WorkshopPLUS

Microsoft Azure Infrastructure as a Service (IaaS)

Introduction to Microsoft Azure Virtual Machines – ARM

Student Lab Manual

V1.9, September 3, 2016

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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

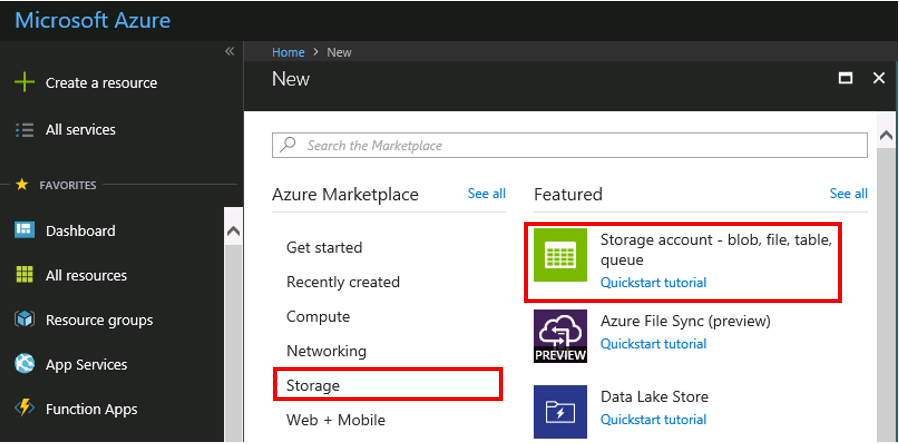
The following is required to complete this hands-on lab:

* [Microsoft Azure PowerShell](http://www.microsoft.com/windowsazure/sdk/)
* Install the SQL Server PowerShell extensions on the database VM (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 **+Create a resource, Storage** and then **Storage account – blob, file, table, queue.**



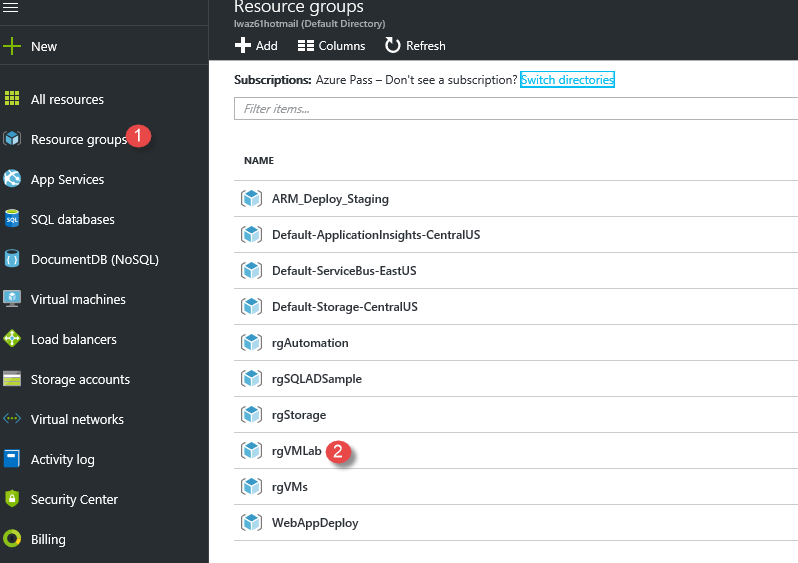
1. On the *Create storage account* blade, enter a unique storage account name (unique in all of Azure). Note all the settings that you need to select or change in the screenshot below. Click the **Create** button to complete the storage account creation.

|  |  |
| --- | --- |
| 1. **Name** – unique storage account name 2. **Deployment model** – pick Resource Manager 3. **Account kind** – select Storage (general purpose v1) 4. **Performance** – choose Standard 5. **Replication** – choose LRS 6. **Subscription** – pick your subscription 7. **Resource Group** – create a new resource group or pick an existing one 8. **Location** – pick your region where you want this storage account created |  |

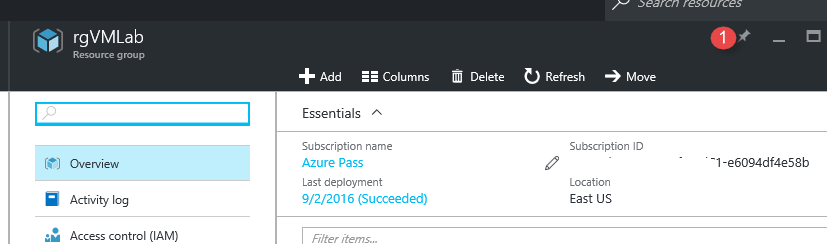
Due to changes in Azure, the screenshots in this lab may be slightly different from what you see in the Azure Portal.

## Task 2 – Create a Virtual Network

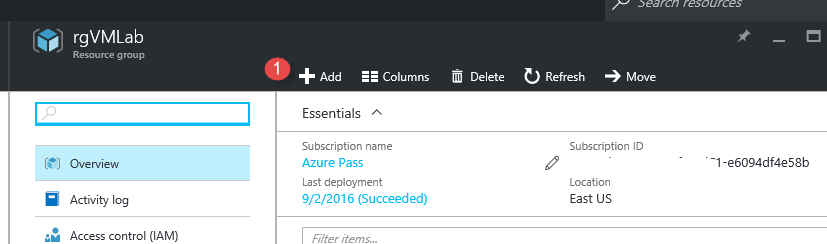
1. o*Rs*:
   1. Click on the **Resource groups** menu item in the Azure portal.
   2. Select the name of the resource group you just created.



