

[MS-DPDACPAC]: Data-Tier Application Data Portability Overview

Intellectual Property Rights Notice for Open Specifications Documentation

- **Technical Documentation.** Microsoft publishes Open Specifications documentation for protocols, file formats, languages, standards as well as overviews of the interaction among each of these technologies.
- **Copyrights.** This documentation is covered by Microsoft copyrights. Regardless of any other terms that are contained in the terms of use for the Microsoft website that hosts this documentation, you may make copies of it in order to develop implementations of the technologies described in the Open Specifications and may distribute portions of it in your implementations using these technologies or your documentation as necessary to properly document the implementation. You may also distribute in your implementation, with or without modification, any schema, IDL's, or code samples that are included in the documentation. This permission also applies to any documents that are referenced in the Open Specifications.
- **No Trade Secrets.** Microsoft does not claim any trade secret rights in this documentation.
- **Patents.** Microsoft has patents that may cover your implementations of the technologies described in the Open Specifications. Neither this notice nor Microsoft's delivery of the documentation grants any licenses under those or any other Microsoft patents. However, a given Open Specification may be covered by Microsoft [Open Specification Promise](#) or the [Community Promise](#). If you would prefer a written license, or if the technologies described in the Open Specifications are not covered by the Open Specifications Promise or Community Promise, as applicable, patent licenses are available by contacting iplg@microsoft.com.
- **Trademarks.** The names of companies and products contained in this documentation may be covered by trademarks or similar intellectual property rights. This notice does not grant any licenses under those rights.
- **Fictitious Names.** The example companies, organizations, products, domain names, email addresses, logos, people, places, and events depicted in this documentation are fictitious. No association with any real company, organization, product, domain name, email address, logo, person, place, or event is intended or should be inferred.

Reservation of Rights. All other rights are reserved, and this notice does not grant any rights other than specifically described above, whether by implication, estoppel, or otherwise.

Tools. The Open Specifications do not require the use of Microsoft programming tools or programming environments in order for you to develop an implementation. If you have access to Microsoft programming tools and environments you are free to take advantage of them. Certain Open Specifications are intended for use in conjunction with publicly available standard specifications and network programming art, and assumes that the reader either is familiar with the aforementioned material or has immediate access to it.

Revision Summary

Date	Revision History	Revision Class	Comments
06/04/2010	0.1	Major	First release.
09/03/2010	0.1.1	Editorial	Changed language and formatting in the technical content.
02/09/2011	0.1.1	No change	No changes to the meaning, language, or formatting of the technical content.
07/07/2011	0.1.1	No change	No changes to the meaning, language, or formatting of the technical content.
11/03/2011	0.1.1	No change	No changes to the meaning, language, or formatting of the technical content.
01/19/2012	0.1.1	No change	No changes to the meaning, language, or formatting of the technical content.
02/23/2012	0.1.1	No change	No changes to the meaning, language, or formatting of the technical content.
03/27/2012	0.1.1	No change	No changes to the meaning, language, or formatting of the technical content.
05/24/2012	0.1.1	No change	No changes to the meaning, language, or formatting of the technical content.
06/29/2012	0.1.1	No change	No changes to the meaning, language, or formatting of the technical content.
07/16/2012	0.1.1	No change	No changes to the meaning, language, or formatting of the technical content.

Contents

- 1 Introduction 4**
 - 1.1 Glossary 4
 - 1.2 References 5

- 2 Data Portability Scenarios 6**
 - 2.1 Export Data 6
 - 2.1.1 Data Description 6
 - 2.1.2 Format and Protocol Summary 6
 - 2.1.3 Data Portability Methodology 7
 - 2.1.3.1 Preconditions 7
 - 2.1.3.2 Versioning 8
 - 2.1.3.3 Error Handling 8
 - 2.1.3.4 Coherency Requirements 8
 - 2.1.3.5 Additional Considerations 8
 - 2.2 Import Data 8
 - 2.2.1 Data Description 8
 - 2.2.2 Format and Protocol Summary 9
 - 2.2.3 Data Portability Methodology 9
 - 2.2.3.1 Preconditions 9
 - 2.2.3.2 Versioning 10
 - 2.2.3.3 Error Handling 10
 - 2.2.3.4 Coherency Requirements 10
 - 2.2.3.5 Additional Considerations 10

