7 DEPLOYING

MODULE OBJECTIVE

Deploying an Analysis Services project creates the defined objects in an instance of Analysis Services. In this module we will explore deployment options, processing strategies and security.

MODULE TOPICS

EXAMINING DEPLOYMENT OPTIONS

In SQL Server Data Tools (SSDT), you build an Analysis Services project much like you build any programming project in Visual Studio. When you build the project, a set of XML files are created in the output directory. These XML files use Analysis Services Scripting Language (ASSL), which is the XML dialect the client applications including SQL Server Management Studio and SQL Server Data Tools (SSDT) use to communicate with an Analysis Services instance to create or modify Analysis

Services objects. These XML files are used to deploy Analysis Services object definitions in an Analysis Services project to a specified Analysis Services instance.

BUILD

The first step of deployment is to use Build from the menu bar to check for errors. When you build an Analysis Services project, SQL Server Data Tools (SSDT) will build a complete set of XML files in the output folder containing all of the necessary ASSL commands needed to build all of the Analysis Services database objects in the project. If the project was previously built and incremental deployment specified for the active configuration, SQL Server Data Tools (SSDT) will also build an XML file containing the ASSL commands to perform an incremental update to the deployed objects.

DEPLOY

The act of deployment moves the objects from the development environment to Analysis Services. After you have completed the development of an Analysis Services project, you can deploy the database to an Analysis Services server. During development of an Analysis Services project in SQL Server Data Tools (SSDT), you frequently deploy the project to a development server in order to create the Analysis Services database defined by the project. You can deploy a project independently, or you can deploy all of the projects within the solution. When you deploy a project, several things happen in sequence. First, the project is built. This step creates the output files that define the Analysis Services database and its constituent objects. Next, the destination server is validated. Finally, the destination database and its objects are created on the destination server. During deployment, the deployment engine totally replaces any pre-existing database with the contents of the project unless those objects were created by the project during a previous deployment. Analysis Services provides six possible deployment methods that can be used to move the database to a test or production server.

- **Analysis Management Objects (AMO) Automation** AMO provides a programmatic interface to the complete command set for Analysis Services, including commands that can be used for solution deployment. As an approach for solution deployment, AMO automation is the most flexible, but it also requires a programming effort. A key advantage to using AMO is that you can

use SQL Server Agent with your AMO application to run deployment on a preset schedule.

- **XMLA** Use SQL Server Management Studio to generate an XMLA script of the metadata of an existing Analysis Services database, and then run that script on another server to recreate the initial database. XMLA scripts are easily formed in SQL Server Management Studio by defining the deployment process, then codifying it and saving it in an XMLA script. Once you have the XMLA script in a saved file, you can easily run the script according to a schedule, or embed the script in an application that connects directly to an instance of Analysis Services.

  You can also run XMLA Scripts on a preset basis using SQL Server Agent, but you do not have the same flexibility with XMLA Scripts as with AMO. AMO provides a larger breadth of functionality by hosting the complete spectrum of administrative commands.

- **Deployment Wizard** Use the Deployment Wizard to use the XMLA output files generated by an Analysis Services project to deploy the project's metadata to a destination server. With the Deployment Wizard, you can deploy directly from the Analysis Services file, as created by the output directory by project build.

  The primary advantage of using the Analysis Services Deployment Wizard is convenience. Just as you can save an XMLA script for use later in SQL Server Management Studio, you can save Deployment Wizard scripts. The Deployment Wizard can be run both interactively and at the command prompt via the Deployment Utility.

- **Deployment Utility** The Deployment utility lets you start the Analysis Services deployment engine from a command prompt.

- **Synchronize Database Wizard** Use the Synchronize Database Wizard to synchronize the metadata and data between any two Analysis Services databases.

  The Synchronize Wizard can be used to copy both data and metadata from a source server to a destination server. If the destination server does not have a copy of the database that you want to deploy, a new database is copied to the destination server. If the destination server already has a copy of the same

database, the database on the destination server is updated to use the metadata and data of the source database.