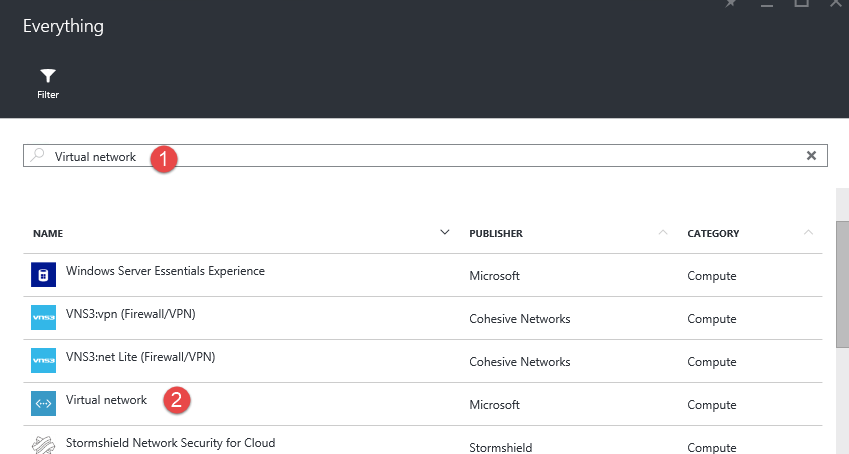
1. For ease of finding your resource group again later, we will first pin the resource group to the Home page. Click the **Pin** button at the top of the resource group. Now, the next time you click on the *Home* menu item (left side of the portal window), you can find your resource group on a tile.



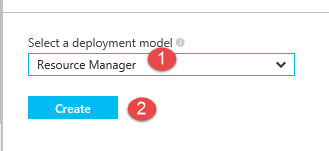
1. In the *Resource group* blade, click on the **+Add** button.



1. To create a virtual network:
   1. Type in ‘Virtual Network’ in the *Search Everything* field and press Enter.
   2. Find **Virtual network** and select it.



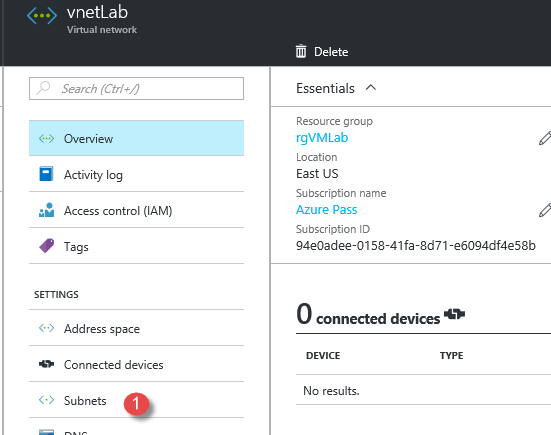
1. In the virtual network blade:
   1. Select **Resource Manager** as the deployment model.
   2. Click the **Create** button.



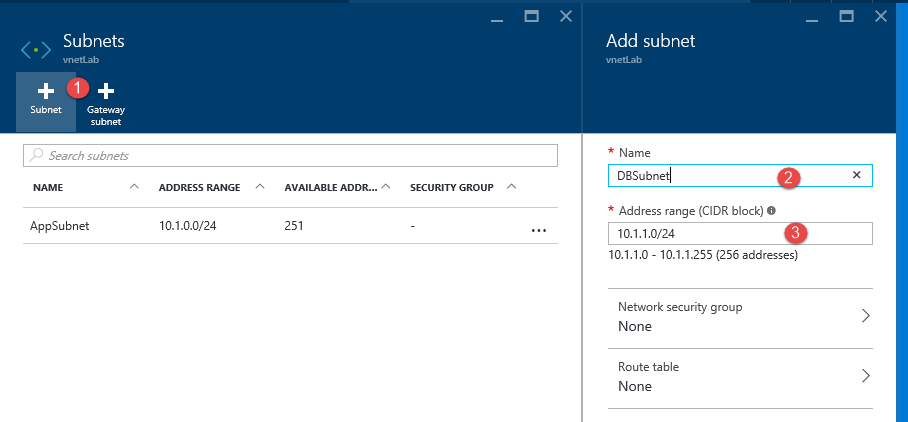
1. When setting up the virtual network, you will need to enter information as shown in the following table/screenshot:

|  |  |
| --- | --- |
| 1. **Name** – enter the name of the virtual network (only need to be unique within the subscription) 2. **Address space** - this needs to be an internal (not internet addressable) range 3. **Subnet name** - for this lab exercise, name it **AppSubnet**. 4. **Subnet address range** - leave as the default 5. **Subscription** - select your Azure subscription (if you have multiple) 6. **Resource Group** - select the Resource group you created previously 7. **Location** - select the region to put the virtual network in   Clear the **Pin to dashboard** checkbox.  Click the **Create** button. | C:\Users\larrywa\AppData\Local\Temp\SNAGHTML57ebdcb.PNG |

1. When the virtual network has finished the creation process, if you do not see the named virtual network appear in your resource group, refresh your browser. Then, click on the virtual network name and the virtual network blade should open.
2. In the *Virtual network* blade, select the **Subnets** menu item.



1. To create a new subnet:
   1. Click on the **+Subnet** button on the Subnets blade.
   2. Enter the name **DBSubnet** for the new subnet name. This is the subnet we will put the SQL Server machine in.
   3. Accept the default address range.