- 3 Appendix B: Product Behavior 11**

- 4 Change Tracking 12**

- 5 Index 13**

1 Introduction

A data-tier application (DAC) is a self-contained unit of deployment 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 (a .dacpac file), as specified in [\[MSDN-UNDERDAC\]](#). A .dacpac file consists of a package of XML parts that represents metadata of the data-tier application and SQL Server object **schema** [\[MS-DACPAC\]](#).

This document provides an overview of data portability scenarios, data export and import, between SQL Server and a vendor's application using a .dacpac file as a portable artifact. In these scenarios, a vendor must provide API or XML transformation methodology to produce or consume the .dacpac file within the vendor's application, unless it is implemented using the Microsoft DAC API [\[MSDN-DACAPI\]](#).

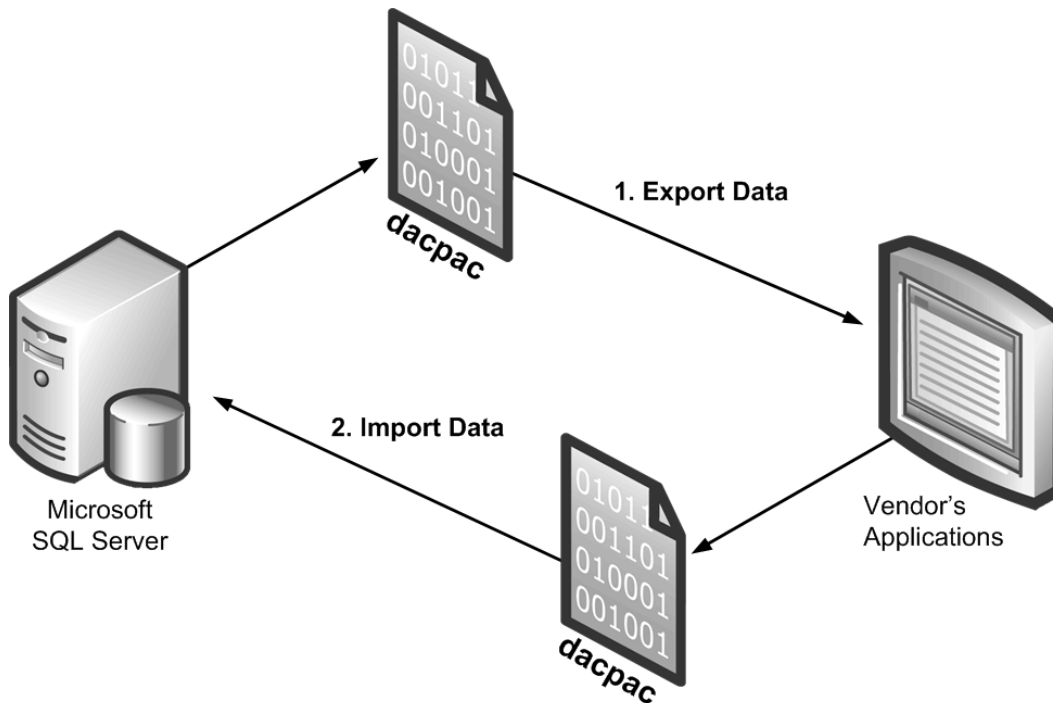


Figure 1: Conceptual overview of export and import data portability

In the (1) export data scenario in the preceding figure, a vendor can implement an application using the DAC API as specified in [\[MSDN-DACAPI\]](#) to export SQL Server objects to a .dacpac file. The methodology for exporting SQL Server objects to a .dacpac file is described in section [2.1](#).

