

## [MS-CSDLBI]:

# Conceptual Schema Definition File Format with Business Intelligence Annotations

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## Revision Summary

Date	Revision History	Revision Class	Comments
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10/8/2012	2.0	Major	Updated and revised the technical content.
10/23/2012	2.1	Minor	Clarified the meaning of the technical content.
3/26/2013	2.2	Minor	Clarified the meaning of the technical content.
6/11/2013	2.2	None	No changes to the meaning, language, or formatting of the technical content.
8/8/2013	2.3	Minor	Clarified the meaning of the technical content.
12/5/2013	3.0	Major	Updated and revised the technical content.
2/11/2014	4.0	Major	Updated and revised the technical content.
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5/10/2016	6.0	Major	Significantly changed the technical content.

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# 1 Introduction

The conceptual **schema** definition file format with business intelligence (BI) annotations provides the structure and semantics of **conceptual schema definition language (CSDL)** annotations that are used in BI applications. CSDL is a language based on XML that can be used for defining **Entity Data Model (EDM)**-based conceptual models.

Sections 1.7 and 2 of this specification are normative. All other sections and examples in this specification are informative.

## 1.1 Glossary

This document uses the following terms:

**annotation:** Any custom, application-specific extension that is applied to an instance of a schema definition language through the use of custom attributes and elements that are not a part of that schema definition language.

**association:** A named independent relationship between two entity type definitions. Associations in the **Entity Data Model (EDM)** are first-class concepts and are always bidirectional. Indeed, the first-class nature of associations helps distinguish the **EDM** from the relational model. Every association includes exactly two association ends.

**collection:** A grouping of one or more EDM types that are type compatible.

**complex type:** A type that represents a set of related information. Like the entity type, it consists of one or more properties of the EDM simple type or complex types; however, unlike the entity type, the complex type does not have an EntityKey element or a NavigationProperty element.

**conceptual schema definition language (CSDL):** A language that is based on XML and that can be used to define conceptual models that are based on the **Entity Data Model (EDM)**.

**conceptual schema definition language with business intelligence annotations (CSDLBI):** A language that is based on XML and that can be used to annotate EDM-based conceptual models with specific information that is useful in business intelligence applications.

**conceptual schema definition language with business intelligence annotations (CSDLBI) document:** A document that contains a conceptual model that is defined by using the CSDL and CSDLBI code.

**dimension:** A structural attribute of a cube, which is an organized hierarchy of categories (levels) that describe data in a fact table. These categories typically describe a similar set of members upon which the user bases an analysis.

**entity:** An instance of an EntityType element that has a unique identity and an independent existence. An entity is an operational unit of consistency.

**Entity Data Model (EDM):** A set of concepts that describes the structure of data, regardless of its stored form.

**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.

**identifier:** A string value that is used to uniquely identify a component of the **CSDL** and that is of type SimpleIdentifier.

**language code identifier (LCID):** A 32-bit number that identifies the user interface human language dialect or variation that is supported by an application or a client computer.

**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.

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

**namespace:** A name that is defined on the **schema** and that is subsequently used to prefix **identifiers** to form the namespace qualified name of a structural type.

**schema:** A container that defines a **namespace** that describes the scope of EDM types. All EDM types are contained within some **namespace**.

**simple type:** An element that can contain only text and appears as <simpleType> in an XML document or any attribute of an element. Attributes are considered simple types because they contain only text. See also **complex type**.

**XML namespace:** A collection of names that is used to identify elements, types, and attributes in XML documents identified in a URI reference [RFC3986]. A combination of XML namespace and local name allows XML documents to use elements, types, and attributes that have the same names but come from different sources. For more information, see [XMLNS-2ED].

**XML schema:** A description of a type of XML document that is typically expressed in terms of constraints on the structure and content of documents of that type, in addition to the basic syntax constraints that are imposed by XML itself. An XML schema provides a view of a document type at a relatively high level of abstraction.

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

## 1.2 References

Links to a document in the Microsoft Open Specifications library point to the correct section in the most recently published version of the referenced document. However, because individual documents in the library are not updated at the same time, the section numbers in the documents may not match. You can confirm the correct section numbering by checking the [Errata](#).

### 1.2.1 Normative References

We conduct frequent surveys of the normative references to assure their continued availability. If you have any issue with finding a normative reference, please contact [dochelp@microsoft.com](mailto:dochelp@microsoft.com). We will assist you in finding the relevant information.

[MC-CSDL] Microsoft Corporation, "[Conceptual Schema Definition File Format](#)".

[MS-SSAS] Microsoft Corporation, "[SQL Server Analysis Services Protocol](#)".

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997, <http://www.rfc-editor.org/rfc/rfc2119.txt>

[XML1.0] Bray, T., Paoli, J., Sperberg-McQueen, C.M., and Maler, E., "Extensible Markup Language (XML) 1.0 (Second Edition)", W3C Recommendation, October 2000, <http://www.w3.org/TR/2000/REC-xml-20001006>

[XMLNS] Bray, T., Hollander, D., Layman, A., et al., Eds., "Namespaces in XML 1.0 (Third Edition)", W3C Recommendation, December 2009, <http://www.w3.org/TR/2009/REC-xml-names-20091208/>

[XMLSCHEMA1] Thompson, H., Beech, D., Maloney, M., and Mendelsohn, N., Eds., "XML Schema Part 1: Structures", W3C Recommendation, May 2001, <http://www.w3.org/TR/2001/REC-xmlschema-1-20010502/>

## 1.2.2 Informative References

[MSDN-NLSAPIRef] Microsoft Corporation, "National Language Support (NLS) API Reference", <http://msdn.microsoft.com/en-us/goglobal/bb896001.aspx>

## 1.3 Overview

**Conceptual schema definition language with business intelligence annotations (CSDLBI)** is an XML-based file format that is used to annotate Entity Data Model (EDM)-based conceptual models and is based on standards that are defined in [\[XML1.0\]](#) and [\[XMLSCHEMA1\]](#). Type names in CSDLBI are generally the same as in conceptual schema definition language (CSDL). For details about CSDL, see [\[MC-CSDL\]](#).

Conceptually, a **CSDLBI document** has an overall structure that resembles the following.

```
<Schema>
  <Using/>
  <Using/>

  <ComplexType/>

  <Function/>
  <Function/>

  <EntityContainer>
    <EntitySet>
      <bi:EntitySet/>
    <EntitySet/>

    <EntitySet>
      <bi:EntitySet/>
    <EntitySet/>

    <AssociationSet>
      <End/>
      <End/>
      <bi:AssociationSet/>
    </AssociationSet>

    <AssociationSet>
      <End/>
      <End/>
      <bi:AssociationSet/>
    </AssociationSet>

    <bi:EntityContainer>
      <bi:CompareOptions/>
    </bi:EntityContainer>
  </EntityContainer>

  <EntityType>
    <Key>
      <PropertyRef/>
    </Key>

    <Property>
      <bi:Property>
    </Property>

    <Property>
      <bi:Property>
    </Property>

    <Property>
      <bi:Measure>
        <bi:Kpi>

```

```

        <bi:Goal>
          <bi:PropertyRef/>
        </bi:Goal>
        <bi:Status>
          <bi:PropertyRef/>
        </bi:Status>
      </bi:Kpi>
    </bi:Measure>
  </Property>

  <NavigationProperty>
    <bi:NavigationProperty/>
  </NavigationProperty>

  <bi:EntityType>
    <bi:Hierarchy>
      <bi:Level>
        <bi:Source>
          <bi:PropertyRef/>
        </bi:Source>
      </bi:Level>
      <bi:Level>
        <bi:Source>
          <bi:PropertyRef/>
        </bi:Source>
      </bi:Level>
    </bi:Hierarchy>
  </bi:EntityType>
</EntityType>

<EntityType>
  <bi:EntityType>
    <bi:Hierarchy>
      <bi:Level>
        <bi:Source>
          <bi:PropertyRef/>
        </bi:Source>
      </bi:Level>
      <bi:Level>
        <bi:Source>
          <bi:PropertyRef/>
        </bi:Source>
      </bi:Level>
    </bi:Hierarchy>
  </bi:EntityType>
</EntityType>

<Association>
  <End/>
  <End/>
</Association>

<Association>
  <End/>
  <End/>
</Association>
</Schema>

```

**Note** The previous example is not a detailed specification. It is meant to provide only a visual overview.

## 1.4 Relationship to Protocols and Other Structures

The conceptual schema definition language with business intelligence annotations (CSDLBI) format uses the conceptual schema definition language (CSDL) [\[MC-CSDL\]](#) to provide the structure and semantics.



The CSDLBI format is used to specify SQL Server Analysis Services database metadata, as described in [\[MS-SSAS\]](#).

There are no schemas, protocols, or other structures that extend CSDLBI.

## 1.5 Applicability Statement

CSDLBI is a file format for defining **annotations** to CSDL models that support business intelligence (BI) applications.

## 1.6 Versioning and Localization

This document specifies the structures for the following versions of conceptual schema definition file format with business intelligence annotations (CSDLBI): [<1>](#)

- CSDLBI 1.0
- CSDLBI 1.1
- CSDLBI 2.0

These versions are defined in [Appendix A: Full XML Schema \(section 5\)](#).

Aspects of later CSDLBI versions that do not apply to earlier versions are identified in the text.

## 1.7 Vendor-Extensible Fields

None.

## 2 Structures

Conceptual schema definition language (CSDL) supports application-specific customization and extension through the use of annotations. These annotations enable applications to embed application-specific and vendor-specific information into CSDL. The CSDL format does not specify how to process these custom-defined structures or how to distinguish structures from multiple vendors or layers. Parsers of CSDL can ignore annotations that are not expected or are not understood.

Annotations can be of two kinds:

- **AnnotationElement**, as defined in [\[MC-CSDL\]](#) section [2.1.22](#).
- **AnnotationAttribute**, as defined in [\[MC-CSDL\]](#) section [2.2.7](#).

Conceptual schema definition language with business intelligence annotations (CSDLBI) is defined by **complex types**, some of which include **simple types** and other complex types, with the exception of the **SourceDescription** element. The **SourceDescription** element is of basic xs:string type.

The following CSDL elements are annotated by the corresponding CSDLBI complex types, as shown in the table.

CSDL element	CSDLBI complex type
<a href="#">EntityContainer</a>	<a href="#">TEntityContainer</a>
<a href="#">EntitySet</a>	<a href="#">TEntitySet</a>
<a href="#">AssociationSet</a>	<a href="#">TAssociationSet</a>
<a href="#">EntityType</a>	<a href="#">TEntityType</a>
<a href="#">Property</a>	<a href="#">TProperty</a>
<a href="#">NavigationProperty</a>	<a href="#">TNavigationProperty</a>

Other complex types that are defined in the CSDLBI schema are included in the definitions of the complex types that are listed in the preceding table. These complex types are as follows:

- [TCompareOptions](#)
- [TModelCapabilities](#) (introduced in CSDLBI 2.0)
- [TBaseProperty](#)
- [TPropertyRefs](#)
- [TPropertyRef](#)
- [TMember](#)
- [TKpi](#) (introduced in CSDLBI 1.1)
- [TMemberRefs](#)
- [TMemberRef](#)
- [THierarchy](#) (introduced in CSDLBI 1.1)
- [TLevel](#) (introduced in CSDLBI 1.1)
- [TDocumentation](#)

- [TDAXFunctions](#) (introduced in CSDLBI 2.0)
- [TPropertyStatistics](#) (introduced in CSDLBI 2.0)
- [TEntityStatistics](#) (introduced in CSDLBI 2.0)

One more complex type that is defined in the CSDLBI schema is [TMeasure](#). The **TMeasure** complex type is used to define the **Measure** element. The **Measure** element is introduced in the CSDLBI 1.0 schema.

Some complex types include simple types. The simple types that are defined in the CSDLBI schema are as follows:

- [TDirectQueryMode](#)
- [TCrossFilteringWithinTable](#) (introduced in CSDLBI 2.0)
- [TGroupByValidation](#) (introduced in CSDLBI 2.0)
- [TQueryAggregateUsage](#) (introduced in CSDLBI 2.0)
- [TEncourageIsEmptyDAXFunctionUsage](#) (introduced in CSDLBI 2.0)
- [TFiveStateKPIRange](#) (introduced in CSDLBI 2.0)
- [TState](#)
- [TCrossFilterDirection](#) (introduced in CSDLBI 2.0)
- [TEntityContents](#)
- [TContextualNameRule](#)
- [TContents](#)
- [TDefaultAggregateFunction](#)
- [TGroupingBehavior](#)
- [TStability](#)
- [TAlignment](#)
- [TSortDirection](#)
- [TQueryBatching](#) (introduced in CSDLBI 2.0)
- [TVariables](#) (introduced in CSDLBI 2.0)
- [TSummarizeColumns](#) (introduced in CSDLBI 2.0)
- [TSubstituteWithIndex](#) (introduced in CSDLBI 2.0)
- [TLeftOuterJoin](#) (introduced in CSDLBI 2.0)
- [TBinaryMinMax](#) (introduced in CSDLBI 2.0)

The CSDLBI schema defines a total of 22 complex types and 22 simple types. Section [2.1](#) contains a subsection for each complex type. The simple types that are included in complex types are defined in subsections under the complex type to which they belong.

An example of a CSDL model that is annotated by using these types is provided in Section [3](#) of this specification.

## 2.1 Complex and Simple Types

This section specifies each complex type that is defined by conceptual schema definition language with business intelligence annotations (CSDLBI). Each simple type that is part of a complex type is defined in a subsection under the complex type to which it belongs.

The prefix **bi:** refers to the following **XML namespace**:  
<http://schemas.microsoft.com/sqlbi/2010/10/edm/extensions>.

For more information about **namespaces**, see [\[XMLNS\]](#).

### 2.1.1 TEntityContainer

The **TEntityContainer** complex type annotates the **EntityContainer** element that is defined in [\[MC-CSDL\]](#) section [2.1.14](#). The **EntityContainer** element is conceptually similar to a database or data source. It groups **EntitySet** and **AssociationSet** child elements that represent a data source.

The **TEntityContainer** complex type is defined in the schema as follows.

```
<xs:complexType name="TEntityContainer">
  <xs:sequence>
    <xs:element name="CompareOptions" type="bi:TCompareOptions" />
    <xs:element name="ModelCapabilities" type="bi:TModelCapabilities" />
  </xs:sequence>
  <xs:attribute name="Caption" type="xs:string" use="optional"/>
  <xs:attribute name="Culture" type="xs:string" />
  <xs:attribute name="DirectQueryMode" type="bi:TDirectQueryMode" />
  <xs:attribute name="PreferOrdinalStringEquality" type="xs:boolean" default="false"/>
</xs:complexType>
```

The elements and attributes that are defined by the **TEntityContainer** complex type are specified in the following tables.

Element	Description
CompareOptions	Contains language-specific sorting and string comparison options for the model. The contents of this element are defined by the <b>TCompareOptions</b> complex type (section <a href="#">2.1.2</a> ).
ModelCapabilities	In CSDLBI 2.0, contains elements that describe which new properties and features of the model or Data Analysis Expressions (DAX) SHOULD be taken into account when the client generates DAX queries. The contents of this element are defined by the <b>TModelCapabilities</b> complex type (section <a href="#">2.1.3</a> ).

Attribute	Description
Caption	Describes the database or data model.
Culture	Contains the culture name, as specified in the following table. For more information about <b>language code identifiers (LCIDs)</b> , see <a href="#">[MSDN-NLSAPIRef]</a> .
DirectQueryMode	Determines which mode is used for a query. The contents of this attribute are defined by the <b>TDirectQueryMode</b> simple type (section <a href="#">2.1.1.1</a> ).
PreferOrdinalStringEquality	Directs clients to perform culture-invariant comparisons and ordering on string values that are returned in query results, disregarding the <b>Culture</b> attribute. <a href="#">&lt;2&gt;</a>

The culture name that is contained in the **Culture** attribute MUST be one of the following:

<b>Language</b>	<b>LCID</b>	<b>Culture name</b>
Neutral	0	en-US
Arabic	1025	ar-SA
Bengali	1093	bn-IN
Brazilian	1046	pt-BR
British English	2057	en-GB
Bulgarian	1026	bg-BG
Catalan	1027	ca-ES
Chinese - Simplified	2052	zh-CN
Chinese - Traditional	1028	zh-TW
Chinese (Hong Kong SAR, PRC)	3076	zh-HK
Chinese (Macau SAR)	5124	zh-MO
Chinese (Singapore)	4100	zh-SG
Croatian	1050	hr-HR
Dutch	1043	nl-NL
English-US	1033	en-US
French	1036	fr-FR
German	1031	de-DE
Gujarati	1095	gu-IN
Hebrew	1037	he-IL
Hindi	1081	hi-IN
Icelandic	1039	is-IS
Indonesian	1057	id-ID
Italian	1040	it-IT
Japanese	1041	ja-JP
Kannada	1099	kn-IN
Korean	1042	ko-KR
Latvian	1062	lv-LV
Lithuanian	1063	lt-LT
Malay - Malaysia	1086	ms-MY
Malayalam	1100	ml-IN
Marathi	1102	mr-IN
Norwegian (Bokmål)	1044	nb-NO

Language	LCID	Culture name
Portuguese	2070	pt-PT
Punjabi	1094	pa-IN
Romanian	1048	ro-RO
Russian	1049	ru-RU
Serbian (Cyrillic)	3098	sr-Cyrl-CS
Serbian (Latin)	2074	sr-Latn-CS
Slovak	1051	sk-SK
Slovenian	1060	sl-SI
Spanish	3082	es-ES
Swedish	1053	sv-SE
Tamil	1097	ta-IN
Telugu	1098	te-IN
Thai	1054	th-TH
Ukrainian	1058	uk-UA
Urdu	1056	ur-PK
Vietnamese	1066	vi-VN

### 2.1.1.1 TDirectQueryMode

The **TDirectQueryMode** simple type is an enumeration that indicates the kind of query that will be conducted in DirectQuery mode. Data stores can opt to cache database information. In that case, the client can query the cache or the backing store, depending on user instructions.

The **TDirectQueryMode** simple type is defined in the schema as follows.

```
<xs:simpleType name="TDirectQueryMode">
  <xs:restriction base="xs:string">
    <xs:enumeration value="InMemory" />
    <xs:enumeration value="InMemoryWithDirectQuery" />
    <xs:enumeration value="DirectQueryWithInMemory" />
    <xs:enumeration value="DirectQuery" />
  </xs:restriction>
</xs:simpleType>
```

The possible values for the **TDirectQueryMode** simple type are specified in the following table.

Value	Meaning
InMemory	Indicates that queries against the model will be conducted against the cache.
InMemoryWithDirectQuery	Indicates that queries against the model are conducted against the cache by default.

Value	Meaning
DirectQueryWithInMemory	Indicates that queries against the model primarily reference the relational data source but can use the cache, if the cache is available.
DirectQuery	Indicates that queries against the model reference only the relational data source.

### 2.1.2 TCompareOptions

The **TCompareOptions** complex type defines collation properties that are applied to the data model. The values for **CompareOptions** are based on the **Database.Collation** element, as defined in [\[MS-SSAS\]](#) section 2.2.4.2.2.5.

The **TCompareOptions** complex type is defined in the schema as follows.

```
<xs:complexType name="TCompareOptions" >
  <xs:attribute name="IgnoreCase" type="xs:boolean" default="false" />
  <xs:attribute name="IgnoreNonSpace" type="xs:boolean" default="false" />
  <xs:attribute name="IgnoreKanaType" type="xs:boolean" default="false" />
  <xs:attribute name="IgnoreWidth" type="xs:boolean" default="false" />
</xs:complexType>
```

The attributes that are defined by the **TCompareOptions** complex type are specified in the following table.

Attribute	Description
IgnoreCase	Indicates whether the string comparison SHOULD ignore case.
IgnoreNonSpace	Indicates whether the string comparison SHOULD ignore nonspacing combining characters, such as diacritics.
IgnoreKanaType	Indicates whether the string comparison SHOULD ignore the Kana type.
IgnoreWidth	Indicates whether the string comparison SHOULD ignore the character width.

### 2.1.3 TModelCapabilities

In CSDLBI 2.0, the **TModelCapabilities** complex type is a container element for other CSDLBI 2.0 elements. Those elements describe features that are specific to the model and that clients are expected to interpret and utilize when querying data from the model. These elements can be optimization hints, constraints, or enhancements made to the model.

The **TModelCapabilities** complex type is defined in the schema as follows.

```
<xs:complexType name="TModelCapabilities" >
  <xs:sequence>
    <xs:element name="CrossFilteringWithinTable" type="bi:TCrossFilteringWithinTable" />
    <xs:element name="GroupByValidation" type="bi:TGroupByValidation" />
    <xs:element name="QueryAggregateUsage" type="bi:TQueryAggregateUsage" />
    <xs:element name="EncourageIsEmptyDAXFunctionUsage"
      type="bi:TEncourageIsEmptyDAXFunctionUsage" />
    <xs:element name="FiveStateKPIRange" type="bi:TFiveStateKPIRange" />
    <xs:element name="QueryBatching" type="bi:TQueryBatching" />
    <xs:element name="Variables" type="bi:TVariables" />
  </xs:sequence>
</xs:complexType>
```

```

    <xs:element name="DAXFunctions" type="bi:TDAXFunctions" />
  </xs:sequence>
</xs:complexType>

```

The elements that are defined by the **TModelCapabilities** complex type are specified in the following table.

Element	Description
CrossFilteringWithinTable	Indicates whether the model will restrict model measures. The contents of this element are defined by the <b>TCrossFilteringWithinTable</b> simple type (section <a href="#">2.1.3.1</a> )
GroupByValidation	Indicates whether the server will perform a GroupBy validation. The contents of this element are defined by the <b>TGroupByValidation</b> simple type (section <a href="#">2.1.3.2</a> )
QueryAggregateUsage	Indicates whether the server encourages query aggregate usage. The contents of this element are defined by the <b>TQueryAggregateUsage</b> simple type (section <a href="#">2.1.3.3</a> )
EncourageIsEmptyDAXFunctionUsage	Indicates whether the server encourages ISEMPY DAX function usage. The contents of this element are defined by the <b>TEncourageIsEmptyDAXFunctionUsage</b> simple type (section <a href="#">2.1.3.4</a> )
FiveStateKPIRange	Indicates the range of key performance indicator (KPI) values that are used for five-states KPIs. The contents of this element are defined by the <b>TFiveStateKPIRange</b> simple type (section <a href="#">2.1.3.5</a> ).
QueryBatching	Indicates whether batching is supported for DAX query requests. The contents of this element are defined by the <b>TQueryBatching</b> simple type (section <a href="#">2.1.3.6</a> ).
Variables	Indicates the level of support for defining variables in DAX expressions. The contents of this element are defined by the <b>TVariables</b> simple type (section <a href="#">2.1.3.7</a> ).
DAXFunctions	Indicates the level of support for various DAX functions in DAX queries that are executed against the model. The contents of this element are defined by the <b>TDAXFunctions</b> complex type (section <a href="#">2.1.3.8</a> ).

### 2.1.3.1 TCrossFilteringWithinTable

In CSDLBI 2.0, the **TCrossFilteringWithinTable** simple type indicates whether the model will restrict model measures.

