Microsoft

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20461C

Querying Microsoft® SQL Server®

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Module 1

Introduction to Microsoft SQL Server 2014

Contents:

Lesson 2

SQL Server Editions and Versions

Contents:

Question and Answers

SQL Server Versions

Question: Have you worked with any versions of SQL Server prior to SQL Server 2012?

Answer: Answers will vary.

Resources

SQL Server in the Cloud

 **Additional Reading:** For more information on the use of T-SQL in Microsoft Azure SQL Databases, go to the MSDN article **Transact-SQL Support (Microsoft Azure SQL Database)**: http://go.microsoft.com/fwlink/?LinkID=394805

Lesson 3

Getting Started with SQL Server Management Studio

Contents:

Question and Answers

Connecting to SQL Server

Question: Which authentication method do you use to log on to SQL Server in your organization?

Demonstration: Introducing Microsoft SQL Server 2014

Demonstration Steps

Use SSMS to connect to an on-premises instance of SQL Server 2014

1. Ensure that the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines are both running, and then log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**.
2. Run D:\Demofiles\Mod01\Setup.cmd as an administrator.
3. Start SQL Server Management Studio and connect to the **MIA-SQL** database engine instance using Windows authentication.

Explore databases and other objects

1. If the **Object Explorer** pane is not visible, click **View** and click **Object Explorer**.
2. Expand the **Databases** folder to see the list of databases.
3. Expand the **AdventureWorks** database.
4. Expand the **Tables** folder.
5. Expand the **Sales.Customer** table.
6. Expand the **Columns** folder.
7. Show the list of columns, and point out the data type information for the **ModifiedDate** column.

Work with T-SQL scripts

1. If the **Solution Explorer** pane is not visible, click **View** and click **Solution Explorer**. Initially, it will be empty.
2. Click the **File** menu, click **New**, click **Project**.
3. In the **New Project** box, under **Installed Templates**, click **SQL Server Management Studio Projects**.
4. In the middle pane, click **SQL Server Scripts**.
5. In the **Name** box, type **Module 1 Demonstration**.
6. In the **Location** box, type or browse to **D:\Demofiles\Mod01**.
7. Point out the solution name, then click **OK**.
8. In the **Solution Explorer** pane, right-click **Queries**, then click **New Query**.
9. Type the following T-SQL code:

```
USE AdventureWorks;
GO
SELECT CustomerID, AccountNumber
FROM Sales.Customer;
```

10. Select the code and click **Execute** on the toolbar.
11. Point out the results pane.
12. Click **File**, and then click **Save All**.

13. Click **File**, and then click **Close Solution**.
14. Click **File**, click **Recent Projects and Solutions**, and then click **Module 1 Demonstration.ssmssln**.
15. Point out the **Solution Explorer** pane.
16. Close SQL Server Management Studio without saving any files.

Module Review and Takeaways

Review Question(s)

Question: Can an SQL Server database be stored across multiple instances?

Answer: No, a database is completely contained within a single instance.

Question: If no T-SQL code is selected in a script window, which lines will be run when you click the Execute button?

Answer: All statements in the script will be executed.

Question: What does an SQL Server Management Studio solution contain?

Answer: Projects.

Module 2

Introduction to T-SQL Querying

Contents:

Lesson 1

Introducing T-SQL

Contents:

Demonstration: T-SQL Language Elements

Demonstration Steps

Use T-SQL Language Elements

1. Ensure that the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines are both running, and then log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**.
2. Run D:\Demofiles\Mod02\Setup.cmd as administrator.
3. Start SQL Server Management Studio and connect to the **MIA-SQL** database engine instance.
4. Open the Demo.ssmssln solution in the D:\Demofiles\Mod02\Demo folder.
5. On the **View** menu, click **Solution Explorer**.
6. Open the 11 – Demonstration A.sql script file.
7. Follow the instructions contained within the comments of the script file.
8. Keep SQL Server Management Studio open for the next demonstration.

Lesson 2

Understanding Sets

Contents:

Resources

Set Theory and SQL Server

Additional Reading: More information on the set theory and its application to SQL Server queries can be found in Chapter 1 of Itzik Ben-Gan's *Inside Microsoft® SQL Server® 2008: T-SQL Querying* (Microsoft Press, 2009) and Chapter 2 of Itzik Ben-Gan's *Microsoft SQL Server 2008: T-SQL Fundamentals* (Microsoft Press, 2008). For more information on the use of "Set of all…" see Joe Celko's *Thinking in Sets* (Morgan Kaufman, 2008).

Lesson 4

Understanding the Logical Order of Operations in SELECT Statements

Contents:

Demonstration: Logical Query Processing

Demonstration Steps

View Query Output that Illustrates Logical Processing Order

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod02\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod02\Demo folder.
3. On the **View** menu, click **Solution Explorer**. Then open the 21 – **Demonstration B.sql** script file.
4. Follow the instructions contained within the comments of the script file.

Module Review and Takeaways

Review Question(s)

Question: Which category of T-SQL statements concerns querying and modifying data?

Answer: DML

Question: What are some examples of aggregate functions supported by T-SQL?