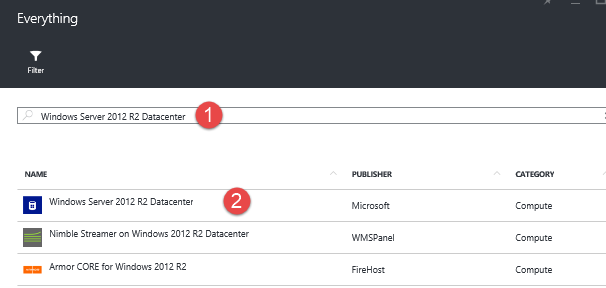
1. Close all the blades and go all the way back to the Home screen. From there, you can find the tile for your resource group and click on it. You should see your resource group blade appear with your virtual network and storage account in it.

## Task 3: Creating Virtual Machine for IIS

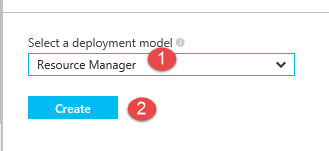
In this task, you will learn how to create a Virtual Machine in Microsoft Azure portal <https://portal.azure.com>. Then, you will configure the machine for Internet Information Server, adding roles to use later on in this lab.

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:
   1. Type in the search keywords ‘*Windows Server 2012 R2 Datacenter*’ and press Enter.
   2. Select the server image as shown below.



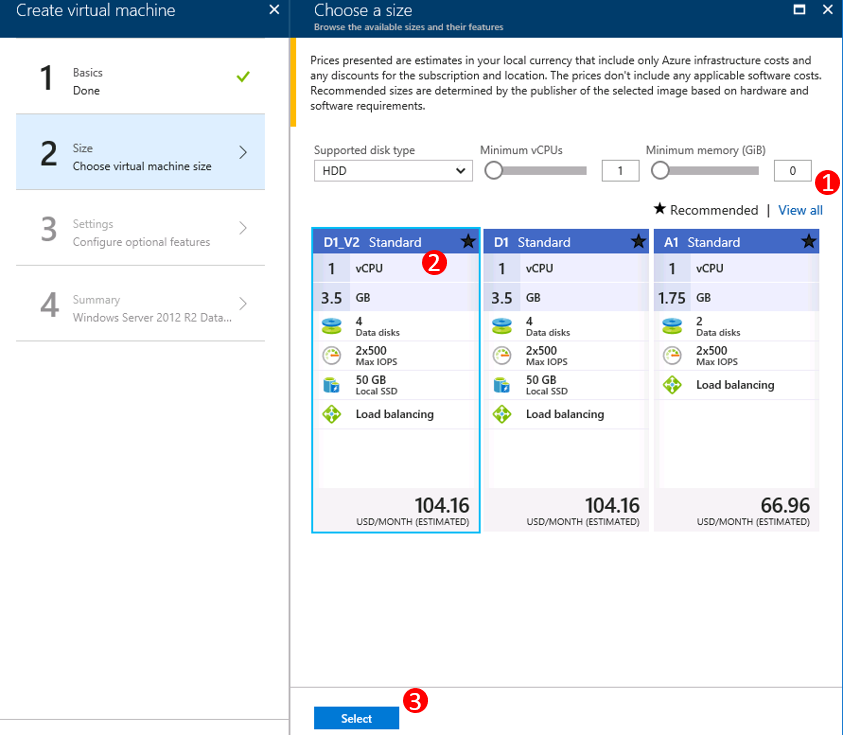
1. In the *Windows Server 2012 R2 Datacenter* blade:
   1. Select **Resource Manager** as the deployment model.
   2. Click the **Create** button.



1. In the *Create virtual machine* blade, select **Basics** and then enter the following:

|  |  |
| --- | --- |
| 1. **Name** - a virtual machine name (i.e. "iisvm1") 2. **VM disk type** - select the VM disk type to be ‘HDD’ (selecting SSD would require specific machine category choices and Premium storage) 3. **User Name** - an RDP username 4. **Password** - an RDP password 5. **Subscription** - select your subscription 6. **Resource group** - choose **Use existing** and select your resource group 7. **Location** - choose a location close to you | C:\Users\larrywa\AppData\Local\Temp\SNAGHTML5830550.PNG |

1. Click the **OK** button.
2. For the virtual machine size:
   1. Select the **View All** link (if necessary).
   2. Select **D1\_V2 Standard**.
   3. Click the **Select** button at the bottom of the blade.



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

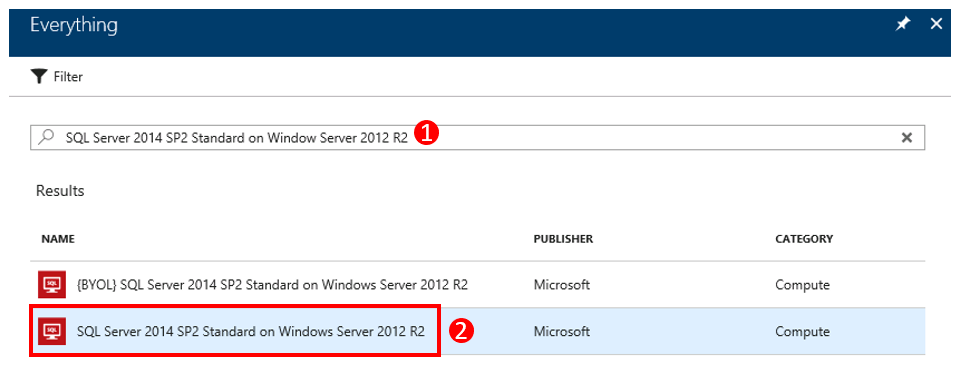
|  |  |
| --- | --- |
| Confirm/Set the following:   1. **Storage -**   - Change **Use Managed Disks** to **No**  - **Storage account** – the previous storage account you created   1. **Virtual network** – the previous virtual network you created 2. **Subnet** – needs to be **AppSubnet** 3. **Public IP address** – leave as is; you need a public IP address in this case to do RDP 4. **Network security group** – leave as is; this puts a network security group around our **AppSubnet** 5. **Extensions** – leave as is 6. **Monitoring**     * + **Guest OS diagnostics** – leave disabled (despite the fact that the screenshot shows it enabled)      + **Diagnostics storage account** – pick the storage account you created earlier (normally you would place your diagnostics in a separate storage account) 7. Click the **OK** button |  |