The **TCrossFilteringWithinTable** simple type is defined in the schema as follows.

```

<xs:simpleType name="TCrossFilteringWithinTable">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Always" />
    <xs:enumeration value="Never" />
  </xs:restriction>
</xs:simpleType>

```



The possible values for the **TCrossFilteringWithinTable** type are specified in the following table.

Value	Meaning
Always (when DeploymentMode set to 0)	The model will restrict model measures.
Never (for Tabular)	The model will not restrict model measures.

The default value is "Never (for Tabular)".

### 2.1.3.2 TGroupByValidation

In CSDLBI 2.0, the **TGroupByValidation** simple type indicates whether the server will perform a GroupBy validation.

The **TGroupByValidation** simple type is defined in the schema as follows.

```
<xs:simpleType name="TGroupByValidation">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Relaxed" />
    <xs:enumeration value="Enforced" />
  </xs:restriction>
</xs:simpleType>
```

The possible values for the **TGroupByValidation** type are specified in the following table.

Value	Meaning
Relaxed	The server will not perform a validation of the completeness of GroupBy columns for each Data Analysis Expressions (DAX) query sent to the server
Enforced (when DeploymentMode set to 0)	The server will perform a validation of the completeness of GroupBy columns for each DAX query sent to the server

The default value is "Relaxed".

### 2.1.3.3 TQueryAggregateUsage

In CSDLBI 2.0, the **TQueryAggregateUsage** simple type indicates whether the server encourages query aggregate usage.

The **TQueryAggregateUsage** simple type is defined in the schema as follows.

```
<xs:simpleType name="TQueryAggregateUsage">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Encourage" />
    <xs:enumeration value="Discourage" />
  </xs:restriction>
</xs:simpleType>
```

The possible values for the **TQueryAggregateUsage** type are specified in the following table.

Value	Meaning
Encourage	The server encourages query aggregate usage.
Discourage (when DeploymentMode set to 0)	The server discourages query aggregate usage.

The default value is "Encourage".

#### 2.1.3.4 TEncourageIsEmptyDAXFunctionUsage

In CSDLBI 2.0, the **TEncourageIsEmptyDAXFunctionUsage** simple type indicates whether the server encourages IEMPTY DAX function usage.

The **TEncourageIsEmptyDAXFunctionUsage** simple type is defined in the schema as follows.

```
<xs:simpleType name="TEncourageIsEmptyDAXFunctionUsage">
  <xs:restriction base="xs:boolean" />
</xs:simpleType>
```

The default value of the **TEncourageIsEmptyDAXFunctionUsage** type is "true" if the current model on the server supports CSDLBI 2.0.

#### 2.1.3.5 TFiveStateKPIRange

In CSDLBI 2.0, the **TFiveStateKPIRange** simple type indicates the range of key performance indicator (KPI) values that are used for five-states KPIs.

The **TFiveStateKPIRange** simple type is defined in the schema as follows.

```
<xs:simpleType name="TFiveStateKPIRange">
  <xs:restriction base="xs:short">
    <xs:enumeration value="0" />
    <xs:enumeration value="1" />
  </xs:restriction>
</xs:simpleType>
```

The possible values for the **TFiveStateKPIRange** type are specified in the following table.

Value	Meaning
0	Range of -2 to 2 (returned when DeploymentMode is set to 1 or 2).
1	Range of -1 to 1 (returned when DeploymentMode is set to 0).

The default value is "0".

#### 2.1.3.6 TQueryBatching

In CSDLBI 2.0, the **TQueryBatching** simple type indicates whether batching is supported for DAX query requests.

The **TQueryBatching** simple type is defined in the schema as follows.

```
<xs:simpleType name="TQueryBatching">
  <xs:restriction base="xs:short">
    <xs:enumeration value="0" />
    <xs:enumeration value="1" />
  </xs:restriction>
</xs:simpleType>
```

The possible values for the **TQueryBatching** type are specified in the following table.

Value	Meaning
0	Query batching is not supported.
1	Query batching is supported.

The default value is "0".

### 2.1.3.7 TVariables

In CSDLBI 2.0, the **TVariables** simple type indicates the level of support for defining variables in DAX expressions.

The **TVariables** simple type is defined in the schema as follows.

```
<xs:simpleType name="TVariables">
  <xs:restriction base="xs:short">
    <xs:enumeration value="0" />
    <xs:enumeration value="1" />
    <xs:enumeration value="2" />
    <xs:enumeration value="3" />
  </xs:restriction>
</xs:simpleType>
```

The possible values for the **TVariables** type are specified in the following table.

Value	Meaning
0	DAX variables are not supported.
1	Only DAX table variables are supported.
2	Only DAX scalar variables are supported.
3	Both DAX table variables and DAX scalar variables are supported.

The default value is "0".

### 2.1.3.8 TDAXFunctions

In CSDLBI 2.0, the **TDAXFunctions** complex type is a container element for other CSDLBI 2.0 elements. These elements define the level of support for various DAX functions in DAX queries that are executed against the model.

The **TDAXFunctions** complex type is defined in the schema as follows.

```
<xs:complexType name="TDAXFunctions" >
  <xs:sequence>
    <xs:element name="SummarizeColumns" type="bi:TSummarizeColumns" />
    <xs:element name="SubstituteWithIndex" type="bi:TSubstituteWithIndex" />
    <xs:element name="LeftOuterJoin" type="bi:TLeftOuterJoin" />
    <xs:element name="BinaryMinMax" type="bi:TBinaryMinMax" />
  </xs:sequence>
</xs:complexType>
```

The elements that are defined by the **TDAXFunctions** complex type are specified in the following table.

Element	Description
SummarizeColumns	Indicates whether the <b>SummarizeColumns</b> DAX function is supported. The contents of this element are defined by the <b>TSummarizeColumns</b> simple type (section <a href="#">2.1.3.8.1</a> ).
SubstituteWithIndex	Indicates whether the <b>SubstituteWithIndex</b> DAX function is supported. The contents of this element are defined by the <b>TSubstituteWithIndex</b> simple type (section <a href="#">2.1.3.8.2</a> ).
LeftOuterJoin	Indicates whether the <b>LeftOuterJoin</b> DAX function is supported. The contents of this element are defined by the <b>TLeftOuterJoin</b> simple type (section <a href="#">2.1.3.8.3</a> ).
BinaryMinMax	Indicates the level of support for the <b>Min</b> and <b>Max</b> DAX functions. The contents of this element are defined by the <b>TBinaryMinMax</b> simple type (section <a href="#">2.1.3.8.4</a> ).

### 2.1.3.8.1 TSummarizeColumns

In CSDLBI 2.0, the **TSummarizeColumns** simple type indicates whether the **SummarizeColumns** DAX function is supported.

The **TSummarizeColumns** simple type is defined in the schema as follows.

```
<xs:simpleType name="TSummarizeColumns">
  <xs:restriction base="xs:short">
    <xs:enumeration value="0" />
    <xs:enumeration value="1" />
  </xs:restriction>
</xs:simpleType>
```

The possible values for the **TSummarizeColumns** type are specified in the following table.

Value	Meaning
0	The <b>SummarizeColumns</b> DAX function is not supported.
1	The <b>SummarizeColumns</b> DAX function is supported.

The default value is "0".

### 2.1.3.8.2 TSubstituteWithIndex

In CSDLBI 2.0, the **TSubstituteWithIndex** simple type indicates whether the **SubstituteWithIndex** DAX function is supported.

The **TSubstituteWithIndex** simple type is defined in the schema as follows.

```
<xs:simpleType name="TSubstituteWithIndex">
  <xs:restriction base="xs:short">
    <xs:enumeration value="0" />
    <xs:enumeration value="1" />
  </xs:restriction>
</xs:simpleType>
```

The possible values for the **TSubstituteWithIndex** type are specified in the following table.

Value	Meaning
0	The <b>SubstituteWithIndex</b> DAX function is not supported.
1	The <b>SubstituteWithIndex</b> DAX function is supported.

The default value is "0".

### 2.1.3.8.3 TLeftOuterJoin

In CSDLBI 2.0, the **TLeftOuterJoin** simple type indicates whether the **LeftOuterJoin** DAX function is supported.

The **TLeftOuterJoin** simple type is defined in the schema as follows.

```
<xs:simpleType name="TLeftOuterJoin">
  <xs:restriction base="xs:short">
    <xs:enumeration value="0" />
    <xs:enumeration value="1" />
  </xs:restriction>
</xs:simpleType>
```

The possible values for the **TLeftOuterJoin** type are specified in the following table.

Value	Meaning
0	The <b>LeftOuterJoin</b> DAX function is not supported.
1	The <b>LeftOuterJoin</b> DAX function is supported.

The default value is "0".

### 2.1.3.8.4 TBinaryMinMax

In CSDLBI 2.0, the **TBinaryMinMax** simple type indicates the level of support for the **Min** and **Max** DAX functions.

The **TBinaryMinMax** simple type is defined in the schema as follows.

```
<xs:simpleType name="TBinaryMinMax">
  <xs:restriction base="xs:short">
    <xs:enumeration value="0" />
    <xs:enumeration value="1" />
  </xs:restriction>
</xs:simpleType>
```

The possible values for the **TBinaryMinMax** type are specified in the following table.

Value	Meaning
0	The <b>Min</b> and <b>Max</b> DAX functions support one argument.
1	The <b>Min</b> and <b>Max</b> DAX functions support one or two arguments.

The default value is "0".

## 2.1.4 TEntitySet

The **TEntitySet** complex type annotates the **EntitySet** element, as defined in [\[MC-CSDL\]](#) section [2.1.18](#). The **EntitySet** element defines a named set that can contain instances of an **entity**. More than one **EntitySet** element for a particular **EntityType** can be defined.

The **TEntitySet** complex type is defined in the schema as follows.

```
<xs:complexType name="TEntitySet">
  <xs:attribute name="Caption" type="xs:string" use="optional"/>
  <xs:attribute name="CollectionCaption" type="xs:string" use="optional"/>
  <xs:attribute name="ReferenceName" type="xs:string" use="optional"/>
  <xs:attribute name="Hidden" type="xs:boolean" default="false" use="optional"/>
</xs:complexType>
```

The attributes that are defined by the **TEntitySet** complex type are specified in the following table.

Attribute	Description
Caption	Contains a user-friendly display name for the entity. If no caption is set in the model, no caption is displayed.
CollectionCaption	Contains the plural name for the entity.
ReferenceName	Contains the unmerged and fully qualified name of the entity, that is, the original <b>CubeDimension</b> ( <a href="#">[MS-SSAS]</a> section 2.2.4.2.2.9.1) name before munging.
Hidden	Indicates whether the entity is hidden. If the value of this attribute is "true", the entity is hidden.

## 2.1.5 TAssociationSet

The **TAssociationSet** complex type annotates the **AssociationSet** element, as defined in [\[MC-CSDL\]](#) section [2.1.19](#). There is one **association** set for every relationship between two entity types (defined by **EntityType** elements). An association set provides a definition for grouping association instances so that they can be mapped to a data source.

The **TAssociationSet** complex type is defined in the schema as follows.

```
<xs:complexType name="TAssociationSet">
  <xs:attribute name="State" type="bi:TState" default="Active"/>
  <xs:attribute name="Hidden" type="xs:boolean" default="false" />
  <xs:attribute name="CrossFilterDirection" type="bi:TCrossFilterDirection"
    default="Single"/>
</xs:complexType>
```

The attributes that are defined by the **TAssociationSet** complex type are specified in the following table.

Attribute	Description
State	Indicates the state of an association set. The contents of this attribute are defined by the <b>TState</b> simple type (section <a href="#">2.1.5.1</a> ). Where multiple association sets connect two <b>EntitySets</b> , no more than one association set can be marked as active.
Hidden	Indicates whether the association set will be hidden from the client. If the value of this

Attribute	Description
	attribute is "true", the association set will be hidden.
CrossFilterDirection	Indicates how selections on values from one end of an association affect the entity at the other end of the association. <a href="#">&lt;3&gt;</a>

### 2.1.5.1 TState

The **TState** simple type enumerates the states that can be assigned to an association set.

The **TState** simple type is defined in the schema as follows.

```
<xs:simpleType name="TState">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Active" />
    <xs:enumeration value="Inactive" />
  </xs:restriction>
</xs:simpleType>
```

The possible values for the **TState** simple type are specified in the following table.

Value	Meaning
Active	The association set is active.
Inactive	The association set is inactive.

### 2.1.5.2 TCrossFilterDirection

The **TCrossFilterDirection** simple type describes how data selections that involve an entity at one end of an association affect operations that target the entity at the opposite end of the same association.

The **TCrossFilterDirection** simple type is defined in the schema as follows.

```
<xs:simpleType name="TCrossFilterDirection">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Single" />
    <xs:enumeration value="Both" />
  </xs:restriction>
</xs:simpleType>
```

The possible values for the **TCrossFilterDirection** simple type are specified in the following table.

Value	Meaning
Single	Selections on the association end that is designated by a cardinality value of "One" propagate to the other end of the association.
Both	Selections on either association end propagate to the entity at the opposite association end, respectively.

## 2.1.6 TEntityType

The **TEntityType** complex type annotates the **EntityType** element, as defined in [\[MC-CSDL\]](#) section [2.1.2](#). The **EntityType** element represents the structure of a top-level concept, such as a customer or order, in a conceptual model. An entity type is a template for instances of entity types in an application.

The **TEntityType** complex type is defined in the schema as follows.

```
<xs:complexType name="TEntityType">
  <xs:sequence >
    <xs:element name="DisplayKey" type="bi:TMemberRefs" minOccurs="0"
      maxOccurs="1"/>
    <xs:element name="DefaultDetails" type="bi:TMemberRefs" minOccurs="0"
      maxOccurs="1"/>
    <xs:element name="DefaultImage" minOccurs="0" maxOccurs="1" >
      <xs:complexType >
        <xs:sequence>
          <xs:element name="MemberRef" type="bi:TMemberRef" minOccurs="1"
            maxOccurs="1" />
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="DefaultMeasure" minOccurs="0" maxOccurs="1" >
      <xs:complexType >
        <xs:sequence>
          <xs:element name="MemberRef" type="bi:TMemberRef" minOccurs="1"
            maxOccurs="1" />
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="SortMembers" type="bi:TMemberRefs" minOccurs="0"
      maxOccurs="1"/>
    <xs:element name="Hierarchy" type="bi:THierarchy" minOccurs="0"
      maxOccurs="unbounded" />
    <xs:element name="Statistics" type="bi:TEntityStatistics" minOccurs="0"
      maxOccurs="1"/>
  </xs:sequence>
  <xs:attribute name="Contents" type="bi:TEntityContents" default="Regular"
    use="optional"/>
  <xs:attribute name="ReferenceName" type="xs:string" use="optional"/>
</xs:complexType>
```

The elements and attributes that are defined by the **TEntityType** complex type are specified in the following tables.

Element	Description
DisplayKey	A list of references to columns or to role ends that constitutes a strong <b>identifier</b> that uniquely identifies an entity instance. The list SHOULD be unique. However, the SSAS protocol <a href="#">[MS-SSAS]</a> , which provides CSDLBI output, does not verify that the list is unique.
DefaultDetails	A list of property references that, together, represent the larger set of columns in the table. A single property MUST be a column or a <b>measure</b> .
DefaultImage	A reference to a column that contains the image that illustrates the entity. In the Unified Dimensional Model (UDM), this element is represented by a binary attribute on the <b>dimension</b> attribute. If this element is present, it MUST contain exactly one <b>MemberRef</b> element whose contents are defined by the <b>TMemberRef</b> complex type (section <a href="#">2.1.8</a> ).
DefaultMeasure	A reference to a measure that is used as the default representation for multiple instances of the entity. If this element is present, it MUST contain exactly one <b>MemberRef</b> element whose contents are defined by the <b>TMemberRef</b> complex type (section <a href="#">2.1.8</a> ).



Element	Description
SortMembers	A list of properties on which to sort. <b>TSortDirection</b> (section <a href="#">2.1.14.2</a> ) provides a hint to the sort engine about whether the order is ascending or descending.
Hierarchy	A list of <b>hierarchies</b> ( <b>THierarchy</b> , section <a href="#">2.1.9</a> ).
Statistics	In CSDLBI 2.0, a set of statistics from the underlying data that is associated with the entity. These statistics are defined by the <b>TEntityStatistics</b> complex type and are provided only if they are not computationally expensive to generate, as described in section <a href="#">2.1.20</a> .

Attribute	Description
Contents	The type of data in the entity. The contents of this attribute are defined by the <b>TEntityContents</b> simple type (section <a href="#">2.1.6.1</a> ).
ReferenceName	The identifier that references this entity in a Data Analysis Expressions (DAX) query. If this attribute is omitted, the field name is used.

### 2.1.6.1 TEntityContents

The **TEntityContents** simple type enumerates the possible types of data in an entity.

The **TEntityContents** simple type is defined in the schema as follows.

```
<xs:simpleType name="TEntityContents">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Regular"/>
    <xs:enumeration value="Time"/>
    <xs:enumeration value="Geography"/>
    <xs:enumeration value="Organization"/>
    <xs:enumeration value="BillOfMaterials"/>
    <xs:enumeration value="Accounts"/>
    <xs:enumeration value="Customers"/>
    <xs:enumeration value="Products"/>
    <xs:enumeration value="Scenario"/>
    <xs:enumeration value="Quantitative"/>
    <xs:enumeration value="Utility"/>
    <xs:enumeration value="Currency"/>
    <xs:enumeration value="Rates"/>
    <xs:enumeration value="Channel"/>
    <xs:enumeration value="Promotion"/>
  </xs:restriction>
</xs:simpleType>
```

The possible values for the **TEntityContents** simple type are specified in the following table.

Value	Meaning
Regular	A dimension whose type has not been set to a special dimension type.
Time	A dimension whose attributes represent time periods, such as years, semesters, quarters, months, or days.
Geography	A dimension whose attributes represent geographic information, such as cities or postal codes.
Organization	A dimension whose attributes represent organizational information, such as employees or

Value	Meaning
	subsidiaries.
BillOfMaterials	A dimension whose attributes represent inventory or manufacturing information, such as parts lists for products.
Accounts	A dimension whose attributes represent a chart of accounts for financial reporting.
Customers	A dimension whose attributes represent customer or contact information.
Products	A dimension whose attributes represent product information.
Scenario	A dimension whose attributes represent planning or strategic analysis information.
Quantitative	A dimension whose attributes represent quantitative information.
Utility	A dimension whose attributes represent miscellaneous information.
Currency	A dimension that contains currency data and metadata.
Rates	A dimension whose attributes represent currency rate information.
Channel	A dimension whose attributes represent channel information.
Promotion	A dimension whose attributes represent marketing promotion information.

The default value is "Regular".

### 2.1.7 TMemberRefs

The **TMemberRefs** complex type defines a **collection** of members in which each member is contained in a **MemberRef** element.

The **TMemberRefs** complex type is defined in the schema as follows.

```
<xs:complexType name="TMemberRefs" >
  <xs:sequence>
    <xs:element name="MemberRef" type="bi:TMemberRef" minOccurs="1"
      maxOccurs="unbounded" />
  </xs:sequence>
</xs:complexType>
```

The element that is defined by the **TMemberRefs** complex type is specified in the following table.

Element	Description
MemberRef	A collection of members.

### 2.1.8 TMemberRef

The **TMemberRef** complex type identifies the name of the property that is contained in a **MemberRef** element.

The **TMemberRef** complex type is defined in the schema as follows.

```
<xs:complexType name="TMemberRef">
  <xs:attribute name="Name" type="xs:string" use="required" />
</xs:complexType>
```

```
</xs:complexType>
```

The attribute that is defined by the **TMemberRef** complex type is specified in the following table.

Attribute	Description
Name	The name of the property that is contained in a <b>MemberRef</b> element.

### 2.1.9 THierarchy

In CSDLBI 1.1 and CSDLBI 2.0, the **THierarchy** complex type specifies the content of a hierarchy. A hierarchy exposes the same set of attributes as do other members, such as columns (that are exposed as properties) and measures. Therefore, the **THierarchy** type is derived from the base **TMember** type (section [2.1.10](#)).

The **THierarchy** complex type is defined in the schema as follows.

```
<xs:complexType name="THierarchy">
  <xs:complexContent>
    <xs:extension base="bi:TMember">
      <xs:sequence>
        <xs:element name="Documentation" type="bi:TDocumentation"
          minOccurs="0" maxOccurs="1" />
        <xs:element name="Level" type="bi:TLevel" minOccurs="1"
          maxOccurs="unbounded" />
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

The elements that are defined by the **THierarchy** complex type are specified in the following table.

Element	Description
Documentation	A description of the hierarchy. The contents of this element are defined by the <b>TDocumentation</b> complex type (section <a href="#">2.1.11</a> ).
Level	A single <b>level</b> of the hierarchy. The contents of this element are defined by the <b>TLevel</b> type (section <a href="#">2.1.12</a> ). The number of <b>Level</b> elements that can be specified is at least one, with no upper limit.

### 2.1.10 TMember

The **TMember** complex type is a base type. Its attributes can appear in columns, measures, navigation properties, hierarchies, and levels.

The **TMember** complex type is defined in the schema as follows.

```
<xs:complexType name="TMember" abstract="true">
  <xs:attribute name="Name" type="xs:string" use="required" />
  <xs:attribute name="Caption" type="xs:string" use="optional"/>
  <xs:attribute name="ContextualNameRule" type="bi:TContextualNameRule"
    default="None" />
</xs:complexType>
```

```

<xs:attribute name="Hidden" type="xs:boolean" default="false" />
<xs:attribute name="ReferenceName" type="xs:string" use="optional" />
</xs:complexType>

```

The attributes that are defined by the **TMember** complex type are specified in the following table.

Attribute	Description
Name	The name given to the member (a column, measure, navigation property, hierarchy, or level) that is defined by the implementation of the <b>TMember</b> type.
Caption<4>	The display name for the member.
ContextualNameRule	The naming format that is used to disambiguate members. The contents of this attribute are defined by the <b>TContextualNameRule</b> simple type (section <a href="#">2.1.10.1</a> ).
Hidden	A boolean value that indicates whether the member will be hidden from the client. If the value of this attribute is "true", the member will be hidden.
ReferenceName	The identifier that is used to reference the member in a Data Analysis Expressions (DAX) query. If this attribute is omitted, the field name is used.

### 2.1.10.1 TContextualNameRule

The **TContextualNameRule** simple type enumerates the naming formats that can be used to disambiguate members. **TContextualNameRule** provides a hint to client applications for creating unambiguous names for **CalculationProperty**, as defined in [\[MS-SSAS\]](#) section 2.2.4.2.2.10.1.

The **TContextualNameRule** simple type is defined in the schema as follows.

```

<xs:simpleType name="TContextualNameRule">
  <xs:restriction base="xs:string">
    <xs:enumeration value="None" />
    <xs:enumeration value="Context" />
    <xs:enumeration value="Merge" />
  </xs:restriction>
</xs:simpleType>

```

The possible values for the **TContextualNameRule** simple type are specified in the following table.

Value	Meaning
None	Use the attribute name.
Context	Use the incoming relationship name.
Merge	Concatenate the incoming relationship name and the <b>CalculationProperty</b> name, in compliance with the language grammar.

### 2.1.11 TDocumentation

The **TDocumentation** complex type defines the contents of the **Documentation** element. The **Documentation** element provides information about an object that is defined in the parent element that contains the **Documentation** element.

The **TDocumentation** complex type is defined in the schema as follows.

