WorkshopPLUS

Microsoft Azure Infrastructure as a Service (IaaS)

Introduction to Microsoft Azure Virtual Machines – V2

Student Lab Manual

V1.3, December 2, 2015

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# Introduction to Microsoft Azure Virtual Machines

In this lab, you will create 2 virtual machines. One of the virtual machines will be an IIS server and the other machine with have SQL Server 2012 installed to serve as the application database. These machines will be connected via a Microsoft Azure Virtual Network.

You'll learn:

* How to create an Azure Storage Account
* Configure an IIS Web Server and connect it to a SQL Server running in a virtual machine through a simple virtual network
* Configure a SQL Server virtual machine
* Deploy the sample Web application to the IaaS IIS virtual machine

## Prerequisites

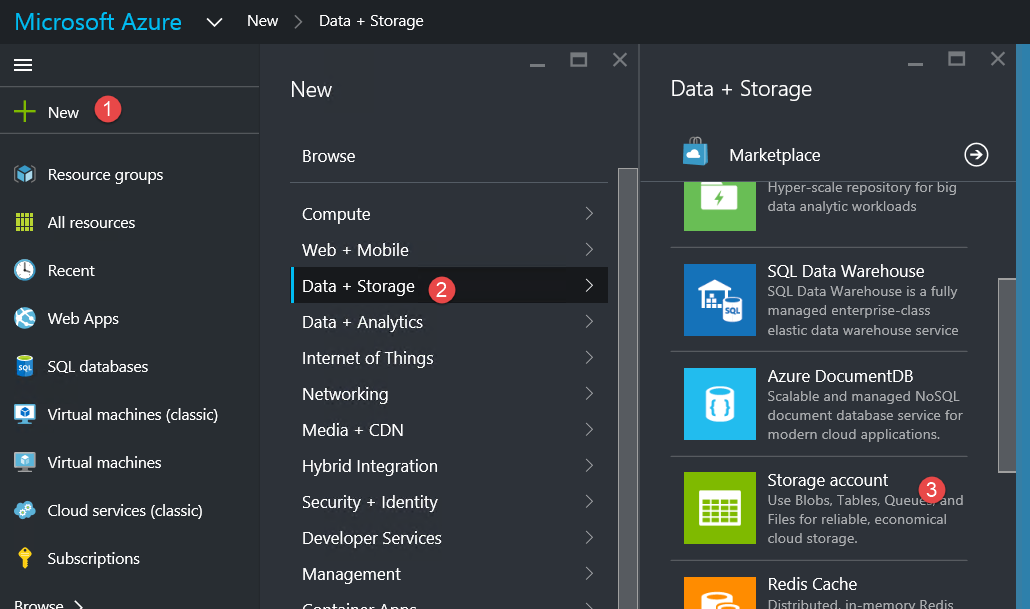
The following is required to complete this hands-on lab:

* [Microsoft Azure PowerShell](http://www.microsoft.com/windowsazure/sdk/)
* Install the SQL Server PowerShell extensions (link)
* A Microsoft Azure subscription

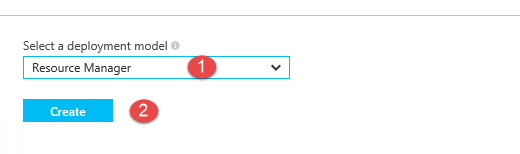
## Task 1 – Create a Storage Account and Resource Group

We will need a storage account in order to have a place to put our Virtual Machine vhd blob files. Although while creating a virtual machine, you have the option to create a storage account, we want to first create our storage account manually so that we can create a resource group to hold all the applications resources in. Creating the storage account up front gives us more flexible options.

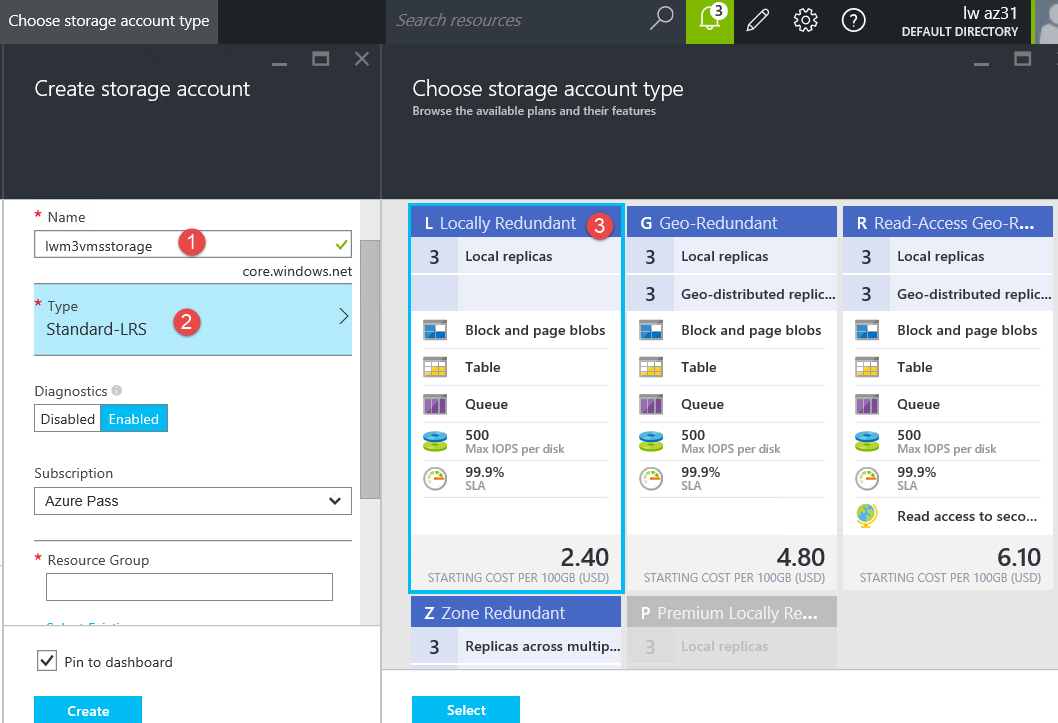
1. Log in to the Azure portal at <https://portal.azure.com>.
2. From within the Azure Portal, click on the **+New, Data + Storage** and then **Storage account.**



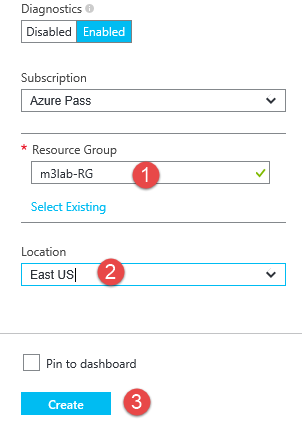
1. In the storage account blade that appears, select **Resource Manager** from the deployment model drop-down and then select the **Create** button.



1. On the Create storage account blade, enter a unique storage account name (unique in all of Azure), and then select **Locally Redundant** storage account type. Click the **Select** button to close the storage type blade. The type shown on the Create storage account blade will update once the type blade has closed.

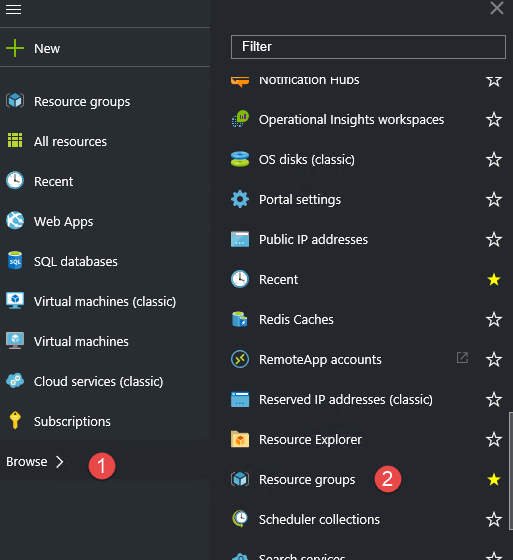


1. Enter a resource group name in the *Resource group* edit field. This name only needs to be unique within your subscription. Select the region you want the storage account to be created in and then click the **Create** button. (You do not need for the ‘Pin to dashboard’ checkbox to be checked)