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

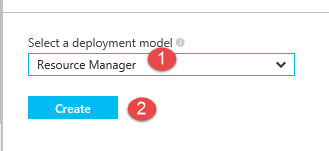
## Task 4 – Create an IaaS SQL Server Virtual Machine

In this task, 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 2014 SP2 Standard* edition of a Windows Server 2012 R2 machine. Click on the **+Add** button in your resource group.
   1. In the *Everything* blade, type in the search words **SQL Server 2014 SP2 Standard on Windows Server 2012 R2”** and press Enter.
   2. Once you see this machine listed, select it.



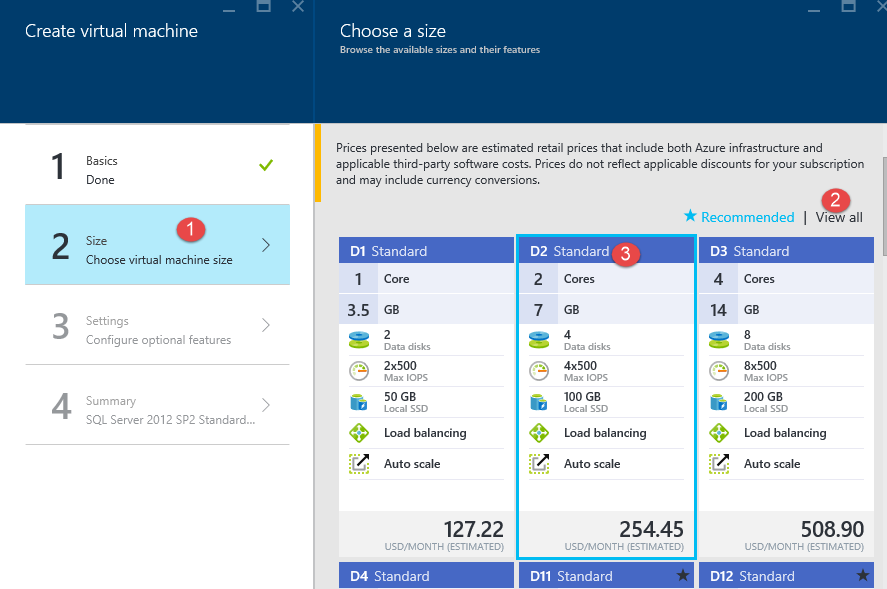
1. In the *SQL Server 2014* blade:
   1. Select **Resource Manager** as the deployment model.
   2. Click the **Create** button.



1. In the *Create virtual machine* blade, select **Basics** and then enter the following:

|  |  |
| --- | --- |
| 1. **Name** - An 2. - select 3. **User Name** - an RDP username 4. **Password** - an RDP password 5. **Subscription**: Select your subscription name 6. **Resource Group** - choose **Use existing** and select your resource group 7. **Location** - select the region used for your web server | C:\Users\larrywa\AppData\Local\Temp\SNAGHTML58efde3.PNG |

1. Click the **OK** button.
2. To choose a virtual machine size:
   1. Ensure the **Size** blade is open.
   2. If necessary, select **View all**.
   3. Select **D2 Standard** and then click the **Select** button at the bottom of the blade.



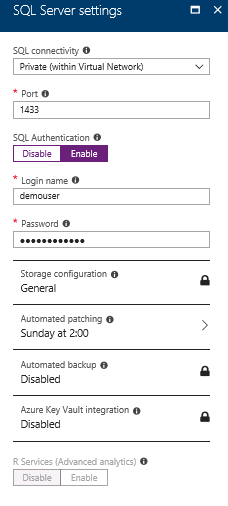
1. Now you are on the MOST IMPORTANT blade, the **Settings** blade.

|  |  |
| --- | --- |
| Confirm/Enter the following:   1. **Storage** -   - Change **Use Managed Disks** to **No**  - **Storage account** – select the previous storage account you created. The portal will more than likely try to put the machine in a different storage account to enhance IOPs.   1. **Virtual network** – select the previous virtual network you created 2. **Subnet** – select **DBSubnet**. This is important, because we want the IIS machine to be in a different subnet than the DB machine. 3. **Public IP address** – leave as is; you need a public IP address in this case to do RDP 4. **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. 5. **Extensions** – leave as is 6. **Availability Set** – leave as is 7. **Monitoring** – leave as is 8. **Diagnostics storage account** - Pick your storage account diagnostics storage account   Click the **OK** button. |  |

1. On the SQL Server Settings blade, the only thing that needs to be changed is the tab for **SQL Authentication**. Set this to **Enable** and leave all the other settings as they are.

You can see here that we are specifying that for SQL connectivity, everything is within a virtual network and that we will need port 1433 open on the machine. Other settings are for automated patching, backups etc.