```
<xs:complexType name="TDocumentation">
  <xs:sequence>
    <xs:element name="Summary" type="xs:string" minOccurs="0" maxOccurs="1" />
  </xs:sequence>
</xs:complexType>
```

The element that is defined by the **TDocumentation** complex type is specified in the following table.

Element	Description
Summary	A description of a parent element's object.

### 2.1.12 TLevel

In CSDLBI 1.1 and CSDLBI 2.0, the **TLevel** complex type specifies a hierarchy level. The **TLevel** type is derived from the base **TMember** type (section [2.1.10](#)).

The **TLevel** complex type is defined in the schema as follows.

```
<xs:complexType name="TLevel">
  <xs:complexContent>
    <xs:extension base="bi:TMember">
      <xs:sequence>
        <xs:element name="Source" minOccurs="0" maxOccurs="1" >
          <xs:complexType >
            <xs:sequence>
              <xs:element name="PropertyRef" type="bi:TPropertyRef" minOccurs="1"
                maxOccurs="1" />
            </xs:sequence>
          </xs:complexType>
        </xs:element>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

The elements that are defined by the **TLevel** complex type are specified in the following table.

Element	Description
Source	A container element for the <b>PropertyRef</b> element (see section <a href="#">2.1.16</a> ).
Source.PropertyRef	A property reference that points back to an instance property. Caption, description, name, and reference name can be drawn from the referenced instance property, if it is not specified for the <b>TLevel</b> complex type.

### 2.1.13 TProperty

The **TProperty** complex type annotates the **Property** element that is defined in [\[MC-CSDL\] section 2.1.3](#). The **TProperty** complex type is an extension of the **TBaseProperty** complex type (section [2.1.14](#)) that adds attributes that appear only in instance columns.

The **TProperty** complex type is defined in the schema as follows.

```
<xs:complexType name="TProperty">
  <xs:complexContent>
    <xs:extension base="bi:TBaseProperty">
      <xs:sequence >
        <xs:element name="OrderBy" type="bi:TPropertyRefs" minOccurs="0"
          maxOccurs="1"/>
        <xs:element name="GroupBy " type="bi:TPropertyRefs" minOccurs="0"
          maxOccurs="1"/>
        <xs:element name="RelatedTo" type="bi:TPropertyRefs" minOccurs="0"
          maxOccurs="1"/>
        <xs:element name="DefaultValue" type="xs:any" minOccurs="0"
          maxOccurs="1"/>
        <xs:element name="FilterNullsBy" type="bi:TPropertyRefs" minOccurs="0"
          maxOccurs="1"/>
        <xs:element name="Statistics" type="bi:TPropertyStatistics" minOccurs="0"
          maxOccurs="1"/>
      </xs:sequence>
      <xs:attribute name="Contents" type="bi:TContents" use="optional"
        default="Regular"/>
      <xs:attribute name="DefaultAggregateFunction"
        type="bi:TDefaultAggregateFunction" default="Default" />
      <xs:attribute name="GroupingBehavior" type="bi:TGroupingBehavior"
        default="GroupOnValue"/>
      <xs:attribute name="Stability" type="bi:TStability" default="Stable"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

The element and attributes that are defined by the **TProperty** complex type are specified in the following tables.

Element	Description
OrderBy	A reference to a property within the entity that defines the sort order for that property's values. The values for the current property and the <b>OrderBy</b> property SHOULD have a 1-to-1 mapping. Otherwise, the sort behavior is undefined. If this element is omitted, the properties are sorted based on their values.
GroupBy	In CSDLBI 2.0, a reference to other properties within the entity that MUST be used as <b>GroupBy</b> columns when the Data Analysis Expressions (DAX) query contains the current property. Otherwise, the query will fail.
RelatedTo	In CSDLBI 2.0, a reference to other properties within the entity that are related to the current property. This information MAY be used to construct DAX queries that will give the same results as equivalent multidimensional expression (MDX) queries that take attribute relationships into account.
DefaultValue	In CSDLBI 2.0, a property that specifies the value that SHOULD be used when evaluating the query. The <b>DefaultValue</b> property is optional, but it is automatically selected if the values from the member cannot be aggregated.
FilterNullsBy	In CSDLBI 2.0, a reference to other properties within the entity that SHOULD be used in DAX queries to properly construct filter by NULL values.
Statistics	In CSDLBI 2.0, a set of statistics from the underlying data that is associated with the column. These statistics are defined by the <b>TPropertyStatistics</b> complex type and are provided only if they are not computationally expensive to generate, as described in section <a href="#">2.1.13.5</a> .

Attribute	Description
Contents	The type of data in a column. This value is drawn from the <b>DimensionAttribute</b> complex type, as defined in <a href="#">[MS-SSAS]</a> section 2.2.4.2.2.8.1. The contents of this attribute are defined by the <b>TContents</b> simple type (section <a href="#">2.1.13.1</a> ).
DefaultAggregateFunction	A value that indicates the default aggregate function, if any, that is typically used to summarize properties. The contents of this attribute are defined by the <b>TDefaultAggregateFunction</b> simple type (section <a href="#">2.1.13.2</a> ).
GroupingBehavior	A value that specifies how query results are grouped. The attribute's contents are defined by the <b>TGroupingBehavior</b> simple type (section <a href="#">2.1.13.3</a> ).
Stability	An attribute that specifies the stability of a declared property between refresh operations. This attribute is set on columns that contain a row number or other volatile value (such as NOW()). This attribute is emitted only for an unstable value. The contents of this attribute are defined by the <b>TStability</b> simple type (section <a href="#">2.1.13.4</a> ).

### 2.1.13.1 TContents

The **TContents** simple type is a string that contains the possible types of data in a column. The **TContents** value is derived from the **DimensionAttributeTypeEnumType** simple type that is included in the definition of the **DimensionAttribute** complex type, as specified in [\[MS-SSAS\]](#) section 2.2.4.2.2.8.1. If the enumeration value in **DimensionAttributeTypeEnumType** is "ExtendedType", the **TContents** value is derived from the **ExtendedType** element of **DimensionAttribute**. The client is not required to respond to these values.

The **TContents** simple type is defined in the schema as follows.

```
<xs:simpleType name="TContents">
  <xs:restriction base="xs:string" />
</xs:simpleType>
```

### 2.1.13.2 TDefaultAggregateFunction

The **TDefaultAggregateFunction** simple type enumerates the aggregate functions that can be used by reporting tools to summarize attribute values.

The **TDefaultAggregateFunction** simple type is defined in the schema as follows.

```
<xs:simpleType name="TDefaultAggregateFunction" >
  <xs:restriction base="xs:string">
    <xs:enumeration value="Default" />
    <xs:enumeration value="None" />
    <xs:enumeration value="Sum" />
    <xs:enumeration value="Count" />
    <xs:enumeration value="Average" />
    <xs:enumeration value="Min" />
    <xs:enumeration value="Max" />

    <xs:enumeration value="DistinctCount" />
  </xs:restriction>
</xs:simpleType>
```

The possible values for the **TDefaultAggregateFunction** simple type are specified in the following table.

Value	Meaning
Default	Automatically selects the appropriate aggregate function based on the data type.
None	Does not use aggregate functions.
Sum	Uses the aggregate function <b>Sum</b> .
Count	Uses the aggregate function <b>Count</b> .
Average	Uses the aggregate function <b>Average</b> .
Min	Uses the aggregate function <b>Min</b> .
Max	Uses the aggregate function <b>Max</b> .
DistinctCount	Uses the aggregate function <b>DistinctCount</b> .

### 2.1.13.3 TGroupingBehavior

The **TGroupingBehavior** simple type enumerates the options that are available for building queries in a hierarchy.

The **TGroupingBehavior** simple type is defined in the schema as follows.

```
<xs:simpleType name="TGroupingBehavior" >
  <xs:restriction base="xs:string" >
    <xs:enumeration value="GroupOnValue" />
    <xs:enumeration value="GroupOnEntityKey" />
  </xs:restriction>
</xs:simpleType>
```

The possible values for the **TGroupingBehavior** simple type are specified in the following table.

Value	Meaning
GroupOnValue	Group by value.
GroupOnEntityKey	Group by entity key.

The meaning of these two values can be illustrated by considering a query to show the total payroll deductions for an employee named "Brian Smith" in a company that has several employees named "Brian Smith". If the value "GroupOnValue" is used, the result shows the combined total of payroll deductions for all employees named "Brian Smith" that are represented in the database. If the value "GroupOnEntityKey" is used, the result shows the separate payroll deductions for each employee named "Brian Smith" in the database.

### 2.1.13.4 TStability

The **TStability** simple type enumerates the acceptable values for specifying the stability of a declared property between refresh operations.

The **TStability** simple type is defined in the schema as follows.

```
<xs:simpleType name="TStability">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Stable" />
  </xs:restriction>
</xs:simpleType>
```



```

<xs:enumeration value="RowNumber" />
<xs:enumeration value="Volatile" />
</xs:restriction>
</xs:simpleType>

```

The possible values for the **TStability** simple are specified in the following table.

Value	Meaning
Stable	The property remains constant between refresh operations.
RowNumber	The property contains a row number.
Volatile	The property might not remain constant between refresh operations.

### 2.1.13.5 TPropertyStatistics

In CSDLBI 2.0, the **TPropertyStatistics** complex type defines statistics that are computed over the data that is associated with a column.

Statistics are provided only if the computation is not prevented by use of certain advanced product features such as dimension security, row level security, and columns with non-ordered attribute hierarchies. Because statistics are not provided if they are computationally expensive to generate, the response is not guaranteed to include statistics.

The **TPropertyStatistics** complex type is defined in the schema as follows.

```

<xs:complexType name="TPropertyStatistics">
  <xs:attribute name="DistinctCount" type="xs:long" minOccurs="0" maxOccurs="1" />
  <xs:attribute name="StringValueMaxLength" type="xs:long" minOccurs="0" maxOccurs="1" />
  <xs:element name="MinValue" type="xs:any" minOccurs="0" maxOccurs="1" />
  <xs:element name="MaxValue" type="xs:any" minOccurs="0" maxOccurs="1" />
</xs:complexType>

```

The attributes and elements that are defined by the **TPropertyStatistics** complex type are specified in the following tables.

Attribute	Description
DistinctCount	The number of unique values present in the column.
StringValueMaxLength	An upper bound on the maximum length of any string value in the column. Note that this value can be larger than the longest string length but cannot be shorter than the longest string length.

Element	Description
MinValue	The smallest data value present in the column. The type of this value varies to match the data type of the column. Note that the ordering of values in the column is based on the attribute hierarchy for the column.
MaxValue	The largest data value present in the column. The type of this value varies to match the data type of the column. Note that the ordering of values in the column is based on the attribute hierarchy for the column.

## 2.1.14 TBaseProperty

The **TBaseProperty** complex type is an extension of the **TMember** type (section [2.1.10](#)) that adds attributes that appear only in columns and measures.

The **TBaseProperty** complex type is defined in the schema as follows.

```
<xs:complexType name="TBaseProperty" abstract="true">
  <xs:complexContent>
    <xs:extension base="bi:TMember">
      <xs:attribute name="Alignment" type="bi:TAlignment" use="optional"/>
      <xs:attribute name="FormatString" type="xs:string" use="optional"/>
      <xs:attribute name="Units" type="xs:string" use="optional" />
      <xs:attribute name="SortDirection" type="bi:TSortDirection"
        default="Default"/>
      <xs:attribute name="IsRightToLeft" type="xs:boolean" default="false"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

The attributes that are defined by the **TBaseProperty** complex type are specified in the following table.

Attribute	Description
Alignment	A value that indicates how the field values SHOULD be aligned in a tabular presentation. If this attribute is omitted, the default determines the alignment based on the field's data type. The contents of this attribute are defined by the <b>TAlignment</b> simple type (section <a href="#">2.1.14.1</a> ).
FormatString	A format string that defines the default client formatting for date and time values. If this attribute is omitted, the following format string values are assumed: <ul style="list-style-type: none"><li>Integer fields: "g"</li><li>Decimal data type fields: "#,0.00"</li><li>Double data type fields: "#,0.00"</li><li>Date and time fields: "d"</li></ul> For all other kinds of fields, no format string applies.
Units	The symbol that is applied to field values to express units. If this attribute is omitted, the units are assumed to be unknown.
SortDirection	A value that indicates how the field values are typically sorted. If this attribute is omitted, the default value assigns a sort direction based on the field's data type. The contents of this attribute are defined by the <b>TSortDirection</b> simple type (section <a href="#">2.1.14.2</a> ).
IsRightToLeft	A boolean value that indicates whether the field contains text that MAY be read from right to left. If this attribute is omitted, the model setting is assumed.

### 2.1.14.1 TAlignment

The **TAlignment** simple type enumerates the types of justification that can be used in a column.

The **TAlignment** simple type is defined in the schema as follows.

```
<xs:simpleType name="TAlignment">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Default" />
    <xs:enumeration value="Left" />
    <xs:enumeration value="Right" />
    <xs:enumeration value="Center" />
  </xs:restriction>
</xs:simpleType>
```

The possible values for the **TAlignment** simple type are specified in the following table.

Value	Meaning
Default	Automatically sets the appropriate justification that corresponds to the data type.
Left	Sets the justification to left-aligned.
Right	Sets the justification to right-aligned.
Center	Sets the justification to center-aligned.

#### 2.1.14.2 TSortDirection

The **TSortDirection** simple type enumerates sort directions.

The **TSortDirection** simple type is defined in the schema as follows.

```
<xs:simpleType name="TSortDirection">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Default" />
    <xs:enumeration value="Ascending" />
    <xs:enumeration value="Descending" />
  </xs:restriction>
</xs:simpleType>
```

The possible values for the **TSortDirection** simple type are specified in the following table.

Value	Meaning
Default	The default sort direction. The default is based on data type.
Ascending	The ascending sort direction.
Descending	The descending sort direction.

#### 2.1.15 TPropertyRefs

The **TPropertyRefs** complex type defines a collection of properties, with each property contained in a **PropertyRef** element.

The **TPropertyRefs** complex type is defined in the schema as follows.

```

<xs:complexType name="TPropertyRefs" >
  <xs:sequence>
    <xs:element name="PropertyRef" type="bi:TPropertyRef" minOccurs="1"
      maxOccurs="unbounded" />
  </xs:sequence>
</xs:complexType>

```

The element that is defined by the **TPropertyRefs** complex type is specified in the following table.

Element	Description
PropertyRef	A collection of properties.

### 2.1.16 TPropertyRef

The **TPropertyRef** complex type identifies the name of the property that is contained in a **PropertyRef** element (see section [2.1.15](#)). The **PropertyRef** name MUST match the name of one of the **Property** elements within the same **EntityType** element, as defined in [\[MC-CSDL\]](#) section [2.1.2](#).

The **TPropertyRef** complex type is defined in the schema as follows.

```

<xs:complexType name="TPropertyRef">
  <xs:attribute name="Name" type="xs:string" use="required" />
</xs:complexType>

```

The attribute that is defined by the **TPropertyRef** complex type is specified in the following table.

Attribute	Description
Name	The name of a property that is contained in a <b>PropertyRef</b> element.

### 2.1.17 TMeasure

The **TMeasure** complex type is an extension of the **TProperty** type (section [2.1.13](#)), adding components that appear only in measures.

The **TMeasure** complex type is defined in the schema as follows.

```

<xs:complexType name="TMeasure">
  <xs:complexContent>
    <xs:extension base="bi:TProperty">
      <xs:sequence>
        <xs:element name="Kpi" type="bi:TKpi" minOccurs="0" maxOccurs="1" />
        <xs:element name="FormatBy" type="bi:TPropertyRefs" minOccurs="0"
          maxOccurs="1"/>
        <xs:element name="ApplyCulture" type="bi:TPropertyRefs" minOccurs="0"
          maxOccurs="1"/>
      </xs:sequence>
      <xs:attribute name="IsSimpleMeasure" type="xs:boolean" default="true"/>
      <xs:attribute name="ActualType" type="xs:string"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

```

The element and attribute that are defined by the **TMeasure** complex type are specified in the following tables.

Element	Description
Kpi	In CSDLBI 1.1 and CSDLBI 2.0, a key performance indicator (KPI). The contents of this element are defined by the <b>TKpi</b> complex type (section <a href="#">2.1.18</a> ).
FormatBy	In CSDLBI 2.0, a reference to a measure within the entity that contains a format string for the current measure. It MAY be used to apply proper formatting to the values of the current measure.
ApplyCulture	In CSDLBI 2.0, a reference to a measure within the entity that contains a culture for each value of the current measure. It MAY be used to apply proper transformation on the values of current measure in order to display them properly.

Attribute	Description
IsSimpleMeasure	A boolean value that indicates whether the formula that is used in the measure is one of the simple aggregations (Sum, Count, Min, Max, Avg, DistinctCount). The value "true" means that one of the simple aggregations is used. The actual value is derived from the <b>IsSimpleMeasure</b> element in the model, as specified in <a href="#">[MS-SSAS]</a> section 2.2.4.2.2.10.2.
ActualType	In CSDLBI 2.0, a string value that, if present, contains "Any" as the only possible value, which indicates that the actual measure type could change for each value. If so, the <b>Type</b> attribute of the <b>Property</b> element (see <a href="#">[MC-CSDL]</a> section <a href="#">2.1.3</a> ) is only a suggestion of what default data type SHOULD be used when the client attempts to visualize values.

### 2.1.18 TKpi

In CSDLBI 1.1 (section [3.2](#)) and CSDLBI 2.0 (section [3.3](#)), the **TKpi** complex type defines a calculation that can be used as a key performance indicator (KPI). In a business intelligence data model, a KPI is based on a measure. The definition of the KPI contains all the metadata that is associated with measures and information that is needed for the presentation of the KPI values.

The **TKpi** complex type does not specify the formula that is contained in the measure definition. Instead, it specifies the additional metadata that is associated with measures that are used as KPIs. After a measure is designated as a KPI, it SHOULD be exposed only as a KPI.

The **TKpi** complex type lists attributes that SHOULD be included only with a **TMeasure** complex type (section [2.1.17](#)).

The **TKpi** complex type is defined in the schema as follows.

```
<xs:complexType name="TKpi">
  <xs:sequence >
    <xs:element name="Documentation" type="bi:TDocumentation" minOccurs="0"
      maxOccurs="1" />
    <xs:element name="KpiGoal" minOccurs="1" maxOccurs="1" >
      <xs:complexType >
        <xs:sequence>
          <xs:element name="PropertyRef" type="bi:TPropertyRef" minOccurs="1"
            maxOccurs="1" />
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="KpiStatus" minOccurs="1" maxOccurs="1" >
      <xs:complexType >
```

```

    <xs:sequence>
      <xs:element name="PropertyRef" type="bi:TPropertyRef" minOccurs="1"
        maxOccurs="1" />
    </xs:sequence>
  </xs:complexType>
</xs:element>
</xs:sequence>
<xs:attribute name="StatusGraphic" type="xs:string" use="required"/>
</xs:complexType>

```

The elements and attribute that are defined by the **TKpi** complex type are specified in the following tables.

Element	Description
Documentation	An element that contains information about the KPI. The contents of this element are defined by the <b>TDocumentation</b> complex type (section <a href="#">2.1.11</a> ).
KpiGoal	An element that contains the reference to the column that contains the KPI goal value. This element <b>MUST</b> contain exactly one <b>PropertyRef</b> element (see section <a href="#">2.1.15</a> ). The contents of this element are defined by the <b>TPropertyRef</b> complex type (section <a href="#">2.1.16</a> ).
KpiStatus	An element that contains the reference to a column that contains the value as the status indicator in a KPI. This element <b>MUST</b> contain exactly one <b>PropertyRef</b> element (see section <a href="#">2.1.15</a> ). The contents of this element are defined by the <b>TPropertyRef</b> complex type (section <a href="#">2.1.16</a> ).

Attribute	Description
StatusGraphic	A reference to an image that indicates negative, neutral, or positive progress against the targets defined in the KPI.

### 2.1.19 TNavigationProperty

The **TNavigationProperty** complex type annotates the **NavigationProperty** element, as defined in [\[MC-CSDL\]](#) section [2.1.4](#). The **TNavigationProperty** complex type is an extension of the **TMember** complex type (section [2.1.10](#)), adding an attribute that appears only in navigation properties.

The **TNavigationProperty** complex type is defined in the schema as follows.

```

<xs:complexType name="TNavigationProperty">
  <xs:complexContent>
    <xs:extension base="bi:TMember">
      <xs:attribute name="CollectionCaption" type="xs:string" use="optional"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

```

The attribute that is defined by the **TNavigationProperty** complex type is specified in the following table.

Attribute	Description
CollectionCaption	Plural name for referring to a set of instances of the navigation property. If this attribute is omitted, the <b>TMember.Caption</b> attribute is used.

### 2.1.20 TEntityStatistics

In CSDLBI 2.0, the **TEntityStatistics** complex type defines statistics that are computed over the data that is associated with the entity.

Statistics are provided only if the computation is not prevented by use of certain advanced product features such as dimension security and row level security. Because statistics are not provided if they are computationally expensive to generate, the response is not guaranteed to include statistics.

The **TEntityStatistics** complex type is defined in the schema as follows.

```
<xs:complexType name="TEntityStatistics">
  <xs:element name="RowCount" type="xs:long" minOccurs="0" maxOccurs="1" />
</xs:complexType>
```

The elements that are defined by the **TEntityStatistics** complex type are specified in the following table.

Element	Description
RowCount	The number of rows present in the table described by the entity.

## 3 Structure Examples

The following samples of CSDLBI code are annotated structures that are populated with values that represent common use cases. The examples illustrate the structures that are specified in this document, but do not cover all possible usage scenarios. These samples are not intended to replace this specification but only to clarify and enhance the specification.