In the (2) import data scenario in the preceding figure, a vendor can implement an application using the DAC API as specified in [\[MSDN-DACAPI\]](#) to import the vendor-produced .dacpac file into SQL Server. This methodology is described in section [2.2](#).

1.1 Glossary

The following terms are defined in [\[MS-GLOS\]](#):

**database
schema**

1.2 References

- [MS-DACPAC] Microsoft Corporation, "[Data-Tier Application Schema File Format Structure Specification](#)".
- [MSDN-DACAPI] Microsoft Corporation, "Microsoft.SqlServer.Management.DAC Namespace", [http://msdn.microsoft.com/en-us/library/microsoft.sqlserver.management.dac\(SQL.105\).aspx](http://msdn.microsoft.com/en-us/library/microsoft.sqlserver.management.dac(SQL.105).aspx)
- [MSDN-DACERROR] Microsoft Corporation, "Troubleshooting Data-tier Applications", [http://msdn.microsoft.com/en-us/library/ee240741\(SQL.105\).aspx](http://msdn.microsoft.com/en-us/library/ee240741(SQL.105).aspx)
- [MSDN-DACEXCON] Microsoft Corporation, "DacExtractionUnit Constructor", [http://msdn.microsoft.com/en-us/library/ee211479\(SQL.105\).aspx](http://msdn.microsoft.com/en-us/library/ee211479(SQL.105).aspx)
- [MSDN-DACEXT] Microsoft Corporation, "DacExtractionUnit Class", [http://msdn.microsoft.com/en-us/library/microsoft.sqlserver.management.dac.dacextractionunit\(SQL.105\).aspx](http://msdn.microsoft.com/en-us/library/microsoft.sqlserver.management.dac.dacextractionunit(SQL.105).aspx)
- [MSDN-DACEXUEX] Microsoft Corporation, "DacExtractionUnit.Extract Method", [http://msdn.microsoft.com/en-us/library/ee211479\(SQL.105\).aspx](http://msdn.microsoft.com/en-us/library/ee211479(SQL.105).aspx)
- [MSDN-DACSTIN] Microsoft Corporation, "DacStore.Install Method", [http://msdn.microsoft.com/en-us/library/microsoft.sqlserver.management.dac.dacstore.install\(SQL.105\).aspx](http://msdn.microsoft.com/en-us/library/microsoft.sqlserver.management.dac.dacstore.install(SQL.105).aspx)
- [MSDN-DACSUPOB] Microsoft Corporation, "SQL Server Objects Supported in Data-tier Applications", [http://msdn.microsoft.com/en-us/library/ee210549\(SQL.105\).aspx](http://msdn.microsoft.com/en-us/library/ee210549(SQL.105).aspx)
- [MSDN-DACTYCON] Microsoft Corporation, "DacType Constructor", [http://msdn.microsoft.com/en-us/library/microsoft.sqlserver.management.dac.dactype.dactype\(SQL.105\).aspx](http://msdn.microsoft.com/en-us/library/microsoft.sqlserver.management.dac.dactype.dactype(SQL.105).aspx)
- [MSDN-DACTYPE] Microsoft Corporation, "DacType Class", [http://msdn.microsoft.com/en-us/library/microsoft.sqlserver.management.dac.dactype\(SQL.105\).aspx](http://msdn.microsoft.com/en-us/library/microsoft.sqlserver.management.dac.dactype(SQL.105).aspx)
- [MSDN-DBSTATE] Microsoft Corporation, "Database States", <http://msdn.microsoft.com/en-us/library/ms190442.aspx>
- [MSDN-PACKGET] Microsoft Corporation "Package.GetPart Method", <http://msdn.microsoft.com/en-us/library/system.io.packaging.package.getpart.aspx>
- [MSDN-PACKNAME] Microsoft Corporation, "System.IO.Packaging Namespace", <http://msdn.microsoft.com/en-us/library/system.io.packaging.aspx>
- [MSDN-PACKOP] Microsoft Corporation "Package.Open Method", <http://msdn.microsoft.com/en-us/library/system.io.packaging.package.open.aspx>
- [MSDN-PACKPARTCON] Microsoft Corporation, "PackagePart Constructor", <http://msdn.microsoft.com/en-us/library/system.io.packaging.packagepart.packagepart.aspx>
- [MSDN-UNDERDAC] Microsoft Corporation, "Understanding Data-tier Applications", [http://msdn.microsoft.com/en-us/library/ee240739\(SQL.105\).aspx](http://msdn.microsoft.com/en-us/library/ee240739(SQL.105).aspx)