T



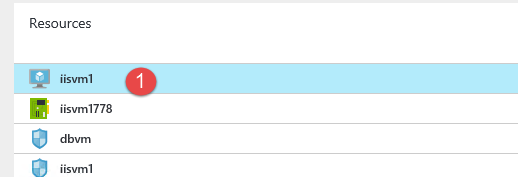
1. Click **OK**.

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

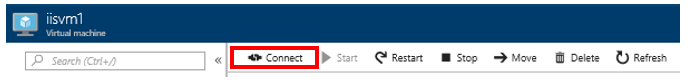
## Task 5: Configuring the IIS Virtual Machines

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.



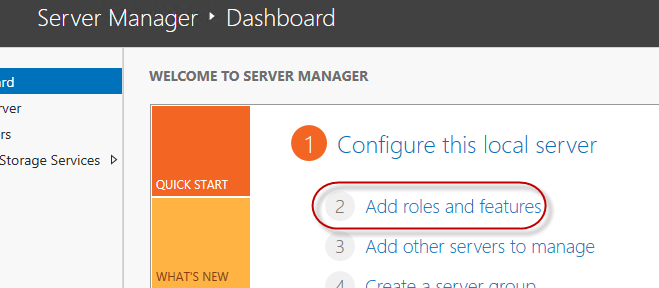
1. On the *Virtual machine* blade, click the **Connect** button. If Azure has not finished creating the machine yet, the *Connect* button will be disabled.



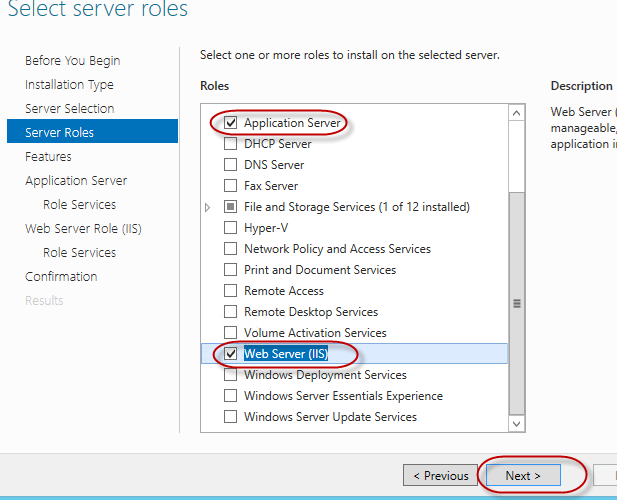
1. You will be asked to download the remote desktop settings file. Click **Open** and then click **Connect**. Log on using the remote desktop credentials you defined when creating the virtual machine. You will also be prompted to accept the certificate. Select **Yes**.

NOTE: If you cannot connect to the machine, check with your system administrator to make sure ports are open on your network to allow RDP.

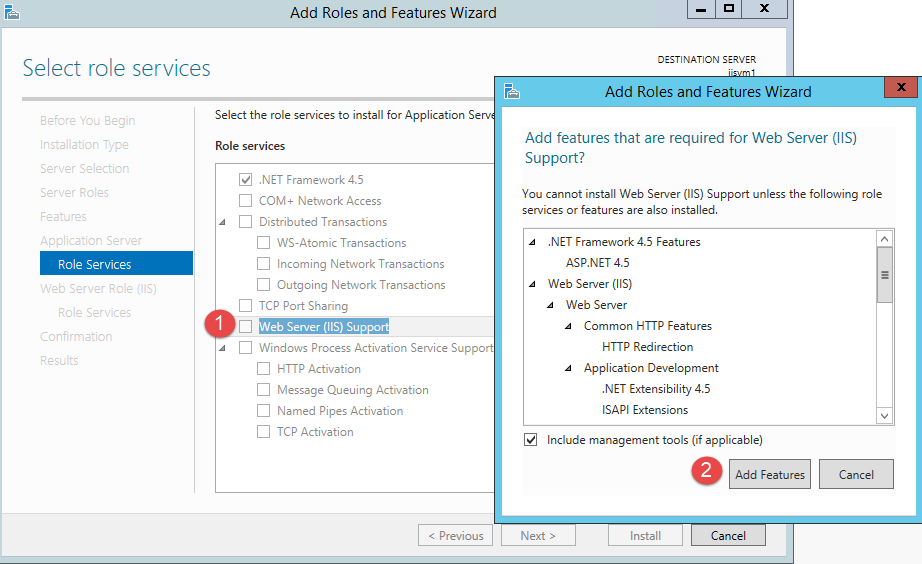
1. Wait until the *Server Manager* appears and then select the **Add Roles and Features** link in the dashboard.



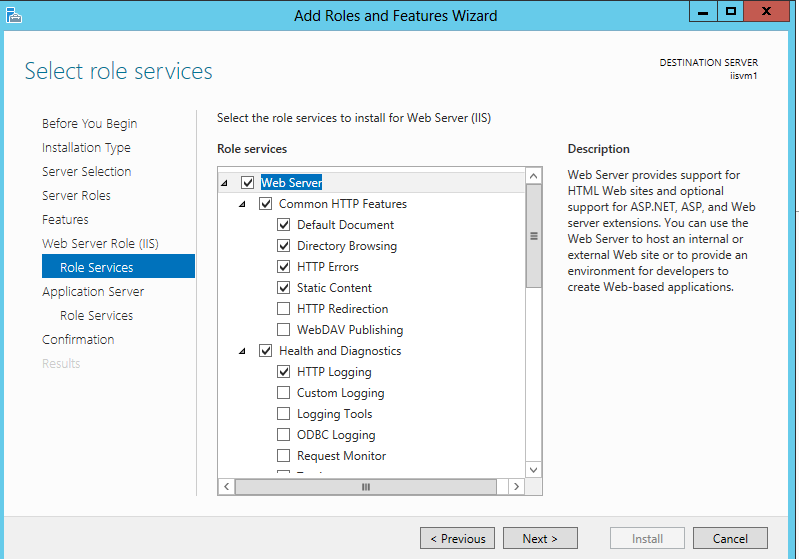
1. Keep clicking the **Next** button until you get to the *Select Server Roles* window. In this window, you need to select **Application Server** and **Web Server (IIS)**. Click the **Add Features** button and then select the **Next** button.