- **Backup and Restore** Backup offers the simplest approach to transferring Analysis Services databases. From the Backup dialog box, you can set the options configuration, and then you can run the backup from the dialog box itself. Or, you can create a script that can be saved and run as frequently as required.

  Backup and restore is not used as frequently as the other deployment methods, but is a way to quickly complete a deployment with minimal infrastructure requirements.

PROCESS

Processing is the step, or series of steps, in which Analysis Services loads data from a relational data source into a multidimensional model. For objects that use MOLAP storage, data is saved on disk in the database file folder. For ROLAP storage, processing occurs on demand, in response to an MDX query on an object. For objects that use ROLAP storage, processing refers to updating the cache before returning query results.

By default, processing occurs when you deploy a solution to the server. You can also process all or part of a solution, either ad hoc using tools such as Management Studio or SQL Server Data Tools, or on a schedule using Integration Services and SQL Server Agent. When making a structural change to the model, such as removing a dimension or changing its compatibility level, you will need to process again to synchronize the physical and logical aspects of the model.

PROCESSING STRATEGIES

Processing affects the following: Analysis Services databases, cubes, dimensions, measure groups, partitions, and data mining structures and models. For each object, you can specify the level of processing for the object, or you can specify the Process Default option to enable Analysis Services to automatically select the optimal level of processing.

- **ProcessFull** deletes existing partition data, indexes, and aggregations and fully reprocesses a partition.
- **ProcessData** deletes existing partition data, indexes, and aggregations, and loads only data in a partition.
- **ProcessIndex** builds indexes and aggregations for a partition.
- **ProcessAdd** incrementally updates a partition by adding new data to it.
- **ProcessClear** deletes partition data, indexes, and aggregations.

EXPLORING SECURITY

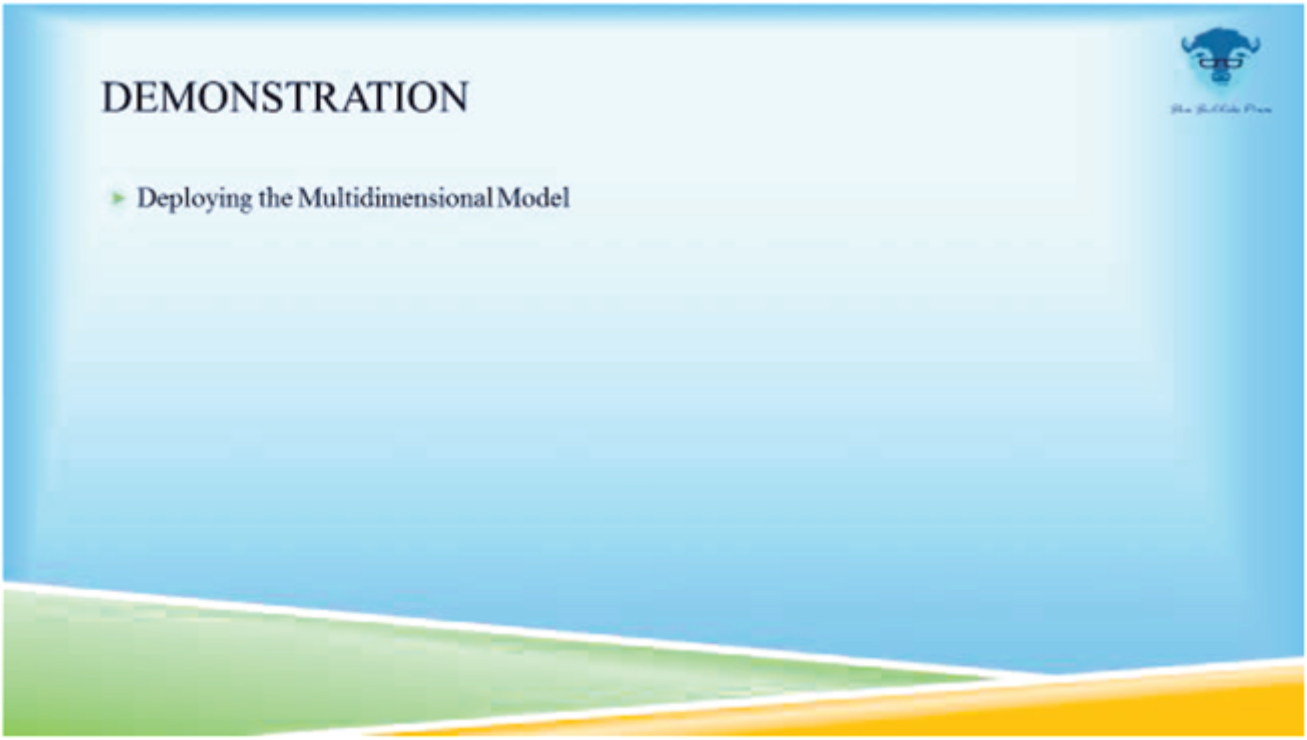
As you build and deploy the database throughout the development process, its contents are secure by default. No one besides the database developer is able to query the cube. To make the database accessible to user queries, there are a few extra steps to perform. Additionally, you might need to configure administrative security for users who need to perform processing tasks. Finally, the Analysis Services service account requires specific permissions to support processing and, when applicable, query logging and writeback.

