ID&gt;
&lt;NAME&gt;Discretize&lt;/NAME&gt;
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&lt;ID&gt;15&lt;/ID&gt;
&lt;NAME&gt;CreateView&lt;/NAME&gt;
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&lt;EVENTCOLUMNSUBCLASS&gt;
&lt;ID&gt;16&lt;/ID&gt;
&lt;NAME&gt;WriteData&lt;/NAME&gt;
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&lt;ID&gt;12&lt;/ID&gt;
&lt;NAME&gt;Query Subcube Verbose&lt;/NAME&gt;
&lt;DESCRIPTION&gt;Query subcube with detailed information.
This event may have a negative impact on performance when turned on.
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&lt;NAME&gt;Get Data From Aggregation&lt;/NAME&gt;
&lt;DESCRIPTION&gt;Answer query by getting data from aggregation.
This event may have a negative impact on performance when turned on.
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&lt;/EVENTCOLUMNLIST&gt;
&lt;/EVENT&gt;
&lt;EVENT&gt;
&lt;ID&gt;61&lt;/ID&gt;
&lt;NAME&gt;Get Data From Cache&lt;/NAME&gt;
&lt;DESCRIPTION&gt;Answer query by getting data from one
```


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of the caches. This event may have a negative impact on performance
when turned on.&lt;/DESCRIPTION&gt;
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                &lt;/EVENTCOLUMNLIST&gt;
                &lt;/EVENT&gt;
                &lt;/EVENTLIST&gt;
                &lt;/EVENTCATEGORY&gt;
              </Data>
            </row>
          </root>
        </return>
      </DiscoverResponse>
    </soap:Body>
  </soap:Envelope>
```

4.13 Client Sends MDX Query and Receives Back mddataset Result

In this example, the client sends an **Execute** command, with an MDX query in the **Statement** element.

4.13.1 Client Sends Request

The client sends the following request:

```
<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Body>
    <Execute xmlns="urn:schemas-microsoft-com:xml-analysis">
      <Command>
        <Statement>select Measures.members on 0 from [Adventure Works]
        </Statement>
      </Command>
      <Properties>
        <PropertyList>
          <Catalog>Adventure Works DW 2008</Catalog>
        </PropertyList>
      </Properties>
    </Execute>
  </Body>
</Envelope>
```

4.13.2 Server Response

The server responds with an **mddataset** result.

```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <ExecuteResponse xmlns="urn:schemas-microsoft-com:xml-analysis">
      <return>
        <root xmlns="urn:schemas-microsoft-com:xml-analysis:mddataset"
```


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```
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<xs:schema targetNamespace=
           "urn:schemas-microsoft-com:xml-analysis:mddataset"
           elementFormDefault="qualified"
           xmlns="urn:schemas-microsoft-com:xml-analysis:mddataset"
           xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <xs:complexType name="MemberType">
    <xs:sequence>
      <xs:any namespace="##targetNamespace" minOccurs="0"
              maxOccurs="unbounded" processContents="skip" />
    </xs:sequence>
    <xs:attribute name="Hierarchy" type="xs:string" />
  </xs:complexType>
  <xs:complexType name="PropType">
    <xs:sequence>
      <xs:element name="Default" minOccurs="0" />
    </xs:sequence>
    <xs:attribute name="name" type="xs:string" use="required" />
    <xs:attribute name="type" type="xs:QName" />
  </xs:complexType>
  <xs:complexType name="TupleType">
    <xs:sequence>
      <xs:element name="Member" type="MemberType"
                  maxOccurs="unbounded" />
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="MembersType">
    <xs:sequence>
      <xs:element name="Member" type="MemberType" minOccurs="0"
                  maxOccurs="unbounded" />
    </xs:sequence>
    <xs:attribute name="Hierarchy" type="xs:string" use="required" />
  </xs:complexType>
  <xs:complexType name="TuplesType">
    <xs:sequence>
      <xs:element name="Tuple" type="TupleType" minOccurs="0"
                  maxOccurs="unbounded" />
    </xs:sequence>
  </xs:complexType>
  <xs:group name="SetType">
    <xs:choice>
      <xs:element name="Members" type="MembersType" />
      <xs:element name="Tuples" type="TuplesType" />
      <xs:element name="CrossProduct" type="SetListType" />
<xs:element ref="msxmla:NormTupleSet" />
      <xs:element name="Union">
        <xs:complexType>
          <xs:group ref="SetType" minOccurs="0" maxOccurs="unbounded" />
        </xs:complexType>
      </xs:element>
    </xs:choice>
  </xs:group>
  <xs:complexType name="SetListType">
    <xs:group ref="SetType" minOccurs="0" maxOccurs="unbounded" />
    <xs:attribute name="Size" type="xs:unsignedInt" />
  </xs:complexType>
  <xs:complexType name="OlapInfo">
    <xs:sequence>
```


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```
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                              type="xs:dateTime" />
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                              type="xs:dateTime" />
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            </xs:element>
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        </xs:complexType>
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                                minOccurs="0" maxOccurs="unbounded"
                                processContents="skip" />
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                      <xs:attribute name="name" type="xs:string"
                                    use="required" />
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</xs:schema>
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       "http://schemas.microsoft.com/analysisservices/2003/engine">
        2009-05-30T19:26:25
      </LastDataUpdate>
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    "http://schemas.microsoft.com/analysisservices/2003/engine">
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  </CubeInfo>
  <AxesInfo>
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```
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  <LName name="[Ship Date].[Calendar].[LEVEL_UNIQUE_NAME]"
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  <LNum name="[Ship Date].[Calendar].[LEVEL_NUMBER]"
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  <Caption name="[Ship Date].[Calendar Week of Year].[MEMBER_CAPTION]"
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  <LName name="[Ship Date].[Calendar Week of Year].[LEVEL_UNIQUE_NAME]"
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  <LNum name="[Ship Date].[Calendar Week of Year].[LEVEL_NUMBER]"
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          type="xsd:string" />
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Year].[MEMBER_UNIQUE_NAME]"
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Year].[DISPLAY_INFO]"
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Year].[MEMBER_UNIQUE_NAME]"
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Year].[MEMBER_CAPTION]"
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Year].[LEVEL_UNIQUE_NAME]"
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                  <LNum name="[Delivery Date].[Calendar Semester of Year].[LEVEL_NUMBER]"
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Year].[DISPLAY_INFO]"
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                         type="xsd:string" />
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Year].[MEMBER_UNIQUE_NAME]"
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                         type="xsd:string" />
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Year].[LEVEL_UNIQUE_NAME]"
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Year].[DISPLAY_INFO]"
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                         type="xsd:string" />
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                       type="xsd:string" />
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                         type="xsd:string" />
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                <Caption name="[Delivery Date].[Fiscal Week of Year].[MEMBER_CAPTION]"
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  <LNum name="[Customer].[Customer].[LEVEL_NUMBER]"
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</HierarchyInfo>
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  <LName name="[Customer].[State-Province].[LEVEL_UNIQUE_NAME]"
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</HierarchyInfo>
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  <UName name="[Customer].[Number of Children At Home].[MEMBER_UNIQUE_NAME]"
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          type="xsd:string" />
    <LName name="[Customer].[Number of Children At Home].[LEVEL_UNIQUE_NAME]"
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  <LName name="[Reseller].[Reseller Bank].[LEVEL_UNIQUE_NAME]"
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  <LNum name="[Reseller].[Reseller Bank].[LEVEL_NUMBER]"
        type="xsd:int" />
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  <LNum name="[Reseller].[Reseller Order Frequency].[LEVEL_NUMBER]"
        type="xsd:int" />
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  <Value xsi:type="xsd:double">8.7847418366998E6</Value>
  <FmtValue>$8,784,741.84</FmtValue>
</Cell>
<Cell CellOrdinal="24">
  <Value xsi:type="xsd:double">2.745235524899713E6</Value>
  <FmtValue>$2,745,235.52</FmtValue>
</Cell>
<Cell CellOrdinal="25">
  <Value xsi:type="xsd:int">31455</Value>
  <FmtValue>31,455</FmtValue>
</Cell>
<Cell CellOrdinal="26">
  <Value xsi:type="xsd:double">1.1425355E8</Value>
  <FmtValue>$114,253,550.00</FmtValue>
</Cell>
<Cell CellOrdinal="27">
  <Value xsi:type="xsd:double">1.2609503E7</Value>
  <FmtValue>$12,609,503.00</FmtValue>
</Cell>
<Cell CellOrdinal="28">
  <Value xsi:type="xsd:double">1.</Value>
  <FmtValue>1.00</FmtValue>
</Cell>
```


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```
            <Cell CellOrdinal="29">
              <Value xsi:type="xsd:double">1.</Value>
              <FmtValue>1.00</FmtValue>
            </Cell>
          </CellData>
        </root>
      </return>
    </ExecuteResponse>
  </soap:Body>
</soap:Envelope>
```

4.14 Create

In this example, the client sends an **XMLA Create** command to the server.

4.14.1 Client Sends Request

The client sends the following request:

```
<Create xmlns="http://schemas.microsoft.com/analysisservices/2003/engine">
  <ObjectDefinition>
    <Database xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:ddl2="http://schemas.microsoft.com/analysisservices/2003/engine/2"
xmlns:ddl2_2="http://schemas.microsoft.com/analysisservices/2003/engine/2/2"
xmlns:ddl100_100="http://schemas.microsoft.com/analysisservices/2008/engine/100/100">
      <ID>Adventure_SSAS</ID>
      <Name>Adventure_SSAS</Name>
      <Language>1033</Language>
      <Collation>Latin1_General_CI_AS</Collation>
      <DataSourceImpersonationInfo>
        <ImpersonationMode>Default</ImpersonationMode>
      </DataSourceImpersonationInfo>
      <Dimensions>
        <Dimension>
          <ID>Dim Date</ID>
          <Name>Date</Name>
          <Annotations>
            <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramLayout</Name>
              <Value>
                <dds xmlns="">
                  <diagram fontclsid="{0BE35203-8F91-11CE-9DE3-00AA004BB851}"
mouseiconclsid="{0BE35204-8F91-11CE-9DE3-00AA004BB851}" defaultlayout="MSDDS.Rectilinear"
defaultlineroute="MSDDS.Rectilinear" version="7" nextobject="2" scale="100"
pagebreakanchorx="0" pagebreakanchory="0" pagebreaksizex="0" pagebreaksizey="0" scrollleft="-
1356" scrolltop="-4617" gridx="150" gridy="150" marginx="5000" marginy="5000" zoom="100"
x="7276" y="14235" backcolor="15334399" defaultpersistence="2" PrintPageNumbersMode="3"
PrintMarginTop="0" PrintMarginBottom="635" PrintMarginLeft="0" PrintMarginRight="0"
marqueeselectionmode="0" mousepointer="0" snaptogrid="0" autotypeannotation="1"
showscrollbars="0" viewpagebreaks="0" donotforceconnectorsbehindshapes="1"
backpictureclsid="{00000000-0000-0000-0000-000000000000}">
                    <font>
                      <ddsxmlobjectstreamwrapper binary="0100000090014442010006546168 6f6d61"
/>
                    </font>
```


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```
                    <mouseicon>
                      <ddsxmlobjectstreamwrapper binary="6c74000000000000" />
                    </mouseicon>
                  </diagram>
                  <layoutmanager>
                    <ddsxmlobj />
                  </layoutmanager>
                  <ddscontrol controlprogid="DdsShapes.DdsObjectManagedBridge.2"
tooltip="DimDate" left="20" top="0" logicalid="1" controlid="1" masterid="0" hint1="0"
hint2="0" width="4524" height="5000" noresize="0" nomove="0" nodefaultattachpoints="0"
autodrag="1" usedefaultiddshape="1" selectable="1" showselectionhandles="1" allownudging="1"
isannotation="0" dontautolayout="0" groupcollapsed="0" tabstop="1" visible="1"
snaptogrid="0">
                    <control>
                      <ddsxmlobjectstreaminitwrapper binary="00080000ac11000088130000" />
                    </control>
                    <layoutobject>
                      <ddsxmlobj>
                        <property name="LogicalObject" value="dbo_DimDate" vartype="8" />
                      </ddsxmlobj>
                    </layoutobject>
                    <shape groupshapeid="0" groupnode="0" />
                  </ddscontrol>
                </dds>
              </Value>
            </Annotation>
            <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:ShowFriendlyNames</Name>
              <Value>true</Value>
            </Annotation>
            <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:ShowRelationshipNames</Name>
              <Value>false</Value>
            </Annotation>
            <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:UseDiagramDefaultLayout</Name>
              <Value>true</Value>
            </Annotation>
            <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramViewPortLeft</Name>
              <Value>-1356</Value>
            </Annotation>
            <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramViewPortTop</Name>
              <Value>-4617</Value>
            </Annotation>
            <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramBoundingLeft</Name>
              <Value>20</Value>
            </Annotation>
            <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramBoundingTop</Name>
              <Value>0</Value>
```


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```
            </Annotation>
            <Annotation>

  <Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramZoom</Name>
              <Value>100</Value>
            </Annotation>
            <Annotation>

  <Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:ARDiagramLayout</Name>
              <Value>
                <DiagramLayout ZoomPercent="100" ViewPortX="0" ViewPortY="0" xmlns="">
                  <Shapes NodeWidth="161">
                    <Shape Id="Date Key" Expanded="true">
                      <Attributes>
                        <Attribute Id="Date Key" />
                      </Attributes>
                      <Position x="20" y="20" />
                    </Shape>
                    <Shape Id="Calendar Quarter" Expanded="false">
                      <Attributes>
                        <Attribute Id="Calendar Quarter" />
                      </Attributes>
                      <Position x="226" y="20" />
                    </Shape>
                    <Shape Id="English Month Name" Expanded="false">
                      <Attributes>
                        <Attribute Id="English Month Name" />
                      </Attributes>
                      <Position x="226" y="68" />
                    </Shape>
                    <Shape Id="Week Number Of Year" Expanded="false">
                      <Attributes>
                        <Attribute Id="Week Number Of Year" />
                      </Attributes>
                      <Position x="226" y="116" />
                    </Shape>
                    <Shape Id="Full Date Alternate Key" Expanded="false">
                      <Attributes>
                        <Attribute Id="Full Date Alternate Key" />
                      </Attributes>
                      <Position x="226" y="164" />
                    </Shape>
                  </Shapes>
                </DiagramLayout>
              </Value>
            </Annotation>
          </Annotations>
          <Source xsi:type="DataSourceViewBinding">
            <DataSourceViewID>dsvAdventureWorksDW2008</DataSourceViewID>
          </Source>
          <ErrorConfiguration>
            <KeyNotFound>ReportAndStop</KeyNotFound>
            <KeyDuplicate>ReportAndStop</KeyDuplicate>
            <NullKeyNotAllowed>ReportAndStop</NullKeyNotAllowed>
          </ErrorConfiguration>
          <Language>1033</Language>
          <Collation>Latin1_General_CI_AS</Collation>
          <UnknownMemberName>Unknown</UnknownMemberName>
          <Attributes>
```


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```
<Attribute>
  <ID>Date Key</ID>
  <Name>Date Key</Name>
  <Usage>Key</Usage>
  <EstimatedCount>1188</EstimatedCount>
  <KeyColumns>
    <KeyColumn>
      <DataType>Integer</DataType>
      <Source xsi:type="ColumnBinding">
        <TableID>dbo_DimDate</TableID>
        <ColumnID>DateKey</ColumnID>
      </Source>
    </KeyColumn>
  </KeyColumns>
  <NameColumn>
    <DataType>WChar</DataType>
    <Source xsi:type="ColumnBinding">
      <TableID>dbo_DimDate</TableID>
      <ColumnID>DateKey</ColumnID>
    </Source>
  </NameColumn>
  <AttributeRelationships>
    <AttributeRelationship>
      <AttributeID>Full Date Alternate Key</AttributeID>
      <Name>Full Date Alternate Key</Name>
    </AttributeRelationship>
    <AttributeRelationship>
      <AttributeID>Week Number Of Year</AttributeID>
      <Name>Week Number Of Year</Name>
    </AttributeRelationship>
    <AttributeRelationship>
      <AttributeID>Calendar Quarter</AttributeID>
      <Name>Calendar Quarter</Name>
    </AttributeRelationship>
    <AttributeRelationship>
      <AttributeID>English Month Name</AttributeID>
      <Name>English Month Name</Name>
    </AttributeRelationship>
    <AttributeRelationship>
      <AttributeID>Calendar Year</AttributeID>
      <Name>Calendar Year</Name>
    </AttributeRelationship>
  </AttributeRelationships>
</Attribute>
<Attribute>
  <ID>Full Date Alternate Key</ID>
  <Name>Full Date Alternate Key</Name>
  <KeyColumns>
    <KeyColumn>
      <DataType>Date</DataType>
      <Source xsi:type="ColumnBinding">
        <TableID>dbo_DimDate</TableID>
        <ColumnID>FullDateAlternateKey</ColumnID>
      </Source>
    </KeyColumn>
  </KeyColumns>
  <NameColumn>
    <DataType>WChar</DataType>
    <Source xsi:type="ColumnBinding">
```