### 3.1 CSDLBI 1.0 Example

```
<Schema xmlns="http://schemas.microsoft.com/ado/2008/09/edm"
xmlns:edm_annotation="http://schemas.microsoft.com/ado/2009/02/edm/annotation"
xmlns:bi="http://schemas.microsoft.com/sqlbi/2010/10/edm/extensions" bi:Version="1.0"
Namespace="Sandbox">
  <EntityContainer Name="Sandbox">
    <Documentation>
      <Summary>DescriptionRolePlayingDimensionsDB</Summary>
    </Documentation>
    <EntitySet Name="DimCustomer" EntityType="Sandbox.DimCustomer">
      <Documentation>
        <Summary>Description_Dimension_DimCustomer</Summary>
      </Documentation>
      <bi:EntitySet />
    </EntitySet>
    <EntitySet Name="DimEmployee" EntityType="Sandbox.DimEmployee">
      <bi:EntitySet />
    </EntitySet>
    <EntitySet Name="DimGeography" EntityType="Sandbox.DimGeography">
      <bi:EntitySet />
    </EntitySet>
    <EntitySet Name="DimProduct" EntityType="Sandbox.DimProduct">
      <bi:EntitySet />
    </EntitySet>
    <EntitySet Name="DimProductCategory" EntityType="Sandbox.DimProductCategory">
      <bi:EntitySet />
    </EntitySet>
    <EntitySet Name="DimProductSubcategory"
EntityType="Sandbox.DimProductSubcategory">
      <bi:EntitySet />
    </EntitySet>
    <EntitySet Name="DimStore" EntityType="Sandbox.DimStore">
      <bi:EntitySet />
    </EntitySet>
    <EntitySet Name="DimTime" EntityType="Sandbox.DimTime">
      <bi:EntitySet />
    </EntitySet>
    <EntitySet Name="FactInternetSales" EntityType="Sandbox.FactInternetSales">
      <bi:EntitySet />
    </EntitySet>
    <AssociationSet Name="DimCustomer DimGeography Geography"
Association="Sandbox.DimCustomer_DimGeography_Geography">
      <End EntitySet="DimCustomer" />
      <End EntitySet="DimGeography" />
      <bi:AssociationSet />
    </AssociationSet>
    <AssociationSet Name="DimProduct DimProductSubcategory Subcategory"
Association="Sandbox.DimProduct_DimProductSubcategory_Subcategory">
      <End EntitySet="DimProduct" />
      <End EntitySet="DimProductSubcategory" />
      <bi:AssociationSet />
    </AssociationSet>
    <AssociationSet Name="DimProductSubcategory DimProductCategory Category"
Association="Sandbox.DimProductSubcategory_DimProductCategory_Category">
      <End EntitySet="DimProductSubcategory" />
      <End EntitySet="DimProductCategory" />
      <bi:AssociationSet />
    </AssociationSet>
  </EntityContainer>
</Schema>
```



```

        <AssociationSet Name="DimStore_DimGeography_Geography2"
Association="Sandbox.DimStore_DimGeography_Geography2">
    <End EntitySet="DimStore" />
    <End EntitySet="DimGeography" />
    <bi:AssociationSet State="Inactive" />
</AssociationSet>
    <AssociationSet Name="FactInternetSales_DimCustomer_Customer2"
Association="Sandbox.FactInternetSales_DimCustomer_Customer2">
    <End EntitySet="FactInternetSales" />
    <End EntitySet="DimCustomer" />
    <bi:AssociationSet />
</AssociationSet>
    <AssociationSet Name="FactInternetSales_DimCustomer_Customer_2"
Association="Sandbox.FactInternetSales_DimCustomer_Customer_2">
    <End EntitySet="FactInternetSales" />
    <End EntitySet="DimCustomer" />
    <bi:AssociationSet State="Inactive" />
</AssociationSet>
    <AssociationSet Name="FactInternetSales DimTime Time"
Association="Sandbox.FactInternetSales_DimTime_Time">
    <End EntitySet="FactInternetSales" />
    <End EntitySet="DimTime" />
    <bi:AssociationSet State="Inactive" />
</AssociationSet>
    <AssociationSet Name="FactInternetSales_DimTime_Time_2"
Association="Sandbox.FactInternetSales_DimTime_Time_2">
    <End EntitySet="FactInternetSales" />
    <End EntitySet="DimTime" />
    <bi:AssociationSet State="Inactive" />
</AssociationSet>
    <AssociationSet Name="FactInternetSales DimTime Time 3"
Association="Sandbox.FactInternetSales_DimTime_Time_3">
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        </Documentation>
        <bi:Measure Caption="CaptionRolePlayingDimensionsDB"
ContextualNameRule="Context" Alignment="Right"

```

```

FormatString="&quot;,$&quot;#,0.00; (&quot;,$&quot;#,0.00);&quot;,$&quot;#,0.00" Units="money"
SortDirection="Ascending" IsRightToLeft="true" IsSimpleMeasure="true" />
</Property>
<NavigationProperty Name="Customer2"
Relationship="Sandbox.FactInternetSales_DimCustomer_Customer2" FromRole="Sales"
ToRole="Customer2">
<bi:NavigationProperty ContextualNameRule="Merge" />
</NavigationProperty>
<NavigationProperty Name="Customer_2"
Relationship="Sandbox.FactInternetSales DimCustomer Customer 2" FromRole="Sales2"
ToRole="Customer_2">
<bi:NavigationProperty ContextualNameRule="Merge" />
</NavigationProperty>
<NavigationProperty Name="Time"
Relationship="Sandbox.FactInternetSales_DimTime_Time" FromRole="Sales3" ToRole="Time">
<bi:NavigationProperty ContextualNameRule="Merge" />
</NavigationProperty>
<NavigationProperty Name="Time_2"
Relationship="Sandbox.FactInternetSales_DimTime_Time_2" FromRole="Sales4" ToRole="Time_2">
<bi:NavigationProperty ContextualNameRule="Merge" />
</NavigationProperty>
<NavigationProperty Name="Time_3"
Relationship="Sandbox.FactInternetSales_DimTime_Time_3" FromRole="Sales5" ToRole="Time_3">
<bi:NavigationProperty ContextualNameRule="Merge" />
</NavigationProperty>
<NavigationProperty Name="Store2"
Relationship="Sandbox.FactInternetSales DimStore Store2" FromRole="Sales6" ToRole="Store2">
<bi:NavigationProperty ContextualNameRule="Merge" />
</NavigationProperty>
<NavigationProperty Name="Employee"
Relationship="Sandbox.FactInternetSales_DimEmployee_Employee" FromRole="Sales7"
ToRole="Employee">
<bi:NavigationProperty ContextualNameRule="Merge" />
</NavigationProperty>
<NavigationProperty Name="Product2"
Relationship="Sandbox.FactInternetSales_DimProduct_Product2" FromRole="FactInternetSales"
ToRole="Product2">
<bi:NavigationProperty ContextualNameRule="Merge" />
</NavigationProperty>
<bi:EntityType>
<bi:DefaultDetails>
<bi:MemberRef Name="TotalSales" />
</bi:DefaultDetails>
<bi:DefaultMeasure>
<bi:MemberRef Name="TotalSales" />
</bi:DefaultMeasure>
</bi:EntityType>
</EntityType>
<Association Name="DimCustomer_DimGeography_Geography">
<End Role="Customer" Type="Sandbox.DimCustomer" Multiplicity="*" />
<End Role="Geography" Type="Sandbox.DimGeography" Multiplicity="0..1" />
</Association>
<Association Name="DimProduct_DimProductSubcategory_Subcategory">
<End Role="Product" Type="Sandbox.DimProduct" Multiplicity="*" />
<End Role="Subcategory" Type="Sandbox.DimProductSubcategory" Multiplicity="0..1"
/>
</Association>
<Association Name="DimProductSubcategory DimProductCategory Category">
<End Role="Subcategory2" Type="Sandbox.DimProductSubcategory" Multiplicity="*" />
<End Role="Category" Type="Sandbox.DimProductCategory" Multiplicity="0..1" />
</Association>
<Association Name="DimStore DimGeography Geography2">
<End Role="Store" Type="Sandbox.DimStore" Multiplicity="*" />
<End Role="Geography2" Type="Sandbox.DimGeography" Multiplicity="0..1" />
</Association>
<Association Name="FactInternetSales_DimCustomer_Customer2">
<End Role="Sales" Type="Sandbox.FactInternetSales" Multiplicity="*" />
<End Role="Customer2" Type="Sandbox.DimCustomer" Multiplicity="0..1" />
</Association>
<Association Name="FactInternetSales_DimCustomer_Customer_2">

```

```

        <End Role="Sales2" Type="Sandbox.FactInternetSales" Multiplicity="*" />
        <End Role="Customer_2" Type="Sandbox.DimCustomer" Multiplicity="0..1" />
    </Association>
    <Association Name="FactInternetSales_DimTime_Time">
        <End Role="Sales3" Type="Sandbox.FactInternetSales" Multiplicity="*" />
        <End Role="Time" Type="Sandbox.DimTime" Multiplicity="0..1" />
    </Association>
    <Association Name="FactInternetSales_DimTime_Time_2">
        <End Role="Sales4" Type="Sandbox.FactInternetSales" Multiplicity="*" />
        <End Role="Time_2" Type="Sandbox.DimTime" Multiplicity="0..1" />
    </Association>
    <Association Name="FactInternetSales_DimTime_Time_3">
        <End Role="Sales5" Type="Sandbox.FactInternetSales" Multiplicity="*" />
        <End Role="Time_3" Type="Sandbox.DimTime" Multiplicity="0..1" />
    </Association>
    <Association Name="FactInternetSales_DimStore_Store2">
        <End Role="Sales6" Type="Sandbox.FactInternetSales" Multiplicity="*" />
        <End Role="Store2" Type="Sandbox.DimStore" Multiplicity="0..1" />
    </Association>
    <Association Name="FactInternetSales_DimEmployee_Employee">
        <End Role="Sales7" Type="Sandbox.FactInternetSales" Multiplicity="*" />
        <End Role="Employee" Type="Sandbox.DimEmployee" Multiplicity="0..1" />
    </Association>
    <Association Name="FactInternetSales_DimProduct_Product2">
        <End Role="FactInternetSales" Type="Sandbox.FactInternetSales" Multiplicity="*"
/>
        <End Role="Product2" Type="Sandbox.DimProduct" Multiplicity="0..1" />
    </Association>
</Schema>

```

### 3.2 CSDLBI 1.1 Example

```

<Schema xmlns="http://schemas.microsoft.com/ado/2008/09/edm"
xmlns:edm_annotation="http://schemas.microsoft.com/ado/2009/02/edm/annotation"
xmlns:bi="http://schemas.microsoft.com/sqlbi/2010/10/edm/extensions" bi:Version="1.1"
Namespace="Sandbox">
    <EntityContainer Name="Sandbox">
        <EntitySet Name="Bike" EntityType="Sandbox.Bike">
            <bi:EntitySet Hidden="true" />
        </EntitySet>
        <EntitySet Name="BikeSales" EntityType="Sandbox.BikeSales">
            <bi:EntitySet />
        </EntitySet>
        <EntitySet Name="BikeSubcategory" EntityType="Sandbox.BikeSubcategory">
            <bi:EntitySet />
        </EntitySet>
        <EntitySet Name="CalendarQuarter" EntityType="Sandbox.CalendarQuarter">
            <bi:EntitySet />
        </EntitySet>
        <EntitySet Name="Country" EntityType="Sandbox.Country">
            <bi:EntitySet />
        </EntitySet>
        <EntitySet Name="Currency" EntityType="Sandbox.Currency">
            <bi:EntitySet />
        </EntitySet>
        <EntitySet Name="SalesChannel" EntityType="Sandbox.SalesChannel">
            <bi:EntitySet />
        </EntitySet>
        <AssociationSet Name="Bike BikeSubcategory BikeSubcategory ProductSubcategoryKey"
Association="Sandbox.Bike_BikeSubcategory_BikeSubcategory_ProductSubcategoryKey">
            <End EntitySet="Bike" />
            <End EntitySet="BikeSubcategory" />
            <bi:AssociationSet Hidden="true" />
        </AssociationSet>
        <AssociationSet Name="BikeSales Bike Bike ProductKey"
Association="Sandbox.BikeSales Bike Bike ProductKey">
            <End EntitySet="BikeSales" />
        </AssociationSet>
    </EntityContainer>

```

```

        <End EntitySet="Bike" />
        <bi:AssociationSet />
    </AssociationSet>
    <AssociationSet Name="BikeSales_CalendarQuarter_CalendarQuarter_CalendarQuarter"
Association="Sandbox.BikeSales_CalendarQuarter_CalendarQuarter_CalendarQuarter">
        <End EntitySet="BikeSales" />
        <End EntitySet="CalendarQuarter" />
        <bi:AssociationSet />
    </AssociationSet>
    <AssociationSet Name="BikeSales_Country_Country_CountryCode"
Association="Sandbox.BikeSales_Country_Country_CountryCode">
        <End EntitySet="BikeSales" />
        <End EntitySet="Country" />
        <bi:AssociationSet />
    </AssociationSet>
    <AssociationSet Name="BikeSales_Currency_Currency_CurrencyKey"
Association="Sandbox.BikeSales_Currency_Currency_CurrencyKey">
        <End EntitySet="BikeSales" />
        <End EntitySet="Currency" />
        <bi:AssociationSet />
    </AssociationSet>
    <AssociationSet Name="BikeSales_SalesChannel_SalesChannel_SalesChannelCode"
Association="Sandbox.BikeSales_SalesChannel_SalesChannel_SalesChannelCode">
        <End EntitySet="BikeSales" />
        <End EntitySet="SalesChannel" />
        <bi:AssociationSet State="Inactive" />
    </AssociationSet>
    <bi:EntityContainer Caption="CSDLTest" Culture="en-US">
        <bi:CompareOptions IgnoreCase="true" />
    </bi:EntityContainer>
</EntityContainer>
<EntityType Name="Bike">
    <Key>
        <PropertyRef Name="RowNumber" />
    </Key>
    <Property Name="RowNumber" Type="Int64" Nullable="false">
        <bi:Property Hidden="true" Contents="RowNumber" Stability="RowNumber" />
    </Property>
    <Property Name="ProductKey" Type="Int64" Nullable="false">
        <bi:Property />
    </Property>
    <Property Name="ProductAlternateKey" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
    </Property>
    <Property Name="ProductSubcategoryKey" Type="Int64">
        <bi:Property />
    </Property>
    <Property Name="ProductName" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
    </Property>
    <Property Name="StandardCost" Type="Decimal" Precision="19" Scale="4">
        <bi:Property />
    </Property>
    <Property Name="FinishedGoodsFlag" Type="Boolean">
        <bi:Property />
    </Property>
    <Property Name="Color" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property ContextualNameRule="Context" Alignment="Left" Units="counts"
SortDirection="Descending" IsRightToLeft="true" DefaultAggregateFunction="Max" />
    </Property>
    <Property Name="ListPrice" Type="Decimal" Precision="19" Scale="4">
        <bi:Property />
    </Property>
    <Property Name="Size" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />

```

```

        </Property>
        <Property Name="SizeRange" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
        </Property>
        <Property Name="Weight" Type="Double">
        <bi:Property />
        </Property>
        <Property Name="DealerPrice" Type="Decimal" Precision="19" Scale="4">
        <bi:Property />
        </Property>
        <Property Name="Class" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
        </Property>
        <Property Name="Style" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
        </Property>
        <Property Name="ModelName" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
        </Property>
        <Property Name="Description" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
        </Property>
        <Property Name="WeightUnitMeasureCode" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
        <bi:Property />
        </Property>
        <Property Name="SizeUnitMeasureCode" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
        </Property>
        <Property Name="SafetyStockLevel" Type="Int64">
        <bi:Property />
        </Property>
        <Property Name="ReorderPoint" Type="Int64">
        <bi:Property />
        </Property>
        <Property Name="DaysToManufacture" Type="Int64">
        <bi:Property />
        </Property>
        <Property Name="ProductLine" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
        </Property>
        <NavigationProperty Name="BikeSubcategory_ProductSubcategoryKey"
Relationship="Sandbox.Bike_BikeSubcategory_BikeSubcategory_ProductSubcategoryKey"
FromRole="Bike_ProductSubcategoryKey" ToRole="BikeSubcategory_ProductSubcategoryKey">
        <bi:NavigationProperty />
        </NavigationProperty>
        <bi:EntityType>
        <bi:DisplayKey>
        <bi:MemberRef Name="Color" />
        </bi:DisplayKey>
        <bi:DefaultDetails>
        <bi:MemberRef Name="Color" />
        </bi:DefaultDetails>
        <bi:SortMembers>
        <bi:MemberRef Name="Color" />
        </bi:SortMembers>
        <bi:Hierarchy Name="Product_Hierarchy" Caption="Product Hierarchy"
ReferenceName="Product Hierarchy">
        <bi:Documentation>
        <bi:Summary>DESCRIPTION_ProductModelCateg_Hierarchies</bi:Summary>
        </bi:Documentation>
        <bi:Level Name="ProductLine">

```

```

        <bi:Source>
          <bi:PropertyRef Name="ProductLine" />
        </bi:Source>
      </bi:Level>
    </bi:Level Name="ModelName">
      <bi:Source>
        <bi:PropertyRef Name="ModelName" />
      </bi:Source>
    </bi:Level>
  </bi:Hierarchy>
</bi:EntityType>
</EntityType>
<EntityType Name="BikeSales">
  <Key>
    <PropertyRef Name="RowNumber" />
  </Key>
  <Property Name="RowNumber" Type="Int64" Nullable="false">
    <bi:Property Hidden="true" Contents="RowNumber" Stability="RowNumber" />
  </Property>
  <Property Name="SalesOrderNumber" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
    <bi:Property />
  </Property>
  <Property Name="SalesOrderLineNumber" Type="Int64">
    <bi:Property />
  </Property>
  <Property Name="RevisionNumber" Type="Int64">
    <bi:Property />
  </Property>
  <Property Name="ProductKey" Type="Int64">
    <bi:Property />
  </Property>
  <Property Name="CountryCode" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
    <bi:Property />
  </Property>
  <Property Name="CurrencyKey" Type="Int64">
    <bi:Property />
  </Property>
  <Property Name="CalendarQuarter" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
    <bi:Property />
  </Property>
  <Property Name="SalesChannelCode" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
    <bi:Property />
  </Property>
  <Property Name="OrderQuantity" Type="Int64">
    <bi:Property />
  </Property>
  <Property Name="UnitPrice" Type="Decimal" Precision="19" Scale="4">
    <bi:Property />
  </Property>
  <Property Name="ExtendedAmount" Type="Decimal" Precision="19" Scale="4">
    <bi:Property />
  </Property>
  <Property Name="UnitPriceDiscountPct" Type="Double">
    <bi:Property />
  </Property>
  <Property Name="DiscountAmount" Type="Double">
    <bi:Property />
  </Property>
  <Property Name="ProductStandardCost" Type="Decimal" Precision="19" Scale="4">
    <bi:Property />
  </Property>
  <Property Name="TotalProductCost" Type="Decimal" Precision="19" Scale="4">
    <bi:Property />
  </Property>
  <Property Name="SalesAmount" Type="Decimal" Precision="19" Scale="4">

```



```

        <bi:Property />
    </Property>
    <Property Name="TaxAmt" Type="Decimal" Precision="19" Scale="4">
        <bi:Property />
    </Property>
    <Property Name="Freight" Type="Decimal" Precision="19" Scale="4">
        <bi:Property />
    </Property>
    <Property Name="CarrierTrackingNumber" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
        <bi:Property />
    </Property>
    <Property Name="CustomerPONumber" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
    </Property>
    <Property Name="CustomerAccountNumber" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
        <bi:Property />
    </Property>
    <Property Name="Sum_of_TotalProductCost" Type="Decimal" Precision="19" Scale="4">
        <bi:Measure Caption="Sum of TotalProductCost" ReferenceName="Sum of
TotalProductCost" FormatString="\$#,0.00; (\$#,0.00); \$#,0.00" />
    </Property>
    <Property Name="Sum_of_SalesAmount" Type="Decimal" Precision="19" Scale="4">
        <Documentation>
            <Summary>KPI Description</Summary>
        </Documentation>
        <bi:Measure Caption="Sum of SalesAmount" ReferenceName="Sum of SalesAmount"
FormatString="\$#,0.00; (\$#,0.00); \$#,0.00">
            <bi:Kpi StatusGraphic="Three Circles Colored">
                <bi:KpiGoal>
                    <bi:PropertyRef Name="v_Sum_of_SalesAmount_Goal" />
                </bi:KpiGoal>
                <bi:KpiStatus>
                    <bi:PropertyRef Name="v Sum of SalesAmount Status" />
                </bi:KpiStatus>
            </bi:Kpi>
        </bi:Measure>
    </Property>
    <NavigationProperty Name="Bike_ProductKey"
Relationship="Sandbox.BikeSales Bike Bike ProductKey" FromRole="BikeSales ProductKey"
ToRole="Bike_ProductKey">
        <bi:NavigationProperty />
    </NavigationProperty>
    <NavigationProperty Name="CalendarQuarter_CalendarQuarter"
Relationship="Sandbox.BikeSales_CalendarQuarter_CalendarQuarter_CalendarQuarter"
FromRole="BikeSales_CalendarQuarter" ToRole="CalendarQuarter_CalendarQuarter">
        <bi:NavigationProperty />
    </NavigationProperty>
    <NavigationProperty Name="Country_CountryCode"
Relationship="Sandbox.BikeSales_Country_Country_CountryCode" FromRole="BikeSales_CountryCode"
ToRole="Country_CountryCode">
        <bi:NavigationProperty />
    </NavigationProperty>
    <NavigationProperty Name="Currency_CurrencyKey"
Relationship="Sandbox.BikeSales_Currency_Currency_CurrencyKey"
FromRole="BikeSales_CurrencyKey" ToRole="Currency_CurrencyKey">
        <bi:NavigationProperty />
    </NavigationProperty>
    <NavigationProperty Name="SalesChannel_SalesChannelCode"
Relationship="Sandbox.BikeSales_SalesChannel_SalesChannel_SalesChannelCode"
FromRole="BikeSales_SalesChannelCode" ToRole="SalesChannel_SalesChannelCode">
        <bi:NavigationProperty />
    </NavigationProperty>
    <bi:EntityType />
</EntityType>
<EntityType Name="BikeSubcategory">
    <Key>

```

```

        <PropertyRef Name="RowNumber" />
    </Key>
    <Property Name="RowNumber" Type="Int64" Nullable="false">
        <bi:Property Hidden="true" Contents="RowNumber" Stability="RowNumber" />
    </Property>
    <Property Name="ProductSubcategoryKey" Type="Int64" Nullable="false">
        <bi:Property />
    </Property>
    <Property Name="Subcategory" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
    </Property>
    <bi:EntityType />
</EntityType>
<EntityType Name="CalendarQuarter">
    <Key>
        <PropertyRef Name="RowNumber" />
    </Key>
    <Property Name="RowNumber" Type="Int64" Nullable="false">
        <bi:Property Hidden="true" Contents="RowNumber" Stability="RowNumber" />
    </Property>
    <Property Name="CalendarQuarter2" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false" Nullable="false">
        <bi:Property Caption="CalendarQuarter" ReferenceName="CalendarQuarter" />
    </Property>
    <bi:EntityType />
</EntityType>
<EntityType Name="Country">
    <Key>
        <PropertyRef Name="RowNumber" />
    </Key>
    <Property Name="RowNumber" Type="Int64" Nullable="false">
        <bi:Property Hidden="true" Contents="RowNumber" Stability="RowNumber" />
    </Property>
    <Property Name="CountryCode" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false" Nullable="false">
        <bi:Property />
    </Property>
    <Property Name="CountryName" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
    </Property>
    <bi:EntityType />
</EntityType>
<EntityType Name="Currency">
    <Key>
        <PropertyRef Name="RowNumber" />
    </Key>
    <Property Name="RowNumber" Type="Int64" Nullable="false">
        <bi:Property Hidden="true" Contents="RowNumber" Stability="RowNumber" />
    </Property>
    <Property Name="CurrencyKey" Type="Int64" Nullable="false">
        <bi:Property />
    </Property>
    <Property Name="CurrencyAlternateKey" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
        <bi:Property />
    </Property>
    <Property Name="CurrencyName" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
    </Property>
    <bi:EntityType />
</EntityType>
<EntityType Name="SalesChannel">
    <Key>
        <PropertyRef Name="RowNumber" />
    </Key>
    <Property Name="RowNumber" Type="Int64" Nullable="false">

