

Use Microsoft HPC Pack to Create a Microsoft Azure Compute Cluster

Create an Affinity Group

Affinity groups group your Microsoft Azure services to optimize performance. All services within an affinity group will be located close to each other in the same data center.

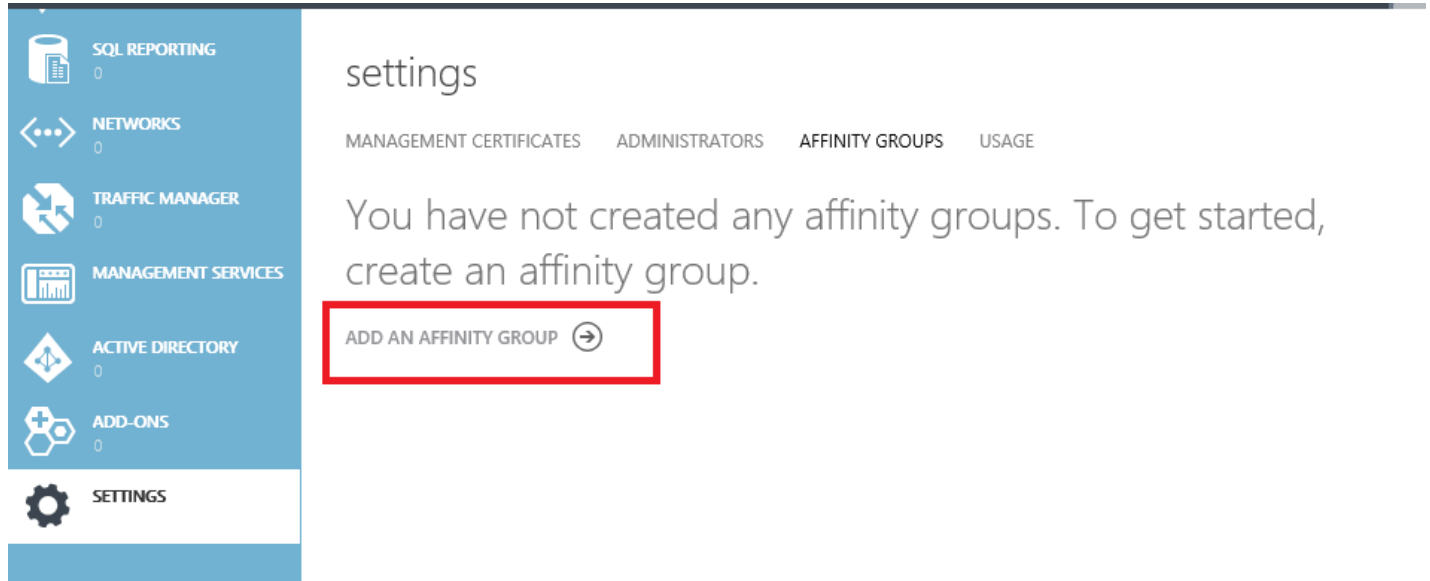
For HPC, it's especially important to use affinity groups because of how Microsoft Azure Data Centers are designed. Basically, Microsoft Azure Data Centers are built using "containers" full of clusters and racks. Each container has specific services, i.e. Compute and Storage, SQL Azure, Service Bus, Access Control Service, etc. Containers are spread across the data center, so when we subscribe or deploy a service the *Fabric Controller* (which chooses based on our solution configuration where the services should be deployed) can place our services anywhere in the data center. This means that even if we choose the same data center for all our Azure services, we cannot guarantee that the services will be physically close together. Using an Affinity Group tells the Fabric Controller that services should always be close together, thereby reducing latency and increasing performance.

IMPORTANT

You must create the affinity group before creating any other services. Services are added to the affinity group at creation time, and once a service is created, you cannot add it to an affinity group.

Here's how you do it:

1. Log in to the [Microsoft Azure Management Portal](#).
2. Click the **Settings** tab, click **Affinity Groups** at the top, and click **Add** in the bottom panel.



1. Enter the affinity name and select a region.
2. Click the checkmark button to create the new affinity group.

Specify affinity group details

NAME

hpcaffinity-group

DESCRIPTION

the hpc affinity group

REGION

East Asia



Create a Storage Account

A *storage account* gives your applications access to Microsoft Azure Blob, Table, and Queue services located in a geographic region. It represents the highest level of the namespace for accessing the storage services and can contain up to 100 TB of blob, queue, and table data.

Storage costs are based on storage utilization and the number of storage transactions required to add, update, read, and delete stored data. Storage utilization is calculated based on your average usage of storage for blobs, tables, and queues during a billing period.

Create a storage account in the affinity group:

1. In the Microsoft Azure Management Portal, click the **Storage** tab and click **New** in the bottom panel.

NEW

COMPUTE **SQL DATABASE** **QUICK CREATE**

DATA SERVICES **STORAGE**

APP SERVICES

NETWORK SERVICES

STORE PREVIEW

HDINSIGHT PREVIEW

CACHE PREVIEW

RECOVERY SERVICES

SQL REPORTING

URL
hpcdata ✓
*.core.windows.net

LOCATION/AFFINITY GROUP
hpcaffinity-group

☒ Enable Geo-Replication

CREATE STORAGE ACCOUNT ✓

1. Click on **Quick Create**, enter the storage URL, and select the affinity group you created in the previous step.
2. Click **Create Storage Account** to create the new account.

Create a Windows Server 2012 Datacenter Virtual Machine

A *virtual machine (VM)* in Microsoft Azure is a server in the cloud that you can control and manage. After you create a virtual machine in Microsoft Azure, you can delete and re-create it whenever you need to, and you can access the virtual machine just like any other server. Virtual hard disks (.vhd files) are used to create a virtual machine. You can use the following types of virtual hard disks to create a virtual machine:

- *Image* An image is a template that you use to create a new virtual machine. An image doesn't have specific settings like a running virtual machine, such as the computer name and user account settings. If you use an image to create a virtual machine, an operating system disk is automatically created for the new virtual machine.
- *Disk* A disk is a VHD that you can boot and mount as a running version of an operating system. After an image is provisioned, it becomes a disk. A disk is always created when you use an image to create a virtual machine. Any VHD that is attached to virtualized hardware and that is running as part of a service is a disk.

We will create a Windows Server 2012 Datacenter VM from the Windows Server 2012 Datacenter image to serve as the HPC compute cluster's *head node*.

IMPORTANT

Windows Server 2012 R2 is currently **not** supported by HPC Pack. Please use Windows Server 2012 edition for creating the head node.

1. Log in to the [Microsoft Azure Management Portal](#).
2. Click on the **Virtual Machines** tab and click on **New** in the bottom panel.

ALL ITEMS

WEB SITES

VIRTUAL MACHINES

MOBILE SERVICES

CLOUD SERVICES

SQL DATABASES

STORAGE

HDINSIGHT

MEDIA SERVICES

SERVICE BUS

virtual machines

VIRTUAL MACHINE INSTANCES

IMAGES

DISKS

NAME	STATUS	SUBSCRIPTION	LOCATION	DNS NAME
datastreamvm	Running	Azpas300A0U8655	East Asia	datastreamvm.cloudapp.net
datastreamvm2	Running	Azpas300A0U8655	East Asia	datastreamvm2.cloudapp.net
hpc-cluster	Starting (Provisioning)	Azpas300A0U8655	-	hpc-cluster.cloudapp.net
ipythonmgr	Running	Azpas300A0U8655	East Asia	ipythonmgr.cloudapp.net
msrlinuxvm	Running	Azpas300A0U8655	East Asia	msrlinuxvm.cloudapp.net
msrwindowsvm	Running	Azpas300A0U8655	East Asia	msrtrainingvm.cloudapp.net
pythoncluster1	Running	Azpas300A0U8655	East Asia	pythoncluster.cloudapp.net
pythoncluster2	Running	Azpas300A0U8655	East Asia	pythoncluster.cloudapp.net
pythoncluster20	Running	Azpas300A0U8655	East Asia	pythoncluer2.cloudapp.net
pythoncluster21	Running	Azpas300A0U8655	East Asia	pythoncluer2.cloudapp.net
pythoncluster22	Running	Azpas300A0U8655	East Asia	pythoncluer2.cloudapp.net

NEW

CONNECT

RESTART

SHUT DOWN

ATTACH

DETACH DISK

CAPTURE

DELETE

1. Click on **Compute**, **Virtual Machine**, then **Quick Create**.
2. Enter the DNS name, select **Windows Server 2012 Datacenter** in the Image drop down box, select the **Large** machine size, enter the username and password you will use to connect to the VM, and select the affinity group from the drop down list.

NEW

COMPUTE

DATA SERVICES

APP SERVICES

NETWORK SERVICES

STORE PREVIEW

WEB SITE

VIRTUAL MACHINE

MOBILE SERVICE

CLOUD SERVICE

QUICK CREATE

FROM GALLERY

DNS NAME

hpc-cluster ✓

IMAGE

Windows Server 2012

SIZE

Large (4 cores, 7 GB m)

USER NAME

azureuser

NEW PASSWORD

CONFIRM

REGION/AFFINITY GROUP

hpcaffinity-group

CREATE A VIRTUAL MACHINE ✓

Azure will automatically provision and boot the VM once it is created. It will take a few minutes for the new VM to be provisioned. You should see your new VM in the virtual machines listing when it is done.

INFO

Creating a VM in this way accomplishes several important tasks for you automatically. First, a **virtual hard disk (VHD)** file has been created for you in **blob storage**. When you create files in the VM, this is where they are actually stored. Secondly, a cloud service has been created for you so you can reach your VM at <http://your-vm-name.cloudapp.net/>.

1. If you want other machines can manage your cluster head node, you need to add an endpoint and open port 5800. Click the endpoint tab of the virtual machine.

hpc-cluster

DASHBOARD

MONITOR

ENDPOINTS

CONFIGURE

NAME	PROTOCOL	PUBLIC PORT	PRIVATE PORT	LOAD-BALANCED SET NA...
PowerShell	TCP	5986	5986	-
Remote Desktop	TCP	61905	3389	-

2. Click Add, Select "Add Standalone Endpoint".

ADD ENDPOINT



Add an endpoint to a virtual machine

Traffic coming to this endpoint will be sent to the virtual machine.

☒ ADD STANDALONE ENDPOINT

☐ ADD AN ENDPOINT TO AN EXISTING LOAD-BALANCED SET ?

(None)



3. Input the endpoint name, protocol, public port and private port.

ADD ENDPOINT



Specify the details of the endpoint

NAME

Cluster Manager

PROTOCOL

TCP

PUBLIC PORT

5800

PRIVATE PORT

5800

☐ CREATE A LOAD-BALANCED SET ?



4. You should also do the same steps for port 9893.

Connect to the VM with Remote Desktop Connection

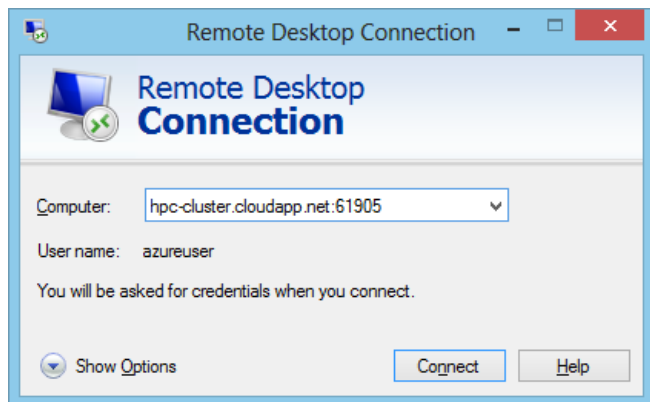
1. Once your VM has been created and started, go to the **Virtual Machines** tab and select it.

2. With the VM selected, click **Connect** in the bottom panel to download an RDP file to your local machine that tells the Remote Desktop Connection Client how to connect to the new VM.

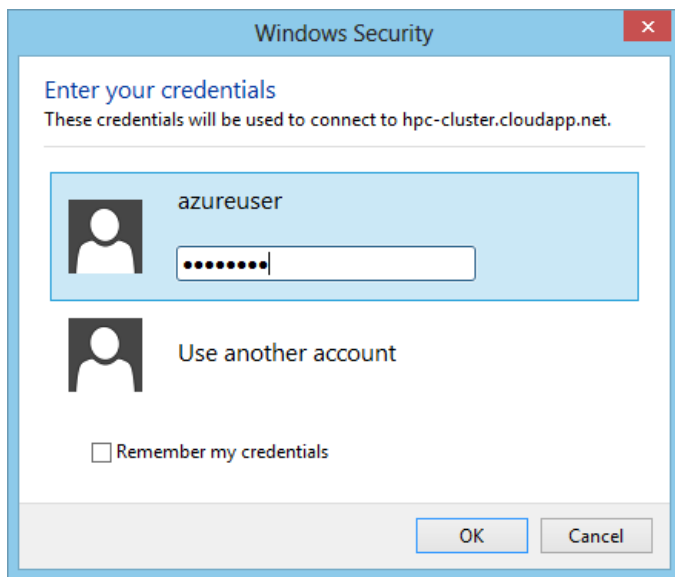
The screenshot shows the Azure portal interface for virtual machines. On the left is a navigation pane with categories like ALL ITEMS, WEB SITES, VIRTUAL MACHINES (14), MOBILE SERVICES (0), CLOUD SERVICES (14), SQL DATABASES (0), STORAGE (8), HDINSIGHT (1), MEDIA SERVICES (0), and SERVICE BUS. The main area is titled 'virtual machines' and contains a table of 'VIRTUAL MACHINE INSTANCES'. The table has columns for NAME, STATUS, SUBSCRIPTION, and LOCATION. The 'hpc-cluster' VM is highlighted with a red box. Below the table is a toolbar with buttons: NEW, CONNECT (highlighted with a red box), RESTART, SHUT DOWN, ATTACH, DETACH DISK, CAPTURE, and DELETE.

NAME	STATUS	SUBSCRIPTION	LOCATION
datastreamvm	Running	Azpas300A0U8655	East Asia
datastreamvm2	Running	Azpas300A0U8655	East Asia
hpc-cluster	Running	Azpas300A0U8655	hpcaffinity-group (East Asia)
ipythonmgr	Running	Azpas300A0U8655	East Asia
msrlinuxvm	Running	Azpas300A0U8655	East Asia
msrwindowsvm	Running	Azpas300A0U8655	East Asia
pythoncluster1	Running	Azpas300A0U8655	East Asia
pythoncluster2	Running	Azpas300A0U8655	East Asia
pythoncluster20	Running	Azpas300A0U8655	East Asia
pythoncluster21	Running	Azpas300A0U8655	East Asia
pythoncluster22	Running	Azpas300A0U8655	East Asia

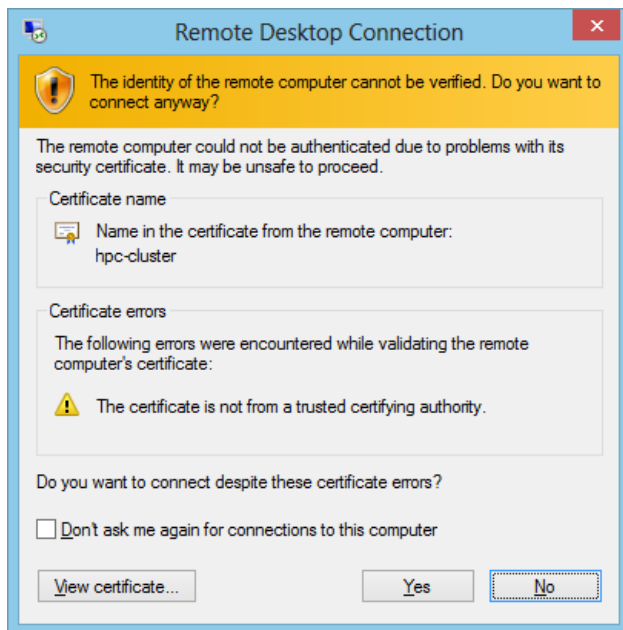
1. Double-click the RDP file to open the connection.



When prompted for credentials, enter the username and password you gave when you created the VM.



Don't worry if you see a certificate warning. Just click **Connect**.



1. The Server Manager will open automatically once you're logged in. Server Manager is your starting point for almost all management tasks in Windows Server 2012.

WARNING

Remote Desktop Connection Client won't connect to unknown versions of Windows. If you're being adventurous and created a VM with a preview version of Windows Server then you may not be able to continue.

Download Microsoft HPC Pack

We need a new Active Directory forest for your compute cluster. In fact, Microsoft HPC Pack won't install without first promoting our new Windows Server 2012 to an Active Directory domain controller and adding a domain user. Don't worry, this is easy. We'll even work in parallel by downloading Microsoft HPC Pack to the VM while we install Active Directory.

1. Before you do anything, you need to disable Internet Explorer Enhanced Security Configuration so we can download files from the Internet. In Server Manager, click on **Local Server**. In the Properties pane, click the little blue word **On** next to **IE Enhanced Security Configuration**. (You may need to scroll over if your screen resolution is low.)

Server Manager

Server Manager ▸ Local Server

Local Server

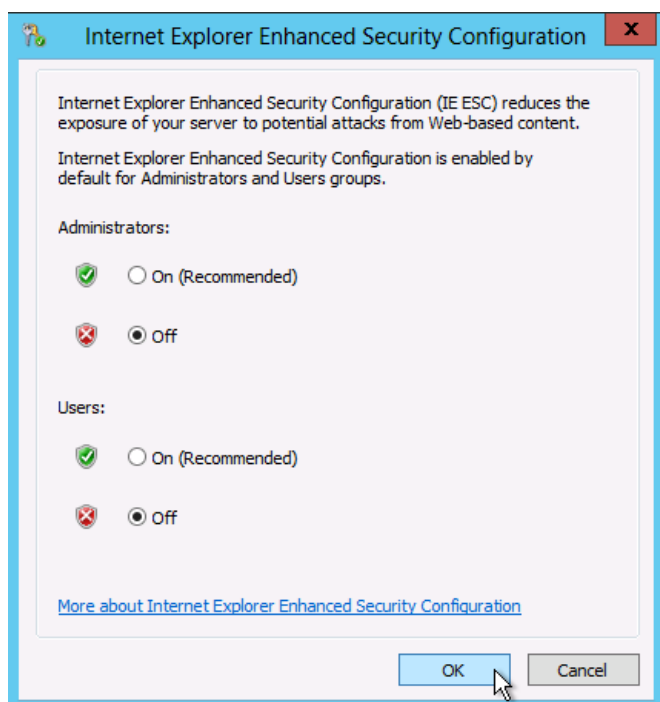
PROPERTIES
For paratools01

Computer name	paratools01	Last installed updates	Never
Workgroup	WORKGROUP	Windows Update	Install up
		Last checked for updates	Today at
Windows Firewall	Public: On	Windows Error Reporting	Off
Remote management	Disabled	Customer Experience Improvement Program	Not partic
Remote Desktop	Enabled	IE Enhanced Security Configuration	On
NIC Teaming	Disabled	Time zone	(UTC) Coc
Ethernet 2	IPv4 address assigned by DHCP, IPv6 enabled	Product ID	00184-90
Operating system version	Microsoft Windows Server 2012 Datacenter	Processors	AMD Opt
Hardware information	Microsoft Corporation Virtual Machine	Installed memory (RAM)	7 GB
		Total disk space	412 GB

EVENTS
All events | 7 total

Server Name	ID	Severity	Source	Log	Date and Time
PARATOOLS01	15301	Warning	Microsoft-Windows-HttpEvent	System	8/19/2013 1:08:53 PM
PARATOOLS01	10149	Warning	Microsoft-Windows-Windows Remote Management	System	8/19/2013 1:08:53 PM
PARATOOLS01	134	Warning	Microsoft-Windows-Time-Service	System	8/19/2013 1:08:41 PM

Select **Off** for both Administrators and Users and click OK.



