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Participant Guide

Azure FastStart : Azure Backup and Site Recovery

Module 1 Lab: Backing Up with ASR

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## Lab 1:

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|  |  |
|  | The time to complete this module, including exercises, is 240 minutes. |
|  | The key takeaways from this lab are:   * DPM is a simple and powerful backup solution which can backup data & applications from a server’s client * DPM enables customers to easily extend their on-premises protection to Azure. * Administrators can monitor DPM (physical, virtual, running on premises, running in Azure) from a single console. |
|  |  |

### Overview

Fabrikam Inc is a Silicon Valley enterprise which specializes in building custom turnkey solutions in the real estate space. They have 17 branch offices in the U.S and are supported by 3000 full time employees.

Their line of business applications is based on Windows and their endpoint client laptop/desktop are on either Windows 7 or Windows 8

For the purpose of this hands on lab, as an IT administrator of Fabrikam Inc, you have been tasked to define the business continuity & protection policy for the applications, data and client machines (desktop, laptop).

As your IT infrastructure is managed by System Center, you intend to use System Center Data Protection Manager (DPM) to define your backup strategy. You are also interested in exploring how Microsoft Azure can bring down your operational and infrastructure cost by providing a robust offsite backup technology which can replace your aging, expensive tape media. The hands on lab is aimed at bringing you to speed on some of the key capabilities of DPM.

#### Exercise Details

1. Protect files and folders from your laptop to Azure in 10 minutes

* Register your laptop to Azure Backup Service
* Backup a folder on your client to Azure
* Restore a folder on your client from Azure

1. Backup Azure Iaas VMs

* Create a VM on Azure
* Backup IaaS VM

1. DPM Attach to Azure

* Register DPM to Azure Backup
* Configure SQL Database backup to Azure
* Recover a SQL Database from Azure Backup

#### Prerequisites

* Internet access
* Azure Subscription and an Operations Management Suite subscription already setup and configured
* **You need servers on-premises or in Azure, running:**
* **System Center Data Protection Manager:** This lab doesn’t cover the installation of this server.
* **SQL Server:** A single database must be created on this server. This lab doesn’t cover the installation of this server.
* **Windows 10** client machine

### Exercise 1: Protect your client to Microsoft Azure

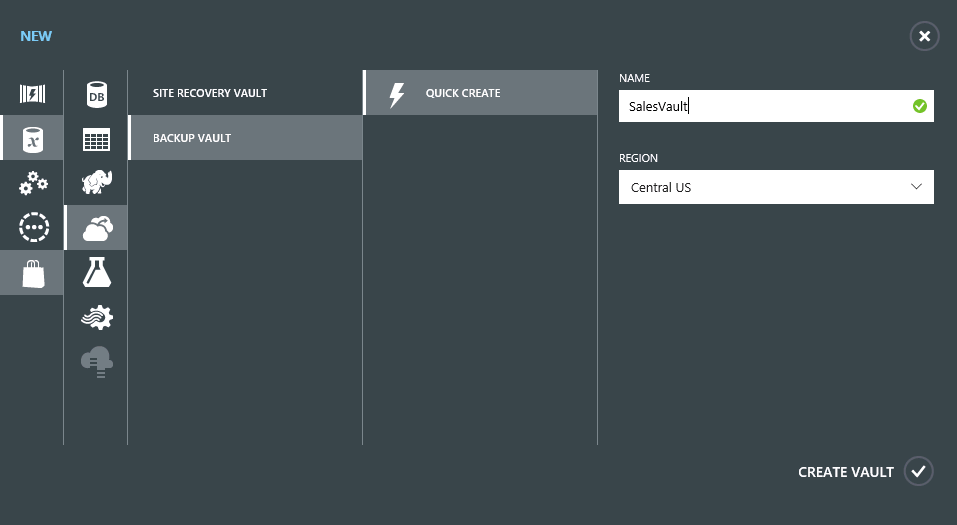
|  |  |
| --- | --- |
|  | The time to complete this exercise is 45 minutes. |
|  | The key takeaways from this lab are:   * Demonstrate client backup to Azure |
|  |  |

#### Create Azure Backup Vault

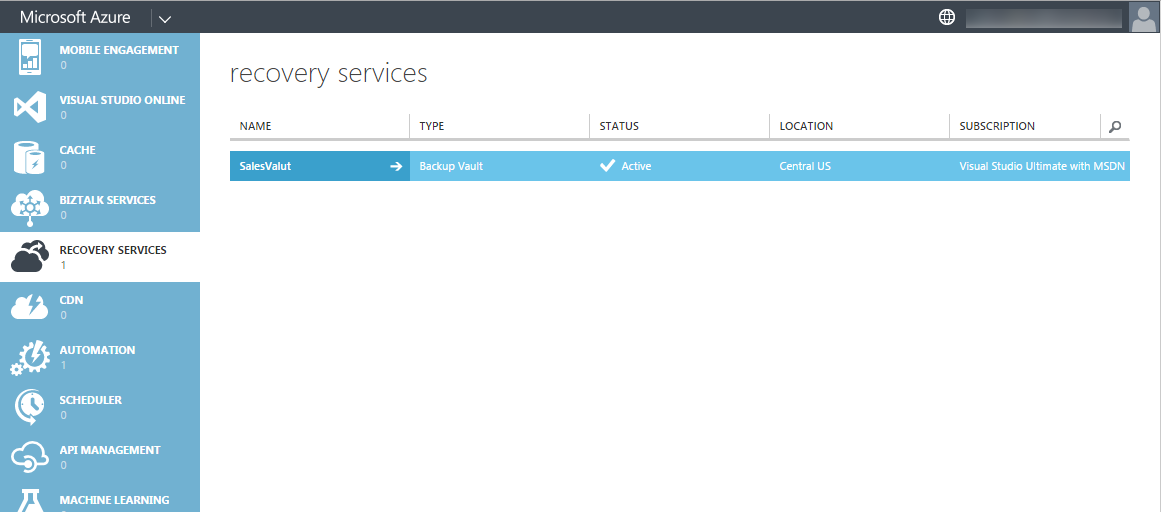
1. Logon to your Windows 10 client machine.
2. To create an Azure Backup Vault to store backup data, Open Internet Explorer and navigate to the Azure Management Portal, <https://manage.windowsazure.com>.
3. Browse to the “+ New” icon at the bottom of the portal:



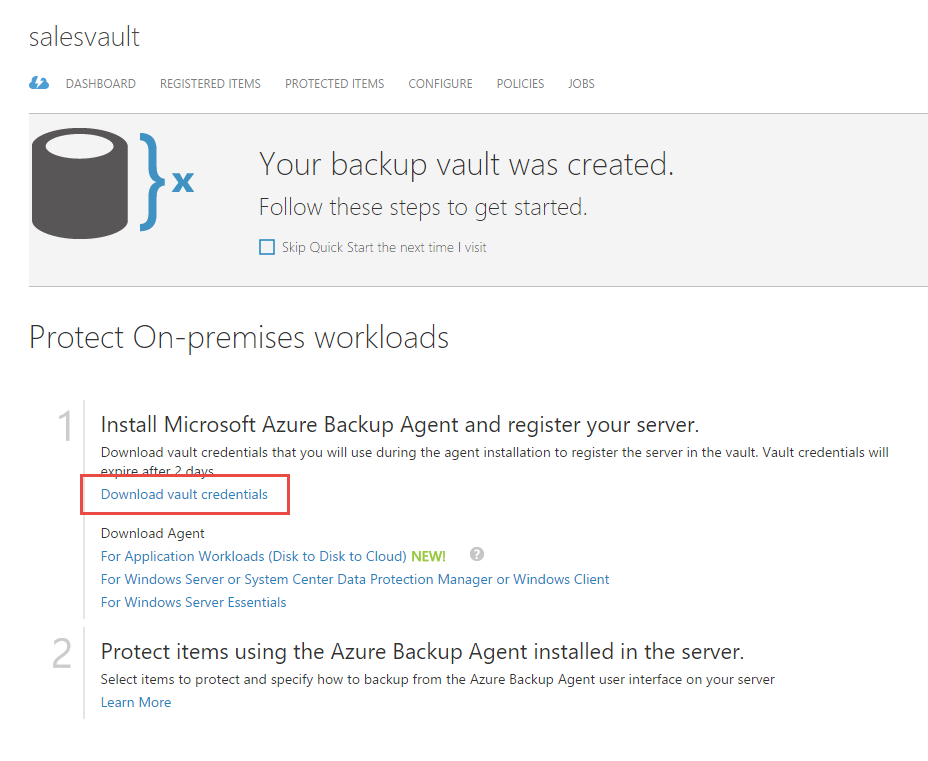
1. **Select** *Data Services\Recovery Services\Backup Vault\Quick Create* and then create a backup vault with the name “*SalesVault*”. Choose the region “*Central US*”.



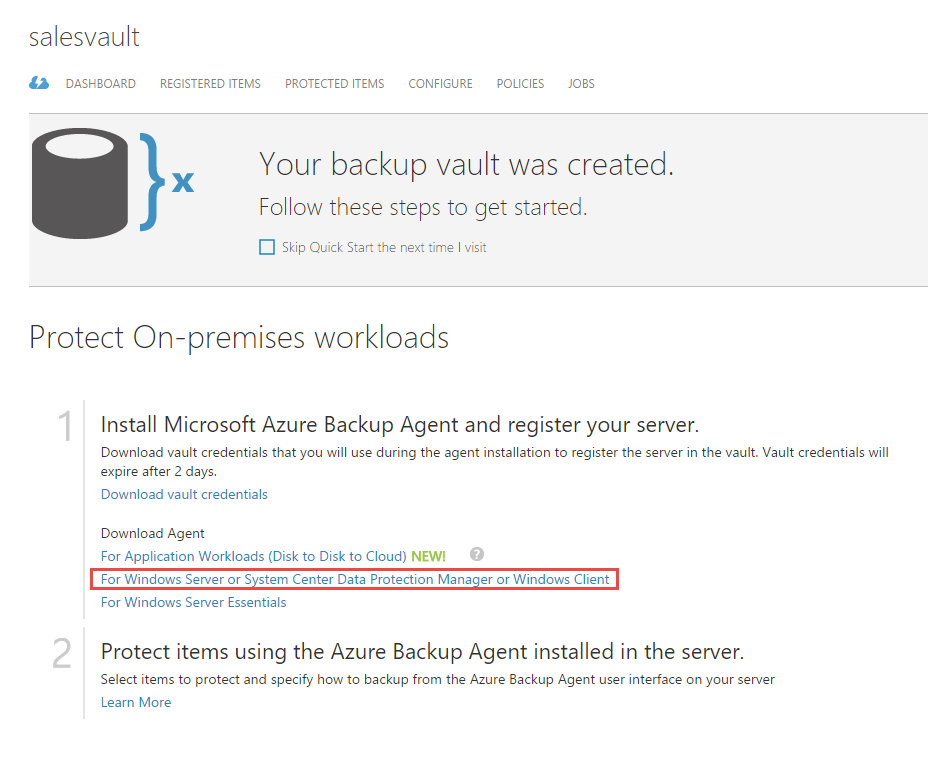
1. Click on “CREATE VAULT” icon.
2. Go to the main Azure Portal Page and then **select** Recovery Services from the left-hand side and then select *SalesVault*:



1. On the main dashboard screen, review the instructions and then **select** *“Download Vault” Credentials”* and then save it to your system’s *Desktop*.