Answer: SUM, MIN, COUNT, MAX, AVG

Question: Which SELECT statement element will be processed before a WHERE clause?

Answer: FROM

Module 3

Writing SELECT Queries

Contents:

Lesson 1

Writing Simple SELECT Statements

Contents:

Demonstration: Writing Simple SELECT Statements

Demonstration Steps

Use Simple SELECT Queries

1. Ensure that the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines are both running, and then log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**.
2. Run D:\Demofiles\Mod03\Setup.cmd as an administrator.
3. Start SQL Server Management Studio and connect to the **MIA-SQL** database engine instance using Windows authentication.
4. Open the **Demo.ssmssln** solution in the D:\Demofiles\Mod03\Demo folder.
5. If the Solution Explorer pane is not visible, on the **View** menu, click **Solution Explorer**.
6. Open the **11 – Demonstration A.sql** script file.
7. Follow the instructions contained within the comments of the script file.
8. Keep SQL Server Management Studio open for the next demonstration.

Lesson 2

Eliminating Duplicates with DISTINCT

Contents:

Demonstration: Eliminating Duplicates with DISTINCT

Demonstration Steps

Eliminate Duplicate Rows

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod03\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod03\Demo folder.
3. In Solution Explorer, open the **21 – Demonstration B.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Keep SQL Server Management Studio open for the next demonstration.

Lesson 3

Using Column and Table Aliases

Contents:

Question and Answers

Using Aliases to Refer to Columns

Question: Which style of column aliases do you prefer? Why?

Demonstration: Using Column and Table Aliases

Demonstration Steps

Use Column and Table Aliases

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod03\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod03\Demo folder.
3. In Solution Explorer, open the **31 – Demonstration C.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Keep SQL Server Management Studio open for the next demonstration.

Lesson 4

Writing Simple CASE Expressions

Contents:

Demonstration: Using a Simple CASE Expression

Demonstration Steps

Use a Simple CASE Expression

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod03\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod03\Demo folder.
3. In Solution Explorer, open the **41 – Demonstration D.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Close SQL Server Management Studio without saving any files.

Module Review and Takeaways

Best Practice

Terminate all T-SQL statements with a semicolon. This will make your code more readable, avoid certain parsing errors, and protect your code against changes in future versions of SQL Server.

Consider standardizing your code on the AS keyword for labeling column and table aliases. This will make it easier to read and avoids accidental aliases.

Review Question(s)

Question: Why is the use of SELECT * not a recommended practice?

Answer: Looking for two answers: 1) * asks for all columns, which is typically too much.

2) Query exposed to changes in underlying table structure.

Question: What will happen if you omit a comma between column names in a SELECT clause?

Answer: An accidental alias is created.

Question: What kind of result does a simple CASE statement return?

Answer: Scalar (single-value).

Module 4

Querying Multiple Tables

Contents:

Lesson 1

Understanding Joins

Contents:

Demonstration: Understanding Joins

Demonstration Steps

Use Joins

1. Ensure that the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines are both running, and then log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**.
2. Run D:\Demofiles\Mod04\Setup.cmd as an administrator.
3. Start SQL Server Management Studio and connect to the **MIA-SQL** database engine instance using Windows authentication.
4. Open the **Demo.ssmssln** solution in the D:\Demofiles\Mod04\Demo folder.
5. If the Solution Explorer pane is not visible, on the **View** menu, click **Solution Explorer**.
6. Open the **11 – Demonstration A.sql** script file.
7. Follow the instructions contained within the comments of the script file.
8. Keep SQL Server Management Studio open for the next demonstration.

Lesson 2

Querying with Inner Joins

Contents:

Demonstration: Querying with Inner Joins

Demonstration Steps

Use Inner Joins

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod04\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod04\Demo folder.
3. In Solution Explorer, open the **21 – Demonstration B.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Keep SQL Server Management Studio open for the next demonstration.

Lesson 3

Querying with Outer Joins

Contents:

Demonstration: Querying with Outer Joins

Demonstration Steps

Use Outer Joins

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod04\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod04\Demo folder.
3. In Solution Explorer, open the **31 – Demonstration C.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Keep SQL Server Management Studio open for the next demonstration.

Lesson 4

Querying with Cross Joins and Self Joins

Contents:

Demonstration: Querying with Cross Joins and Self Joins

Demonstration Steps

Use Self Joins and Cross Joins

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod04\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod04\Demo folder.
3. In Solution Explorer, open the **41 – Demonstration D.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Close SQL Server Management Studio without saving any files.

Module Review and Takeaways

Best Practice

Table aliases should always be defined when joining tables.

Joins should be expressed using SQL-92 syntax, with JOIN and ON keywords.

Review Question(s)

Question: How does an inner join differ from an outer join?

> **Answer:** An inner join filters out rows which do not satisfy the predicate in the ON clause. An outer join includes all rows from both tables and includes NULLs for attributes where no match is found.

Question: Which join types include a logical Cartesian product?

> **Answer:** CROSS, INNER and OUTER

.

Question: Can a table be joined to itself?

> **Answer:** Yes, as a self join. An alias to at least one table is required in the FROM clause.