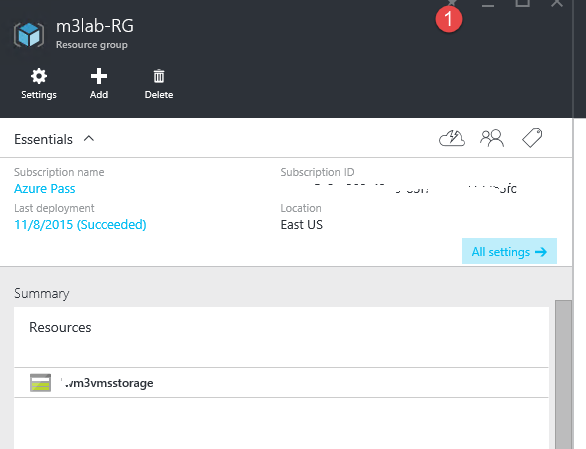


## Task 2 – Create a Virtual Network

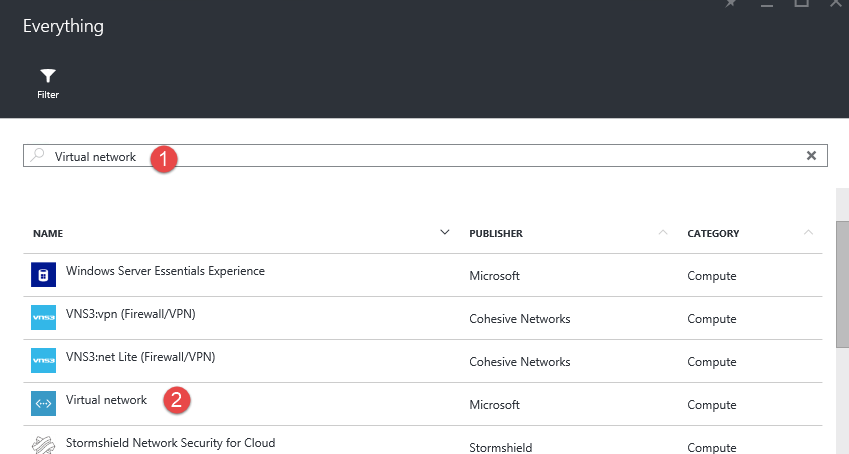
1. Click on the **Browse** button in the Azure portal and then select **Resource Groups**.



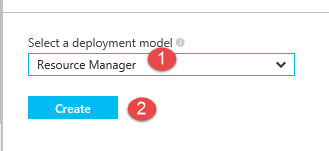
1. Select the name of the resource group you created in the previous task. This will open up the resource group blade
2. For ease of finding your resource group again later, we will first pin the resource group to the Home page. Click the Pin button at the top of the resource group. Now, the next time you click on the Home menu item (left side of the portal window), you can find your resource group on a tile.



1. Click on the **Add** button in the resource group blade.
2. Type in ‘Virtual Network’ in the Everything window and then find *Virtual network* and select it.

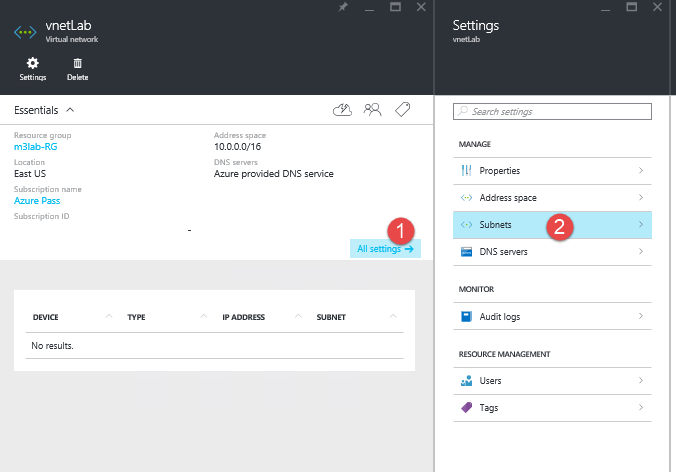


1. In the virtual network blade, select Resource Manager as the deployment type and then select the create button.

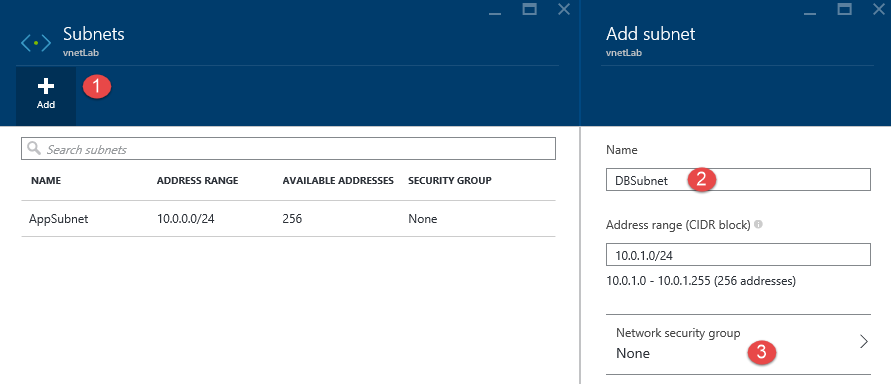


|  |  |
| --- | --- |
| 1. When setting up the virtual network, you will need to:  * The name of the virtual network (only need to be unique within the subscription) * The address space. Needs to be an internal (not internet addressable) range * The name of the subnet. For this lab exercise, name it **AppSubnet**. * Subnet address range (leave as the default) * Select your Azure subscription (if you have multiple) * Select the Resource group you created previously * Select the region to put the virtual network in * Clear the Pin to dashboard checkbox * Click the **Create** button |  |
|  |  |

1. When the virtual network has finished the creation process, you should see that the virtual network blade is shown in the portal window. Click on the **All settings** link and then then **Subnets** menu item. NOTE: If the virtual network blade is not shown, click on the new virtual network in your resource group to be able to see it.



1. Now click on the Add button on the Subnets blade and enter the name **DBSubnet** for the new subnet name. This is the subnet we will put the SQL Server machine in. Finally, select the **OK** button in the Add subnet blade.



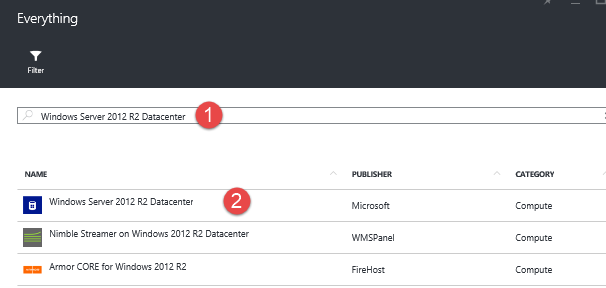
1. Close all the blades and go all the way back to the Home screen. From there, you can find the tile for your resource group and click on it. You should see your resource group blade appear with your virtual network and storage account in it.

## Task 3: Creating Virtual Machine for IIS

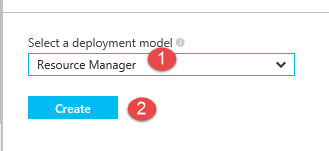
In this task, you will learn how to create a Virtual Machine in Microsoft Azure portal <https://portal.azure.com> . Then, you will configure the machine for Internet Information Server, adding roles to use later on in this lab.

In this task, you will provision a Virtual Machine to host an MVC4 application.

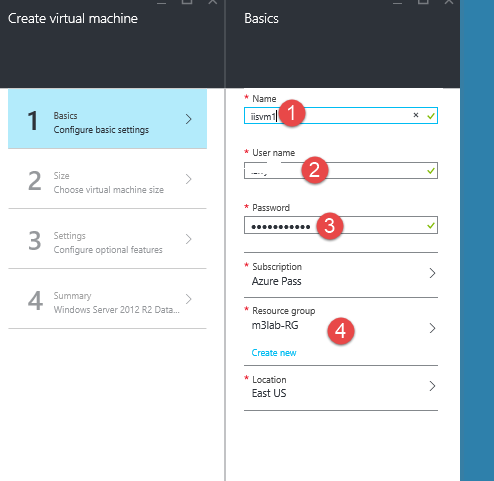
1. From within your resource group blade, select the **Add** button.
2. In the Everything resource blade, type in the search keywords ‘*Windows Server 2012 R2 Datacenter*’ and select Enter. Then select the server image as shown below.



