

OFFICIAL MICROSOFT LEARNING PRODUCT

# 10988C

## Managing SQL Business Intelligence Operations

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# Module 1

## Introduction to Operational Management in BI Solutions

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## Lesson 1

# Rationale for BI Operations

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## Question and Answers

**Question:** Does your organization manage its BI environment within an operational framework? What are the advantages and disadvantages?

**Answer:** If a student works for an organization that uses an operational framework, some of the advantages they might list include:

- There is a structured approach to fixing issues.
- It typically involves a group of people to solve an issue.
- Fixes are usually applied in a controlled manner.

Some of the disadvantages might include:

- It can be very bureaucratic.
- It can slow down the time for fixes to be applied.

## Lesson 2

# Roles in BI Operations

### Contents:

Question and Answers

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## Question and Answers

**Question:** Does your organization have similar roles to the ones outlined in this lesson?

**Answer:** The answers will vary. Consider asking those students whose organizations are missing some of the roles if they would benefit by having a particular role included.

## Lesson 3

# Technologies Used in BI Operations

### Contents:

Question and Answers

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## Question and Answers

**Question:** How many students in the room use Team Foundation Server in their BI solutions?

**Answer:** If there is a student in the room who uses TFS, ask them what benefits this has brought to their organization.

## Lesson 4

# Environment and Operational Standards

### Contents:

Question and Answers

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## Question and Answers

**Question:** Do you see any advantages to using standard or emergency operating procedures?

**Answer:** The advantages that can be gained from using standard and emergency operating procedures include:

- This sets the expectation for the business as to how the operational team will respond to a problem.
- This can document processes that can inform the business continuity planning.
- This provides clarity with documented processes at a time when there could be chaos.

# Lab Review Questions and Answers

## Lab: Introduction to Operational Management in BI Solutions

### Question and Answers

#### Lab Review

**Question:** Based on the interviews in the lab, discuss the findings of the group regarding the role assignments and the responsibilities of each role. Are there any roles missing?

**Question:** Based on the interview document, how would you improve the BI developer's current working environment?

**Answer:** Answers will vary, but should be along the lines of:

- Introduce Team Foundation Server to manage development work.
- Introduce environments for proper testing and quality checks.
- Introduce a process of application life-cycle management to better manage the deployments of the BI solution.
- Liaise with the DBA team to understand the database standards.

# Module 2

## Configuring BI Components

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## Lesson 1

# The Importance of Standardized Builds

### Contents:

Question and Answers

3

## Question and Answers

**Question:** Does your organization apply any standard to your BI environments?

**Answer:** Answers will vary. To promote discussion among the students, try to find an example where there is an organization that uses standards and an organization that does not use standards.

## Lesson 2

# Configuration Considerations for BI Technologies

### Contents:

Question and Answers

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## Question and Answers

**Question:** Which area of the BI technology stack will you explore in more depth when you get back to your organization?

**Answer:** Answers will vary. If your classroom contains a lot of BI professionals they will likely state that they did not realize the importance of configuring the database engine or operating system, because this would usually be performed by a DBA.

If your classroom contains DBAs, they are likely to respond with the BI technologies as their focus for consideration.

## Lesson 3

# BI Architectures

### Contents:

Question and Answers

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## Question and Answers

**Question:** Whilst isolated services would be a desired architecture for many BI production scenarios, how do you manage balancing services on a stand-alone architecture setup? Do you see any options that have just been presented that could help your current situation?

**Answer:** Answers will vary.

## Module Review and Takeaways

### Real-world Issues and Scenarios

Common scenarios that are observed on BI servers in the real world include:

- The overprovisioning of multiple virtual servers on a single host server.
- Incorrectly configured memory and CPU settings for multiple services on a single server.
- Data and log files stored on the same drive.
- The incorrect management of **tempdb** data files.
- Local security policy settings of an operating system not being applied to servers.

# Lab Review Questions and Answers

## Lab: Configuring BI Components

### Question and Answers

#### Lab Review

**Question:** Are there any additional changes you would have made to the server that was configured?

**Answer:** Answers will vary, but should include:

- Manage the database and log files of other databases.
- Manage the CPU settings for the BI applications.
- Two additional instances of SQL Server installed on the MIA-SQL were not configured.