```

```

        <bi:Property Hidden="true" Contents="RowNumber" Stability="RowNumber" />
    </Property>
    <Property Name="SalesChannelCode" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false" Nullable="false">
        <bi:Property />
    </Property>
    <Property Name="SalesChannelName" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
    </Property>
    <bi:EntityType />
</EntityType>
<Association Name="Bike_BikeSubcategory_BikeSubcategory_ProductSubcategoryKey">
    <End Role="Bike_ProductSubcategoryKey" Type="Sandbox.Bike" Multiplicity="*" />
    <End Role="BikeSubcategory_ProductSubcategoryKey" Type="Sandbox.BikeSubcategory"
Multiplicity="0..1" />
</Association>
<Association Name="BikeSales_Bike_Bike_ProductKey">
    <End Role="BikeSales_ProductKey" Type="Sandbox.BikeSales" Multiplicity="*" />
    <End Role="Bike_ProductKey" Type="Sandbox.Bike" Multiplicity="0..1" />
</Association>
<Association Name="BikeSales_CalendarQuarter_CalendarQuarter_CalendarQuarter">
    <End Role="BikeSales_CalendarQuarter" Type="Sandbox.BikeSales" Multiplicity="*"
/>
    <End Role="CalendarQuarter_CalendarQuarter" Type="Sandbox.CalendarQuarter"
Multiplicity="0..1" />
</Association>
<Association Name="BikeSales_Country_Country_CountryCode">
    <End Role="BikeSales_CountryCode" Type="Sandbox.BikeSales" Multiplicity="*" />
    <End Role="Country_CountryCode" Type="Sandbox.Country" Multiplicity="0..1" />
</Association>
<Association Name="BikeSales_Currency_Currency_CurrencyKey">
    <End Role="BikeSales_CurrencyKey" Type="Sandbox.BikeSales" Multiplicity="*" />
    <End Role="Currency_CurrencyKey" Type="Sandbox.Currency" Multiplicity="0..1" />
</Association>
<Association Name="BikeSales_SalesChannel_SalesChannel_SalesChannelCode">
    <End Role="BikeSales_SalesChannelCode" Type="Sandbox.BikeSales" Multiplicity="*"
/>
    <End Role="SalesChannel_SalesChannelCode" Type="Sandbox.SalesChannel"
Multiplicity="0..1" />
</Association>
</Schema>

```

### 3.3 CSDLBI 2.0 Example

```

<Schema xmlns="http://schemas.microsoft.com/ado/2008/09/edm"
xmlns:edm_annotation="http://schemas.microsoft.com/ado/2009/02/edm/annotation"
xmlns:bi="http://schemas.microsoft.com/sqlbi/2010/10/edm/extensions" bi:Version="2.0"
Namespace="Sandbox">
    <EntityContainer Name="Sandbox">
        <Documentation>
            <Summary>A Unified Dimensional Model that encompasses the Adventure Works data
warehouse.</Summary>
        </Documentation>
        <EntitySet Name="Measures" EntityType="Sandbox.Measures">
            <bi:EntitySet Hidden="true" />
        </EntitySet>
        <EntitySet Name="Date" EntityType="Sandbox.Date">
            <bi:EntitySet />
        </EntitySet>
        <EntitySet Name="Customer" EntityType="Sandbox.Customer">
            <bi:EntitySet />
        </EntitySet>
        <EntitySet Name="Product" EntityType="Sandbox.Product">
            <bi:EntitySet />
        </EntitySet>
        <EntitySet Name="Internet_Sales" EntityType="Sandbox.Internet_Sales">

```

```

    <bi:EntitySet Caption="Internet Sales" ReferenceName="Internet Sales" />
  </EntitySet>
  <AssociationSet Name="Internet_Sales_Product_Product_Product"
Association="Sandbox.Internet_Sales_Product_Product_Product">
    <End EntitySet="Internet_Sales" />
    <End EntitySet="Product" />
    <bi:AssociationSet />
  </AssociationSet>
  <AssociationSet Name="Internet_Sales_Customer_Customer_Customer"
Association="Sandbox.Internet_Sales_Customer_Customer_Customer">
    <End EntitySet="Internet_Sales" />
    <End EntitySet="Customer" />
    <bi:AssociationSet />
  </AssociationSet>
  <AssociationSet Name="Internet_Sales_Date_Date_Date"
Association="Sandbox.Internet_Sales_Date_Date_Date">
    <End EntitySet="Internet_Sales" />
    <End EntitySet="Date" />
    <bi:AssociationSet />
  </AssociationSet>
  <bi:EntityContainer Caption="Adventure Works DW 2008" Culture="en-US">
    <bi:CompareOptions IgnoreCase="true" IgnoreKanaType="true" IgnoreWidth="true" />
    <bi:ModelCapabilities>
      <bi:CrossFilteringWithinTable>Always</bi:CrossFilteringWithinTable>
      <bi:GroupByValidation>Enforced</bi:GroupByValidation>
      <bi:QueryAggregateUsage>Discourage</bi:QueryAggregateUsage>
      <bi:FiveStateKPIRange>1</bi:FiveStateKPIRange>
      <bi:EncourageIsEmptyDAXFunctionUsage>true</bi:EncourageIsEmptyDAXFunctionUsage>
      <bi:QueryBatching>1</bi:QueryBatching>
      <bi:Variables>1</bi:Variables>
      <bi:DAXFunctions>
        <bi:SummarizeColumns>1</bi:SummarizeColumns>
        <bi:SubstituteWithIndex>1</bi:SubstituteWithIndex>
        <bi:LeftOuterJoin>1</bi:LeftOuterJoin>
      </bi:DAXFunctions>
    </bi:ModelCapabilities>
  </bi:EntityContainer>
</EntityContainer>
<EntityType Name="Measures">
  <Key>
    <PropertyRef Name="RowNumber" />
  </Key>
  <Property Name="RowNumber" Type="Int64" Nullable="false">
    <bi:Property Hidden="true" Stability="RowNumber" />
  </Property>
</EntityType>
<EntityType Name="Date">
  <Key>
    <PropertyRef Name="Date_Key0" />
  </Key>
  <Property Name="Fiscal Year Key0" Type="Int64" Nullable="false">
    <bi:Property Hidden="true" ReferenceName="Fiscal Year.Key0" />
  </Property>
  <Property Name="Fiscal_Year" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false" Nullable="false">
    <bi:Property Caption="Fiscal Year" ReferenceName="Fiscal Year" Contents="FiscalYears">
      <bi:GroupBy>
        <bi:PropertyRef Name="Fiscal Year Key0" />
      </bi:GroupBy>
      <bi:OrderBy>
        <bi:PropertyRef Name="Fiscal_Year_Key0" />
      </bi:OrderBy>
    </bi:Property>
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Nullable="false">
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        <bi:RelatedTo>
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            <bi:PropertyRef Name="Day_Name" />
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            <bi:PropertyRef Name="Day_of_Year" />
            <bi:PropertyRef Name="Calendar_Week" />
            <bi:PropertyRef Name="Month_Name" />
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Semester" Contents="HalfYears">
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Contents="FiscalHalfYears">
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    </bi:OrderBy>
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  </bi:Property>
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        </bi:Level>
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            </bi:Source>
        </bi:Level>
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</bi:EntityType>

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    </bi:Level>
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        <bi:PropertyRef Name="Calendar_Year" />
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    </bi:Level>
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ReferenceName="Calendar Semester">
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    </bi:Level>
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      <bi:PropertyRef Name="Fiscal_Quarter" />
      <bi:PropertyRef Name="Fiscal_Semester" />
      <bi:PropertyRef Name="Fiscal_Semester_of_Year" />
      <bi:PropertyRef Name="Fiscal_Quarter_of_Year" />
      <bi:PropertyRef Name="Fiscal_Week_of_Year" />
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    </bi:DisplayFolder>
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      <bi:PropertyRef Name="Calendar_Semester" />
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      <bi:PropertyRef Name="Calendar_Quarter_of_Year" />
      <bi:PropertyRef Name="Calendar_Week_of_Year" />
      <bi:HierarchyRef Name="Calendar" />
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</bi:DisplayFolders>
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                <bi:PropertyRef Name="Total_Children" />
                <bi:PropertyRef Name="Number of Cars Owned" />
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                <bi:PropertyRef Name="Education" />
                <bi:PropertyRef Name="Occupation" />
                <bi:PropertyRef Name="Marital_Status" />
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                <bi:PropertyRef Name="Home_Owner" />
                <bi:PropertyRef Name="Commute_Distance" />
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    </Property>
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ReferenceName="Customer.Date of First Purchase">
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        </bi:Property>
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FixedLength="false" Nullable="false">
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    <bi:Property Hidden="true" ReferenceName="Postal Code.Key1">
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            <bi:PropertyRef Name="Postal Code Key0" />
            <bi:PropertyRef Name="Postal_Code_Key1" />
            <bi:PropertyRef Name="Postal Code Key2" />
        </bi:GroupBy>
    </bi:Property>
</Property>
<Property Name="Postal_Code_Key2" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false" Nullable="false">
    <bi:Property Hidden="true" ReferenceName="Postal Code.Key2">
        <bi:GroupBy>
            <bi:PropertyRef Name="Postal_Code_Key0" />
            <bi:PropertyRef Name="Postal_Code_Key1" />
            <bi:PropertyRef Name="Postal_Code_Key2" />
        </bi:GroupBy>
    </bi:Property>
</Property>
<Property Name="Postal_Code" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false" Nullable="false">
    <bi:Property Caption="Postal Code" ReferenceName="Postal Code">
        <bi:GroupBy>
            <bi:PropertyRef Name="Postal_Code_Key0" />
            <bi:PropertyRef Name="Postal_Code_Key1" />
            <bi:PropertyRef Name="Postal_Code_Key2" />
        </bi:GroupBy>
        <bi:RelatedTo>
            <bi:PropertyRef Name="City" />
        </bi:RelatedTo>
    </bi:Property>
</Property>
<Property Name="Country_Key0" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false" Nullable="false">
    <bi:Property Hidden="true" ReferenceName="Country.Key0" />
</Property>
<Property Name="Country" Type="String" MaxLength="Max" Unicode="true" FixedLength="false"
Nullable="false">
    <bi:Property LocaleImpact="true">
        <bi:GroupBy>
            <bi:PropertyRef Name="Country_Key0" />
        </bi:GroupBy>
    </bi:Property>
</Property>

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    <Property Name="State_Province_Key0" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false" Nullable="false">
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    <bi:GroupBy>
    <bi:PropertyRef Name="State_Province_Key0" />
    <bi:PropertyRef Name="State Province Key1" />
    </bi:GroupBy>
    </bi:Property>
</Property>
    <Property Name="State_Province_Key1" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false" Nullable="false">
    <bi:Property Hidden="true" ReferenceName="State-Province.Key1">
    <bi:GroupBy>
    <bi:PropertyRef Name="State_Province_Key0" />
    <bi:PropertyRef Name="State_Province_Key1" />
    </bi:GroupBy>
    </bi:Property>
</Property>
    <Property Name="State Province" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false" Nullable="false">
    <bi:Property Caption="State-Province" ReferenceName="State-Province">
    <bi:DefaultValue>WA</bi:DefaultValue>
    <bi:GroupBy>
    <bi:PropertyRef Name="State_Province_Key0" />
    <bi:PropertyRef Name="State_Province_Key1" />
    </bi:GroupBy>
    <bi:RelatedTo>
    <bi:PropertyRef Name="Country" />
    </bi:RelatedTo>
    </bi:Property>
</Property>
    <Property Name="City_Key0" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false" Nullable="false">
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    <bi:GroupBy>
    <bi:PropertyRef Name="City Key0" />
    <bi:PropertyRef Name="City_Key1" />
    </bi:GroupBy>
    </bi:Property>
</Property>
    <Property Name="City_Key1" Type="String" MaxLength="Max" Unicode="true"
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    <bi:GroupBy>
    <bi:PropertyRef Name="City_Key0" />
    <bi:PropertyRef Name="City_Key1" />
    </bi:GroupBy>
    </bi:Property>
</Property>
    <Property Name="City" Type="String" MaxLength="Max" Unicode="true" FixedLength="false"
Nullable="false">
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    <bi:GroupBy>
    <bi:PropertyRef Name="City Key0" />
    <bi:PropertyRef Name="City_Key1" />
    </bi:GroupBy>
    <bi:RelatedTo>
    <bi:PropertyRef Name="State_Province" />
    </bi:RelatedTo>
    </bi:Property>
</Property>
    <Property Name="Yearly_Income_Key0" Type="Decimal" Precision="19" Scale="4"
Nullable="false">
    <bi:Property Hidden="true" ReferenceName="Yearly Income.Key0" />
</Property>
    <Property Name="Yearly_Income" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false" Nullable="false">
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    <bi:GroupBy>

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        <bi:PropertyRef Name="Yearly_Income_Key0" />
    </bi:GroupBy>
    <bi:OrderBy>
        <bi:PropertyRef Name="Yearly_Income_Key0" />
    </bi:OrderBy>
</bi:Property>
</Property>
<Property Name="Total_Children_Key0" Type="Int64" Nullable="false">
    <bi:Property Hidden="true" ReferenceName="Total Children.Key0" />
</Property>
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FixedLength="false" Nullable="false">
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        <bi:GroupBy>
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        </bi:GroupBy>
    </bi:Property>
</Property>
<Property Name="Number of Cars Owned Key0" Type="Int64" Nullable="false">
    <bi:Property Hidden="true" ReferenceName="Number of Cars Owned.Key0" />
</Property>
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FixedLength="false" Nullable="false">
    <bi:Property Caption="Number of Cars Owned" ReferenceName="Number of Cars Owned">
        <bi:GroupBy>
            <bi:PropertyRef Name="Number_of_Cars_Owned_Key0" />
        </bi:GroupBy>
    </bi:Property>
</Property>
<Property Name="Number_of_Children_At_Home_Key0" Type="Int64" Nullable="false">
    <bi:Property Hidden="true" ReferenceName="Number of Children At Home.Key0" />
</Property>
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FixedLength="false" Nullable="false">
    <bi:Property Caption="Number of Children At Home" ReferenceName="Number of Children At
Home">
        <bi:GroupBy>
            <bi:PropertyRef Name="Number_of_Children_At_Home_Key0" />
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    </bi:Property>
</Property>
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FixedLength="false" Nullable="false">
    <bi:Property Hidden="true" ReferenceName="Education.Key0" />
</Property>
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FixedLength="false" Nullable="false">
    <bi:Property LocaleImpact="true">
        <bi:GroupBy>
            <bi:PropertyRef Name="Education_Key0" />
        </bi:GroupBy>
    </bi:Property>
</Property>
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FixedLength="false" Nullable="false">
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FixedLength="false" Nullable="false">
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        </bi:GroupBy>
    </bi:Property>
</Property>
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    <Property Name="Marital_Status" Type="String" MaxLength="Max" Unicode="true"
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        </bi:GroupBy>
      </bi:Property>
    </Property>
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FixedLength="false" Nullable="false">
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    </Property>
    <Property Name="Gender" Type="String" MaxLength="Max" Unicode="true" FixedLength="false"
Nullable="false">
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        <bi:GroupBy>
          <bi:PropertyRef Name="Gender Key0" />
        </bi:GroupBy>
      </bi:Property>
    </Property>
    <Property Name="Home_Owner_Key0" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false" Nullable="false">
      <bi:Property Hidden="true" ReferenceName="Home Owner.Key0" />
    </Property>
    <Property Name="Home_Owner" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false" Nullable="false">
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        <bi:GroupBy>
          <bi:PropertyRef Name="Home Owner Key0" />
        </bi:GroupBy>
      </bi:Property>
    </Property>
    <Property Name="Commute_Distance" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false" Nullable="false">
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        <bi:OrderBy>
          <bi:PropertyRef Name="Commute_Distance_Commute_Distance_Sort" />
        </bi:OrderBy>
      </bi:Property>
    </Property>
    <Property Name="Commute_Distance_Commute_Distance_Sort" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false" Nullable="false">
      <bi:Property Caption="Commute Distance Sort" Hidden="true" ReferenceName="Commute
Distance.Commute Distance Sort">
        <bi:GroupBy>
          <bi:PropertyRef Name="Commute Distance" />
        </bi:GroupBy>
      </bi:Property>
    </Property>
    <bi:EntityType Contents="Customers">
      <bi:Hierarchy Name="Customer_Geography" Caption="Customer Geography"
ReferenceName="Customer Geography">
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          <bi:Source>
            <bi:PropertyRef Name="Country" />
          </bi:Source>
        </bi:Level>
        <bi:Level Name="State_Province" Caption="State-Province" ReferenceName="State-
Province">
          <bi:Source>
            <bi:PropertyRef Name="State_Province" />
          </bi:Source>
        </bi:Level>
        <bi:Level Name="City">
          <bi:Source>
            <bi:PropertyRef Name="City" />
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        </bi:Level>
        <bi:Level Name="Postal_Code" Caption="Postal Code" ReferenceName="Postal Code">

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    <bi:Source>
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    </bi:Source>
  </bi:Level>
  <bi:Level Name="Customer">
    <bi:Source>
      <bi:PropertyRef Name="Customer2" />
    </bi:Source>
  </bi:Level>
</bi:Hierarchy>
<bi:DisplayFolders>
  <bi:DisplayFolder Name="Location">
    <bi:PropertyRef Name="Customer_Address" />
    <bi:PropertyRef Name="Postal_Code" />
    <bi:PropertyRef Name="Country" />
    <bi:PropertyRef Name="State_Province" />
    <bi:PropertyRef Name="City" />
  </bi:DisplayFolder>
  <bi:DisplayFolder Name="Demographic">
    <bi:PropertyRef Name="Yearly_Income" />
    <bi:PropertyRef Name="Total_Children" />
    <bi:PropertyRef Name="Number_of_Cars_Owned" />
    <bi:PropertyRef Name="Number_of_Children_At_Home" />
    <bi:PropertyRef Name="Education" />
    <bi:PropertyRef Name="Occupation" />
    <bi:PropertyRef Name="Marital_Status" />
    <bi:PropertyRef Name="Gender" />
    <bi:PropertyRef Name="Home_Owner" />
    <bi:PropertyRef Name="Commute_Distance" />
  </bi:DisplayFolder>
</bi:DisplayFolders>
</bi:EntityType>
</EntityType>
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  </Key>
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    <bi:Property Hidden="true" ReferenceName="Product.Key0" />
  </Property>
  <Property Name="Product2" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false" Nullable="false">
    <bi:Property Caption="Product" ReferenceName="Product" Contents="Product"
LocaleImpact="true">
      <bi:GroupBy>
        <bi:PropertyRef Name="Product_Key0" />
      </bi:GroupBy>
      <bi:RelatedTo>
        <bi:PropertyRef Name="Standard_Cost" />
        <bi:PropertyRef Name="Color" />
        <bi:PropertyRef Name="Safety_Stock_Level" />
        <bi:PropertyRef Name="Reorder_Point" />
        <bi:PropertyRef Name="List_Price" />
        <bi:PropertyRef Name="Size" />
        <bi:PropertyRef Name="Size_Range" />
        <bi:PropertyRef Name="Weight" />
        <bi:PropertyRef Name="Days_to_Manufacture" />
        <bi:PropertyRef Name="Dealer_Price" />
        <bi:PropertyRef Name="Class" />
        <bi:PropertyRef Name="Style" />
        <bi:PropertyRef Name="Model_Name" />
        <bi:PropertyRef Name="Subcategory" />
        <bi:PropertyRef Name="Status" />
        <bi:PropertyRef Name="Start_Date" />
        <bi:PropertyRef Name="End_Date" />
        <bi:PropertyRef Name="Large_Photo" />
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</EntityType>

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<Property Name="Standard_Cost" Type="Decimal" Precision="19" Scale="4">
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  <bi:Property Hidden="true" ReferenceName="Category.Key0" />
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FixedLength="false" Nullable="false">
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    <bi:GroupBy>
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    </bi:GroupBy>
  </bi:Property>
</Property>
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FixedLength="false" Nullable="false">
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    <bi:GroupBy>
      <bi:PropertyRef Name="Color UniqueName" />
    </bi:GroupBy>
  </bi:Property>
</Property>
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  <bi:Property Caption="Safety Stock Level" ReferenceName="Safety Stock Level" />
</Property>
<Property Name="Reorder_Point" Type="Int64">
  <bi:Property Caption="Reorder Point" ReferenceName="Reorder Point" />
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  <bi:Property Caption="List Price" ReferenceName="List Price" />
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FixedLength="false" Nullable="false">
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    <bi:GroupBy>
      <bi:PropertyRef Name="Size_UniqueName" />
    </bi:GroupBy>
  </bi:Property>
</Property>
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FixedLength="false" Nullable="false">
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FixedLength="false" Nullable="false">
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    <bi:GroupBy>
      <bi:PropertyRef Name="Size_Range_UniqueName" />
    </bi:GroupBy>
  </bi:Property>
</Property>
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<Property Name="Weight" Type="String" MaxLength="Max" Unicode="true" FixedLength="false"
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      <bi:PropertyRef Name="Weight_Key0" />
    </bi:GroupBy>
    <bi:OrderBy>

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        <bi:PropertyRef Name="Weight_Key0" />
    </bi:OrderBy>
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            <bi:PropertyRef Name="Weight_Key0" />
        </bi:GroupBy>
        <bi:OrderBy>
            <bi:PropertyRef Name="Weight Key0" />
        </bi:OrderBy>
    </bi:Property>
</Property>
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<Property Name="Days_to_Manufacture" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false" Nullable="false">
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        <bi:GroupBy>
            <bi:PropertyRef Name="Days_to_Manufacture_Key0" />
        </bi:GroupBy>
    </bi:Property>
</Property>
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FixedLength="false" Nullable="false">
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</Property>
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FixedLength="false">
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    </bi:Property>
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        <bi:OrderBy>
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        </bi:OrderBy>
    </bi:Property>
</Property>
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    </bi:Property>
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    </bi:Property>
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  </Property>
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FixedLength="false" Nullable="false">
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        <bi:PropertyRef Name="Model Name UniqueName" />
      </bi:GroupBy>
      <bi:RelatedTo>
        <bi:PropertyRef Name="Product_Line" />
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    </bi:Property>
  </Property>
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FixedLength="false" Nullable="false">
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    </bi:Property>
  </Property>
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        <bi:PropertyRef Name="Product Line UniqueName" />
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    </bi:Property>
  </Property>
  <Property Name="Subcategory_Key0" Type="Int64">
    <bi:Property Hidden="true" ReferenceName="Subcategory.Key0" />
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FixedLength="false" Nullable="false">
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        <bi:PropertyRef Name="Subcategory_Key0" />
      </bi:GroupBy>
      <bi:RelatedTo>
        <bi:PropertyRef Name="Category" />
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    </bi:Property>
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FixedLength="false">
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    </bi:Property>
  </Property>
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        <bi:PropertyRef Name="Status_UniqueName" />
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    </bi:Property>
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FixedLength="false" Nullable="false">
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        <bi:PropertyRef Name="Start_Date_Key0" />
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      <bi:OrderBy>
        <bi:PropertyRef Name="Start_Date_Key0" />
      </bi:OrderBy>
    </bi:Property>
  </Property>
  <Property Name="Start Date Value" Type="DateTime">
    <bi:Property Caption="Start Date.Value" ReferenceName="Start Date.Value"
Contents="ScdStartDate">
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        <bi:PropertyRef Name="Start_Date_Key0" />
      </bi:GroupBy>
      <bi:OrderBy>
        <bi:PropertyRef Name="Start_Date_Key0" />
      </bi:OrderBy>
    </bi:Property>
  </Property>
  <Property Name="End_Date_Key0" Type="DateTime">
    <bi:Property Hidden="true" ReferenceName="End Date.Key0" />
  </Property>
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FixedLength="false" Nullable="false">
    <bi:Property Caption="End Date" ReferenceName="End Date" Contents="ScdEndDate">
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        <bi:PropertyRef Name="End_Date_Key0" />
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      <bi:OrderBy>
        <bi:PropertyRef Name="End_Date_Key0" />
      </bi:OrderBy>
    </bi:Property>
  </Property>
  <Property Name="End Date Value" Type="DateTime">
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        <bi:PropertyRef Name="End Date Key0" />
      </bi:GroupBy>
      <bi:OrderBy>
        <bi:PropertyRef Name="End_Date_Key0" />
      </bi:OrderBy>
    </bi:Property>
  </Property>
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    <bi:Property Caption="Large Photo" ReferenceName="Large Photo" />
  </Property>
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    <bi:Hierarchy Name="Product Categories" Caption="Product Categories"
ReferenceName="Product Categories">
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        <bi:Source>
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        </bi:Source>
      </bi:Level>
      <bi:Level Name="Subcategory">
        <bi:Source>
          <bi:PropertyRef Name="Subcategory" />
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      </bi:Level>
      <bi:Level Name="Product">

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        <bi:Source>
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        </bi:Source>
    </bi:Level>
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ReferenceName="Product Model Lines">
    <bi:Level Name="Product_Line" Caption="Product Line" ReferenceName="Product Line">
        <bi:Source>
            <bi:PropertyRef Name="Product_Line" />
        </bi:Source>
    </bi:Level>
    <bi:Level Name="Model">
        <bi:Source>
            <bi:PropertyRef Name="Model_Name" />
        </bi:Source>
    </bi:Level>
</bi:Hierarchy>
<bi:Hierarchy Name="Stock Level" Caption="Stock Level" ReferenceName="Stock Level">
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ReferenceName="Safety Stock Level">
        <bi:Source>
            <bi:PropertyRef Name="Safety Stock Level" />
        </bi:Source>
    </bi:Level>
    <bi:Level Name="Product">
        <bi:Source>
            <bi:PropertyRef Name="Product2" />
        </bi:Source>
    </bi:Level>
</bi:Hierarchy>
<bi:DisplayFolders>
    <bi:DisplayFolder Name="Financial">
        <bi:PropertyRef Name="Standard Cost" />
        <bi:PropertyRef Name="List_Price" />
        <bi:PropertyRef Name="Dealer Price" />
    </bi:DisplayFolder>
    <bi:DisplayFolder Name="Stocking">
        <bi:PropertyRef Name="Color" />
        <bi:PropertyRef Name="Safety Stock Level" />
        <bi:PropertyRef Name="Reorder Point" />
        <bi:PropertyRef Name="Size" />
        <bi:PropertyRef Name="Size Range" />
        <bi:PropertyRef Name="Weight" />
        <bi:PropertyRef Name="Weight Value" />
        <bi:PropertyRef Name="Days to Manufacture" />
        <bi:PropertyRef Name="Class" />
        <bi:HierarchyRef Name="Stock Level" />
    </bi:DisplayFolder>
    <bi:DisplayFolder Name="History">
        <bi:PropertyRef Name="Status" />
        <bi:PropertyRef Name="Start Date" />
        <bi:PropertyRef Name="Start Date Value" />
        <bi:PropertyRef Name="End Date" />
        <bi:PropertyRef Name="End Date Value" />
    </bi:DisplayFolder>
</bi:DisplayFolders>
</bi:EntityType>
</EntityType>
<EntityType Name="Internet_Sales">
    <Key>
        <PropertyRef Name="RowNumber" />
    </Key>
    <Property Name="RowNumber" Type="Int64" Nullable="false">
        <bi:Property Hidden="true" Stability="RowNumber" />
    </Property>
    <Property Name="Internet_Gross_Profit" Type="Double">
        <bi:Measure Caption="Internet Gross Profit" ReferenceName="Internet Gross Profit"
ActualType="Any">