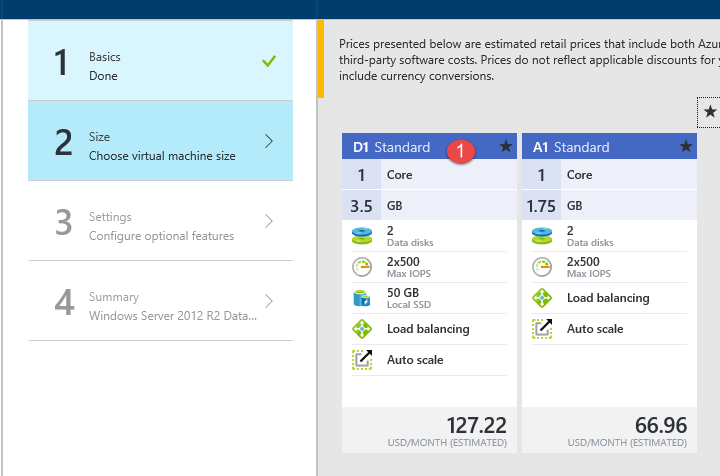
1. In the Windows Server 2012 R2 Datacenter blade, select Resource Manager as the deployment model and then select the Create button.



1. In the *Create virtual machine* blade, select **Basics** and then enter the virtual machine Name (i.e. "iisvm1"), provide a user name for the *User Name* field and a password (this is the RDP username/password). This password needs to contain three of these - lower case characters, uppercase characters, numbers and special characters. Make sure you remember your password! Lastly, select the resource group name you previously created and the region the machine will be in and select the **OK** button at the bottom of the Basics blade.



1. For the virtual machine size, select D1 Standard and the click the select button at the bottom of the blade.



NOTE: Currently, Azure VMs come in two tiers. The **Standard** tier has VM sizes A0-A4 (Extra Small to Extra Large), and the “Memory Intensive Instances” tier has sizes A5-A11. The **Basic** tier will be similar machine configurations to the "Standard" A0-A4, but the new "Basic" VMs won’t include load balancing or auto-scaling options.

These new "Basic" VMs might be of interest to developers who are using Azure VMs for Dev/Test workloads and don’t need the load balancing and auto-scaling features. These basic VMs will give developers equivalent compute capabilities at a lower cost if load balancing and auto-scaling are not needed.

**NOTE:** It is suggested to use secure passwords for admin users, as Microsoft Azure virtual machines could be accessible from the Internet knowing just their DNS.

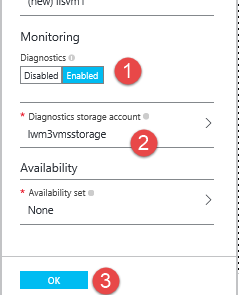
You can also read this document on the Microsoft Security website that will help you select a secure password: <http://www.microsoft.com/security/online-privacy/passwords-create.aspx>

1. Now you are on the MOST IMPORTANT blade, the Settings blade.

|  |  |
| --- | --- |
| Confirm the following:   * Disk type: Standard – you could use Premium SSD if you have a DS or GS series machine and have chosen a region that supports Premium storage. * Storage account – the previous storage account you created * Virtual network – the previous virtual network you created * Subnet – needs to be **AppSubnet** * Public IP address – leave as is, you need a public IP address in this case to do RDP * Network security group – leave as is, this puts a network security group around our **AppSubnet** |  |

1. Scroll farther down in the Settings blade and make sure **Diagnostics** are enabled and that the diagnostics storage account is the same as the storage account the VM will be placed in. Typically, you would use a different storage account for diagnostics, but for the lab, this is fine. Select the **OK** button.

We do not need an availability set since we will only have one IIS machine.

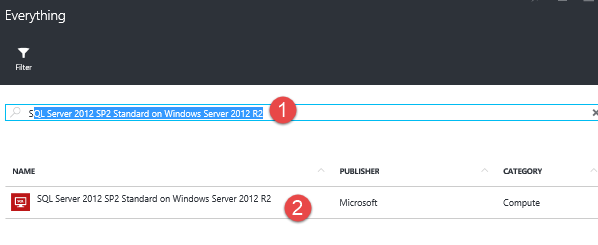


1. Select the **OK** button in the Summary blade. The machine creation process will begin. This will take at least 10 minutes, so proceed with the next task.

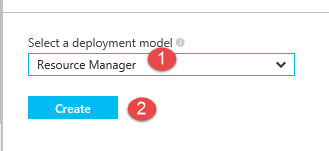
## Task 4 – Create an IaaS SQL Server Virtual Machine

In this step, you will create a new virtual machine using the Microsoft Azure Portal <https://portal.azure.com> that will serve as your database server.

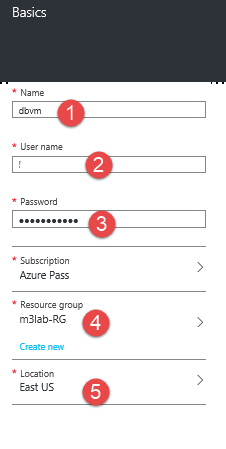
1. For the SQL Server machine, we want to use *SQL Server 2012 SP2 Standard* edition on a Windows Server 2012 R2 machine. Click on the Add button in your resource group and then in the Everything blade, type in the search words **SQL Server 2012 SP2 Standard on Windows Server 2012 R2.** Once you see this machine listed, select it.



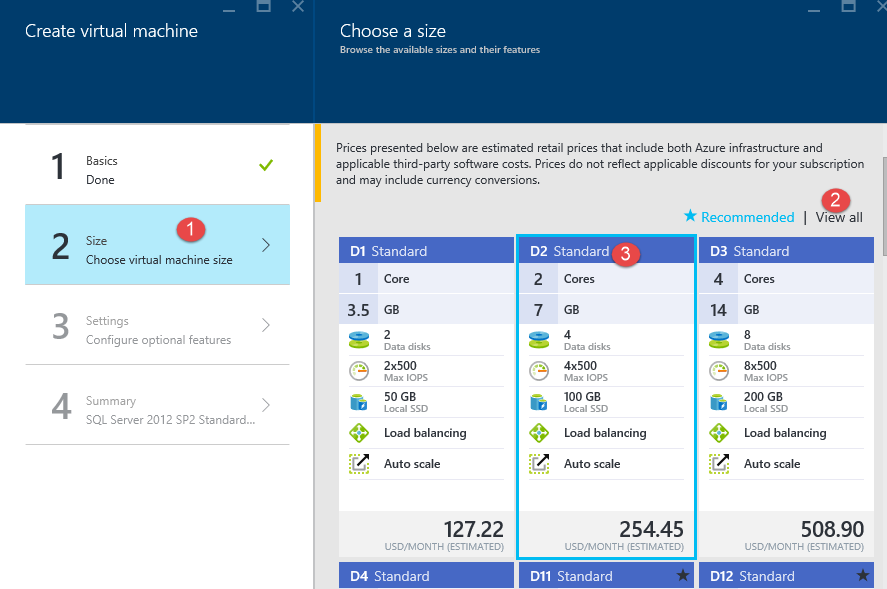
1. In the SQL Server 2012 blade, select Resource Manager as the deployment model and then select the Create button.



1. In the *Create virtual machine* blade, select **Basics** and then enter the virtual machine Name (i.e. "dbvm"), provide a user name for the *User Name* field and a password (this is the RDP username/password). This password needs to contain three of these - lower case characters, uppercase characters, numbers and special characters. Make sure you remember your password! Lastly, select the resource group name you previously created and the region the machine will be in and select the **OK** button at the bottom of the Basics blade.



1. For the virtual machine size, select D2 Standard and the click the **Select** button at the bottom of the blade. You may need to select the View all link to see all the machine options.

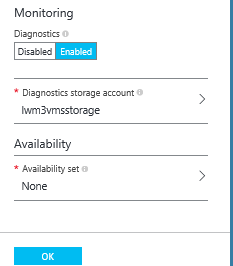


1. Now you are on the MOST IMPORTANT blade, the Settings blade.

|  |  |
| --- | --- |
| Confirm the following:   * Disk type: Standard – you could use Premium SSD if you have a DS or GS series machine and have chosen a region that supports Premium storage. Typically, you WOULD use Premium SSD for a SQL database. * Storage account – the previous storage account you created * Virtual network – the previous virtual network you created * Subnet – needs to be **DBSubnet**. This is important, we want the IIS machine to be in a different subnet than the DB machine. * Public IP address – leave as is, you need a public IP address in this case to do RDP * Network security group – leave as is, this puts a network security group around our DBSubnet. This is important! We want the machines to be in **DIFFERENT** network security groups so we can have different rules. |  |

1. Scroll farther down in the Settings blade and make sure **Diagnostics** are enabled and that the diagnostics storage account is the same as the storage account the VM will be placed in. Typically, you would use a different storage account for diagnostics, but for the lab, this is fine. Select the **OK** button.