Module 5

Sorting and Filtering Data

Contents:

Lesson 1

Sorting Data

Contents:

Question and Answers

Sorting Data

Question: Does the physical order of rows in an SQL Server table guarantee any sort order in queries using the table?

Answer: No.

Demonstration: Sorting Data

Demonstration Steps

Sort Data Using the ORDER BY Clause

1. Ensure that the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines are both running, and then log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**.
2. Run D:\Demofiles\Mod05\Setup.cmd as an administrator.
3. Start SQL Server Management Studio and connect to the **MIA-SQL** database engine instance using Windows authentication.
4. Open the **Demo.ssmssln** solution in the D:\Demofiles\Mod05\Demo folder.
5. If the Solution Explorer pane is not visible, on the **View** menu, click **Solution Explorer**.
6. Open the **11 – Demonstration A.sql** script file.
7. Follow the instructions contained within the comments of the script file.
8. Keep SQL Server Management Studio open for the next demonstration.

Lesson 2

Filtering Data with Predicates

Contents:

Demonstration: Filtering Data with Predicates

Demonstration Steps

Filter Data in a WHERE Clause

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod05\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod05\Demo folder.
3. In Solution Explorer, open the **21 – Demonstration B.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Keep SQL Server Management Studio open for the next demonstration.

Lesson 3

Filtering Data with TOP and OFFSET-FETCH

Contents:

Demonstration: Filtering Data with TOP and OFFSET-FETCH

Demonstration Steps

Filter Data Using TOP and OFFSET-FETCH

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod05\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod05\Demo folder.
3. In Solution Explorer, open the **31 – Demonstration C.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Keep SQL Server Management Studio open for the next demonstration.

Lesson 4

Working with Unknown Values

Contents:

Demonstration: Working with NULL

Demonstration Steps

Test for NULL

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod05\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod05\Demo folder.
3. In Solution Explorer, open the **41 – Demonstration D.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Close SQL Server Management Studio without saving any files.

Module Review and Takeaways

Best Practice

You should always use an ORDER BY clause if you need records returned in a specific order. Even if the results are returned correctly without an ORDER BY clause, this cannot be guaranteed and might not always be the case.

Ensure that you handle NULL values correctly. NULL values are unknown and are not the same a s a zero-length string or the number 0, which are both known values.

Module 6

Working with SQL Server 2014 Data Types

Contents:

Lesson 1

Introducing SQL Server 2014 Data Types

Contents:

Resources

Other Data Types

 **Additional Reading:** See course 20464C: *Developing Microsoft® SQL Server® Databases* for additional information on the XML data type.

 **Additional Reading:** Go to course 20464C: *Developing Microsoft® SQL Server® Databases* for additional information about the hierarchyid data type.

Demonstration: SQL Server Data Types

Demonstration Steps

Convert Data Types

1. Ensure that the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines are both running, and then log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**.
2. Run D:\Demofiles\Mod06\Setup.cmd as an administrator.
3. Start SQL Server Management Studio and connect to the **MIA-SQL** database engine instance using Windows authentication.
4. Open the **Demo.ssmssln** solution in the D:\Demofiles\Mod06\Demo folder.
5. If the Solution Explorer pane is not visible, on the **View** menu, click **Solution Explorer**.
6. Open the **11 – Demonstration A.sql** script file.
7. Follow the instructions contained within the comments of the script file.
8. Keep SQL Server Management Studio open for the next demonstration.

Lesson 2

Working with Character Data

Contents:

Demonstration: Working with Character Data

Demonstration Steps

Manipulate Character Data

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod06\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod06\Demo folder.
3. In Solution Explorer, open the **21 – Demonstration B.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Keep SQL Server Management Studio open for the next demonstration.

Lesson 3

Working with Date and Time Data

Contents:

Demonstration: Working with Date and Time Data

Demonstration Steps

Query Data and Time Values

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod06\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod06\Demo folder.
3. In Solution Explorer, open the **31 – Demonstration C.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Close SQL Server Management Studio without saving any files.

Module Review and Takeaways

Review Question(s)

Question: Will SQL Server be able to successfully implicitly convert an int data type to a varchar?

Answer: No, int has higher type precedence.

Question: What data type is suitable for storing flag information, such as TRUE or FALSE?

Answer: Bit

Question: What logical operators are useful for retrieving ranges of date and time values?

Answer: >=, <

Module 7

Using DML to Modify Data

Contents:

Lesson 1

Adding Data to Tables

Contents:

Demonstration: Inserting Data Into Tables

Demonstration Steps

Insert Rows Into Tables

1. Ensure that the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines are both running, and then log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**.
2. Run D:\Demofiles\Mod07\Setup.cmd as an administrator.
3. Start SQL Server Management Studio and connect to the **MIA-SQL** database engine instance using Windows authentication.
4. Open the **Demo.ssmssln** solution in the D:\Demofiles\Mod07\Demo folder.
5. If the Solution Explorer pane is not visible, on the **View** menu, click **Solution Explorer**.
6. Open the **11 – Demonstration A.sql** script file.
7. Follow the instructions contained within the comments of the script file.
8. Keep SQL Server Management Studio open for the next demonstration.