1. Click the **Next** button.
2. Click the **Next** button.
3. In the *Select role services* window:
   1. Select **Web Server (IIS) Support**.
   2. You will be prompted to accept the features that accompany your selection. Click **Add Features**.



1. Click the **Next** button.
2. Click the **Next** button.
3. In the *Select role services* window, the **Web Server** roleshould already be selected. Click **Next.**

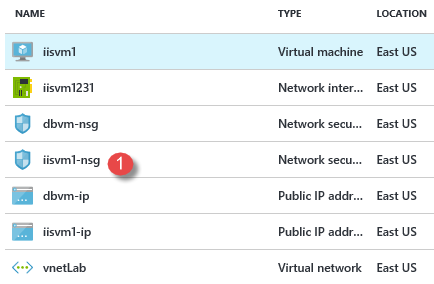


1. Click the **Install** button.
2. Once the installation has completed, you can click the **Close** button.
3. Leave the remote desktop session open since you will need to copy the web application into this machine later. Minimize the session.

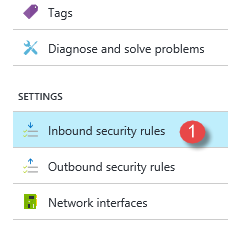
## Task 6: Setting Inbound Security rules for the IIS Machine

You have installed IIS and, in that process, IIS has opened up port 80 on the virtual machine’s 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* web server virtual machine.



1. Select **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.
2. Click the **Basic** icon.



1. In the **Advanced** blade, set the fields settings as shown below:

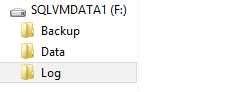
|  |  |
| --- | --- |
| 1. **Service** – set to Custom 2. **Port ranges** - make sure the Destination port is set to 80 since that is the firewall port open in the machine. 3. **Priority** - you could specify a priority if you wish, the lower the number, the higher the priority. Since we only have one rule other than the RDP port, this setting is fine. 4. **Name** - the name can be any name; in this lab, call it ‘Webport’ |  |

1. Click the **OK** button.

## Task 7: Configuring the SQL Server 2014 Instance

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

1. When you create an IaaS SQL machine, the portal will automatically add a 1TB data disk to the machine for you, but it will not automatically format it. You will use this 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. From the SQL Server blade, select the **Connect** button.
3. Click **Open** and click **Connect**. Complete the log in process using the RDP credentials of the SQL machine.
4. Using *File Explorer*, go to your new **F:\** drive and make sure you have a **Backup**, **Data** and **Log** directory. Create these directories if necessary.



1. Do not close the SQL RDP session.

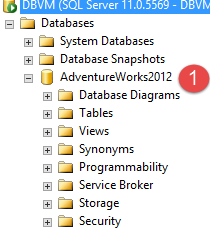
### Installing the AdventureWorks Database

In the following steps, you will add the AdventureWorks database that will be used by the sample application.

1. Switch to the hosted lab HOST machine and browse to the **C:\AzureIaaSWS\M4 - Azure Virtual Machines\Labs\IntroToAzureVMs\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 set 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.



1. Click **Connect** to connect to the SQL Server 2014 default instance using the Windows Account assigned by default.
2. Expand the **Databases** node to make sure the **AdventureWorks2012 database** has been attached.



1. Close SQL Server Management Studio.

## 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. When 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. On your local machine, navigate to **C:\AzureIaaSWS\M4 - Azure Virtual Machines\Labs\IntroToAzureVMs\\Source\Assets\CloudShop** and copy the **CloudShop.zip** file to the **C:\inetpub\wwwroot** folder on your IIS web server. To do this, copy **CloudShop.zip** (Ctrl + C) and paste it (Ctrl + V) in the virtual machine's **wwwroot** folder.
4. Extract all files to **C:\inetpub\wwwroot\CloudShop** folder.
5. 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

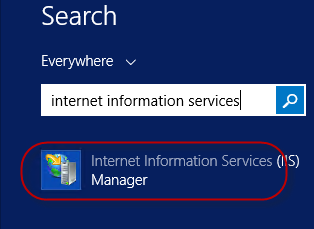
**<connectionStrings>**

**<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 PRIVATE IP ADDRESS];initial catalog=AdventureWorks2012;Uid=CloudShop;Password=Azure$123;multipleactiveresultsets=True;App=EntityFramework&quot;" providerName="System.Data.EntityClient" />**

