DAT244x

SQL Server Disaster Recovery

Lab 02 | Backing Up SQL Server Databases

Estimated time to complete this lab is 60 minutes

Overview

As a database administrator for Adventure Works Cycles, you are responsible for the **AdventureWorks** regional, national, and data archive databases. You must implement a backup solution for these databases, based on the backup requirements that have been provided.

The labs in this course are accumulative. You cannot complete the following labs if this lab has not been successfully completed.

What You'll Need

To complete this lab, you will need the following:

- High-speed and reliable internet connectivity (for remote connections to the VM)
- A second monitor is recommended (for the Remote Desktop connection)
- A Microsoft account (such as one used for outlook.com, Hotmail, or other Microsoft services)
- A Microsoft Azure subscription
- To have completed the previous labs in this course.

Exercise 1: Performing Database, Differential and Transaction Log Backups

The backup strategy for the national **AdventureWorks2016** database uses a combination of full, differential, and transaction log backups.

The main tasks for this exercise are as follows:

1. Set the Recovery Model
2. Perform a Full Database Backup
3. Modify Data in the Database
4. Perform a Transaction Log Backup
5. Modify Data in the Database
6. Perform a Differential Backup
7. Modify Data in the Database
8. Perform Another Transaction Log Backup
9. Verify Backup Media

Start the virtual machine

In this task, you will start the virtual machine for the lab.

- If the virtual machine that you created in Lab 00 is not already running, open the Azure Portal, sign in, select the virtual machine, and click **Start**.

Check the Current Recovery Model Using Transact-SQL

In this task, you will create a user with Transact-SQL.

1. On your client machine. in SQL Operations Studio, right-click your server and click **New Query**.
2. Based on the proposed backup strategy for the AdventureWorks2016 database, determine the appropriate recovery model for the database.
3. Check the current recovery model of the database with the following T-SQL statement:

```
USE Master
GO
SELECT name, recovery_model_desc
   FROM sys.databases
   WHERE name = 'AdventureWorks2016';
GO
```

4. Change the recovery model if necessary by adapting the following T-SQL statement:

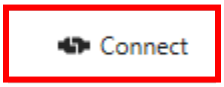
```
USE [master]
```

```
GO
ALTER DATABASE [AdventureWorks2016] SET RECOVERY Type New Recovery
Model Here WITH NO_WAIT
GO
```

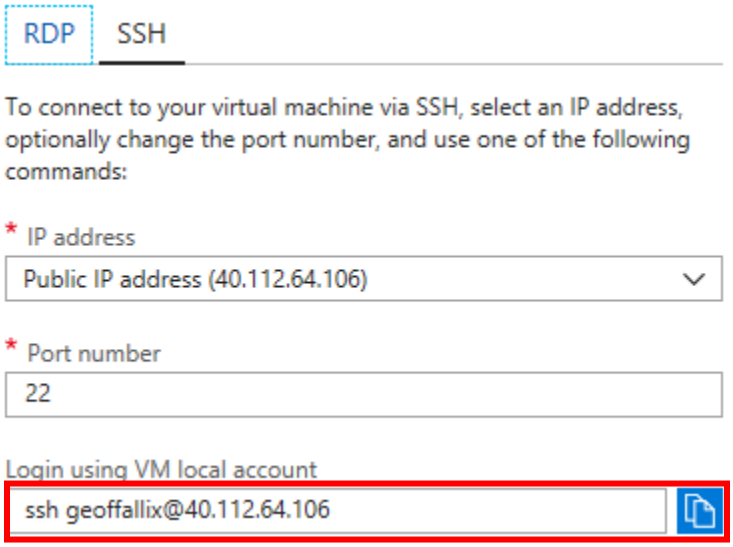
Start Cloud Shell

In this task, you will start the virtual machine for the lab.