We do not need an availability set since we will only have one SQL Server machine.



1. Select the OK button in the **Summary** blade. The machine creation process will begin. This will take at least 10 minutes, so proceed with the next task.

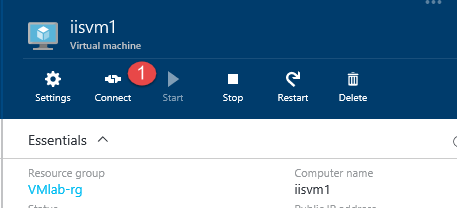
## Task 5: Configuring the IIS Virtual Machines

Next, you will configure the IIS virtual machine by adding the necessary roles to deploy the MVC application.

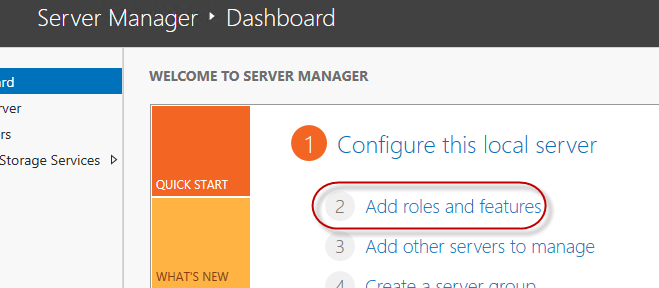
1. From within your resource group blade, select the iisvm1 machine.



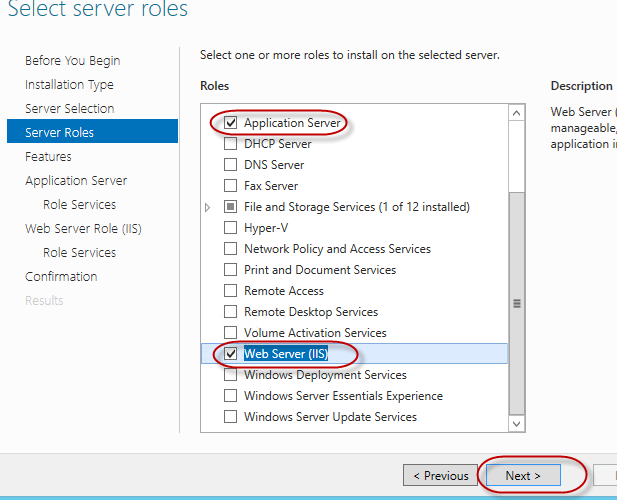
1. On the virtual machine blade, select the **Connect** button.



1. You will be asked to download the remote desktop settings file. Click **Open** and log on using the remote desktop credentials you defined when creating the virtual machine. You will also be prompted to accept the certificate. Select **Yes**.
2. Wait until the Server Manager appears and then select the **Add Roles and Features** link in the dashboard.

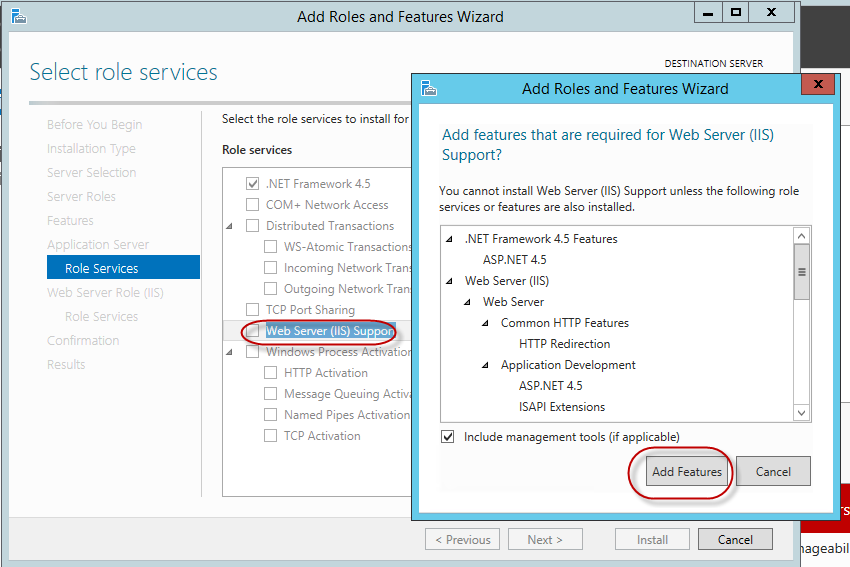


1. Keep clicking the Next button until you get to the Select Server Roles window. In this window, you need to select **Application Server** and **Web Server (IIS)**. Click the **Add Features** button and then select the **Next** button.



Adding Server Roles

1. Click the **Next** button.
2. Click the **Next** button.
3. In the Select Role Services page, select **Web Server (IIS) Support**. It will prompt a dialog warning about Required Role Services. Click **Add Features** button to install them and then click **Next.**



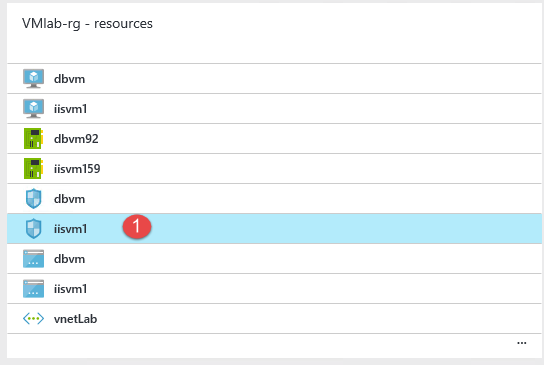
Adding Server Roles

1. Click the **Next** button.
2. Click the **Next** button.
3. Click the **Install** button.
4. Once the installation has completed, you can click the **Close** button.
5. Close the Remote Desktop Connection.

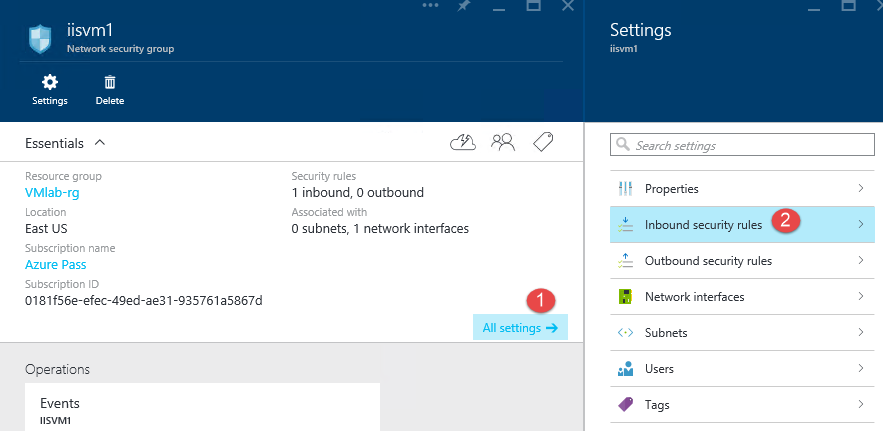
## Task 6: Setting Inbound Security rules for the IIS Machine

You have installed IIS and in that process, IIS has opened up port 80 on the virtual machines firewall. What we need to do now is open an external port for access outside of the IIS machine. In the Azure portal <https://portal.azure.com> , this is called an *Inbound Rule*.