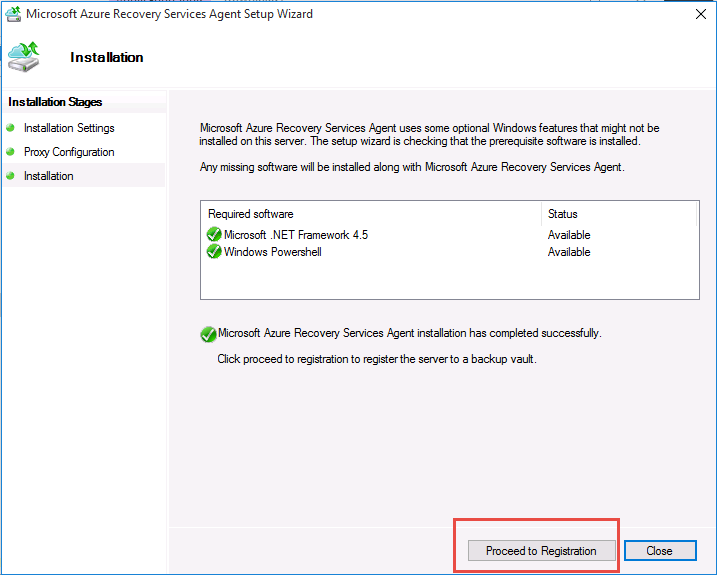


1. On the same page, also download *the Microsoft Azure Backup Agent for Windows Server or System Center Data Protection Manager or Windows Client* (MARSAgentInstaller.exe) to your desktop:

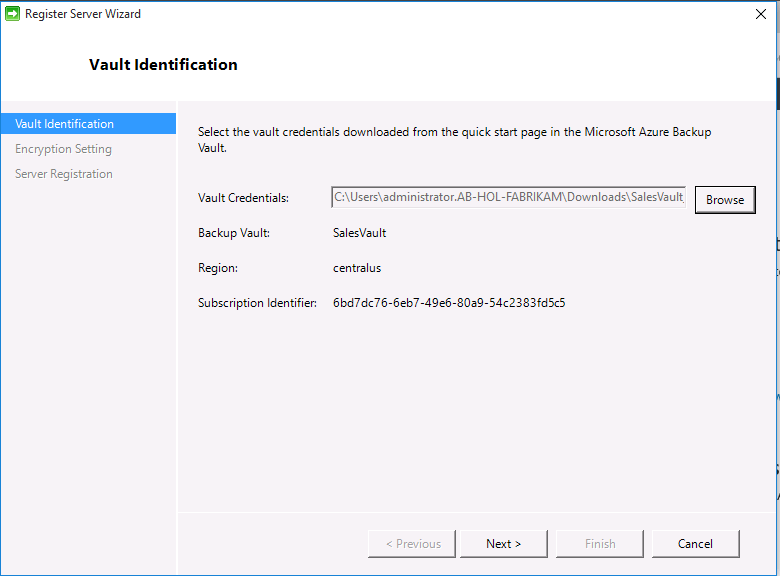


#### Register the Win10 client machine to the Azure Backup Service

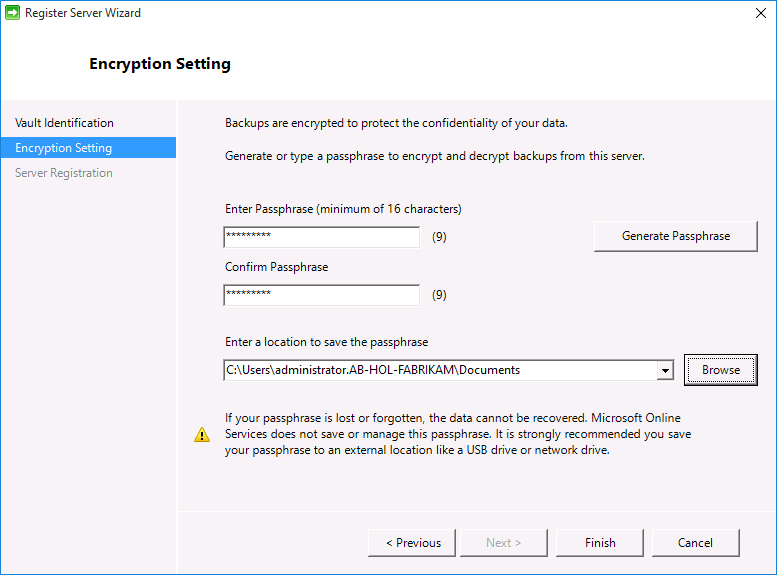
1. Install the MARSAgent by **clicking** on the *MARSAgentInstaller.exe* downloaded in the previous section. Once installation has completed, **click** on *Proceed to Registration*:



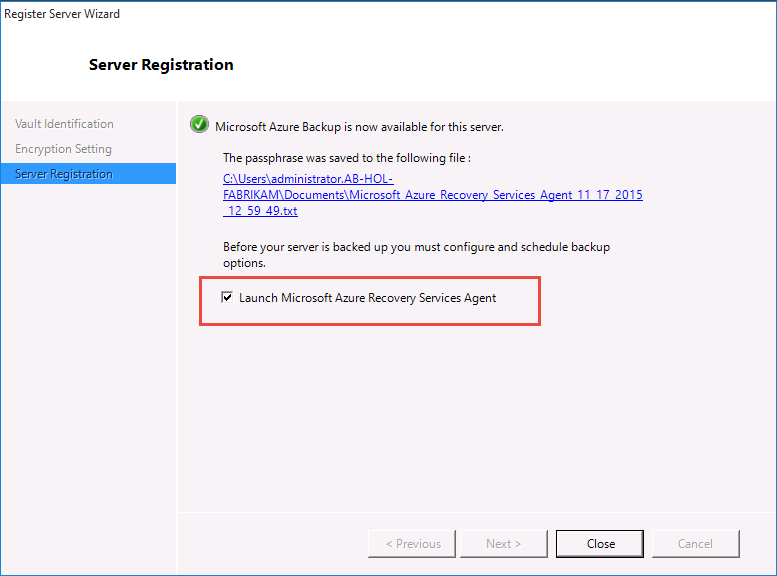
1. In the *Vault Identification* dialog, **browse** to and **select** the vault credential file that was downloaded in the last section and then **click** Next:



1. **Enter** a Passphrase at least 16 characters or longer. **Store** the Passphrase file on local directory and **click** Finish as shown:

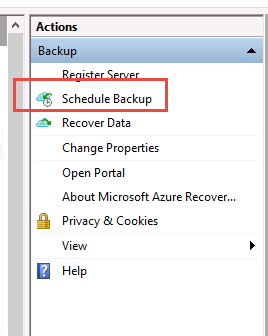


1. In the ending dialog, keep the *“Launch Microsoft Azure Recovery Service Agent”* checked and **click** *Close.*

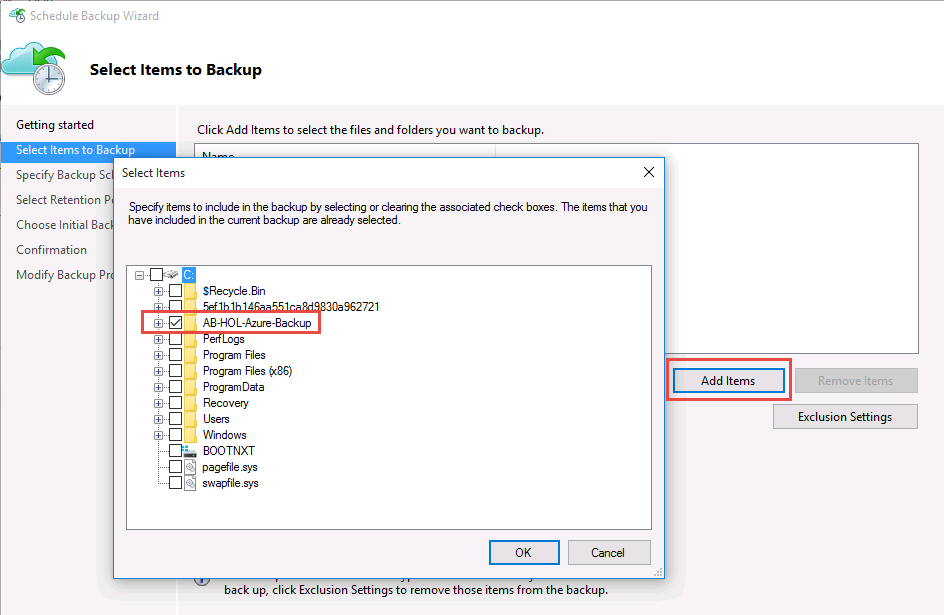


#### Protecting your Client using Microsoft Azure Backup

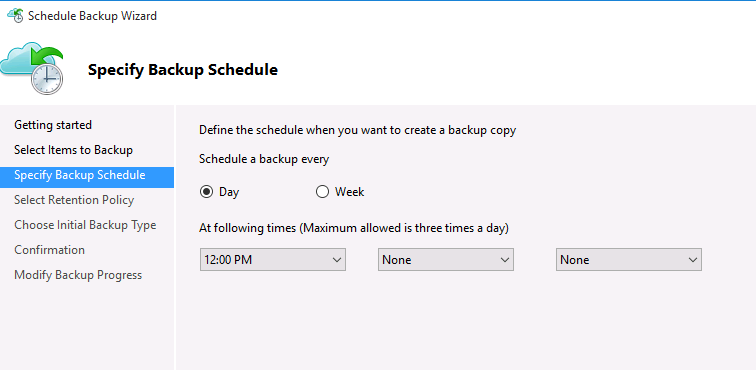
1. **Create** a folder called *AB-HOL-Azure-Backup* in the C:\ folder and copy some files into it. (**For example**: *Copy the MARSagent installer and your Vault Credential settings into the folder.*)
2. Navigate back to the *Microsoft Azure Backup* application and **click** on *Schedule Backup*.



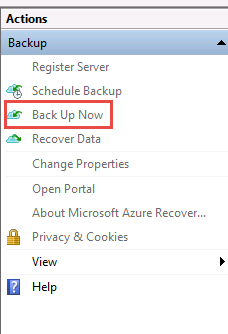
1. **Click** *Next* at the *Getting Started* dialog.
2. In the *Select Items to Backup* dialog, **select** the *Add Items* button and select the folder that you created in Step A. **Click** OK and then *Next*.