SECURING USER ACCESS

Users are granted access to Analysis Services at the cube level in each database. Initially, each user must have a Windows login and can optionally be assigned to a Windows group in your network's Active Directory. SSAS uses role-based security, which is dependent on Windows authentication. At minimum, you create a role to which you assign Windows logins, or better yet, Windows groups, and grant the role permission to access a cube. For more detailed security, you'll have to take additional steps. As an example, you can configure security at the dimension level, choosing the members you want users to see and excluding all others. Additionally you can get more granular with security by controlling which cells a user can or cannot see.

DEMONSTRATION

VIDEO: DEPLOYING THE MULTIDIMENSIONAL MODEL



EXERCISE A.1: DEPLOYING THE MULTIDIMENSIONAL MODEL

Objective: in this exercise we will create a new project and then build, deploy, and process it.

A.1.1 Navigate down to the taskbar, right-click **SQL Server Data Tools** icon, right-click the new **SQL Server Data Tools** icon showing, and then click **Run as administrator**.

A.1.2 In the **User Account Control** dialog box, click **Yes**.

A.1.3 When **Microsoft Visual Studio** opens, click **New Project…**.

A.1.4 When the **New Project** dialog box opens, navigate to the left side of the dialog box, in the **Installed Templates** section, verify **Business Intelligence** is selected, then move to the middle of the dialog box, and click to select **Analysis Services Multidimensional and Data Mining Project**.

A.1.5 Click **Browse…**.

A.1.6 In the **Project Location** dialog box, navigate to **C:** | **Lab Files** | **Student**.

A.1.7 Inside the **Student** folder, create a new folder, and name it 07 Deployment.

A.1.8 Open the **07 Deployment** folder.

A.1.9 Click **Select Folder**.

A.1.10 Back in the **New Project** dialog box, navigate to the **Name** text box and change the name to Deployment.

A.1.11 Click **OK**.

A.1.12 Navigate to **Solution Explorer** pane on the right, right-click **Data Sources** folder and click **New Data Source…**.

A.1.13 In the **Welcome to the Data Source Wizard** dialog box, review the welcome message, then click **Next**.

A.1.14 When the **Select how to define the connection** dialog box opens, review the options and settings available.

A.1.15 Notice the current connection into **AdventureWorksDW2012** is selected, and then click **Next**.

A.1.16 In the **Impersonation Information** dialog box, review the settings and options available.