1. From within your resource group, select the network security group for the *iisvm1* SQL Server virtual machine.



1. Select All settings…Inbound security rules

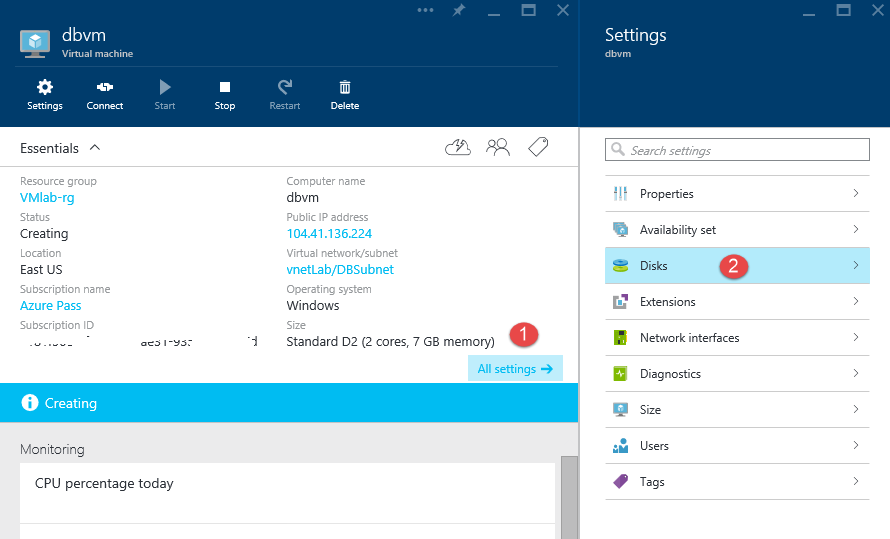


1. In the **Inbound security rules** blade, select the **Add** button which will advance you to the **Add inbound security rule** blade. Set the fields settings as shown below and then click the **Select** button.

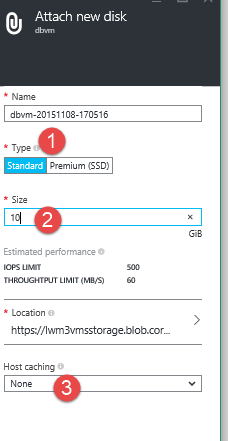
|  |  |
| --- | --- |
| A couple of points regarding the security rule:   * The name can be any name, in this lab, we will call it ‘webport’ * You could specify a priority if you wish, the lower the number, the higher the priority. Since we only have one rule other than the RDP port, this setting is fine. * The protocol will be TCP in our case * The Source port range in this case can be any valid set of internet addressable IP ranges, any IP address or a tag (virtual network, internet, Load balancer). In our case, we accept any traffic * Make sure the Destination port is set to 80 since that is the firewall port open in the machine. |  |

## Task 7: Configuring the SQL Server 2012 Instance

1. Now, you will create and attach an empty data disk to store the SQL Server logs and data files. To do this, go back to your resource group blade and select the SQL Server virtual machine (dbvm).
2. Select **All Settings**…**Disks**.

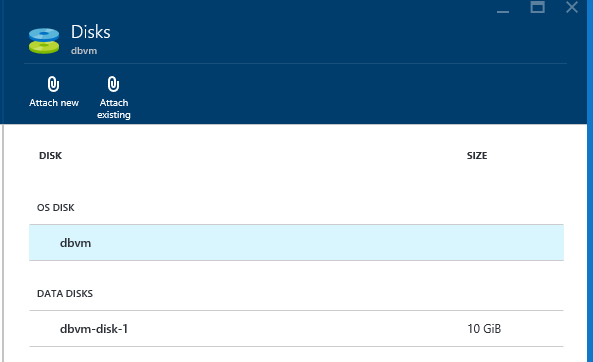


1. Select Attach new and then enter the size of the disk to attach (10GB for the lab). Then select the **OK** button at the bottom of the Attach new disk blade.



1. Wait until the attach disk process finishes.
2. You will see two disks for the virtual machine listed in the blade for your SQL VM: one for the operating system and other one for data and logs. Note that the disk name is not important here, just that the disk is created.

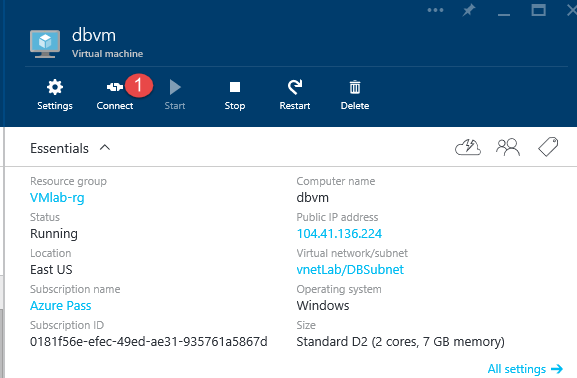
**NOTE:** It might take a few minutes until the data disk appears in the virtual machine's dashboard within the Microsoft Azure Portal.



### Configuring SQL Server 2012 Instance

In this step, you will set up SQL Server instance and database to be used by the web application.

1. From the SQL Server blade, select the **Connect** button.

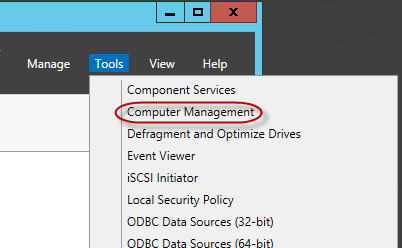


1. In the virtual machine, open Server Manager (if it is not already opened) by clicking on the icon in the lower left hand corner of the window.   
     
   NOTE: Server Manager should open by itself the first time you log into the machine.

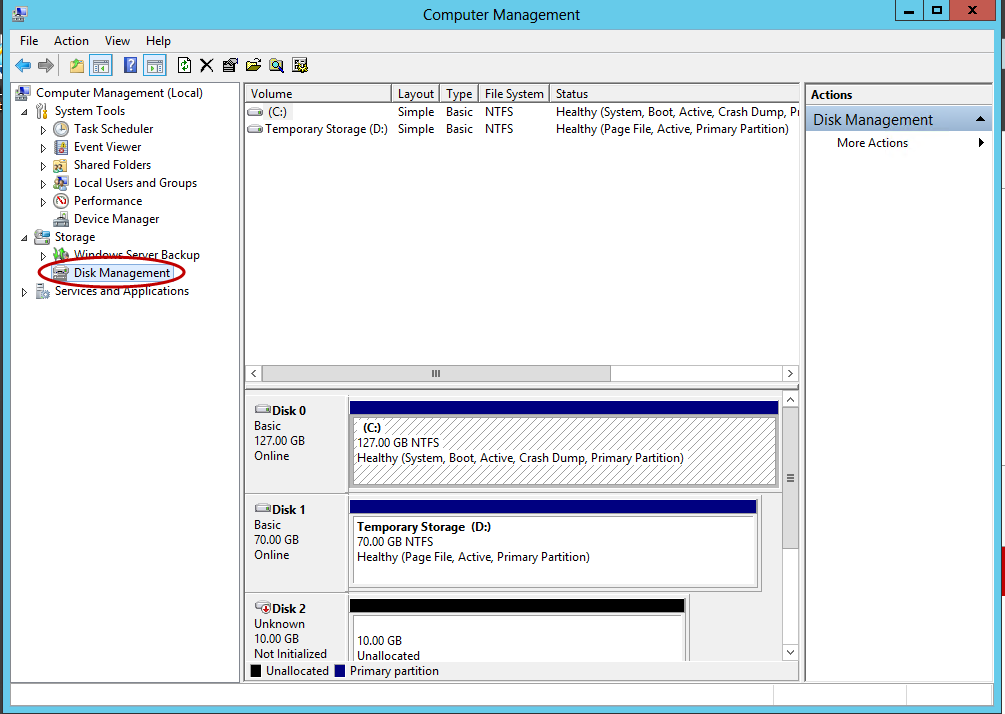


Server Manager Icon

1. Once the server manager has opened, click on the **Tools** menu item and then **Computer Management**.



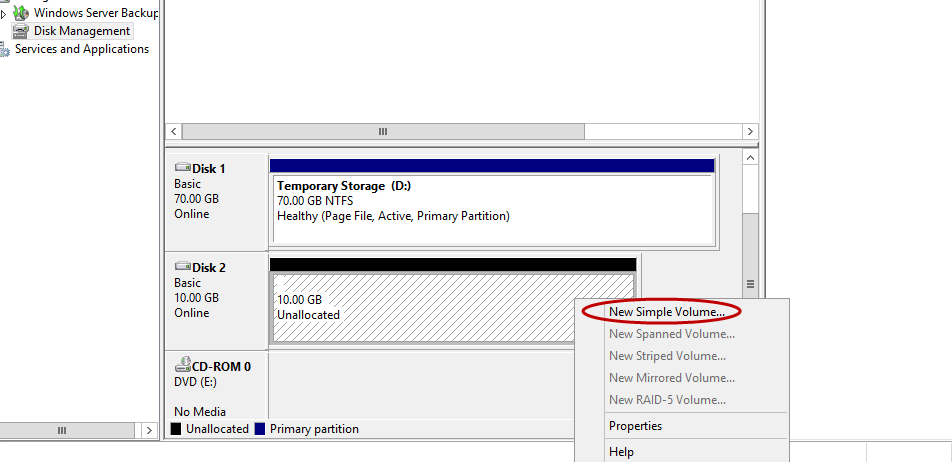
1. Expand **Storage** node and select **Disk Management** option.