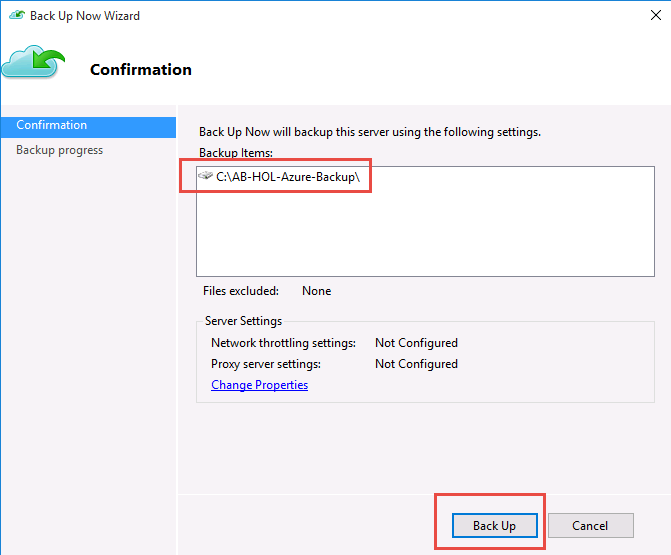
1. In the *Specify Backup Schedule* dialog, specify daily time to backup data as shown below and then **click** *Next*:



1. In the *Select Retention Policy* dialog, leave the default settings and then **click** *Next*.
2. In the *Choose Initial Backup Type* dialog, leave the default settings and then **click** *Next.*
3. In the *Confirmation* dialog, leave the default settings and then **click** *Finish*.
4. In the main window of the *Microsoft Azure Backup* application, **click** on *Backup Now* in the *Actions* menu:



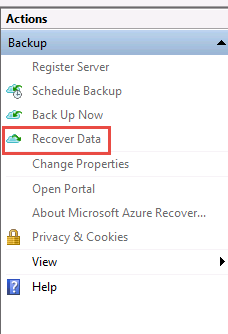
1. In the *Confirmation* dialog of the *Back Up Now Wizard*, ensure that the folder you created at the beginning of this section is listed in the backup and then **select** *Backup*.



1. Your files will now be backed up to Azure.

#### Restoring files to your Client using Microsoft Azure Backup

1. On your C:\ drive, **delete** the *AB-HOL-Azure-Backup* folder using File Explorer.
2. In the *Microsoft Azure Backup* application, **select** *Recover Data* from the *Actions* menu:

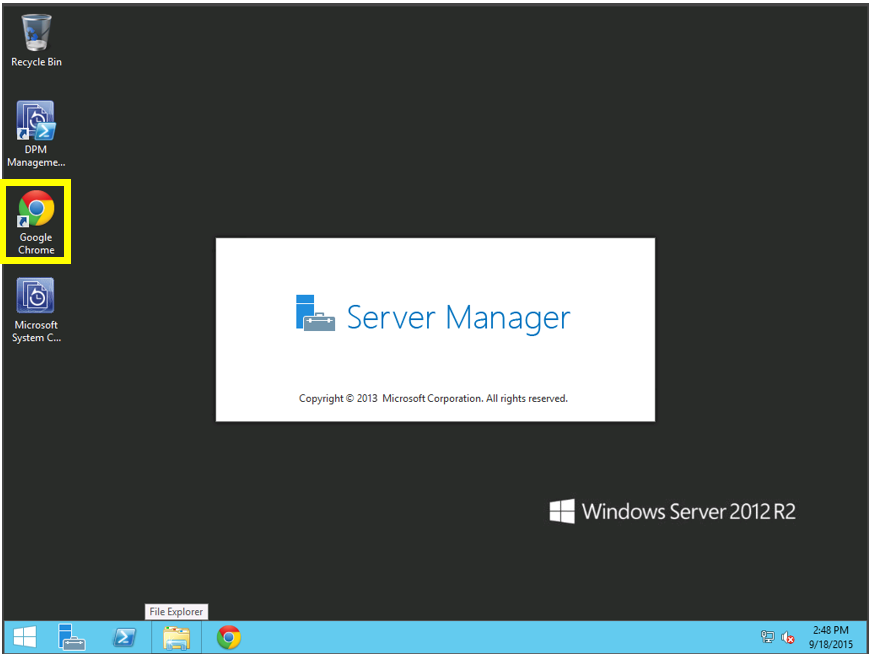


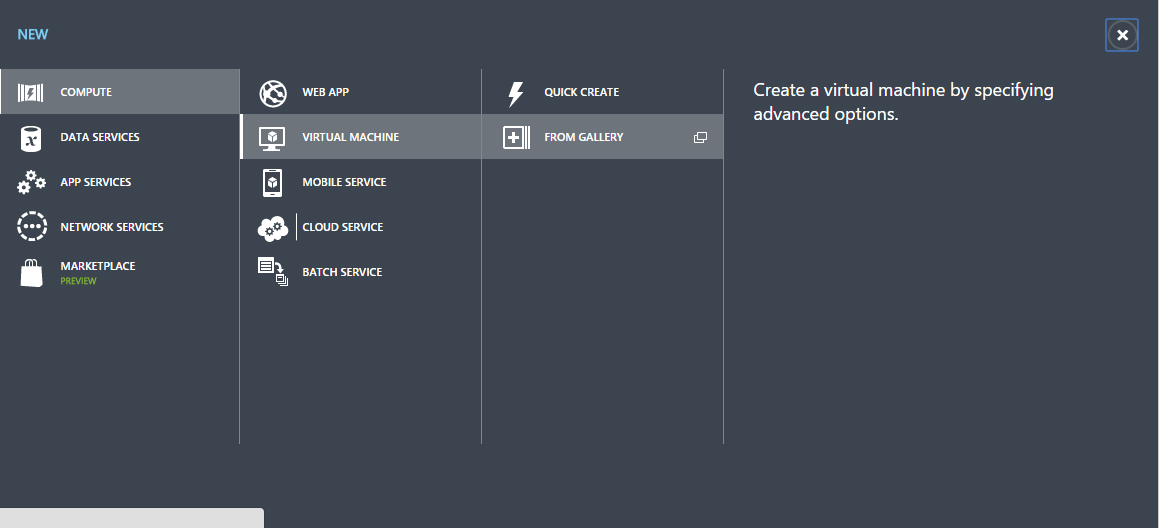
1. In the *Getting Started* dialog, leave the defaults and **click** *Next*.
2. In the *Select Recovery Mode* dialog, keep the defaults and **click** *Next*.
3. In the *Select Volume and Data* dialog, select volume C:\ and then **click** *Next*.
4. In the *Select Items to Recover* dialog, leave the defaults and then **click** *Next.*
5. In the *Specify Recovery Items* dialog, leave the defaults and then **click** *Next*.
6. In the *Confirmation* dialog, **click** *Recover*.
7. After the restore has completed, verify that your files were indeed recovered using File Explorer.

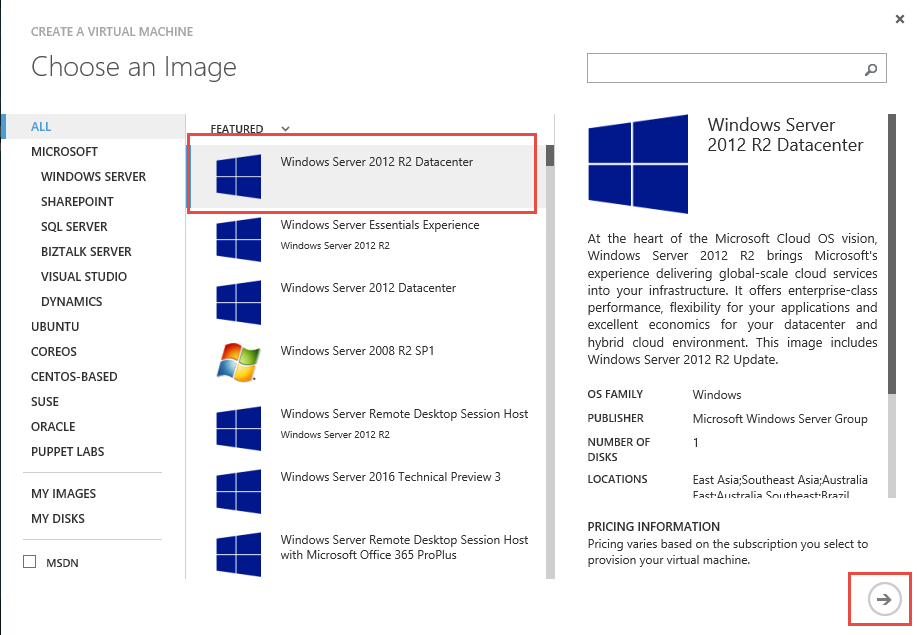
### Exercise 2: Protecting Azure IaaS VM

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|  | The time to complete this exercise, is 45 minutes. |
|  | The key takeaways from this lab are:   * Protecting Azure VMs |
|  |  |

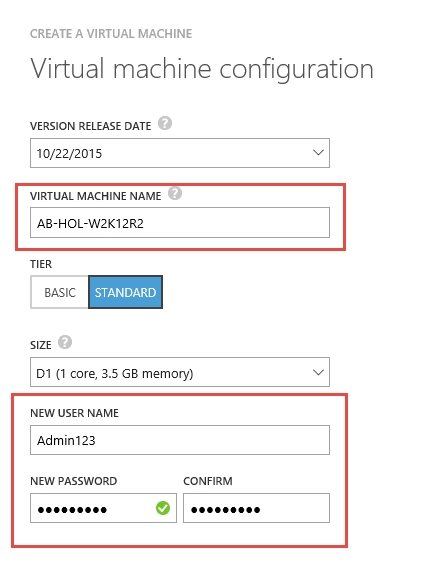
1. Log into AB-HOL-DPM1. Login name is AB-HOL-FABRIKAM\BkpAdmin1 and password is DPMDOMAIN~1
2. Launch Chrome Browser by clicking Chrome icon as shown below:



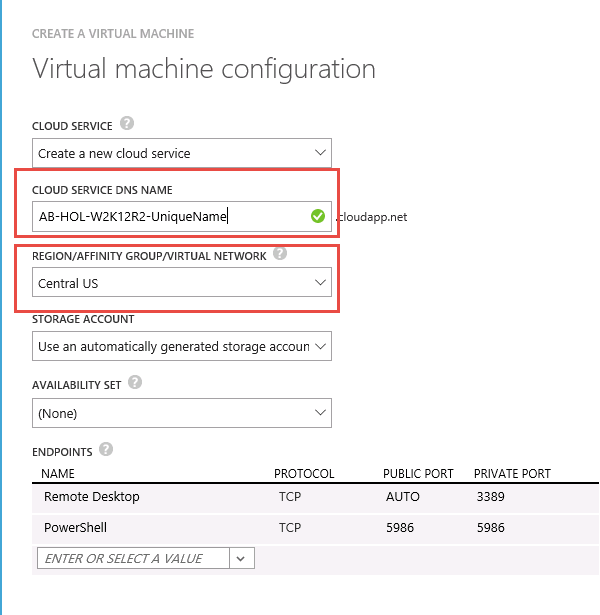
1. Navigate to Azure Management Portal, <https://manage.windowsazure.com>.
2. Login into your Azure Subscription
3. Create a VM by clicking **New**, **Compute**, **Virtual Machine**, **From** **Gallery** as shown below:
4. In the *Choose an Image* dialog, **select** *Windows 2012 R2 Datacenter* as shown below:



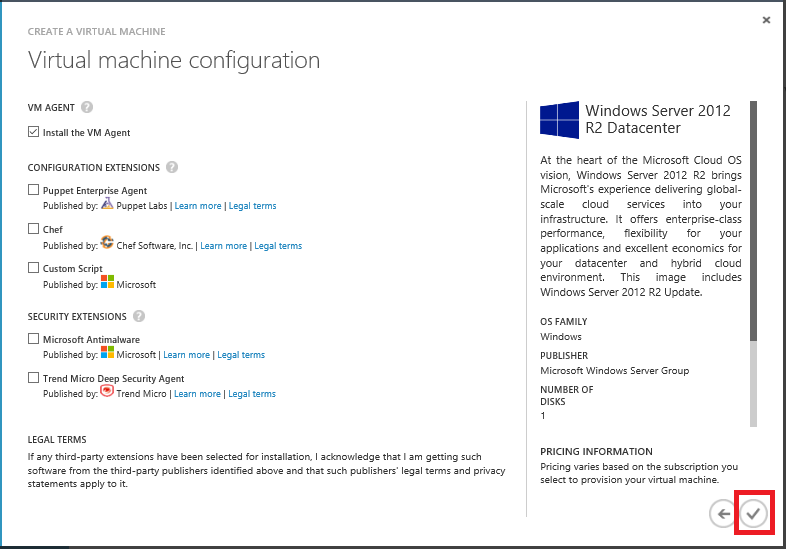
1. Specify the machine name as AB-HOL-W2K12R2 and add user name as Admin123 and a password of your choice then select the next page:



1. Ensure that you have a unique Cloud Service DNS Name, that the region is in Central US, and then create the VM. (**Note:** *The Cloud Service Name can be anything you like*)
2. Click for the next page



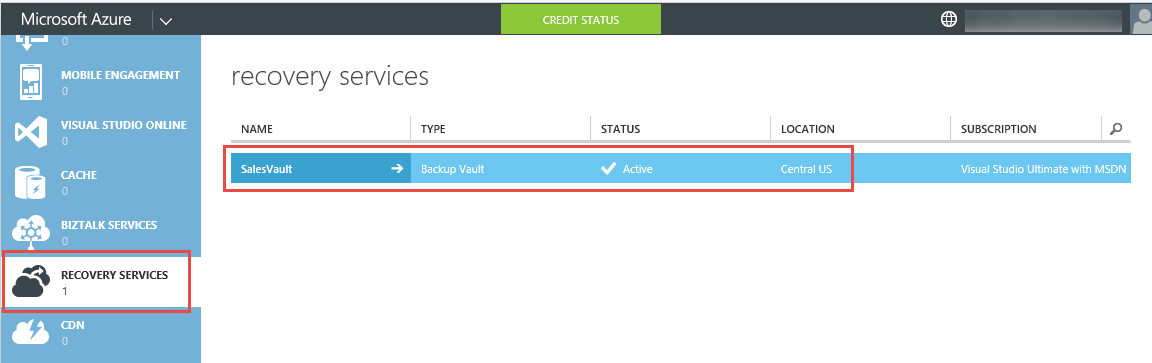
1. Click for the next page

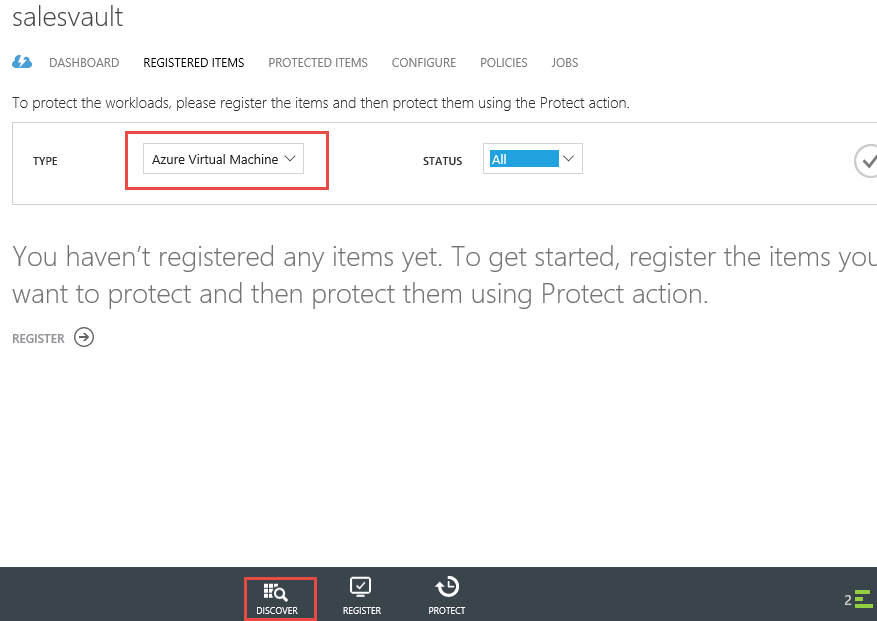


1. Select OK to start the VM creation process.

#### Configure IaaS VM Protection

1. Ensure that the VM that you created in the last section has completed successfully and is running.
2. Navigate to Azure Management Portal, <https://manage.windowsazure.com>.
3. Login into your Azure Subscription.
4. In the portal, **click** Reco*very Services* on the left pane and then **click** on *SalesVault* that you created in the previous exercise.

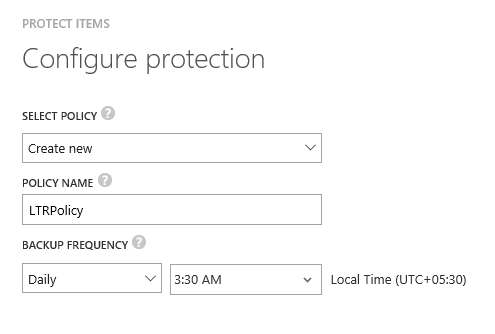


1. In the *SalesVault* main page, **select** *Registered Items*.
2. Ensure that the *Type = “Azure Virtual Machine”* and then **click** *Discover* at the bottom of the page:
3. After *Discover* has completed, **click** *REGISTER* at the bottom of the page. The *Register Items* wizard appears. This wizard only lists virtual machines which are not registered or protected.
4. **Select** the checkbox of the *AB-HOL-W212R2 VM* that we created in the last step.

**Note:** *If you do not see a VM, then it is most likely that the VM is in a different region than SalesVault*

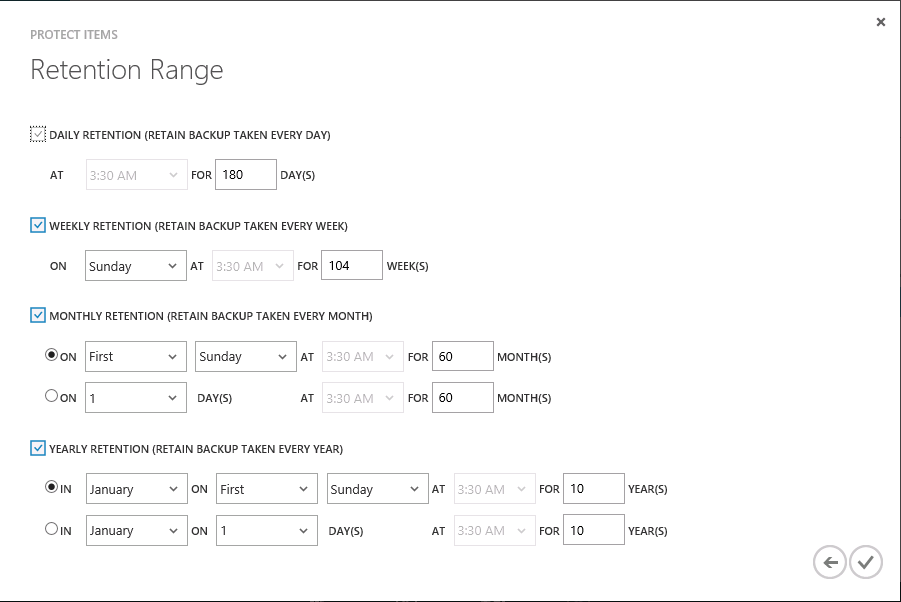
1. **Click** the arrow circle on the lower right hand corner of the wizard.
2. **Click** *PROTECT* at the bottom of the page. The *Protect Items* wizard appears.
3. **Select** the checkbox of the *AB-HOL-W212R2 VM* and choose next.
4. In the second screen of the Protect Items wizard, choose a backup schedule to back up the selected virtual machines. Pick from an existing set of policies or define a new one.

In each backup vault, you can have multiple backup policies. The policies reflect the details about how the backup should be scheduled and retained. For example, one backup policy could be for daily backup at 10:00 P.M., while another backup policy could be for weekly backup on Saturday at 6:00 A.M. Multiple backup policies allow flexibility in scheduling backups for your virtual machine infrastructure.

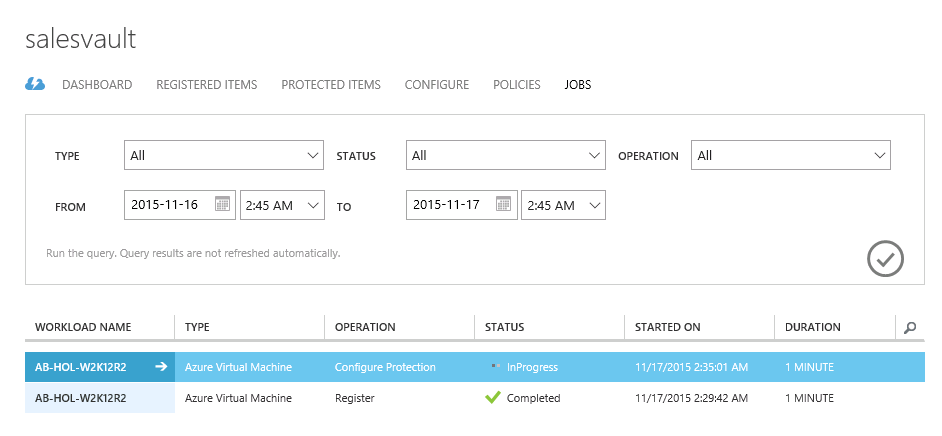
Each backup policy can have multiple virtual machines that are associated with the policy. The virtual machine can be associated with only one policy at any given point in time.