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```
        <TableID>dbo_DimDate</TableID>
        <ColumnID>FullDateAlternateKey</ColumnID>
      </Source>
    </NameColumn>
  </Attribute>
  <Attribute>
    <ID>Week Number Of Year</ID>
    <Name>Week Number Of Year</Name>
    <KeyColumns>
      <KeyColumn>
        <DataType>UnsignedTinyInt</DataType>
        <Source xsi:type="ColumnBinding">
          <TableID>dbo_DimDate</TableID>
          <ColumnID>WeekNumberOfYear</ColumnID>
        </Source>
      </KeyColumn>
    </KeyColumns>
    <NameColumn>
      <DataType>WChar</DataType>
      <Source xsi:type="ColumnBinding">
        <TableID>dbo_DimDate</TableID>
        <ColumnID>WeekNumberOfYear</ColumnID>
      </Source>
    </NameColumn>
    <OrderBy>Key</OrderBy>
  </Attribute>
  <Attribute>
    <ID>Calendar Quarter</ID>
    <Name>Calendar Quarter</Name>
    <KeyColumns>
      <KeyColumn>
        <DataType>UnsignedTinyInt</DataType>
        <Source xsi:type="ColumnBinding">
          <TableID>dbo_DimDate</TableID>
          <ColumnID>CalendarQuarter</ColumnID>
        </Source>
      </KeyColumn>
    </KeyColumns>
    <NameColumn>
      <DataType>WChar</DataType>
      <Source xsi:type="ColumnBinding">
        <TableID>dbo_DimDate</TableID>
        <ColumnID>CalendarQuarter</ColumnID>
      </Source>
    </NameColumn>
    <OrderBy>Key</OrderBy>
  </Attribute>
  <Attribute>
    <ID>English Month Name</ID>
    <Name>English Month Name</Name>
    <KeyColumns>
      <KeyColumn>
        <DataType>WChar</DataType>
        <DataSize>10</DataSize>
        <Source xsi:type="ColumnBinding">
          <TableID>dbo_DimDate</TableID>
          <ColumnID>EnglishMonthName</ColumnID>
        </Source>
      </KeyColumn>
```


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```
      </KeyColumns>
      <NameColumn>
        <DataType>WChar</DataType>
        <DataSize>10</DataSize>
        <Source xsi:type="ColumnBinding">
          <TableID>dbo_DimDate</TableID>
          <ColumnID>EnglishMonthName</ColumnID>
        </Source>
      </NameColumn>
      <OrderBy>Key</OrderBy>
    </Attribute>
    <Attribute>
      <ID>Calendar Year</ID>
      <Name>Calendar Year</Name>
      <EstimatedCount>5</EstimatedCount>
      <KeyColumns>
        <KeyColumn>
          <DataType>SmallInt</DataType>
          <Source xsi:type="ColumnBinding">
            <TableID>dbo_DimDate</TableID>
            <ColumnID>CalendarYear</ColumnID>
          </Source>
        </KeyColumn>
      </KeyColumns>
      <NameColumn>
        <DataType>WChar</DataType>
        <Source xsi:type="ColumnBinding">
          <TableID>dbo_DimDate</TableID>
          <ColumnID>CalendarYear</ColumnID>
        </Source>
      </NameColumn>
      <OrderBy>Key</OrderBy>
    </Attribute>
  </Attributes>
  <Hierarchies>
    <Hierarchy>
      <ID>Hierarchy</ID>
      <Name>Calendar Hierarchy</Name>
      <Levels>
        <Level>
          <ID>Calendar Year</ID>
          <Name>Calendar Year</Name>
          <SourceAttributeID>Calendar Year</SourceAttributeID>
        </Level>
        <Level>
          <ID>Calendar Quarter</ID>
          <Name>Calendar Quarter</Name>
          <SourceAttributeID>Calendar Quarter</SourceAttributeID>
        </Level>
        <Level>
          <ID>English Month Name</ID>
          <Name>English Month Name</Name>
          <SourceAttributeID>English Month Name</SourceAttributeID>
        </Level>
        <Level>
          <ID>Week Number Of Year</ID>
          <Name>Week Number Of Year</Name>
          <SourceAttributeID>Week Number Of Year</SourceAttributeID>
        </Level>
```


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```
                <Level>
                  <ID>Full Date Alternate Key</ID>
                  <Name>Full Date Alternate Key</Name>
                  <SourceAttributeID>Full Date Alternate Key</SourceAttributeID>
                </Level>
              </Levels>
            </Hierarchy>
          </Hierarchies>
          <ProactiveCaching>
            <SilenceInterval>-PT1S</SilenceInterval>
            <Latency>-PT1S</Latency>
            <SilenceOverrideInterval>-PT1S</SilenceOverrideInterval>
            <ForceRebuildInterval>-PT1S</ForceRebuildInterval>
            <Source xsi:type="ProactiveCachingInheritedBinding" />
          </ProactiveCaching>
        </Dimension>
        <Dimension>
          <ID>Dim Customer</ID>
          <Name>Customer</Name>
          <Annotations>
            <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramLayout</Name>
            </Annotation>
            <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:ShowFriendlyNames</Name>
              <Value>true</Value>
            </Annotation>
            <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:ShowRelationshipNames</Name>
              <Value>false</Value>
            </Annotation>
            <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:UseDiagramDefaultLayout</Name>
              <Value>true</Value>
            </Annotation>
            <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramViewPortLeft</Name>
              <Value>0</Value>
            </Annotation>
            <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramViewPortTop</Name>
              <Value>0</Value>
            </Annotation>
            <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramBoundingLeft</Name>
              <Value>0</Value>
            </Annotation>
            <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramBoundingTop</Name>
              <Value>0</Value>
            </Annotation>
            <Annotation>
```


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```
<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramZoom</Name>
              <Value>100</Value>
            </Annotation>
          </Annotations>
          <Source xsi:type="DataSourceViewBinding">
            <DataSourceViewID>dsvAdventureWorksDW2008</DataSourceViewID>
          </Source>
          <ErrorConfiguration>
            <KeyNotFound>ReportAndStop</KeyNotFound>
            <KeyDuplicate>ReportAndStop</KeyDuplicate>
            <NullKeyNotAllowed>ReportAndStop</NullKeyNotAllowed>
          </ErrorConfiguration>
          <Language>1033</Language>
          <Collation>Latin1_General_CI_AS</Collation>
          <UnknownMemberName>Unknown</UnknownMemberName>
          <Attributes>
            <Attribute>
              <ID>Customer Key</ID>
              <Name>Customer Key</Name>
              <Usage>Key</Usage>
              <EstimatedCount>18484</EstimatedCount>
              <KeyColumns>
                <KeyColumn>
                  <DataType>Integer</DataType>
                  <Source xsi:type="ColumnBinding">
                    <TableID>dbo_DimCustomer</TableID>
                    <ColumnID>CustomerKey</ColumnID>
                  </Source>
                </KeyColumn>
              </KeyColumns>
              <NameColumn>
                <DataType>WChar</DataType>
                <Source xsi:type="ColumnBinding">
                  <TableID>dbo_DimCustomer</TableID>
                  <ColumnID>CustomerKey</ColumnID>
                </Source>
              </NameColumn>
              <OrderBy>Key</OrderBy>
            </Attribute>
          </Attributes>
          <ProactiveCaching>
            <SilenceInterval>-PT1S</SilenceInterval>
            <Latency>-PT1S</Latency>
            <SilenceOverrideInterval>-PT1S</SilenceOverrideInterval>
            <ForceRebuildInterval>-PT1S</ForceRebuildInterval>
            <Source xsi:type="ProactiveCachingInheritedBinding" />
          </ProactiveCaching>
        </Dimension>
        <Dimension>
          <ID>Dim Sales Territory</ID>
          <Name>Sales Territory</Name>
          <Annotations>
            <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramLayout</Name>
              </Annotation>
              <Annotation>
```


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```
<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:ShowFriendlyNames</Name>
              <Value>true</Value>
            </Annotation>
            <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:ShowRelationshipNames</Name>
              <Value>false</Value>
            </Annotation>
            <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:UseDiagramDefaultLayout</Name>
              <Value>true</Value>
            </Annotation>
            <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramViewPortLeft</Name>
              <Value>0</Value>
            </Annotation>
            <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramViewPortTop</Name>
              <Value>0</Value>
            </Annotation>
            <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramBoundingLeft</Name>
              <Value>0</Value>
            </Annotation>
            <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramBoundingTop</Name>
              <Value>0</Value>
            </Annotation>
            <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramZoom</Name>
              <Value>100</Value>
            </Annotation>
          </Annotations>
          <Source xsi:type="DataSourceViewBinding">
            <DataSourceViewID>dsvAdventureWorksDW2008</DataSourceViewID>
          </Source>
          <ErrorConfiguration>
            <KeyNotFound>ReportAndStop</KeyNotFound>
            <KeyDuplicate>ReportAndStop</KeyDuplicate>
            <NullKeyNotAllowed>ReportAndStop</NullKeyNotAllowed>
          </ErrorConfiguration>
          <Language>1033</Language>
          <Collation>Latin1_General_CI_AS</Collation>
          <UnknownMemberName>Unknown</UnknownMemberName>
          <Attributes>
            <Attribute>
              <ID>Sales Territory Key</ID>
              <Name>Sales Territory Key</Name>
              <Usage>Key</Usage>
              <EstimatedCount>11</EstimatedCount>
              <KeyColumns>
                <KeyColumn>
                  <DataType>Integer</DataType>
```


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```
                  <Source xsi:type="ColumnBinding">
                    <TableID>dbo_DimSalesTerritory</TableID>
                    <ColumnID>SalesTerritoryKey</ColumnID>
                  </Source>
                </KeyColumn>
              </KeyColumns>
              <NameColumn>
                <DataType>WChar</DataType>
                <Source xsi:type="ColumnBinding">
                  <TableID>dbo_DimSalesTerritory</TableID>
                  <ColumnID>SalesTerritoryKey</ColumnID>
                </Source>
              </NameColumn>
              <OrderBy>Key</OrderBy>
            </Attribute>
          </Attributes>
          <ProactiveCaching>
            <SilenceInterval>-PT1S</SilenceInterval>
            <Latency>-PT1S</Latency>
            <SilenceOverrideInterval>-PT1S</SilenceOverrideInterval>
            <ForceRebuildInterval>-PT1S</ForceRebuildInterval>
            <Source xsi:type="ProactiveCachingInheritedBinding" />
          </ProactiveCaching>
        </Dimension>
        <Dimension>
          <ID>Dim Product</ID>
          <Name>Product</Name>
          <Annotations>
            <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramLayout</Name>
              <Value>
                <dds xmlns="">
                  <diagram fontclsid="{0BE35203-8F91-11CE-9DE3-00AA004BB851}"
mouseiconclsid="{0BE35204-8F91-11CE-9DE3-00AA004BB851}" defaultlayout="MSDDS.Rectilinear"
defaultlineroute="MSDDS.Rectilinear" version="7" nextobject="12" scale="100"
pagebreakanchorx="0" pagebreakanchory="0" pagebreaksizex="0" pagebreaksizey="0"
scrollleft="1715" scrolltop="-2135" gridx="150" gridy="150" marginx="5000" marginy="5000"
zoom="75" x="11695" y="14235" backcolor="15334399" defaultpersistence="2"
PrintPageNumbersMode="3" PrintMarginTop="0" PrintMarginBottom="635" PrintMarginLeft="0"
PrintMarginRight="0" marqueeselectionmode="0" mousepointer="0" snaptogrid="0"
autotypeannotation="1" showscrollbars="0" viewpagebreaks="0"
donotforceconnectorsbehindshapes="1" backpictureclsid="{00000000-0000-0000-0000-
000000000000}">
                    <font>
                      <ddsxmlobjectstreamwrapper binary="0100000090014442010006546168 6f6d61"
/>
                    </font>
                    <mouseicon>
                      <ddsxmlobjectstreamwrapper binary="6c74000000000000" />
                    </mouseicon>
                  </diagram>
                  <layoutmanager>
                    <ddsxmlobj />
                  </layoutmanager>
                  <ddscontrol controlprogid="DdsShapes.DdsObjectManagedBridge.2"
tooltip="DimProductCategory" left="2870" top="-353" logicalid="6" controlid="1" masterid="0"
hint1="0" hint2="0" width="6818" height="3149" noresize="0" nomove="0"
nodefaultattachpoints="0" autodrag="1" usedefaultiddshape="1" selectable="1"
```


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```
showselectionhandles="1" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
                    <control>
                      <ddsxmlobjectstreaminitwrapper binary="00080000a21a00004d0c0000" />
                    </control>
                    <layoutobject>
                      <ddsxmlobj>
                        <property name="LogicalObject" value="dbo_DimProductCategory"
vartype="8" />
                      </ddsxmlobj>
                    </layoutobject>
                    <shape groupshapeid="0" groupnode="0" />
                  </ddscontrol>
                  <ddscontrol controlprogid="DdsShapes.DdsObjectManagedBridge.2"
tooltip="DimProduct" left="3107" top="9112" logicalid="7" controlid="2" masterid="0"
hint1="0" hint2="0" width="7858" height="5352" noresize="0" nomove="0"
nodefaultattachpoints="0" autodrag="1" usedefaultiddshape="1" selectable="1"
showselectionhandles="1" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
                    <control>
                      <ddsxmlobjectstreaminitwrapper binary="00080000b21e0000e8140000" />
                    </control>
                    <layoutobject>
                      <ddsxmlobj>
                        <property name="LogicalObject" value="dbo_DimProduct" vartype="8" />
                      </ddsxmlobj>
                    </layoutobject>
                    <shape groupshapeid="0" groupnode="0" />
                  </ddscontrol>
                  <ddscontrol controlprogid="DdsShapes.DdsObjectManagedBridge.2"
tooltip="DimProductSubcategory" left="2913" top="4126" logicalid="8" controlid="3"
masterid="0" hint1="0" hint2="0" width="8423" height="3572" noresize="0" nomove="0"
nodefaultattachpoints="0" autodrag="1" usedefaultiddshape="1" selectable="1"
showselectionhandles="1" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
                    <control>
                      <ddsxmlobjectstreaminitwrapper binary="00080000e7200000f40d0000" />
                    </control>
                    <layoutobject>
                      <ddsxmlobj>
                        <property name="LogicalObject" value="dbo_DimProductSubcategory"
vartype="8" />
                      </ddsxmlobj>
                    </layoutobject>
                    <shape groupshapeid="0" groupnode="0" />
                  </ddscontrol>
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selectable="1" showselectionhandles="0" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
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                      <ddsxmlobj>
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linerender="1" customendtypedstid="0" customendtypesrcid="0" adornsvisible="1" />
                      </ddsxmlobj>
                    </control>
                    <layoutobject>
                      <ddsxmlobj>
                        <property name="LogicalObject"
value="dataSet.Relations[FK_DimProductSubcategory_DimProductCategory]" vartype="8" />
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                      <property name="Virtual" value="0" vartype="11" />
                      <property name="VisibleAP" value="0" vartype="3" />
                    </ddsxmlobj>
                  </layoutobject>
                  <connector lineroutestyle="MSDDS.Rectilinear" sourceid="1" destid="3"
sourceattachpoint="1" destattachpoint="24" segmenteditmode="0" bendpointeditmode="0"
bendpointvisibility="0" relatedid="0" virtual="0">
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                    <point x="9874" y="4126" />
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                </ddscontrol>
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selectable="1" showselectionhandles="0" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
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linerender="1" customendtypedstid="0" customendtypesrcid="0" adornsvisible="1" />
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                  </control>
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                      <property name="LogicalObject"
value="dataSet.Relations[FK_DimProduct_DimProductSubcategory]" vartype="8" />
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                      <property name="VisibleAP" value="0" vartype="3" />
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                  </layoutobject>
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sourceattachpoint="1" destattachpoint="0" segmenteditmode="0" bendpointeditmode="0"
bendpointvisibility="0" relatedid="0" virtual="0">
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                    <point x="3540" y="8899" />
                    <point x="3540" y="8712" />
                    <point x="3736" y="8712" />
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                  </connector>
                </ddscontrol>
              </dds>
            </Value>
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          <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:UseDiagramDefaultLayout</Name>
            <Value>true</Value>
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            </Annotation>
            <Annotation>