```

```

    <bi:FormatBy>
      <bi:PropertyRef Name="Internet_Gross_Profit_FormatString" />
    </bi:FormatBy>
  </bi:ApplyCulture>
  <bi:PropertyRef Name="Internet_Gross_Profit_ApplyCulture" />
</bi:ApplyCulture>
</bi:Measure>
</Property>
<Property Name="Internet_Gross_Profit_Margin" Type="Double">
  <bi:Measure Caption="Internet Gross Profit Margin" ReferenceName="Internet Gross Profit
Margin" ActualType="Any">
    <bi:FormatBy>
      <bi:PropertyRef Name="Internet_Gross_Profit_Margin_FormatString" />
    </bi:FormatBy>
  </bi:ApplyCulture>
  <bi:PropertyRef Name="Internet_Gross_Profit_Margin_ApplyCulture" />
</bi:ApplyCulture>
</bi:Measure>
</Property>
<Property Name="Internet_Average_Unit_Price" Type="Double">
  <bi:Measure Caption="Internet Average Unit Price" ReferenceName="Internet Average Unit
Price" ActualType="Any">
    <bi:FormatBy>
      <bi:PropertyRef Name="Internet_Average_Unit_Price_FormatString" />
    </bi:FormatBy>
  </bi:ApplyCulture>
  <bi:PropertyRef Name="Internet_Average_Unit_Price_ApplyCulture" />
</bi:ApplyCulture>
</bi:Measure>
</Property>
<Property Name="Internet_Average_Sales_Amount" Type="Double">
  <bi:Measure Caption="Internet Average Sales Amount" ReferenceName="Internet Average
Sales Amount" ActualType="Any">
    <bi:FormatBy>
      <bi:PropertyRef Name="Internet_Average_Sales_Amount_FormatString" />
    </bi:FormatBy>
  </bi:ApplyCulture>
  <bi:PropertyRef Name="Internet_Average_Sales_Amount_ApplyCulture" />
</bi:ApplyCulture>
</bi:Measure>
</Property>
<Property Name="Internet_Ratio_to_All_Products" Type="Double">
  <bi:Measure Caption="Internet Ratio to All Products" ReferenceName="Internet Ratio to
All Products" ActualType="Any">
    <bi:FormatBy>
      <bi:PropertyRef Name="Internet_Ratio_to_All_Products_FormatString" />
    </bi:FormatBy>
  </bi:ApplyCulture>
  <bi:PropertyRef Name="Internet_Ratio_to_All_Products_ApplyCulture" />
</bi:ApplyCulture>
</bi:Measure>
</Property>
<Property Name="Internet_Ratio_to_Parent_Product" Type="Double">
  <bi:Measure Caption="Internet Ratio to Parent Product" ReferenceName="Internet Ratio to
Parent Product" ActualType="Any">
    <bi:FormatBy>
      <bi:PropertyRef Name="Internet_Ratio_to_Parent_Product_FormatString" />
    </bi:FormatBy>
  </bi:ApplyCulture>
  <bi:PropertyRef Name="Internet_Ratio_to_Parent_Product_ApplyCulture" />
</bi:ApplyCulture>
</bi:Measure>
</Property>
<Property Name="Growth_in_Customer_Base" Type="Double">
  <bi:Measure Caption="Growth in Customer Base" ReferenceName="Growth in Customer Base"
ActualType="Any">
    <bi:FormatBy>
      <bi:PropertyRef Name="Growth_in_Customer_Base_FormatString" />
    </bi:FormatBy>

```

```

    <bi:ApplyCulture>
      <bi:PropertyRef Name="Growth_in_Customer_Base_ApplyCulture" />
    </bi:ApplyCulture>
  </bi:Measure>
</Property>
<Property Name="v Growth in Customer Base Value" Type="Double">
  <bi:Measure Caption="Growth in Customer Base" ReferenceName="___Growth in Customer Base Value" ActualType="Any">
    <bi:Kpi StatusGraphic="Road Signs" TrendGraphic="Standard Arrow">
      <bi:Documentation>
        <bi:Summary>The ratio between the customer count in the current period to that of the previous period.</bi:Summary>
      </bi:Documentation>
      <bi:KpiGoal>
        <bi:PropertyRef Name="Growth_in_Customer_Base_Goal" />
      </bi:KpiGoal>
      <bi:KpiStatus>
        <bi:PropertyRef Name="Growth_in_Customer_Base_Status" />
      </bi:KpiStatus>
      <bi:KpiTrend>
        <bi:PropertyRef Name="Growth_in_Customer_Base_Trend" />
      </bi:KpiTrend>
    </bi:Kpi>
    <bi:FormatBy>
      <bi:PropertyRef Name="v___Growth_in_Customer_Base_Value_FormatString" />
    </bi:FormatBy>
    <bi:ApplyCulture>
      <bi:PropertyRef Name="v___Growth_in_Customer_Base_Value_ApplyCulture" />
    </bi:ApplyCulture>
  </bi:Measure>
</Property>
<Property Name="Growth_in_Customer_Base_Goal" Type="Double">
  <bi:Measure Caption="Growth in Customer Base Goal" Hidden="true" ReferenceName="Growth in Customer Base Goal" ActualType="Any">
    <bi:ApplyCulture>
      <bi:PropertyRef Name="Growth in Customer Base Goal ApplyCulture" />
    </bi:ApplyCulture>
  </bi:Measure>
</Property>
<Property Name="Growth in Customer Base Status" Type="Double">
  <bi:Measure Caption="Growth in Customer Base Status" Hidden="true" ReferenceName="Growth in Customer Base Status" ActualType="Any">
    <bi:ApplyCulture>
      <bi:PropertyRef Name="Growth_in_Customer_Base_Status_ApplyCulture" />
    </bi:ApplyCulture>
  </bi:Measure>
</Property>
<Property Name="Growth in Customer Base Trend" Type="Double">
  <bi:Measure Caption="Growth in Customer Base Trend" Hidden="true" ReferenceName="Growth in Customer Base Trend" ActualType="Any">
    <bi:ApplyCulture>
      <bi:PropertyRef Name="Growth in Customer Base Trend ApplyCulture" />
    </bi:ApplyCulture>
  </bi:Measure>
</Property>
<Property Name="Internet_Sales_Amount" Type="Decimal" Precision="19" Scale="4">
  <bi:Measure Caption="Internet Sales Amount" ReferenceName="Internet Sales Amount" ActualType="Any">
    <bi:FormatBy>
      <bi:PropertyRef Name="Internet_Sales_Amount_FormatString" />
    </bi:FormatBy>
    <bi:ApplyCulture>
      <bi:PropertyRef Name="Internet Sales Amount ApplyCulture" />
    </bi:ApplyCulture>
  </bi:Measure>
</Property>
<Property Name="Internet_Order_Quantity" Type="Int64">
  <bi:Measure Caption="Internet Order Quantity" ReferenceName="Internet Order Quantity" ActualType="Any">

```



```

        <bi:FormatBy>
          <bi:PropertyRef Name="Internet_Order_Quantity_FormatString" />
        </bi:FormatBy>
        <bi:ApplyCulture>
          <bi:PropertyRef Name="Internet_Order_Quantity_ApplyCulture" />
        </bi:ApplyCulture>
      </bi:Measure>
    </Property>
    <Property Name="Internet_Extended_Amount" Type="Decimal" Precision="19" Scale="4">
      <bi:Measure Caption="Internet Extended Amount" ReferenceName="Internet Extended Amount"
ActualType="Any">
        <bi:FormatBy>
          <bi:PropertyRef Name="Internet_Extended_Amount_FormatString" />
        </bi:FormatBy>
        <bi:ApplyCulture>
          <bi:PropertyRef Name="Internet_Extended_Amount_ApplyCulture" />
        </bi:ApplyCulture>
      </bi:Measure>
    </Property>
    <Property Name="Internet_Tax_Amount" Type="Decimal" Precision="19" Scale="4">
      <bi:Measure Caption="Internet Tax Amount" ReferenceName="Internet Tax Amount"
ActualType="Any">
        <bi:FormatBy>
          <bi:PropertyRef Name="Internet_Tax_Amount_FormatString" />
        </bi:FormatBy>
        <bi:ApplyCulture>
          <bi:PropertyRef Name="Internet_Tax_Amount_ApplyCulture" />
        </bi:ApplyCulture>
      </bi:Measure>
    </Property>
    <Property Name="Internet_Freight_Cost" Type="Decimal" Precision="19" Scale="4">
      <bi:Measure Caption="Internet Freight Cost" ReferenceName="Internet Freight Cost"
ActualType="Any">
        <bi:FormatBy>
          <bi:PropertyRef Name="Internet_Freight_Cost_FormatString" />
        </bi:FormatBy>
        <bi:ApplyCulture>
          <bi:PropertyRef Name="Internet_Freight_Cost_ApplyCulture" />
        </bi:ApplyCulture>
      </bi:Measure>
    </Property>
    <Property Name="Internet_Unit_Price" Type="Decimal" Precision="19" Scale="4">
      <bi:Measure Caption="Internet Unit Price" Hidden="true" ReferenceName="Internet Unit
Price" ActualType="Any">
        <bi:FormatBy>
          <bi:PropertyRef Name="Internet_Unit_Price_FormatString" />
        </bi:FormatBy>
        <bi:ApplyCulture>
          <bi:PropertyRef Name="Internet_Unit_Price_ApplyCulture" />
        </bi:ApplyCulture>
      </bi:Measure>
    </Property>
    <Property Name="Internet_Total_Product_Cost" Type="Decimal" Precision="19" Scale="4">
      <bi:Measure Caption="Internet Total Product Cost" ReferenceName="Internet Total Product
Cost" ActualType="Any">
        <bi:FormatBy>
          <bi:PropertyRef Name="Internet_Total_Product_Cost_FormatString" />
        </bi:FormatBy>
        <bi:ApplyCulture>
          <bi:PropertyRef Name="Internet_Total_Product_Cost_ApplyCulture" />
        </bi:ApplyCulture>
      </bi:Measure>
    </Property>
    <Property Name="Internet_Standard_Product_Cost" Type="Decimal" Precision="19" Scale="4">
      <bi:Measure Caption="Internet Standard Product Cost" ReferenceName="Internet Standard
Product Cost" ActualType="Any">
        <bi:FormatBy>
          <bi:PropertyRef Name="Internet_Standard_Product_Cost_FormatString" />
        </bi:FormatBy>

```

```

    <bi:ApplyCulture>
      <bi:PropertyRef Name="Internet_Standard_Product_Cost_ApplyCulture" />
    </bi:ApplyCulture>
  </bi:Measure>
</Property>
<Property Name="Internet Transaction Count" Type="Int64">
  <bi:Measure Caption="Internet Transaction Count" Hidden="true" ReferenceName="Internet
Transaction Count" ActualType="Any">
    <bi:FormatBy>
      <bi:PropertyRef Name="Internet_Transaction_Count_FormatString" />
    </bi:FormatBy>
    <bi:ApplyCulture>
      <bi:PropertyRef Name="Internet_Transaction_Count_ApplyCulture" />
    </bi:ApplyCulture>
  </bi:Measure>
</Property>
<Property Name="Internet Gross Profit FormatString" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
  <bi:Measure Hidden="true" ReferenceName="Internet Gross Profit.FormatString" />
</Property>
<Property Name="Internet_Gross_Profit_ApplyCulture" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
  <bi:Measure Hidden="true" ReferenceName="Internet Gross Profit.ApplyCulture" />
</Property>
<Property Name="Internet_Gross_Profit_Margin_FormatString" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
  <bi:Measure Hidden="true" ReferenceName="Internet Gross Profit Margin.FormatString" />
</Property>
<Property Name="Internet Gross Profit Margin ApplyCulture" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
  <bi:Measure Hidden="true" ReferenceName="Internet Gross Profit Margin.ApplyCulture" />
</Property>
<Property Name="Internet_Average_Unit_Price_FormatString" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
  <bi:Measure Hidden="true" ReferenceName="Internet Average Unit Price.FormatString" />
</Property>
<Property Name="Internet_Average_Unit_Price_ApplyCulture" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
  <bi:Measure Hidden="true" ReferenceName="Internet Average Unit Price.ApplyCulture" />
</Property>
<Property Name="Internet_Average_Sales_Amount_FormatString" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
  <bi:Measure Hidden="true" ReferenceName="Internet Average Sales Amount.FormatString" />
</Property>
<Property Name="Internet_Average_Sales_Amount_ApplyCulture" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
  <bi:Measure Hidden="true" ReferenceName="Internet Average Sales Amount.ApplyCulture" />
</Property>
<Property Name="Internet_Ratio_to_All_Products_FormatString" Type="String"
MaxLength="Max" Unicode="true" FixedLength="false">
  <bi:Measure Hidden="true" ReferenceName="Internet Ratio to All Products.FormatString"
/>
</Property>
<Property Name="Internet Ratio to All Products ApplyCulture" Type="String"
MaxLength="Max" Unicode="true" FixedLength="false">
  <bi:Measure Hidden="true" ReferenceName="Internet Ratio to All Products.ApplyCulture"
/>
</Property>
<Property Name="Internet Ratio to Parent Product FormatString" Type="String"
MaxLength="Max" Unicode="true" FixedLength="false">
  <bi:Measure Hidden="true" ReferenceName="Internet Ratio to Parent Product.FormatString"
/>
</Property>
<Property Name="Internet_Ratio_to_Parent_Product_ApplyCulture" Type="String"
MaxLength="Max" Unicode="true" FixedLength="false">
  <bi:Measure Hidden="true" ReferenceName="Internet Ratio to Parent Product.ApplyCulture"
/>
</Property>

```

```

    <Property Name="Growth_in_Customer_Base_FormatString" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
    <bi:Measure Hidden="true" ReferenceName="Growth in Customer Base.FormatString" />
  </Property>
  <Property Name="Growth_in_Customer_Base_ApplyCulture" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
    <bi:Measure Hidden="true" ReferenceName="Growth in Customer Base.ApplyCulture" />
  </Property>
  <Property Name="v__Growth_in_Customer_Base_Value_FormatString" Type="String"
MaxLength="Max" Unicode="true" FixedLength="false">
    <bi:Measure Hidden="true" ReferenceName=" Growth in Customer Base Value.FormatString"
/>
  </Property>
  <Property Name="v__Growth_in_Customer_Base_Value_ApplyCulture" Type="String"
MaxLength="Max" Unicode="true" FixedLength="false">
    <bi:Measure Hidden="true" ReferenceName="__Growth in Customer Base Value.ApplyCulture"
/>
  </Property>
  <Property Name="Growth in Customer Base Goal ApplyCulture" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
    <bi:Measure Hidden="true" ReferenceName="Growth in Customer Base Goal.ApplyCulture" />
  </Property>
  <Property Name="Growth in Customer Base Status ApplyCulture" Type="String"
MaxLength="Max" Unicode="true" FixedLength="false">
    <bi:Measure Hidden="true" ReferenceName="Growth in Customer Base Status.ApplyCulture"
/>
  </Property>
  <Property Name="Growth_in_Customer_Base_Trend_ApplyCulture" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
    <bi:Measure Hidden="true" ReferenceName="Growth in Customer Base Trend.ApplyCulture" />
  </Property>
  <Property Name="Internet_Sales_Amount_FormatString" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
    <bi:Measure Hidden="true" ReferenceName="Internet Sales Amount.FormatString" />
  </Property>
  <Property Name="Internet Sales Amount ApplyCulture" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
    <bi:Measure Hidden="true" ReferenceName="Internet Sales Amount.ApplyCulture" />
  </Property>
  <Property Name="Internet Order Quantity FormatString" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
    <bi:Measure Hidden="true" ReferenceName="Internet Order Quantity.FormatString" />
  </Property>
  <Property Name="Internet_Order_Quantity_ApplyCulture" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
    <bi:Measure Hidden="true" ReferenceName="Internet Order Quantity.ApplyCulture" />
  </Property>
  <Property Name="Internet Extended Amount FormatString" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
    <bi:Measure Hidden="true" ReferenceName="Internet Extended Amount.FormatString" />
  </Property>
  <Property Name="Internet Extended Amount ApplyCulture" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
    <bi:Measure Hidden="true" ReferenceName="Internet Extended Amount.ApplyCulture" />
  </Property>
  <Property Name="Internet_Tax_Amount_FormatString" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
    <bi:Measure Hidden="true" ReferenceName="Internet Tax Amount.FormatString" />
  </Property>
  <Property Name="Internet_Tax_Amount_ApplyCulture" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
    <bi:Measure Hidden="true" ReferenceName="Internet Tax Amount.ApplyCulture" />
  </Property>
  <Property Name="Internet_Freight_Cost_FormatString" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
    <bi:Measure Hidden="true" ReferenceName="Internet Freight Cost.FormatString" />
  </Property>
  <Property Name="Internet_Freight_Cost_ApplyCulture" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">

```

```

        <bi:Measure Hidden="true" ReferenceName="Internet Freight Cost.ApplyCulture" />
    </Property>
    <Property Name="Internet_Unit_Price_FormatString" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
        <bi:Measure Hidden="true" ReferenceName="Internet Unit Price.FormatString" />
    </Property>
    <Property Name="Internet_Unit_Price_ApplyCulture" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
        <bi:Measure Hidden="true" ReferenceName="Internet Unit Price.ApplyCulture" />
    </Property>
    <Property Name="Internet Total Product Cost FormatString" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
        <bi:Measure Hidden="true" ReferenceName="Internet Total Product Cost.FormatString" />
    </Property>
    <Property Name="Internet_Total_Product_Cost_ApplyCulture" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
        <bi:Measure Hidden="true" ReferenceName="Internet Total Product Cost.ApplyCulture" />
    </Property>
    <Property Name="Internet Standard Product Cost FormatString" Type="String"
MaxLength="Max" Unicode="true" FixedLength="false">
        <bi:Measure Hidden="true" ReferenceName="Internet Standard Product Cost.FormatString"
/>
    </Property>
    <Property Name="Internet_Standard_Product_Cost_ApplyCulture" Type="String"
MaxLength="Max" Unicode="true" FixedLength="false">
        <bi:Measure Hidden="true" ReferenceName="Internet Standard Product Cost.ApplyCulture"
/>
    </Property>
    <Property Name="Internet Transaction Count FormatString" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
        <bi:Measure Hidden="true" ReferenceName="Internet Transaction Count.FormatString" />
    </Property>
    <Property Name="Internet_Transaction_Count_ApplyCulture" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
        <bi:Measure Hidden="true" ReferenceName="Internet Transaction Count.ApplyCulture" />
    </Property>
    <NavigationProperty Name="Product_Product"
Relationship="Sandbox.Internet_Sales_Product_Product_Product"
FromRole="Internet_Sales_Product_Product" ToRole="Product_Product">
        <bi:NavigationProperty />
    </NavigationProperty>
    <NavigationProperty Name="Customer_Customer"
Relationship="Sandbox.Internet_Sales_Customer_Customer_Customer"
FromRole="Internet_Sales_Customer_Customer" ToRole="Customer_Customer">
        <bi:NavigationProperty />
    </NavigationProperty>
    <NavigationProperty Name="Date_Date" Relationship="Sandbox.Internet_Sales_Date_Date_Date"
FromRole="Internet Sales Date Date" ToRole="Date Date">
        <bi:NavigationProperty />
    </NavigationProperty>
    <bi:EntityType Contents="Sales">
        <bi:DisplayFolders>
            <bi:DisplayFolder Name="Customer_Perspective" Caption="Customer Perspective">
                <bi:DisplayFolder Name="Expand Customer Base" Caption="Expand Customer Base">
                    <bi:PropertyRef Name="v__Growth_in_Customer_Base_Value" />
                </bi:DisplayFolder>
            </bi:DisplayFolder>
        </bi:DisplayFolders>
    </bi:EntityType>
    </EntityType>
    <Association Name="Internet_Sales_Product_Product_Product">
        <End Role="Internet_Sales_Product_Product" Type="Sandbox.Internet_Sales" Multiplicity="*"
/>
    </Association>
    <Association Name="Internet_Sales_Customer_Customer_Customer">
        <End Role="Internet_Sales_Customer_Customer" Type="Sandbox.Internet_Sales"
Multiplicity="*" />
    </Association>
    <Association Name="Internet_Sales_Customer_Customer_Customer">
        <End Role="Customer_Customer" Type="Sandbox.Customer" Multiplicity="0..1" />
    </Association>

```

```
</Association>
<Association Name="Internet_Sales_Date_Date_Date">
  <End Role="Internet_Sales_Date_Date" Type="Sandbox.Internet_Sales" Multiplicity="*" />
  <End Role="Date_Date" Type="Sandbox.Date" Multiplicity="0..1" />
</Association>
</Schema>
```

## **4 Security**

### **4.1 Security Considerations for Implementers**

There are no known security considerations that are not covered in the preceding sections.