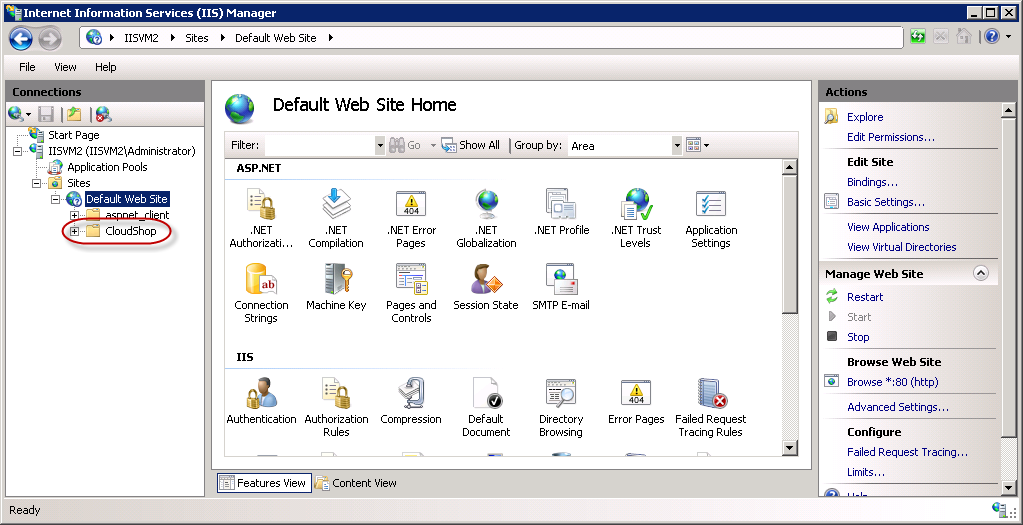
**<add name="DefaultConnection" connectionString="Data Source=[ENTER YOUR SQL MACHINE PRIVATE IP ADDRESS];initial catalog=AdventureWorks2012;Uid=CloudShop;Password=Azure$123;MultipleActiveResultSets=True" providerName="System.Data.SqlClient" />**

**</connectionStrings>**

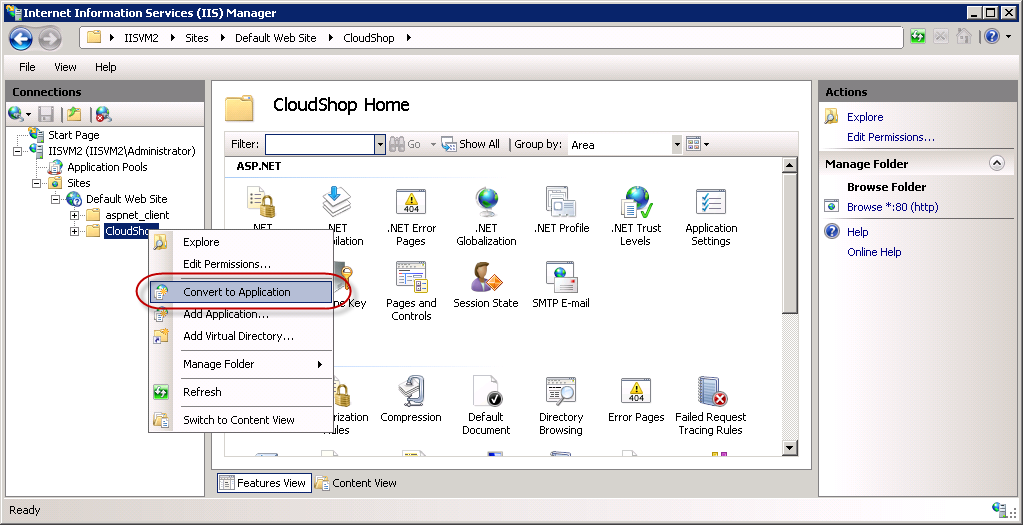
1. Save the web.config file.
2. Open the **Internet Information Services (IIS) Manager** by going to the *Start* page of the Windows Server and then typing in ‘Internet Information Services’. Click on the icon.



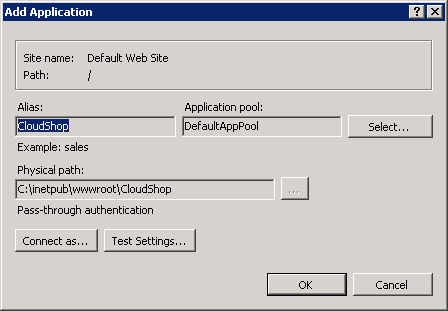
1. In the *Connections* pane, expand *Default Web Site* within your IIS Server's node. You will see the *CloudShop* folder you copied in the *wwwroot* folder.