Lesson 2

Modifying and Removing Data

Contents:

Demonstration: Modifying and Removing Data From Tables

Demonstration Steps

Update and Delete Data in a Table

1. On the virtual machine, on the Taskbar, click Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod07\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod07\Demo folder.
3. In Solution Explorer, open the **21 – Demonstration B.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Close SQL Server Management Studio without saving any files.

Module Review and Takeaways

Review Question(s)

Question: What attributes of the source columns are transferred to a table created with a SELECT INTO query?

Answer: Name, data type and nullability.

Question: The presence of which constraint prevents TRUNCATE TABLE from executing?

Answer: A foreign key reference to the table.

Module 8

Using Built-In Functions

Contents:

Lesson 1

Writing Queries with Built-In Functions

Contents:

Demonstration: Writing Queries Using Built-In Functions

Demonstration Steps

Use Built-in Scalar Functions

1. Ensure that the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines are both running, and then log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**.
2. Run D:\Demofiles\Mod08\Setup.cmd as an administrator.
3. Start SQL Server Management Studio and connect to the **MIA-SQL** database engine instance using Windows authentication.
4. Open the **Demo.ssmssln** solution in the D:\Demofiles\Mod08\Demo folder.
5. If the Solution Explorer pane is not visible, on the **View** menu, click **Solution Explorer**.
6. Open the **11 – Demonstration A.sql** script file.
7. Follow the instructions contained within the comments of the script file.
8. Keep SQL Server Management Studio open for the next demonstration.

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Lesson 2

Using Conversion Functions

Contents:

Demonstration: Using Conversion Functions

Demonstration Steps

Use Functions to Convert Data

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod08\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod08\Demo folder.
3. In Solution Explorer, open the **21 – Demonstration B.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Keep SQL Server Management Studio open for the next demonstration.

Lesson 3

Using Logical Functions

Contents:

Demonstration: Using Logical Functions

Demonstration Steps

Use Logical Functions

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod08\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod08\Demo folder.
3. In Solution Explorer, open the **31 – Demonstration C.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Keep SQL Server Management Studio open for the next demonstration.

Lesson 4

Using Functions to Work with NULL

Contents:

Demonstration: Using Functions to Work with NULL

Demonstration Steps

Use Functions to Work with NULL

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod08\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod08\Demo folder.
3. In Solution Explorer, open the **41 – Demonstration D.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Close SQL Server Management Studio without saving any files.

Module Review and Takeaways

Best Practice

When possible, use standards-based functions such as CAST or COALESCE rather than SQL Server-specific functions like NULLIF or CONVERT.

Consider the impact of functions in a WHERE clause on query performance.

Review Question(s)

Question: Which function should you use to convert from an int to a nchar(8)?

Answer: CAST is the preferred conversion function because it is ANSI-standard.

Question: Which functions will return a NULL, rather than an error message, if it cannot convert a string to a date?

Answer: TRY_PARSE and TRY_CONVERT will attempt a conversion, just like PARSE and CONVERT, respectively. However, instead of raising a runtime error, failed conversions return NULL.

Question: What is the name for a function that returns a single value?

Answer: Scalar functions return a single value.

Module 9

Grouping and Aggregating Data

Contents:

Lesson 1

Using Aggregate Functions

Contents:

Demonstration: Using Aggregate Functions

Demonstration Steps

Use Built-in Aggregate Functions

1. Ensure that the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines are both running, and then log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**.
2. Run D:\Demofiles\Mod09\Setup.cmd as an administrator.
3. Start SQL Server Management Studio and connect to the **MIA-SQL** database engine instance using Windows authentication.
4. Open the **Demo.ssmssln** solution in the D:\Demofiles\Mod09\Demo folder.
5. If the Solution Explorer pane is not visible, on the **View** menu, click **Solution Explorer**.
6. Open the **11 – Demonstration A.sql** script file.
7. Follow the instructions contained within the comments of the script file.
8. Keep SQL Server Management Studio open for the next demonstration.

Lesson 2

Using the GROUP BY Clause

Contents:

Demonstration: Using GROUP BY

Demonstration Steps

Use the GROUP BY Clause

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod09\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod09\Demo folder.
3. In Solution Explorer, open the **21 – Demonstration B.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Keep SQL Server Management Studio open for the next demonstration.

Lesson 3

Filtering Groups with HAVING

Contents:

Demonstration: Filtering Groups with HAVING

Demonstration Steps

Filter Grouped Data Using the HAVING Clause

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod09\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod09\Demo folder.
3. In Solution Explorer, open the **31 – Demonstration C.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Close SQL Server Management Studio without saving any files.

Module Review and Takeaways

Review Question(s)

Question: What is the difference between the COUNT function and the COUNT_BIG function?

Answer: COUNT returns an int; COUNT_BIG returns a big_int.

Question: Can a GROUP BY clause include more than one column?

Answer: Yes, separated by commas.

Question: Can a WHERE clause and a HAVING clause in a query filter on the same column?

Answer: Yes.