### **4.2 Index of Security Fields**

None.

## 5 Appendix A: Full XML Schema

For ease of implementation, the following are the full **XML schemas** for this protocol.

Schema name	Prefix	Section
CSDLBI Schema 1.0	xs:	section <a href="#">5.1</a>
CSDLBI Schema 1.1	xs:	section <a href="#">5.2</a>
CSDLBI Schema 2.0	xs:	section <a href="#">5.3</a>

### 5.1 CSDLBI Schema 1.0

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema id="bi"
  targetNamespace="http://schemas.microsoft.com/sqlbi/2010/10/edm/extensions"
  elementFormDefault="qualified"
  xmlns:bi="http://schemas.microsoft.com/sqlbi/2010/10/edm/extensions"
  xmlns:edm="http://schemas.microsoft.com/ado/2008/09/edm"
  xmlns:xs="http://www.w3.org/2001/XMLSchema">

  <xs:import namespace="http://schemas.microsoft.com/ado/2008/09/edm"
    schemaLocation="System.Data.Resources.CSDLSchema_2.xs"/>

  <xs:element name="EntityContainer" type="bi:TEntityContainer"/>
  <xs:element name="EntitySet" type="bi:TEntitySet"/>
  <xs:element name="AssociationSet" type="bi:TAssociationSet"/>
  <xs:element name="EntityType" type="bi:TEntityType"/>
  <xs:element name="Property" type="bi:TProperty"/>
  <xs:element name="NavigationProperty" type="bi:TNavigationProperty"/>
  <xs:element name="Measure" type="bi:TMeasure"/>
  <xs:element name="SourceDescription" type="xs:string" />

  <xs:complexType name="TEntityContainer">
    <xs:sequence>
      <xs:element name="CompareOptions" type="bi:TCompareOptions" />
    </xs:sequence>
    <xs:attribute name="Caption" type="xs:string" use="optional"/>
    <xs:attribute name="Culture" type="xs:string" />
    <xs:attribute name="DirectQueryMode" type="bi:TDirectQueryMode" />
  </xs:complexType>

  <xs:simpleType name="TDirectQueryMode">
    <xs:restriction base="xs:string">
      <xs:enumeration value="InMemory" />
      <xs:enumeration value="InMemoryWithDirectQuery" />
      <xs:enumeration value="DirectQueryWithInMemory" />
      <xs:enumeration value="DirectQuery" />
    </xs:restriction>
  </xs:simpleType>

  <xs:complexType name="TCompareOptions" >
    <xs:attribute name="IgnoreCase" type="xs:boolean" default="false" />
    <xs:attribute name="IgnoreNonSpace" type="xs:boolean" default="false" />
    <xs:attribute name="IgnoreKanaType" type="xs:boolean" default="false" />
    <xs:attribute name="IgnoreWidth" type="xs:boolean" default="false" />
  </xs:complexType>

  <xs:complexType name="TEntitySet">
    <xs:attribute name="Caption" type="xs:string" use="optional"/>
    <xs:attribute name="CollectionCaption" type="xs:string" use="optional"/>
    <xs:attribute name="ReferenceName" type="xs:string" use="optional"/>
  </xs:complexType>
```

```

    <xs:attribute name="Hidden" type="xs:boolean" default="false" use="optional"/>
</xs:complexType>

<xs:complexType name="TAssociationSet">
  <xs:attribute name="State" type="bi:TState" default="Active"/>
  <xs:attribute name="Hidden" type="xs:boolean" default="false" />
</xs:complexType>

<xs:simpleType name="TState">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Active" />
    <xs:enumeration value="Inactive" />
  </xs:restriction>
</xs:simpleType>

<xs:complexType name="TEntityType">
  <xs:sequence >
    <xs:element name="DisplayKey" type="bi:TMemberRefs" minOccurs="0" maxOccurs="1" />
    <xs:element name="DefaultDetails" type="bi:TMemberRefs" minOccurs="0" maxOccurs="1"/>
    <xs:element name="DefaultImage" minOccurs="0" maxOccurs="1" >
      <xs:complexType >
        <xs:sequence>
          <xs:element name="MemberRef" type="bi:TMemberRef" minOccurs="1" maxOccurs="1" />
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="DefaultMeasure" minOccurs="0" maxOccurs="1" >
      <xs:complexType >
        <xs:sequence>
          <xs:element name="MemberRef" type="bi:TMemberRef" minOccurs="1" maxOccurs="1" />
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="SortMembers" type="bi:TMemberRefs" minOccurs="0" maxOccurs="1" />
  </xs:sequence>
  <xs:attribute name="Contents" type="bi:TEntityContents" default="Regular"
use="optional"/>
  <xs:attribute name="ReferenceName" type="xs:string" use="optional"/>
</xs:complexType>

<xs:simpleType name="TEntityContents">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Regular"/>
    <xs:enumeration value="Time"/>
    <xs:enumeration value="Geography"/>
    <xs:enumeration value="Organization"/>
    <xs:enumeration value="BillOfMaterials"/>
    <xs:enumeration value="Accounts"/>
    <xs:enumeration value="Customers"/>
    <xs:enumeration value="Products"/>
    <xs:enumeration value="Scenario"/>
    <xs:enumeration value="Quantitative"/>
    <xs:enumeration value="Utility"/>
    <xs:enumeration value="Currency"/>
    <xs:enumeration value="Rates"/>
    <xs:enumeration value="Channel"/>
    <xs:enumeration value="Promotion"/>
  </xs:restriction>
</xs:simpleType>

<xs:complexType name="TMemberRefs" >
  <xs:sequence>
    <xs:element name="MemberRef" type="bi:TMemberRef" minOccurs="1" maxOccurs="unbounded"
/>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="TMemberRef">
  <xs:attribute name="Name" type="xs:string" use="required" />

```



```

</xs:complexType>

<xs:complexType name="TMember" abstract="true">
  <xs:attribute name="Caption" type="xs:string" use="optional"/>
  <xs:attribute name="ContextualNameRule" type="bi:TContextualNameRule" default="None" />
    <xs:attribute name="Hidden" type="xs:boolean" default="false" />
  <xs:attribute name="ReferenceName" type="xs:string" use="optional" />
</xs:complexType>

<xs:simpleType name="TContextualNameRule">
  <xs:restriction base="xs:string">
    <xs:enumeration value="None" />
    <xs:enumeration value="Context" />
    <xs:enumeration value="Merge" />
  </xs:restriction>
</xs:simpleType>

<xs:complexType name="TDocumentation">
  <xs:sequence>
    <xs:element name="Summary" type="xs:string" minOccurs="0" maxOccurs="1" />
  </xs:sequence>
</xs:complexType>

<xs:complexType name="TProperty">
  <xs:complexContent>
    <xs:extension base="bi:TBaseProperty">
      <xs:sequence>
        <xs:element name="OrderBy" type="bi:TPropertyRefs" minOccurs="0" maxOccurs="1"/>
      </xs:sequence>
      <xs:attribute name="Contents" type="bi:TContents" use="optional" default="Regular"/>
      <xs:attribute name="DefaultAggregateFunction" type="bi:TDefaultAggregateFunction"
default="Default" />
      <xs:attribute name="GroupingBehavior" type="bi:TGroupingBehavior"
default="GroupOnValue"/>
      <xs:attribute name="Stability" type="bi:TStability" default="Stable"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:simpleType name="TContents">
  <xs:restriction base="xs:string" />
</xs:simpleType>

<xs:simpleType name="TDefaultAggregateFunction" >
  <xs:restriction base="xs:string">
    <xs:enumeration value="Default" />
    <xs:enumeration value="None" />
    <xs:enumeration value="Sum" />
    <xs:enumeration value="Count" />
    <xs:enumeration value="Average" />
    <xs:enumeration value="Min" />
    <xs:enumeration value="Max" />
    <xs:enumeration value="DistinctCount" />
  </xs:restriction>
</xs:simpleType>

<xs:simpleType name="TGroupingBehavior" >
  <xs:restriction base="xs:string" >
    <xs:enumeration value="GroupOnValue" />
    <xs:enumeration value="GroupOnEntityKey" />
  </xs:restriction>
</xs:simpleType>

<xs:simpleType name="TStability">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Stable" />
    <xs:enumeration value="RowNumber" />
    <xs:enumeration value="Volatile" />
  </xs:restriction>

```

```

</xs:simpleType>

<xs:complexType name="TBaseProperty" abstract="true">
  <xs:complexContent>
    <xs:extension base="bi:TMember">
      <xs:attribute name="Alignment" type="bi:TAlignment" use="optional"/>
      <xs:attribute name="FormatString" type="xs:string" use="optional"/>
      <xs:attribute name="Units" type="xs:string" use="optional" />
      <xs:attribute name="SortDirection" type="bi:TSortDirection" default="Default"/>
      <xs:attribute name="IsRightToLeft" type="xs:boolean" default="false"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:simpleType name="TAlignment">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Default" />
    <xs:enumeration value="Left" />
    <xs:enumeration value="Right" />
    <xs:enumeration value="Center" />
  </xs:restriction>
</xs:simpleType>

<xs:simpleType name="TSortDirection">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Default" />
    <xs:enumeration value="Ascending" />
    <xs:enumeration value="Descending" />
  </xs:restriction>
</xs:simpleType>

<xs:complexType name="TPropertyRefs" >
  <xs:sequence>
    <xs:element name="PropertyRef" type="bi:TPropertyRef" minOccurs="1"
maxOccurs="unbounded" />
  </xs:sequence>
</xs:complexType>

<xs:complexType name="TPropertyRef">
  <xs:attribute name="Name" type="xs:string" use="required" />
</xs:complexType>

<xs:complexType name="TMeasure">
  <xs:complexContent>
    <xs:extension base="bi:TProperty">
      <xs:attribute name="IsSimpleMeasure" type="xs:boolean" default="true"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name="TNavigationProperty">
  <xs:complexContent>
    <xs:extension base="bi:TMember">
      <xs:attribute name="CollectionCaption" type="xs:string" use="optional"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

</xs:schema>

```

## 5.2 CSDLBI Schema 1.1

```

<?xml version="1.0" encoding="utf-8"?>
<xs:schema id="bi"
  targetNamespace="http://schemas.microsoft.com/sqlbi/2010/10/edm/extensions"
  elementFormDefault="qualified"
  xmlns:bi="http://schemas.microsoft.com/sqlbi/2010/10/edm/extensions"

```

```

xmlns:edm="http://schemas.microsoft.com/ado/2008/09/edm"
xmlns:xs="http://www.w3.org/2001/XMLSchema">

<xs:import namespace="http://schemas.microsoft.com/ado/2008/09/edm"
schemaLocation="System.Data.Resources.CSDLSchema_2.xs"/>

<xs:element name="EntityContainer" type="bi:TEntityContainer"/>
<xs:element name="EntitySet" type="bi:TEntitySet"/>
<xs:element name="AssociationSet" type="bi:TAssociationSet"/>
<xs:element name="EntityType" type="bi:TEntityType"/>
<xs:element name="Property" type="bi:TProperty"/>
<xs:element name="NavigationProperty" type="bi:TNavigationProperty"/>
<xs:element name="Measure" type="bi:TMeasure"/>
<xs:element name="SourceDescription" type="xs:string" />

<xs:complexType name="TEntityContainer">
  <xs:sequence>
    <xs:element name="CompareOptions" type="bi:TCompareOptions" />
  </xs:sequence>
  <xs:attribute name="Caption" type="xs:string" use="optional"/>
  <xs:attribute name="Culture" type="xs:string" />
  <xs:attribute name="DirectQueryMode" type="bi:TDirectQueryMode" />
</xs:complexType>

<xs:simpleType name="TDirectQueryMode">
  <xs:restriction base="xs:string">
    <xs:enumeration value="InMemory" />
    <xs:enumeration value="InMemoryWithDirectQuery" />
    <xs:enumeration value="DirectQueryWithInMemory" />
    <xs:enumeration value="DirectQuery" />
  </xs:restriction>
</xs:simpleType>

<xs:complexType name="TCompareOptions" >
  <xs:attribute name="IgnoreCase" type="xs:boolean" default="false" />
  <xs:attribute name="IgnoreNonSpace" type="xs:boolean" default="false" />
  <xs:attribute name="IgnoreKanaType" type="xs:boolean" default="false" />
  <xs:attribute name="IgnoreWidth" type="xs:boolean" default="false" />
</xs:complexType>

<xs:complexType name="TEntitySet">
  <xs:attribute name="Caption" type="xs:string" use="optional"/>
  <xs:attribute name="CollectionCaption" type="xs:string" use="optional"/>
  <xs:attribute name="ReferenceName" type="xs:string" use="optional"/>
  <xs:attribute name="Hidden" type="xs:boolean" default="false" use="optional"/>
</xs:complexType>

<xs:complexType name="TAssociationSet">
  <xs:attribute name="State" type="bi:TState" default="Active"/>
  <xs:attribute name="Hidden" type="xs:boolean" default="false" />
</xs:complexType>

<xs:simpleType name="TState">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Active" />
    <xs:enumeration value="Inactive" />
  </xs:restriction>
</xs:simpleType>

<xs:complexType name="TEntityType">
  <xs:sequence >
    <xs:element name="DisplayKey" type="bi:TMemberRefs" minOccurs="0" maxOccurs="1" />
    <xs:element name="DefaultDetails" type="bi:TMemberRefs" minOccurs="0" maxOccurs="1"/>
    <xs:element name="DefaultImage" minOccurs="0" maxOccurs="1" >
      <xs:complexType >
        <xs:sequence>
          <xs:element name="MemberRef" type="bi:TMemberRef" minOccurs="1" maxOccurs="1" />
        </xs:sequence>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
</xs:complexType>

```

```

    </xs:element>
    <xs:element name="DefaultMeasure" minOccurs="0" maxOccurs="1" >
      <xs:complexType >
        <xs:sequence>
          <xs:element name="MemberRef" type="bi:TMemberRef" minOccurs="1" maxOccurs="1" />
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="SortMembers" type="bi:TMemberRefs" minOccurs="0" maxOccurs="1" />
    <xs:element name="Hierarchy" type="bi:THierarchy" minOccurs="0" maxOccurs="unbounded"
  />
</xs:sequence>
<xs:attribute name="Contents" type="bi:TEntityContents" default="Regular"
use="optional"/>
<xs:attribute name="ReferenceName" type="xs:string" use="optional"/>
</xs:complexType>

<xs:simpleType name="TEntityContents">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Regular"/>
    <xs:enumeration value="Time"/>
    <xs:enumeration value="Geography"/>
    <xs:enumeration value="Organization"/>
    <xs:enumeration value="BillOfMaterials"/>
    <xs:enumeration value="Accounts"/>
    <xs:enumeration value="Customers"/>
    <xs:enumeration value="Products"/>
    <xs:enumeration value="Scenario"/>
    <xs:enumeration value="Quantitative"/>
    <xs:enumeration value="Utility"/>
    <xs:enumeration value="Currency"/>
    <xs:enumeration value="Rates"/>
    <xs:enumeration value="Channel"/>
    <xs:enumeration value="Promotion"/>
  </xs:restriction>
</xs:simpleType>

<xs:complexType name="TMemberRefs" >
  <xs:sequence>
    <xs:element name="MemberRef" type="bi:TMemberRef" minOccurs="1" maxOccurs="unbounded"
  />
  </xs:sequence>
</xs:complexType>

<xs:complexType name="TMemberRef">
  <xs:attribute name="Name" type="xs:string" use="required" />
</xs:complexType>

<xs:complexType name="THierarchy">
  <xs:complexContent>
    <xs:extension base="bi:TMember">
      <xs:sequence>
        <xs:element name="Documentation" type="bi:TDocumentation" minOccurs="0"
maxOccurs="1" />
        <xs:element name="Level" type="bi:TLevel" minOccurs="1" maxOccurs="unbounded" />
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name="TMember" abstract="true">
  <xs:attribute name="Name" type="xs:string" use="required" />
  <xs:attribute name="Caption" type="xs:string" use="optional"/>
  <xs:attribute name="ContextualNameRule" type="bi:TContextualNameRule" default="None" />
  <xs:attribute name="Hidden" type="xs:boolean" default="false" />
  <xs:attribute name="ReferenceName" type="xs:string" use="optional" />
</xs:complexType>

<xs:simpleType name="TContextualNameRule">

```

```

    <xs:restriction base="xs:string">
      <xs:enumeration value="None" />
      <xs:enumeration value="Context" />
      <xs:enumeration value="Merge" />
    </xs:restriction>
  </xs:simpleType>

  <xs:complexType name="TDocumentation">
    <xs:sequence>
      <xs:element name="Summary" type="xs:string" minOccurs="0" maxOccurs="1" />
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="TLevel">
    <xs:complexContent>
      <xs:extension base="bi:TMember">
        <xs:sequence>
          <xs:element name="Source" minOccurs="0" maxOccurs="1" >
            <xs:complexType >
              <xs:sequence>
                <xs:element name="PropertyRef" type="bi:TPropertyRef" minOccurs="1"
                  maxOccurs="1" />
              </xs:sequence>
            </xs:complexType>
          </xs:element>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>

  <xs:complexType name="TProperty">
    <xs:complexContent>
      <xs:extension base="bi:TBaseProperty">
        <xs:sequence >
          <xs:element name="OrderBy" type="bi:TPropertyRefs" minOccurs="0" maxOccurs="1"/>
        </xs:sequence>
        <xs:attribute name="Contents" type="bi:TContents" use="optional" default="Regular"/>
        <xs:attribute name="DefaultAggregateFunction" type="bi:TDefaultAggregateFunction"
          default="Default" />
        <xs:attribute name="GroupingBehavior" type="bi:TGroupingBehavior"
          default="GroupOnValue"/>
        <xs:attribute name="Stability" type="bi:TStability" default="Stable"/>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>

  <xs:simpleType name="TContents">
    <xs:restriction base="xs:string" />
  </xs:simpleType>

  <xs:simpleType name="TDefaultAggregateFunction" >
    <xs:restriction base="xs:string">
      <xs:enumeration value="Default" />
      <xs:enumeration value="None" />
      <xs:enumeration value="Sum" />
      <xs:enumeration value="Count" />
      <xs:enumeration value="Average" />
      <xs:enumeration value="Min" />
      <xs:enumeration value="Max" />
      <xs:enumeration value="DistinctCount" />
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="TGroupingBehavior" >
    <xs:restriction base="xs:string" >
      <xs:enumeration value="GroupOnValue" />
      <xs:enumeration value="GroupOnEntityKey" />
    </xs:restriction>
  </xs:simpleType>

```

```

<xs:simpleType name="TStability">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Stable" />
    <xs:enumeration value="RowNumber" />
    <xs:enumeration value="Volatile" />
  </xs:restriction>
</xs:simpleType>

<xs:complexType name="TBaseProperty" abstract="true">
  <xs:complexContent>
    <xs:extension base="bi:TMember">
      <xs:attribute name="Alignment" type="bi:TAlignment" use="optional"/>
      <xs:attribute name="FormatString" type="xs:string" use="optional"/>
      <xs:attribute name="Units" type="xs:string" use="optional" />
      <xs:attribute name="SortDirection" type="bi:TSortDirection" default="Default"/>
      <xs:attribute name="IsRightToLeft" type="xs:boolean" default="false"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:simpleType name="TAlignment">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Default" />
    <xs:enumeration value="Left" />
    <xs:enumeration value="Right" />
    <xs:enumeration value="Center" />
  </xs:restriction>
</xs:simpleType>

<xs:simpleType name="TSortDirection">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Default" />
    <xs:enumeration value="Ascending" />
    <xs:enumeration value="Descending" />
  </xs:restriction>
</xs:simpleType>

<xs:complexType name="TPropertyRefs" >
  <xs:sequence>
    <xs:element name="PropertyRef" type="bi:TPropertyRef" minOccurs="1"
maxOccurs="unbounded" />
  </xs:sequence>
</xs:complexType>

<xs:complexType name="TPropertyRef">
  <xs:attribute name="Name" type="xs:string" use="required" />
</xs:complexType>

<xs:complexType name="TMeasure">
  <xs:complexContent>
    <xs:extension base="bi:TProperty">
      <xs:sequence>
        <xs:element name="Kpi" type="bi:TKpi" minOccurs="0" maxOccurs="1" />
      </xs:sequence>
      <xs:attribute name="IsSimpleMeasure" type="xs:boolean" default="true"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name="TKpi">
  <xs:sequence >
    <xs:element name="Documentation" type="bi:TDocumentation" minOccurs="0" maxOccurs="1"
/>
    <xs:element name="KpiGoal" minOccurs="1" maxOccurs="1" >
      <xs:complexType >
        <xs:sequence>
          <xs:element name="PropertyRef" type="bi:TPropertyRef" minOccurs="1" maxOccurs="1"
/>
        </xs:sequence>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
</xs:complexType>

```