**Question:** What configuration setting would you adopt as standard—and why?

**Answer:** There are no right or wrong answers. Essentially, configurations that enable better use of resources should be used for a given environment.



# Module 3

## Managing Business Intelligence Security

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## Lesson 1

# Security Approach to BI Solutions

### Contents:

Question and Answers

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## Question and Answers

**Question:** In what scenarios would auditing be appropriate?

**Answer:** The following are examples of when monitoring would be deemed to be appropriate:

- To meet legislative or compliance requirements.
- To monitor suspicious activity.
- To understand changes made to BI components.

## Lesson 2

# Security Components

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## Question and Answers

**Question:** Does your organization use Active Directory groups or Active Directory users to access SQL Server BI resources?

**Answer:** The answers should promote a discussion about the merits of using AD groups over AD users. By using groups, you can get into the position where the access management is done by the AD team. Assigning access at a user level significantly increases the administrative overhead of managing SQL Server security. Some students may point out that they would not like trusting the approach of letting AD administrators be in charge of this. Therefore, the follow-on question could occur if they collaborate with the AD team to manage security.

## Demonstration: Setting Up Transparent Data Encryption

### Demonstration Steps

1. Open SQL Server Management Studio, and connect to the **MIA-SQL** database engine instance.
2. Use Transact-SQL to:
  - Create a database master key that is encrypted with the password **S4nFr4nc1sc0**.
  - Create a certificate named **ServerCert** with the description **used for TDE**.
  - Create a database encryption key that uses the AES\_128 algorithm and is encrypted by the certificate **ServerCert**.
  - Enable transparent data encryption on the **AdventureWorks** database.

Your code should look like this:

```
USE master;
GO
CREATE MASTER KEY
ENCRYPTION BY PASSWORD = 'S4nFr4nc1sc0';
GO
CREATE CERTIFICATE ServerCert
WITH SUBJECT = 'Used for TDE'
GO
USE AdventureWorksDW
GO
CREATE DATABASE ENCRYPTION KEY
WITH ALGORITHM = AES_128
ENCRYPTION BY SERVER CERTIFICATE ServerCert
GO
ALTER DATABASE AdventureWorksDW
SET ENCRYPTION ON
GO
```

3. Execute the code and read the warning message.
4. Close SQL Server Management Studio without saving files.

## Lesson 3

# Security Approach for BI Components

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Question and Answers

7

## Question and Answers

**Question:** What is the implication of the deny permission in SSAS?

**Answer:** The deny permission is overridden.

This is an unusual aspect of Analysis Services compared to other technologies where the deny permission takes precedence.

## Lesson 4

# The Security Approach in Different BI Environments

### Contents:

Question and Answers

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## Question and Answers

**Question:** Should developers be given full administrative rights to developers' development servers?

**Answer:** Answers will vary. Stand back and watch the arguments flow. Especially if there is a DBA in the room.

# Lab Review Questions and Answers

## Lab: Managing Business Intelligence Security

### Question and Answers

#### Lab Review

**Question:** Which best practices for security would you envisage being able to implement when you return to your own workplace?

**Answer:** Answers will vary. It is important to promote a discussion between the students about the security practices that they would implement.

**Question:** At any point, did the lab not follow security best practice?

**Answer:** Ask the students to identify what approach they would have taken, given the circumstances.



# Module 4

## Deploying BI Solutions

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## Lesson 1

# Application Life Cycle Management for BI Solutions

### Contents:

Question and Answers

3

## Question and Answers

**Question:** How do you manage the deployments of BI solutions?

**Answer:** Answers will vary. Some students will perform deployments from SQL Server® Data Tools without the need for TFS. Others will collate the files through TFS to a build and release approach.

Ask if the students practice the deployments in nonproduction environments before going live with a solution on a production environment.