Internet Explorer Enhanced Security Configuration places your server and Internet Explorer in a configuration that decreases the exposure of your server to potential attacks that can occur through Web content and application scripts. This is a good thing for servers, but unfortunately it makes

IE effectively unusable on the Internet at large. We have to disable this feature or we won't be able to download HPC Pack from the Microsoft website. You can learn more about Enhanced Security Configuration [in this Technet article](#).

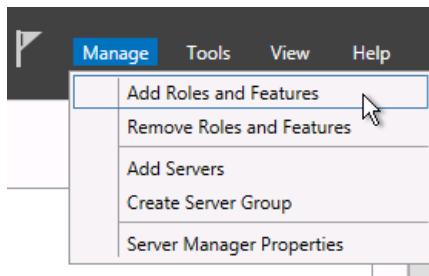
1. Once IE ESC is disabled, open Internet Explorer and go to <http://www.microsoft.com/en-us/download/details.aspx?id=36054>. Click **Download** and then click **Save** to begin the download. The file is almost 2GB large, so continue to the next step and install Active Directory while the transfer completes.



Install the Active Directory Role

While you're waiting for HPC Pack to download to the VM, we'll go ahead and install Microsoft Active Directory in the VM and configure a new Active Directory forest for your compute cluster.

1. In the Server Manager, click on **Manage** in the top-right corner and select **Add Roles and Features**



1. Click **Next** to skip the first screen. (If you like, you may check the box at the bottom to skip this screen automatically next time.)
2. Select **Role-based or feature-based installation** and click Next.

Add Roles and Features Wizard

DESTINATION SERVER
hpc-cluster

Select installation type

Before You Begin
Installation Type
 Server Selection
 Server Roles
 Features
 Confirmation
 Results

Select the installation type. You can install roles and features on a running physical computer or virtual machine, or on an offline virtual hard disk (VHD).

- ☒ **Role-based or feature-based installation**
Configure a single server by adding roles, role services, and features.
- ☐ **Remote Desktop Services installation**
Install required role services for Virtual Desktop Infrastructure (VDI) to create a virtual machine-based or session-based desktop deployment.

< Previous Next > Install Cancel

1. The head node will be automatically selected on the Server Selection tab. Just click **Next** to continue.

Add Roles and Features Wizard

DESTINATION SERVER
hpc-cluster

Select destination server

Before You Begin
 Installation Type
Server Selection
 Server Roles
 Features
 Confirmation
 Results

Select a server or a virtual hard disk on which to install roles and features.

- ☒ Select a server from the server pool
- ☐ Select a virtual hard disk

Server Pool

Filter:

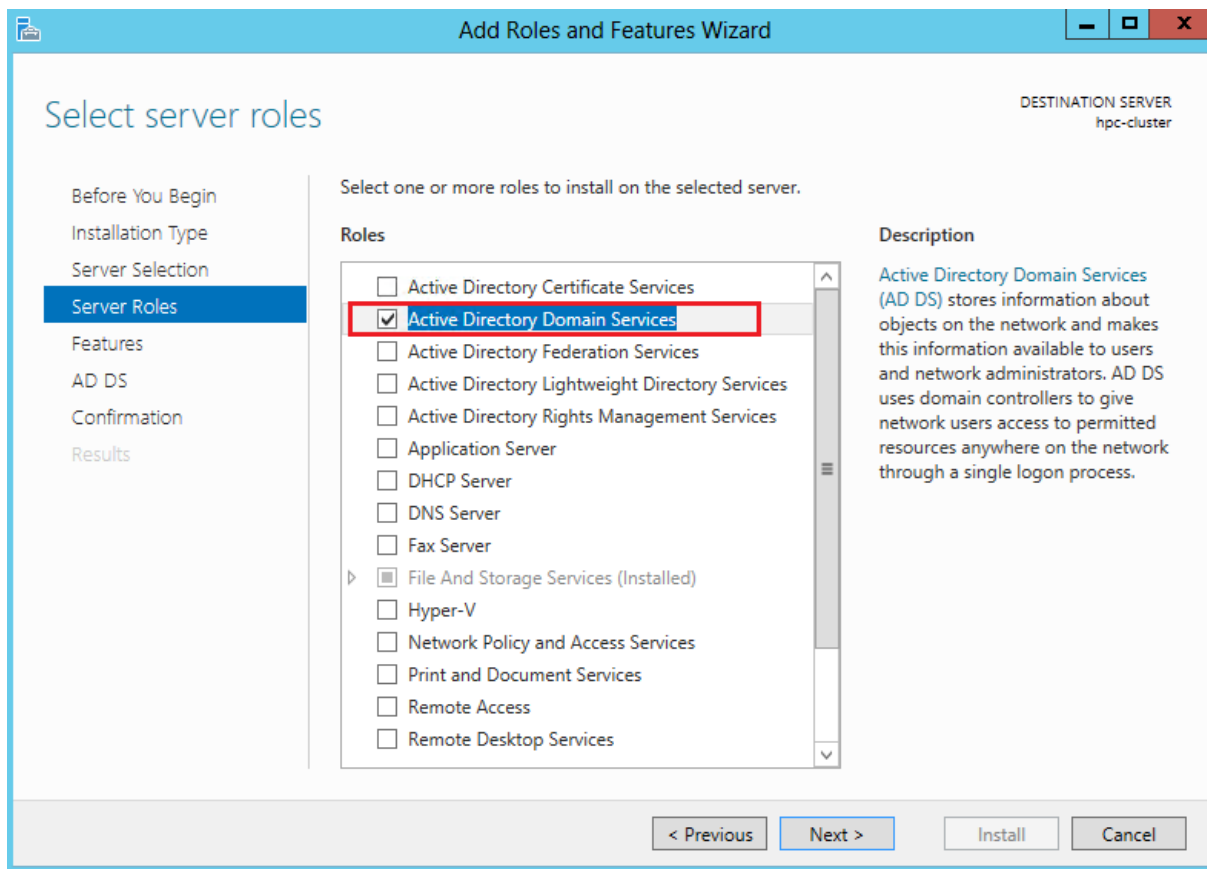
Name	IP Address	Operating System
hpc-cluster	10.24.200.52	Microsoft Windows Server 2012 Datacenter

1 Computer(s) found

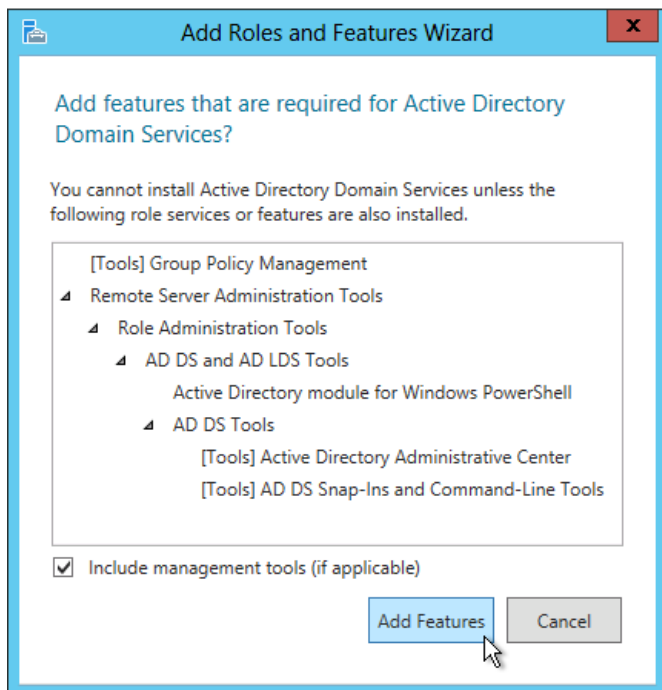
This page shows servers that are running Windows Server 2012, and that have been added by using the Add Servers command in Server Manager. Offline servers and newly-added servers from which data collection is still incomplete are not shown.

< Previous Next > Install Cancel

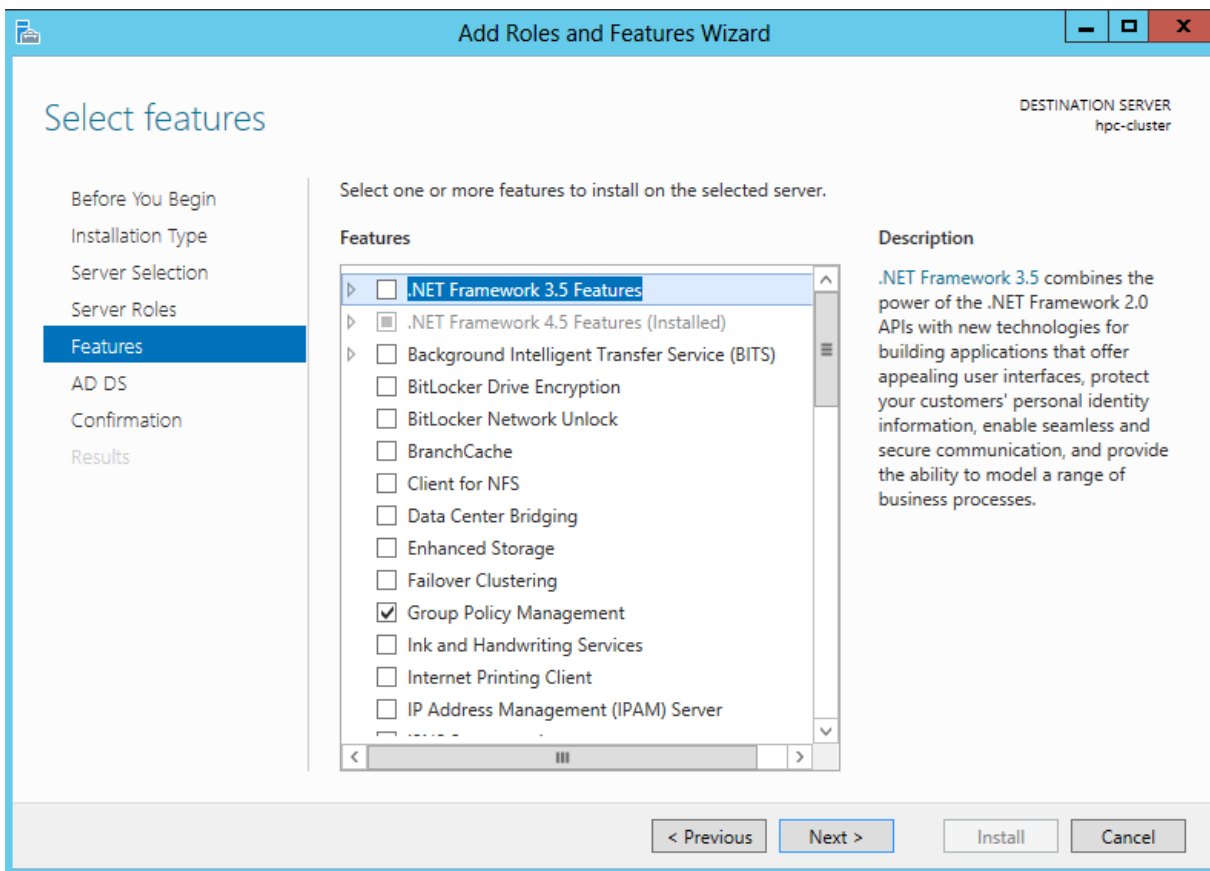
1. Check the box next to **Active Directory Domain Services** on the Server Roles tab.



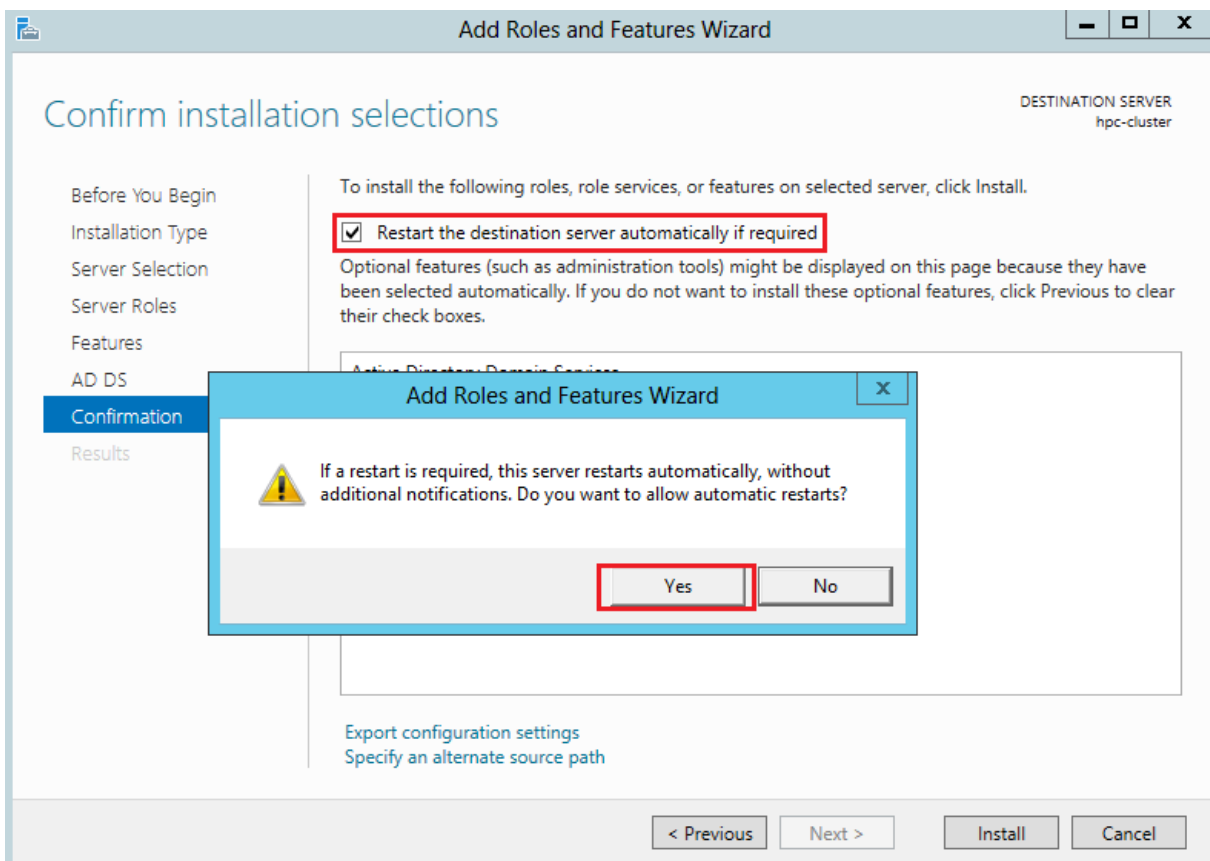
Several features must also be installed to add the Active Directory role. Click **Add Features** on the popup box to continue.



1. Click **Next** on the Features tab. All the features you need have already been selected.



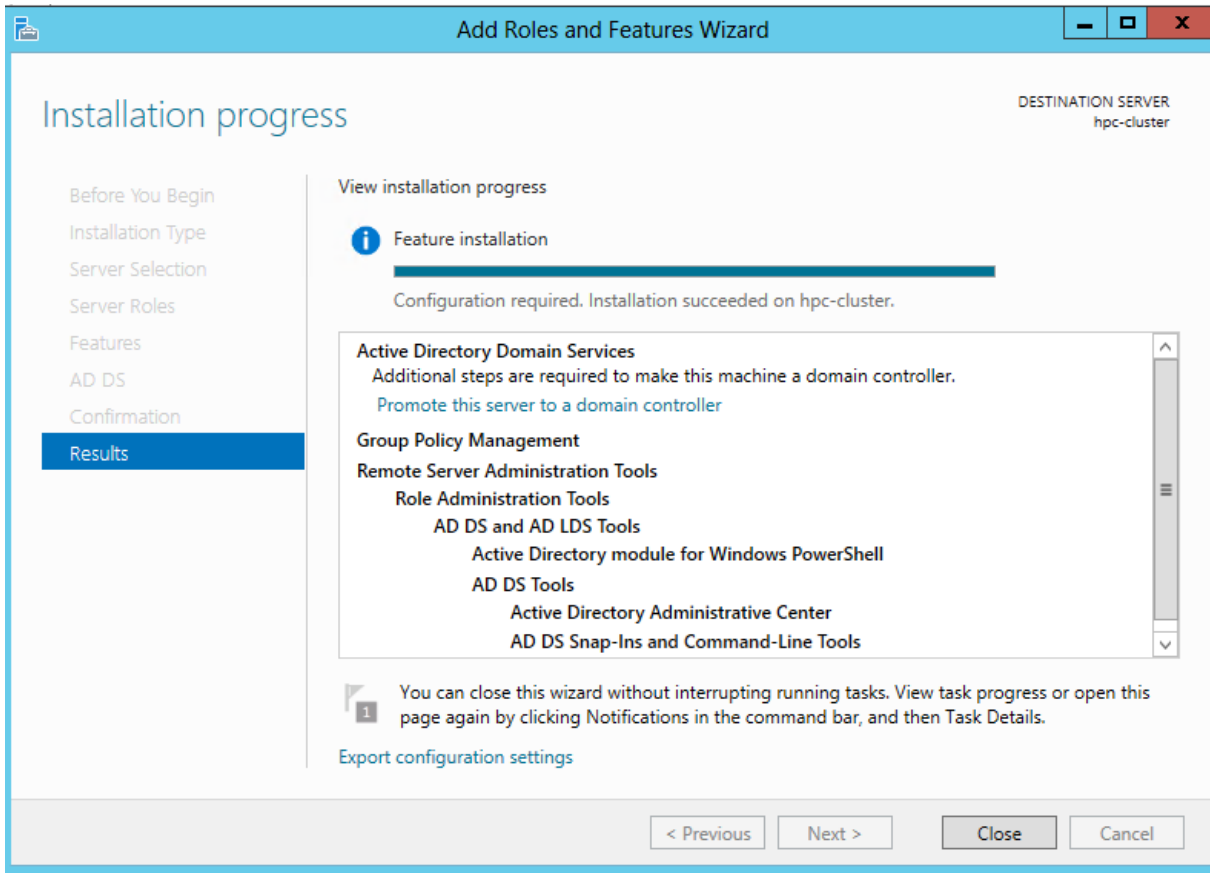
1. Click **Next** until you reach the Confirmation tab. On the Confirmation tab, check the box labeled **Restart the destination server automatically if required** and confirm by clicking **Yes** on the popup box.



