# Lab Answer Key: Module 4: Managing virtual machines

# Lab: Managing Azure virtual machines

## Exercise 1: Configuring availability

#### Task 1: Create virtual machines in an availability set

1. On MIA-CL1, open Internet Explorer and navigate to the Azure portal at https://portal.azure.com.
2. When prompted, sign in with an account that is either a Service Administrator or Co-Admin in the subscription you are using for this lab.
3. On the **Hub** menu, click **+New**. In the **New** blade, in the **Search the marketplace** text box, type **Availability Set**, and press the Enter keyboard key.
4. In the **Everything** blade, select **Availability Set**.
5. In the **Availability Set** blade, click **Create**.
6. In the **Create availability set** blade, specify the following settings:

* Name: **ResDevWebAS**
* Fault domains: **3** > **Note:** You can decrease the value to 2, but not increase it.
* Update domains: **5** > **Note:** The number of update domains can vary between 5 and 20.
* Subscription: ***Y* *our Azure subscription you intend to use for this demo****.*
* Resource group name: **ResDevWebRG**
* Location: ***T* *he Azure region closest to the location of your lab computer****.*

1. Click **Create**. Wait for deployment to complete. This should take only a few seconds.
2. On the **Dashboard** of the Azure portal, click **+New** on the **Hub** menu.
3. In the **New** blade, click **Compute**.
4. In the **Compute** blade, click **Windows Server 2012 R2 Datacenter**.
5. In the **Windows Server 2012 R2 Datacenter** blade, ensure that **Resource Manager** appears in the **Select a deployment model** drop-down list, and then click **Create**. The **Create virtual machine** blade appears and expands its **Basics** blade.
6. In the **Basics** blade, specify the following:

* Name: **ResDevWebVM1**
* VM disk type: **HDD**
* User name: **Student**
* Password: **Pa$$w0rd1234**
* Subscription: ***Your Azure subscription you intend to use for this demo****.*
* Resource group: **ResDevWebRG**
* Location: ***The same location you chose for the availability set****.*

1. Click **OK**. The **Choose a size** blade automatically appears.
2. In the **Choose a size** blade, select **A1 Standard**, and then click **Select**. The **Settings** blade appears.
3. In the **Settings** blade, specify the following settings:

* Storage account: ***Accept the default****.*
* Virtual network: **ResDevWebVNet**
* Subnet: ***Accept the default****.*
* Public IP address: **ResDevWebVM1**
* Network security group: **ResDevWebNSG**
* Monitoring: **Disabled**
* Availability set: **ResDevWebAS**

1. Click **OK**. The **Summary** blade automatically appears.
2. In the **Summary** blade, click **OK**.
3. On the **Dashboard** of the Azure portal, click **+New** on the **Hub** menu.
4. In the **New** blade, click **Virtual Machines**.
5. In the **Virtual Machines** blade, click **Windows Server 2012 R2 Datacenter**.
6. In the **Windows Server 2012 R2 Datacenter** blade, ensure that **Resource Manager** appears in the **Select a deployment model** drop-down list, and then click **Create**. The **Create virtual machine** blade appears and expands its **Basics** blade.
7. In the **Basics** blade, specify the following:

* Name: **ResDevWebVM2**
* VM disk type: **HDD**
* User name: **Student**
* Password: **Pa$$w0rd1234**
* Subscription: ***Your Azure subscription you intend to use for this demo.***
* Resource group: **ResDevWebRG**
* Location: ***The same location you chose for the availability set****.*

1. Click **OK**. The **Choose a size** blade automatically appears.
2. In the **Choose a size** blade, select **A1 Standard**, and then click **Select**. The **Settings** blade automatically appears.
3. In the **Settings** blade, specify the following settings:

* Storage account: ***Accept the default****.*
* Virtual network: **ResDevWebVNet**
* Subnet: ***Accept the default****.*
* Public IP address: **ResDevWebVM2**
* Network security group: **ResDevWebNSG2**
* Monitoring: **Disabled**
* Availability set: **ResDevWebAS**

1. Click **OK**. The **Summary** blade automatically appears.
2. In the **Summary** blade, click **OK**.
3. On the **Dashboard** of the Azure portal, click **Browse** on the **Hub** menu.
4. In the list of services, select **Availability sets**.
5. On the **Availability sets** blade, click **ResDevWebAS**.
6. On the **ResDevWebAS** blade, note that the availability set contains the two newly deployed virtual machines (at this point, both of them will likely display the **Creating** status). Point out that each VM has a unique fault domain and update domain.
7. Leave the instance of Internet Explorer with the Azure portal open.