Module 10

Using Subqueries

Contents:

Lesson 1

Writing Self-Contained Subqueries

Contents:

Demonstration: Writing Self-Contained Subqueries

Demonstration Steps

Write a Nested Subquery

1. Ensure that the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines are both running, and then log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**.
2. Run D:\Demofiles\Mod10\Setup.cmd as an administrator
3. Start SQL Server Management Studio and connect to the **MIA-SQL** database engine instance using Windows authentication.
4. Open the **Demo.ssmssln** solution in the D:\Demofiles\Mod10\Demo folder.
5. If the Solution Explorer pane is not visible, on the **View** menu, click **Solution Explorer**.
6. Open the **11 – Demonstration A.sql** script file.
7. Follow the instructions contained within the comments of the script file.
8. Keep SQL Server Management Studio open for the next demonstration.

Lesson 2

Writing Correlated Subqueries

Contents:

Demonstration: Writing Correlated Subqueries

Demonstration Steps

Write a Correlated Subquery

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod10\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod10\Demo folder.
3. In Solution Explorer, open the **21 – Demonstration B.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Keep SQL Server Management Studio open for the next demonstration.

Lesson 3

Using the EXISTS Predicate with Subqueries

Contents:

Demonstration: Writing Subqueries Using EXISTS

Demonstration Steps

Write Queries Using EXISTS and NOT EXISTS

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod10\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod10\Demo folder.
3. In Solution Explorer, open the **31 – Demonstration C.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Close SQL Server Management Studio without saving any files.

Module Review and Takeaways

Review Question(s)

Question: Can a correlated subquery return a multi-valued set?

Answer: Yes.

Question: What type of subquery may be rewritten as a JOIN?

Answer: Correlated subqueries.

Question: Which columns should appear in the SELECT list of a subquery following the EXISTS predicate?

Answer: Only a * needs to be specified. No actual columns will be retrieved.

Module 11

Using Table Expressions

Contents:

Lesson 1

Using Views

Contents:

Resources

Writing Queries That Return Results from Views

 **Additional Reading:** For more information on database security, see the Microsoft Course 20462C: *Administering a Microsoft SQL Server Database*.

Demonstration: Using Views

Demonstration Steps

Create Views

1. Ensure that the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines are both running, and then log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**.
2. Run D:\Demofiles\Mod11\Setup.cmd as an administrator
3. Start SQL Server Management Studio and connect to the **MIA-SQL** database engine instance using Windows authentication.
4. Open the **Demo.ssmssln** solution in the D:\Demofiles\Mod11\Demo folder.
5. If the Solution Explorer pane is not visible, on the **View** menu, click **Solution Explorer**.
6. Open the **11 – Demonstration A.sql** script file.
7. Follow the instructions contained within the comments of the script file.
8. Keep SQL Server Management Studio open for the next demonstration.

Lesson 2

Using Inline TVFs

Contents:

Demonstration: Inline TVFs

Demonstration Steps

Create Inline TVFs

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod11\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod11\Demo folder.
3. In Solution Explorer, open the **21 – Demonstration B.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Keep SQL Server Management Studio open for the next demonstration.

Lesson 3

Using Derived Tables

Contents:

Demonstration: Using Derived Tables

Demonstration Steps

Write Queries that Create Derived Tables

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod11\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod11\Demo folder.
3. In Solution Explorer, open the **31 – Demonstration C.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Keep SQL Server Management Studio open for the next demonstration.

Lesson 4

Using CTEs

Contents:

Demonstration: Using CTEs

Demonstration Steps

Write Queries that Create CTEs

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod11\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod11\Demo folder.
3. In Solution Explorer, open the **41 – Demonstration D.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Close SQL Server Management Studio without saving any files.

Module Review and Takeaways

Review Question(s)

Question: When would you use a CTE rather than a derived table for a query?

Answer: CTEs may be written once, referenced multiple times in a query.

Question: Which table expressions allow variables to be passed in as parameters to the expression?

Answer: Table-valued functions.

Module 12

Using Set Operators

Contents:

Lesson 1

Writing Queries with the UNION Operator

Contents:

Demonstration: Using UNION and UNION ALL

Demonstration Steps

Use UNION and UNION ALL

1. Ensure that the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines are both running, and then log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**.
2. Run D:\Demofiles\Mod12\Setup.cmd as an administrator
3. Start SQL Server Management Studio and connect to the **MIA-SQL** database engine instance using Windows authentication.
4. Open the **Demo.ssmssln** solution in the D:\Demofiles\Mod12\Demo folder.
5. If the Solution Explorer pane is not visible, on the **View** menu, click **Solution Explorer**.
6. Open the **11 – Demonstration A.sql** script file.
7. Follow the instructions contained within the comments of the script file.
8. Keep SQL Server Management Studio open for the next demonstration.

Lesson 2

Using EXCEPT and INTERSECT

Contents:

Demonstration: Using EXCEPT and INTERSECT

Demonstration Steps

Use INTERSECT and EXCEPT

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod12\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod12\Demo folder.
3. In Solution Explorer, open the **21 – Demonstration B.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Keep SQL Server Management Studio open for the next demonstration.