  <Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramViewPortLeft</Name>
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            </Annotation>
            <Annotation>

  <Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramViewPortTop</Name>
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  <Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramBoundingLeft</Name>
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  <Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramBoundingTop</Name>
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  <Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramZoom</Name>
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  <Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:ARDiagramLayout</Name>
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                    <Shape Id="Product Key" Expanded="true">
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                      </Attributes>
                      <Position x="20" y="20" />
                    </Shape>
                    <Shape Id="English Product Name" Expanded="false">
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                      </Attributes>
                      <Position x="246" y="20" />
                    </Shape>
                  </Shapes>
                </DiagramLayout>
              </Value>
            </Annotation>
          </Annotations>
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            <DataSourceViewID>dsvAdventureWorksDW2008</DataSourceViewID>
          </Source>
          <UnknownMember>Visible</UnknownMember>
          <ErrorConfiguration>
            <KeyNotFound>ReportAndStop</KeyNotFound>
            <KeyDuplicate>ReportAndStop</KeyDuplicate>
            <NullKeyNotAllowed>ReportAndStop</NullKeyNotAllowed>
          </ErrorConfiguration>
          <Language>1033</Language>
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<Collation>Latin1_General_CI_AS</Collation>
<UnknownMemberName>Unknown</UnknownMemberName>
<Attributes>
  <Attribute>
    <ID>Product Key</ID>
    <Name>Product Key</Name>
    <Usage>Key</Usage>
    <EstimatedCount>606</EstimatedCount>
    <KeyColumns>
      <KeyColumn>
        <DataType>Integer</DataType>
        <Source xsi:type="ColumnBinding">
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          <ColumnID>ProductKey</ColumnID>
        </Source>
      </KeyColumn>
    </KeyColumns>
    <NameColumn>
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      <Source xsi:type="ColumnBinding">
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        <ColumnID>ProductKey</ColumnID>
      </Source>
    </NameColumn>
    <AttributeRelationships>
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        <Name>English Product Name</Name>
      </AttributeRelationship>
      <AttributeRelationship>
        <AttributeID>English Product Subcategory Name</AttributeID>
        <Name>English Product Subcategory Name</Name>
      </AttributeRelationship>
      <AttributeRelationship>
        <AttributeID>Product Subcategory Key</AttributeID>
        <Name>Product Subcategory Key</Name>
      </AttributeRelationship>
      <AttributeRelationship>
        <AttributeID>Product Category Key</AttributeID>
        <Name>Product Category Key</Name>
      </AttributeRelationship>
      <AttributeRelationship>
        <AttributeID>English Product Category Name</AttributeID>
        <Name>English Product Category Name</Name>
      </AttributeRelationship>
    </AttributeRelationships>
    <OrderBy>Key</OrderBy>
  </Attribute>
  <Attribute>
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    <Name>English Product Name</Name>
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        <DataSize>50</DataSize>
        <Source xsi:type="ColumnBinding">
          <TableID>dbo_DimProduct</TableID>
          <ColumnID>EnglishProductName</ColumnID>
        </Source>
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      </KeyColumn>
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      <Name>Product Hierarchy</Name>
      <Levels>
        <Level>
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            <Latency>-PT1S</Latency>
            <SilenceOverrideInterval>-PT1S</SilenceOverrideInterval>
            <ForceRebuildInterval>-PT1S</ForceRebuildInterval>
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      </Dimensions>
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mouseiconclsid="{0BE35204-8F91-11CE-9DE3-00AA004BB851}" defaultlayout="MSDDS.Rectilinear"
defaultlineroute="MSDDS.Rectilinear" version="7" nextobject="32" scale="100"
pagebreakanchorx="0" pagebreakanchory="0" pagebreaksizex="0" pagebreaksizey="0" scrollleft="-
2240" scrolltop="5062" gridx="150" gridy="150" marginx="5000" marginy="5000" zoom="75"
x="16034" y="10821" backcolor="15334399" defaultpersistence="2" PrintPageNumbersMode="3"
PrintMarginTop="0" PrintMarginBottom="635" PrintMarginLeft="0" PrintMarginRight="0"
marqueeselectionmode="0" mousepointer="0" snaptogrid="0" autotypeannotation="1"
showscrollbars="1" viewpagebreaks="0" donotforceconnectorsbehindshapes="1"
backpictureclsid="{00000000-0000-0000-0000-000000000000}">
                    <font>
                      <ddsxmlobjectstreamwrapper binary="0100000090014442010006546168 6f6d61"
/>
                    </font>
                    <mouseicon>
                      <ddsxmlobjectstreamwrapper binary="6c74000000000000" />
                    </mouseicon>
                  </diagram>
                  <layoutmanager>
                    <ddsxmlobj />
                  </layoutmanager>
                  <ddscontrol controlprogid="DdsShapes.DdsObjectManagedBridge.2"
tooltip="DimSalesTerritory" left="-1850" top="1213" logicalid="16" controlid="1" masterid="0"
hint1="0" hint2="0" width="4498" height="3149" noresize="0" nomove="0"
nodefaultattachpoints="0" autodrag="1" usedefaultiddshape="1" selectable="1"
showselectionhandles="1" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
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                    </control>
                    <layoutobject>
                      <ddsxmlobj>
                        <property name="LogicalObject" value="dbo_DimSalesTerritory"
vartype="8" />
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                    </layoutobject>
                    <shape groupshapeid="0" groupnode="0" />
                  </ddscontrol>
                  <ddscontrol controlprogid="DdsShapes.DdsObjectManagedBridge.2"
tooltip="FactInternetSales" left="6494" top="3004" logicalid="17" controlid="2" masterid="0"
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hint1="0" hint2="0" width="4101" height="5000" noresize="0" nomove="0"
nodefaultattachpoints="0" autodrag="1" usedefaultiddshape="1" selectable="1"
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groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
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vartype="8" />
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                    <shape groupshapeid="0" groupnode="0" />
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tooltip="DimCustomer" left="9185" top="10454" logicalid="18" controlid="3" masterid="0"
hint1="0" hint2="0" width="4207" height="5000" noresize="0" nomove="0"
nodefaultattachpoints="0" autodrag="1" usedefaultiddshape="1" selectable="1"
showselectionhandles="1" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
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masterid="0" hint1="0" hint2="0" width="5530" height="3572" noresize="0" nomove="0"
nodefaultattachpoints="0" autodrag="1" usedefaultiddshape="1" selectable="1"
showselectionhandles="1" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
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                    </layoutobject>
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masterid="0" hint1="0" hint2="0" width="5054" height="3149" noresize="0" nomove="0"
nodefaultattachpoints="0" autodrag="1" usedefaultiddshape="1" selectable="1"
showselectionhandles="1" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
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                        <property name="LogicalObject" value="dbo_DimProductCategory"
vartype="8" />
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                    </layoutobject>
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hint2="0" width="4524" height="5000" noresize="0" nomove="0" nodefaultattachpoints="0"
autodrag="1" usedefaultiddshape="1" selectable="1" showselectionhandles="1" allownudging="1"
isannotation="0" dontautolayout="0" groupcollapsed="0" tabstop="1" visible="1"
snaptogrid="0">
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                  <ddscontrol controlprogid="DdsShapes.DdsObjectManagedBridge.2"
tooltip="DimProduct" left="16364" top="-564" logicalid="22" controlid="7" masterid="0"
hint1="0" hint2="0" width="4366" height="5000" noresize="0" nomove="0"
nodefaultattachpoints="0" autodrag="1" usedefaultiddshape="1" selectable="1"
showselectionhandles="1" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
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                    </layoutobject>
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groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
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linerender="1" customendtypedstid="0" customendtypesrcid="0" adornsvisible="1" />
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                    <layoutobject>
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value="dataSet.Relations[FK_FactInternetSales_DimSalesTerritory]" vartype="8" />
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                        <property name="VisibleAP" value="0" vartype="3" />
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                    </layoutobject>
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bendpointvisibility="0" relatedid="0" virtual="0">
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                  </connector>
                </ddscontrol>
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logicalid="24" controlid="9" masterid="0" hint1="0" hint2="0" width="4302" height="2924"
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selectable="1" showselectionhandles="0" allownudging="1" isannotation="0" dontautolayout="0"
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bendpointvisibility="0" relatedid="0" virtual="0">
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noresize="0" nomove="0" nodefaultattachpoints="1" autodrag="0" usedefaultiddshape="0"
selectable="1" showselectionhandles="0" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
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value="dataSet.Relations[FK_FactInternetSales_DimDate2]" vartype="8" />
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                      <property name="VisibleAP" value="0" vartype="3" />
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                  If the CALCULATE command is deleted or modified, the data within the cube
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                  You should edit this command only if you manually specify how the cube is
aggregated.
                  */
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vartype="8" />
                            </ddsxmlobj>
                          </layoutobject>
                          <shape groupshapeid="0" groupnode="0" />
                        </ddscontrol>
                        <ddscontrol controlprogid="DdsShapes.DdsObjectManagedBridge.2"
tooltip="DimSalesTerritory" left="0" top="10385" logicalid="18" controlid="3" masterid="0"
hint1="0" hint2="0" width="4498" height="3149" noresize="0" nomove="0"
nodefaultattachpoints="0" autodrag="1" usedefaultiddshape="1" selectable="1"
showselectionhandles="1" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
                          <control>
                            <ddsxmlobjectstreaminitwrapper binary="00080000921100004d0c0000"
/>
                          </control>
                          <layoutobject>
                            <ddsxmlobj>
                              <property name="LogicalObject" value="dbo_DimSalesTerritory"
vartype="8" />
                            </ddsxmlobj>
                          </layoutobject>
                          <shape groupshapeid="0" groupnode="0" />
                        </ddscontrol>
                        <ddscontrol controlprogid="DdsShapes.DdsObjectManagedBridge.2"
tooltip="DimDate" left="3383" top="26320" logicalid="19" controlid="4" masterid="0" hint1="0"
hint2="0" width="4524" height="5000" noresize="0" nomove="0" nodefaultattachpoints="0"
autodrag="1" usedefaultiddshape="1" selectable="1" showselectionhandles="1" allownudging="1"
isannotation="0" dontautolayout="0" groupcollapsed="0" tabstop="1" visible="1"
snaptogrid="0">
                          <control>
                            <ddsxmlobjectstreaminitwrapper binary="00080000ac11000088130000"
/>
                          </control>
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                        <layoutobject>
                          <ddsxmlobj>
                            <property name="LogicalObject" value="dbo_DimDate" vartype="8"
/>
                          </ddsxmlobj>
                        </layoutobject>
                        <shape groupshapeid="0" groupnode="0" />
                      </ddscontrol>
                      <ddscontrol controlprogid="DdsShapes.DdsObjectManagedBridge.2"
tooltip="DimCustomer" left="10307" top="26320" logicalid="20" controlid="5" masterid="0"
hint1="0" hint2="0" width="4207" height="5000" noresize="0" nomove="0"
nodefaultattachpoints="0" autodrag="1" usedefaultiddshape="1" selectable="1"
showselectionhandles="1" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
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/>
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                        <layoutobject>
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                            <property name="LogicalObject" value="dbo_DimCustomer"
vartype="8" />
                          </ddsxmlobj>
                        </layoutobject>
                        <shape groupshapeid="0" groupnode="0" />
                      </ddscontrol>
                      <ddscontrol controlprogid="DdsShapes.DdsObjectManagedBridge.2"
tooltip="DimProductCategory" left="13637" top="13372" logicalid="21" controlid="6"
masterid="0" hint1="0" hint2="0" width="5054" height="3149" noresize="0" nomove="0"
nodefaultattachpoints="0" autodrag="1" usedefaultiddshape="1" selectable="1"
showselectionhandles="1" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
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                          <ddsxmlobjectstreaminitwrapper binary="00080000be1300004d0c0000"
/>
                        </control>
                        <layoutobject>
                          <ddsxmlobj>
                            <property name="LogicalObject" value="dbo_DimProductCategory"
vartype="8" />
                          </ddsxmlobj>
                        </layoutobject>
                        <shape groupshapeid="0" groupnode="0" />
                      </ddscontrol>
                      <ddscontrol controlprogid="DdsShapes.DdsObjectManagedBridge.2"
tooltip="DimProductSubcategory" left="13399" top="7400" logicalid="22" controlid="7"
masterid="0" hint1="0" hint2="0" width="5530" height="3572" noresize="0" nomove="0"
nodefaultattachpoints="0" autodrag="1" usedefaultiddshape="1" selectable="1"
showselectionhandles="1" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
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/>
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                        <layoutobject>
                          <ddsxmlobj>
                            <property name="LogicalObject"
value="dbo_DimProductSubcategory" vartype="8" />
                          </ddsxmlobj>
                        </layoutobject>
                        <shape groupshapeid="0" groupnode="0" />
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                        </ddscontrol>
                        <ddscontrol controlprogid="MSDDS.Polyline" left="6896" top="14125"
logicalid="23" controlid="8" masterid="0" hint1="0" hint2="0" width="1840" height="12695"
noresize="0" nomove="0" nodefaultattachpoints="1" autodrag="0" usedefaultiddshape="0"
selectable="1" showselectionhandles="0" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
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                            <ddsxmlobj>
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linestyle="0" linerender="1" customendtypedstid="0" customendtypesrcid="0" adornsvisible="1"
/>
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                          </control>
                          <layoutobject>
                            <ddsxmlobj>
                              <property name="LogicalObject"
value="dataSet.Relations[FK_FactInternetSales_DimDate]" vartype="8" />
                              <property name="Virtual" value="0" vartype="11" />
                              <property name="VisibleAP" value="0" vartype="3" />
                            </ddsxmlobj>
                          </layoutobject>
                          <connector lineroutestyle="MSDDS.Rectilinear" sourceid="4"
destid="1" sourceattachpoint="12" destattachpoint="9" segmenteditmode="0"
bendpointeditmode="0" bendpointvisibility="0" relatedid="0" virtual="0">
                            <point x="7295" y="26320" />
                            <point x="7295" y="20390" />
                            <point x="8436" y="20390" />
                            <point x="8436" y="14425" />
                          </connector>
                        </ddscontrol>
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logicalid="24" controlid="9" masterid="0" hint1="0" hint2="0" width="1840" height="12695"
noresize="0" nomove="0" nodefaultattachpoints="1" autodrag="0" usedefaultiddshape="0"
selectable="1" showselectionhandles="0" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
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linestyle="0" linerender="1" customendtypedstid="0" customendtypesrcid="0" adornsvisible="1"
/>
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                          </control>
                          <layoutobject>
                            <ddsxmlobj>
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value="dataSet.Relations[FK_FactInternetSales_DimDate2]" vartype="8" />
                              <property name="Virtual" value="0" vartype="11" />
                              <property name="VisibleAP" value="0" vartype="3" />
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destid="1" sourceattachpoint="10" destattachpoint="7" segmenteditmode="0"
bendpointeditmode="0" bendpointvisibility="0" relatedid="0" virtual="0">
                            <point x="6745" y="26320" />
                            <point x="6745" y="20390" />
                            <point x="7886" y="20390" />
                            <point x="7886" y="14425" />
                          </connector>
                        </ddscontrol>
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logicalid="25" controlid="10" masterid="0" hint1="0" hint2="0" width="1840" height="12695"
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noresize="0" nomove="0" nodefaultattachpoints="1" autodrag="0" usedefaultiddshape="0"
selectable="1" showselectionhandles="0" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
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                          <ddsxmlobj>
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linestyle="0" linerender="1" customendtypedstid="0" customendtypesrcid="0" adornsvisible="1"
/>
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                        </control>
                        <layoutobject>
                          <ddsxmlobj>
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value="dataSet.Relations[FK_FactInternetSales_DimDate1]" vartype="8" />
                            <property name="Virtual" value="0" vartype="11" />
                            <property name="VisibleAP" value="0" vartype="3" />
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                        </layoutobject>
                        <connector lineroutestyle="MSDDS.Rectilinear" sourceid="4"
destid="1" sourceattachpoint="8" destattachpoint="5" segmenteditmode="0"
bendpointeditmode="0" bendpointvisibility="0" relatedid="0" virtual="0">
                          <point x="6195" y="26320" />
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                      </ddscontrol>
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logicalid="26" controlid="11" masterid="0" hint1="0" hint2="0" width="2359" height="12978"
noresize="0" nomove="0" nodefaultattachpoints="1" autodrag="0" usedefaultiddshape="0"
selectable="1" showselectionhandles="0" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
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                          <ddsxmlobj>
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linestyle="0" linerender="2" customendtypedstid="0" customendtypesrcid="0" adornsvisible="1"
/>
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                        </control>
                        <layoutobject>
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value="dataSet.Relations[FK_FactInternetSales_DimCustomer]" vartype="8" />
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                        </layoutobject>
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destid="1" sourceattachpoint="6" destattachpoint="35" segmenteditmode="0"
bendpointeditmode="0" bendpointvisibility="0" relatedid="0" virtual="0">
                          <point x="12410" y="26320" />
                          <point x="12410" y="20390" />
                          <point x="11828" y="20390" />
                          <point x="11828" y="14142" />
                          <point x="10751" y="14142" />
                        </connector>
                      </ddscontrol>
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logicalid="27" controlid="12" masterid="0" hint1="0" hint2="0" width="2224" height="799"
noresize="0" nomove="0" nodefaultattachpoints="1" autodrag="0" usedefaultiddshape="0"
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```
selectable="1" showselectionhandles="0" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
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linestyle="0" linerender="1" customendtypedstid="0" customendtypesrcid="0" adornsvisible="1"
/>
                          </ddsxmlobj>
                        </control>
                        <layoutobject>
                          <ddsxmlobj>
                            <property name="LogicalObject"
value="dataSet.Relations[FK_FactInternetSales_DimSalesTerritory]" vartype="8" />
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                            <property name="VisibleAP" value="0" vartype="3" />
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destid="1" sourceattachpoint="19" destattachpoint="26" segmenteditmode="0"
bendpointeditmode="0" bendpointvisibility="0" relatedid="0" virtual="0">
                          <point x="4498" y="11959" />
                          <point x="5698" y="11959" />
                          <point x="5698" y="11942" />
                          <point x="6122" y="11942" />
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logicalid="28" controlid="13" masterid="0" hint1="0" hint2="0" width="3830" height="9041"
noresize="0" nomove="0" nodefaultattachpoints="1" autodrag="0" usedefaultiddshape="0"
selectable="1" showselectionhandles="0" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
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linestyle="0" linerender="1" customendtypedstid="0" customendtypesrcid="0" adornsvisible="1"
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                        </control>
                        <layoutobject>
                          <ddsxmlobj>
                            <property name="LogicalObject"
value="dataSet.Relations[FK_FactInternetSales_DimProduct]" vartype="8" />
                            <property name="Virtual" value="0" vartype="11" />
                            <property name="VisibleAP" value="0" vartype="3" />
                          </ddsxmlobj>
                        </layoutobject>
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destid="1" sourceattachpoint="22" destattachpoint="23" segmenteditmode="0"
bendpointeditmode="0" bendpointvisibility="0" relatedid="0" virtual="0">
                          <point x="13981" y="2500" />
                          <point x="12490" y="2500" />
                          <point x="12490" y="10842" />
                          <point x="10751" y="10842" />
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                      </ddscontrol>
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logicalid="29" controlid="14" masterid="0" hint1="0" hint2="0" width="799" height="3200"
noresize="0" nomove="0" nodefaultattachpoints="1" autodrag="0" usedefaultiddshape="0"
selectable="1" showselectionhandles="0" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
                        <control>
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```
                            <ddsxmlobj>
                              <polyline endtypedst="6" endtypesrc="3" usercolor="0"
linestyle="0" linerender="1" customendtypedstid="0" customendtypesrcid="0" adornsvisible="1"
/>
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                          </control>
                          <layoutobject>
                            <ddsxmlobj>
                              <property name="LogicalObject"
value="dataSet.Relations[FK_DimProduct_DimProductSubcategory]" vartype="8" />
                              <property name="Virtual" value="0" vartype="11" />
                              <property name="VisibleAP" value="0" vartype="3" />
                            </ddsxmlobj>
                          </layoutobject>
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destid="2" sourceattachpoint="8" destattachpoint="7" segmenteditmode="0"
bendpointeditmode="0" bendpointvisibility="0" relatedid="0" virtual="0">
                            <point x="16164" y="7400" />
                            <point x="16164" y="5000" />
                          </connector>
                        </ddscontrol>
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logicalid="30" controlid="15" masterid="0" hint1="0" hint2="0" width="799" height="3200"
noresize="0" nomove="0" nodefaultattachpoints="1" autodrag="0" usedefaultiddshape="0"
selectable="1" showselectionhandles="0" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
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                            <ddsxmlobj>
                              <polyline endtypedst="6" endtypesrc="3" usercolor="0"
linestyle="0" linerender="1" customendtypedstid="0" customendtypesrcid="0" adornsvisible="1"
/>
                            </ddsxmlobj>
                          </control>
                          <layoutobject>
                            <ddsxmlobj>
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value="dataSet.Relations[FK_DimProductSubcategory_DimProductCategory]" vartype="8" />
                              <property name="Virtual" value="0" vartype="11" />
                              <property name="VisibleAP" value="0" vartype="3" />
                            </ddsxmlobj>
                          </layoutobject>
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destid="7" sourceattachpoint="8" destattachpoint="9" segmenteditmode="0"
bendpointeditmode="0" bendpointvisibility="0" relatedid="0" virtual="0">
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                            <point x="16164" y="10972" />
                          </connector>
                        </ddscontrol>
                      </dds>
                    </DiagramLayout>
                    <ShowRelationshipNames>False</ShowRelationshipNames>
                    <UseDiagramDefaultLayout>True</UseDiagramDefaultLayout>
                    <DiagramViewPortLeft>4450</DiagramViewPortLeft>
                    <DiagramViewPortTop>7616</DiagramViewPortTop>
                    <DiagramBoundingLeft>0</DiagramBoundingLeft>
                    <DiagramBoundingTop>0</DiagramBoundingTop>
                    <DiagramZoom>75</DiagramZoom>
                  </Diagram>
                </Layouts>
              </Value>
```


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            </Annotation>
          </Annotations>
          <DataSourceID>dsAdventureWorksDW2008</DataSourceID>
          <Schema>
            <xs:schema id="dsvAdventureWorksDW2008" xmlns=""
xmlns:xs="http://www.w3.org/2001/XMLSchema" xmlns:msdata="urn:schemas-microsoft-com:xml-
msdata" xmlns:msprop="urn:schemas-microsoft-com:xml-msprop">
              <xs:element name="dsvAdventureWorksDW2008" msdata:IsDataSet="true"
msdata:UseCurrentLocale="true">
                <xs:complexType>
                  <xs:choice minOccurs="0" maxOccurs="unbounded">
                    <xs:element name="dbo_FactInternetSales"
msprop:FriendlyName="FactInternetSales" msprop:DbSchemaName="dbo"
msprop:DbTableName="vwFactInternetSales" msprop:TableType="View">
                      <xs:complexType>
                        <xs:sequence>
                          <xs:element name="ProductKey" msprop:FriendlyName="ProductKey"
msprop:DbColumnName="ProductKey" type="xs:int" />
                          <xs:element name="OrderDateKey" msprop:FriendlyName="OrderDateKey"
msprop:DbColumnName="OrderDateKey" type="xs:int" />
                          <xs:element name="DueDateKey" msprop:FriendlyName="DueDateKey"
msprop:DbColumnName="DueDateKey" type="xs:int" />
                          <xs:element name="ShipDateKey" msprop:FriendlyName="ShipDateKey"
msprop:DbColumnName="ShipDateKey" type="xs:int" />
                          <xs:element name="CustomerKey" msprop:FriendlyName="CustomerKey"
msprop:DbColumnName="CustomerKey" type="xs:int" />
                          <xs:element name="SalesTerritoryKey"
msprop:FriendlyName="SalesTerritoryKey" msprop:DbColumnName="SalesTerritoryKey" type="xs:int"
/>
                          <xs:element name="OrderQuantity"
msprop:FriendlyName="OrderQuantity" msprop:DbColumnName="OrderQuantity" type="xs:short" />
                          <xs:element name="SalesAmount" msprop:FriendlyName="SalesAmount"
msprop:DbColumnName="SalesAmount" type="xs:decimal" />
                          <xs:element name="TaxAmt" msprop:FriendlyName="TaxAmt"
msprop:DbColumnName="TaxAmt" type="xs:decimal" />
                          <xs:element name="Total_x0020_Amount" msdata:ReadOnly="true"
msprop:DbColumnName="Total Amount" msprop:ComputedColumnExpression="([SalesAmount]+[TaxAmt])"
msprop:Description="" msprop:IsLogical="True" type="xs:decimal" minOccurs="0" />
                        </xs:sequence>
                      </xs:complexType>
                    </xs:element>
                    <xs:element name="dbo_DimProduct" msprop:FriendlyName="DimProduct"
msprop:DbSchemaName="dbo" msprop:DbTableName="DimProduct" msprop:TableType="Table">
                      <xs:complexType>
                        <xs:sequence>
                          <xs:element name="ProductKey" msdata:ReadOnly="true"
msdata:AutoIncrement="true" msprop:FriendlyName="ProductKey" msprop:DbColumnName="ProductKey"
type="xs:int" />
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msprop:FriendlyName="ProductAlternateKey" msprop:DbColumnName="ProductAlternateKey"
minOccurs="0">
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                            </xs:simpleType>
                          </xs:element>
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msprop:FriendlyName="ProductSubcategoryKey" msprop:DbColumnName="ProductSubcategoryKey"
type="xs:int" minOccurs="0" />
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                        <xs:element name="WeightUnitMeasureCode"
msprop:FriendlyName="WeightUnitMeasureCode" msprop:DbColumnName="WeightUnitMeasureCode"
minOccurs="0">
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minOccurs="0">
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msprop:FriendlyName="EnglishProductName" msprop:DbColumnName="EnglishProductName">
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msprop:FriendlyName="SpanishProductName" msprop:DbColumnName="SpanishProductName">
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msprop:FriendlyName="FrenchProductName" msprop:DbColumnName="FrenchProductName">
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                          </xs:simpleType>
                        </xs:element>
                        <xs:element name="StandardCost" msprop:FriendlyName="StandardCost"
msprop:DbColumnName="StandardCost" type="xs:decimal" minOccurs="0" />
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msprop:FriendlyName="FinishedGoodsFlag" msprop:DbColumnName="FinishedGoodsFlag"
type="xs:boolean" />
                        <xs:element name="Color" msprop:FriendlyName="Color"
msprop:DbColumnName="Color">
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                              <xs:maxLength value="15" />
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                          </xs:simpleType>
                        </xs:element>
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msprop:FriendlyName="SafetyStockLevel" msprop:DbColumnName="SafetyStockLevel" type="xs:short"
minOccurs="0" />
                        <xs:element name="ReorderPoint" msprop:FriendlyName="ReorderPoint"
msprop:DbColumnName="ReorderPoint" type="xs:short" minOccurs="0" />
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                        <xs:element name="ListPrice" msprop:FriendlyName="ListPrice"
msprop:DbColumnName="ListPrice" type="xs:decimal" minOccurs="0" />
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                          </xs:simpleType>
                        </xs:element>
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msprop:DbColumnName="SizeRange" minOccurs="0">
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                          </xs:simpleType>
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                <xs:field xpath="SalesTerritoryKey" />
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              </xs:unique>
              <xs:unique name="dbo_DimProductCategory_Constraint1"
msdata:ConstraintName="Constraint1" msdata:PrimaryKey="true">
                <xs:selector xpath=".//dbo_DimProductCategory" />
                <xs:field xpath="ProductCategoryKey" />
              </xs:unique>
              <xs:unique name="dbo_DimProductSubcategory_Constraint1"
msdata:ConstraintName="Constraint1" msdata:PrimaryKey="true">
                <xs:selector xpath=".//dbo_DimProductSubcategory" />
                <xs:field xpath="ProductSubcategoryKey" />
              </xs:unique>
              <xs:keyref name="FK_DimProductSubcategory_DimProductCategory"
refer="dbo_DimProductCategory_Constraint1">
                <xs:selector xpath=".//dbo_DimProductSubcategory" />
                <xs:field xpath="ProductCategoryKey" />
              </xs:keyref>
              <xs:keyref name="FK_DimProduct_DimProductSubcategory"
refer="dbo_DimProductSubcategory_Constraint1">
                <xs:selector xpath=".//dbo_DimProduct" />
                <xs:field xpath="ProductSubcategoryKey" />
              </xs:keyref>
```