1. After selecting Disk Management, an Initialize Disk dialog will be displayed. Leave the default values and click **OK**.

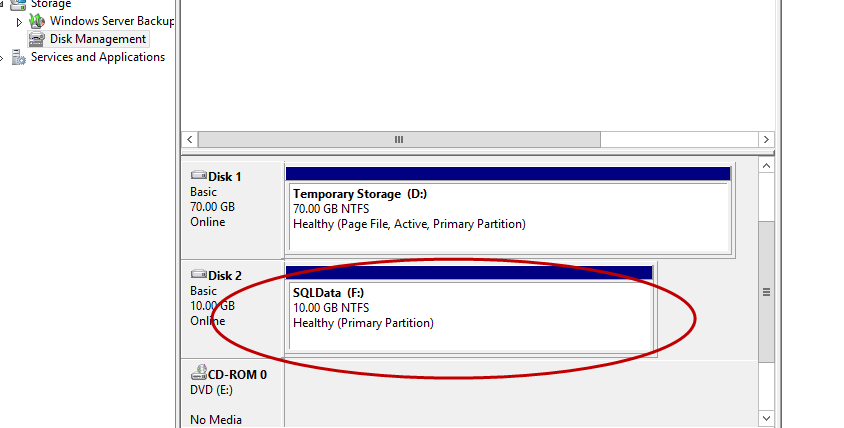
**NOTE**: If the Initialize Disk dialog is not displayed when selecting Disk Management, locate the disk you created using the **Attach Empty Disk** feature from the Microsoft Azure Management Portal, right-click the first disk and select **Initialize Disk**. Leave the default values and click **OK**.

1. Right-click the disk unallocated space and select **New Simple Volume**.



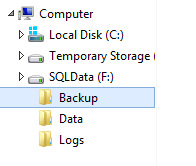
Disk Management

1. Follow the New Simple Volume Wizard. When asked for the Volume Label use ***SQLData***.   
     
   NOTE: Make sure you leave the drive letter as F:
2. Wait until the process for the disk is completed. Note that you will be prompted with a dialog box that asks you if you want to format the disk (select OK or Yes) and then you may be prompted by another dialog box saying it is not possible to format the disk. Ignore the second dialog box.
3. The Disk Management list of available disks should now show the **SQLData** disk like in the following figure (close the disk management windows after this step).



Disk Management

1. Using Windows Explorer, go to your new **F:\** drive and create the directories **F:\Data**, **F:\Logs** and **F:\Backup**.



### Installing the AdventureWorks Database

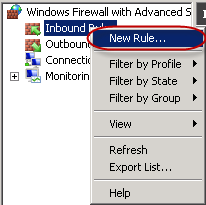
In this step, you will add the AdventureWorks database that will be used by the sample application.

1. In the hands-on lab material (on the hosted lab HOST machine), browse to the **C:\AzureIaaSWS\M3-VirtualMachines\Labs\IntroToAzureVMs-V2\Source\Assets** directory. If you are not using a Microsoft hosted lab, you will need to browse to wherever you extracted the lab material to on your hard drive.
2. Copy the entire **Database** directory over to the SQL Server IaaS virtual machine and drop it on the C:\ drive. You can do this by selecting the Database directory on the source drive, select CTRL+C and then doing a CTRL+V onto the C:\ Drive of the database VM.
3. On the SQL IaaS machine, browse to **C:\Database**.
4. Right click the **AdventureWorks2012\_Database.zip** file and extract the contents to **F:\Data**.
5. Browse to the **C:\Database\Scripts** directory.
6. Right click on the **SQLPSX.msi** file and select **Install**. Step through the install process, accepting the defaults.
7. Right click on the **InstallDB.cmd** file and select **Run as Administrator**. The DBSetup.ps1 PowerShell script will be executed and will:
   1. Attach the AdventureWorks2012 database.
   2. Set the database server instances to mixed mode.
   3. Add a user login, CloudShop and sets user mappings.
8. Open the **SQL Server Management Studio** by going back to the Start menu (tile page) and then typing SQL Server Management Studio. Click on the icon that will appear on the left hand side.



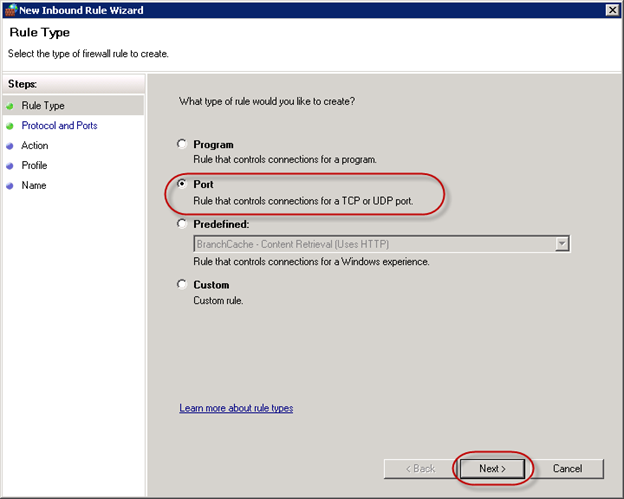
Opening SQL Server Management Studio

1. Connect to the SQL Server 2012 default instance using your Windows Account.
2. Expand the Databases node to make sure the **AdventureWorks2012 database** has been attached.
3. Close SQL Server Management Studio.
4. In order to allow the MVC4 application access the SQL Server database you will need to add an **Inbound Rule** for the SQL Server requests in the **Windows Firewall**. To do this, go to the Start page (tile Window) and open the Control Panel.
5. Choose Windows Firewall from the Control Panel icons and then choose **Advanced Settings**.
6. Select **Inbound Rules** node, right-click it and select **New Rule**.



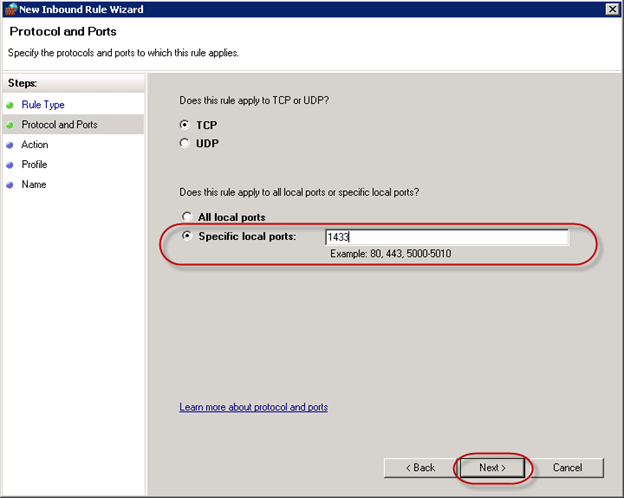
Creating an Inbound Rule

1. In the New Inbound Rule Wizard, select **Port** as **Rule Type** and click **Next**.



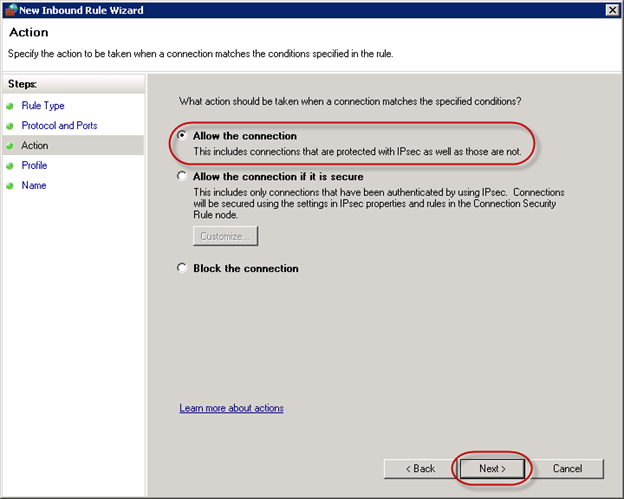
Inbound Rule's Type

1. In Protocols and Ports step, select **Specific local ports** and set its value to ***1433***. Click **Next** to continue.