1. Click **Install** to begin the installation process. This will take several minutes, so go grab a coffee or check your e-mail or something. Note that you may be disconnected from the VM when it restarts. Don't worry, if you get disconnected just double-click the RDP file we downloaded

earlier to reconnect.

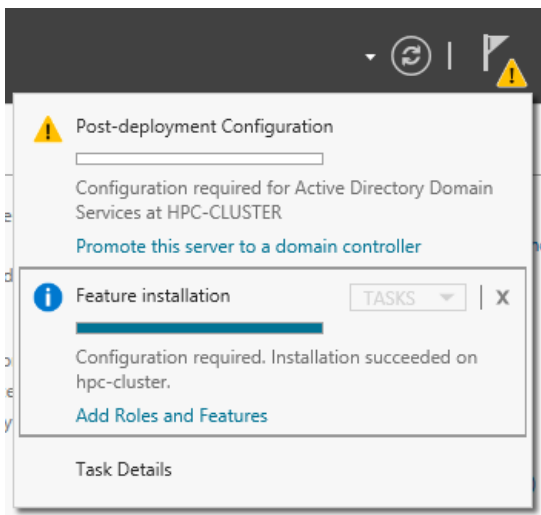
2. Click **Close** to close the installation progress window.



Promote the Server to a Domain Controller

We need to establish a new Active Directory domain for the HPC cluster. To do that, we will promote the Windows Server 2012 VM to an Active Directory domain controller

1. After Active Directory installation is complete, you'll see a yellow sign appear in the notifications area of the Server Manager. Click on it and select **Promote this server to a domain controller**



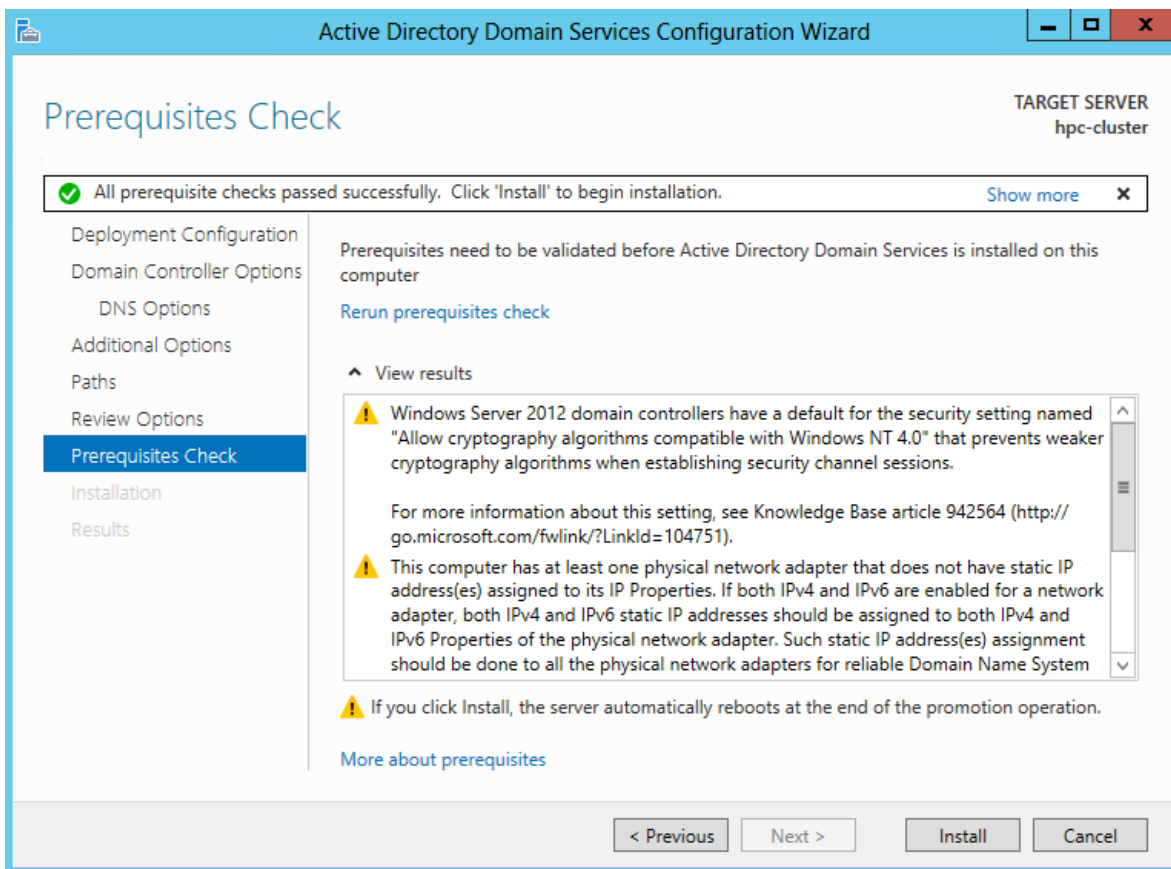
1. Select **Add a new forest**, specify the root domain name with a ".local" top-level domain (TLD) and click Next.

The screenshot shows the 'Active Directory Domain Services Configuration Wizard' window. The title bar includes standard Windows window controls. The main title is 'Deployment Configuration'. On the right, it says 'TARGET SERVER hpc-cluster'. A left-hand navigation pane lists several steps: 'Deployment Configuration' (highlighted in blue), 'Domain Controller Options', 'Additional Options', 'Paths', 'Review Options', 'Prerequisites Check', 'Installation', and 'Results'. The main content area is titled 'Select the deployment operation' and contains three radio button options: 'Add a domain controller to an existing domain', 'Add a new domain to an existing forest', and 'Add a new forest' (which is selected and highlighted with a red rectangle). Below this, it says 'Specify the domain information for this operation' and 'Root domain name:'. A text box next to it contains 'hpc-cluster.local' and is also highlighted with a red rectangle. At the bottom right of the main area is a link that says 'More about deployment configurations'. The bottom of the window features four buttons: '< Previous', 'Next >', 'Install', and 'Cancel'.

1. Wait for the Domain Controller Options tab to load, then enter the DSRM password and click Next.

The screenshot shows the 'Active Directory Domain Services Configuration Wizard' window, now on the 'Domain Controller Options' tab. The title bar and target server information remain the same. The left-hand navigation pane now has 'Domain Controller Options' highlighted in blue. The main content area is titled 'Select functional level of the new forest and root domain'. It contains two dropdown menus: 'Forest functional level:' and 'Domain functional level:', both set to 'Windows Server 2012'. Below these is the section 'Specify domain controller capabilities' with three checkboxes: 'Domain Name System (DNS) server' (checked), 'Global Catalog (GC)' (checked), and 'Read only domain controller (RODC)' (unchecked). The next section is 'Type the Directory Services Restore Mode (DSRM) password', which has two password input fields labeled 'Password:' and 'Confirm password:'. The bottom of the window features the same four buttons: '< Previous', 'Next >', 'Install', and 'Cancel'.

1. Click **Next** until you reach the Prerequisites Check tab. Don't worry about the warnings, just click **Install** to begin the installation. Installation will take several minutes and may reboot the server a few times so this is a great chance to get another coffee.



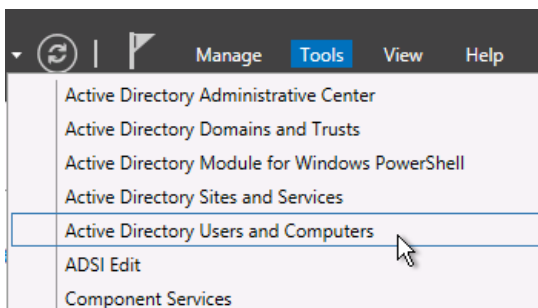
NOTE

If the VM restarts then your Remote Desktop Connection window will close. If that happens, wait a few minutes to give the server a chance to boot up and then double-click the RDP file again to reopen the connection. If the connection fails, wait a few more minutes. It may take some time for the reboot to complete.

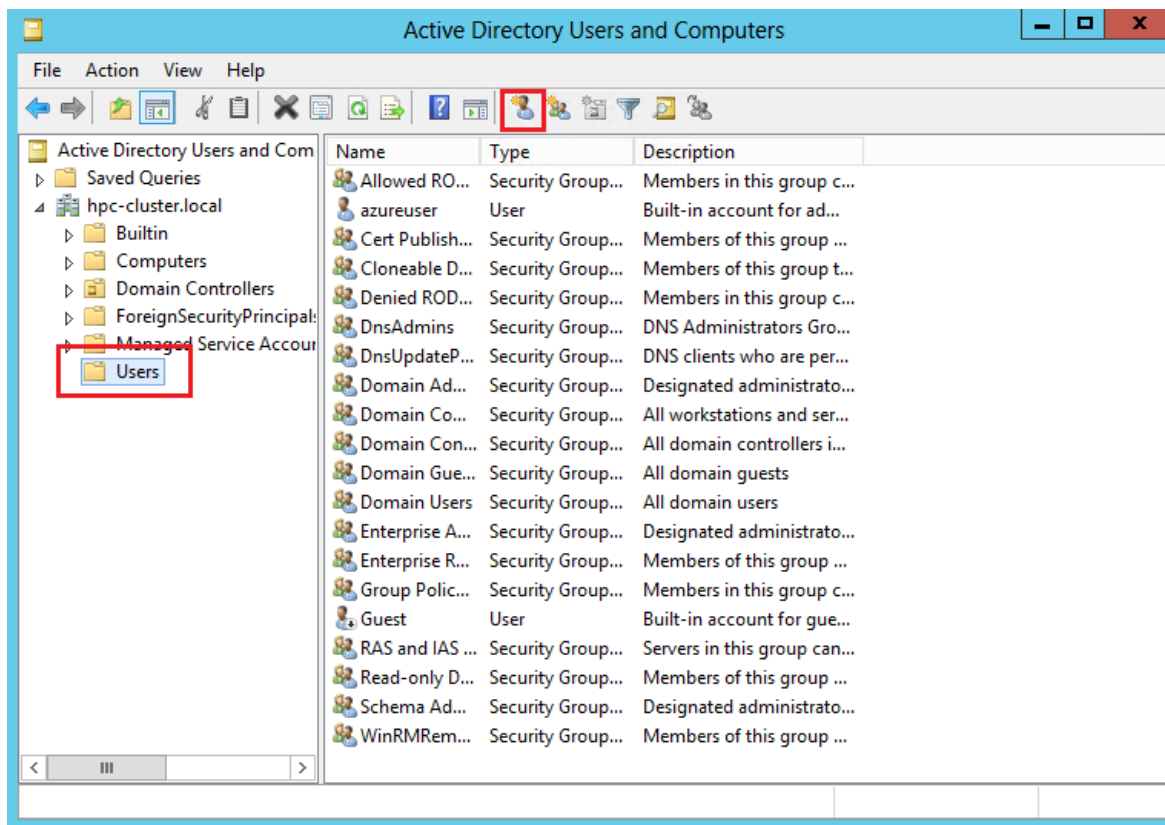
Add a Domain User Account

Microsoft HPC Pack needs to be installed from a domain user account, so we'll add a new administrator account to our new Active Directory domain.

1. Once the server has finished the promotion process, click on **Tools** in upper right corner of the Server Manager and select **Active Directory Users and Computers**.



1. In the Active Directory Users and Computers window, expand the domain name on the left side and select the **Users** container. Click the icon in the toolbar to add a new domain user.



1. Give the user a first name and a user name and click **Next**.

Create in: hpc-cluster.local/Users

First name: Initials:

Last name:

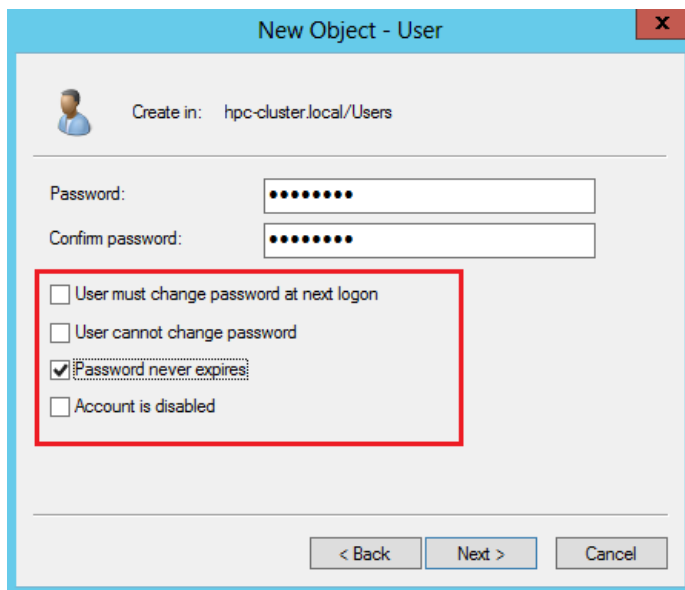
Full name:

User login name:

User login name (pre-Windows 2000):

< Back Next > Cancel

1. Set the user's password, select the check boxes as shown, and click **Next**.



New Object - User

Create in: hpc-cluster.local/Users

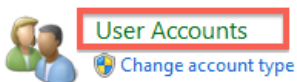
Password: [password field]

Confirm password: [password field]

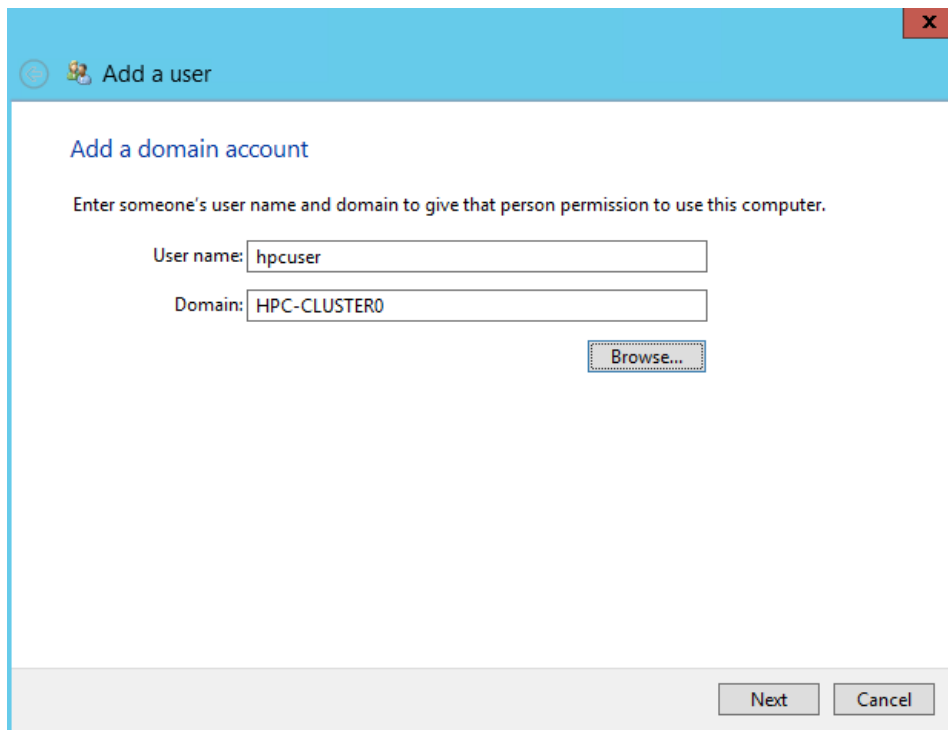
☐ User must change password at next logon
☐ User cannot change password
☒ Password never expires
☐ Account is disabled

< Back Next > Cancel

1. Click **Finish** on the final screen to create the user. Close the Active Directory Users and Computers window.
2. We will be logging in to the VM as this user so we need to give this user permission to access the server as an administrator. Open the control panel and click on **User Accounts**, then click on **Give other users access to this computer**.



1. Click the **Add...** button. Enter the domain user's username and the name of the Active Directory Domain and click **Next**.



Add a user

Add a domain account

Enter someone's user name and domain to give that person permission to use this computer.

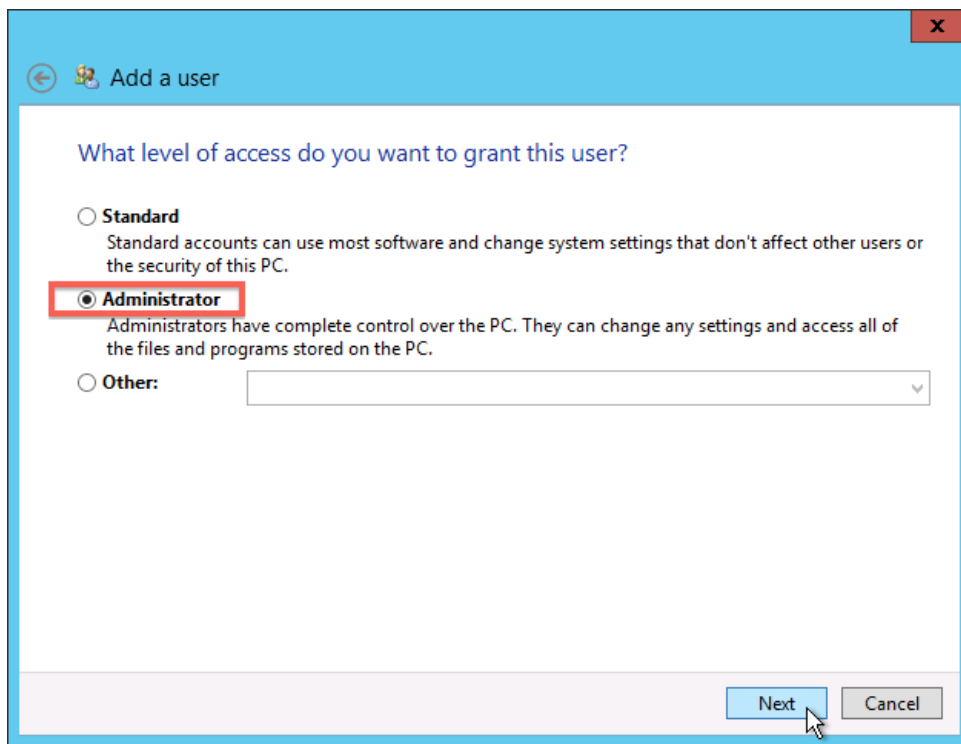
User name: hpcuser

Domain: HPC-CLUSTER0

Browse...