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```
                <xs:keyref name="FK_FactInternetSales_DimDate"
refer="dbo_DimDate_Constraint1">
                  <xs:selector xpath=".//dbo_FactInternetSales" />
                  <xs:field xpath="OrderDateKey" />
                </xs:keyref>
                <xs:keyref name="FK_FactInternetSales_DimDate2"
refer="dbo_DimDate_Constraint1">
                  <xs:selector xpath=".//dbo_FactInternetSales" />
                  <xs:field xpath="ShipDateKey" />
                </xs:keyref>
                <xs:keyref name="FK_FactInternetSales_DimDate1"
refer="dbo_DimDate_Constraint1">
                  <xs:selector xpath=".//dbo_FactInternetSales" />
                  <xs:field xpath="DueDateKey" />
                </xs:keyref>
                <xs:keyref name="FK_FactInternetSales_DimCustomer"
refer="dbo_DimCustomer_Constraint1">
                  <xs:selector xpath=".//dbo_FactInternetSales" />
                  <xs:field xpath="CustomerKey" />
                </xs:keyref>
                <xs:keyref name="FK_FactInternetSales_DimSalesTerritory"
refer="dbo_DimSalesTerritory_Constraint1">
                  <xs:selector xpath=".//dbo_FactInternetSales" />
                  <xs:field xpath="SalesTerritoryKey" />
                </xs:keyref>
                <xs:keyref name="FK_FactInternetSales_DimProduct" refer="Constraint1">
                  <xs:selector xpath=".//dbo_FactInternetSales" />
                  <xs:field xpath="ProductKey" />
                </xs:keyref>
              </xs:element>
            </xs:schema>
            <diffgr:diffgram xmlns:msdata="urn:schemas-microsoft-com:xml-msdata"
xmlns:diffgr="urn:schemas-microsoft-com:xml-diffgram-v1" />
          </Schema>
        </DataSourceView>
      </DataSourceViews>
      <Roles>
        <Role>
          <ID>Role</ID>
          <Name>StudentAdmin</Name>
          <Members>
            <Member>
              <Name>NY-SQL-02\Student</Name>
              <Sid>S-1-5-21-170207-3540798901-1547344715-1000</Sid>
            </Member>
          </Members>
        </Role>
      </Roles>
      <DatabasePermissions>
        <DatabasePermission>
          <ID>DatabasePermission</ID>
          <Name>DatabasePermission</Name>
          <RoleID>Role</RoleID>
          <Process>true</Process>
          <ReadDefinition>Allowed</ReadDefinition>
          <Read>Allowed</Read>
          <Administer>true</Administer>
        </DatabasePermission>
      </DatabasePermissions>
```


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```
    </Database>
  </ObjectDefinition>
</Create>
```

4.14.2 Server Response

The server responds with the results of the **Create** command:

```
<return xmlns="urn:schemas-microsoft-com:xml-analysis">
  <root xmlns="urn:schemas-microsoft-com:xml-analysis:empty" />
</return>
```

4.15 Alter

In this example, the client sends an **XMLA Alter** command to the server.