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



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

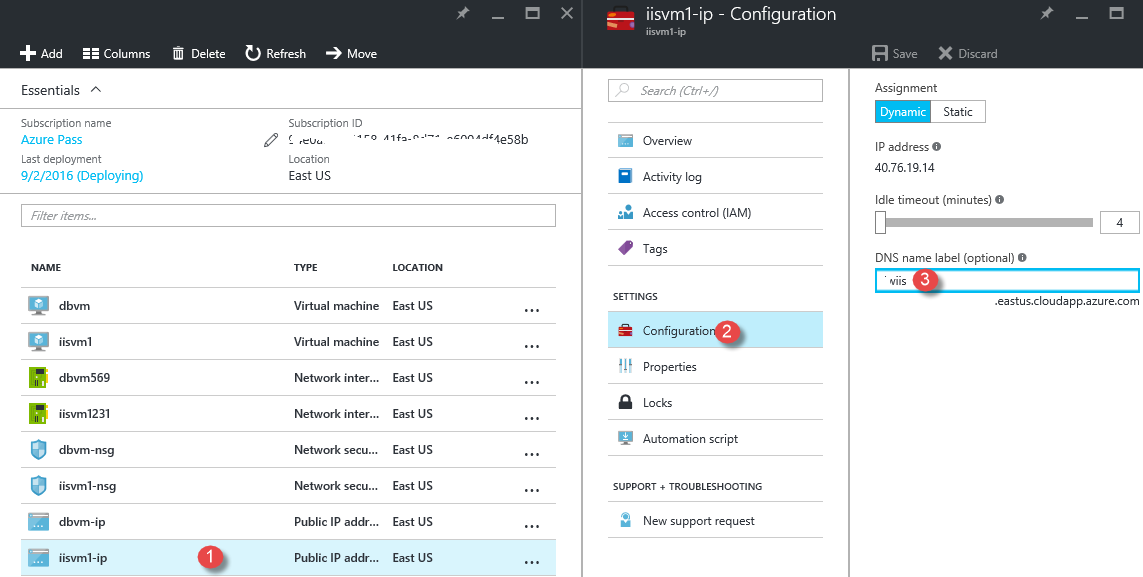


1. Close the *Internet Information Server (IIS) Manager* window.
2. Close the *Remote Desktop Connection*.

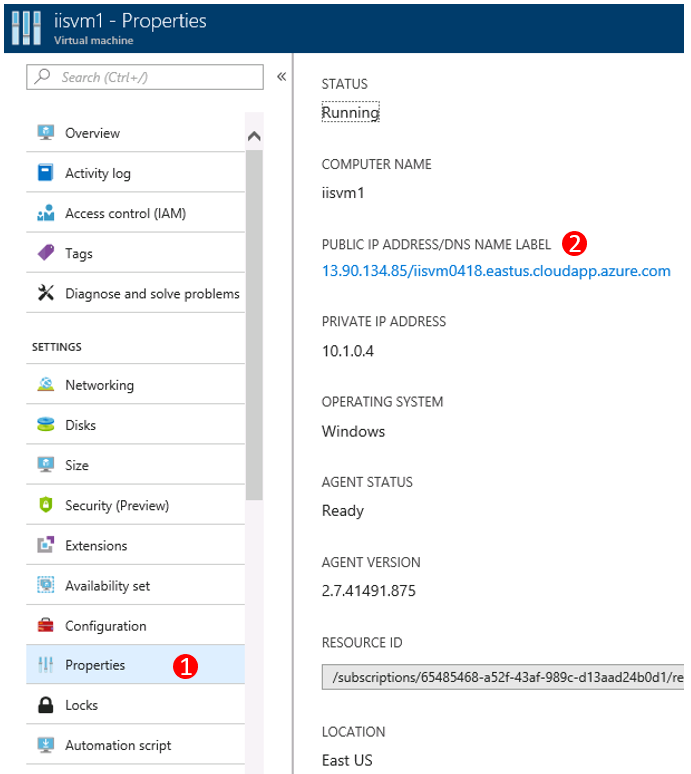
## Task 9: Setting up the IIS machines DNS address

By default, machines in ARM 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:
   1. Click on the **Public IP Address** icon for *iisvm1*
   2. Select **Configuration.**
   3. In the DNS name label field, enter a unique value.



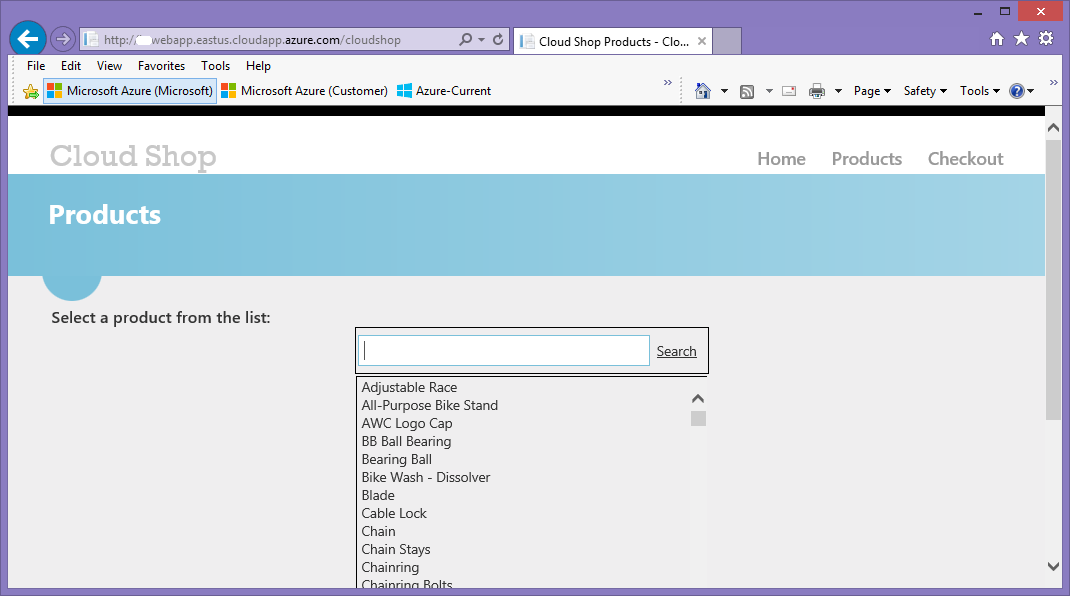
1. Close the *Configuration* blade by selecting the ‘**X**’ in upper right-hand corner of the blade.
2. To see what your full DNS address is:
   1. Click on the **Properties** menu item in the **Settings** blade of the IIS virtual machine.
   2. Your DNS address will be under the **PUBLIC IP ADDRESS/DNS NAME LABEL** field. Record the url portion of the dns name label for use in the next task.



## 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 a new *Internet Explorer* tab.
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.



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.

For Troubleshooting Tips, see Appendix A of this document.

This is the end of this lab. Do not delete these resources, as they may be used in later labs. However, you should ensure that any existing VMs are in a stopped (deallocated) state, to conserve costs.

# 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.