# Lab Answer Key: Module 2: Implementing and managing Azure networking

# Lab A: Using a deployment template and Azure PowerShell to implement Azure virtual networks

## Exercise 1: Creating an Azure virtual network by using a deployment template

#### Task 1: Access the template on GitHub

1. Ensure that you are signed in to MIA-CL1 as **Student** with the password **Pa$$w0rd**.
2. On the desktop, on the taskbar, click the **Internet Explorer** icon.
3. In the Microsoft Internet Explorer Address bar, type the following address, and then press Enter: http://aka.ms/Mt32e4.
4. Open a GitHub template that you can use to create a virtual network with two subnets.

#### Task 2: Load the template into new deployment on the Azure portal

1. In Internet Explorer, under Virtual Network with two Subnets, click **Deploy to Azure**.
2. When prompted, sign in using the Microsoft account associated with your Azure subscription.
3. In the Azure portal, in the **Create a Virtual Network with two Subnets** blade, click the **Edit** button.
4. Review the structure of the JavaScript Object Notation (JSON) file. Examine the placeholders for values that can be edited during the deployment. This template contains the following parameters that you can edit: *location, vnetName*, *vnetAddressPrefix*, \_ subnet1Name\_, \_ subnet1Prefix, subnet2Name\_, \_ subnet2Prefix.\_
5. Review the content under resources to identify type of the resource, its name, and properties.
6. Click **Discard** to close the Edit Template blade.

**Note:** If the template fails to load into the Azure portal, navigate to the following URL: <http://aka.ms/Fpqovq> . Then, select and copy all the text. Paste the copied text into the Edit Template blade, and then perform steps 4 and 5 to review the template.

#### Task 3: Run the deployment from the Azure portal

1. In the **Create a Virtual Network with two Subnets** blade, locate the Basics section.
2. In the **Resource Group** section, locate the **Create new** radio button and select it.
3. In the **Resource Group** section, locate the dialog box and enter **AdatumLabRG** as the name of the *Resource Group*.
4. In the Custom Deployment blade under Resource group location drop-down list select *<Location1>*.
5. Type the following information for the Parameters in the **SETTINGS** section.

* Vnet Name: **HQ**
* Vnet Address Prefix: **10.0.0.0/16**
* Subnet1Prefix: **10.0.0.0/24**
* Subnet1Name: **Subnet1**
* Subnet2Prefix: **10.0.1.0/24**
* Subnet2Name: **Subnet2**

1. In the **Terms and Conditions** section, check **I agree to the terms and conditions stated above**. Review the Terms of use, and then click **Purchase**.
2. Verify that provisioning of the new virtual network with name **HQ** completed successfully.

**Result**: After completing this exercise, you should have created virtual networks for A. Datum HQ.

## Exercise 2: Creating a virtual network by using PowerShell

#### Task 1: Create a virtual network by using PowerShell

1. From the taskbar, start Windows PowerShell.
2. Sign in to your subscription by typing the following command, and then pressing Enter:

Login-AzureRMAccount

1. To select the subscription in which you are going to create a virtual network, type the following commands, and then press Enter after each (replace ' *Name of your subscription'* with the actual name of your subscription and make sure to enclose the name of your subscription in single quotes):

Get-AzureRmSubscription Set-AzureRmContext -SubscriptionName 'Name of your subscription'

1. To create a new resource group, type the following command, and then press Enter (replace ' *Location'* with the actual name of the primary Azure region provided by the instructor and make sure to enclose the name of the region in single quotes):

New-AzureRMResourceGroup -Name AdatumTestRG -Location 'Location1'

1. To create a new virtual network named **AdatumTestVnet** with the address space **10.0.0.0/16** and store a reference to it in the $vnet variable, type the following command, and then press Enter (replace ' *Location'* with the actual name of the primary Azure region provided by the instructor and make sure to enclose the name of the region in single quotes):

$vnet = New-AzureRMVirtualNetwork -ResourceGroupName AdatumTestRG -Name AdatumTestVnet -AddressPrefix 10.0.0.0/16 -Location 'Location1'

1. To add a subnet to the new virtual network, type the following command, and then press Enter:

Add-AzureRmVirtualNetworkSubnetConfig -Name FrontEnd -VirtualNetwork $vnet -AddressPrefix 10.0.0.0/24

1. To update the configuration in the virtual network, type the following command, and then press Enter:

Set-AzureRMVirtualNetwork -VirtualNetwork $vnet

**Result**: After completing this exercise, you should have created a test virtual networks for A. Datum by using Azure PowerShell.