4.15.1 Client Sends Request

The client sends the following request:

```
<Alter xmlns="http://schemas.microsoft.com/analysisservices/2003/engine">
  <Object>
    <DatabaseID>AdventureWorks_SSAS_Alter</DatabaseID>
    <DimensionID>Dim Customer</DimensionID>
  </Object>
  <ObjectDefinition>
    <Dimension xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:ddl2="http://schemas.microsoft.com/analysisservices/2003/engine/2"
xmlns:ddl2_2="http://schemas.microsoft.com/analysisservices/2003/engine/2/2"
xmlns:ddl100_100="http://schemas.microsoft.com/analysisservices/2008/engine/100/100">
      <ID>Dim Customer</ID>
      <Name>Customer</Name>
          <Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramLayout</Name>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:ShowFriendlyNames</Name>
          <Value>true</Value>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:ShowRelationshipNames</Name>
          <Value>false</Value>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:UseDiagramDefaultLayout</Name>
          <Value>true</Value>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramViewPortLeft</Name>
          <Value>0</Value>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramViewPortTop</Name>
          <Value>0</Value>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramBoundingLeft</Name>
          <Value>0</Value>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramBoundingTop</Name>
```


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```
            <Value>0</Value>
            <Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramZoom</Name>
            <Value>100</Value>
          <Source xsi:type="DataSourceViewBinding">
            <DataSourceViewID>dsvAdventureWorksDW2008</DataSourceViewID>
          </Source>
          <ErrorConfiguration>
            <KeyNotFound>ReportAndStop</KeyNotFound>
            <KeyDuplicate>ReportAndStop</KeyDuplicate>
            <NullKeyNotAllowed>ReportAndStop</NullKeyNotAllowed>
          </ErrorConfiguration>
          <Language>1033</Language>
          <Collation>Latin1_General_CI_AS</Collation>
          <UnknownMemberName>Unknown</UnknownMemberName>
          <Attributes>
            <Attribute>
              <ID>Customer Key</ID>
              <Name>Customer Key</Name>
              <Usage>Key</Usage>
              <EstimatedCount>18484</EstimatedCount>
              <KeyColumns>
                <KeyColumn>
                  <DataType>Integer</DataType>
                  <Source xsi:type="ColumnBinding">
                    <TableID>dbo_DimCustomer</TableID>
                    <ColumnID>CustomerKey</ColumnID>
                  </Source>
                </KeyColumn>
              </KeyColumns>
              <NameColumn>
                <DataType>WChar</DataType>
                <Source xsi:type="ColumnBinding">
                  <TableID>dbo_DimCustomer</TableID>
                  <ColumnID>CustomerKey</ColumnID>
                </Source>
              </NameColumn>
              <OrderBy>Key</OrderBy>
            </Attribute>
          </Attributes>
          <ProactiveCaching>
            <SilenceInterval>-PT1S</SilenceInterval>
            <Latency>-PT1S</Latency>
            <SilenceOverrideInterval>-PT1S</SilenceOverrideInterval>
            <ForceRebuildInterval>-PT1S</ForceRebuildInterval>
            <Source xsi:type="ProactiveCachingInheritedBinding"/>
          </ProactiveCaching>
        </Dimension>
      </ObjectDefinition>
    </Alter>
     Customer
```

4.15.2 Server Response

The server responds with the results of the **Alter** command:

```
<return xmlns="urn:schemas-microsoft-com:xml-analysis">
```


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```
  <root xmlns="urn:schemas-microsoft-com:xml-analysis:empty" />
</return>
```

4.16 Delete

In this example, the client sends an **XMLA Delete** command to the server.

4.16.1 Client Sends Request

The client sends the following request:

```
<Delete xmlns="http://schemas.microsoft.com/analysisservices/2003/engine">
    <Object>
        <DatabaseID>AdventureWorksDW2008_Create</DatabaseID>
    </Object>
</Delete>
```

4.16.2 Server Response

The server responds with the results of the **Delete** command:

```
<return xmlns="urn:schemas-microsoft-com:xml-analysis">
  <root xmlns="urn:schemas-microsoft-com:xml-analysis:empty" />
</return>
```

4.17 Process

In this example, the client sends an **XMLA Process** command to the server.

4.17.1 Client Sends Request

The client sends the following request:

```
<Process xmlns="http://schemas.microsoft.com/analysisservices/2003/engine">
  <Object>
    <DatabaseID>AdventureWorks_SSAS</DatabaseID>
  </Object>
  <Type>ProcessFull</Type>
  <WriteBackTableCreation>UseExisting</WriteBackTableCreation>
</Process>
```

4.17.2 Server Response

The server responds with the results of the **Process** command:

```
<return xmlns="urn:schemas-microsoft-com:xml-analysis">
  <root xmlns="urn:schemas-microsoft-com:xml-analysis:empty">
```


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```
    <Messages xmlns="urn:schemas-microsoft-com:xml-analysis:exception">
      <Warning WarningCode="1091960948" Description="Informational (Data mining): Decision
Trees found no splits for model, Dim Product." Source="Microsoft SQL Server 2008 Analysis
Services" HelpFile="" />
    </Messages>
  </root>
</return>
```

4.18 Backup

In this example, the client sends an **XMLA Backup** command to the server.

4.18.1 Client Sends Request

The client sends the following request:

```
<Backup xmlns="http://schemas.microsoft.com/analysisservices/2003/engine">
  <Object>
    <DatabaseID>AdventureWorks_SSAS</DatabaseID>
  </Object>
  <File>C:\Program Files\Microsoft SQL
Server\MSAS10.MSSQLSERVER\OLAP\Backup\AdventureWorks_SSAS.abf</File>
  <Password>pw</Password>
</Backup>
```

4.18.2 Server Response

The server responds with the results of the **Backup** command:

```
<return xmlns="urn:schemas-microsoft-com:xml-analysis">
  <root xmlns="urn:schemas-microsoft-com:xml-analysis:empty" />
</return>
```

4.19 Restore

In this example, the client sends an **XMLA Restore** command to the server.

4.19.1 Client Sends Request

The client sends the following request:

```
<Restore xmlns="http://schemas.microsoft.com/analysisservices/2003/engine">
  <File>C:\Program Files\Microsoft SQL
Server\MSAS10.MSSQLSERVER\OLAP\Backup\AdventureWorks_SSAS.abf</File>
  <DatabaseName>AdventureWorksDW2008_Create</DatabaseName>
  <AllowOverwrite>true</AllowOverwrite>
  <Password>pw</Password>
</Restore>
```


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4.19.2 Server Response

The server responds with the results of the **Restore** command:

```
<return xmlns="urn:schemas-microsoft-com:xml-analysis">
  <root xmlns="urn:schemas-microsoft-com:xml-analysis:empty" />
</return>
```

4.20 Begin Transaction

In this example, the client sends an **XMLA BeginTransaction** command to the server.

4.20.1 Client Sends Request

The client sends the following request:

```
<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Header>
    <BeginSession xmlns="urn:schemas-microsoft-com:xml-analysis"/>
  </Header>
  <Body>
    <Execute xmlns="urn:schemas-microsoft-com:xml-analysis">
      <Command>
        <BeginTransaction xmlns="http://schemas.microsoft.com/analysisservices/2003/engine">
        </BeginTransaction>
      </Command>
      <Properties>
        <PropertyList>
          <LocaleIdentifier>1033</LocaleIdentifier>
        </PropertyList>
      </Properties>
    </Execute>
  </Body>
</Envelope>
```

4.20.2 Server Response

The server responds with the results of the **BeginTransaction** command:

```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Header>
    <Session xmlns="urn:schemas-microsoft-com:xml-analysis" SessionId="DB0399CD-5B61-40C9-
89E1-8C673280F885" />
  </soap:Header>
  <soap:Body>
    <ExecuteResponse xmlns="urn:schemas-microsoft-com:xml-analysis">
      <return>
        <root xmlns="urn:schemas-microsoft-com:xml-analysis:empty" />
      </return>
    </ExecuteResponse>
  </soap:Body>
```


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```
</soap:Envelope>
```

4.21 Commit Transaction

In this example, the client sends an **XMLA CommitTransaction** command to the server.

4.21.1 Client Sends Request

The client sends the following request:

```
<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Header>
    <Session xmlns="urn:schemas-microsoft-com:xml-analysis"
    SessionId="34B67555-85B9-46CE-8803-4BEC7D6AEE13" />
  </Header>
  <Body>
    <Execute xmlns="urn:schemas-microsoft-com:xml-analysis">
      <Command>
        <CommitTransaction xmlns="http://schemas.microsoft.com/analysisservices/2003/engine"
/>
      </Command>
      <Properties>
        <PropertyList>
          <LocaleIdentifier>1033</LocaleIdentifier>
        </PropertyList>
      </Properties>
    </Execute>
  </Body>
</Envelope>
```

4.21.2 Server Response

The server responds with the results of the **CommitTransaction** command:

```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <ExecuteResponse xmlns="urn:schemas-microsoft-com:xml-analysis">
      <return>
        <root xmlns="urn:schemas-microsoft-com:xml-analysis:empty" />
      </return>
    </ExecuteResponse>
  </soap:Body>
</soap:Envelope>
```

4.22 Rollback Transaction

In this example, the client sends an **XMLA RollbackTransaction** command to the server.

4.22.1 Client Sends Request

The client sends the following request:

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```
<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Header>
    <Session xmlns="urn:schemas-microsoft-com:xml-analysis"
    SessionId="34B67555-85B9-46CE-8803-4BEC7D6AEE13" />
  </Header>
  <Body>
    <Execute xmlns="urn:schemas-microsoft-com:xml-analysis">
      <Command>
        <RollbackTransaction
xmlns="http://schemas.microsoft.com/analysisservices/2003/engine" />
      </Command>
      <Properties>
        <PropertyList>
          <LocaleIdentifier>1033</LocaleIdentifier>
        </PropertyList>
      </Properties>
    </Execute>
  </Body>
</Envelope>
```

4.22.2 Server Response

The server responds with the results of the **RollbackTransaction** command:

```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <ExecuteResponse xmlns="urn:schemas-microsoft-com:xml-analysis">
      <return>
        <root xmlns="urn:schemas-microsoft-com:xml-analysis:empty" />
      </return>
    </ExecuteResponse>
  </soap:Body>
</soap:Envelope>
```


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5 Security

5.1 Security Considerations for Implementers

The server could be returning potentially sensitive data in its responses. Therefore, it is strongly recommended that the server be configured to use GSS-API based encryption over TCP or Secure Sockets Layer (SSL) over HTTPS to ensure the integrity of the data and to prevent tampering and unauthorized access.

There are two strategies for reducing the impact of denial-of-service (DOS) attacks against the server:

- Turn on authentication and deny access to unauthenticated clients. This will allow a user to quickly disable access to rogue client machines.
- Make sure no single request takes too much processing time on the server. That will ensure that any attacker must keep up a steady stream of requests to deny access to the server. Therefore, a simple network trace will allow one to identify the offending machine and shut it down. This applies to requests sent by "spoof clients" (for example, a virus emulating a client that might try to pass an unbounded request or a long-running MDX query).

5.2 Index of Security Parameters

None.

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6 Appendix A: Full WSDL

None.

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7 Appendix B: Product Behavior

The information in this specification is applicable to the following Microsoft products:

- Microsoft® SQL Server® 2005 Analysis Services
- Microsoft® SQL Server® 2008 Analysis Services
- Microsoft® SQL Server® 2008 R2 Analysis Services

Exceptions, if any, are noted below. Unless otherwise specified, any statement of optional behavior in this specification prescribed using the terms SHOULD or SHOULD NOT implies that the aforementioned Microsoft products' behavior is in accordance with the SHOULD or SHOULD NOT prescription. Unless otherwise specified, the term MAY implies that these Microsoft products do not follow the prescription.

<1> Section 2.1.1: SQL Server Analysis Services does break down DIME messages into multiple records.

<2> Section 2.1.1: SQL Server Analysis Services sets the RESERVED field in the DIME record to 0.

<3> Section 2.1.1: By default, SQL Server Analysis Services uses the content type **application/sx+xpress**. However, it can be configured to use the other content types (**text/xml**, **application/sx**, or **application/xml+xpress**).

<4> Section 2.2.4.1.1.2.1.1: SQL Server Analysis Services supports only the **Tuples** set type. It does not support **Members**, **CrossProduct**, and **Union** set types.

<5> Section 2.2.4.2.1.1: The following rules also apply to names and IDs:

- The maximum number of characters is 100.
- There are no special requirements for the first character of an identifier. Same rules as for other valid characters apply.
- The following reserved names must not be used:
  - AUX
  - CLOCK$
  - COM1 through COM9 (COM1, COM2, COM3, and so on)
  - CON
  - LPT1 through LPT9 (LPT1, LPT2, LPT3, and so on)
  - NUL
  - PRN
- NULL MUST NOT be used as a character in any string within the XML.

The following table lists invalid characters for each type of object:

Object	Invalid Characters

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Object	Invalid Characters
Server	The name must follow the rules for Microsoft Windows NT 4.0 and Windows 2000 computer names. (IP addresses are not valid.)
Data Source	: / \ * | ? " () [] {} <>
Level & Attribute	. , ; ' ` : / \ * | ? " & % $! + = [] {} < >
Dimension & Hierarchy	.,, ; ' ` : / \ * | ? " & % $! + = () [] {} <,>
All other objects	. , ; ' ` : / \ * | ? " & % $! + = () [] {} < >

A DataSource reference that consists of a single period means the current database of the current analysis server.

So, for instance, DataSourceID./DataSourceID points to the current database of the current analysis server instance.

<6> Section 2.2.4.2.1.2: The following cases are handled by the server when encountered, when they are the values of String elements:

Control characters will be stripped out.

Leading and trailing white space will be trimmed.

Internal white space will be preserved.

<7> Section 2.2.4.2.2.2: Obtained from sqlboot.dll Zero for local cubes.

<8> Section 2.2.4.2.2.2: Obtained from sqlver.h.

<9> Section 2.2.4.2.2.2.1:

Property	Default Value	Description
AdminTimeout	0	A signed 32-bit integer property that defines the administrator timeout in seconds.
AllowedBrowsingFolders	"%ProgramFiles%Microsoft SQL Server\MSAS10.MSSQLSERVER\OLAP\Backup|%ProgramFiles%\Microsoft SQL Server\MSAS10.MSSQLSERVER\OLAP\Log\"	A string property that defines the names of the folders where logs, backups, and other objects are allowed to be created on the server, in the form of a comma-separated list.
BackupDir	"%ProgramFiles%\Microsoft SQL Server\MSAS10.MSSQLSERVER\OLAP\Backup"	A string property that identifies the name of the directory where backup files are

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Property	Default Value	Description
		created by default, in the event a path is not specified as part of the **Backup** command.
CollationName	"Latin1_General_CI_AS"	A string property that identifies the server collation. For more information, see [MSDN-LCASMD].
CommitTimeout	0	A signed 32-bit integer property that defines the number of milliseconds before pending commit operations time out. Zero indicates that the server will not time out commit operations.
CoordinatorBuildMaxThreads	4	A signed 32-bit integer property that defines the maximum number of threads allocated to building partition indexes. Increase this value in order to speed-up partition indexing, at the cost of memory usage.
CoordinatorCancelCount	1000	A signed 32-bit integer property that defines how frequently the server should check whether a **Cancel** event occurred (based on internal iteration count). Decrease this number in order to check for **Cancel** more frequently, at the expense of general performance.
CoordinatorExecutionMode	-4	A signed 32-bit integer property that defines the maximum number of parallel operations

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Property	Default Value	Description
		the server will attempt, including processing and querying operations. Zero (0) indicates that the server will decide, based on an internal algorithm. A positive number indicates the maximum number of operations in total. A negative number, with the sign reversed, indicates the maximum number of operations per processor.
DataDir	"%ProgramFiles%\Microsoft SQL Server\MSAS10.MSSQLSERVER\OLAP\Data"	A string property that identifies the name of the directory where data is stored.
ExternalCommandTimeout	3600	A signed 32-bit integer property that defines the timeout, in seconds, for commands issued to external servers, including relational data sources and external Analysis Services servers.
ExternalConnectionTimeout	60	A signed 32-bit integer property that defines the timeout, in seconds, for creating connections to external servers, including relational data sources and external Analysis Services servers.
ForceCommitTimeout	30000	A signed 32-bit integer property that defines the timeout, in milliseconds, before a commit should cancel other commands that preceded the current command, including queries in process.

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Property	Default Value	Description
IdleConnectionTimeout	0	A signed 32-bit integer property that defines the idle connection timeout, in seconds. The value zero (0) indicates that idle connections will not be timed out.
IdleOrphanSessionTimeout	120	A signed 32-bit integer property that defines how long orphaned sessions will be retained in server memory in seconds.
InstanceVisible	1	When true, indicates that the server instance is visible to discover instance requests; otherwise, false.
Language	1033	A string property that defines the language, including error messages and number formatting. This property overrides the **CollationName** property. Blank indicates that the **CollationName** property defines the language.
LogDir	"%ProgramFiles%\Microsoft SQL Server\MSAS10.MSSQLSERVER\OLAP\Log"	A string property that identifies the name of the directory that contains server logs. This property only applies when disk files are used for logging, as opposed to database tables (the default behavior).
MaxIdleSessionTimeout	0	A signed 32-bit integer property that defines the maximum idle session timeout, in seconds.

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Property	Default Value	Description
MinIdleSessionTimeout	2700	A signed 32-bit integer property that defines the minimum time, in seconds, that idle sessions will timeout. After this time expires, the server is permitted to end the idle session, but will only do so as memory is needed.
Port	0	A signed 32-bit integer property that defines the port number on which server will listen for client connections. If not set, server dynamically finds first unused port. Zero (0) means that port 2383 will be used.
ServerTimeout	3600	A signed 32-bit integer property that defines the timeout in seconds for queries.
TempDir	"%ProgramFiles%\Microsoft SQL Server\MSAS10.MSSQLSERVER\OLAP\Temp"	A string property that identifies the name of the directory for defining temporary files used for processing, restoring, and other operations. If not specified, the default is the Data directory.
DataMining\Algorithms\Microsoft_Association_Rules\Enabled	1	When true, indicates that the Microsoft_Association_Rules algorithm is enabled; otherwise, false.
DataMining\Algorithms\Microsoft_Clustering\Enabled	1	When true, indicates that the Microsoft_Clustering algorithm is enabled; otherwise, false.
DataMining\Algorithms\Microsoft_Dec	1	When true, indicates

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Property	Default Value	Description
ision_Trees\Enabled		that the Microsoft_DecisionTrees algorithm is enabled; otherwise, false.
DataMining\Algorithms\Microsoft_Linear_Regression\Enabled	1	When true, indicates that the Microsoft_Linear_Regression algorithm is enabled; otherwise, false.
DataMining\Algorithms\Microsoft_Logistic_Regression\Enabled	1	When true, indicates that the Microsoft_Logistic_Regression algorithm is enabled; otherwise, false.
DataMining\Algorithms\Microsoft_Naive_Bayes\Enabled	1	When true, indicates that the Microsoft_Naive_Bayes algorithm is enabled; otherwise, false.
DataMining\Algorithms\Microsoft_Neural_Network\Enabled	1	When true, indicates that the Microsoft_Neural_Network algorithm is enabled; otherwise, false.
DataMining\Algorithms\Microsoft_Sequence_Clustering\Enabled	1	When true, indicates that the Microsoft_Sequence_Clustering algorithm is enabled; otherwise, false.
DataMining\Algorithms\Microsoft_Time_Series\Enabled	1	When true, indicates that the Microsoft_Time_Series algorithm is enabled; otherwise, false.
DataMining\AllowAdHocOpenRowsetQueries	0	When true, indicates that ad hoc open rowset queries are allowed; otherwise, false.
DataMining\AllowedProvidersInOpenRowset	Empty	A string property that identifies which providers are allowed in an open rowset, consisting of a

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Property	Default Value	Description
		comma/semi-colon separated list of provider ProgIDs, or else [All].
DataMining\AllowSessionMiningModels	0	When true, indicates that session mining models can be created; otherwise, false.
DataMining\MaxConcurrentPredictionQueries	0	A signed 32-bit integer property that defines the maximum number of concurrent prediction queries.
DSO\LocksDirectory	Empty	LocksDirectory is a folder where DSO keeps locking information. Locking information is created and deleted in this folder without any user intervention. Complete access to create, modify, and delete files is required in this folder for all DSO applications. LocksDirectory contains the path of the folder.
DSO\RemoteLocksDirectory	Empty	RemoteLocksDirectory contains the path of a shared folder where locks are kept for DSO applications.
DSO\RemoteRepositoryConnectionString	Empty	RemoteRepositoryConnectionString is a standard OLEDB SQL Server connection string that points to the SQL Server Analysis Services repository. If repository is a Microsoft Access database (an .mdb file), then the path of the file is a path of a shared folder. RemoteRepositoryCo

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Property	Default Value	Description
		nnectionString is used by DSO when the repository is located on a remote server. DSO checks the name of the server. If the name of the server is localhost or it is the name of the computer, then DSO uses RepositoryConnectionString, otherwise DSO uses RemoteRepositoryConnectionString.
DSO\RepositoryConnectionString	Empty	RepositoryConnectionString is a standard OLEDB connection string that points to the SQL Server repository. If the repository is a Microsoft Access database (an .mdb file), then the path of the file is a local path. RepositoryConnectionString is used by DSO when repository is locally available on the server. DSO checks the name of the server. If the name of the server is localhost or it is the name of the computer, then DSO uses RepositoryConnectionString, otherwise DSO uses RemoteRepositoryConnectionString.
Feature\ComUdfEnabled	0	When true, indicates that user-defined functions defined as com objects are enabled; otherwise, false.
Feature\LinkFromOtherInstanceEnabled	0	When true, indicates that objects can be linked to from other

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Property	Default Value	Description
		server instances; otherwise, false.
Feature\LinkInsideInstanceEnabled	1	When true, indicates that a linked object can be created inside the same server instance; otherwise, false.
Feature\LinkToOtherInstanceEnabled	0	When true, indicates that objects on remote servers can be linked to; otherwise, false.
Log\ErrorLog\ErrorLogFileName	Empty	A property used as a default during processing operation performed by the server.
Log\ErrorLog\ErrorLogFileSize	4	A property used as a default during processing operation performed by the server.
Log\ErrorLog\KeyErrorAction	0	A property used as a default during processing operation performed by the server.
Log\ErrorLog\KeyErrorLimit	0	A property used as a default during processing operation performed by the server.
Log\ErrorLog\KeyErrorLimitAction	0	A property used as a default during processing operation performed by the server.
Log\ErrorLog\KeyErrorLogFile	Empty	A property used as a default during processing operation performed by the server.
Log\ErrorLog\LogErrorTypes\KeyDuplicate	0	A property used as a default during processing operation performed by the server.

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Property	Default Value	Description
Log\ErrorLog\LogErrorTypes\KeyNotFound	1	A property used as a default during processing operation performed by the server.
Log\ErrorLog\LogErrorTypes\NullKeyConvertedToUnknown	0	A property used as a default during processing operation performed by the server.
Log\ErrorLog\LogErrorTypes\NullKeyNotAllowed	1	A property used as a default during processing operation performed by the server.
Log\File	"msmdsrv.log"	A string property that identifies the name of the server log file. This property only applies when a disk file is used for logging, as opposed to a database table (the default behavior).
Log\FlightRecorder\Enabled	1	When true, indicates that the flight recorder feature is enabled; otherwise, false.
Log\FlightRecorder\FileSizeMB	10	A signed 32-bit integer property that defines the size of the flight recorder disk file, in megabytes.
Log\FlightRecorder\LogDurationSec	3600	A signed 32-bit integer property that defines the frequency that the flight recorder is rolled over, in seconds.
Log\FlightRecorder\SnapshotDefinitionFile	Empty	A string property that defines the name of the snapshot definition file, containing discover commands that are issued to the server when a

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Property	Default Value	Description
		snapshot is taken. Blank signifies file name FlightRecorderSnapshotDef.xml.
Log\FlightRecorder\SnapshotFrequencySec	120	A signed 32-bit integer property that defines the snapshot frequency, in seconds.
Log\FlightRecorder\TraceDefinitionFile	Empty	A string property that specifies the name of the flight recorder trace definition file. Blank indicates FlightRecorderTraceDef.xml.
Log\MessageLogs	"File;Console;System"	An advanced property that should not be changed, except under the guidance of Microsoft support.
Log\QueryLog\CreateQueryLogTable	0	When true, specifies to create the query log table; otherwise, false.
Log\QueryLog\QueryLogConnectionString	Empty	A string property that specifies the connection to the query log database.
Log\QueryLog\QueryLogFileName	Empty	A string property that specifies the name of the query log file. This property only applies when a disk file is used for logging, as opposed to a database table (the default behavior).
Log\QueryLog\QueryLogSampling	10	A signed 32-bit integer property that specifies the query log sampling rate. 10, for example, means that 1 out of every 10 server queries is logged.

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Property	Default Value	Description
Log\QueryLog\QueryLogTableName	"OlapQueryLog"	A string property that specifies the name of the query log table.
Log\Trace\TraceReportFQDN	0	An advanced property that should not be changed, except under the guidance of Microsoft support.
Memory\HardMemoryLimit	0	The target maximum memory use for the server. If memory use exceeds this value, the server will free all shrinkable memory, and if memory use still exceeds the limit after freeing all shrinkable memory, the server will kill all running commands. Default is (TotalMemoryLimit + min (system physical memory, system total available virtual memory))/2.
Memory\HeapTypeForObjects	1	An advanced property that should not be changed, except under the guidance of Microsoft support.
Memory\LowMemoryLimit	65	A signed 64-bit double-precision floating-point number property that defines the point at which the server is low on memory, expressed as percentage of total physical memory. When this threshold is reached, the server aggressively looks for opportunities to free up memory.
Memory\MemoryHeapType	1	An advanced

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Property	Default Value	Description
		property that should not be changed, except under the guidance of Microsoft support.
Memory\TotalMemoryLimit	80	A property that defines the maximum physical memory the server will use, expressed as percentage of total physical memory.
Network\Listener\IPV4Support	1	A signed 32-bit integer property that defines support for IPv4 protocol. This property can have one of the following values: ▪ 0 – IPv4 disabled ▪ 1 – IPv4 required ▪ 2 – IPv4 optional
Network\Listener\IPV6Support	2	A signed 32-bit integer property that defines support for IPv6 protocol. This property can have one of the following values: ▪ 0 – IPv6 disabled ▪ 1 – IPv6 required ▪ 2 – IPv6 optional
Network\Listener\MaxAllowedRequestSize	0	An advanced property that should not be changed, except under the guidance of Microsoft support.
Network\ListenOnlyOnLocalConnections	0	When true, specifies to listen only on local connections, for example localhost; otherwise, false.
Network\Requests\EnableBinaryXML	0	When true, specifies

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Property	Default Value	Description
		that the server will recognize requests binary xml format; otherwise, false.
Network\Requests\EnableCompression	0	When true, specifies that compression is enabled for requests; otherwise, false.
Network\Responses\EnableBinaryXML	1	When true, specifies that the server is enabled for binary xml responses; otherwise, false.
Network\Responses\EnableCompression	1	When true, specifies that compression is enabled for responses to client requests; otherwise, false.
OLAP\LazyProcessing\Enabled	1	When true, specifies that **lazy aggregation** processing is enabled; otherwise, false.
OLAP\LazyProcessing\MaxCPUUsage	0.5	A signed 64-bit double-precision floating-point number property that defines maximum CPU usage for lazy processing, expressed as a percentage. The server monitors average CPU use based on snapshots. It is normal behavior for the CPU to spike above this threshold.
OLAP\LazyProcessing\MaxObjectsInParallel	2	A signed 32-bit integer property that specifies the maximum number of partitions that can be lazily processed in parallel.
OLAP\LazyProcessing\MaxRetries	3	A signed 32-bit integer property that defines the number of retries in the

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Property	Default Value	Description
		event that lazy processing fails before an error is raised.
OLAP\LazyProcessing\SleepIntervalSecs	5	A signed 32-bit integer property that defines the interval, in seconds, that the server checks whether there are lazy processing jobs pending.