1. In the third screen of the Protect Items wizard, choose a retention range to be associated with backups taken. This screen supports industry standard GFS(Grandfather-Father-Son) based retention scheme. Read more about long Term retention.

A backup policy also involves retention scheme of the scheduled backups. Selecting an existing backup policy in previous screen disables modification of the retention scheme and backups follow the retention policy as defined in the policy.



1. A job is created for each virtual machine to configure the protection policy and to associate the virtual machines to the policy. **Click** the *Jobs* tab and choose the right filter to view the list of *Configure Protection* jobs.

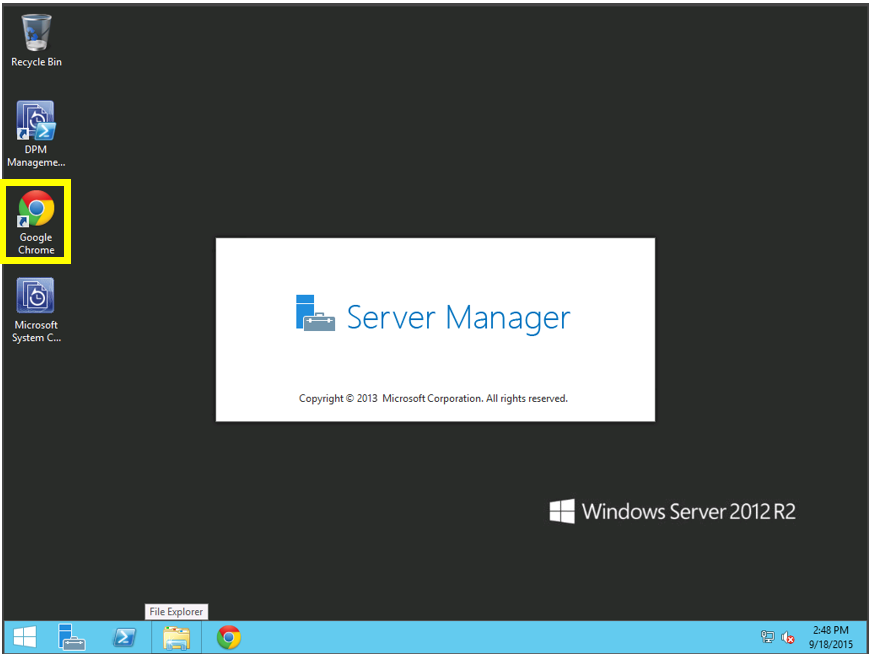


### Exercise 3: Protecting SQL Databases to Azure from DPM

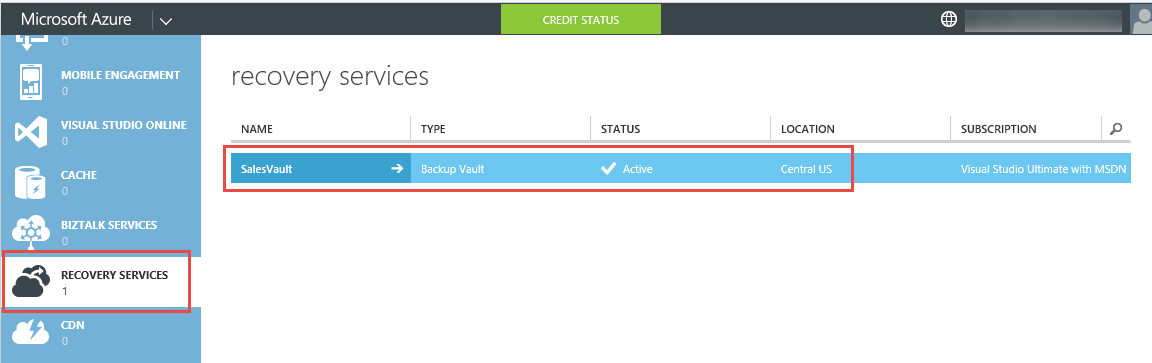
|  |  |
| --- | --- |
|  | The time to complete this module, including exercises, is 30 minutes. |
|  | The key takeaways from this lab are:   * How to protect SQL Databases to Microsoft Azure with Microsoft Data Protection Manager |
|  |  |

#### Register DPM with Azure Site Recovery

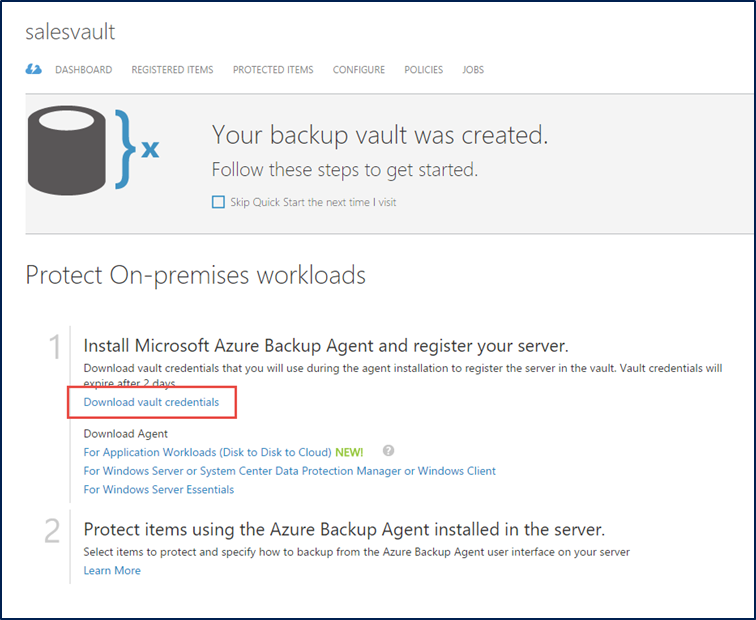
1. Log into AB-HOL-DPM1. Login name is AB-HOL-FABRIKAM\BkpAdmin1 and password is DPMDOMAIN~1
2. Launch Chrome Browser by clicking Chrome icon as shown below:



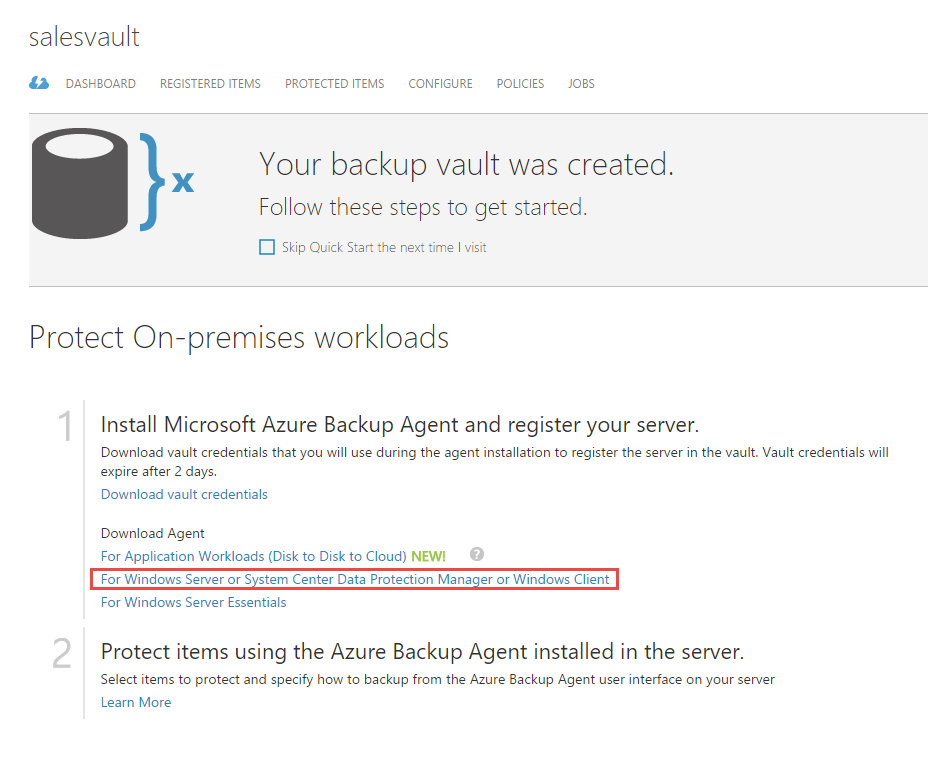
1. Navigate to Azure Management Portal, <https://manage.windowsazure.com>.
2. Login into your Azure Subscription
3. In the portal, **click** Reco*very Services* on the left pane and then **click** on *SalesVault* that you created in the previous exercise.



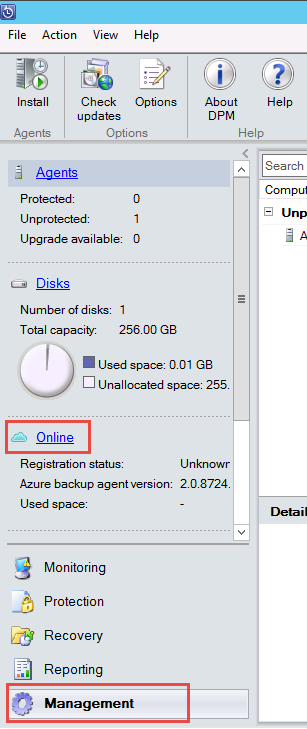
1. In the *SalesVault* main page, **download** the vault credentials and Chrome will store them in the downloads folder of user profile C:\Users\BkpAdmin1\Downloads folder.