Next Cancel

1. Select **Administrator** to give the domain user administrative privileges and click **Next**.



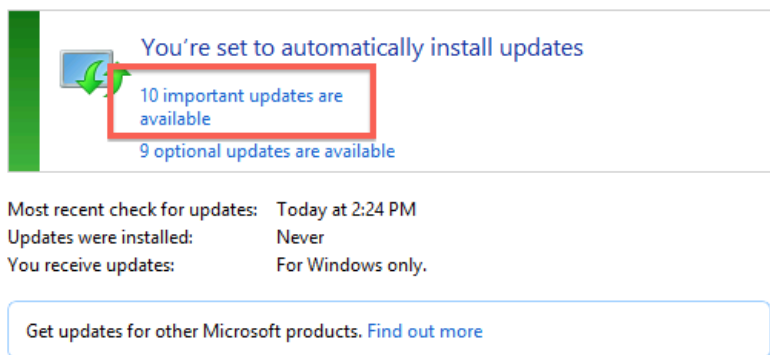
1. Click **Finish** to close the Add a user wizard window and then click **OK** to close the User Accounts window.

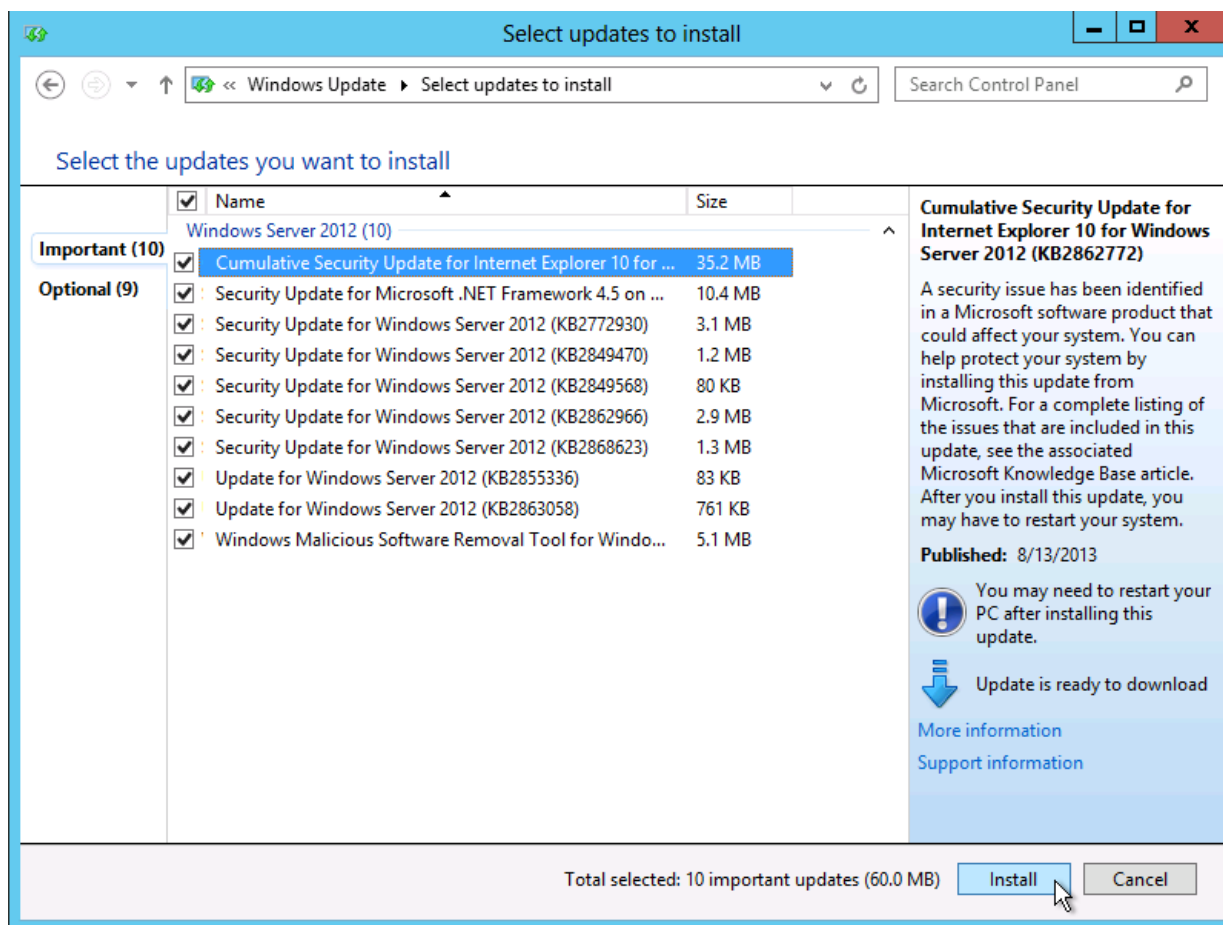
Install All Critical and Important Updates

You're almost there, but before we can install Microsoft HPC Pack we need to make sure that all services are up to date. Part of the HPC Pack installation process is to install various prerequisites and some of these prerequisites will fail to install if critical updates are not installed.

1. Open the control panel. Click on **System and Security** and then click on **Windows Update**.
2. If important or critical updates are available, click the label listing the updates to open the update window, then click **Install** to begin the installation process. Wait for installation to complete.

Windows Update



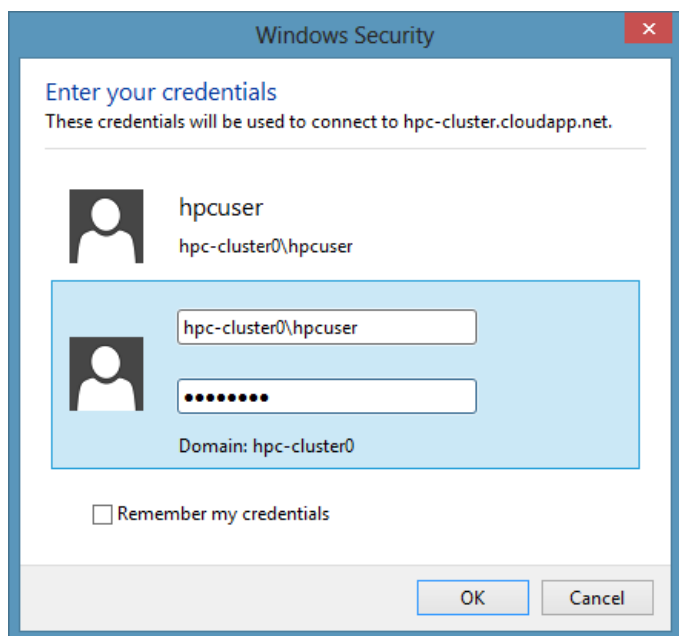


1. Once installation is complete, restart the computer. Remote Desktop Connection will disconnect, so double-click the RDP file to reconnect to the VM.
2. Once you're reconnected, check again for critical and important updates. Continue to install updates and reboot until no more updates are available.

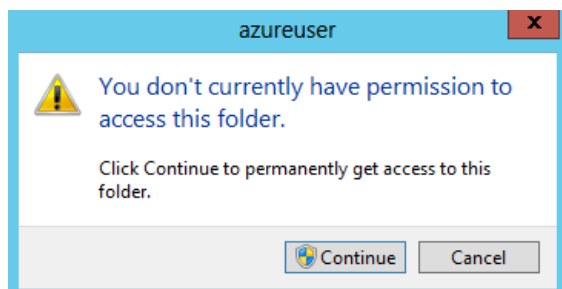
Install Microsoft HPC Pack

We're ready to install Microsoft HPC Pack! The installation must be performed as a domain user, so disconnect from the virtual machine now.

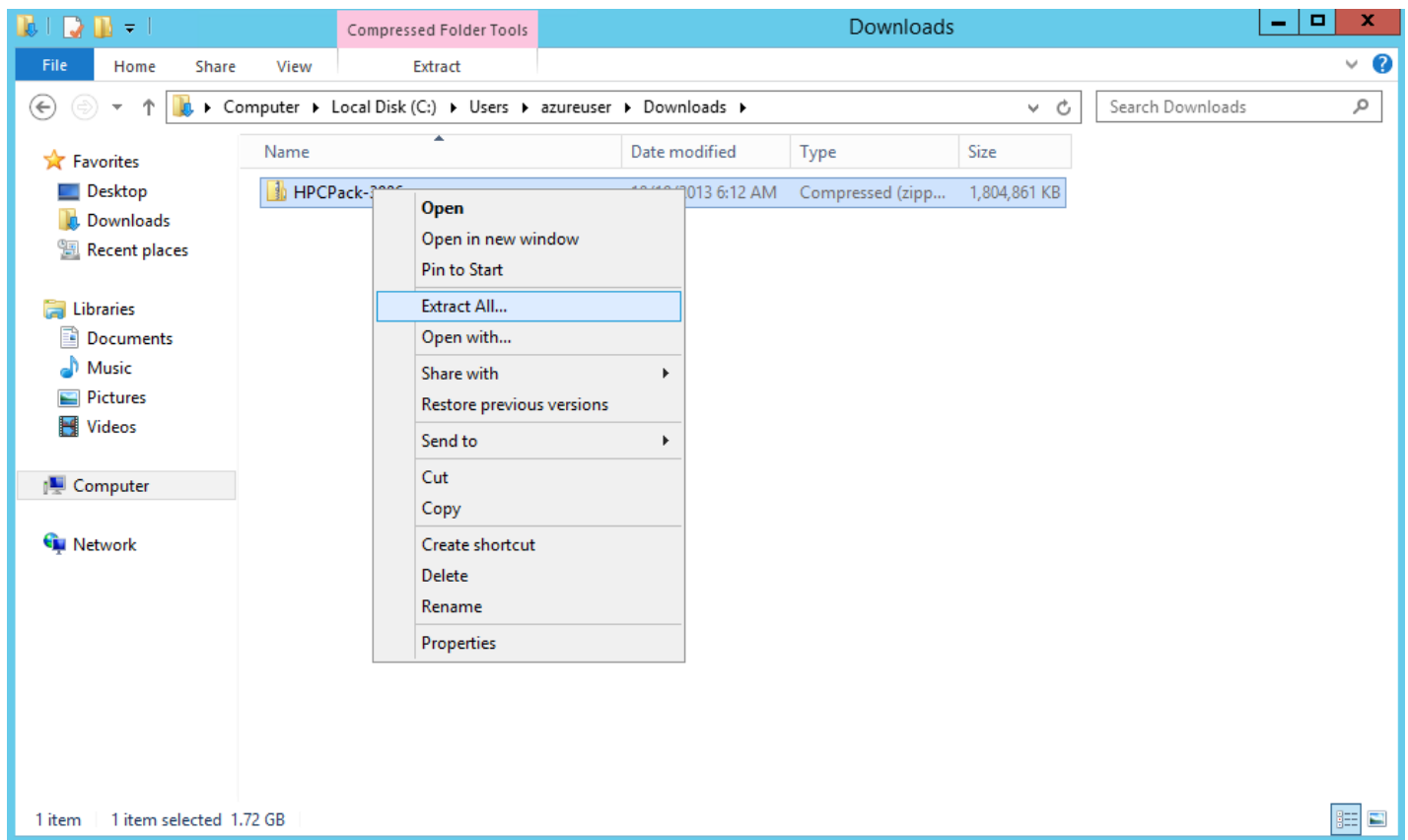
1. Reconnect to the VM and log in with the domain account we created earlier. This is *not* the same account we have been using up to this point. If you're connecting from a Mac, be sure to change the domain to the NetBIOS name of your Active Directory domain.



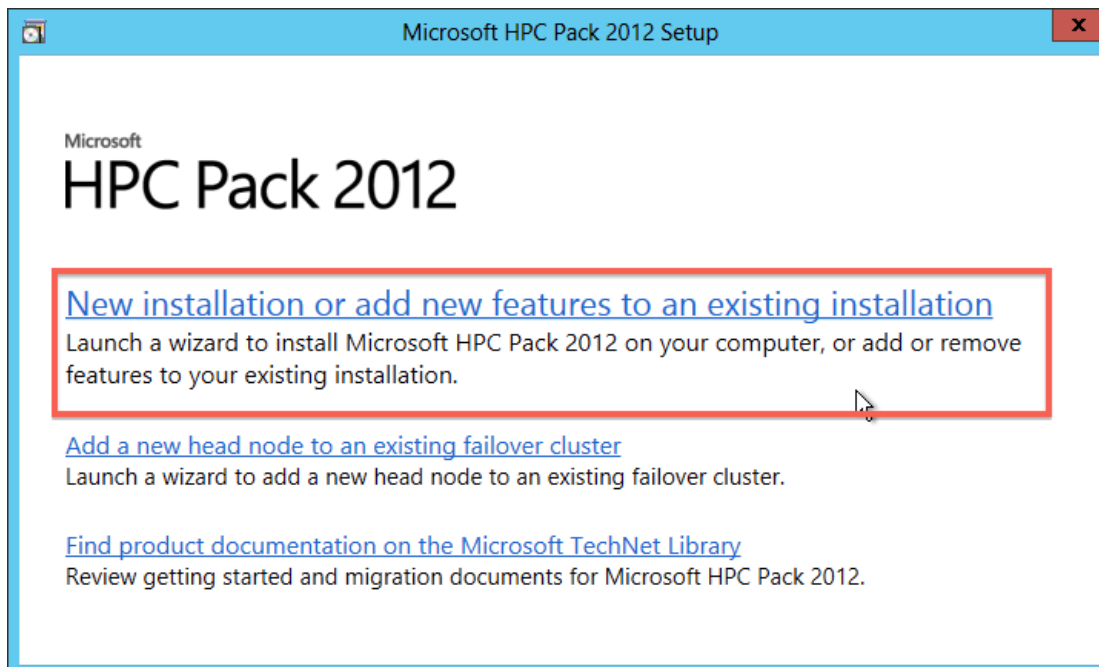
1. Once you're logged in as the domain user, open Explorer and navigate to C:\Users\<local-user-name>\Downloads. If you are told you don't have access to the folder, just click **Continue** to get access.



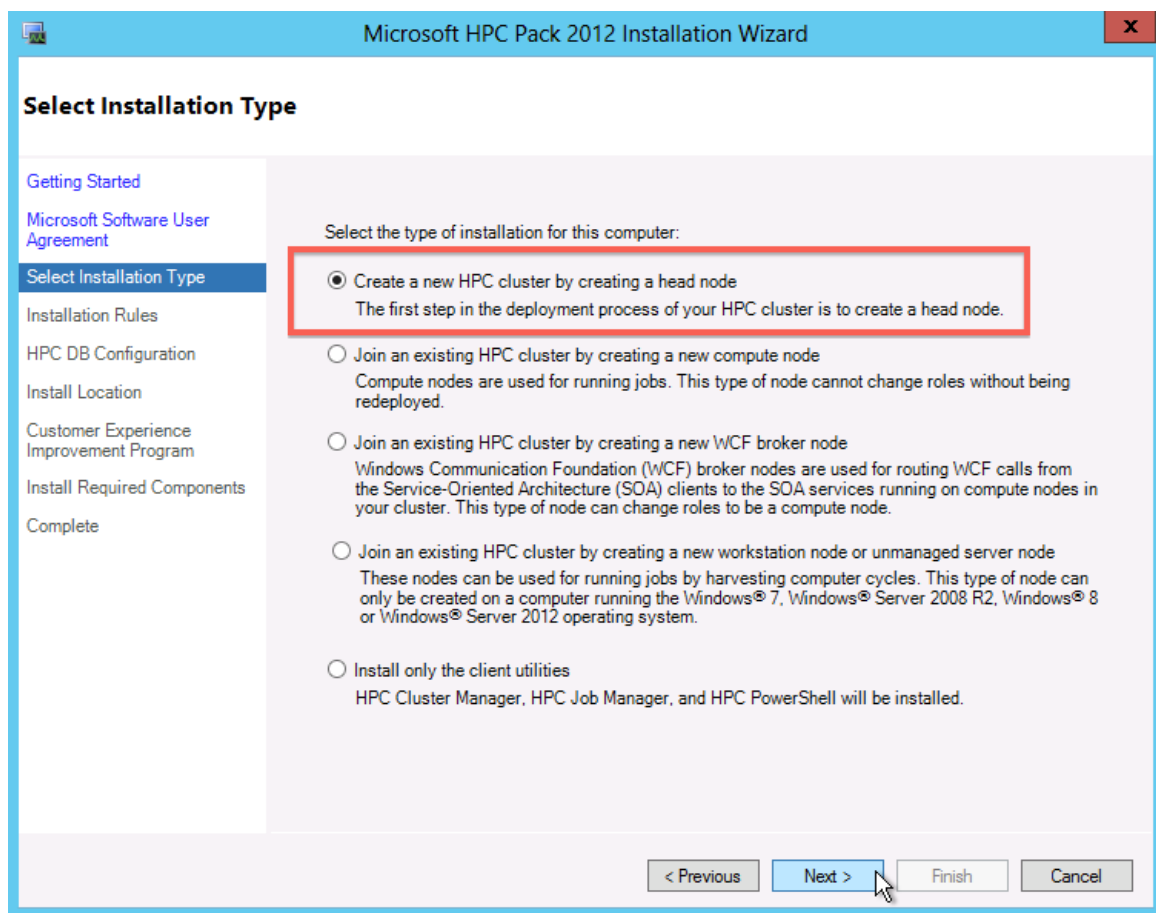
1. Locate the compressed file we downloaded earlier and right-click it. Select **Extract All...** then click the **Extract** button to unpack the file. It will take a few minutes to unpack everything.