OLAP\Process\AggregationMemoryLimitMax	80	A signed 64-bit double-precision floating-point number property that defines the maximum amount of memory that can be devoted to aggregation processing, expressed as a percentage of physical memory.
OLAP\Process\AggregationMemoryLimitMin	10	A signed 64-bit double-precision floating-point number property that defines the minimum amount of memory that can be devoted to aggregation processing, expressed as a percentage of physical memory. A larger value may speed up aggregation processing at the cost of memory usage.
OLAP\Process\BufferMemoryLimit	60	A signed 64-bit double-precision floating-point number property that defines the processing buffer memory limit, expressed as a percent of physical

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Property	Default Value	Description
		memory.
OLAP\Process\CheckDistinctRecordSortOrder	1	A Boolean property that defines if the sort order for the results of a distinct count query are meaningful when processing partitions. True indicates the sort order is not meaningful and must be checked by the server. When processing partitions with distinct count measure, query sent to SQL with order-by. Set to false to speed up processing.
OLAP\Process\DatabaseConnectionPoolConnectTimeout	60	A signed 32-bit integer property that specifies timeout when opening a new connection in seconds.
OLAP\Process\DatabaseConnectionPoolGeneralTimeout	60	A signed 32-bit integer property that specifies database connection timeout for use with external OLEDB connections in seconds.
OLAP\Process\DatabaseConnectionPoolMax	50	A signed 32-bit integer property that specifies the maximum number of pooled database connections.
OLAP\Process\DatabaseConnectionPoolTimeout	120000	An advanced property that should not be changed, except under the guidance of Microsoft support.
OLAP\Process\DeepCompressValue	1	A Boolean property applying to measures with Double data type that specifies whether numbers can be compressed, causing a loss in numeric precision. A

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Property	Default Value	Description
		value of False indicates no compression and no precision loss.
OLAP\Process\IndexBuildThreshold	4096	A signed 32-bit integer property that specifies a row count threshold below which indexes will not be built for partitions.
OLAP\Process\RecordsReportGranularity	10000	A signed 32-bit integer property that specifies how often the server records Trace events during processing, in rows.
OLAP\Process\ROLAPDimensionProcessingEffort	300000	An advanced property that should not be changed, except under the guidance of Microsoft support.
OLAP\ProcessPlan\EnableRolapDimQueryTableGrouping	1	A Boolean property that specifies whether table grouping is enabled for ROLAP dimensions. If true, when querying ROLAP dimensions at runtime, entire ROLAP dimension tables are queried at once, as opposed to separate queries for each attribute.
OLAP\ProcessPlan\MemoryLimitErrorEnabled	1	An advanced property that should not be changed, except under the guidance of Microsoft support.
OLAP\Query\DefaultDrillthroughMaxRows	10000	A signed 32-bit integer property that specifies the maximum number of rows that will return from a drillthrough query.
OLAP\Query\NonEmptyBehaviorMode	1	Defines default for

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Property	Default Value	Description
		Non_Empty_behavior MDX property.
Security\BuiltinAdminsAreServerAdmins	1	When true, indicates that members of the local machine administrators group are Analysis Services administrators; otherwise, false.
Security\DataProtection\RequiredProtectionLevel	1	A signed 32-bit integer property that defines the required protection level for all client requests. This property can have one of the following values: ▪ 0 – None disabled ▪ 1 – Encryption required ▪ 2 –Clear-text requests allowed but only with signatures
Security\DisableClientImpersonation	0	When true, indicates that client impersonation (for example, from stored procedures) is disabled; otherwise, false.
Security\RequireClientAuthentication	1	When true, indicates that client authentication is required; otherwise, false.
Security\SecurityPackageList	Empty	A string property that contains a comma-separated list of SSPI packages used by server for client authentication.
Security\ServiceAccountIsServerAdmin	1	When true, indicates that the service account is a server administrator; otherwise, false.

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Property	Default Value	Description
ThreadPool\Process\MaxThreads	64	The target maximum number of threads for the thread pool used by processing operations. Default is 64. If a value less than 64 is specified, the server will use the default value.
ThreadPool\Process\MinThreads	1	The minimum number of threads for the thread pool used by processing operations. Default is 1.
ThreadPool\Query\MaxThreads	10	A signed 32-bit integer property that defines the maximum number of threads.
ThreadPool\Query\MinThreads	1	A signed 32-bit integer property that defines the minimum number of threads for queries.

<10> Section 2.2.4.2.2.4: If **LogFileSize** is set to a negative value, the result for SSAS is undetermined.

<11> Section 2.2.4.2.2.4: The **Filter** element is supported only in SQL Server 2008 Analysis Services and later versions.

<12> Section 2.2.4.2.2.5: SQL Server Analysis Services uses the value provided by the server administrator in the server configuration file as the default if this value is empty.

<13> Section 2.2.4.2.2.5: The **CompatibilityLevel** property is introduced in SQL Server 2008 R2. For SQL Server 2008 R2, the compatibility level is 1050.

<14> Section 2.2.4.2.2.8: For the **Type** element, the SSAS server implements functionality for the enumeration values "Account" and "Time". All other enumeration values are only informational.

<15> Section 2.2.4.2.2.8: SQL Server Analysis Services uses the value provided by the server administrator in the server configuration file as the default if this value is empty.

<16> Section 2.2.4.2.2.8.1: The **ProcessingState** element is only supported in SQL Server 2008 R2 Analysis Services and later versions.

<17> Section 2.2.4.2.2.8.2: The **MemberKeysUnique** element is supported only in SQL Server 2005 Analysis Services SP2 and later versions.

<18> Section 2.2.4.2.2.9: SQL Server Analysis Services uses the value provided by the server administrator in the server configuration file as the default if this value is empty.

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<19> Section 2.2.4.2.2.9: Follows the SQL Server Analysis Services form of LCID & "_" & compare flag.

<20> Section 2.2.4.2.2.9.2: SQL Server Analysis Services implicitly includes any attributes not specified in the collection with their default values.

<21> Section 2.2.4.2.2.9.3: SQL Server Analysis Services implicitly includes hierarchies not specified in the collection with their default values.

<22> Section 2.2.4.2.2.9.4: SQL Server Analysis Services provides list of known graphics such as arrow, chart, and so on; however, other values are possible.

<23> Section 2.2.4.2.2.9.4: SQL Server Analysis Services provides a list of known values; however, other values are possible.

<24> Section 2.2.4.2.2.10.1: SQL Server Analysis Services uses the value provided by the server administrator in the server configuration file as the default if this value is empty.

<25> Section 2.2.4.2.2.11.1.2: SQL Server Analysis Services populates attributes that are not specified in the collection with default element values.

<26> Section 2.2.4.2.2.11.3: The RGB format used in the Windows operating system.

<27> Section 2.2.4.2.2.11.3: The RGB format used in the Windows operating system.

<28> Section 2.2.4.2.2.14.1.1: **DefaultMember** is not used in SQL Server Analysis Services. It is ignored and is therefore a no-op.

<29> Section 2.2.4.2.2.15: SQL Server Analysis Services uses the value provided by the server administrator in the server configuration file as the default if this value is empty.

<30> Section 2.2.4.2.2.16: SQL Server Analysis Services supports the following values for the **Algorithm** element:

Microsoft_Decision_Trees

Microsoft_Naive_Bayes

Microsoft_Clustering

Microsoft_Neural_Network

Microsoft_Logistic_Regression

Microsoft_Linear_Regression

Microsoft_Association_Rules

Microsoft_Time_Series

Microsoft_Sequence_Clustering]

<31> Section 2.2.4.2.2.16: The **FoldingParameters** element is supported only in SQL Server 2008 Analysis Services and later versions.

<32> Section 2.2.4.2.2.16: The **Filter** element is supported only in SQL Server 2008 Analysis Services and later versions.

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<33> Section 2.2.4.2.2.16.1: SQL Server Analysis Services supports certain **ModelingFlag** values as built in to algorithms included in the server, such as **MODEL_EXISTENCE_ONLY** and **REGRESSOR**.

<34> Section 2.2.4.2.2.16.2: The **Filter** element is supported only in SQL Server 2008 Analysis Services and later versions.

<35> Section 2.2.4.2.2.16.4: The FoldingParameters element is supported only in SQL Server 2008 Analysis Services and later versions.

<36> Section 2.2.4.2.2.16.4: The **FoldIndex** element is supported only in SQL Server 2008 Analysis Services and later versions.

<37> Section 2.2.4.2.2.16.4: The **FoldCount** element is supported only in SQL Server 2008 Analysis Services and later versions.

<38> Section 2.2.4.2.2.16.4: The **MaxFoldCases** element is supported only in SQL Server 2008 Analysis Services and later versions.

<39> Section 2.2.4.2.2.16.4: The **FoldTargetAttribute** element is supported only in SQL Server 2008 Analysis Services and later versions.

<40> Section 2.2.4.2.2.17: Microsoft does not guarantee that the **Annotation****Name** element produced by Microsoft products is in a style that references the vendor's XML namespace, although in many cases, it may be so.

<41> Section 2.2.4.2.2.19: For the **Automatic** value of NullProcessing, the server will use "ZeroOrBlank" (for OLAP) and "UnknownMember" (for DM).

<42> Section 2.2.4.2.2.20.25: The **RowNumberBinding** type may be used only if the Database, Cube, or MeasureGroup uses memory storage mode.

<43> Section 2.2.4.2.2.31: The behavior of the value "Default" is dependent upon the context in which impersonation is used.

<44> Section 3.1.3: SQL Server Analysis Services supports sessions.

<45> Section 3.1.3: SQL Server Analysis Services ends sessions automatically after a period of inactivity that can be configured.

<46> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services ignores this value, and it is always treated as if "TupleFormat" were specified.

<47> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value 0x00000006L for **ProviderType**. This is a product defect, and the expected value is 0x00000003L. .

<48> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services returns the value "512".

<49> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns 1.

<50> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services returns the value "Database" for DbpropCatalogTerm.

<51> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns "0" for DbpropCatalogUsage.

<52> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns "0" for DbpropColumnDefinition.

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<53> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "1" for DbpropConcatNullBehavior.

<54> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services returns the value false for **DbpropDataSourceReadOnly**.

<55> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "2" for **DbpropGroupBy**.

<56> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "0" for **DbpropHeterogeneousTables**.

<57> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "8" for **DbpropIdentifierCase**.

<58> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "0" for **DbpropMaxIndexSize**.

<59> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "0" for **DbpropMaxOpenChapters**.

<60> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "0" for **DbpropMaxRowSize**.

<61> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value true for **DbpropMaxRowSizeIncludeBlob**.

<62> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "0" for **DbpropMaxTablesInSelect**.

<63> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value false for **DbpropMultiTableUpdate**.

<64> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "4" for **DbpropNullCollation**.

<65> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value false for **DbpropOrderByColumnsInSelect**.

<66> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "1" for **DbpropOutputParameterAvailable**.

<67> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "4" for DbpropPersistentIdType.

<68> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "1" for **DbpropPrepareAbortBehavior**.

<69> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "1" for **DbpropPrepareCommitBehavior**.

<70> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "Calculated member" for **DbpropProcedureTerm**.

<71> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "8" for **DbpropQuotedIdentifierCase**.

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<72> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "0" for **DbpropSchemausage**.

<73> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "512" for **DbpropSqlSupport**.

<74> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "0" for **DbpropSubqueries**.

<75> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "0" for **DbpropSupportedTxnDdl**.

<76> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "4096" for **DbpropSupportedTxnIsoLevels**.

<77> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "292" for **DbpropSupportedTxnIsoRetain**.

<78> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "Cube" for **DbpropTableTerm**.

<79> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "4" for **MdpropAggregateCellUpdate**.

<80> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "2147483647" for **MdpropAxes**.

<81> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "1" for **MdpropFlatteningSupport**.

<82> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "3" for **MdpropMdxCaseSupport**.

<83> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "7" for **MdpropMdxDescFlags**.

<84> Section 3.1.4.2.2.1.2.1: MDPROPVAL_MDF_ASYMMETRIC was introduced in SQL Server 2005 Service Pack 2 (SP2).

<85> Section 3.1.4.2.2.1.2.1: MDPROPVAL_MDF_CALC_MEMBERS was introduced in SQL Server 2008 R2.

<86> Section 3.1.4.2.2.1.2.1: SQL Server 2008 R2 always returns the value "7" for **MdpropMdxDrillFunctions**. Previous versions of SQL Server return the value "3".

<87> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "63" for **MdpropMdxFormulas**.

<88> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "1" for **MdpropMdxJoinCubes**.

<89> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "15" for **MdpropMdxMemberFunctions**.

<90> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "0" for **MdpropMdxNonMeasureExpressions**.

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<91> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "2047" for **MdpropMdxNumericFunctions**.

<92> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "496" for **MdpropMdxObjQualification**.

<93> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "0" for **MdpropMdxOuterReference**.

<94> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value true for **MdpropMdxQueryByProperty**.

<95> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "4" for **MdpropMdxRangeRowset**.

<96> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "524287" for MdpropMdxSetFunctions.

<97> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "2" for MdpropMdxSlicer.

<98> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "15" for **MdpropMdxStringCompop**.

<99> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "3" for **MdpropNamedLevels**.

<100> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services always returns the value "Core" for **MDXSupport**.

<101> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services ignores the value for **DbpropInitMode**.

<102> Section 3.1.4.2.2.1.2.1: SQL Server Analysis Services attempts to deduce the dialect from the content of the command statement, but will use the value provided in the **Dialect** property if the command contains a value for this property.

<103> Section 3.1.4.2.2.1.2.1: MDPROPVAL_MSQ_CALCMEMBERS was introduced in SQL Server 2008.

<104> Section 3.1.4.2.2.1.2.1: MDPROPVAL_MSQ_CALCMEMBERS2 was introduced in SQL Server 2008 R2.

<105> Section 3.1.4.2.2.1.2.1: SQL Server 2008 R2 Analysis Services always returns the value "31" for **MdpropMdxSubqueries**. SQL Server 2008 Analysis Services always returns the value "15". SQL Server 2005 Analysis Services always returns the value "3".

<106> Section 3.1.4.2.2.1.2.1: Values 0 and 1 were introduced in SQL Server 2008. Value 2 was introduced in SQL Server 2008 R2KJ.

<107> Section 3.1.4.2.2.1.2.1: In SQL Server Analysis Services, the value 0 for **DpbropMsmdAutoExists** can have the same meaning as 1 or 3, depending on the setting of the server property **ConfigurationSettings\OLAP\Query\AxisSetShallow**.

<108> Section 3.1.4.2.2.1.2.1: In SQL Server Analysis Services, the value 31 is returned for MOLAP servers and the value 23 is returned for in-memory servers.

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<109> Section 3.1.4.2.2.1.3.1.1: SQL Server Analysis Services includes an asterisk (*) in the ROLES column if the current user is a server administrator or database administrator. SQL Server Analysis Services includes the system user name as a role if one of the roles uses dynamic security.

<110> Section 3.1.4.2.2.1.3.3.1: SQL Server Analysis Services does not support this column and does not report this.

<111> Section 3.1.4.2.2.1.3.3.1: SQL Server Analysis Services does not support this column and does not report this.

<112> Section 3.1.4.2.2.1.3.3.1: SQL Server Analysis Services always returns the value false for IS_NULLABLE

<113> Section 3.1.4.2.2.1.3.3.1: SQL Server Analysis Services returns the value -1 for all numeric types except currency.

<114> Section 3.1.4.2.2.1.3.3.1: SQL Server Analysis Services doesn't support this column and returns NULL.

<115> Section 3.1.4.2.2.1.3.4.1: SQL Server Analysis Services will return one of the following values:

- SHORT
- LONG
- FLOAT
- DOUBLE
- CURRENCY
- DATE
- BSTR
- USHORT
- ULONG
- CHAR
- WCHAR
- VARIANT

<116> Section 3.1.4.2.2.1.3.4.1: SQL Server Analysis Services always returns the value true for IS_NULLABLE.

<117> Section 3.1.4.2.2.1.3.4.1: SQL Server Analysis Services always returns the value "3" for SEARCHABLE.

<118> Section 3.1.4.2.2.1.3.4.1: SQL Server Analysis Services always returns the value false for FIXED_PREC_SCALE.

<119> Section 3.1.4.2.2.1.3.4.1: SQL Server Analysis Services always returns the value false for AUTO_UNIQUE_VALUE.

<120> Section 3.1.4.2.2.1.3.4.1: SSAS always returns False for IS_LONG.

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<121> Section 3.1.4.2.2.1.3.4.1: SQL Server Analysis Services always returns the value true for BEST_MATCH.

<122> Section 3.1.4.2.2.1.3.4.1: SQL Server Analysis Services always returns the value true for IS_FIXEDLENGTH.

<123> Section 3.1.4.2.2.1.3.5.1: SQL Server Analysis Services does not support the concept of schemas and always returns NULL for SCHEMA_NAME in all Discover responses containing this column.

<124> Section 3.1.4.2.2.1.3.5.1: SQL Server Analysis Services does not store this information and always returns NULL.

<125> Section 3.1.4.2.2.1.3.5.1: SQL Server Analysis Services does not store this information and always returns NULL.

<126> Section 3.1.4.2.2.1.3.5.1: SQL Server Analysis Services does not store this information and always returns NULL.

<127> Section 3.1.4.2.2.1.3.5.1: SQL Server Analysis Services does not store this information and always returns NULL.

<128> Section 3.1.4.2.2.1.3.5.1: SQL Server Analysis Services always returns true for the IS_DRILLTHROUGH_ENABLED column.

<129> Section 3.1.4.2.2.1.3.5.1: This property was introduced in SQL Server 2008 R2

<130> Section 3.1.4.2.2.1.3.6.1: SQL Server Analysis Services does not support the concept of schemas and always returns NULL for SCHEMA_NAME in all Discover responses containing this column.

<131> Section 3.1.4.2.2.1.3.6.1: SQL Server Analysis Services always returns false for the IS_VIRTUAL column.

<132> Section 3.1.4.2.2.1.3.7.1: SQL Server Analysis Services does not support the concept of schemas and always returns NULL for SCHEMA_NAME in all Discover responses containing this column.

<133> Section 3.1.4.2.2.1.3.7.1: For SQL Server Analysis Services providers that generate unique names by qualification, each component of this unique dimension name is delimited.

<134> Section 3.1.4.2.2.1.3.7.1: SQL Server Analysis Services always returns a value for the HIERARCHY_NAME column.

<135> Section 3.1.4.2.2.1.3.7.1: SQL Server Analysis Services always returns false for the IS_VIRTUAL column.