A.1.17 Navigate to the **User name** text box and enter Student.

A.1.18 Move to the **Password** text box and enter Passw0rd. *(The 0 is numeric.)*

A.1.19 Click **Next**.

A.1.20 In the **Completing the Wizard** dialog box, review the settings.

A.1.21 Click **Finish**.

A.1.22 Navigate back to **Solution Explorer** pane on the right and review the results in the **Data Sources** folder.

A.1.23 Right-click **Data Source Views** folder, and click **New Data Source View…**.

A.1.24 In the **Welcome to the Data Source View Wizard** dialog box, review the welcome message, then click **Next**.

A.1.25 In the **Select a Data Source** dialog box, review the settings.

A.1.26 Click **Next**.

A.1.27 When the **Select Tables and Views** dialog box opens, review the settings and options available.

A.1.28  Maximize the window.

A.1.29 Navigate to the **Available objects** section and click to select **FactInternetSales (dbo)**.

A.1.30 Click > and notice **FactInternetSales (dbo)** is now listed in the **Included objects** section.

A.1.31 Click **Add Related Tables**.

A.1.32 Review the results noticing **DimSalesTerritory (dbo)**, **DimCurrency (dbo)**, **DimProduct (dbo)**, **FactInternetSalesReason (dbo)**, **DimDate (dbo)**, **DimCustomer (dbo)**, and **DimPromotion (dbo)** were added.

A.1.33 Move to the **Included objects** section, click to select **FactInternetSalesReason (dbo)**, and then

click < .

A.1.34 Notice FactInternetSalesReason (dbo) is no longer listed in the **Included objects** section.

A.1.35

Click to select **DimPromotion (dbo)**, and then click < .

A.1.36 Notice DimPromotion (dbo) is no longer listed in the **Included objects** section.

A.1.37 Click to select **DimCurrency (dbo)**, and then click < .

A.1.38 Notice DimCurrency (dbo) is no longer listed in the **Included objects** section.

A.1.39 Click to select **DimProduct (dbo)**, and then click **Add Related Tables**.

A.1.40 Review the results noticing **FactResellerSales (dbo)**, **FactProductInventory (dbo)**, and **DimProductSubcategory (dbo)** were added.

A.1.41 Click to select **FactProductInventory (dbo)**, and then click < .

A.1.42 Notice FactProductInventory (dbo) is no longer listed in the **Included objects** section.

A.1.43 Click to select **FactResellerSales (dbo)**, and then click < .

A.1.44 Notice FactResellerSales (dbo) is no longer listed in the **Included objects** section.

A.1.45 Click to select **DimProductSubcategory (dbo)**, and then click **Add Related Tables**.

A.1.46 Review the results noticing **DimProductCategory (dbo)** was added.

A.1.47 Click **Next**.

A.1.48 In the **Completing the Wizard** dialog box, review the settings.

A.1.49 Click **Finish**.

A.1.50 Review the results noticing the tables and their existing connections.

A.1.51 Navigate to **Solution Explorer** pane on the right, right-click **Dimensions** folder, and click **New Dimension…**.

A.1.52 In the **Welcome to the Dimension Wizard** dialog box, review the welcome

message, and then click **Next**.

A.1.53 When the **Select Creation Method** dialog box opens, review the options and settings available.

A.1.54 Leave **Use an existing table** selected, and click **Next**.

A.1.55 In the **Specify Source Information** dialog box, review the settings.

A.1.56 Navigate to the **Main table** setting, use the corresponding drop-down arrow, and click to select **DimProduct**.

A.1.57 Move down to the **Name column** setting, use the corresponding drop-down arrow, and click to select **EnglishProductName**.

A.1.58 Click **Next**.

A.1.59 In the **Select Related Tables** dialog box, review the options available.

A.1.60 Click **Next**.

A.1.61 When the **Select Dimension Attributes** dialog box opens, review the options.