2 Data Portability Scenarios

2.1 Export Data

The data export scenario describes export customer data from Microsoft® SQL Server® to a .dacpac file so that a vendor can consume it within the vendor's application. As shown in the following figure, a .dacpac file can be created by extracting SQL Server objects and then unzipped to XML parts. A vendor can consume the XML parts of a .dacpac file as a native XML format. In this case, the vendor must implement the methodology to consume the .dacpac file within the vendor's application.

As shown in the following figure, a .dacpac file consists of dacmetadata.xml, logicalobjectstream.xml, physicalobjectstream.xml. It may contain targetselection.xml and miscellaneous files, such as Transact-SQL scripts. Refer to [\[MS-DACPAC\]](#) for more detail of the file format structure.

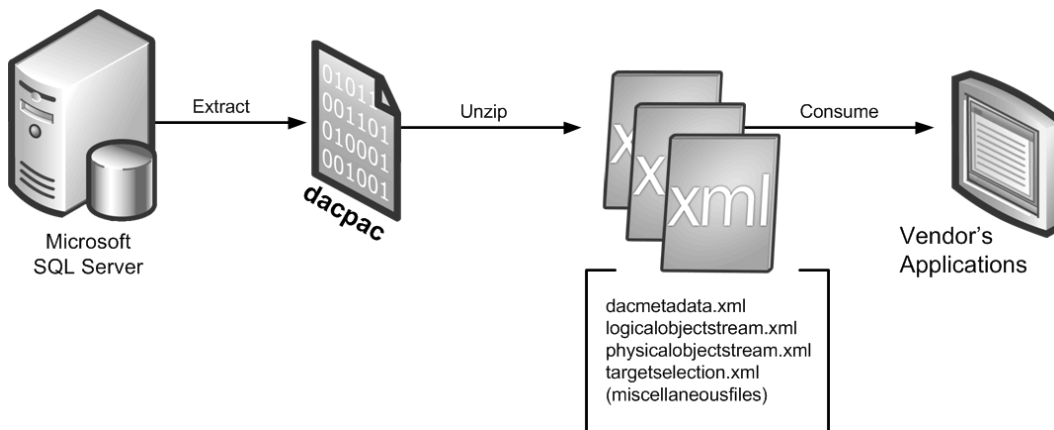


Figure 2: Export data

This section provides a step-by-step description and references for exporting data to a .dacpac file and obtaining XML parts using APIs.

2.1.1 Data Description

Customer data

The customer data is a schema representation of a Microsoft® SQL Server® database and instances in SQL Server. In this version, a .dacpac file supports a subset of SQL Server objects, as specified in [\[MSDN-DACSUPOB\]](#).

Intended user

The intended user is a vendor who can export SQL Server object schema from SQL Server to a .dacpac file format to consume it within the vendor's application.

2.1.2 Format and Protocol Summary

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

Protocol or format name	Description	Reference
Data-Tier Application File (.dacpac file) Format	The data-tier application file format is a package of XML files that serves as the packaging format for the data-tier application.	[MS-DACPAC]
Microsoft.SqlServer.Management.DAC Namespace	The Microsoft.SqlServer.Management.Dac namespace contains classes that represent the DAC objects.	[MSDN-DACAPI]
System.IO.Packaging Namespace	The System.IO.Packaging namespace provides classes that support storage of multiple data objects in a single container.	[MSDN-PACKNAME]

2.1.3 Data Portability Methodology

The data portability methodology describes the steps to extract and unzip a data-tier application using the DAC API and **System.IO.Packaging**. The vendor's proprietary implementation for consuming the .dacpac file is outside the scope of this section.