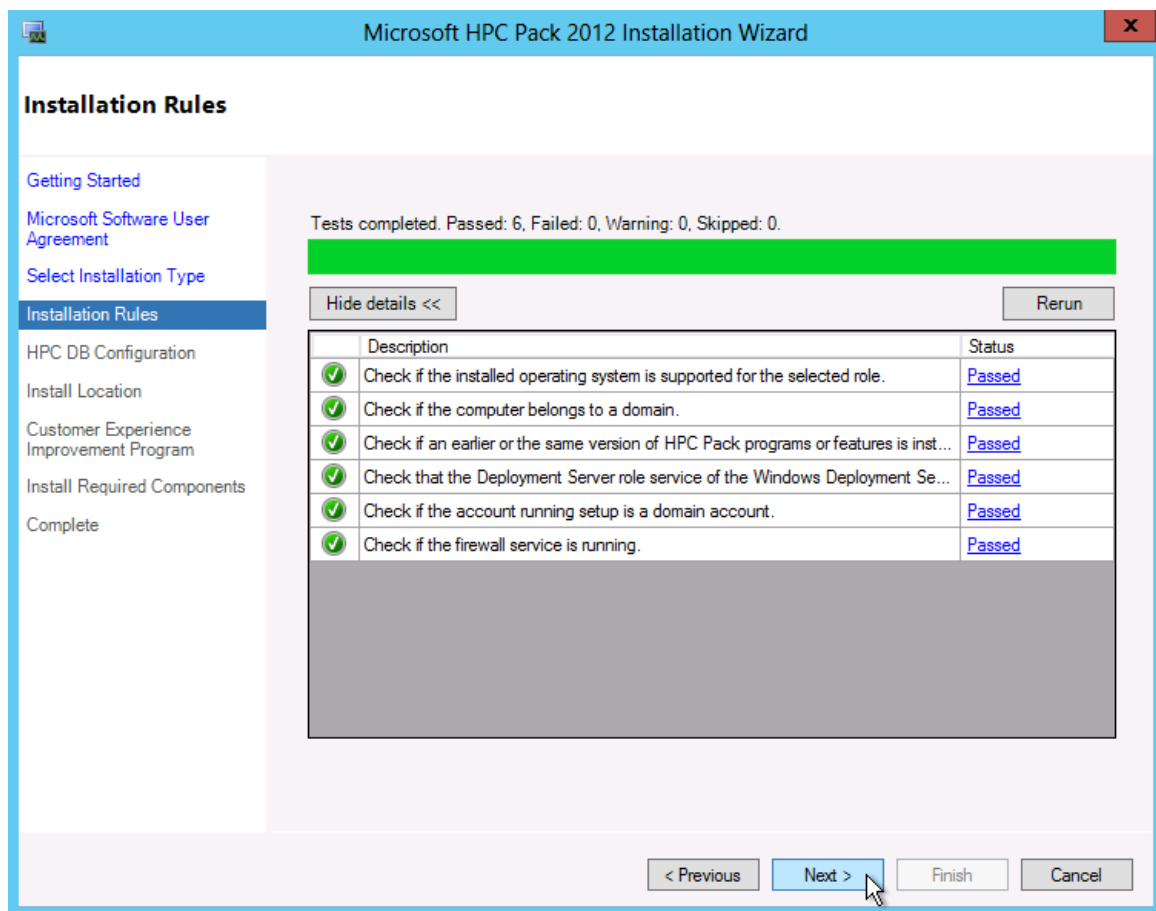
1. After the files are extracted, double click the **HPC Pack** folder and then double click **setup** to begin installation.
2. Click on **New installation or add new features to an existing installation**.



1. Click **Next**, then check the box to accept the license agreement and click **Next**.
2. Select **Create a new HPC cluster by creating a head node** and click **Next**.



1. The installer will run a few prerequisite checks. Click **Next** if all checks pass. Otherwise, go back in this tutorial and make sure you have followed all steps exactly.



1. Make sure **Head Node** is selected for all HPC databases and click **Next**.

The screenshot shows the 'Microsoft HPC Pack 2012 Installation Wizard' window. The title bar is blue with the text 'Microsoft HPC Pack 2012 Installation Wizard' and a close button. The main window has a light blue header with 'HPC DB Configuration'. On the left is a navigation pane with links: 'Getting Started', 'Microsoft Software User Agreement', 'Select Installation Type', 'Installation Rules', 'HPC DB Configuration' (highlighted), 'Local Database Setting', 'Local Database Folders', 'Install Location', 'Customer Experience Improvement Program', 'Install Required Components', and 'Complete'. The main content area has a light purple background. It contains two paragraphs of text: 'The HPC databases can be installed on the head node of the cluster, or on one or more remote servers that are connected to the head node over a network. We suggest that you install the HPC databases on the head node only if your cluster will have less than 256 nodes.' and 'To install the HPC databases on a remote server, that server must be running Microsoft SQL Server 2008 R2 or Microsoft SQL Server 2012, and you need to create and configure the databases for remote access, before continuing with this wizard.' Below the text is a section titled 'Select where you want to install each HPC database:' followed by a table. The table has three columns: 'HPC Database', 'Head Node', and 'Remote Server'. There are five rows of data, each with a radio button in the 'Head Node' column and an empty radio button in the 'Remote Server' column. At the bottom right are four buttons: '< Previous', 'Next >' (highlighted with a mouse cursor), 'Finish', and 'Cancel'.

HPC DB Configuration

Getting Started
Microsoft Software User Agreement
Select Installation Type
Installation Rules
HPC DB Configuration
Local Database Setting
Local Database Folders
Install Location
Customer Experience Improvement Program
Install Required Components
Complete

The HPC databases can be installed on the head node of the cluster, or on one or more remote servers that are connected to the head node over a network. We suggest that you install the HPC databases on the head node only if your cluster will have less than 256 nodes.

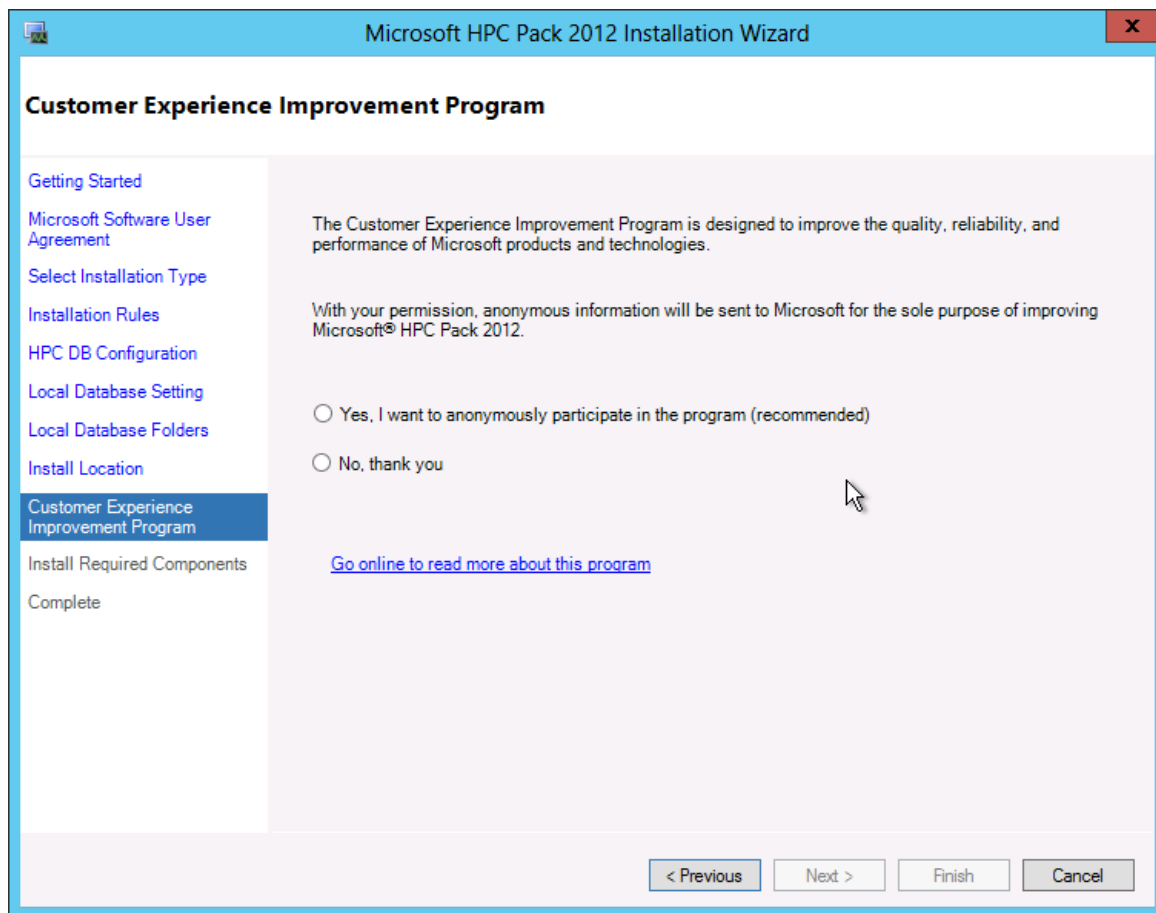
To install the HPC databases on a remote server, that server must be running Microsoft SQL Server 2008 R2 or Microsoft SQL Server 2012, and you need to create and configure the databases for remote access, before continuing with this wizard.

Select where you want to install each HPC database:

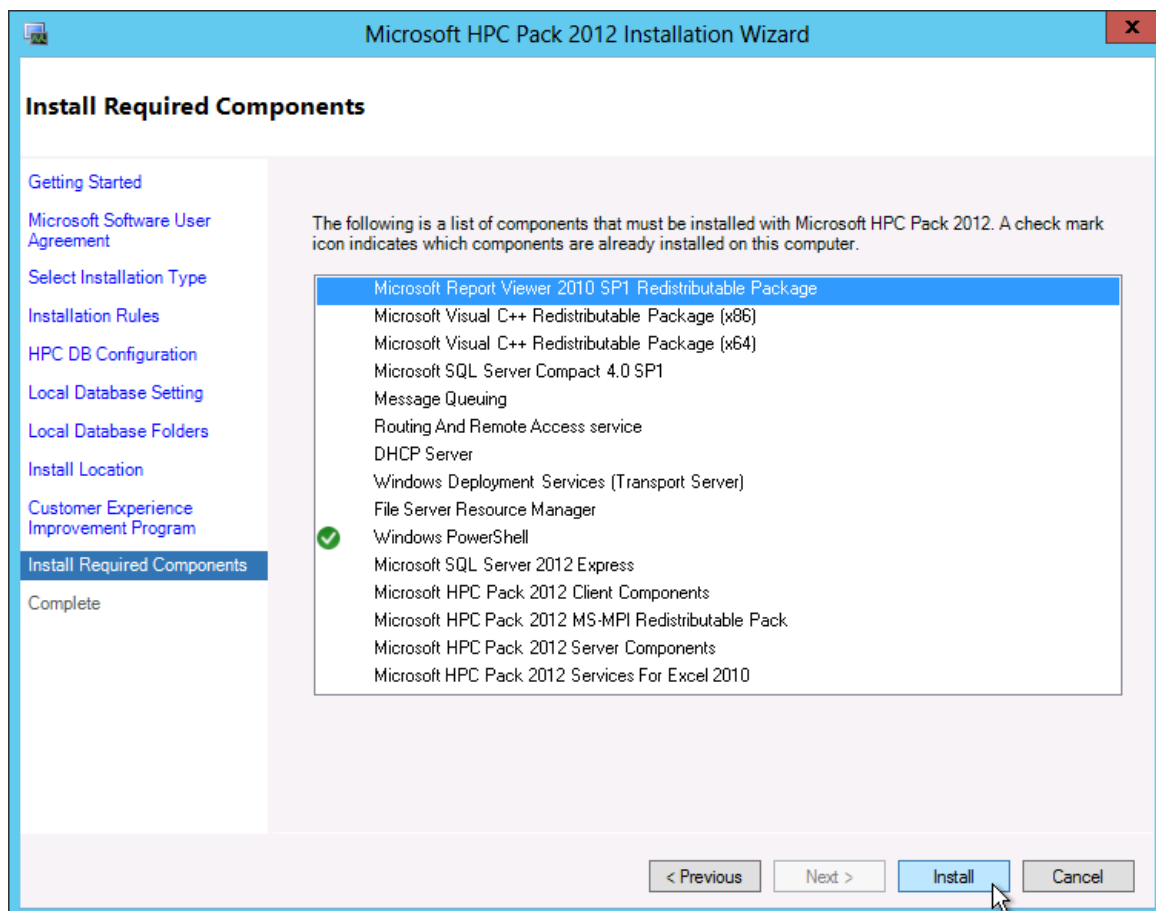
HPC Database	Head Node	Remote Server
Cluster management	<input checked="" type="radio"/>	<input type="radio"/>
Job scheduling	<input checked="" type="radio"/>	<input type="radio"/>
Reporting	<input checked="" type="radio"/>	<input type="radio"/>
Diagnostics	<input checked="" type="radio"/>	<input type="radio"/>
Monitoring	<input checked="" type="radio"/>	<input type="radio"/>

< Previous **Next >** Finish Cancel

1. Click **Next** on the following tabs until you reach the Customer Experience Improvement Program tab. Select either option then click **Next**.



1. Click **Install** on the Install Required Components tab. If you have followed this tutorial exactly you should see that only the Windows PowerShell prerequisite has been installed so far. The installation process will take several minutes. Take another coffee break!

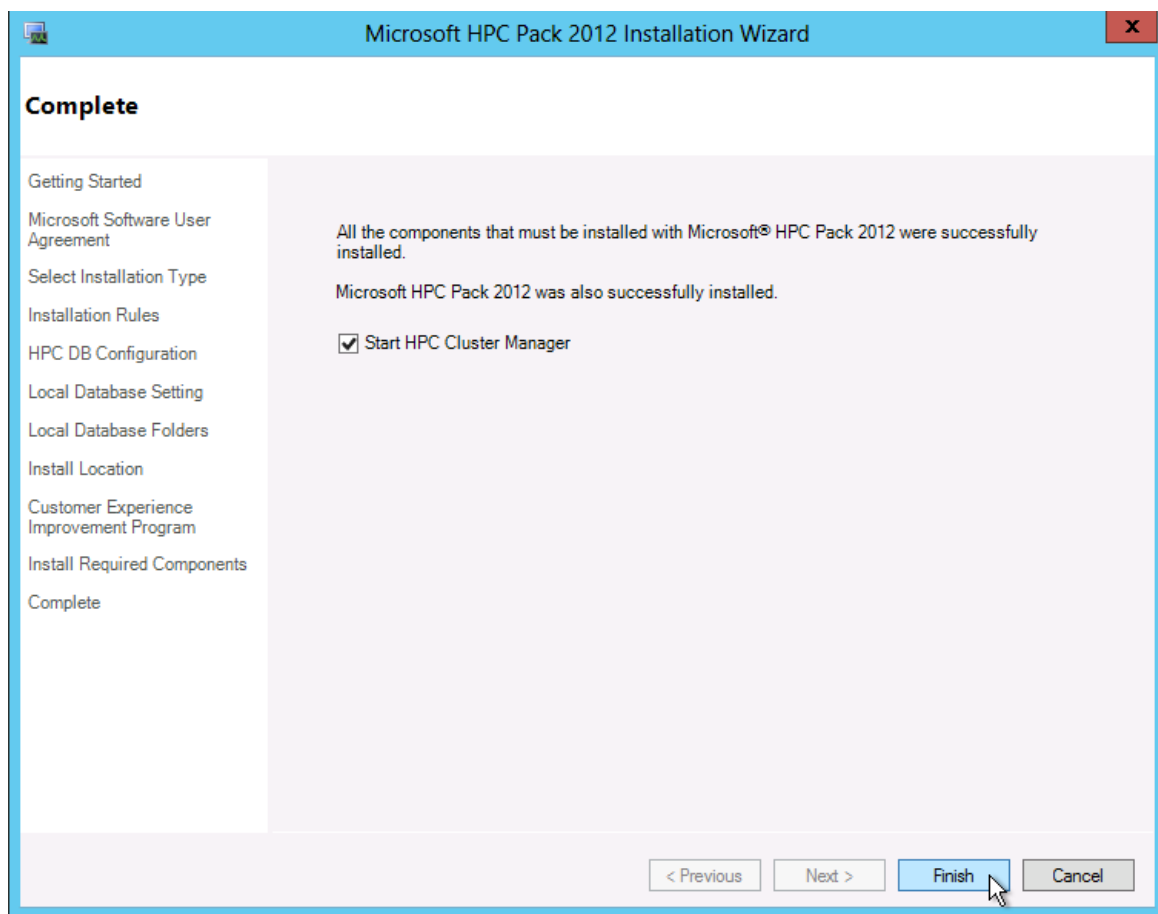


IMPORTANT

You may see an error like the one below during the installation process. If so, reboot the VM and restart the HPC Pack installation using exactly the same steps as before. It may take a few attempts, but it will eventually work. Don't forget to log back in as the domain user when you reconnect!