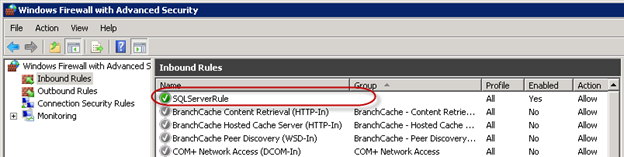
Inbound Rule's Local Port

1. In the Action step, make sure **Allow the connection** option is selected and click **Next**.



Inbound Rule's Action

1. In the Profile step, leave the default values and click **Next**.
2. Finally, set the Inbound Rule's **Name** to SQLServerRule and click **Finish**.



New Inbound Rule

1. Close the Windows Firewall with Advanced Security window.
2. Close the remote desktop session for your SQL IaaS machine.

## Task 8: Deploying the MVC4 Application

1. In the Microsoft Azure Portal <https://portal.azure.com> and your resource group, remote desktop into the IIS virtual machine you created in the earlier task by clicking **Connect** from the menu button. If you used the proposed name, this Virtual Machine's should be named **iisvm1**.
2. You will be prompted to download the remote desktop client. Click **Open** and log on using the remote desktop credentials you defined when creating the virtual machine.
3. Open the **C:\inetpub\wwwroot** folder and copy the file **CloudShop.zip** located in the hands-on lab material **.\Source\Assets\CloudShop** folder. To do this, copy CloudShop.zip (Ctrl + C) and paste it (Ctrl + V) in the virtual machine's wwwroot folder. Extract all files to **C:\inetpub\wwwroot\CloudShop** folder.
4. Open with Notepad, the **Web.config** file located in **C:\inetpub\wwwroot\CloudShop**. Replace the connection strings placeholder with the internal IP address of your SQL Server (by default, is the virtual machine's IP address which you can obtain by looking in the virtual networks dashboard). DO NOT INCLUDE THE BRACKETS AT THE BEGINNING AND END OF THE Data Source setting.

XML

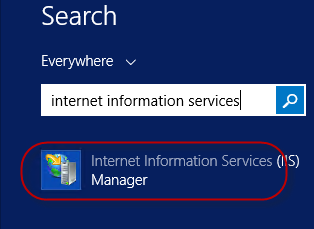
**<connectionStrings>**

**<add name="AdventureWorksEntities" connectionString="metadata=res://\*/Models.AdventureWorks.csdl|res://\*/Models.AdventureWorks.ssdl|res://\*/Models.AdventureWorks.msl;provider=System.Data.SqlClient;provider connection string=&quot;data source=[ENTER YOUR SQL MACHINE INTERNAL IP ADDRESS];initial catalog=AdventureWorks2012;Uid=CloudShop;Password=Azure$123;multipleactiveresultsets=True;App=EntityFramework&quot;" providerName="System.Data.EntityClient" />**

**<add name="DefaultConnection" connectionString="Data Source=[ENTER YOUR SQL MACHINE INTERNAL IP ADDRESS];initial catalog=AdventureWorks2012;Uid=CloudShop;Password=Azure$123;MultipleActiveResultSets=True" providerName="System.Data.SqlClient" />**

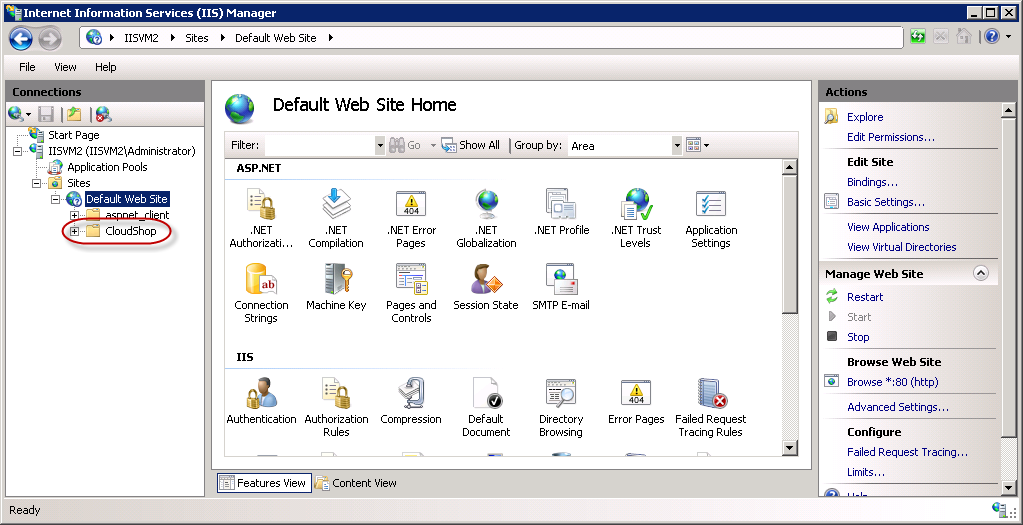
**</connectionStrings>**

1. Open the **Internet Information Services (IIS) Manager** by going to the Start page of the Windows Server and then typing in ‘Internet Information Services’. Click on the icon.



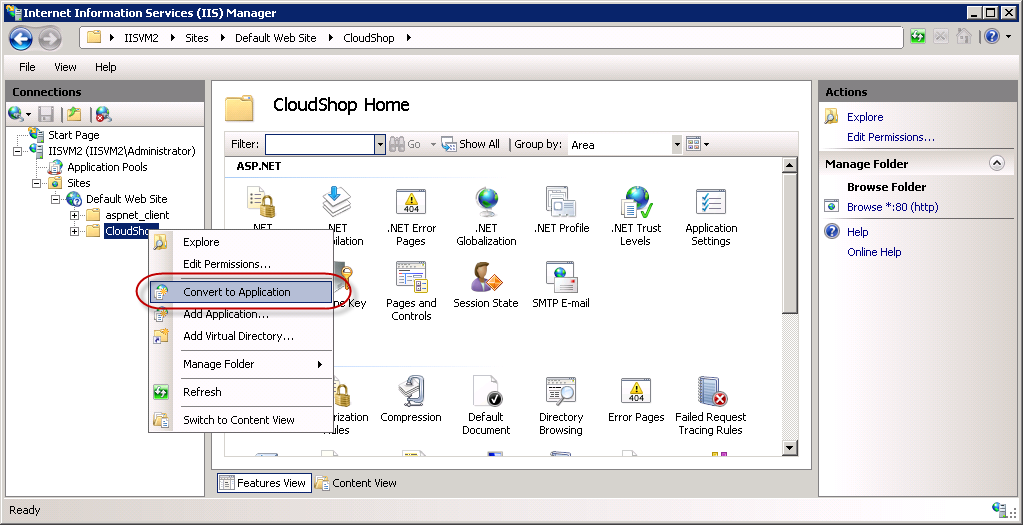
Starting Internet Information Services Manager

1. In the *Connections* pane, expand Default Web Site within your IIS Server's node. You will see the CloudShop folder you copied in the wwwroot folder.