## Lesson 2

# Stand-alone Deployments

### Contents:

Question and Answers

5

## Question and Answers

**Question:** How do you handle the creation of databases in nonproduction environments?

**Answer:** Answers will vary.

Try to promote a discussion about the different methods of deployment. Typically databases are required in nonproduction environments without production quality data. It is not unusual for a developer to create data with mocked-up data so that development or test can be performed.

BACPACs can then be used to distribute this mocked-up data to different team members.

## Lesson 3

# Team-Based Deployments

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## Question and Answers

**Question:** What rollback strategies do you need to employ if a production deployment fails?

**Answer:** Answers will vary.

## Demonstration: Configuring a Build Agent

### Demonstration Steps

Open the Builds Console in Internet Explorer

1. Start **Visual Studio 2017**.
2. In **Team Explorer**, click the **home** icon.
3. Under **Project**, click the **Builds** icon.
4. In the **Builds** window, click **New Build Definition**. Internet Explorer starts.

Download the Build Agent

1. In Internet Explorer, in the page menu bar, click **Builds**.
2. On the **Build Definitions** page, click **+Agent**.
3. In the **Get Agent** window, on the **Windows** tab, click **Download**.
4. In the Internet Explorer notification bar, click **Save** drop-down arrow, and then click **Save as**.
5. In the **Save As** dialog box, browse to **D:\Demofiles\Mod04** and click **Save**.
6. On the Windows desktop, click **File Explorer** and browse to **D:\Demofiles\Mod04**.
7. Right-click the agent zip file and click **Extract All**.
8. In the **Extract compressed (Zipped) Folders** dialog box, extract all files to the **D:\Demofiles\Mod04\Starter\agent** folder.
9. Close Internet Explorer.

Install the Build Agent on the MIA-SQL

1. In File Explorer, move to the **D:\Demofiles\Mod04\Starter\agent** folder, right-click **config.cmd** and then click **Run As administrator**.
2. In the **User Account Control** dialog box, click **Yes**.
3. At the **Enter Server URL** prompt, type the following text, and then press Enter:

**http://mia-sql:8080/tfs**

4. At the **Enter authentication type** prompt, press Enter to accept the default value of Integrated authentication.
5. At the line **Enter agent pool** prompt, press Enter to accept the default value.
6. At the **Enter agent name** prompt, accept the default value (MIA-SQL), and press Enter.
7. At the **Enter work folder** prompt, type **D:\Demofiles\Mod04\agent\work**, and then press Enter.
8. At the **Enter run agent as service?** prompt, type **Y**, and then press Enter.
9. At the **Enter the user account to use for the service** prompt, type **AdventureWorks\ServiceAcct**, and then press Enter.

10. At the **Enter Password for user account AdventureWorks\ServiceAcct** prompt, type **Pa55w.rd**, and then press Enter.
11. Verify that the configuration completes without any errors.



# Lab Review Questions and Answers

## Lab: Deploying BI Solutions

### Question and Answers

#### Lab Review

**Question:** What conclusions can be drawn from the various methods of deployment that are available?

**Answer:** Answers will vary. The reality is that the deployments of BI components can be very fragmented. As yet, there is no single cohesive platform that can manage all of the deployments in one tool—deployments from Visual Studio come closest to this. However, there are still additional steps with SSIS packages to deploy them to a SQL Server, and databases require a dacpac to be run. This is why many organizations will use TFS for the version control aspect and to create a build. But deployments will likely be performed in Visual Studio first, and use any supporting tools such as DACPAC and dtutil to finalize the deployments.

**Question:** Who handles deployments to production servers within your organization?

**Answer:** Students from smaller organizations will likely conduct the deployments themselves; larger organizations may use a DBA or an operations team.



# Module 5

## Logging and Monitoring in BI Operations

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## Lesson 1

# The Need for Logging and Monitoring

### Contents:

Question and Answers

3

## Question and Answers

**Question:** What tools do you use to baseline the performance of your BI technologies?

**Answer:** Answers will vary.

The discussion should focus on the needs to have a broad baseline that is used to identify potential bottlenecks with the hardware and key configuration settings with the BI technologies. This makes performance monitor a useful tool for baseline monitoring. The event logs and SQL Server error logs will also provide useful information regarding the errors that may exist on the server and BI applications.