1. Switch to Firefox and the Azure Portal.
2. Click **Dashboard**, click your virtual machine, and click **Connect**.



3. Copy the **ssh** command.



4. Click **Cloud shell**.

5. In Cloud shell paste the ssh command and press Enter.

6. Type your password and press Enter.

Perform a Full Database Backup

1. Switch to super user mode and create the directory `/var/opt/mssql/backup` in Linux.
    a. Type `sudo mkdir /var/opt/mssql/backup` and press enter.
    b. Type your password and press Enter.
    c. Change ownership with the following commands:
    `sudo chown mssql:mssql /var/opt/mssql`

```
sudo chown mssql:mssql /var/opt/mssql/backup
```

d. Give write access to the relevant folders to the owner with the following command:
```
sudo chmod 0700 /var/opt/mssql/backup
```

2. Back up the **AdventureWorks2016** database to `/usr/tmp/backup/AdventureWorks.bak`.

a. Switch to SQL Operations Studio.

b. Right-click your server and click **New Query**.

c. Type the following query and click **Run**:
```
USE master
GO
BACKUP DATABASE [AdventureWorks2016] TO  DISK =
N'/var/opt/mssql/backup/AdventureWorks.bak' WITH FORMAT,
INIT,  MEDIANAME = N' AdventureWorks-Full Database Backup
',  NAME = N'AdventureWorks2016-Full Database Backup',
SKIP, NOREWIND, NOUNLOAD, COMPRESSION
GO
```

3. Verify that the backup file has been created, and note its size.

a. Switch to the Azure portal.

b. In the Cloud Shell pane, type the following command and press Enter:
```
sudo cd /var/opt/mssql/backup
```

c. Enter your password, if requested.

d. Type the following command and press Enter:
```
ls -l
```

e. Note the size of AdventureWorks.bak.

Lab Check – *You will need these answers for the module quiz – write them down!*

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Approximately what size is the backup file?

_____

Modify Data in the Database

1. On your client machine. in SQL Operations Studio, right-click your server and click **New Query**.

2. Update the **Employee** table in the **AdventureWorks** database using the following Transact-SQL code:

```
USE AdventureWorks2016
GO
```

```
UPDATE HumanResources.Employee
SET VacationHours = VacationHours + 10 WHERE SickLeaveHours < 30;
```

Perform a Transaction Log Backup

1. Back up the **AdventureWorks2016** database to /usr/tmp/backup/AdventureWorks.bak.
    a. Right-click your server and click **New Query**.
    b. Type the following query and click **Run**:
    ```
    USE master
    GO
    BACKUP LOG [AdventureWorks2016] TO  DISK =
    N'/var/opt/mssql/backup/AdventureWorks.bak' WITH NOFORMAT,
    NOINIT,  NAME = N'AdventureWorks2016-Loh Database Backup',
    COMPRESSION
    GO
    ```
2. Verify that the backup file has been created, and note its size.
    a. Switch to the Azure portal.
    b. In the Cloud Shell pane, type the following command and press Enter:
    ```
    sudo cd /var/opt/mssql/backup
    ```
    c. Enter your password, if requested.
    d. Type the following command and press Enter:
    ```
    ls -l
    ```
3. Note the size of AdventureWorks.bak. Verify that the size of the backup file has increased.

Modify Data in the Database

In SQL Operations Studio, update the **Employee** table in the **AdventureWorks2016** database using the following Transact-SQL code:

```
USE AdventureWorks2016
GO
UPDATE HumanResources.Employee
SET VacationHours = VacationHours + 10;
```

Perform a Differential Backup

1. Perform a differential backup of the **AdventureWorks2016** database to /var/opt/mssql/backup/AdventureWorks.bak.
    a. Right-click your server and click **New Query**.
    b. Type the following query and click **Run**:
    ```
    USE master
    GO
    BACKUP DATABASE [AdventureWorks2016] TO  DISK =
    N'/var/opt/mssql/backup/AdventureWorks.bak' WITH
    DIFFERENTIAL, COMPRESSION
    GO
    ```
2. Verify that the backup file has been created, and note its size.

a. Switch to the Azure portal.

b. In the Cloud Shell pane, type the following command and press Enter:
```
sudo cd /var/opt/mssql/backup
```

c. Enter your password, if requested.

d. Type the following command and press Enter:
```
ls -l
```

e. Note the size of AdventureWorks.bak.