A.1.62 Navigate to the **Available attributes** section and place a check in the **Attribute Name** check box, which selects everything listed.

A.1.63 Clear the check from the **Product Alternate Key** check box.

A.1.64 Click **Next**.

A.1.65 In the **Completing the Wizard** dialog box, review the settings.

A.1.66 Navigate to the **Name** text box and change the name to Product.

A.1.67 Click **Finish**. Review the results.

A.1.68 Navigate to the **Attributes** section on the left, right-click **English Product Subcategory Name** and click **Start New Hierarchy**.

A.1.69 Review the results in the **Hierarchies** section in the center.

A.1.70 Move back to the **Attributes** section on the left, and using drag-and-drop, take **Product Key** and drop it into the (newly created) **Hierarchy** box in the

center, onto the **<new level>** cell. Review the results.

A.1.71 Right-click the header cell of the **Hierarchy** box in the center, and click **Rename**.

A.1.72 Enter Product by Subcategory.

A.1.73 Click a blank spot in the design area and review the results.

A.1.74 Right-click **Cubes** folder and click **New Cube…**.

A.1.75 In the **Welcome to the Cube Wizard** dialog box, review the welcome message.

A.1.76 Click **Next**.

A.1.77 In the **Select Creation Method** dialog box, review the options available.

A.1.78 Leave **Use existing tables** selected, and click **Next**.

A.1.79 When the **Select Measure Group Tables** dialog box opens, review the options available.

A.1.80 Move to the **Measure group tables** section, and place a check in the **FactInternetSales** check box.

A.1.81 Click **Next**.

A.1.82 In the **Select Measures** dialog box, review the options available, and then click **Next**.

A.1.83 In the **Select Existing Dimensions** dialog box, review the current dimension, and then click **Next**.

A.1.84 When the **Select New Dimensions** dialog box opens, review the current settings.

A.1.85 Clear the check from the **Dimension** check box, which will clear all the corresponding check boxes.

All check boxes should now be cleared.

A.1.86 Click **Next**.

A.1.87 In the **Completing the Wizard** dialog box, review the settings.

A.1.88 Navigate to the **Cube name** text box and change the name to Adventure Works DW2012 Deployment.

A.1.89 Click **Finish**. Review the results.

A.1.90 Navigate to the **Solution Explorer** pane on the right, right-click the **Deployment** project, then click **Build**.

A.1.91 Notice in the lower-left you see **Build succeeded**.

A.1.92 Move back to the **Solution Explorer** pane on the right, right-click the **Deployment** project, then click **Deploy**.

A.1.93 Notice in the lower-left you see **Deploy succeeded**.

A.1.94 Move back to the **Solution Explorer** pane one more time, right-click the **Deployment** project, then click **Process…**.

A.1.95 In the **Process Database - Deployment** dialog box, review the current settings and options available.

A.1.96 Move to the **Process Options** column, click into the corresponding cell, use the provided drop-down arrow, and review the options available.

A.1.97 Click **Change Settings…**.

A.1.98 When **Change Settings** dialog box opens, review the options available.

A.1.99 Click **Dimension key errors** tab, and review the options available.

A.1.100 Click the radio button to **Use custom error configuration**. Review the options available.

A.1.101 Move to the **Number of errors** setting, click into the corresponding text box, and change the setting to **5**.

A.1.102 Click **OK**.

A.1.103 Click **Run…**.

A.1.104 In the **Process Progress** dialog box, review the status.

A.1.105 When **Process succeeded**, click **Close**.

A.1.106 Back in the **Process Database - Deployment** dialog box, click **Close**.

A.1.107 Click **Browser** tab.

A.1.108 When the browser opens, move to the **Metadata** pane on the left, and expand **Measures**. Review the results.

A.1.109 Expand **Fact Internet Sales** folder. Review the results.

A.1.110 Locate **Sales Amount**, right-click the measure, and click **Add to Query**. Review the results.

A.1.111 Scroll down to **Product** dimension.