<136> Section 3.1.4.2.2.1.3.7.1: SQL Server Analysis Services returns true if the WritebackToDimension column that represents this column is enabled.

<137> Section 3.1.4.2.2.1.3.7.1: SQL Server Analysis Services always returns 0x01 for the DIMENSION_UNIQUE_SETTINGS column.

<138> Section 3.1.4.2.2.1.3.7.1: SQL Server Analysis Services always misses the DIMENSION_MASTER_UNIQUE_NAME column.

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<139> Section 3.1.4.2.2.1.3.7.1: SQL Server Analysis Services always returns true for the DIMENSION_IS_VISIBLE column. If the dimension is not visible, it will not appear in the schema rowset.

<140> Section 3.1.4.2.2.1.3.7.1: SQL Server Analysis Services always returns true for the DIMENSION_IS_SHARED column.

<141> Section 3.1.4.2.2.1.3.8.1: SQL Server Analysis Services does not support the concept of schemas and always returns NULL for SCHEMA_NAME in all Discover responses containing this column.

<142> Section 3.1.4.2.2.1.3.8.1: For SQL Server Analysis Services providers that generate unique names by qualification, each component of the unique dimension name is delimited.

<143> Section 3.1.4.2.2.1.3.8.1: In SQL Server Analysis Services, if a caption does not exist, LEVEL_NAME is returned.

<144> Section 3.1.4.2.2.1.3.9.1: SQL Server Analysis Services does not support the concept of schemas and always returns NULL for SCHEMA_NAME in all Discover responses containing this column.

<145> Section 3.1.4.2.2.1.3.9.1: SQL Server Analysis Services returns the value -1 for all numeric types except currency.

<146> Section 3.1.4.2.2.1.3.9.1: SQL Server Analysis Services will always return NULL for LEVELS_LIST.

<147> Section 3.1.4.2.2.1.3.9.1: SQL Server Analysis Services folder names are separated by a semicolon. Nested folders are indicated by a backslash (\).

<148> Section 3.1.4.2.2.1.3.10.1: SQL Server Analysis Services does not support the concept of schemas and always returns NULL for SCHEMA_NAME in all Discover responses containing this column.

<149> Section 3.1.4.2.2.1.3.10.1: In SQL Server Analysis Services, if the key for the property is the same as the name for the property, the PROPERTY_NAME column will be blank.

<150> Section 3.1.4.2.2.1.3.10.1: SQL Server Analysis Services returns the PROPERTY_NAME column if a caption does not exist.

<151> Section 3.1.4.2.2.1.3.10.1: SQL Server Analysis Services returns the value -1 for all numeric types except currency.

<152> Section 3.1.4.2.2.1.3.11.1: SQL Server Analysis Services does not support the concept of schemas and always returns NULL for SCHEMA_NAME in all Discover responses containing this column.

<153> Section 3.1.4.2.2.1.3.11.1: In SQL Server Analysis Services, the member type value 4 (formula) takes precedence over the member type value 3 (measure). For example, if there is a formula (calculated) member on the Measures dimension, it is listed as 4.

<154> Section 3.1.4.2.2.1.3.12.1: SQL Server Analysis Services does not support the concept of schemas and always returns NULL for SCHEMA_NAME in all Discover responses containing this column.

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<155> Section 3.1.4.2.2.1.3.13.1: SQL Server Analysis Services does not support the concept of schemas and always returns NULL for SCHEMA_NAME in all Discover responses containing this column.

<156> Section 3.1.4.2.2.1.3.15.1: SQL Server Analysis Services does not support the concept of schemas and always returns NULL for SCHEMA_NAME in all Discover responses containing this column.

<157> Section 3.1.4.2.2.1.3.16.1: SQL Server Analysis Services does not support the concept of schemas and always returns NULL for SCHEMA_NAME in all Discover responses containing this column.

<158> Section 3.1.4.2.2.1.3.17.1: SQL Server Analysis Services does not support the concept of schemas and always returns NULL for SCHEMA_NAME in all Discover responses containing this column.

<159> Section 3.1.4.2.2.1.3.18.1: SQL Server Analysis Services does not support the concept of schemas and always returns NULL for SCHEMA_NAME in all Discover responses containing this column.

<160> Section 3.1.4.2.2.1.3.19.1: SQL Server Analysis Services populates this column with one of the following values:

- DM_SERVICETYPE_CLASSIFICATION (1)
- DM_SERVICETYPE_CLUSTERING (2)
- DM_SERVICETYPE_ASSOCIATION (4)
- DM_SERVICETYPE_DENSITY_ESTIMATE (8)
- DM_SERVICETYPE_SEQUENCE (16)

<161> Section 3.1.4.2.2.1.3.21: These data mining algorithms only apply to SQL Server 2008 Analysis Services.

<162> Section 3.1.4.2.2.1.3.22.1: SQL Server Analysis Services does not support the concept of schemas and returns an empty value.

<163> Section 3.1.4.2.2.1.3.23.1: This column is always empty.

<164> Section 3.1.4.2.2.1.3.24.1: This column is not supported by SQL Server 2008 Analysis Services; it always contains NULL.

<165> Section 3.1.4.2.2.1.3.25.1: This column is always empty.

<166> Section 3.1.4.2.2.1.3.26.1: This column is always empty.

<167> Section 3.1.4.2.2.1.3.26.1: SQL Server Analysis Services returns the value -1 for all numeric types except currency.

<168> Section 3.1.4.2.2.1.3.26.1: This column is not supported by Analysis Services; it always contains NULL.

<169> Section 3.1.4.2.2.1.3.26.1: This column is always empty.

<170> Section 3.1.4.2.2.1.3.26.1: This column is not supported by Analysis Services; it always contains NULL.

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<171> Section 3.1.4.2.2.1.3.26.1: This column is not supported by Analysis Services; it always contains NULL.

<172> Section 3.1.4.2.2.1.3.26.1: This column is not supported by Analysis Services; it always contains NULL.

<173> Section 3.1.4.2.2.1.3.26.1: This column is not supported by Analysis Services; it always contains NULL.

<174> Section 3.1.4.2.2.1.3.26.1: This column is not supported by Analysis Services; it always contains NULL.

<175> Section 3.1.4.2.2.1.3.26.1: This column is not supported by Analysis Services; it always contains NULL.

<176> Section 3.1.4.2.2.1.3.26.1: This column is not supported by Analysis Services; it always contains NULL.

<177> Section 3.1.4.2.2.1.3.27.1: This column is always empty.

<178> Section 3.1.4.2.2.1.3.28.1: This column is always empty.

<179> Section 3.1.4.2.2.1.3.28.1: SQL Server Analysis Services does not support this column and does not report this.

<180> Section 3.1.4.2.2.1.3.28.1: SQL Server Analysis Services does not support this column and does not report this.

<181> Section 3.1.4.2.2.1.3.28.1: SQL Server Analysis Services returns the value -1 for all numeric types except currency.

<182> Section 3.1.4.2.2.1.3.28.1: This column is always empty.

<183> Section 3.1.4.2.2.1.3.33.1: SQL Server Analysis Services always returns the values MDP, TDP, and DMP for ProviderType.

<184> Section 3.1.4.2.2.1.3.33.1: SQL Server Analysis Services always returns the value 'Authenticated' for AuthenticationMode.

<185> Section 3.1.4.2.2.1.3.59: DISCOVER_STORAGE_TABLES was introduced in SQL Server 2008 R2.

<186> Section 3.1.4.2.2.1.3.60: DISCOVER_STORAGE_TABLE_COLUMNS was introduced in SQL Server 2008 R2.

<187> Section 3.1.4.2.2.1.3.61: DISCOVER_STORAGE_TABLE_COLUMN_SEGMENTS was introduced in SQL Server 2008 R2.

<188> Section 3.1.4.3.2.1.1.15: Locks are held in the context of the current transaction. When the transaction commits or rolls back, the locks are automatically released.

<189> Section 3.1.4.3.2.1.1.27: SQL Server Analysis Services does not support the Statement command within a **Batch**.

<190> Section 3.2.1: SQL Server 2005 Analysis Services supports one default instance and multiple named instances of the server on a single computer. The default TCP port number for the default instance is 2383. In order to connect to a named instance, the client MUST first connect to the SQL Browser service on port 2382, get the list of named instances on the computer by sending a

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DISCOVER_INSTANCES request, and then examine the response to determine the TCP port number corresponding to the desired named instance.

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8 Change Tracking

This section identifies changes made to [MS-SSAS] protocol documentation between November 2009 and March 2010 releases. Changes are classed as major, minor, or editorial.

Major changes affect protocol interoperability or implementation. Examples of major changes are:

- A document revision that incorporates changes to interoperability requirements or functionality.
- An extensive rewrite, addition, or deletion of major portions of content.
- A protocol is deprecated.
- The removal of a document from the documentation set.
- Changes made for template compliance.

Minor changes do not affect protocol interoperability or implementation. Examples are updates to fix technical accuracy or ambiguity at the sentence, paragraph, or table level.

Editorial changes apply to grammatical, formatting, and style issues.

No changes means that the document is identical to its last release.

Major and minor changes can be described further using the following revision types:

- New content added.
- Content update.
- Content removed.
- New product behavior note added.
- Product behavior note updated.
- Product behavior note removed.
- New protocol syntax added.
- Protocol syntax updated.
- Protocol syntax removed.
- New content added due to protocol revision.
- Content updated due to protocol revision.
- Content removed due to protocol revision.
- New protocol syntax added due to protocol revision.
- Protocol syntax updated due to protocol revision.
- Protocol syntax removed due to protocol revision.
- New content added for template compliance.
- Content updated for template compliance.

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- Content removed for template compliance.
- Obsolete document removed.

Editorial changes always have the revision type "Editorially updated."

Some important terms used in revision type descriptions are defined as follows:

Protocol syntax refers to data elements (such as packets, structures, enumerations, and methods) as well as interfaces.

Protocol revision refers to changes made to a protocol that affect the bits that are sent over the wire.

Changes are listed in the following table. If you need further information, please contact protocol@microsoft.com.

Section	Tracking number (if applicable) and description	Major change (Y or N)	Revision Type
1.2.1 Normative References	Replaced the reference to [XMLNS] with a reference to [XMLNS3], which is the updated version that supersedes [XMLNS].	Y	Content updated due to protocol revision.
2.2.4.1.3 xmla-rs:rowset Complex Type	357113 Updated XSD and description of Schema element.	Y	Content updated due to protocol revision.
2.2.4.2.2.4.1 Event	358486 Updated XSD.	N	New content added due to protocol revision.
2.2.4.2.2.4.1 Event	373164 Updated XSD.	Y	Content updated due to protocol revision.
2.2.4.2.2.4.1.1 EventColumn	358486 Updated XSD.	N	Content updated due to protocol revision.
2.2.4.2.2.4.1.1 EventColumn	373164 Updated XSD.	Y	Content updated due to protocol revision.
2.2.4.2.2.5 Database	392892 Updated XSD and added new element description.	N	Content updated due to protocol revision.
3.1.4.2.2.1.2.1 PropertyList	392892 Updated description of DbPropMsmdOptimizeResponse	N	Content updated due

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Section	Tracking number (if applicable) and description	Major change (Y or N)	Revision Type
	element.		to protocol revision.
3.1.4.2.2.1.2.1 PropertyList	375368 Updated CharacterEncoding information to ResponseEncoding; updated ProviderName, ProviderVersion, and MdpropMdxDrillFunctions information.	Y	Content updated due to protocol revision.
3.1.4.2.2.1.2.1 PropertyList	352431 Updated XSD and description for DbpropMsmdSubqueries, UpdateIsolationLevel, and Dialect properties.	N	Content updated due to protocol revision.
3.1.4.2.2.1.2.1 PropertyList	352490 Moved PropertyList section from 3.1.4.4 to 3.1.4.2.2.1.2.1.	N	Content updated due to protocol revision.
3.1.4.2.2.1.2.1 PropertyList	352490 Moved PropertyList section from 3.1.4.4 to 3.1.4.2.2.1.2.1.	N	Content updated due to protocol revision.
3.1.4.2.2.1.2.1 PropertyList	356040 Added descriptions for the values of MdpropMdxSubqueries and MdpropMdxNamedSets.	Y	New content added due to protocol revision.
3.1.4.2.2.1.2.1 PropertyList	356039 Updated description of MdpropMdxDrillFunctions enumeration.	Y	Content updated due to protocol revision.
3.1.4.2.2.1.3 Discover Request Types	352490 Moved Discover Request Types from section 3.1.4.2.3 to 3.1.4.2.2.1.3.	N	Content updated due to protocol revision.
3.1.4.2.2.1.3.1.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.2.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.3.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.3.1	345343	N	New product

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Section	Tracking number (if applicable) and description	Major change (Y or N)	Revision Type
Columns	Added product behavior note to clarify that SSAS doesn't support CHARACTER_SET_SCHEMA column.		behavior note added.
3.1.4.2.2.1.3.3.1 Columns	345756 Added product behavior note to clarify that SSAS does not support COLUMN_HASDEFAULT or COLUMN_DEFAULT columns.	N	New product behavior note added.
3.1.4.2.2.1.3.4.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.5.1 Columns	358486 Updated to include PREFERRED_QUERY_PATTERNS column.	N	Content updated due to protocol revision.
3.1.4.2.2.1.3.5.1 Columns	358486 Updated table to include PREFERRED_QUERY_PATTERNS column.	N	Content updated due to protocol revision.
3.1.4.2.2.1.3.5.1 Columns	352423 Updated description of SCHEMA_UPDATED_BY column. Added product behavior notes to explain that SQL Server Analysis Services does not store update information and always returns NULL.	N	Content updated due to protocol revision.
3.1.4.2.2.1.3.5.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.6.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.7.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.8.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.9.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.10.1	390066	Y	New content

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Section	Tracking number (if applicable) and description	Major change (Y or N)	Revision Type
Columns	Added XSD.		added due to protocol revision.
3.1.4.2.2.1.3.11.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.12.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.13.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.14.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.15.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.16.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.17.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.18.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.19.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.19.1 Columns	356043 Added values to SERVICE_TYPE_ID column.	Y	Content updated due to protocol revision.
3.1.4.2.2.1.3.20.1	390066	Y	New content

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Section	Tracking number (if applicable) and description	Major change (Y or N)	Revision Type
Columns	Added XSD.		added due to protocol revision.
3.1.4.2.2.1.3.21.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.22.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.22.1 Columns	345343 Added product behavior note to clarify that SSAS does not support the concept of schemas.	N	New product behavior note added.
3.1.4.2.2.1.3.23.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.24.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.25.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.25.1 Columns	356043 Added values to the SERVICE_TYPE_ID column.	Y	Content updated due to protocol revision.
3.1.4.2.2.1.3.25.1 Columns	345343 Added product behavior note to clarify that SSAS does not support the concept of schemas.	N	New product behavior note added.
3.1.4.2.2.1.3.26.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.26.1 Columns	345343 Added product behavior note to clarify that the DMSCHEMA_MINING_COLUMNS column is always empty.	N	New product behavior note added.
3.1.4.2.2.1.3.27.1 Columns	390066 Added XSD.	Y	New content added due to protocol

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Section	Tracking number (if applicable) and description	Major change (Y or N)	Revision Type
			revision.
3.1.4.2.2.1.3.27.1 Columns	345343 Added product behavior note to clarify that the DMSCHEMA_MINING_STRUCTURES column is always empty.	N	Content updated due to protocol revision.
3.1.4.2.2.1.3.28.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.28.1 Columns	345343 Added product behavior note to clarify that the STRUCTURE_SCHEMA and CHARACTER_SET_SCHEMA columns are always empty.	N	New product behavior note added.
3.1.4.2.2.1.3.28.1 Columns	345756 Added product behavior note to clarify that SSAS does not support COLUMN_HASDEFAULT or COLUMN_DEFAULT columns.	N	New product behavior note added.
3.1.4.2.2.1.3.29.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.29.1 Columns	346784 Moved Value element to its own table and added descriptive text.	Y	Content updated due to protocol revision.
3.1.4.2.2.1.3.30.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.31.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.32.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.33.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.34.1 Columns	390066 Added XSD.	Y	New content added due to protocol

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Section	Tracking number (if applicable) and description	Major change (Y or N)	Revision Type
			revision.
3.1.4.2.2.1.3.35.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.36.2 Additional Restrictions	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.37.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.38.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.39.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.40.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.41.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.42.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.43.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.44.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.45.1 Columns	390066 Added XSD.	Y	New content added due to protocol

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Section	Tracking number (if applicable) and description	Major change (Y or N)	Revision Type
			revision.
3.1.4.2.2.1.3.46.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.47.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.48.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.49.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.50.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.51.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.52.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.53.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.54.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.55.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.56.1 Columns	390066 Added XSD.	Y	New content added due to protocol

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Section	Tracking number (if applicable) and description	Major change (Y or N)	Revision Type
			revision.
3.1.4.2.2.1.3.57.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.58.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.59.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.60.1 Columns	375368 Added and updated information for the COLUMN_TYPE, COLUMN_ENCODING, DATATYPE, ISKEY, ISUNIQUE, ISNULLABLE, and ISROWNUMBER columns.	Y	Content updated due to protocol revision.
3.1.4.2.2.1.3.60.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.2.2.1.3.61.1 Columns	375368 Added and updated information for the ALLOCATED_SIZE, COMPRESSION_TYPE, BITS_COUNT, and VERTIPAQ_STATE columns.	Y	Content updated due to protocol revision.
3.1.4.2.2.1.3.61.1 Columns	390066 Added XSD.	Y	New content added due to protocol revision.
3.1.4.3.2.1.1.1 ObjectReference Type	341610 Added DataSourcePermissionID element to XSD.	N	Content updated due to protocol revision.
3.1.4.3.2.1.3 Parameters	352490 Added Parameters section.	N	New content added due to protocol revision.
3.1.4.3.2.1.3.1 ExecuteParameter	352490 Moved ExecuteParameter from section 3.1.4.3.2.1.3 to 3.1.4.3.3.1.	N	Content updated due to protocol revision.
3.1.4.3.2.2 ExecuteResponse	352490 Moved ExecuteResponse from section 3.1.4.3.3 to 3.1.4.3.3.	N	Content updated due to protocol

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Section	Tracking number (if applicable) and description	Major change (Y or N)	Revision Type
			revision.
3.1.4.3.2.2.1 return Element	352431 Revised definitions for the xmla-ds:root element, the xmla-rs:root element, and the xmla-m:results element.	N	Content updated due to protocol revision.
3.1.4.3.2.2.1 return Element	352490 Moved return section from 3.1.4.3.3.1 to 3.1.4.3.3.3.	N	Content updated due to protocol revision.
3.2.3 Content Type Negotiation	382657 Clarified flag settings for first and subsequent requests.	Y	Content updated due to protocol revision.

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