## Exercise 3: Configuring virtual networks

#### Task 1: Create an IaaS v1 virtual network gateway

1. Switch to Internet Explorer and in the new tab navigate to open the classic Azure portal by typing http://manage.windowsazure.com
2. If you are prompted to sign-in, use an account that is either a Service Admin or a co-admin of your Azure subscription.
3. From the navigation bar on the left hand side, select networks, and then click **ADATUM-BRANCH-VNET**.
4. On the **adatum-branch-vnet** page, click **DASHBOARD**,
5. From the command bar located at the bottom of the page, click **CREATE GATEWAY** and then select **Dynamic Routing**.
6. Click **Yes** to confirm creation of a VPN gateway.

**Note:** The creation of the VPN gateway could take 30 - 35 minutes to complete.

#### Task 2: Deploy an IaaS v2 virtual machine into an IaaS v2 virtual network

1. Right-click Windows PowerShell shortcut in the taskbar and click **Run ISE as Administrator**.
2. In the Windows PowerShell ISE, at the command prompt, type the following command, and then press Enter:

CD D:\Labfiles\Lab02\Starter

1. At the command prompt, type the following command, and then press Enter:

.\CreateVirtualMachine.ps1

**Note:** The command starts with dot backslash. 4. When prompted to sign in (twice), type in the user name and the password which is either the Service Administrator or a Co-Admin in your Azure subscription.

1. If you have multiple subscription, when prompted, type in the number corresponding to the subscription to which you deployed the virtual network in the first exercise of this lab and press Enter.

**Note:** The script takes about 10 minutes to complete. The script deploys an IaaS v2 virtual machine named ARMSrv2 onto the first subnet of the IaaS v2 HQ virtual network you provisioned earlier in this lab.

**Result**: After completing this exercise, you should have created a virtual network gateway on the existing IaaS v1 virtual network and deployed a virtual machine to the newly created IaaS v2 HQ virtual network.

# Lab B: Configuring connectivity between IaaS v1 and IaaS v2

## Exercise 1: Using a PowerShell script to connect IaaS v1 VNet and IaaS v2 VNet

#### Task 1: Configure Resource Manager virtual network

1. On MIA-CL1, launch Internet Explorer and browse to the classic Azure portal by typing http://manage.windowsazure.com
2. If you are prompted to sign-in, use an account that is either a Service Admin or a co-admin of your Azure subscription.
3. From the navigation bar on the left hand side, select networks, and then click **ADATUM-BRANCH-VNET**.
4. On the **adatum-branch-vnet** page, click **DASHBOARD**,
5. Ensure that the provisioning of the new virtual gateway that you started in the first lab of this module has been completed. You can determine this by checking whether **DELETE GATEWAY** button appears in the command bar at the bottom of the page. If it is there, the gateway provisioning has completed. If not, wait until icon appears in the command bar. You might need to occasionally refresh the page. Keep in mind that provisioning can take about 30-35 minutes
6. On MIA-CL1, from the Azure PowerShell window, set the current directory to \*\*D:02\* by typing

CD D:\Labfiles\Lab02\Starter

1. Open the **ConfigureARMGateway.ps1** file in Notepad and review its content.
2. From the Azure PowerShell window, run **ConfigureARMGateway.ps1** by typing the following command, and then pressing Enter.

.\ConfigureARMGateway.ps1

1. When prompted to sign-in (twice), use an account that is either a Service Admin or a co-admin of your Azure subscription.
2. Occasionally monitor the execution status.

**Note:** The script might take 20-25 minutes to complete. You do not have to wait for the script to finish. You can proceed with second task of this exercise and with Exercise 2 from this lab.

#### Task 2: Configure classic virtual network

1. On MIA-CL1, launch Internet Explorer and browse to the Azure Portal at https://portal.azure.com
2. If prompted, sign in to your Azure subscription when prompted with an account that is a Service admin or a co-admin of your subscription.
3. In the Azure portal, in the Hub menu, click Browse, scroll down towards the bottom of the list of services and click **Virtual networks.**
4. In the Virtual networks blade, click **HQ**.
5. In the HQ blade, in the **Connected devices** section, click on the **gatewayARM** device and take the note of the value in the **Public IP address**.
6. On MIA-CL1, launch File Explorer and browse to D:02 folder.
7. Right-click on the **NetworkConfig.xml** file and click **Open with** in the menu.
8. In the next cascading menu, click **Notepad** in the list of programs.
9. In Notepad, under the **LocalNetworkSite** section, modify the value of **<VPNGatewayAddress>** (which is at this point set to **1.1.1.1**) by replacing **1.1.1.1** with the value of the IP address that you recorded in step 5, save the changes to **NetworkConfig.xml**, and then close the file.
10. On MIA-CL1, launch Windows PowerShell as Administrator by using the taskbar icon.
11. At the Windows PowerShell prompt, sign into your Azure subscription by running:

Add-AzureAccount

1. If you have multiple subscriptions, to select the target subscription, type the following commands, and then press Enter after each (replace ' *Name of your subscription'* with the actual name of your subscription and make sure to enclose the name of your subscription in single quotes):

Get-AzureSubscription Set-AzureSubscription -SubscriptionName 'Name of your subscription'

1. At the Windows PowerShell command prompt, type the following command, and then press Enter

Set-AzureVNetConfig -ConfigurationPath D:\Configfiles\Lab02\NetworkConfig.xml

1. To set the IPSec shared key for the classic VNet gateway, type the following command at the Windows PowerShell command prompt, and then press Enter.