Extract a data-tier application

To extract a data-tier application, follow these steps:

1. Initialize a new instance of the **DacType** [\[MSDN-DATYPE\]](#). For more information, refer to the **DacType** constructor [\[MSDN-DACTYCON\]](#).
2. Initialize a new instance of the **DacExtractionUnit** class and connect to the Microsoft® SQL Server® database [\[MSDN-DACEXT\]](#). For more information, refer to the **DacExtractionUnit** constructor [\[MSDN-DACEXCON\]](#).
3. Extract the database to the **DacType** [\[MSDN-DACEXT\]](#). For more information, refer to the **DacExtractionUnit.Extract** method [\[MSDN-DACEXUJEX\]](#).
4. Save the **DacType** as a .dacpac file. For more information, refer to the **DacType.Save** method [\[MSDN-DATYPE\]](#).

Unzip a data-tier application

To unzip a data-tier application by using **System.IO.Packaging**, follow these steps:

1. Initialize a new instance of **Package** class and open the .dacpac file [\[MSDN-PACKNAME\]](#). For more information, refer to the **Package.Open** method [\[MSDN-PACKOP\]](#).
2. Save package parts by using a specific folder [\[MSDN-PACKNAME\]](#). For more information, refer to the **Package.GetPart** method [\[MSDN-PACKGET\]](#).

After XML parts are created in the specified folder, a vendor's application can load it as a standard XML file for further proprietary processing.

2.1.3.1 Preconditions

The SQL Server database must be ONLINE as specified in [\[MSDN-DBSTATE\]](#).

2.1.3.2 Versioning

This version of the export data scenario is applicable to Microsoft® SQL Server® 2008 R2 and Microsoft® SQL Server® 2012.

2.1.3.3 Error Handling

Data-tier application error handling and troubleshooting are described in [\[MSDN-DACERROR\]](#).

2.1.3.4 Coherency Requirements

The Microsoft SQL Server object must be listed as a supported object in [\[MSDN-DACSUPOB\]](#).

2.1.3.5 Additional Considerations

There are no additional considerations.

2.2 Import Data

The data import scenario describes importing vendor's data to a .dacpac file so that the data can be deployed to Microsoft® SQL Server® as a data-tier application. As shown in the following figure, a vendor can produce XML parts that conform to [\[MS-DACPAC\]](#) structure format and package it to a .dacpac file. Note that the vendor must implement the methodology producing the XML parts within the vendor's application.

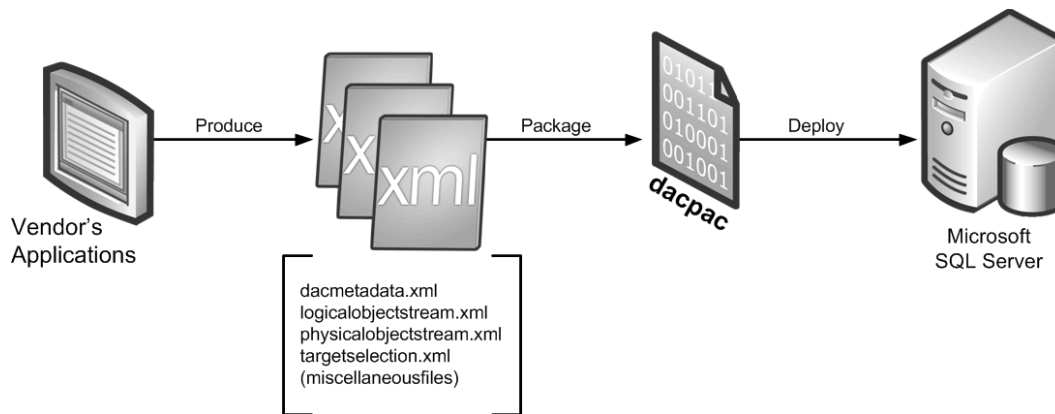


Figure 3: Import data

A vendor can package the XML parts to a .dacpac file by using the API that is specified in System.IO.Packaging [\[MSDN-PACKNAME\]](#) and can deploy the .dacpac file to SQL Server by using the DAC API. To create a .dacpac file that can be deployed to SQL Server, a vendor's .dacpac file must contain dacmetadata.xml, logicalobjectstream.xml, physicalobjectstream.xml, and, optionally, targetselection.xml.