#### Task 2: Configure the Azure Load Balancer

1. On MIA-CL1, in the Azure portal within the Internet Explorer window, on the Hub menu, click **New**, click **Networking**, and then, in the **Networking** blade, click **Load Balancer**.
2. In the **Create load balancer** blade, specify the following settings:

* Name: **ResDevWebLB**
* Type: **Public**
* Public IP address: ***Create new*** dynamic address named **ResDevWebLBIP**.
* Subscription: **Your subscription**.
* Resource group: **ResDevWebRG**
* Location: ***The same location you chose for the availability set****.*
* Pin to dashboard: **Unchecked**

1. Click **Create**. Wait for the deployment to complete. This should take a few seconds.
2. On the **Dashboard** of the Azure portal, click **More services**, select **Load Balancers** from the list of services, and then in the **Load balancers** blade, click **ResDevWebLB**.
3. In the ResDevWebLB Load balancer blade, click **Backend pools**, and then, in the **Backend address pools** blade, click **Add**.
4. In the **Add backend pool** blade, in the **Name** text box, type **ResDevWebLBPool**, and then click **Add a virtual machine**.
5. In the **Choose virtual machines** blade, click **Choose an availability set**, and then, in the **Choose an availability set** blade, click **ResDevWebAS**.
6. In the **Choose virtual machines** blade, click **Choose the virtual machines**, click the check boxes to the left of ResDevWebVM1 and ResDevWebVM2, and then click **Select**.
7. In the **Choose virtual machines** blade, click **OK**.
8. In the **Add backend pool** blade, click **OK**.
9. In the ResDevWebLB blade, click **Probes**, and then in the **Probes** blade, click **Add**.
10. In the **Add probe** blade, specify the following settings, and then click **OK**:

* Name: **ResDevWebProbe80**
* Protocol: **HTTP**
* Port: **80**
* Path: **/**
* Interval: **5**
* Unhealthy threshold: **2**

1. In the ResDevWebLB blade, click **Load balancing rules**, and then in the **Load balancing rules** blade, click **Add**.
2. In the **Add load balancing rule** blade, complete the following , and then click **OK**:

* Name: **ResDevWebLBRule80**
* Protocol: **TCP**
* Port: **80**
* Backend Pool: **ResDevWebLBPool**
* Probe: **ResDevWebProbe**
* Backend port: **80**
* Session persistence: **None**
* Idle timeout: **4**
* Floating IP: **Disabled**

1. Refresh the Azure portal. In the ResDevWebLB blade, you should be able to identify its public IP address. Note that at this point, you will not be able to connect to the two virtual machines in the backend pool, because they are not running a web server and the connectivity is additionally restricted by default network security group settings. You will change these settings later in this lab.

**Result**: After completing this exercise, you should have created an availability set for Azure IaaS v2 virtual machines and configured them up as a load balanced pair.

## Exercise 2: Implementing DSC

#### Task 1: Install and configure IIS by using DSC and Windows PowerShell

1. On MIA-CL1, start File Explorer and browse to the \*\*D:04\* folder.
2. In the D:04 folder, right-click on the **IISInstall.ps1** file and select **Edit** from the right-click menu. This will open the file in the **Windows PowerShell ISE**.
3. Review the content of the file. Note that this is a DSC configuration that controls the installation of the Windows Server 2012 R2 Web-Server role.
4. Close the Windows PowerShell ISE window.
5. In the File Explorer, right click on the **D:04.ps1** file and select **Edit** from the right-click menu. This will open the file in the **Windows PowerShell ISE** window.
6. Review the content of the script - Ensure you enter the location of your subscription at line 6 -: NOTE - the location used here is all one word e.g. "northeurope". Note the variables that it uses, including the storage account and its key. The script first publishes the DSC configuration defined in the **Install.ps1** file to the same storage account hosting the VHD files of the two virtual machines (placing it in the default DSC container named **windows-powershell-dsc**), stores the resulting module URL in a variable, and then sets the Azure Agent VM DSC extension on two virtual machines deployed in the previous lab by referencing that URL. The script generates a shared access signature token that provides read only access to the blob representing the DSC configuration archive.
7. Start the execution of the script. When prompted, sign in with the username and the password of an account that is either a Service Administrator or a Co-Admin of your Azure subscription. Wait until the script completes.
8. On MIA-CL1, open Internet Explorer and navigate to the Azure portal at https://portal.azure.com.
9. Within the Azure portal, click **Virtual Machines** on the Hub menu.
10. In the Virtual machines blade, click the **ResDevWebVM1** entry.
11. In the **ResDevWebVM1** blade, click **Connect**.
12. When prompted whether to open or save the **ResDevWebVM1.rdp** file, click **Open**.
13. If prompted to confirm that you want to connect, click **Connect**.
14. When prompted to enter credentials to connect, type **Student** as the user name and **Pa$$w0rd1234** as the password.
15. If prompted again to confirm that you want to connect, click **Yes**.
16. After you establish a Remote Desktop session to the VM, in the **Server Manager** window, verify that IIS appears in the left pane, indicating that the Web Server (IIS) server role is installed.
17. Repeat steps 10 through 16 for the other virtual machine ResDevWebVM2.
18. After completing the tasks, switch back to your lab computer MIA-CL1. Leave both Remote Desktop sessions open.