Be open to the fact that some of your students may make use of third-party tools, such as SQL Sentry Performance Advisor, to provide this baseline monitoring.

## Lesson 2

# Logging Options

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Question and Answers

5

## Question and Answers

**Question:** Which logging options do you use in your environments—and why?

**Answer:** You might expect that there would be logging for SSIS processes as a data warehouse load failure can have the biggest impact on the delivery of the overall BI solution.

The logging options will then vary, based on the prioritization of the services from the business perspective.

## Lesson 3

# Monitoring Options

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## Question and Answers

**Question:** Are there any barriers to you running monitoring tools on production servers?

**Answer:** Answer will vary.

Although answers will vary, students will cite that the main barrier to running monitoring tools on a production server is due to the potential additional workload that it can create on the server. The results of the monitoring is often an unknown that makes DBAs nervous.

Students should consider if it is worth providing a baseline of performance when monitoring tools are running so that evidence can be provided about the impact of a monitoring tool against a given environment.

## Demonstration: Using Activity Monitor

### Demonstration Steps

1. Start **Microsoft SQL Server Management Studio**.
2. In the **Connect to Server** dialog box, in the **Server name** list, ensure that **MIA-SQL** is selected, and then click **Connect**.
3. To open the Activity Monitor, in Object Explorer, right-click **MIA-SQL**, and then click **Activity Monitor**.
4. On the **MIA-SQL - Activity Monitor** tab, click **Processes**.
5. To open the Resource Waits section, click **Resource Waits**.
6. To open the Data File I/O section, click **Data File I/O**.
7. To open the Recent Expensive Queries section, click **Recent Expensive Queries**.
8. To change the refresh interval, right-click anywhere in the Overview section, point to Refresh interval, and then click **1 second**.
9. Close SQL Server Management Studio without saving any changes.

## Demonstration: Creating a Data Collector

### Demonstration Steps

1. Click **Start**, type **Performance**, and then click **Performance Monitor**.
2. To view the list of data collector sets, in the Performance Monitor window, on the left pane, click **Data Collector Sets**.
3. To create a new data collector set, expand the **Data Collector Sets** node, right-click **User Defined**, point to **New**, and then click **Data Collector Set**.
4. In the Create New Data Collector Set wizard, on the **How would you like to create this new data collector set?** page, in the **Name** box, type a name such as **SQL Monitoring**.
5. Select the **Create manually (Advanced)** option and click **Next**.
6. On the **What type of data do you want to include?** page, select the **Performance counter** check box, and then click **Next**.
7. On the **Which performance counters would you like to log?** page, click **Add**.
8. In the dialog box, in the **Available counters** section, expand the **Processor** node, scroll down, click **%Processor Time**, and then click **Add**.

9. Scroll up and expand the **PhysicalDisk** node, scroll down and click **Avg. Disk Queue Length**, and then click **Add**.
10. Scroll up and expand the **Memory** node, scroll down and click **Available MBytes**, and then click **Add**.
11. Scroll down and expand the **SQLServer:Databases** node, click **Active Transactions**, and then click **Add**.
12. Click **OK**.
13. On the **Which performance counters would you like to log?** page, click **Next**.
14. On the **Where would you like the data to be saved?** page, click **Next**.
15. On the **Create the data collector set?** page, ensure that **Save and close** is selected, and then click **Finish**.
16. In the Performance Monitor window, on the right pane, right-click **SQL Monitoring**, and then click **Start**.