```

        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="KpiStatus" minOccurs="1" maxOccurs="1" >
      <xs:complexType >
        <xs:sequence>
          <xs:element name="PropertyRef" type="bi:TPropertyRef" minOccurs="1" maxOccurs="1"
        />
        </xs:sequence>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
</xs:complexType>
<xs:attribute name="StatusGraphic" type="xs:string" use="required"/>
</xs:complexType>

<xs:complexType name="TNavigationProperty">
  <xs:complexContent>
    <xs:extension base="bi:TMember">
      <xs:attribute name="CollectionCaption" type="xs:string" use="optional"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

</xs:schema>

```

### 5.3 CSDLBI Schema 2.0

```

<?xml version="1.0" encoding="utf-8"?>
<xs:schema id="bi"
  targetNamespace="http://schemas.microsoft.com/sqlbi/2010/10/edm/extensions"
  elementFormDefault="qualified"
  xmlns:bi="http://schemas.microsoft.com/sqlbi/2010/10/edm/extensions"
  xmlns:edm="http://schemas.microsoft.com/ado/2008/09/edm"
  xmlns:xs="http://www.w3.org/2001/XMLSchema">

  <xs:import namespace="http://schemas.microsoft.com/ado/2008/09/edm"
  schemaLocation="System.Data.Resources.CSDLSchema 2.xs"/>

  <xs:element name="EntityContainer" type="bi:TEntityContainer"/>
  <xs:element name="EntitySet" type="bi:TEntitySet"/>
  <xs:element name="AssociationSet" type="bi:TAssociationSet"/>
  <xs:element name="EntityType" type="bi:TEntityType"/>
  <xs:element name="Property" type="bi:TProperty"/>
  <xs:element name="NavigationProperty" type="bi:TNavigationProperty"/>
  <xs:element name="Measure" type="bi:TMeasure"/>
  <xs:element name="SourceDescription" type="xs:string" />

  <xs:complexType name="TEntityContainer">
    <xs:sequence>
      <xs:element name="CompareOptions" type="bi:TCompareOptions" />
      <xs:element name="ModelCapabilities" type="bi:TModelCapabilities" />
    </xs:sequence>
    <xs:attribute name="Caption" type="xs:string" use="optional"/>
    <xs:attribute name="Culture" type="xs:string" />
    <xs:attribute name="DirectQueryMode" type="bi:TDirectQueryMode" />
    <xs:attribute name="PreferOrdinalStringEquality" type="xs:boolean" default="false"/>
  </xs:complexType>

  <xs:simpleType name="TDirectQueryMode">
    <xs:restriction base="xs:string">
      <xs:enumeration value="InMemory" />
      <xs:enumeration value="InMemoryWithDirectQuery" />
      <xs:enumeration value="DirectQueryWithInMemory" />
      <xs:enumeration value="DirectQuery" />
    </xs:restriction>
  </xs:simpleType>

```

```

<xs:complexType name="TCompareOptions" >
  <xs:attribute name="IgnoreCase" type="xs:boolean" default="false" />
  <xs:attribute name="IgnoreNonSpace" type="xs:boolean" default="false" />
  <xs:attribute name="IgnoreKanaType" type="xs:boolean" default="false" />
  <xs:attribute name="IgnoreWidth" type="xs:boolean" default="false" />
</xs:complexType>

<xs:complexType name="TModelCapabilities" >
  <xs:sequence>
    <xs:element name="CrossFilteringWithinTable" type="bi:TCrossFilteringWithinTable" />
    <xs:element name="GroupByValidation" type="bi:TGroupByValidation" />
    <xs:element name="QueryAggregateUsage" type="bi:TQueryAggregateUsage" />
    <xs:element name="EncourageIsEmptyDAXFunctionUsage"
      type="bi:TEncourageIsEmptyDAXFunctionUsage" />
    <xs:element name="FiveStateKPIRange" type="bi:TFiveStateKPIRange" />
    <xs:element name="QueryBatching" type="bi:TQueryBatching" />
    <xs:element name="Variables" type="bi:TVariables" />
    <xs:element name="DAXFunctions" type="bi:TDAXFunctions" />
  </xs:sequence>
</xs:complexType>

<xs:simpleType name="TCrossFilteringWithinTable">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Always" />
    <xs:enumeration value="Never" />
  </xs:restriction>
</xs:simpleType>

<xs:simpleType name="TGroupByValidation">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Relaxed" />
    <xs:enumeration value="Enforced" />
  </xs:restriction>
</xs:simpleType>

<xs:simpleType name="TQueryAggregateUsage">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Encourage" />
    <xs:enumeration value="Discourage" />
  </xs:restriction>
</xs:simpleType>

<xs:simpleType name="TEncourageIsEmptyDAXFunctionUsage">
  <xs:restriction base="xs:boolean" />
</xs:simpleType>

<xs:simpleType name="TFiveStateKPIRange">
  <xs:restriction base="xs:short">
    <xs:enumeration value="0" />
    <xs:enumeration value="1" />
  </xs:restriction>
</xs:simpleType>

<xs:simpleType name="TQueryBatching">
  <xs:restriction base="xs:short">
    <xs:enumeration value="0" />
    <xs:enumeration value="1" />
  </xs:restriction>
</xs:simpleType>

<xs:simpleType name="TVariables">
  <xs:restriction base="xs:short">
    <xs:enumeration value="0" />
    <xs:enumeration value="1" />
    <xs:enumeration value="2" />
    <xs:enumeration value="3" />
  </xs:restriction>
</xs:simpleType>

```



```

<xs:complexType name="TDAXFunctions" >
  <xs:sequence>
    <xs:element name="SummarizeColumns" type="bi:TSummarizeColumns" />
    <xs:element name="SubstituteWithIndex" type="bi:TSubstituteWithIndex" />
    <xs:element name="LeftOuterJoin" type="bi:TLeftOuterJoin" />
    <xs:element name="BinaryMinMax" type="bi:TBinaryMinMax" />
  </xs:sequence>
</xs:complexType>

<xs:simpleType name="TSummarizeColumns">
  <xs:restriction base="xs:short">
    <xs:enumeration value="0" />
    <xs:enumeration value="1" />
  </xs:restriction>
</xs:simpleType>

<xs:simpleType name="TSubstituteWithIndex">
  <xs:restriction base="xs:short">
    <xs:enumeration value="0" />
    <xs:enumeration value="1" />
  </xs:restriction>
</xs:simpleType>

<xs:simpleType name="TLeftOuterJoin">
  <xs:restriction base="xs:short">
    <xs:enumeration value="0" />
    <xs:enumeration value="1" />
  </xs:restriction>
</xs:simpleType>

<xs:simpleType name="TBinaryMinMax">
  <xs:restriction base="xs:short">
    <xs:enumeration value="0" />
    <xs:enumeration value="1" />
  </xs:restriction>
</xs:simpleType>

<xs:complexType name="TEntitySet">
  <xs:attribute name="Caption" type="xs:string" use="optional"/>
  <xs:attribute name="CollectionCaption" type="xs:string" use="optional"/>
  <xs:attribute name="ReferenceName" type="xs:string" use="optional"/>
  <xs:attribute name="Hidden" type="xs:boolean" default="false" use="optional"/>
</xs:complexType>

<xs:complexType name="TAssociationSet">
  <xs:attribute name="State" type="bi:TState" default="Active"/>
  <xs:attribute name="Hidden" type="xs:boolean" default="false" />
  <xs:attribute name="TCrossFilterDirection" type="bi:TCrossFilterDirection"
    default="Single"/>
</xs:complexType>

<xs:simpleType name="TState">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Active" />
    <xs:enumeration value="Inactive" />
  </xs:restriction>
</xs:simpleType>

<xs:simpleType name="TCrossFilterDirection">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Single" />
    <xs:enumeration value="Both" />
  </xs:restriction>
</xs:simpleType>

<xs:complexType name="TEntityType">
  <xs:sequence >
    <xs:element name="DisplayKey" type="bi:TMemberRefs" minOccurs="0" maxOccurs="1" />
    <xs:element name="DefaultDetails" type="bi:TMemberRefs" minOccurs="0" maxOccurs="1"/>
  </xs:sequence >
</xs:complexType>

```

```

    <xs:element name="DefaultImage" minOccurs="0" maxOccurs="1" >
      <xs:complexType >
        <xs:sequence>
          <xs:element name="MemberRef" type="bi:TMemberRef" minOccurs="1" maxOccurs="1" />
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="DefaultMeasure" minOccurs="0" maxOccurs="1" >
      <xs:complexType >
        <xs:sequence>
          <xs:element name="MemberRef" type="bi:TMemberRef" minOccurs="1" maxOccurs="1" />
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="SortMembers" type="bi:TMemberRefs" minOccurs="0" maxOccurs="1" />
    <xs:element name="Hierarchy" type="bi:THierarchy" minOccurs="0" maxOccurs="unbounded"
  />
  <xs:element name="Statistics" type="bi:TEntityStatistics" minOccurs="0" maxOccurs="1"
  />
</xs:sequence>
<xs:attribute name="Contents" type="bi:TEntityContents" default="Regular"
use="optional"/>
<xs:attribute name="ReferenceName" type="xs:string" use="optional"/>
</xs:complexType>

<xs:simpleType name="TEntityContents">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Regular"/>
    <xs:enumeration value="Time"/>
    <xs:enumeration value="Geography"/>
    <xs:enumeration value="Organization"/>
    <xs:enumeration value="BillOfMaterials"/>
    <xs:enumeration value="Accounts"/>
    <xs:enumeration value="Customers"/>
    <xs:enumeration value="Products"/>
    <xs:enumeration value="Scenario"/>
    <xs:enumeration value="Quantitative"/>
    <xs:enumeration value="Utility"/>
    <xs:enumeration value="Currency"/>
    <xs:enumeration value="Rates"/>
    <xs:enumeration value="Channel"/>
    <xs:enumeration value="Promotion"/>
  </xs:restriction>
</xs:simpleType>

<xs:complexType name="TMemberRefs" >
  <xs:sequence>
    <xs:element name="MemberRef" type="bi:TMemberRef" minOccurs="1" maxOccurs="unbounded"
  />
  </xs:sequence>
</xs:complexType>

<xs:complexType name="TMemberRef">
  <xs:attribute name="Name" type="xs:string" use="required" />
</xs:complexType>

<xs:complexType name="THierarchy">
  <xs:complexContent>
    <xs:extension base="bi:TMember">
      <xs:sequence>
        <xs:element name="Documentation" type="bi:TDocumentation" minOccurs="0"
maxOccurs="1" />
        <xs:element name="Level" type="bi:TLevel" minOccurs="1" maxOccurs="unbounded" />
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name="TMember" abstract="true">

```

```

    <xs:attribute name="Name" type="xs:string" use="required" />
    <xs:attribute name="Caption" type="xs:string" use="optional"/>
    <xs:attribute name="ContextualNameRule" type="bi:TContextualNameRule" default="None" />
    <xs:attribute name="Hidden" type="xs:boolean" default="false" />
    <xs:attribute name="ReferenceName" type="xs:string" use="optional" />
  </xs:complexType>

  <xs:simpleType name="TContextualNameRule">
    <xs:restriction base="xs:string">
      <xs:enumeration value="None" />
      <xs:enumeration value="Context" />
      <xs:enumeration value="Merge" />
    </xs:restriction>
  </xs:simpleType>

  <xs:complexType name="TDocumentation">
    <xs:sequence>
      <xs:element name="Summary" type="xs:string" minOccurs="0" maxOccurs="1" />
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="TLevel">
    <xs:complexContent>
      <xs:extension base="bi:TMember">
        <xs:sequence>
          <xs:element name="Source" minOccurs="0" maxOccurs="1" >
            <xs:complexType >
              <xs:sequence>
                <xs:element name="PropertyRef" type="bi:TPropertyRef" minOccurs="1"
                  maxOccurs="1" />
              </xs:sequence>
            </xs:complexType>
          </xs:element>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>

  <xs:complexType name="TProperty">
    <xs:complexContent>
      <xs:extension base="bi:TBaseProperty">
        <xs:sequence >
          <xs:element name="OrderBy" type="bi:TPropertyRefs" minOccurs="0" maxOccurs="1"/>
          <xs:element name="GroupBy " type="bi:TPropertyRefs" minOccurs="0"
            maxOccurs="1"/>
          <xs:element name="RelatedTo" type="bi:TPropertyRefs" minOccurs="0"
            maxOccurs="1"/>
          <xs:element name="DefaultValue" type="xs:any" minOccurs="0"
            maxOccurs="1"/>
          <xs:element name="FilterNullsBy" type="bi:TPropertyRefs" minOccurs="0"
            maxOccurs="1"/>
          <xs:element name="Statistics" type="bi:TPropertyStatistics" minOccurs="0"
            maxOccurs="1"/>
        </xs:sequence>
        <xs:attribute name="Contents" type="bi:TContents" use="optional" default="Regular"/>
        <xs:attribute name="DefaultAggregateFunction" type="bi:TDefaultAggregateFunction"
          default="Default" />
        <xs:attribute name="GroupingBehavior" type="bi:TGroupingBehavior"
          default="GroupOnValue"/>
        <xs:attribute name="Stability" type="bi:TStability" default="Stable"/>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>

  <xs:simpleType name="TContents">
    <xs:restriction base="xs:string" />
  </xs:simpleType>

  <xs:simpleType name="TDefaultAggregateFunction" >

```

```

    <xs:restriction base="xs:string">
      <xs:enumeration value="Default" />
      <xs:enumeration value="None" />
      <xs:enumeration value="Sum" />
      <xs:enumeration value="Count" />
      <xs:enumeration value="Average" />
      <xs:enumeration value="Min" />
      <xs:enumeration value="Max" />
      <xs:enumeration value="DistinctCount" />
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="TGroupingBehavior" >
    <xs:restriction base="xs:string" >
      <xs:enumeration value="GroupOnValue" />
      <xs:enumeration value="GroupOnEntityKey" />
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="TStability">
    <xs:restriction base="xs:string">
      <xs:enumeration value="Stable" />
      <xs:enumeration value="RowNumber" />
      <xs:enumeration value="Volatile" />
    </xs:restriction>
  </xs:simpleType>

  <xs:complexType name="TPropertyStatistics">
    <xs:attribute name="DistinctCount" type="xs:long" minOccurs="0" maxOccurs="1" />
    <xs:attribute name="StringValueMaxLength" type="xs:long" minOccurs="0" maxOccurs="1" />
    <xs:element name="MinValue" type="xs:any" minOccurs="0" maxOccurs="1" />
    <xs:element name="MaxValue" type="xs:any" minOccurs="0" maxOccurs="1" />
  </xs:complexType>

  <xs:complexType name="TBaseProperty" abstract="true">
    <xs:complexContent>
      <xs:extension base="bi:TMember">
        <xs:attribute name="Alignment" type="bi:TAlignment" use="optional"/>
        <xs:attribute name="FormatString" type="xs:string" use="optional"/>
        <xs:attribute name="Units" type="xs:string" use="optional" />
        <xs:attribute name="SortDirection" type="bi:TSortDirection" default="Default"/>
        <xs:attribute name="IsRightToLeft" type="xs:boolean" default="false"/>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>

  <xs:simpleType name="TAlignment">
    <xs:restriction base="xs:string">
      <xs:enumeration value="Default" />
      <xs:enumeration value="Left" />
      <xs:enumeration value="Right" />
      <xs:enumeration value="Center" />
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="TSortDirection">
    <xs:restriction base="xs:string">
      <xs:enumeration value="Default" />
      <xs:enumeration value="Ascending" />
      <xs:enumeration value="Descending" />
    </xs:restriction>
  </xs:simpleType>

  <xs:complexType name="TPropertyRefs" >
    <xs:sequence>
      <xs:element name="PropertyRef" type="bi:TPropertyRef" minOccurs="1"
maxOccurs="unbounded" />
    </xs:sequence>
  </xs:complexType>

```

```

<xs:complexType name="TPropertyRef">
  <xs:attribute name="Name" type="xs:string" use="required" />
</xs:complexType>

<xs:complexType name="TMeasure">
  <xs:complexContent>
    <xs:extension base="bi:TProperty">
      <xs:sequence>
        <xs:element name="Kpi" type="bi:TKpi" minOccurs="0" maxOccurs="1" />
        <xs:element name="FormatBy" type="bi:TPropertyRefs" minOccurs="0"
maxOccurs="1"/>
        <xs:element name="ApplyCulture" type="bi:TPropertyRefs" minOccurs="0"
maxOccurs="1"/>
      </xs:sequence>
      <xs:attribute name="IsSimpleMeasure" type="xs:boolean" default="true"/>
      <xs:attribute name="ActualType" type="xs:string"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name="TKpi">
  <xs:sequence >
    <xs:element name="Documentation" type="bi:TDocumentation" minOccurs="0" maxOccurs="1"
/>
    <xs:element name="KpiGoal" minOccurs="1" maxOccurs="1" >
      <xs:complexType >
        <xs:sequence>
          <xs:element name="PropertyRef" type="bi:TPropertyRef" minOccurs="1" maxOccurs="1"
/>
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="KpiStatus" minOccurs="1" maxOccurs="1" >
      <xs:complexType >
        <xs:sequence>
          <xs:element name="PropertyRef" type="bi:TPropertyRef" minOccurs="1" maxOccurs="1"
/>
        </xs:sequence>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
  <xs:attribute name="StatusGraphic" type="xs:string" use="required"/>
</xs:complexType>

<xs:complexType name="TNavigationProperty">
  <xs:complexContent>
    <xs:extension base="bi:TMember">
      <xs:attribute name="CollectionCaption" type="xs:string" use="optional"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name="TEntityStatistics">
  <xs:element name="RowCount" type="xs:long" minOccurs="0" maxOccurs="1" />
</xs:complexType>
</xs:schema>

```

## 6 Appendix B: Product Behavior

The information in this specification is applicable to the following Microsoft products or supplemental software. References to product versions include released service packs.

- Microsoft Excel 2013
- Microsoft Excel 2016
- Microsoft SQL Server 2012
- Microsoft SQL Server 2014
- Microsoft SQL Server 2016

Exceptions, if any, are noted below. If a service pack or Quick Fix Engineering (QFE) number appears with the product version, behavior changed in that service pack or QFE. The new behavior also applies to subsequent service packs of the product unless otherwise specified. If a product edition appears with the product version, behavior is different in that product edition.

Unless otherwise specified, any statement of optional behavior in this specification that is prescribed using the terms SHOULD or SHOULD NOT implies product behavior in accordance with the SHOULD or SHOULD NOT prescription. Unless otherwise specified, the term MAY implies that the product does not follow the prescription.

[<1> Section 1.6](#): The following table describes versions of conceptual schema definition language with business intelligence annotations (CSDLBI) and when they were introduced. Newer releases of SQL Server and Excel support previous CSDLBI versions. For example, SQL Server 2016 supports all previous CSDLBI versions.

Schema version	Release introduced
CSDLBI 1.0	SQL Server 2012
CSDLBI 1.1	Microsoft SQL Server 2012 Service Pack 1 (SP1); Excel 2013
CSDLBI 2.0	SQL Server 2012 SP1 Cumulative Update 4 (CU4); Microsoft Excel 2013 Service Pack 1 (SP1)

[<2> Section 2.1.1](#): The **PreferOrdinalStringEquality** attribute is not supported by SQL Server 2012 or SQL Server 2014.

[<3> Section 2.1.5](#): The **CrossFilterDirection** attribute is not supported by SQL Server 2012 or SQL Server 2014.

[<4> Section 2.1.10](#): The **Caption** attribute is not supported by Microsoft SQL Server.

## 7 Change Tracking

This section identifies changes that were made to this document since the last release. Changes are classified as New, Major, Minor, Editorial, or No change.

The revision class **New** means that a new document is being released.

The revision class **Major** means that the technical content in the document was significantly revised. Major changes affect protocol interoperability or implementation. Examples of major changes are:

- A document revision that incorporates changes to interoperability requirements or functionality.
- The removal of a document from the documentation set.

The revision class **Minor** means that the meaning of the technical content was clarified. Minor changes do not affect protocol interoperability or implementation. Examples of minor changes are updates to clarify ambiguity at the sentence, paragraph, or table level.

The revision class **Editorial** means that the formatting in the technical content was changed. Editorial changes apply to grammatical, formatting, and style issues.

The revision class **No change** means that no new technical changes were introduced. Minor editorial and formatting changes may have been made, but the technical content of the document is identical to the last released version.

Major and minor changes can be described further using the following change types:

- New content added.
- Content updated.
- 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.
- Obsolete document removed.

Editorial changes are always classified with the change type **Editorially updated**.

Some important terms used in the change 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.

The changes made to this document are listed in the following table. For more information, please contact [dochelp@microsoft.com](mailto:dochelp@microsoft.com).

Section	Tracking number (if applicable) and description	Major change (Y or N)	Change type
<a href="#">2</a> Structures	Added TDAXFunctions, TPropertyStatistics, TEntityStatistics, TCrossFilterDirection, TQueryBatching, TVariables, TSummarizeColumns, TSubstituteWithIndex, TLeftOuterJoin, and TBinaryMinMax types.	Y	Content update.
<a href="#">2.1.1</a> TEntityContainer	Added PreferOrdinalStringEquality attribute.	Y	Content update.
<a href="#">2.1.3</a> TModelCapabilities	Added descriptions of QueryBatching, Variables, and DAXFunctions elements.	Y	Content update.
<a href="#">2.1.3.6</a> TQueryBatching	Added section.	Y	New content added.
<a href="#">2.1.3.7</a> TVariables	Added section.	Y	New content added.
<a href="#">2.1.3.8</a> TDAXFunctions	Added section.	Y	New content added.
<a href="#">2.1.3.8.1</a> TSummarizeColumns	Added section.	Y	New content added.
<a href="#">2.1.3.8.2</a> TSubstituteWithIndex	Added section.	Y	New content added.
<a href="#">2.1.3.8.3</a> TLeftOuterJoin	Added section.	Y	New content added.
<a href="#">2.1.3.8.4</a> TBinaryMinMax	Added section.	Y	New content added.
<a href="#">2.1.5</a> TAssociationSet	Added CrossFilterDirection attribute.	Y	Content update.
<a href="#">2.1.5.2</a> TCrossFilterDirection	Added section.	Y	New content added.
<a href="#">2.1.6</a> TEntityType	Added description of Statistics element.	Y	Content update.
<a href="#">2.1.13</a> TProperty	Added description of DefaultValue and Statistics elements.	Y	Content update.



Section	Tracking number (if applicable) and description	Major change (Y or N)	Change type
<a href="#">2.1.13.5</a> TPropertyStatistics	Added section.	Y	New content added.
<a href="#">2.1.20</a> TEntityStatistics	Added section.	Y	New content added.
<a href="#">3.3</a> CSDLBI 2.0 Example	Added a DefaultValue element to the example.	Y	Content update.
<a href="#">5.3</a> CSDLBI Schema 2.0	Updated schema for SQL Server 2016.	Y	Content update.
<a href="#">6</a> Appendix B: Product Behavior	Added Microsoft Excel 2016 and SQL Server 2016 to the list of applicable products.	Y	Content update.

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