2.2.1 Data Description

Customer data

The customer data is a schema of a vendor's proprietary data to be imported into a Microsoft® SQL Server® database. In this version, supported objects must be specified in [\[MSDN-DACSUPOB\]](#).

Intended user

The intended user is a vendor who can import a vendor's proprietary data to a SQL Server database by using the .dacpac file format.

2.2.2 Format and Protocol Summary

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

Protocol or format name	Description	Reference
Data-Tier Application File (.dacpac) Format	The data-tier application file format is a package of XML files that serves as the packaging format for the data-tier application.	[MS-DACPAC]
Microsoft.SqlServer.Management.DAC Namespace	The Microsoft.SqlServer.Management.Dac namespace contains classes that represent the DAC objects.	[MSDN-DACAPI]
System.IO.Packaging Namespace	The System.IO.Packaging namespace provides classes that support storage of multiple data objects in a single container.	[MSDN-PACKNAME]

2.2.3 Data Portability Methodology

The data portability methodology describes the packaging and deployment steps to take when using DAC API. A vendor must provide its proprietary methodology to produce XML parts to be packaged in a .dacpac file. The XML parts and .dacpac files that are produced by the vendor's proprietary methodology must be compatible with [\[MS-DACPAC\]](#).

Package a data-tier application

To package a data-tier application, follow these steps:

1. Initialize a new instance of the **System.IO.Packaging.Package** class [\[MSDN-PACKNAME\]](#).
2. Create a **PackagePart** class for the XML part file stream in the package [\[MSDN-PACKPARTCON\]](#). **PackageParts** must include logicalobjectstream.xml, physicalobjectstream.xml, dacmetadata.xml, and, optionally, targetselection.xml, as specified in [\[MS-DACPAC\]](#).
3. Close the package. The package must be saved with the *.dacpac file name extension [\[MSDN-PACKNAME\]](#).

Deploy a data-tier application

To deploy a data-tier application, load the .dacpac file, and then install it to a Microsoft® SQL Server® database [\[MSDN-DATYPE\]](#). For more information, refer to the **DacStore.Install** method [\[MSDN-DACSTIN\]](#).

2.2.3.1 Preconditions

A SQL Server user must be a member of the **dbcreator** fixed server role and have ALTER ANY LOGIN server permission on the Microsoft® SQL Server® instance to deploy the .dacpac file.

A vendor must create .dacpac file XML parts that are compatible with the format that is specified in [\[MS-DACPAC\]](#).

A .dacpac file created by a vendor must be compatible with the package format that is specified in [\[MSDN-PACKNAME\]](#).

2.2.3.2 Versioning

This version of import data scenario is applicable to Microsoft® SQL Server® 2008 R2 and Microsoft® SQL Server® 2012.

2.2.3.3 Error Handling

Data-tier application error handling and troubleshooting are described in [\[MSDN-DACERROR\]](#).

2.2.3.4 Coherency Requirements

Imported data must be specified in SQL Server object list [\[MSDN-DACSUPOB\]](#).

2.2.3.5 Additional Considerations

There are no additional considerations.

3 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® SQL Server® 2005
- Microsoft® SQL Server® 2008
- Microsoft® SQL Server® 2008 R2
- Microsoft® SQL Server® 2012

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.

4 Change Tracking

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

5 Index

C

[Change tracking](#) 12

G

[Glossary](#) 4

P

[Product behavior](#) 11

R

[References](#) 5

T

[Tracking changes](#) 12