## Demonstration: Using SQL Server Profiler

### Demonstration Steps

1. On the taskbar, click the **File Explorer** shortcut.
2. View the contents of the **D:\Demofiles\Mod05** folder.
3. Right-click **Setup.cmd**, and then click **Run as administrator**.
4. In the **User Account Control** dialog box, click **Yes**, and then wait for the script to finish.
5. Click **Start**, type **SQL Server Profiler**, and then click **SQL Server Profiler 17**.
6. In the SQL Server Profiler window, on the **File** menu, click **New Trace**.
7. In the **Connect to Server** dialog box, in the server type, select **Database Engine**. In the **Server name** list, ensure that **MIA-SQL** is selected, and then click **Connect**.
8. In the **Trace Properties** dialog box, in the **Trace name** box, select the text, and type **QueryMonitoring.trc**.
9. In the **Use the template** list, select **Blank**.
10. In the **Trace Properties** dialog box, select the **Save to file** check box.
11. In the **Save As** dialog box, browse to **D:\Demofiles\Mod05**.
12. In **File name**, type **QueryMonitoring.trc**, and then click **Save**.
13. In the **Confirm Save As** dialog box, click **Yes**.
14. On the **Events Selection** tab, expand the **TSQL** node, scroll down, and select the **SQL:BatchStarting**, **SQL:BatchCompleted**, **SQL:StmtStarting**, and the **SQL:StmtCompleted** check boxes.
15. In the **DatabaseID** column, clear the **SQL:BatchStarting**, **SQL:BatchCompleted**, **SQL:StmtStarting**, and the **SQL:StmtCompleted** check boxes, and then click **Column Filters**.
16. In the **Edit Filter** dialog box, in the list, click **DatabaseName**.
17. Expand the **Not like** node, type **Master**, and then click **OK**.
18. In the **Trace Properties** dialog box, click **Organize Columns**.

19. In the **Organize Columns** dialog box, in the list, click **DatabaseName**, and then click **Up** until DatabaseName appears under the **Groups** node, and then click **OK**.
20. To run the trace, in the **Trace Properties** dialog box, click **Run**.
21. In the **QueryMonitoring.trc (MIA-SQL)** window, expand the **(1) node**.
22. Start **Microsoft SQL Server Management Studio**.
23. In the **Connect to Server** dialog box, in the **Server name** list, ensure that **MIA-SQL** is selected, and then click **Connect**.
24. In Object Explorer, expand the **Databases** node, expand the **AdventureWorks** node, and then expand the **Tables** node.
25. Right-click **Person.Address**, and then click **Select Top 1000 Rows**.
26. Right-click **HumanResources.Employee**, and then click **Select Top 1000 Rows**.
27. Right-click **HumanResources.JobCandidate**, and then click **Select Top 1000 Rows**.
28. Right-click **Person.Person**, and click **Select Top 1000 Rows**.
29. Right-click **Production.BillOfMaterials**, and then click **Edit Top 200 Rows**.
30. Additional tables may be selected to provide more information to SQL Server Profiler.
31. Close SQL Server Management Studio.
32. Return to SQL Server Profiles, expand the AdventureWorks database name, and review traces for the work performed.
33. In the toolbar, click **Stop Selected Trace**, and then close SQL Server Profiler.

## Lesson 4

# Setting Up Alerts

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## Question and Answers

**Question:** Which BI process do you schedule with the SQL Server Agent? Do you set up alerts for these processes?

**Answer:** It is likely that the execution of an overnight data warehouse ETL process would start with a scheduled job from the SQL Server Agent. Discuss the benefits of the notification options, within the jobs dialog box, to inform about errors.

## Demonstration: Creating an Operator

### Demonstration Steps

1. Start **SQL Server Management Studio**.
2. In the **Connect to Server** dialog box, ensure that the **Server name** is set to **MIA-SQL**, and then click **Connect**.
3. To create an operator, in Object Explorer, expand the **SQL Server Agent** node, right-click **Operators**, and then click **New Operator**.
4. In the **New Operator** window, in the **Name** box, type **BIOperations**.
5. In the **E-mail name** box, type **BIOperations@Adventureworks.com**.
6. Under the **Pager on duty** schedule, select the **Monday, Tuesday, Wednesday, Thursday, and Friday** check boxes.
7. Click **OK**.
8. Close SQL Server Management Studio without saving any changes.