Lesson 3

Using APPLY

Contents:

Demonstration: Using CROSS APPLY and OUTER APPLY

Demonstration Steps

Use APPLY

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod12\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod12\Demo folder.
3. In Solution Explorer, open the **31 – Demonstration C.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Close SQL Server Management Studio without saving any files.

Module Review and Takeaways

Question: Which set operator would you use to combine sets if you knew there were no duplicates and wanted better performance?

Answer: UNION ALL.

Question: Which APPLY form will not return rows from the left table if the result of the right table expression was empty?

Answer: CROSS APPLY.

Question: What is the difference between APPLY and JOIN?

Answer: APPLY can take the output of a TVF.

Module 13

Using Window Ranking, Offset, and Aggregate Functions

Contents:

Lesson 1

Creating Windows with OVER

Contents:

Demonstration: Using OVER and Partitioning

Demonstration Steps

Use OVER, PARTITION BY, and ORDER BY Clauses

1. Ensure that the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines are both running, and then log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**.
2. Run D:\Demofiles\Mod13\Setup.cmd as an administrator
3. Start SQL Server Management Studio and connect to the **MIA-SQL** database engine instance using Windows authentication.
4. Open the **Demo.ssmssln** solution in the D:\Demofiles\Mod13\Demo folder.
5. If the Solution Explorer pane is not visible, on the **View** menu, click **Solution Explorer**.
6. Open the **11 – Demonstration A.sql** script file.
7. Follow the instructions contained within the comments of the script file.
8. Keep SQL Server Management Studio open for the next demonstration.

Lesson 2

Exploring Window Functions

Contents:

Demonstration: Exploring Windows Functions

Demonstration Steps

Use Window Aggregate, Ranking, and Offset Functions

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod13\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod13\Demo folder.
3. In Solution Explorer, open the **21 – Demonstration B.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Close SQL Server Management Studio without saving any files.

Module Review and Takeaways

Review Question(s)

Question: What results will be returned by a ROW_NUMBER function if there is no ORDER BY clause in the query?

Answer: An unordered set.

Question: Which ranking function would you use to return the values 1,1,3? Which would return 1,1,2?

Answer: RANK, DENSE_RANK.

Question: Can a window frame extend beyond the boundaries of the window partition defined in the same OVER() clause?

Answer: No.

Module 14

Pivoting and Grouping Sets

Contents:

Lesson 1

Writing Queries with PIVOT and UNPIVOT

Contents:

Demonstration: Writing Queries with PIVOT and UNPIVOT

Demonstration Steps

Use PIVOT and UNPIVOT

1. Ensure that the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines are both running, and then log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**.
2. Run D:\Demofiles\Mod14\Setup.cmd as an administrator
3. Start SQL Server Management Studio and connect to the **MIA-SQL** database engine instance using Windows authentication.
4. Open the **Demo.ssmssln** solution in the D:\Demofiles\Mod14\Demo folder.
5. If the Solution Explorer pane is not visible, on the **View** menu, click **Solution Explorer**.
6. Open the **11 – Demonstration A.sql** script file.
7. Follow the instructions contained within the comments of the script file.
8. Keep SQL Server Management Studio open for the next demonstration.

Lesson 2

Working with Grouping Sets

Contents:

Demonstration: Using Grouping Sets

Demonstration Steps

Use the CUBE and ROLLUP Subclauses

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod14\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod14\Demo folder.
3. In Solution Explorer, open the **21 – Demonstration B.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Close SQL Server Management Studio without saving any files.

Module Review and Takeaways

Review Question(s)

Question: Once a dataset has been pivoted with aggregation, can the original detail rows be restored with an unpivot operation?

Answer: No, the original detail is lost during aggregation.

Question: What are the possible sources of NULLs returned by a query using grouping sets to create aggregations?

Answer: NULLs might be present in the underlying source data, or may be placeholders for rows that do not participate in the group member.

Question: Which subclause infers a hierarchy of columns to create meaningful grouping sets?

Answer: ROLLUP.

Module 15

Executing Stored Procedures

Contents:

Lesson 1

Querying Data with Stored Procedures

Contents:

Demonstration: Querying Data with Stored Procedures

Demonstration Steps

Use Stored Procedures

1. Ensure that the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines are both running, and then log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**.
2. Run D:\Demofiles\Mod15\Setup.cmd as an administrator
3. Start SQL Server Management Studio and connect to the **MIA-SQL** database engine instance using Windows authentication.
4. Open the **Demo.ssmssln** solution in the D:\Demofiles\Mod15\Demo folder.
5. If the Solution Explorer pane is not visible, on the **View** menu, click **Solution Explorer**.
6. Open the **11 – Demonstration A.sql** script file.
7. Follow the instructions contained within the comments of the script file.
8. Keep SQL Server Management Studio open for the next demonstration.

Lesson 2

Passing Parameters to Stored Procedures

Contents:

Demonstration: Passing Parameters to Stored Procedures

Demonstration Steps

Pass Parameters to a Stored Procedure

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod15\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod15\Demo folder.
3. In Solution Explorer, open the **21 – Demonstration B.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Keep SQL Server Management Studio open for the next demonstration.