Lab Check – *You will need these answers for the module quiz – write them down!*

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Approximately what size is the backup file?

_____

Modify Data in the Database

- In SQL Operations Studio, update the **Employee** table in the **AdventureWorks2016** database using the following Transact-SQL code:

```
USE AdventureWorks2016
GO
UPDATE Production.Product
SET ListPrice = ListPrice + 10;
```

Perform Another Transaction Log Backup

1. Back up the **AdventureWorks2016** database to `/usr/tmp/backup/AdventureWorks.bak`.
    a. Use a transaction log backup.
    b. Back up the log to the existing media set, and append the backup to the existing backup sets.
    c. Compress the backup.
2. Verify that the size of the backup file has increased.

Verify Backup Media

1. Use the following query to verify that the backups you performed in this exercise are all on the backup device:

```
RESTORE HEADERONLY
FROM DISK = '/var/opt/mssql/backup/AdventureWorks.bak';
GO
```

Lab Check – *You will need these answers for the module quiz – write them down!*

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What is the Backup Type of a transaction log backup (positions 2 and 4)?

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You have now completed the lab.

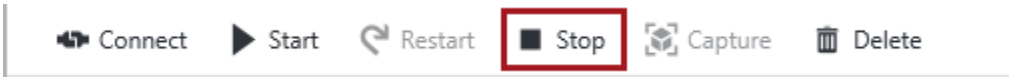
If you are not immediately continuing with the next lab, you should complete the ***Finishing Up*** *exercise to shut down and stop the VM.*

Finishing Up

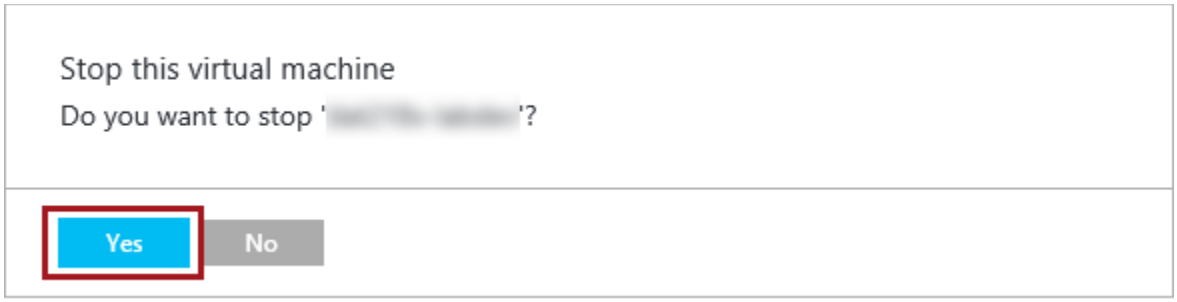
In this exercise, you will shut down and stop the VMs.

1. Deallocate the Linux VM by clicking **Stop**.

   Deallocation will take some minutes to complete, and also extends the time required to restart the VM. Consider deallocating the VM if you want to reduce costs, or if you choose to complete the next lab after an extended period.

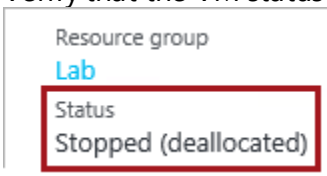


2. When prompted to stop the VM, click **Yes**.



   The deallocation can take several minutes to complete.

3. Verify that the VM status updates to **Stopped (Deallocated)**.



   In this state, the VM is now not billable—except for a relatively smaller storage cost.
   Note that a deallocated VM will likely acquire a different IP address the next time it is started.

4. Sign out of the **Azure Portal**.