## Demonstration: Creating an Alert

### Demonstration Steps

1. Start **SQL Server Management Studio**.
2. In the **Connect to Server** dialog box, ensure that the server name is set to **MIA-SQL**, and then click **Connect**.
3. To create a SQL Server alert, in Object Explorer, expand the **SQL Server Agent** node, right-click **Alerts**, and then click **New Alert**.
4. In the **New Alert** window, in the **Name** box, type **Log File size for EIM\_Demo**.
5. In the **Type** list, select **SQL Server performance condition alert**.
6. In the **Object** list, select **Databases**.
7. In the **Counter** list, select **Percent Log Used**.
8. In the **Instance** list, select **EIM\_Demo**.
9. In the **Alert if counter** list, select **rises above**, and then in the **Value** box, type **50**.
10. To define a response, in the Select a page pane, click **Response**, and then select the **Notify operators** check box.
11. In the **Operator** list, select the **E-mail** check box.
12. To execute a job, select the **Execute job** check box, and then click **New Job**.
13. In the New Job window, in the **Name** box, type **Backup EIM Log**, and then in the Select a page pane, click **Steps**, and then click **New**.

14. In the New Job Step window, in the **Command** box, type:

```
BACKUP LOG EIM_Demo TO Disk = 'D:\Demofiles\Mod05\EIM_DemoLOG.TRN'
```

15. In the **Step** name box, type **Backup**.
16. In the Select a page pane, click **Advanced**, and then in the **Retry attempts** box, click the up arrow once to set the number of attempts to **1**. In the **Retry interval (minutes)** box, click the up arrow once to set the time to **1**, and then click **OK**.
17. In the New Job Step window, in the Select a page pane, click **Notifications**, and then select the **E-mail** check box.
18. In the first E-mail list, select **BIOperators**; in the second E-mail list, ensure that **When the job fails** is selected.
19. On the **Notifications** page, select the **Write to the Windows Application event log** check box; in the list, select **When the job fails**, and then click **OK**.
20. In the New Alert window, in the Select a page pane, click **Options**, select the **E-mail** check box, and in the **Additional notification message to send** box, type **generated by an alert from the SQL Server**, and then click **OK**.
21. Close SQL Server Management Studio.

# Lab Review Questions and Answers

## Lab: Monitoring BI Solutions

### Question and Answers

#### Lab Review

**Question:** Would you have added any additional monitoring tools to the approach laid out in this module?

**Answer:** Answers will vary. You could consider using additional native tools, such as Extended Events, for the database engine and Analysis Services. Microsoft CodePlex also contains a number of free tools that can help with troubleshooting, including Performance Analyzer (PAL), SQL Nexus, and Microsoft Assessment and Planning (MAP) Toolkit.

**Question:** Which graphical tool would you use to identify locking and blocking that currently exists on the server, with a view to terminating a process that is causing the blocking?

**Answer:** Activity Monitor.

A number of tools can be used to observe locking and blocking, including SQL Server Profiler. However, by using Activity Monitor, you can watch the real-time locking and blocking of the connections against a server. It also has a KILL command to terminate a process.





# Module 6

## Troubleshooting BI Solutions

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Lab Review Questions and Answers

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## Lab Review Questions and Answers

### Lab: Troubleshooting BI Solutions

#### Question and Answers

**Question:** Discuss with the group the approach that you used to identify the root cause issue of the problem.

**Answer:** Answers will vary. You will be looking to see if your students performed any basic checks first, with regards to the hardware and operating system, to see if there was any pressure in this area. This could have been conducted by using task manager and performance monitor. Check whether the students then followed up by performing targeted monitoring to drill down into the detail.

**Question:** On reflection, is there anything you would change about the approach or the tools that were used to troubleshoot the BI solution?

**Answer:** Answers will vary. It is important to promote a discussion so that the entire group can learn from each other's experience.

# Module 7

## Performance Tuning BI Queries

### Contents:

Lab Review Questions and Answers

2

## Lab Review Questions and Answers

### Lab: Performance Tuning a BI Solution

#### Question and Answers

**Question:** How often do you get the opportunity to review the production queries that are working on your systems?

**Answer:** Answers will vary. Promote a discussion on any blockers that prevent this activity being performed, and if there are ways in which the students might improve the query in constrained circumstances.

**Question:** Will you use the Query Store feature? What benefits do you see it bringing to your organization?

**Answer:** Answers will vary. The expectation is that students should see the benefits of being able to force and unforce a plan.