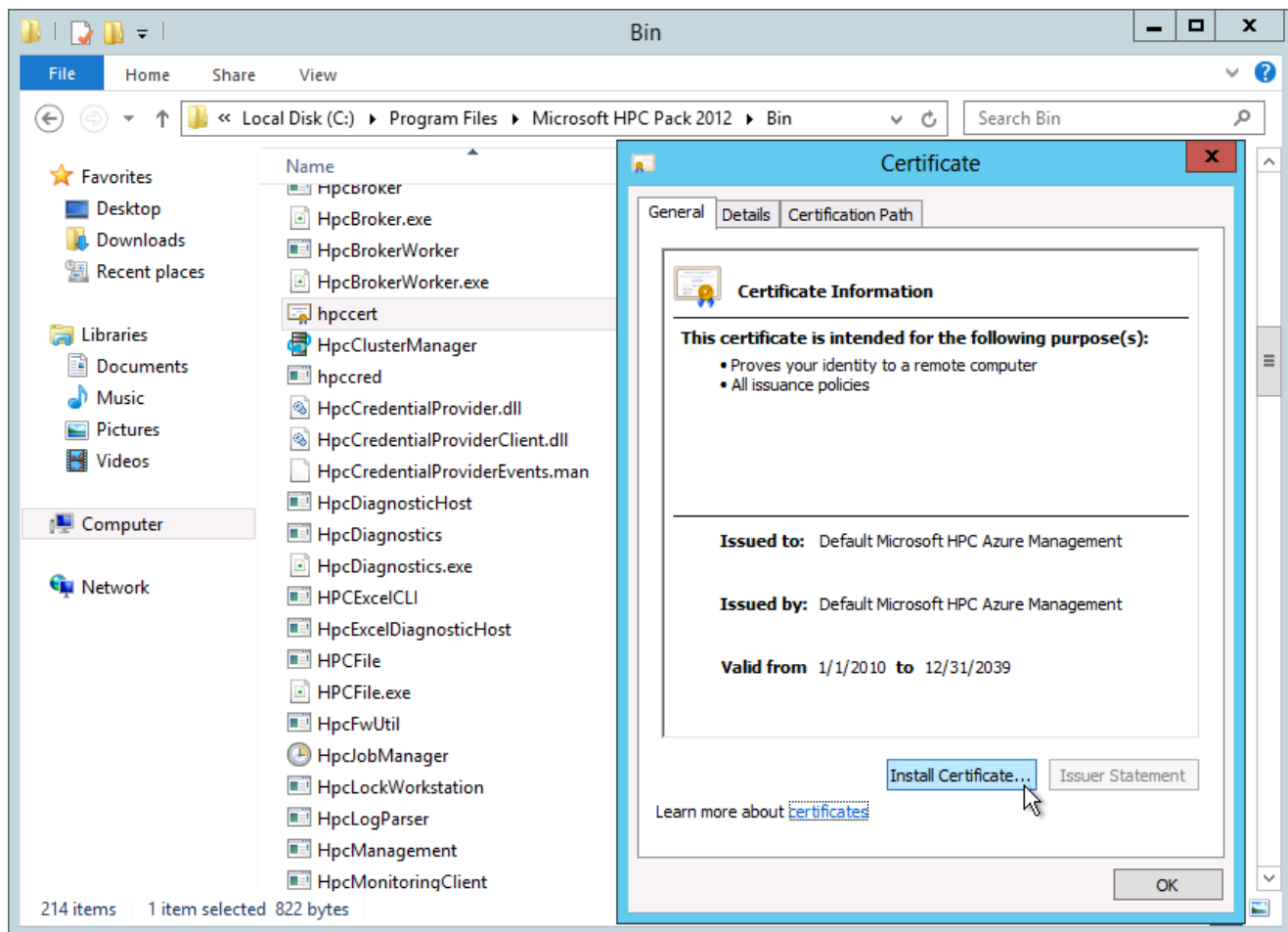
1. Click **Finish** to start the HPC Cluster Manager after the installation completes.



Upload the HPC Pack Management Certificate

We need a Microsoft Azure management certificate to authenticate the HPC cluster head node to Microsoft Azure so it can provision compute nodes. The Default Microsoft HPC Azure Management certificate is generated automatically on the head node when HPC Pack is installed. This certificate is self-signed and unique to your installation of HPC Pack, so all we need to do is upload the certificate to the Microsoft Azure Management Portal.

1. Navigate to **C:\Program Files\Microsoft HPC Pack 2012\Bin** and locate the **hpccert** file.
2. Double-click the hpccert file and click the **Install Certificate...** button.



1. Select **Local Machine** and click **Next**.



1. Click **Next** to let the wizard automatically select the certificate store.

2. Click **Finish** to import the certificate.
3. In the VM, log in to the [Microsoft Azure Management Portal](#).
4. Click on the **Settings** tab to display management certificates associated with your subscription.
5. Click on **Upload**, use the file selection box to select the certificate file you copied from the VM, and click the check button to upload and add the management certificate. You may use the same certificate that you just imported. The default, hpccert.cer is in C:\Program Files\Microsoft HPC Pack 2012\Bin on the Head node VM.

settings

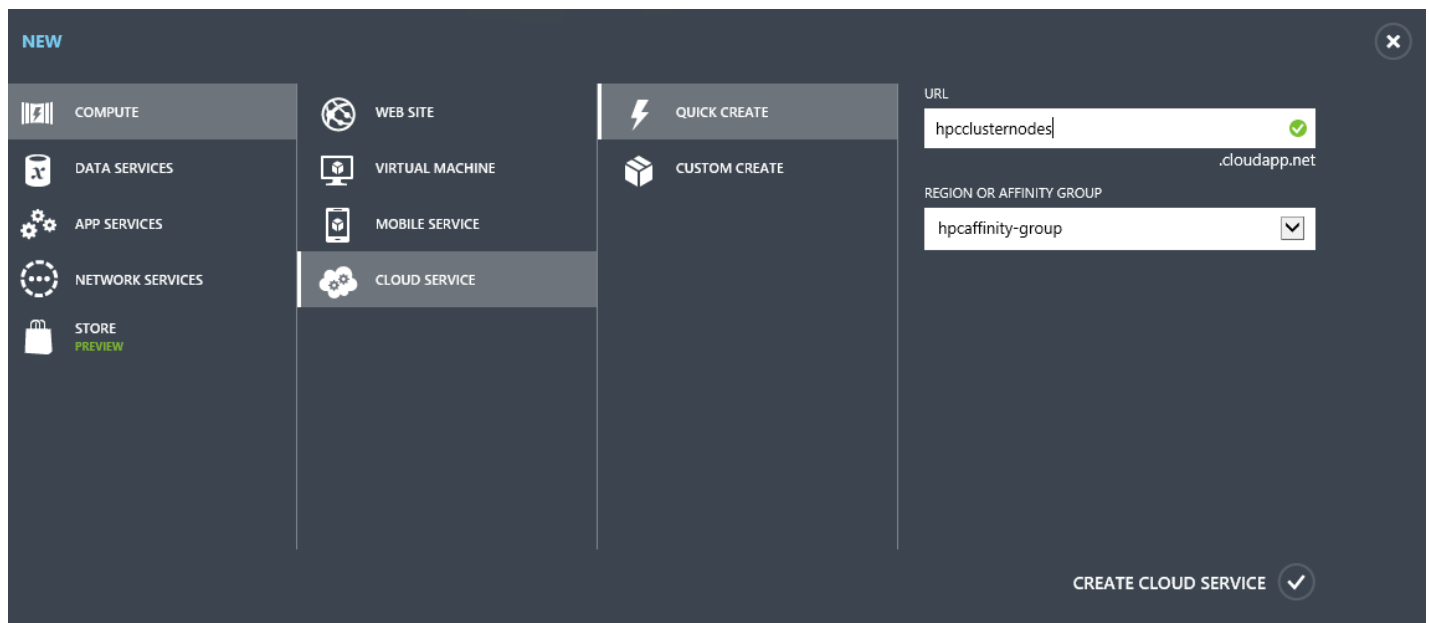
MANAGEMENT CERTIFICATES ADMINISTRATORS AFFINITY GROUPS USAGE

NAME	STATUS	SUBSCRIPTION	SUBSCRIPTION ID	THUMBPRINT
Trainer	✓ Created	Azpas300A0U8655	531bc0ce-9be2-4ece-9120-8ba16d6e0e55	C1BE4D9AE6AC
Azpas300A0U8655-10-5-2013-crede...	✓ Created	Azpas300A0U8655	531bc0ce-9be2-4ece-9120-8ba16d6e0e55	453775E7A0F59
training.com	✓ Created	Azpas300A0U8655	531bc0ce-9be2-4ece-9120-8ba16d6e0e55	80B86586F527I
Visual Studio Ultimate with MSDN-P...	✓ Created	Azpas300A0U8655	531bc0ce-9be2-4ece-9120-8ba16d6e0e55	886901659BB5I
Azpas300A0U8655-10-17-2013-cred...	✓ Created	Azpas300A0U8655	531bc0ce-9be2-4ece-9120-8ba16d6e0e55	1D053157EF0C
Default Microsoft HPC Azure Manag...	✓ Created	Azpas300A0U8655	531bc0ce-9be2-4ece-9120-8ba16d6e0e55	1B2F6C4F080B

+ NEW UPLOAD DELETE ?

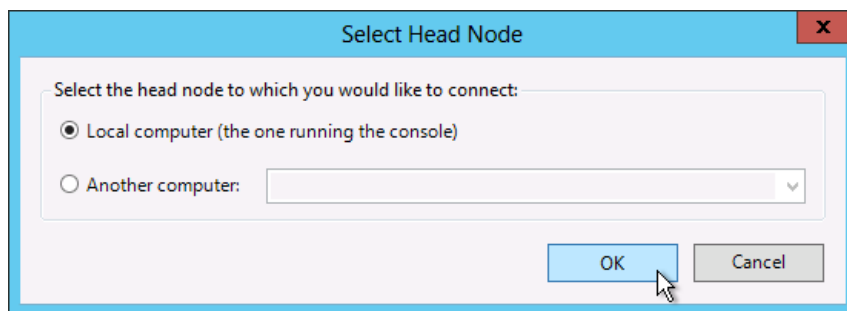
Create Cloud Service Azure Compute Nodes

1. Log in to the [Microsoft Azure Management Portal](#).
2. Click on **New** in the bottom panel.
3. Click on **Compute, Cloud Service, Quick Create**.
4. Enter the URL and click **Create Cloud Service**

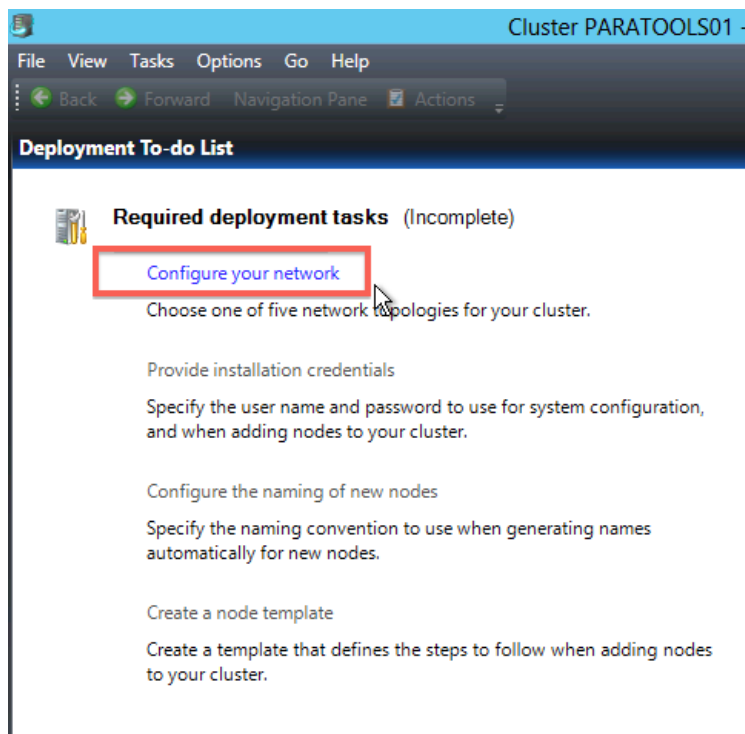


Configure Microsoft HPC Pack

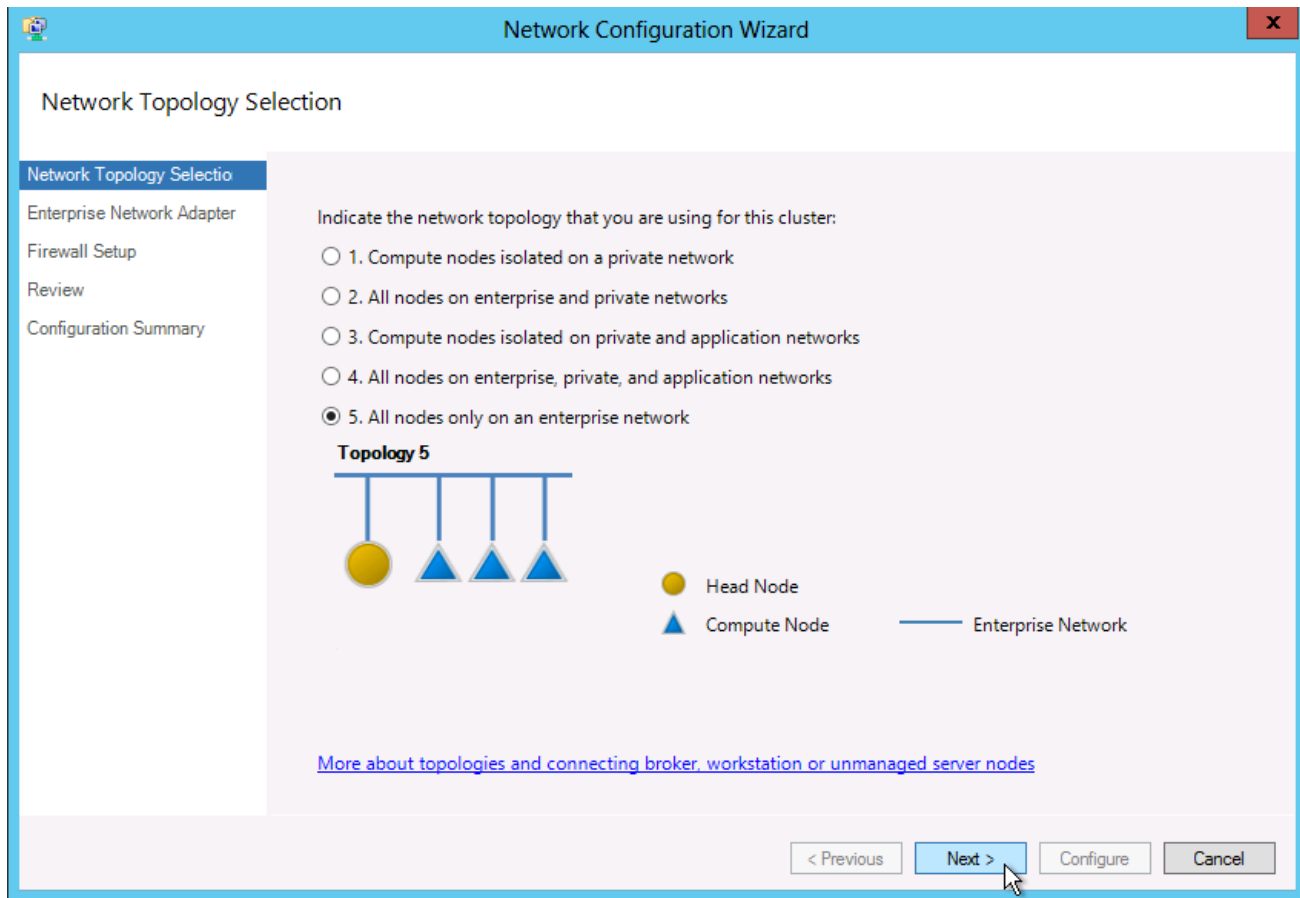
1. On the VM, open the Cluster Manager. In the popup box, select the local computer and click **OK**.



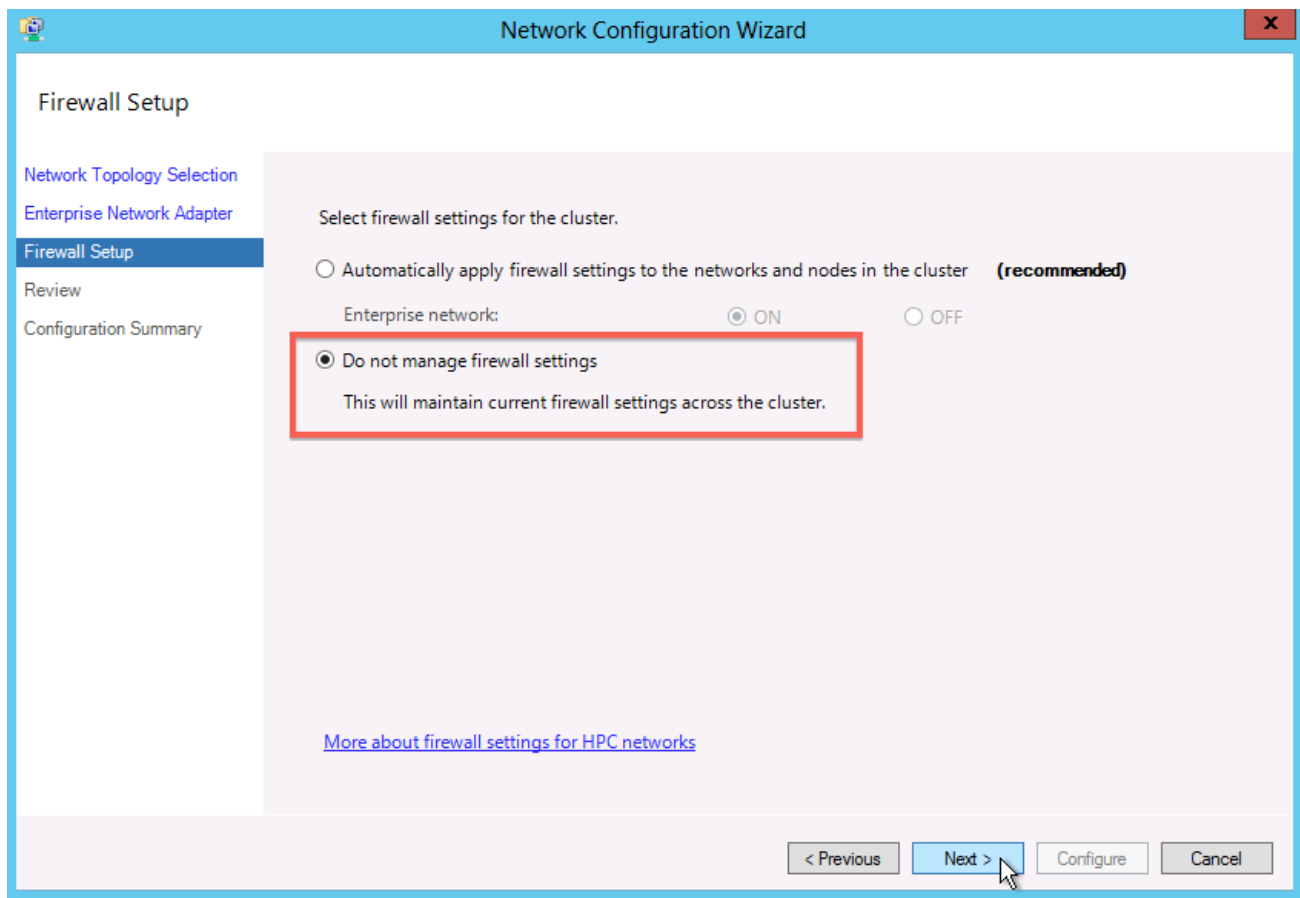
1. Click on **Configure your network** in the Required deployment tasks section of the Cluster Manager window.