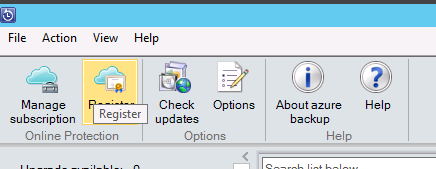
1. On the same page, also download the Microsoft Azure Backup Agent for Windows Server or System Center Data Protection Manager or Windows Client (MARSAgentInstaller.exe) to the user profile downloads folder: C:\Users\BkpAdmin1\Downloads



1. On, AB-HOL-DPM1, **install** the downloaded agent (MARSAgentInstaller.exe). Instructions on how to do this are located in Exercise 1 of this lab.
2. **Open** the *System Center 2012 R2 DPM Administrator Console* shortcut located on the desktop.
3. In the *DPM Console*, **select** the *Management* pane and then **select** Online:



1. Next, **click** on *Register* on the top ribbon:

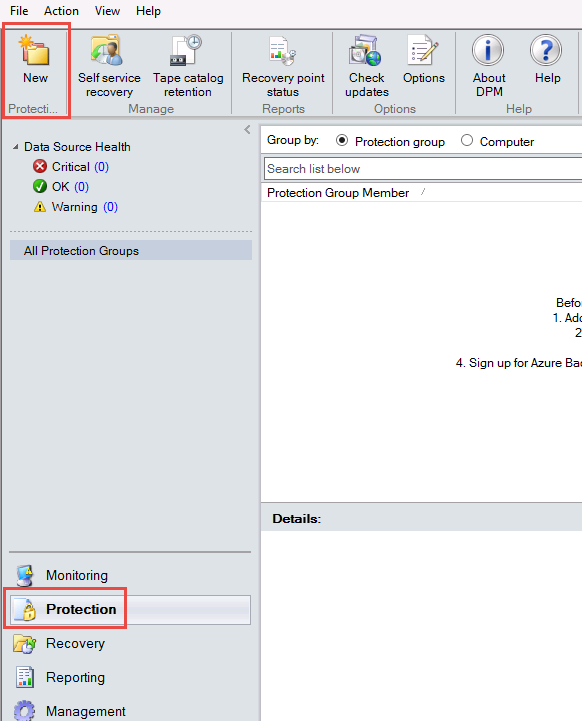


1. In the *Register Server Wizard*, **click** *Next* on the *Proxy Configuration* dialog.
2. In the *Vault Configuration* dialog, **browse to** and **select** the vault credential you downloaded earlier.
3. In the *Network Throttling* dialog, leave the defaults and **select** *Next.*
4. Using *File Explorer*, **create** a folder on the C:\ drive named *RecoveryTemp.*
5. In the *Recovery Folder* dialog, **enter** *C:\RecoveryTemp* as the recovery folder and then **click** *Next*.
6. In the *Encryption Setting* dialog, **type** in or **generate** a passphrase and then click *Next*.

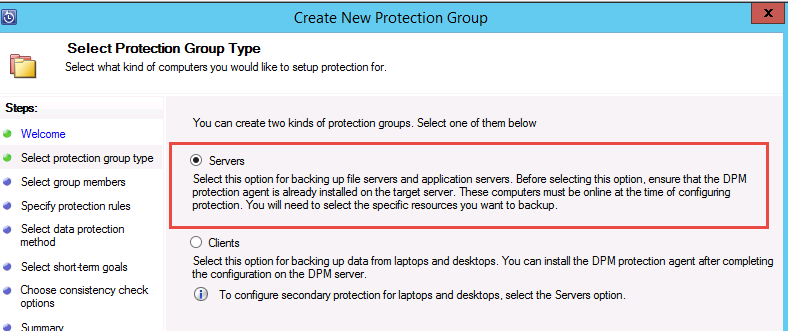
#### Configure Long Term Protection to Azure

This exercise will walk through the steps required to configure long term protection of an on-premises SQL database to Azure.

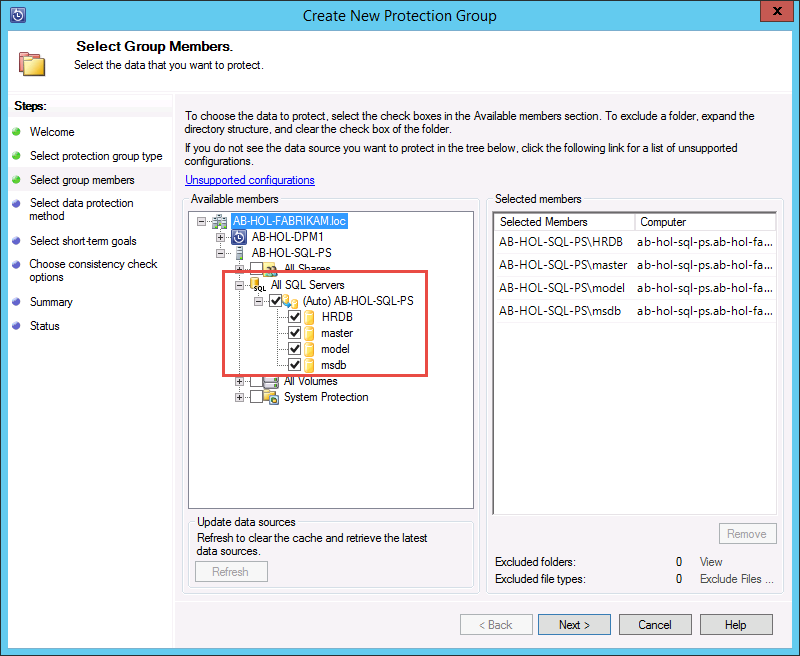
1. Log in to ‘**AB-HOL-DPM1’** server using credentials AB-HOL-FABRIKAM\BKBkpAdmin1, DPMDOMAIN~1
2. In the DPM server console, configure a new backup policy for SQL databases by creating a new Protection Group. Click on the **Protection** workspace.
3. Click on **New** icon in the main ribbon to create a new protection group.



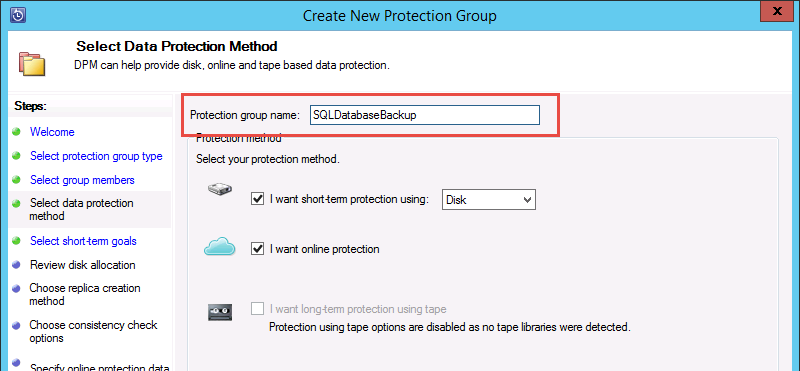
1. In the *Create New Protection Group* wizard, **click** *Next* on the *Welcome to the New Protection Group* dialog.
2. In the *Select Protection Group Type* dialog, **select** *Servers* and then **click** *Next*



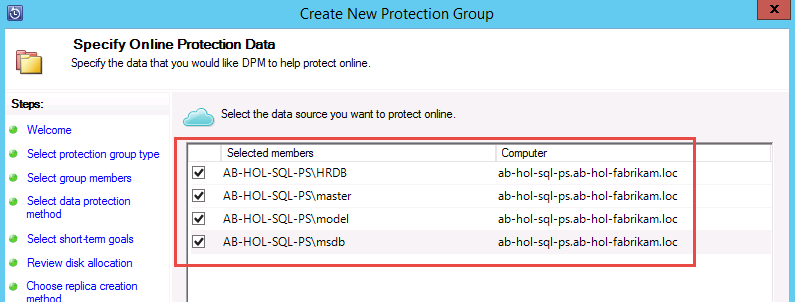
1. In the *Select Group Members* dialog, **expand** the AB-HOL-SQL-PS SQL server where the SQL databases to be backed up are installed. DPM shows various data sources that can be backed up from that server. **Expand** the All SQL Servers. Select the SQL databases to be backed up.
2. Ensure that the HRDB is selected as they would be required in the next exercise recovery scenarios when these databases are lost. **Click** *Next*.



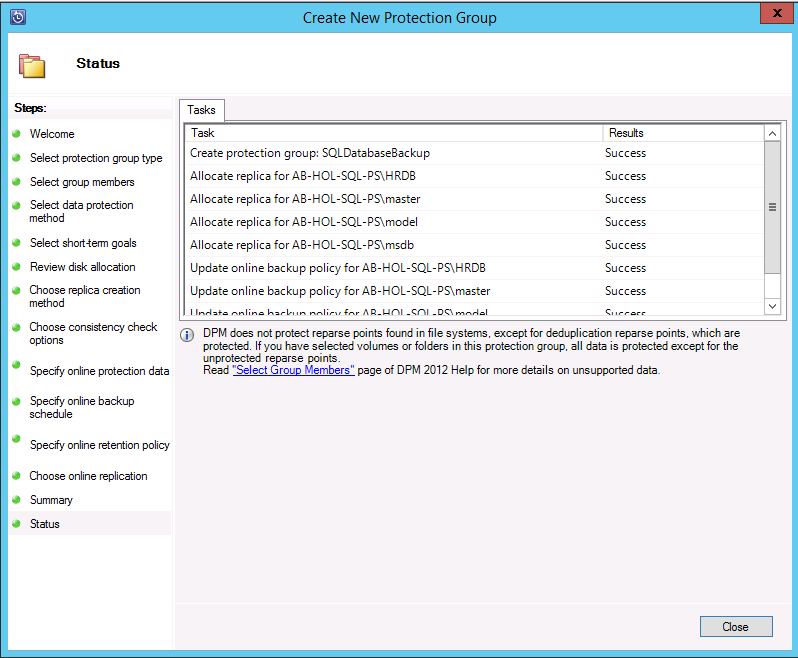
1. In the *Select Data Protection Method* dialog, **type** *SQLDatabaseBackup* as the name for the protection group you are going to create. Ensure “I want Online Protection” option is **selected** and **click** *Next*:



1. In the *Specify Short-Term Goals* dialog, accept the defaults and **click** *Next.*
2. In the *Review Disk Allocation* dialog, accept the defaults and **click** *Next.*
3. In the *Choose Replica Creation Method* dialog, accept the defaults and **click** *Next.*
4. In the *Consistency check options* dialog, accept the defaults and **click** *Next.*
5. In the *Specify Online Protection Data* dialog, **select** all members and then click *Next*:



1. In the *Specify Online Backup Schedule* dialog, accept the defaults and **click** *Next.*
2. In the *Specify Online Retention Policy* dialog, accept the defaults and **click** *Next.*
3. In the *Choose Online Replication* dialog, accept the defaults and **click** *Next.*
4. In *Summary* dialog, accept the defaults and **click** *Create Group.*
5. Watch the status and wait until the group finishes creating.

