[MS-DPBACPAC]:
Data-Tier Application Schema and Data Data Portability Overview

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Revision Summary

Date	Revision History	Revision Class	Comments
07/07/2011	0.1	New	Released new document.
11/03/2011	0.1	No change	No changes to the meaning, language, or formatting of the technical content.
01/19/2012	0.1	No change	No changes to the meaning, language, or formatting of the technical content.
02/23/2012	0.1	No change	No changes to the meaning, language, or formatting of the technical content.
03/27/2012	0.1	No change	No changes to the meaning, language, or formatting of the technical content.
05/24/2012	0.1	No change	No changes to the meaning, language, or formatting of the technical content.
06/29/2012	0.1	No change	No changes to the meaning, language, or formatting of the technical content.
07/16/2012	0.1	No change	No changes to the meaning, language, or formatting of the technical content.
10/08/2012	1.0	Major	Significantly changed the technical content.
10/23/2012	1.0	No change	No changes to the meaning, language, or formatting of the technical content.

Contents

1 Introduction

A data-tier application component (DAC) is a self-contained unit of database deployment and management that enables data-tier developers and database administrators (DBAs) to package Microsoft SQL Server objects, including **database** and instance objects, into a single entity called a DAC package (.dacpac or .bacpac file), as specified in [MSDN-DACOVERVIEW]. A .dacpac file is a package of XML parts that represent:

- Metadata of the data-tier application and SQL Server object the **schema** of the SQL Server database that the package represents; and
- Data from the source representation (project, database, scripts).

The BACPAC file format extends the DACPAC file format to include all table data, in addition to schema data.

Both .dacpac and .bacpac files are Open Packaging Conventions (OPC) packages that comply with the OPC specification [ECMA-376-2/2]. A .dacpac file can optionally also contain data from a set of user tables defined in the schema. Procedures similar to those defined in this document also apply to .dacpac packages that contain user table data. For more information, see [MSDN-DACDeploy].

This document provides an overview of the data portability scenario to retrieve data and schema from a .bacpac file. In this scenario, a vendor must use the Microsoft Data-Tier Application Framework (DACFx) API [MSDN-DACAPI-3] or SQLPackage.exe to consume the .bacpac file.

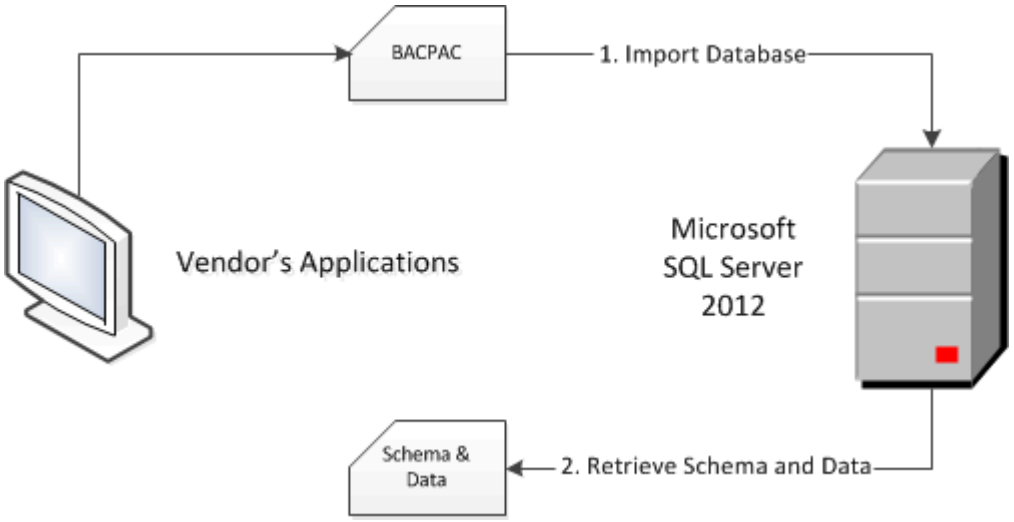

Figure 1: Conceptual overview of .bacpac data portability

A vendor can implement an application by using the DACFx API to create a .bacpac file and import that file into SQL Server or Microsoft Windows Azure SQL Database. Then, the vendor can retrieve the schema and data as described in section 2.1.

1.1 Glossary

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

database
schema

1.2 References

[ECMA-376-2/2] ECMA, "Office Open XML File Formats – Part 2: Open Packaging Conventions", 2nd edition, ECMA-376-2, December 2008, http://www.ecma-international.org/publications/files/ECMA-ST/ECMA-376,%20Second%20Edition,%20Part%202%20-%20Open%20Packaging%20Conventions.zip

[MS-GLOS] Microsoft Corporation, "Windows Protocols Master Glossary".