1. Select the fifth cluster topology **All nodes only on an enterprise network** and click **Next**.




1. Click **Next** on the Enterprise Network Adapter tab to accept the default configuration.
2. Select **Do not manage firewall settings** on the Firewall Setup tab and click **Next**.



1. Click **Configure** on the Review tab to begin the configuration process.
2. Click **Finish** to end the configuration process.
3. Click on **Provide installation credentials** in the Required deployment tasks section of the Cluster Manager window.

 **Required deployment tasks** (Incomplete)

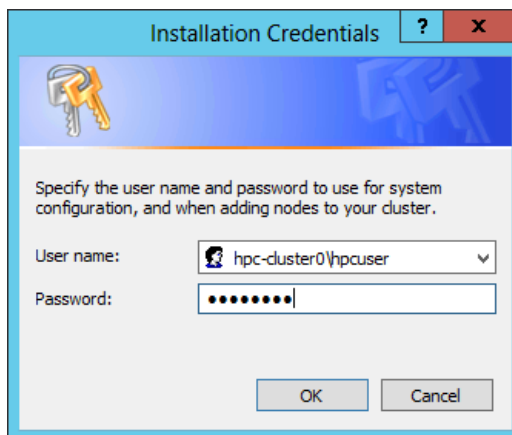
 **Configure your network**
Choose one of five network topologies for your cluster.

Provide installation credentials
Specify the user name and password to use for system configuration, and when adding nodes to your cluster.

Configure the naming of new nodes
Specify the naming convention to use when generating names automatically for new nodes.

Create a node template
Create a template that defines the steps to follow when adding nodes to your cluster.

1. Enter the username and password of the domain user and click **OK**. You will need to enter the fully qualified user name as shown in the example image.



Installation Credentials ? X

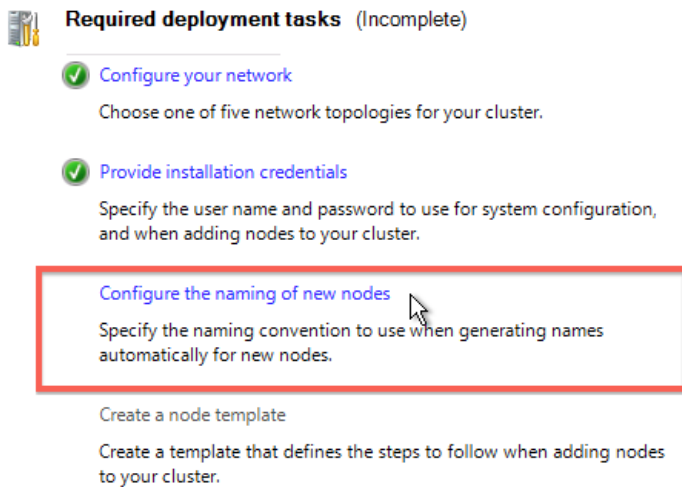
Specify the user name and password to use for system configuration, and when adding nodes to your cluster.

User name: hpc-cluster0\hpcuser

Password: [masked]

OK Cancel

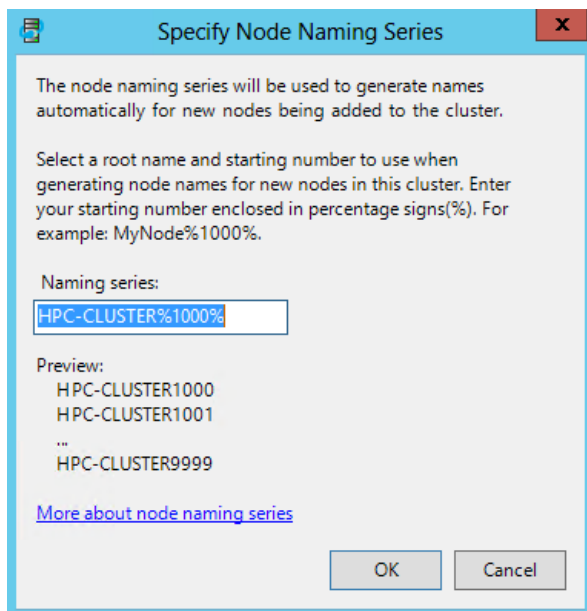
1. Click on **Configure the naming of new nodes** in the Required deployment tasks section of the Cluster Manager window.



Required deployment tasks (Incomplete)

- ✓ [Configure your network](#)
Choose one of five network topologies for your cluster.
- ✓ [Provide installation credentials](#)
Specify the user name and password to use for system configuration, and when adding nodes to your cluster.
- [Configure the naming of new nodes](#)
Specify the naming convention to use when generating names automatically for new nodes.
- [Create a node template](#)
Create a template that defines the steps to follow when adding nodes to your cluster.

1. Click **OK** to accept the default naming series.



Specify Node Naming Series X

The node naming series will be used to generate names automatically for new nodes being added to the cluster.

Select a root name and starting number to use when generating node names for new nodes in this cluster. Enter your starting number enclosed in percentage signs(%). For example: MyNode%1000%.

Naming series:
HPC-CLUSTER%1000%

Preview:
HPC-CLUSTER1000
HPC-CLUSTER1001
...
HPC-CLUSTER9999

[More about node naming series](#)

OK Cancel

1. Click on **Create a node template** in the Required deployment tasks section of the Cluster Manager window.



Required deployment tasks (Incomplete)



Configure your network

Choose one of five network topologies for your cluster.



Provide installation credentials

Specify the user name and password to use for system configuration, and when adding nodes to your cluster.



Configure the naming of new nodes

Specify the naming convention to use when generating names automatically for new nodes.

Create a node template

Create a template that defines the steps to follow when adding nodes to your cluster.

1. Select **Microsoft Azure node template** and click **Next**.

1. Click **Next** to accept the default template name.
2. On the Subscription Information tab, copy your subscription ID and the management certificate fingerprint into their respective boxes and click **Next**. You can find this information on the **Setting** tab of the Microsoft Azure Management Portal. Be careful to copy the subscription ID and certificate fingerprint in full! You may need to resize the columns in the management portal to see the whole field.

ALL ITEMS

WEB SITES
0

VIRTUAL MACHINES
2

MOBILE SERVICES
0

CLOUD SERVICES
4

SQL DATABASES
4

STORAGE
20

HDINSIGHT
0

SOL REPORTING
0

MEDIA SERVICES
0

SERVICE BUS

NAME	STATUS	SUBSCRIPTION	SUBSCRIPTION ID	THUMBPRINT
AzureSampleService Management Certificate	✓ Created	Subscription-1	N5717B5-456A-4912...	22F0B0542B79C0B05FC7E32E30E
AzureSampleService Management Certificate	✓ Created	Subscription-1	N5717B5-456A-4912...	5A0B82B5151D5B03D0C45A92E
AzureSampleService Management Certificate	✓ Created	Subscription-1	N5717B5-456A-4912...	5B01111057B05F050505C6D0D
AzureSampleService Management Certificate	✓ Created	Subscription-1	N5717B5-456A-4912...	8BAC0F7FCE31B4110B4F5104FE
AzureSampleService Management Certificate	✓ Created	Subscription-1	N5717B5-456A-4912...	A0B05F0505050505050505050
AzureSampleService Management Certificate	✓ Created	Subscription-1	N5717B5-456A-4912...	A8F42D0A570F0A0F0C2A87050
AzureSampleService Management Certificate	✓ Created	Subscription-1	N5717B5-456A-4912...	C4B05A0F05050505050505050
be5541e3-7a89-4900-b6be-df3b64bb2680	✓ Created	Subscription-1	N5717B5-456A-4912...	F404050F05050505050505050
CloudZync MSDN-Windows Azure MSDN - ...	✓ Created	Subscription-1	N5717B5-456A-4912...	8105050505050505050505050
Default Microsoft HPC Azure Management	✓ Created	Subscription-1	N5717B5-456A-4912...	857F0B0505050505050505050
elastacloud	✓ Created	Subscription-1	N5717B5-456A-4912...	85F0B05050505050505050505
MODISAzure-WA TPM Subscription-Subscri...	✓ Created	Subscription-1	N5717B5-456A-4912...	3E0F0B0505050505050505050
Subscription-1-12-26-2012-credentials	✓ Created	Subscription-1	N5717B5-456A-4912...	F0C0B05050505050505050505
Subscription-1-12-28-2012-credentials	✓ Created	Subscription-1	N5717B5-456A-4912...	4B05F0A050505050505050505
Subscription-1-12-3-2012-credentials	✓ Created	Subscription-1	N5717B5-456A-4912...	D0B0505050505050505050505

+ NEW

UPLOAD
 DELETE

1

Create Node Template Wizard
✕

Provide Subscription Information

Choose Node Template Type

Specify Template Name

Provide Subscription Information

Provide Service Information

Specify Proxy Nodes

Specify Node Role

Mount Application VHD

Specify Startup Script

Set Up Windows Azure Virtual Network

Configure Remote Desktop Credentials

Configure Availability Policy

Review

Provide information about the Windows Azure subscription that should be used to deploy the nodes. Click Next to retrieve information about available services and storage accounts.

Subscription ID:

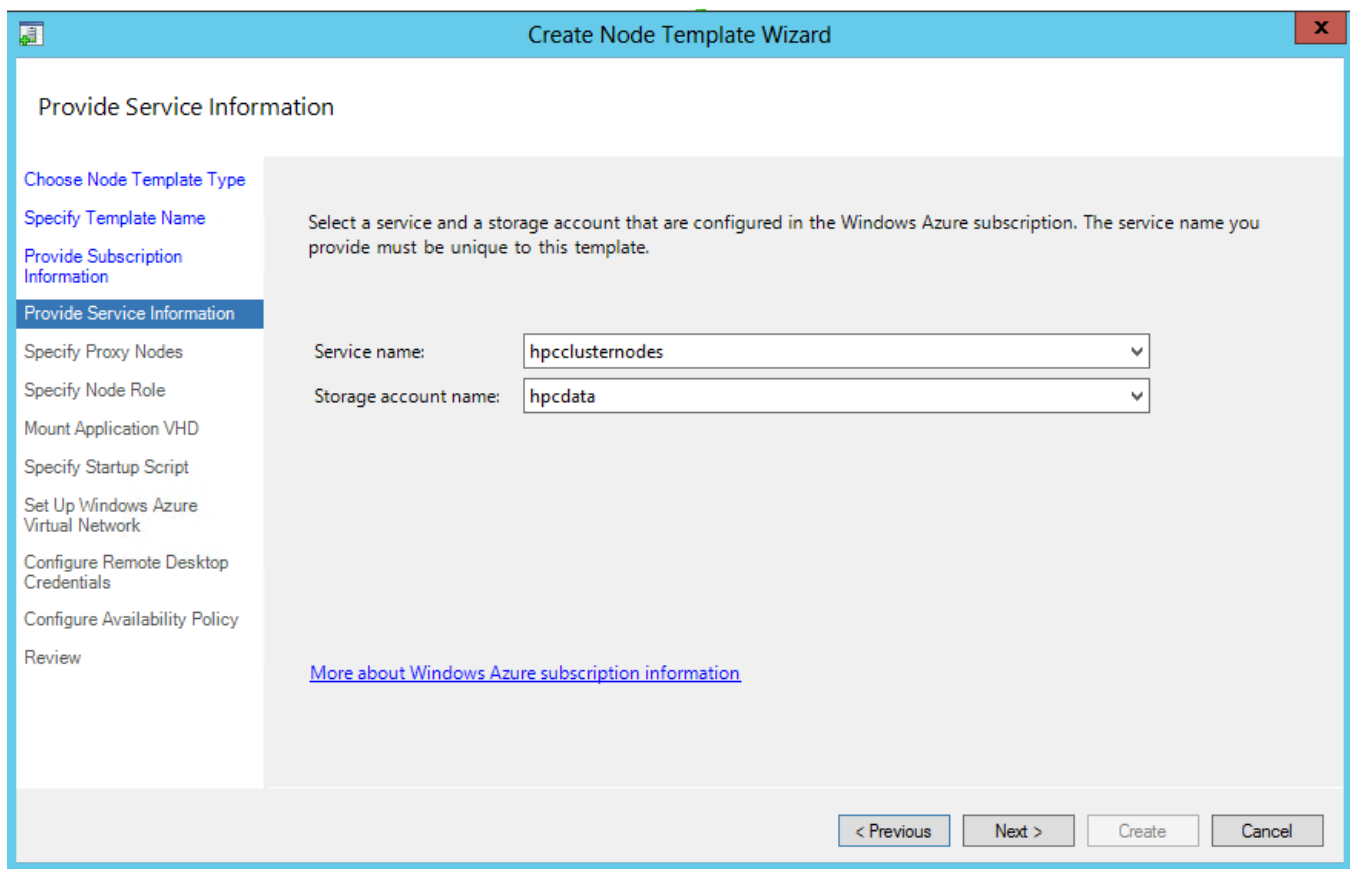
Management certificate: Browse...

[More about Windows Azure subscription information](#)

[Go online to read the Microsoft Windows Azure Privacy Statement](#)

< Previous
Next >
Create
Cancel

1. In the Service name drop-down box, select the cloud service we created earlier. Similarly, select the storage service we created earlier in the Storage account name drop-down. Click **Next**.



Create Node Template Wizard

Provide Service Information

Choose Node Template Type
Specify Template Name
Provide Subscription Information
Provide Service Information
Specify Proxy Nodes
Specify Node Role
Mount Application VHD
Specify Startup Script
Set Up Windows Azure Virtual Network
Configure Remote Desktop Credentials
Configure Availability Policy
Review

Select a service and a storage account that are configured in the Windows Azure subscription. The service name you provide must be unique to this template.

Service name:

Storage account name:

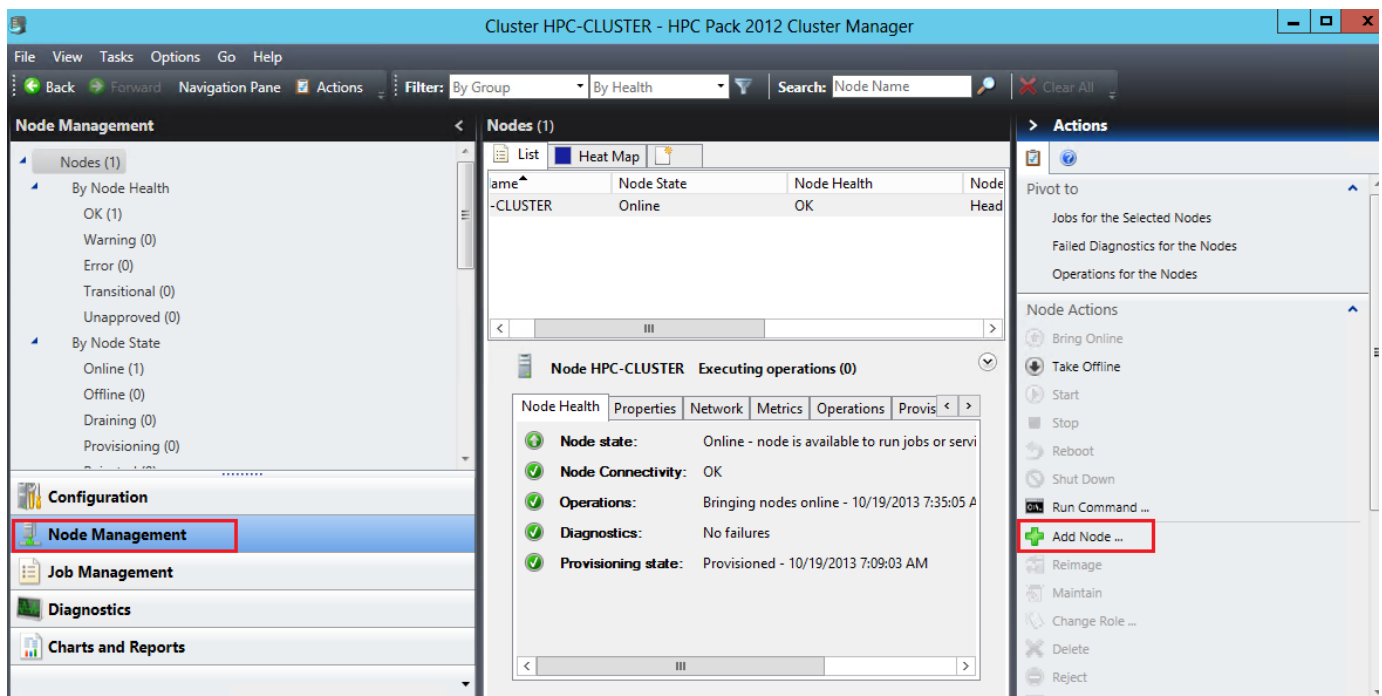
[More about Windows Azure subscription information](#)

< Previous Next > Create Cancel

1. Click **Next** to accept the default settings on every tab until you come to the Review tab.
2. Click **Create** to create the node template.