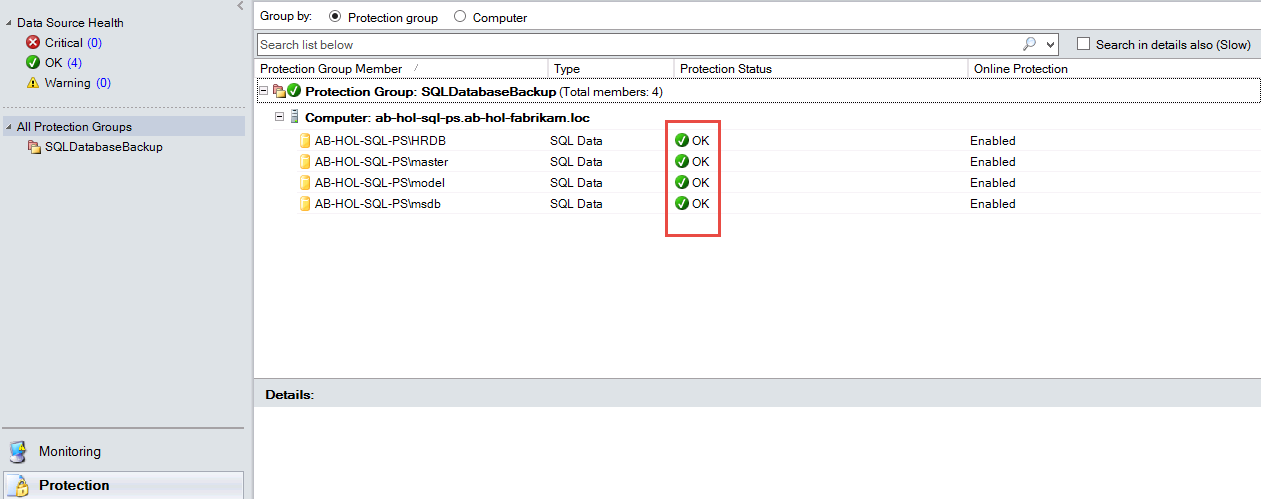


### Exercise 4: Restoring Databases using DPM and Microsoft Azure

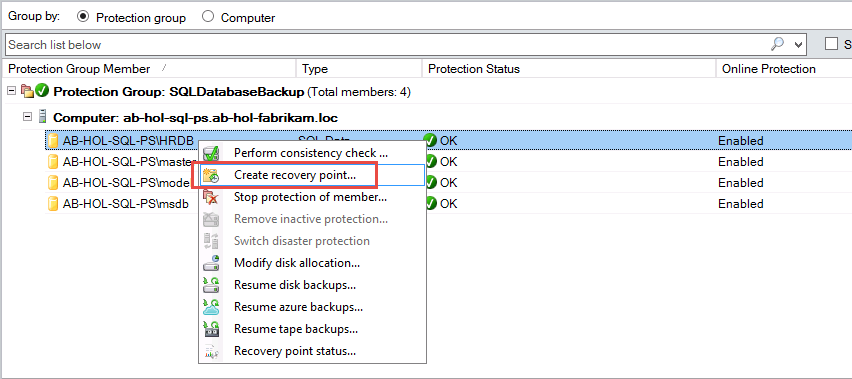
|  |  |
| --- | --- |
|  | The time to complete this module, including exercises, is 30 minutes. |
|  | The key takeaways from this lab are:   * Recovering Databases from Microsoft Azure using System Center Data Protection Manager |
|  |  |

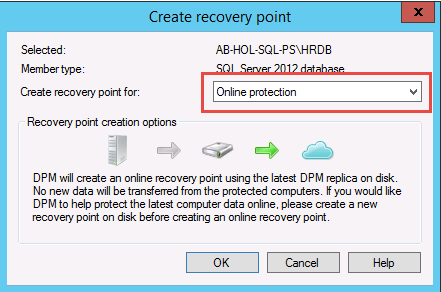
#### Manually Create a Recovery Point

While the previous exercise created a backup policy, a “recovery point” is created only when the first backup happens. Rather than waiting for the scheduler to kick in, this exercise walks through the steps required to trigger the creation of a recovery point manually.

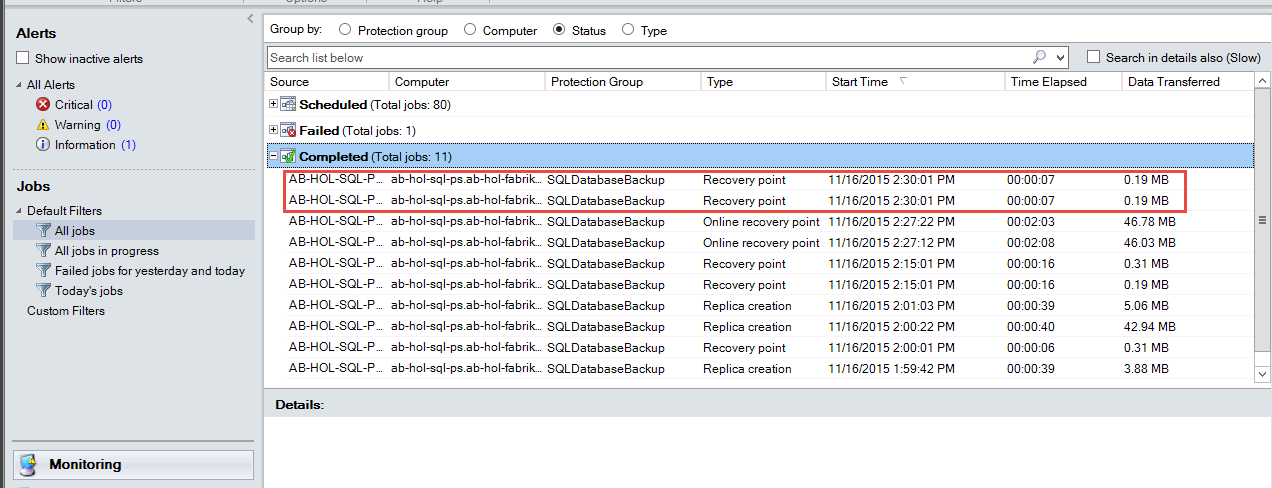


1. **Right-Click** on *AB-HOL-SQL-PS\HRDB* and **select** *Create Recovery Point*. **Choose** *Online Protection* in the drop down and **Click** *OK.* This starts the creation of a recovery point in Microsoft Azure.



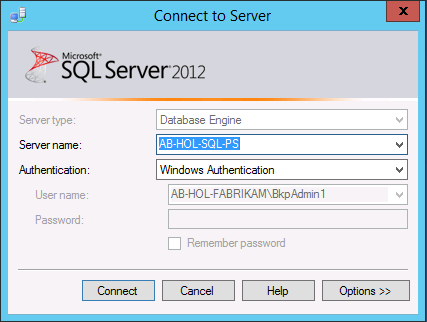


1. You can view the job progress in the Monitoring workspace. Wait for the job to finish before proceeding.

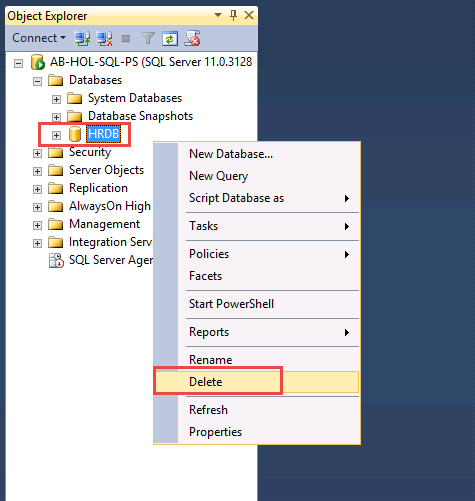


#### Delete the Database

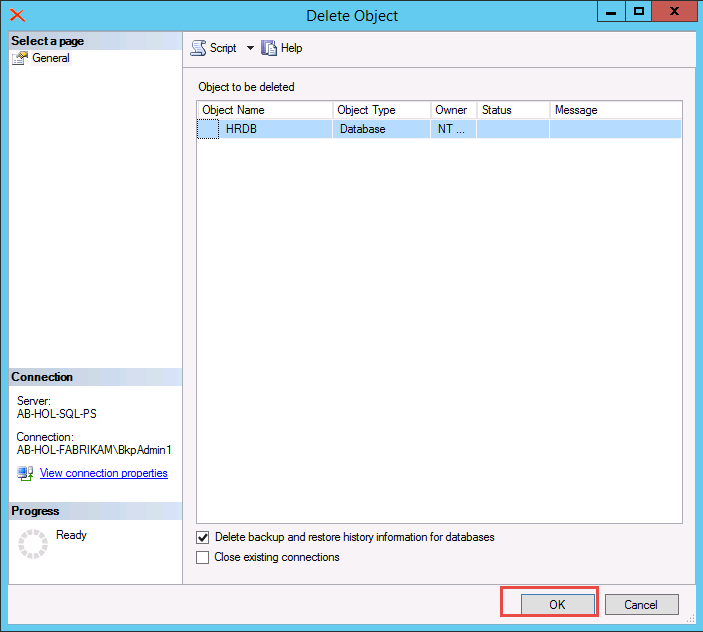
1. Before initiating a recovery workflow, let’s simulate a “disaster” by deleting the SQL database. To achieve this, **Login** to *AB-HOL-SQL-PS* Server.
2. Once you log in to the SQL server, search for *SQL Server Management Studio* and open the application. (***Note****: SQL Server Management Studio should be attached to the toolbar*.)
3. The *Connect to Server* dialog should look like this:



1. **Click** on *Connect.*
2. **Expand** *Databases* in the left-hand tree. Right-Click on the HRDB database and then **select** *Delete*.



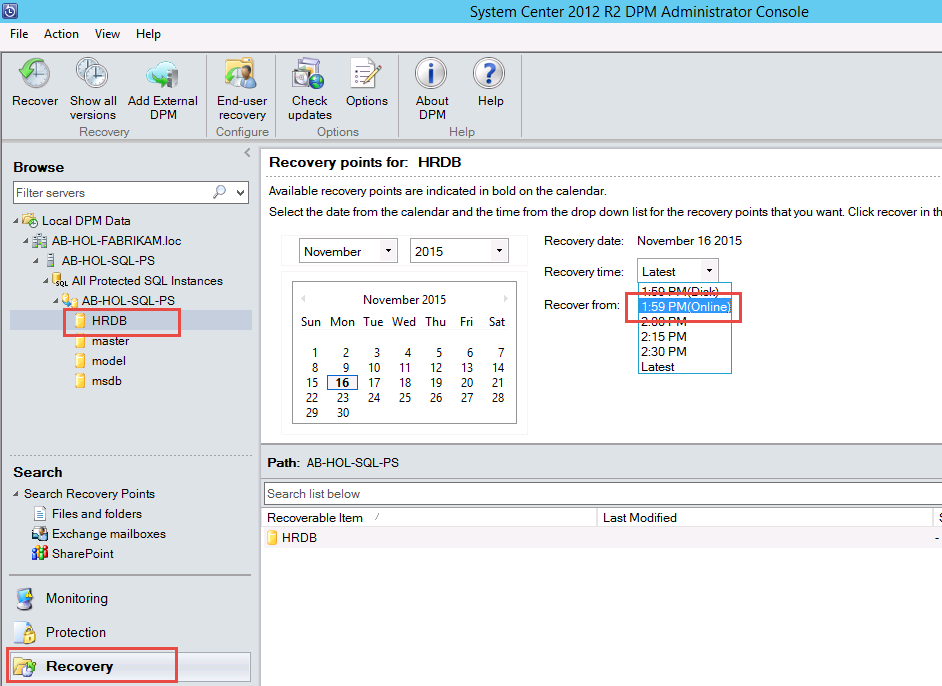
1. In the *Delete Object* dialog, **click** *OK.*



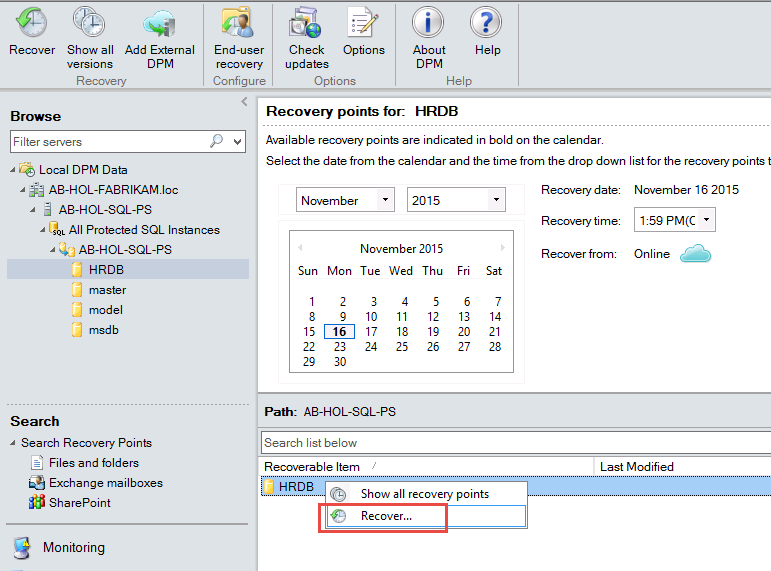
1. Verify that the database was deleted.