[MSDN-BCPU] Microsoft Corporation, "bcp Utility", http://msdn.microsoft.com/en-us/library/ms162802(SQL.105).aspx

[MSDN-CREATEFF] Microsoft Corporation, "Create a Format File (SQL Server)", http://msdn.microsoft.com/en-us/library/ms191516.aspx

[MSDN-DACAPI-3] Microsoft Corporation, "Microsoft.SqlServer.Dac Namespace", http://msdn.microsoft.com/en-us/library/hh753459.aspx

[MSDN-DACDeploy] Microsoft Corporation, "Deploy a Data-tier Application", http://msdn.microsoft.com/en-us/library/ee210569.aspx

[MSDN-DACOVERVIEW] Microsoft Corporation, "Data-tier Applications", http://msdn.microsoft.com/en-us/library/ee210546.aspx

[MSDN-DacSvcsExc] Microsoft Corporation, "DacServicesException Class", http://msdn.microsoft.com/en-us/library/microsoft.sqlserver.dac.dacservicesexception.aspx

[MSDN-DacSvcsImport] Microsoft Corporation, "DacServices.ImportBacpac Method", http://msdn.microsoft.com/en-us/library/microsoft.sqlserver.dac.dacservices.importbacpac.aspx

[MSDN-FFIED] Microsoft Corporation, "Format Files for Importing or Exporting Data (SQL Server)", http://msdn.microsoft.com/en-us/library/ms190393.aspx

[MSDN-SIOPN] Microsoft Corporation, "System.IO.Packaging Namespace", http://msdn.microsoft.com/en-us/library/system.io.packaging.aspx

2 Data Portability Scenarios

2.1 Retrieve Data and Schema from .bacpac File

The retrieve data and schema scenario describes importing a .bacpac file that contains database schema and table data to a Microsoft SQL Server database or Microsoft Windows Azure SQL Database, as shown in the following figure.

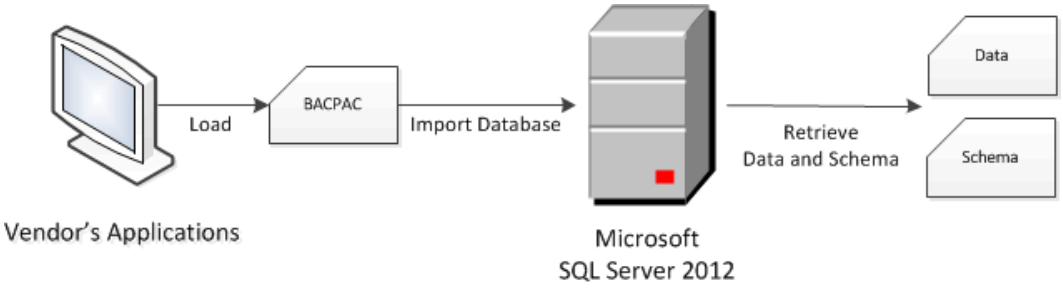

Figure 2: Retrieve data and schema from .bacpac file

2.1.1 Data Description

Customer data

Customer data is a schema representation of a Microsoft SQL Server database or Microsoft Windows Azure SQL Database and user data contained within the tables that are included in the package. Customer data is serialized into the .bacpac by using the Bulk Copy Program (BCP) file format [MSDN-FFIED].

Intended user

The intended user is a customer or vendor who can import SQL Server object schema and table data from a .bacpac file to a SQL Server or Windows Azure SQL Database and then retrieve the data and schema.

2.1.2 Format and Protocol Summary

The following table provides a comprehensive list of the formats and protocols used in a retrieve data and schema data portability scenario.

Format name	Description	Reference
Data-Tier Application File (BACPAC) Format	The BACPAC file format serves as the packaging format for an exported database that contains database schema and user data.	None.
Microsoft.SqlServer.Dac Namespace	The **Microsoft.SqlServer.Dac** namespace contains classes that represent DAC Framework objects.	[MSDN-DACAPI-3]
System.IO.Packaging Namespace	The **System.IO.Packaging** namespace of the .NET Framework provides classes that support storage of multiple data objects in a single container.	[MSDN-SIOPN]
Bulk Copy File Format	The Bulk Copy File Format is used for the data streams contained within the package.	[MSDN-FFIED]

2.1.3 Data Portability Methodology

The data portability methodology describes the packaging and deployment steps to take when using the DACFx API [MSDN-DACAPI-3].

Import a data-tier application

To import a data-tier application, load the .bacpac file, and then import it to a Microsoft SQL Server database or Microsoft Windows Azure SQL Database. For more information about the **DacServices.ImportBacpac** method, see [MSDN-DacSvcsImport].

Retrieve data and schema

The vendor can then use a variety of methods to retrieve the database schema and user data from the database into the file format desired. This document describes one possible method of doing so, which consists of using the Bulk Copy Program (BCP) Utility [MSDN-BCPU].

1. First, use bcp.exe to create a format file to record the data format as described in [MSDN-BCPU] and [MSDN-CREATEFF]. The bcp utility supports XML and other file formats.

2. Then, use bcp.exe to extract table data as per the format file.

The BCP file format is described in further detail in [MSDN-FFIED].

2.1.3.1 Preconditions

The Microsoft SQL Server user must be a member of the **dbcreator** fixed server role on the SQL Server instance to import the .bacpac file. The Microsoft Windows Azure SQL Database user must be a member of the **dbmanager** fixed logical server role.

2.1.3.2 Versioning

This version of the retrieve data and schema scenario is applicable to Microsoft SQL Server 2005 Service Pack 2 (SP2), Microsoft SQL Server 2008 Service Pack 1 (SP1), Microsoft SQL Server 2008 R2 Service Pack 1 (SP1), Microsoft SQL Server 2012, and Microsoft Windows Azure SQL Database.

2.1.3.3 Error Handling

The data-tier application error and exception class is described in [MSDN-DacSvcsExc].

2.1.3.4 Coherency Requirements

When importing a .bacpac file to a database, the database must either not exist or be a new, empty database. Otherwise, the import operation will fail.

2.1.3.5 Additional Considerations

There are no additional considerations.

3 Change Tracking

No table of changes is available. The document is either new or has had no changes since its last release.

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