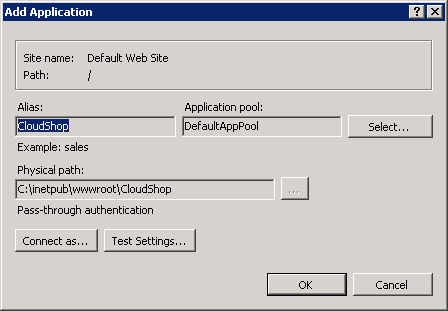
IIS Manager

1. Right-click CloudShop folder and select **Convert to Application**.



IIS Manager - Convert to Application

1. In the **Add Application** dialog, click **OK**.



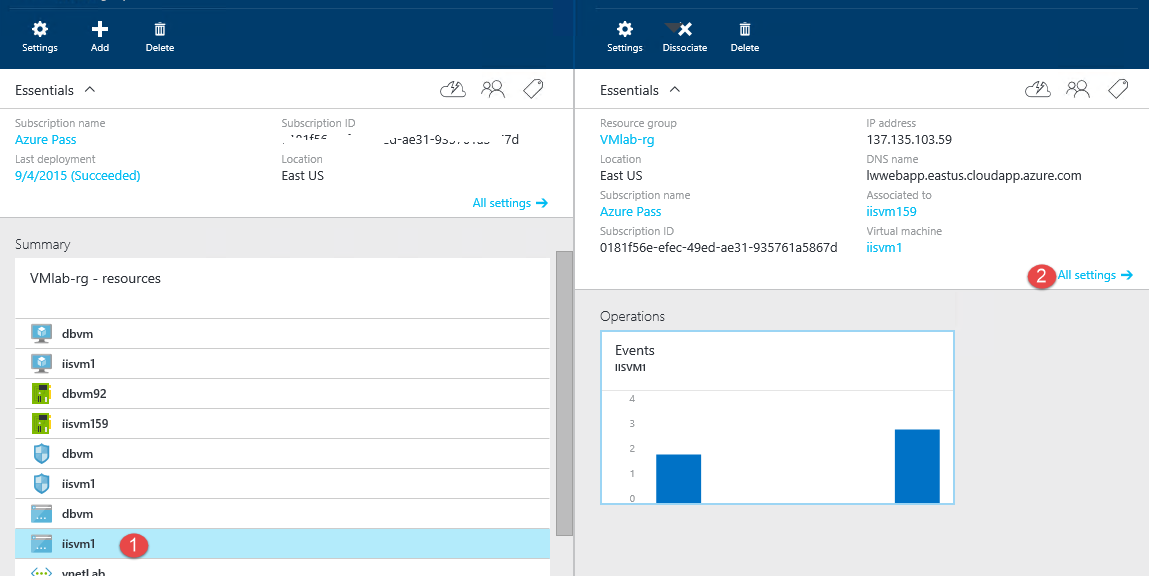
Add Application dialog

1. Close the Internet Information Server (IIS) Manager window.
2. Close the Remote Desktop Connection.

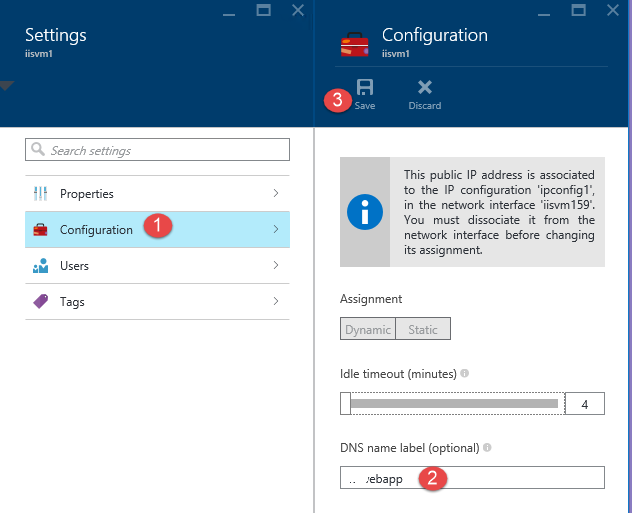
## Task 9: Setting up the IIS machines DNS address

By default, machines in V2 do not have DNS addresses, although they may have public IP addresses. Let’s create a DNS address for the IIS machine.

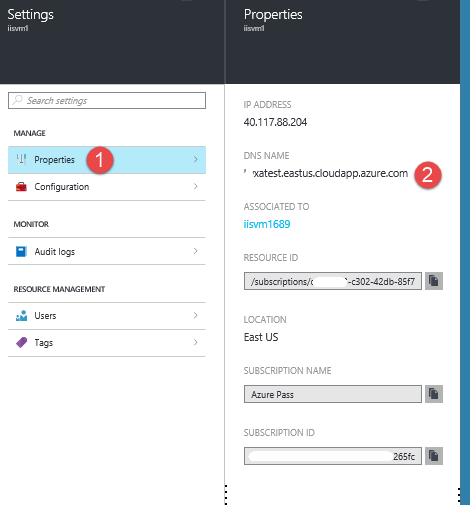
1. Within your resource group, click on the **Public IP Address** icon for iisvm1 and then select **All Settings**…



1. Select the **Configuration** menu item and the in the *DNS name labe*l field, enter a unique value. Click the **Save** button.



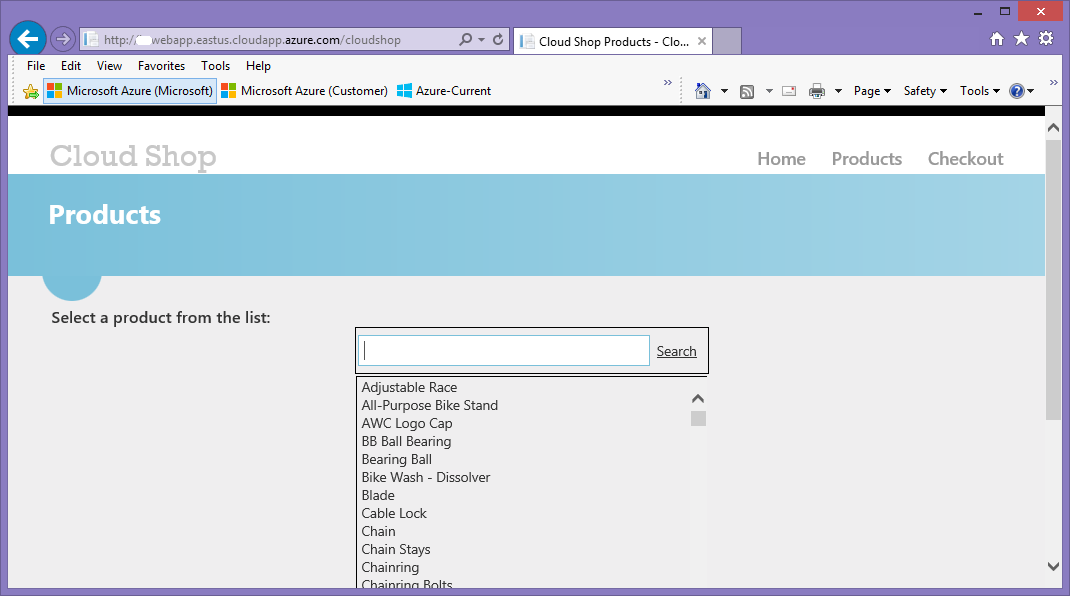
1. Close the Configuration blade by selecting the ‘X’ in upper right hand corner of the blade.
2. To see what your full DNS address is, click on the **Properties** menu item in the **Settings** blade. Your DNS address will be under the DNS NAME field.



## Task 10: Verification

In this task, you will test the Cloud Shop MVC4 application you deployed in the previous task.

1. On your local machine, open Internet Explorer.
2. Go to http://**[YOUR-DNS-NAME].[REGION].cloudapp.azure.com/CloudShop**. The DNS Name is the one you used when setting the configuration value of the public IP for the IIS machine.



MVC4 Application running in the Web Farm

1. In the *Search* box, type ***Classic*** and click **Search**. It will show all the products that have a product name that match the search criteria.

# Appendix A – Troubleshooting Tips

Although this lab has been tested many times, there are still places where students might mistakenly enter the wrong information while working on configuring the lab virtual machines. Here is a list of a few things that may help you with certain issues.

**Scenario 1** – You receive an error when you test your web Cloud app that states that the CloudShop user cannot log in. This means that the call actually went to the database but there is an authentication problem.

1. Remote desktop into the SQL Server machine and open SSMS to make sure the database has been attached.
2. Remote desktop into the SQL Server machine and open SSMS. Right click on the SQL Server (machine name) properties and click on the Security list item. Make sure Mixed Mode is enabled.
3. Remote desktop into the SQL Server machine and make sure there is an inbound firewall rule for port 1433 enabled.

**Scenario 2** – You believe you have everything setup correctly and you go to a separate client machine and enter http://<yourdnsname>.<region>.cloudapp.azure.com/CloudShop and receive (this could be a variety of http error numbers) and http error.

1. Remote desktop into iisvm1. Using the Server Manager console, select Local Server and then select IE Security. Set the radio buttons in the dialog box that appears to OFF on both selections.
2. Open IE and type in <http://localhost/CloudShop>. This will test the app from just this web server.
3. Most http errors mean that you may not have your web.config file setup correctly, or the site is not setup correctly. Try these things:
   1. Open Internet Information Services Manager and make sure CloudShop is setup as an Application.
   2. Open the web.config file to make sure that you have entered the SQL Server private IP address correctly.