Lesson 3

Creating Simple Stored Procedures

Contents:

Demonstration: Creating Simple Stored Procedures

Demonstration Steps

Create a Stored Procedure

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod15\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod15\Demo folder.
3. In Solution Explorer, open the **31 – Demonstration C.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Keep SQL Server Management Studio open for the next demonstration.

Lesson 4

Working with Dynamic SQL

Contents:

Demonstration: Working with Dynamic SQL

Demonstration Steps

Execute Dynamic SQL Queries

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod15\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod15\Demo folder.
3. In Solution Explorer, open the **41 – Demonstration D.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Close SQL Server Management Studio without saving any files.

Module Review and Takeaways

Review Question(s)

Question: What benefits do stored procedures provide for data retrieval that views do not?

Answer: Answers may vary, but ability to accept parameters is what we're looking for.

Question: What form should parameter and value pairs take when passed to a stored procedure in the EXECUTE statement?

Answer: @NAME = VALUE.

Question: Which method for constructing dynamic SQL allows parameters to be passed at runtime?

Answer: Using sp_executesql.

Module 16

Programming with T-SQL

Contents:

Lesson 1

T-SQL Programming Elements

Contents:

Demonstration: T-SQL Programming Elements

Demonstration Steps

Control Batch Execution and Variable Usage

1. Ensure that the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines are both running, and then log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**.
2. Run D:\Demofiles\Mod16\Setup.cmd as an administrator
3. Start SQL Server Management Studio and connect to the **MIA-SQL** database engine instance using Windows authentication.
4. Open the **Demo.ssmssln** solution in the D:\Demofiles\Mod16\Demo folder.
5. If the Solution Explorer pane is not visible, on the **View** menu, click **Solution Explorer**.
6. Open the **11 – Demonstration A.sql** script file.
7. Follow the instructions contained within the comments of the script file.
8. Keep SQL Server Management Studio open for the next demonstration.

Lesson 2

Controlling Program Flow

Contents:

Demonstration: Controlling Program Flow

Demonstration Steps

Control the Flow of Execution

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod16\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod16\Demo folder.
3. In Solution Explorer, open the **21 – Demonstration B.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Close SQL Server Management Studio without saving any files

Module Review and Takeaways

Review Question(s)

Question: Can you declare a variable in one batch and reference it in multiple batches?

Answer: No, variables are local to the batch in which they are declared.

Question: Can you create a synonym that references an object that does not exist yet?

Answer: Yes, resolution doesn't occur until the synonym is used.

Question: Will a WHILE loop exit when the predicate evaluates to NULL?

Answer: Yes.

Module 17

Implementing Error Handling

Contents:

Lesson 1

Implementing T-SQL Error Handling

Contents:

Question and Answers

Raising Errors Using RAISERROR

Question: Why might you want to intentionally raise an error in your code?

Answer: An error is one means of communicating to the person or procedure responsible for executing the code. There might well be a condition that does not raise a SQL Server error, but, nevertheless, needs reporting. For example, if you update all orders made by a particular customer, but no orders are found, you might want this flagged.

Raising Custom Errors

Question: What do the DB_ID and DB_NAME functions return?

Answer: DB_ID returns the database ID number and DB_NAME returns the database name.

Creating Alerts When Errors Occur

Question: Can you suggest an example of an error that would require immediate attention from an administrator?

Answer: Answers will vary.

Demonstration: Handling Errors Using T-SQL

Demonstration Steps

Handle Errors

1. Ensure that the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines are both running, and then log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**.
2. Run D:\Demofiles\Mod17\Setup.cmd as an administrator
3. Start SQL Server Management Studio and connect to the **MIA-SQL** database engine instance using Windows authentication.
4. Open the **Demo.ssmssln** solution in the D:\Demofiles\Mod17\Demo folder.
5. If the Solution Explorer pane is not visible, on the **View** menu, click **Solution Explorer**.
6. Open the **11 – Demonstration A.sql** script file.
7. Follow the instructions contained within the comments of the script file.
8. Keep SQL Server Management Studio open for the next demonstration.

Lesson 2

Implementing Structured Exception Handling

Contents:

Question and Answers

TRY/CATCH Block Programming

Question: In what situation might it have been useful to be able to raise a system error?

Answer: System errors can be useful because they can be logged in the server logging system.

Demonstration: Applying Retry Logic to Deadlocks

Demonstration Steps

Apply Retry Logic to a Deadlock

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod17\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod17\Demo folder.
3. In Solution Explorer, open the **21 – Demonstration B.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Close SQL Server Management Studio without saving any files.

Module Review and Takeaways

Review Question(s)

Question: Which error types cannot by caught by structured exception handling?

Answer: Compile/syntax errors, as well as some delayed name resolution errors.

Question: Can TRY/CATCH blocks be nested?

Answer: Yes.

Question: How can you use THROW outside of a CATCH block?

Answer: With arguments that raise a user-defined error.