A.1.112 Expand **Product** dimension.

A.1.113 Locate **Product by Subcategory**, right-click the hierarchy, and then click **Add to Query**. Review the results.

A.1.114 Navigate up to the toolbar and click  (**Save All**).

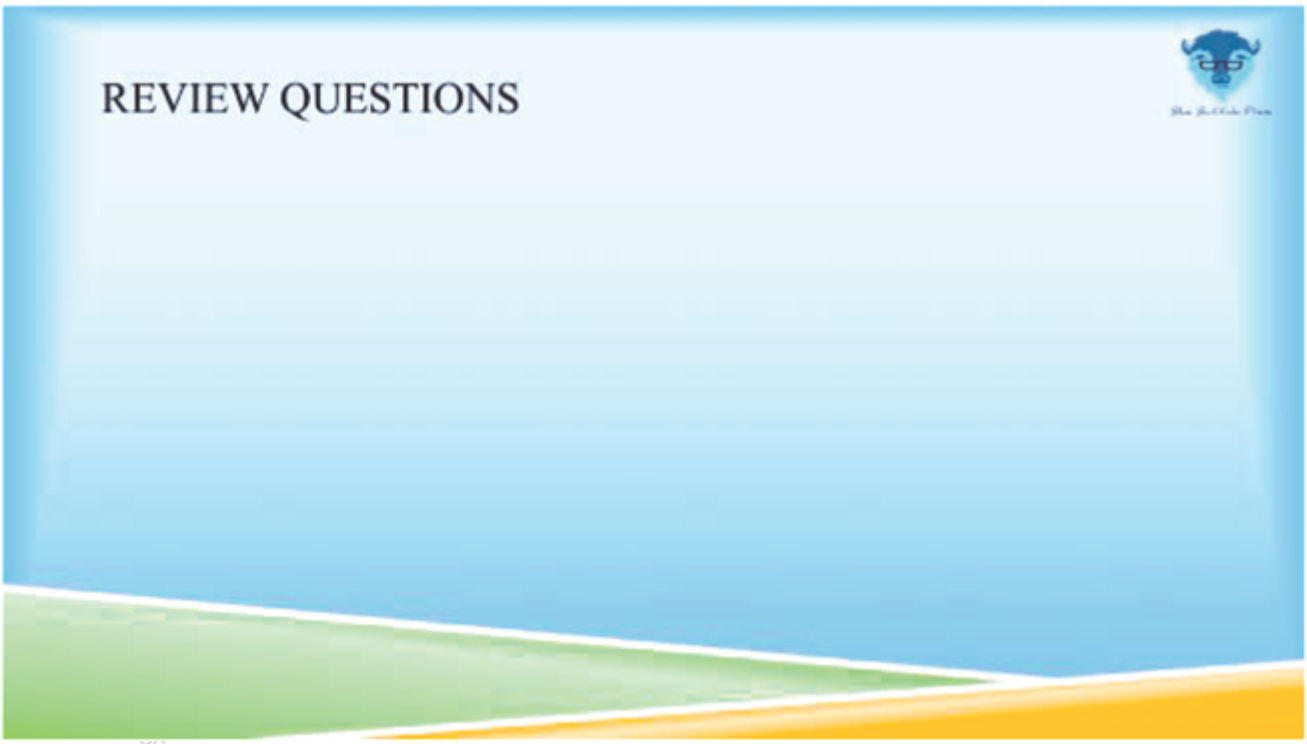
A.1.115 Close all open windows.