#### Recover the Database

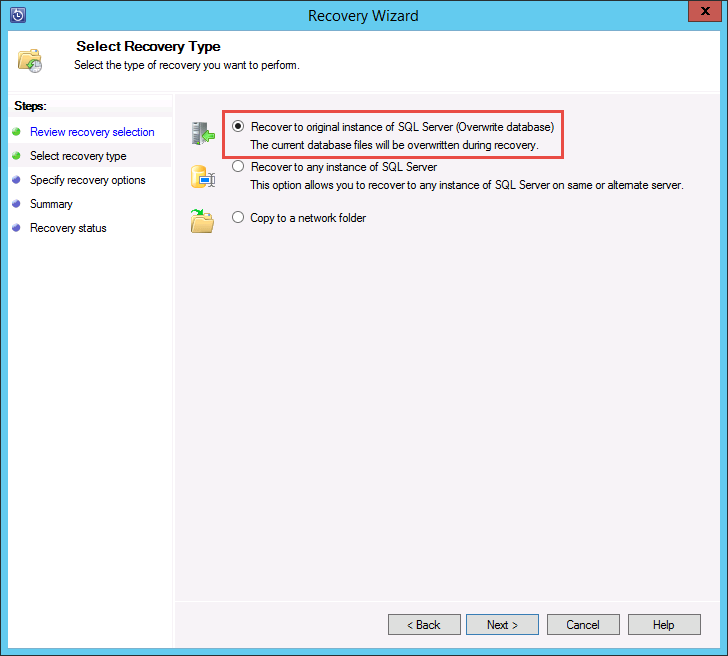
1. To initiate the recovery workflow, login to the DPM server **AB-HOL-DPM1**
2. In the DPM Console, **navigate** to the *Recovery* workspace where you will be able to see the servers backed up by DPM. Browse the database, HRDB. **Select** *Recovery* from time which ends with *Online*.



1. **Right-click** on the *HRDB* database name and click *Recover*



1. In the *Recovery Wizard*, on the *Review Recovery Selection* dialog, **click** *Next.*
2. In the *Select Recovery Type* dialog, **select** *Recover to original instance of SQL Server (Overwrite database)* and then **click** *Next*.



1. In the *Specify Recovery Options* dialog, leave the defaults and **click** *Next*.
2. In the *Summary* dialog, review the selections and then **click** *Recover*.
3. Wait until recovery has completed. After recovery is completed, you can log onto AB-HOL-SQL-PS and verify that the database has been recovered. (***Note****: You will have to refresh your view in SQL Server Management Studio in order to see the recovered database.*)

## Appendix A - Post-protection activities

### Installation of the backup extension

The Azure Backup service seamlessly handles the upgrade and patching of the backup extension without requiring any cumbersome user intervention. This relieves the user of the "agent management overhead" that is typically associated with backup products.

#### Offline VMs

The backup extension is installed if the VM is running. A running VM also provides the greatest chance of getting an application consistent point. However, the Azure Backup service will continue to back up the VM even if the VM is turned off and the extension could not be installed (aka Offline VM). The impact is seen in the consistency - in such a case the recovery point will be Crash consistent.

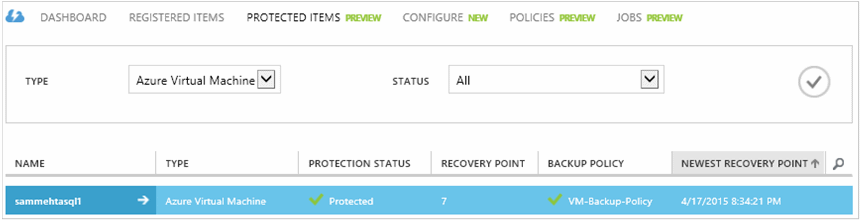
#### Initial backup

Once the virtual machine is protected with a policy, it shows up under the **Protected Items** tab with the status of Protected - (pending initial backup). By default, the first scheduled backup is the initial backup. In order to trigger the initial backup immediately after configuring protection, use the **Backup Now** button at the bottom of the **Protected Items** page.

The Azure Backup service creates a backup job for the initial backup operation. Click the **Jobs** tab to view the list of jobs. As a part of the backup operation, the Azure Backup service issues a command to the backup extension in each virtual machine to flush all writes and take a consistent snapshot.

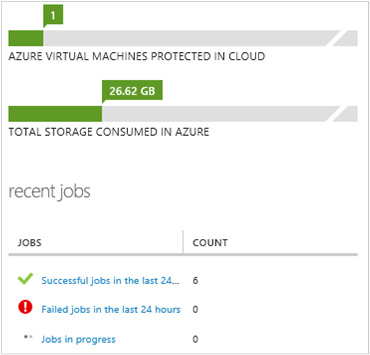


Once the initial backup is completed, the Protection Status of the virtual machine in the **Protected Items** tab will show as Protected.



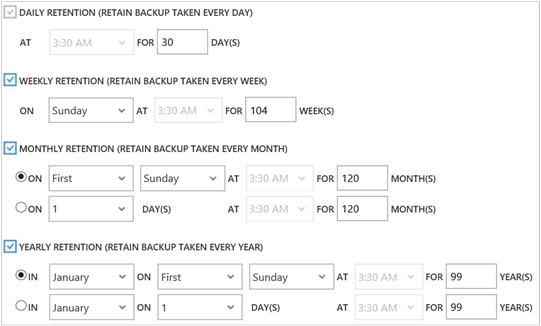
#### Viewing backup status and details

Once protected, the virtual machine count also increases in the **Dashboard** page summary. In addition, the **Dashboard** page shows the number of jobs from the last 24 hours that were successful, have failed, and are still in progress. Clicking on any one category will drill down into that category in the **Jobs** page.



#### Long term retention

Retention policy specifies the duration for which the backup must be stored. Rather than just specifying a “flat retention” for all backup points, customers can specify different retention policies based on when the backup is taken. For example, the backup point taken at the end of each quarter may need to be preserved for a longer duration for audit purposes while the backup point taken daily, which serves as an operational recovery point, needs to be preserved for 90 days.



1. **Daily retention policy**: Backups taken daily are stored for 30 days.
2. **Weekly retention policy**: Backups taken every week on Sunday will be preserved for 104 weeks
3. **Monthly retention policy**: Backups taken on the last Sunday of each month will be preserved for 120 months
4. **Yearly retention policy**: Backups taken on the first Sunday of every January will be preserved for 99 years.

## Appendix B - Consistency of recovery points

When dealing with backup data, customers worry about the behavior of the VM after it has been restored. The typical questions that customers ask are:

* Will the virtual machine boot up?
* Will the data be available on the disk (or) is there any data loss?
* Will the application be able to read the data (or) is the data corrupted?
* Will the data make sense to the application (or) is the data self-consistent when read by the application?

The following table explains the types of consistency that are encountered during Azure VM backup and restore.

| CONSISTENCY | VSS-BASED | EXPLANATION AND DETAILS |
| --- | --- | --- |
| Application consistency | Yes | This is the ideal place to be for Microsoft workloads as it ensures:   1. That the VM boots up. 2. There is no corruption. 3. There is no data loss. 4. The data is consistent to the application that uses the data, by involving the application at the time of backup - using VSS.   The Volume Snapshot Service (VSS) ensures that data is written correctly to the storage. Most Microsoft workloads have VSS writers that do workload-specific actions related to data consistency. For example, Microsoft SQL Server has a VSS writer that ensures the writes to the transaction log file and the database are done correctly.  For Azure VM backup, getting an application consistent recovery point means that the backup extension was able to invoke the VSS workflow and complete correctly before the VM snapshot was taken. Naturally, this means that the VSS writers of all the applications in the Azure VM have been invoked as well.  Learn the [basics of VSS](http://blogs.technet.com/b/josebda/archive/2007/10/10/the-basics-of-the-volume-shadow-copy-service-vss.aspx) dive deep into the details of [how it works](https://technet.microsoft.com/library/cc785914%28v=ws.10%29.aspx). |
| File system consistency | Yes - for Windows machines | There are two scenarios where the recovery point can be file-system consistent:   * Backup of Linux VMs in Azure, since Linux does not have an equivalent platform to VSS. * VSS failure during backup for Windows VMs in Azure.   In both these cases, the best that can be done is to ensure that:   1. The VM boots up. 2. There is no corruption. 3. There is no data loss.   Applications need to implement their own "fix-up" mechanism on the restored data. |
| Crash consistency | No | This situation is equivalent to a machine experiencing a "crash" (through either a soft or hard reset). This typically happens when the Azure virtual machine is shut down at the time of backup. For Azure virtual machine backup, getting a crash-consistent recovery point means that Azure Backup gives no guarantees around the consistency of the data on the storage medium - either from the perspective of the operating system or from the perspective of the application. Only data that already exists on the disk at the time of backup is what gets captured and backed up.   While there are no guarantees, in most cases the OS will boot. This is typically followed by a disk checking procedure like chkdsk to fix any corruption errors. Any in-memory data or writes that have not been completely flushed to the disk will be lost. The application typically follows with its own verification mechanism in case data rollback needs to be done. For Azure VM backup, getting a crash consistent recovery point means that Azure Backup gives no guarantees around the consistency of the data on the storage - either from the OS perspective or the application's perspective. This typically happens when the Azure VM is shut down at the time of backup.  As an example, if the transaction log has entries that are not present in the database, then the database software does a rollback till the data is consistent. When dealing with data spread across multiple virtual disks (like spanned volumes), a crash-consistent recovery point provides no guarantees for the correctness of the data. |