Create nodes

1. We can create some nodes manually. Click *Node Management* tab and *Add Node* on the right.



Cluster HPC-CLUSTER - HPC Pack 2012 Cluster Manager

File View Tasks Options Go Help

Back Forward Navigation Pane Actions Filter: By Group By Health Search: Node Name Clear All

Node Management

Nodes (1)

- By Node Health
 - OK (1)
 - Warning (0)
 - Error (0)
 - Transitional (0)
 - Unapproved (0)
- By Node State
 - Online (1)
 - Offline (0)
 - Draining (0)
 - Provisioning (0)

Configuration

- Node Management**
- Job Management
- Diagnostics
- Charts and Reports

Nodes (1)

Name	Node State	Node Health	Node Role
-CLUSTER	Online	OK	Head

Node HPC-CLUSTER Executing operations (0)

Node Health	Properties	Network	Metrics	Operations	Provis
Node state:	Online - node is available to run jobs or servi				
Node Connectivity:	OK				
Operations:	Bringing nodes online - 10/19/2013 7:35:05 A				
Diagnostics:	No failures				
Provisioning state:	Provisioned - 10/19/2013 7:09:03 AM				

Actions

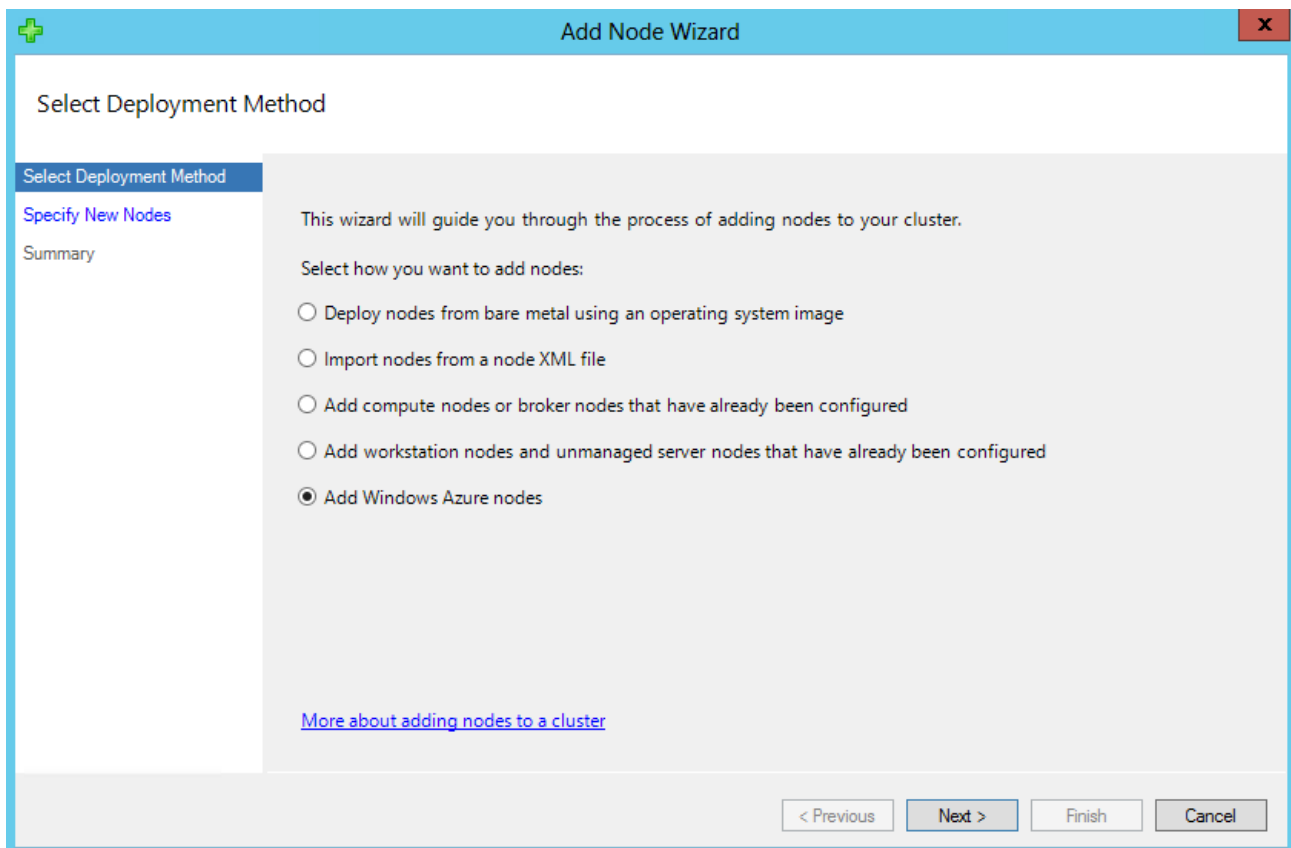
Pivot to

- Jobs for the Selected Nodes
- Failed Diagnostics for the Nodes
- Operations for the Nodes

Node Actions

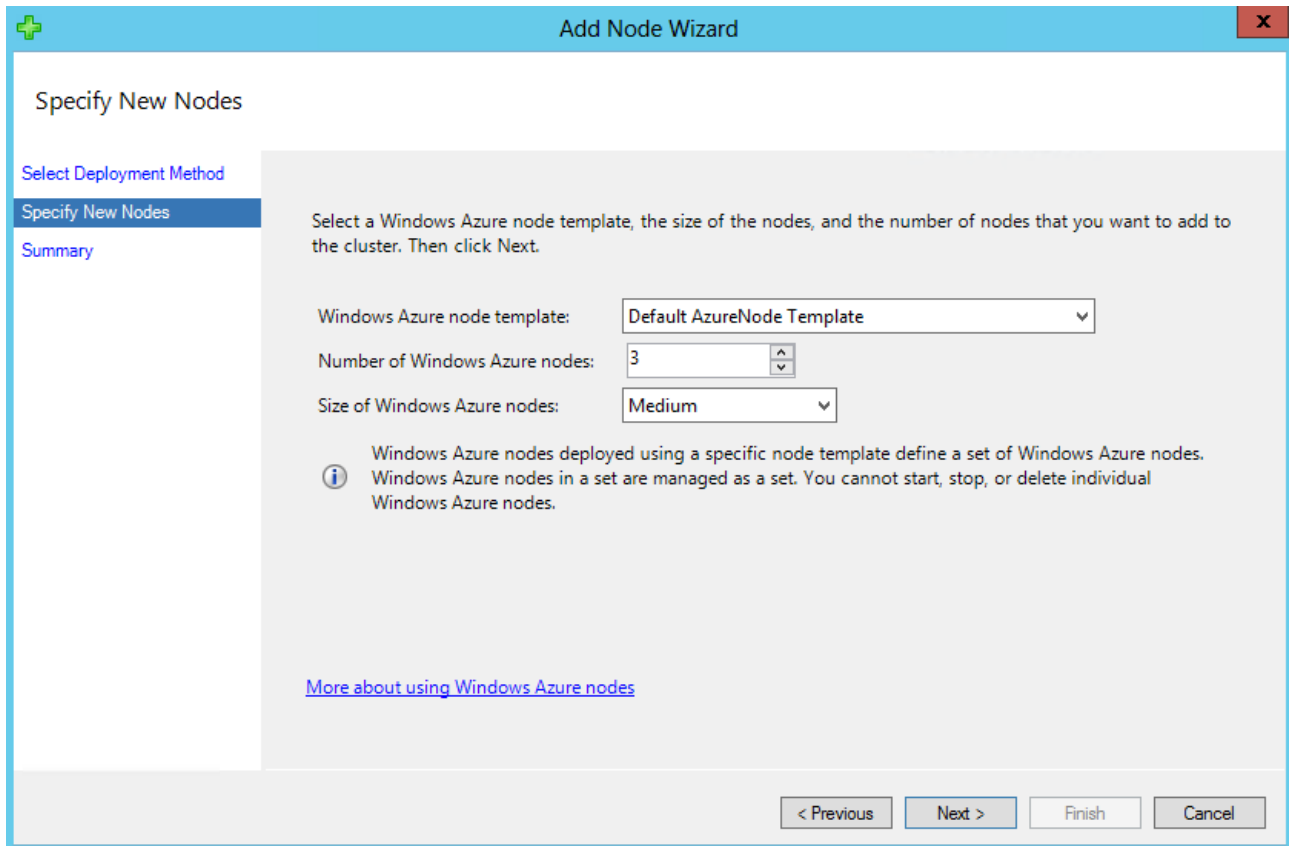
- Bring Online
- Take Offline
- Start
- Stop
- Reboot
- Shut Down
- Run Command ...
- Add Node ...**
- Reimage
- Maintain
- Change Role ...
- Delete
- Reject

2. In the Select Deployment Method tab, select *Add Microsoft Azure nodes*.



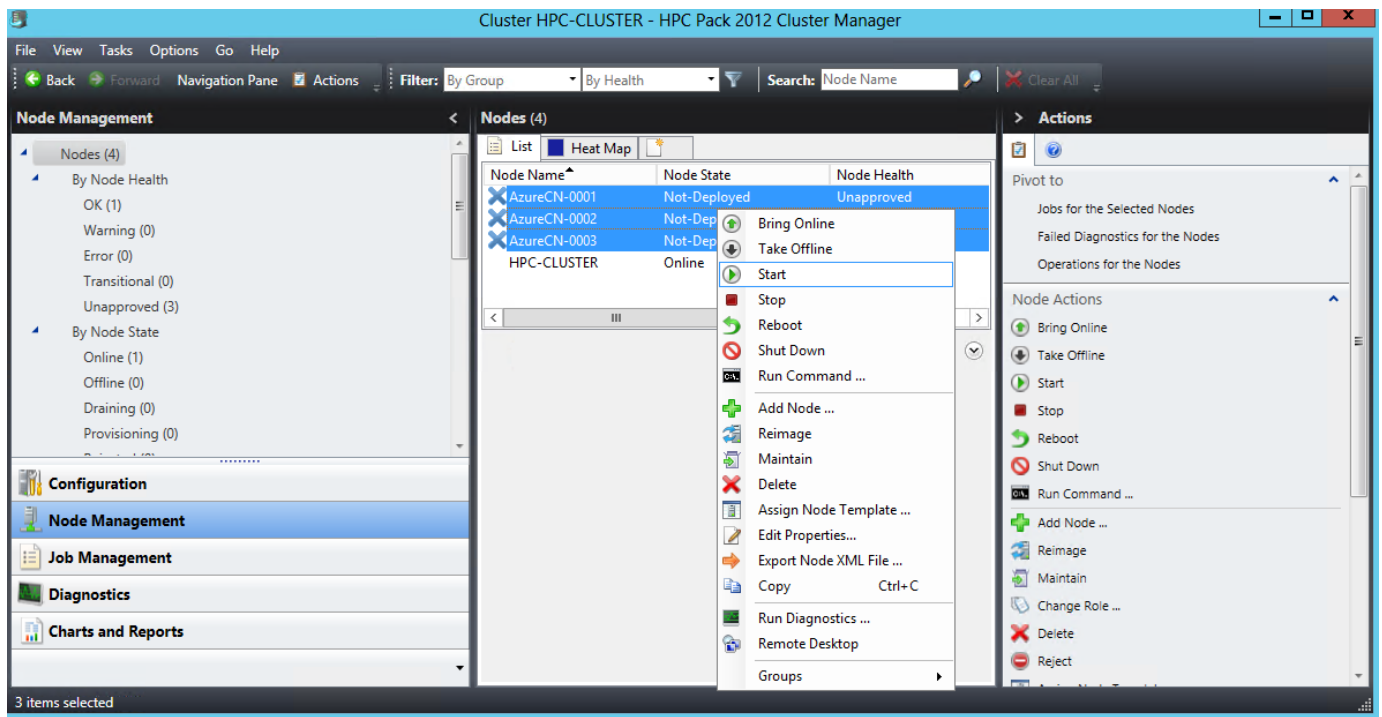
The screenshot shows the 'Add Node Wizard' window with the title bar 'Add Node Wizard'. The main heading is 'Select Deployment Method'. On the left, there is a sidebar with three items: 'Select Deployment Method' (highlighted), 'Specify New Nodes', and 'Summary'. The main content area contains the text: 'This wizard will guide you through the process of adding nodes to your cluster. Select how you want to add nodes:'. Below this are five radio button options: 'Deploy nodes from bare metal using an operating system image', 'Import nodes from a node XML file', 'Add compute nodes or broker nodes that have already been configured', 'Add workstation nodes and unmanaged server nodes that have already been configured', and 'Add Windows Azure nodes' (which is selected). At the bottom of the main area is a link: 'More about adding nodes to a cluster'. At the bottom right of the window are four buttons: '< Previous', 'Next >', 'Finish', and 'Cancel'.

3. Then we choose the Microsoft Azure node template, number of Microsoft Azure nodes and the size of the node.

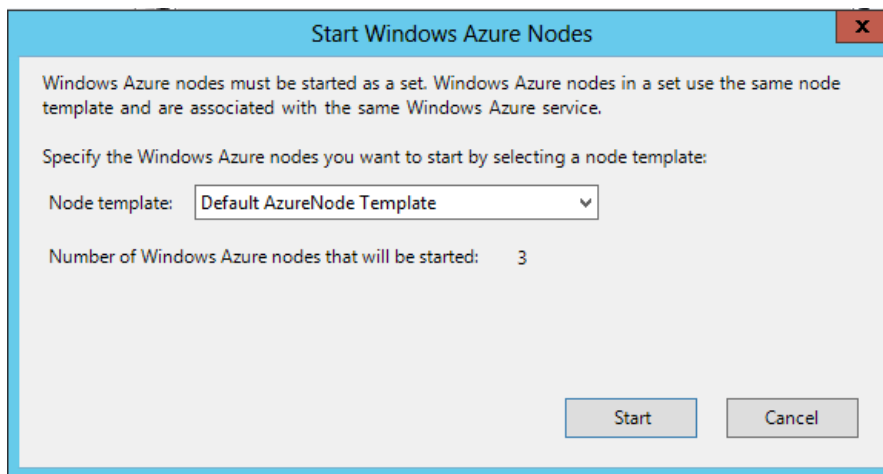


The screenshot shows the 'Add Node Wizard' window with the title bar 'Add Node Wizard'. The main heading is 'Specify New Nodes'. On the left, there is a sidebar with three items: 'Select Deployment Method', 'Specify New Nodes' (highlighted), and 'Summary'. The main content area contains the text: 'Select a Windows Azure node template, the size of the nodes, and the number of nodes that you want to add to the cluster. Then click Next.' Below this are three input fields: 'Windows Azure node template:' with a dropdown menu showing 'Default AzureNode Template', 'Number of Windows Azure nodes:' with a text box containing '3' and up/down arrows, and 'Size of Windows Azure nodes:' with a dropdown menu showing 'Medium'. Below these fields is an information icon (i) followed by the text: 'Windows Azure nodes deployed using a specific node template define a set of Windows Azure nodes. Windows Azure nodes in a set are managed as a set. You cannot start, stop, or delete individual Windows Azure nodes.' At the bottom of the main area is a link: 'More about using Windows Azure nodes'. At the bottom right of the window are four buttons: '< Previous', 'Next >', 'Finish', and 'Cancel'.

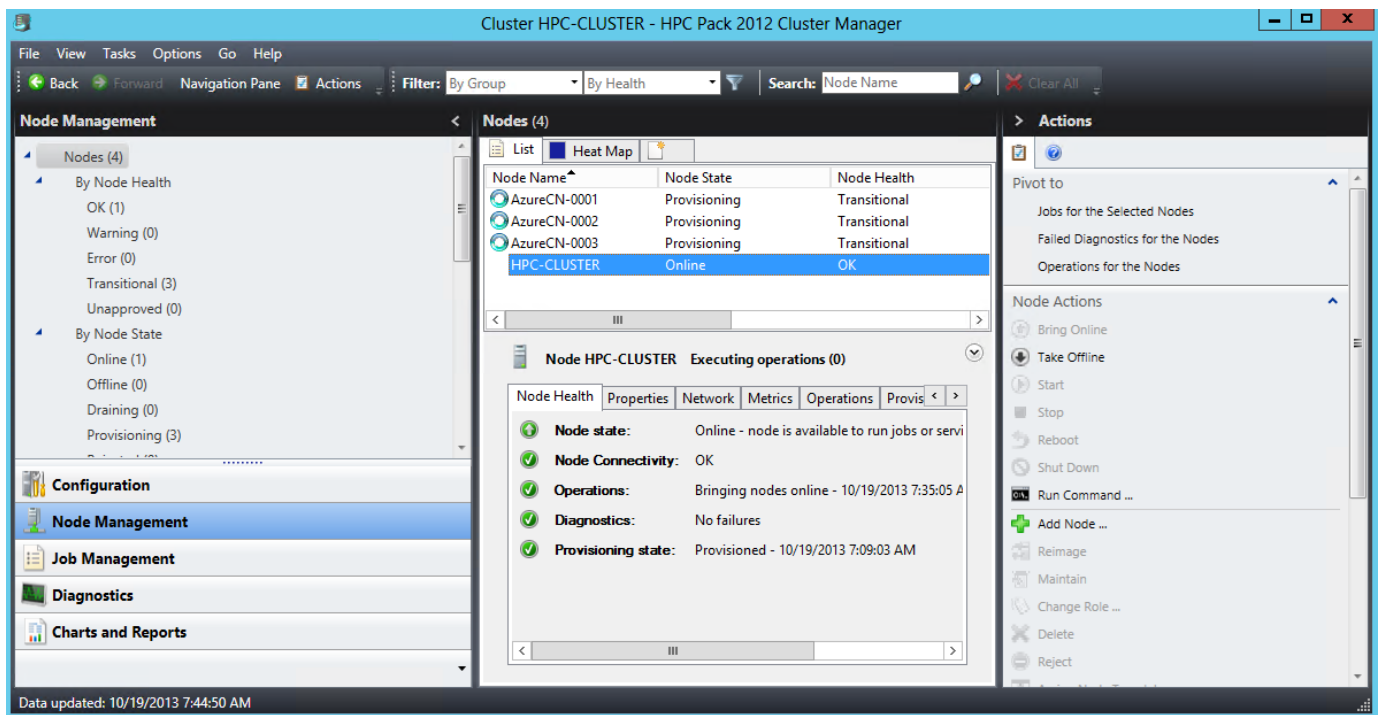
4. Then click Finish. You will see those nodes are not deployed. We can select those nodes, right click *Start*.



5. In the Start Microsoft Azure Nodes window, just select the node template and click Start button.



6. Then the cluster manager will provision those 3 machines in pre-configured cloud service.



- Let's go to the Microsoft Azure Management Portal, and we can see hpc worker machines and proxy machines are being deployed in the cloud service.

- azure4research-blast
- datastreamvm
- datastreamvm2
- hpc-cluster
- ipythonmgr
- msrlinuxvm
- msrtrainingvm
- pythoncluer2
- pythoncluster
- pythonstoragevm
- streamdatavm
- test-storm
- test-storm2
- vmazuredata

hpcclusternodes

[DASHBOARD](#)
[MONITOR](#)
[CONFIGURE](#)
[SCALE PREVIEW](#)
[INSTANCES](#)
[LINKED RESOURCES](#)
[CERTIFICATES](#)

PRODUCTION **STAGING**

NAME	STATUS	ROLE	SIZE	UPDATE DOMAIN	F...
HpcMediumWorker_IN_0	✓ Running	HpcMediumWorker	Medium	0	0
HpcMediumWorker_IN_1	✓ Running	HpcMediumWorker	Medium	1	1
HpcMediumWorker_IN_2	✓ Running	HpcMediumWorker	Medium	1	0
HpcProxy_IN_0	✓ Running	HpcProxy	Medium	0	0
HpcProxy_IN_1	✓ Running	HpcProxy	Medium	1	1

Summary

Congratulations! You have successfully installed Microsoft HPC Pack on a Microsoft Azure Virtual Machine and are ready to deploy computing clusters on Microsoft Azure.

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