MODULE REVIEW

MODULE OBJECTIVE

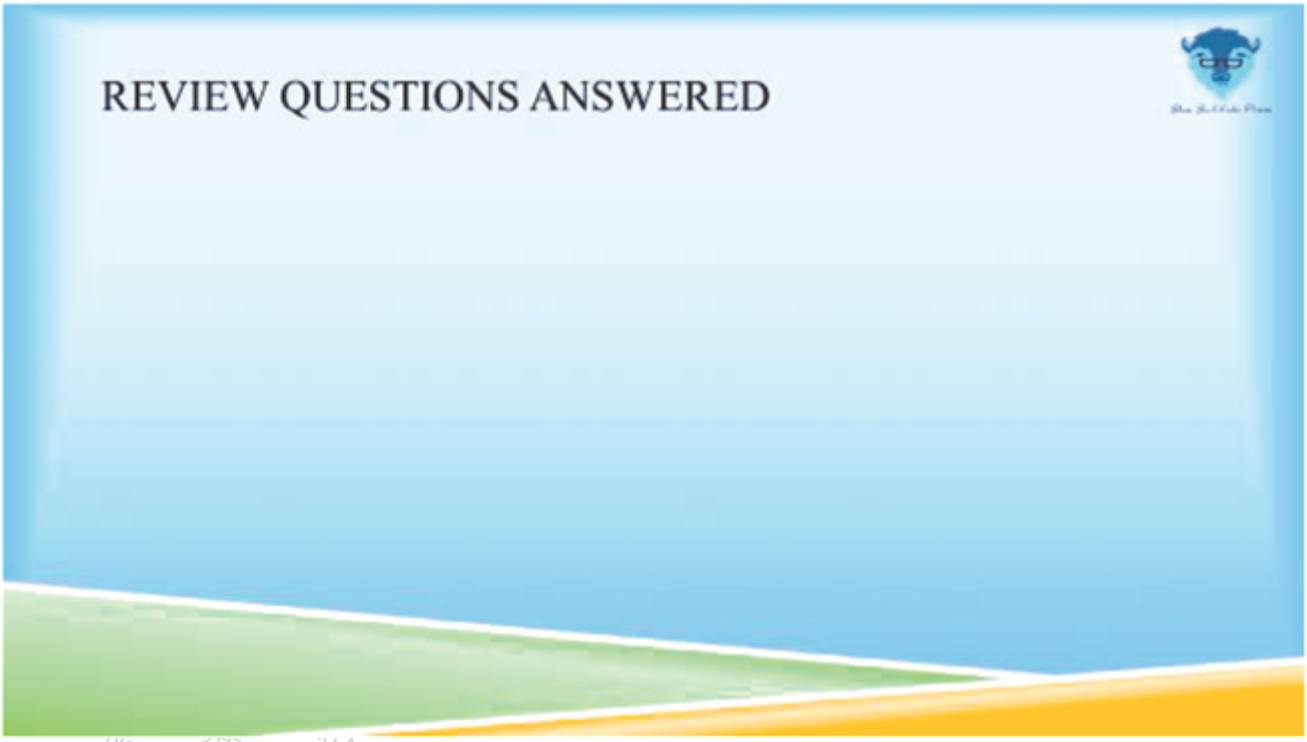
Deploying an Analysis Services project creates the defined objects in an instance of Analysis Services. In this module we will explore deployment options, processing strategies and security.

REVIEW QUESTIONS



1. _____ an Analysis Services project creates the defined objects in an instance of Analysis Services.
2. The first step of deployment is to use _____.
3. What does AMO stand for?
4. True or False: Processing is the step, or series of steps, in which Analysis Services loads data from a relational data source into a multidimensional model.
5. True or False: ProcessData deletes existing partition data, indexes, and aggregations, and loads only data in a partition.

REVIEW QUESTIONS ANSWERED



1. _____ an Analysis Services project creates the defined objects in an instance of Analysis Services.

   a. Deploying

2. The first step of deployment is to use _____.

   a. Build

3. What does AMO stand for?

    a. Analysis Management Objects (AMO)

4. True or False: Processing is the step, or series of steps, in which Analysis Services loads data from a relational data source into a multidimensional model.

    a. True

5. True or False: ProcessData deletes existing partition data, indexes, and aggregations, and loads only data in a partition.

    a. True