Module 18

Implementing Transactions

Contents:

Lesson 1

Transactions and the Database Engine

Contents:

Demonstration: Transactions and the Database Engine

Demonstration Steps

Use Transactions

1. Ensure that the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines are both running, and then log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**.
2. Run D:\Demofiles\Mod18\Setup.cmd as an administrator
3. Start SQL Server Management Studio and connect to the **MIA-SQL** database engine instance using Windows authentication.
4. Open the **Demo.ssmssln** solution in the D:\Demofiles\Mod18\Demo folder.
5. If the Solution Explorer pane is not visible, on the **View** menu, click **Solution Explorer**.
6. Open the **11 – Demonstration A.sql** script file.
7. Follow the instructions contained within the comments of the script file.
8. Keep SQL Server Management Studio open for the next demonstration.

Lesson 2

Controlling Transactions

Contents:

Demonstration: Controlling Transactions

Demonstration Steps

Control Transactions

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod18\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod18\Demo folder.
3. In Solution Explorer, open the **21 – Demonstration B.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Close SQL Server Management Studio without saving any files.

Module Review and Takeaways

Review Question(s)

Question: What happens to a nested transaction when the outer transaction is rolled back?

Answer: The inner transaction is also rolled back, so nested transactions are not typically useful in user code.

Question: When a runtime error occurs in a transaction and SET XACT_ABORT is ON, is the transaction always automatically rolled back?

Answer: No, not if the error occurs within a TRY block.

Module 19

Improving Query Performance

Contents:

Lesson 1

Factors in Query Performance

Contents:

Demonstration: Factors in Query Performance

Demonstration Steps

Rewrite a Cursor as a Set-based Query

1. Ensure that the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines are both running, and then log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**.
2. Run D:\Demofiles\Mod19\Setup.cmd as an administrator
3. Start SQL Server Management Studio and connect to the **MIA-SQL** database engine instance using Windows authentication.
4. Open the **Demo.ssmssln** solution in the D:\Demofiles\Mod19\Demo folder.
5. If the Solution Explorer pane is not visible, on the **View** menu, click **Solution Explorer**.
6. Open the **11 – Demonstration A.sql** script file.
7. Follow the instructions contained within the comments of the script file.
8. Keep SQL Server Management Studio open for the next demonstration.

Lesson 2

Displaying Query Performance Data

Contents:

Demonstration: Displaying Query Performance Data

Demonstration Steps

Display Execution Plans and Query Statistics

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod19\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod19\Demo folder.
3. In Solution Explorer, open the **21 – Demonstration B.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Close SQL Server Management Studio without saving any files.

Module Review and Takeaways

Review Question(s)

Question: Why should you avoid the use of * in a SELECT clause?

Answer: Answers will vary, but should include performance and risk of changes to table design breaking a client application.

Question: How many clustered indexes are permitted per table?

Answer: One.

Question: Which type of execution plan can be displayed without running a query?

Answer: Estimated.

Module 20

Querying SQL Server Metadata

Contents:

Lesson 1

Querying System Catalog Views and Functions

Contents:

Demonstration: Querying System Catalog Views and Functions

Demonstration Steps

Query System Catalog Views and Functions

1. Ensure that the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines are both running, and then log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**.
2. Run D:\Demofiles\Mod20\Setup.cmd as an administrator
3. Start SQL Server Management Studio and connect to the **MIA-SQL** database engine instance using Windows authentication.
4. Open the **Demo.ssmssln** solution in the D:\Demofiles\Mod20\Demo folder.
5. If the Solution Explorer pane is not visible, on the **View** menu, click **Solution Explorer**.
6. Open the **11 – Demonstration A.sql** script file.
7. Follow the instructions contained within the comments of the script file.
8. Keep SQL Server Management Studio open for the next demonstration.

Lesson 2

Executing System Stored Procedures

Contents:

Demonstration: Executing System Stored Procedures

Demonstration Steps

Execute System Stored Procedures

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod20\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod20\Demo folder.
3. In Solution Explorer, open the **21 – Demonstration B.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Keep SQL Server Management Studio open for the next demonstration.

Lesson 3

Querying Dynamic Management Objects

Contents:

Demonstration: Querying Dynamic Management Objects

Demonstration Steps

Query System Dynamic Management Objects

1. Ensure that you have completed the previous demonstration in this module. Alternatively, start the 20461C-MIA-DC and 20461C-MIA-SQL virtual machines, log on to 20461C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**, and run D:\Demofiles\Mod20\Setup.cmd as an administrator.
2. If SQL Server Management Studio is not already open, start it and connect to the **MIA-SQL** database engine instance using Windows authentication, and then open the **Demo.ssmssln** solution in the D:\Demofiles\Mod20\Demo folder.
3. In Solution Explorer, open the **31 – Demonstration C.sql** script file.
4. Follow the instructions contained within the comments of the script file.
5. Close SQL Server Management Studio without saving any files.

Module Review and Takeaways

Review Question(s)

Question: Why might you choose to query a system view rather than a system stored procedure which returned the same metadata?

Answer: Unlike procedures, views may be filtered, joined and further processed.

Question: What issues might you face later if your application used SELECT * to query system catalog views?

Answer: System views may be changed and columns may be added in future releases of SQL Server.