#### Task 2: Test the DSC configuration and virtual machine availability

1. In the Azure portal within the Internet Explorer window on MIA-CL1, on the Hub menu, click **Resource groups**.
2. In the **Resource groups** blade, click **ResDevWebRG**.
3. In the **ResDevWebRG** blade, in the **Resources** tile, click the **ResDevWebNSG** entry representing the network security group (with the icon in the form of a shield). This will open the corresponding blade along with its **Settings** blade.
4. In the **Settings** blade of the **ResDevWebNSG** network security group, click **Inbound security rules**.
5. In the **Inbound security rules** blade, click **Add**.
6. In the **Add inbound security rue** blade, specify the following settings:

* Name: **allow-http**
* Priority: **1100**
* Source: **Any**
* Protocol: **TCP**
* Source port range: \*\* \* \*\*
* Destination: **Any**
* Destination port range: **80**
* Action: **Allow**

1. Click **OK**.
2. In the breadcrumb trail at the top of the portal interface, click **ResDevWebRG** to return to the **ResDevWebRG** blade.
3. In the **ResDevWebRG** blade, in the **Resources** tile, click the **ResDevWebNSG2** entry representing the network security group (with the icon in the form of a shield). This will open the corresponding blade along with its **Settings** blade.
4. In the blade of the **ResDevWebNSG2** network security group, click **Inbound security rules**.
5. In the **Inbound security rules** blade, click **Add**.
6. In the **Add inbound security rules** blade, specify the following settings:

* Name: **allow-http**
* Priority: **1100**
* Source: **Any**
* Protocol: **TCP**
* Source port range: \*\* \* \*\*
* Destination: **Any**
* Destination port range: **80**
* Action: **Allow**

1. Click **OK**.
2. In the breadcrumb trail at the top of the portal interface, click **ResDevWebRG** to return to the **ResDevWebRG** blade.
3. In the **ResDevWebRG** blade, in the **Resources** tile, click **ResDevWebLB**, representing the load balancer.
4. In the **ResDevWebLB** blade, note the value of its **IP address** entry.
5. Open a new InPrivate Browsing Internet Explorer session and type the IP address that you noted in the previous step in the navigation bar, and then press the **Enter** key.
6. Verify that you can access the default IIS webpage.
7. Close the **InPrivate Browsing** window.
8. Switch to the Remote Desktop session on **ResDevWebVM1**. On the **Tools** menu in the **Server Manager** window, select **Services**.
9. In the **Services** window, scroll down to the **World Wide Web Publishing Service** entry, right click on it, and select **Stop** on the context sensitive menu.
10. Switch to the Remote Desktop session on **ResDevWebVM2**. On the **Tools** menu in the **Server Manager** window, select **Services**.
11. In the **Services** window, scroll down to the **World Wide Web Publishing Service** entry, right click on it, and select **Stop** on the context sensitive menu.
12. Switch back to MIA-CL1. From MIA-CL1, open a new InPrivate Browsing Internet Explorer session. In the new Internet Explorer window, click the **cogwheel** icon in the upper-right corner, click **Safety** on the drop-down menu, and then click **Delete browsing history**.
13. In the **Delete Browsing History** dialog box, click **Delete**.
14. In the InPrivate Browsing Internet Explorer window, type the IP address of the load balancer in the navigation bar, and then press the **Enter** key.
15. Verify that the **This page can't be displayed** message appears.
16. Switch back to the **Services** window the Remote Desktop session on ResDevWebVM1.
17. In the **Services** window, right-click the **World Wide Web Publishing Service** entry, and then select **Start** from the right-click menu.
18. Once the service is running, switch back to MIA-CL1 and refresh the InPrivate Browsing Internet Explorer window. Verify that you can again access the default IIS webpage.

**Note:** Optionally you can repeat this sequence, but this time stopping the **World Wide Web Publishing Service** on ResDevWebVM1 and starting it on ResDevWebVM2. As long as the service is running on at least one of the two virtual machines, you should be able to access the webpage.

**Result**: After completing this exercise, you should have implemented DSC.

## Exercise 3: Implementing Storage Space-based volumes

#### Task 1: Attach VHDs to an Azure VM

1. On MIA-CL1, in the Azure portal within the Internet Explorer window, on the Hub menu, click **Virtual Machines**.
2. In the **Virtual machines** blade, click **ResDevWebVM1**. This automatically opens the **ResDevWebVM1** blade and its **Settings** blade.
3. In the ResDevWebVM1 blade, click **Disks**.
4. In the **Disks** blade, click **Attach new**.
5. In the **Attach new disk** blade, specify the following settings, and then click **OK**:

* Name: ***Accept the default***
* Type: **Standard**
* Size: **1023**
* Location: ***Note that this cannot be changed since the location of the VM determines the location of its disks****.*
* Host caching: **None**

1. Repeat the steps 4 and 5 to attach one more new data disks. Note that with current VM size (Standard A1), there is a limit of 2 data disks per VM.

#### Task 2: Configure a Storage Spaces simple volume

1. On MIA-CL1, switch to the Remote Desktop session to ResDevWebVM1.
2. In the Remote Desktop session, in the **Server Manager** window, click **File and Storage Services**.
3. In the **Servers** navigation pane on the left side, click **Storage Pools**.
4. In the **STORAGE POOLS** pane, click the **TASKS** menu, and then click **New Storage Pool** on the drop-down menu. This will open the New Storage Pool Wizard.
5. On the **Before you begin** page, click **Next**.
6. On the **Specify a storage pool name and subsystem** page, type **StoragePool1** in the **Name** text box, and then click **Next**.
7. On **Select physical disks for the storage pool**, select the check boxes next to **PhysicalDisk2** and **PhysicalDisk3** (which represent disks you attached in the Azure portal), and then click **Next**.
8. On the **Confirm selections** page, click **Create**.
9. On the **View results** page, select the **Create a virtual disk when this wizard closes** check box, and then click **Close**. This will launch the New Virtual Disk Wizard.
10. On the **Before you begin** page, click **Next**.
11. On the **Select the storage pool** page, ensure that **StoragePool1** is selected, and then click **Next**.
12. On the **Specify the virtual disk name** page, type **VirtualDisk1** in the **Name** text box, and then click **Next**.
13. On the **Select the storage layout** page, ensure that **Simple** is selected, and then click **Next**.
14. On the **Specify the provisioning type** page, ensure that **Fixed** is selected, and then click **Next**.
15. On the **Specify the size of the virtual disk**, select **Maximum size**, and then click **Next**.
16. On the **Confirm selections** page, click **Create**.
17. On the **View results** page, ensure that the **Create a volume when this wizard closes** check box is selected, and then click **Close**. This will open the New Volume Wizard.
18. On the **Before you begin** page, click **Next**.
19. On the **Select the server and disk** page, ensure that **VirtualDisk1** is selected, and then click **Next**.
20. On the **Specify the size of the volume** page, accept the default (2.00 TB), and then click **Next**.
21. On the **Assign to a drive letter or folder** page, accept the default drive letter (F:), and then click **Next**.
22. On the **Select file system settings** page, accept the default settings (NTFS with default allocation unit size), and then click **Next**.
23. On the **Confirm selections** page, click **Create**.
24. On the **Completion** page, click **Close**.
25. From the desktop of ResDevWebVM1, open File Explorer, and then verify that there is a new drive F with 2 TB of available disk space.
26. Close the Remote Desktop session to ResDevWebVM1.

#### Task 3: Reset the environment

1. Close all open applications without saving any files.
2. On the taskbar, right-click **Windows PowerShell**, and then click **Run as administrator**. In the **User Account Control** dialog box, click **Yes**.
3. Type the following command, and press Enter:

Reset-Azure

1. When prompted (twice), sign in using the Microsoft account associated with your Azure subscription.
2. If you have multiple Azure subscriptions, select the one you want to target by the script.
3. When prompted for confirmation, type **y**.

**Note:** This script will remove Azure services in your subscription. We, therefore, recommend that you use an Azure trial pass that was provisioned specifically for this course, and not your own Azure account. The script will take 5 to 10 minutes to reset your Microsoft Azure environment, before it is ready for the next lab. The script removes all storage, VMs, virtual networks, cloud services, and resource groups.

**Result**: After completing this exercise, you should have implemented Storage Spaces based volumes.

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