Set-AzureVNetGatewayKey -VnetName Adatum-Branch-Vnet -LocalNetworkSiteName HQ -SharedKey 12345

1. Wait for the command to complete and display the StatusCode OK.
2. Open Internet Explorer.
3. In Internet Explorer, browse to the classic Azure Management Portal at **https://manage.windowsazure.com**, and, if prompted, sign in using the Microsoft account that is either the Service Admin or a co-Admin of your subscription.
4. Click **NETWORKS** in the navigation bar on the left hand side.
5. On the **networks** page, click, **ADATUM-BRANCH-VNET**.
6. On the **adatum-branch-vnet** page, click **DASHBOARD**.
7. On the **DASHBOARD** page, verify that the **ADATUM-BRANCH-VNET** and **HQ** are connected. You might need to click **CONNECT** in the menu bar or refresh the Internet Explorer page.
8. Leave the Internet Explorer window open.

**Result**: After completing this exercise, you should have connected the A. Datum HQ and branch virtual networks, and deployed dynamic routing gateways for each virtual network.

## Exercise 2: Configuring a point-to-site VPN

#### Task 1: Configure a VPN from a client to the headquarters virtual network

1. In Internet Explorer, on the **adatum-branch-vnet** page, click **CONFIGURE**.
2. Select the **Configure point-to-site connectivity** checkbox.
3. In the **STARTING IP** text box, type **172.16.0.0**, and then set the **CIDR (ADDRESS COUNT)** to **/24 (254)**.
4. At the bottom of the page, click **SAVE**.
5. In the warning message, click **Yes**.
6. Press the Windows logo key, and then type **Command**.
7. Right-click **Command Prompt**, and then click **Run as administrator**.
8. In the **User Account Control** dialog box, click **Yes**.
9. At the Command Prompt, type the following command, and then press Enter:

CD C:\Program Files (x86)\Windows Kits\10\bin\x64

1. Type the following command, and then press Enter:

makecert -sk exchange -r -n "CN=AdatumRootCertificate" -pe -a sha1 -len 2048 -ss My "AdatumRootCertificate.cer"

1. Switch back to Internet Explorer.
2. On the **adatum-branch-vnet** page, click **CERTIFICATES**.
3. Click **UPLOAD A ROOT CERTIFICATE**.
4. In the **Upload Certificate** dialog box, click **BROWSE FOR FILE**.
5. In the **Choose File to Upload** dialog box, navigate to **C:Files (x86)Kits064**, select **AdatumRootCertificate**, and then click \*\* Open\*\*.
6. In the **Upload Certificate** dialog box, click the **check mark** icon.
7. Switch back to the Command Prompt window.
8. At the command prompt, type the following command, and then press Enter:

makecert.exe -n "CN=AdatumClientCertificate" -pe -sk exchange -m 96 -ss My -in "AdatumRootCertificate" -is my -a sha1

1. Switch back to Internet Explorer.
2. Press the **ALT** key, click **Tools**, and then click **Internet Options**.
3. In **Internet Options**, click the **Content** tab, and then click **Certificates**.
4. Verify that both the **AdatumClientCertificate** and \*\* AdatumRootCertificate\*\* display in the Personal store.
5. Close Certificates.
6. Close Internet Options.

#### Task 2: Connect to the HQ virtual network

1. Switch back to Internet Explorer tab with the classic portal.
2. On the **ADATUM-BRANCH-VNET** page, click **DASHBOARD**.
3. In the quick glance section, click **Download the 64-bit Client VPN Package**.
4. When prompted whether to save or run the file, click **Run**.
5. In the **Windows protected your PC** dialog box, click **More** **Info**, and then click **Run anyway**.
6. In the **User Account Control** dialog box, click **Yes**.
7. In the **ADATUM-BRANCH-VNET** dialog box, click **Yes**.
8. In the **Search the web and Windows** textbox, type \*\* ncpa.cpl\*\* and press Enter.
9. In the Network Connections window, right-click **ADATUM-BRANCH-VNET**, and then click **Connect/Disconnect**. This will launch the Settings app with the VPN tab of **NETWORK & INTERNET** page.
10. Click **ADATUM-BRANCH-VNET**, and then click **Connect**. This will open the **ADATUM-BRANCH-VNET** dialog box.
11. Click **Connect** again.
12. When prompted to accept that the Connection Manager needs elevated privileges to run CMROUTE.DLL, click **Continue**.
13. After the connection is established, switch back to the Command Prompt window
14. At the command prompt, type the following command, and then press Enter:

ipconfig /all

1. In the results, verify that there is a PPP adapter **ADATUM-BRANCH-VNET** section, and that you have an assigned IP address from the IP address range you defined for the point to site connectivity (172.16.0.0/24).
2. In the Search the web and Windows textbox in the taskbar of MIA-CL1, type the following and press Enter:

Mstsc /admin /f /v:192.168.0.4

1. If prompted whether to connect, click **Yes**.
2. In the **Windows Security** dialog box, enter the following credentials, and then click **OK**:

* User name: **Student**
* Password: **Pa$$w0rd123**

1. If prompted again whether to connect, click **Yes**.
2. This will establish a Remote Desktop session to the private IP address of ClassicSrv1 Azure virtual machine. Verify that you can successfully log on to ClassicSrv1. > **Note:** Note that you could potentially also test connectivity to a file share on ClassicSrv1 Azure virtual machine or ping it by its IP address, however, that would require modifying Windows Firewall settings on ClassicSrv1 in order to allow File and Printer Sharing traffic.
3. Close the Remote Desktop session.
4. Switch back to the VPN tab of the **NETWORK & INTERNET** page of the Settings app.
5. Click **Disconnect**, next to the **ADATUM-BRANCH-VNET** entry.

**Result**: After completing this exercise, you should have configured and tested a point-to-site VPN connection.

## Exercise 3: Validating virtual network connectivity

#### Task 1: Connect to the A. Datum VMs

1. On MIA-CL1, Open Internet Explorer and navigate to the Azure classic portal at https://manage.windowsazure.com.
2. In the Azure classic portal, click **VIRTUAL MACHINES** in the navigation bar on the left side of the window.
3. Make sure that **ClassicSrv1** is selected, and then click **CONNECT** in the menu bar at the bottom of the window.
4. When prompted whether to open or save the .rdp file, click **Open**.
5. If a Remote Desktop Connection warning message displays, select **Don't ask me again for connections to this computer**, and then click **Connect**.
6. In the **Windows Security** dialog box, type the following credentials, and then click **OK**:

* User name: **Student**
* Password: **Pa$$w0rd123**

1. If another Remote Desktop Message displays, select **Don't ask me again for connections to this computer**, and then click **Yes**.
2. Minimize the ClassicSrv1 RDP session.
3. From MIA-CL1, launch Internet Explorer and navigate to the Azure portal at https://portal.azure.com.
4. In the Azure portal, click **More Services** in the hub menu on the left hand side of the window and click **Virtual machines**.
5. On the **Virtual machines** blade, click **ARMSrv2**.
6. On the **ARMSrv2** blade, click **Connect** in the toolbar.
7. When prompted whether to open or save the \*\* .rdp\*\* file, click **Open**.
8. If a Remote Desktop Connection warning message displays, select **Don't ask me again for connections to this computer**, and then click **Connect**.
9. In the **Windows Security** dialog box, type the following credentials, and then click **OK**:

* User name: **Student**
* Password: **Pa$$w0rd123**

1. If another Remote Desktop Message displays, select **Don't ask me again for connections to this computer**, and then click **Yes**.

#### Task 2: Test TCP/IP connectivity between the sites

1. From the ARMSrv2 RDP session, if prompted whether to enable network discovery, click **No**.
2. In Server Manager, click **Local Server**.
3. If the status of Windows Firewall is **On** for the Public profile, click **Public:On**.
4. In Windows Firewall, click **Turn Windows Firewall on or off**.
5. Under Public network settings, click **Turn off Windows Firewall (not recommended)**, and then click **OK**.
6. Close the **Windows Firewall** window.
7. Minimize the ARMSrv2 RDP session.
8. Maximize the ClassicSrv1 RDP session.
9. If prompted whether to enable network discovery, click **No**.
10. In Server Manager, click **Local Server**.
11. If the status of Windows Firewall is **On** for the Public profile, click **Public:On**.
12. In Windows Firewall, click **Turn Windows Firewall on or off**.
13. Under Public network settings, click **Turn off Windows Firewall (not recommended)**, and then click **OK**.
14. Close the **Windows Firewall** window.
15. In the ClassicSrv1 RDP session, on the taskbar, click the **Windows PowerShell** icon.
16. At the Windows PowerShell command prompt, type the following command, and then press Enter:

Ping 10.0.0.4

1. Verify that ARMSrv1 responds to Internet Control Message Protocol (ICMP) messages.

#### 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**.
3. In the **User Account Control** dialog box, click **Yes**.
4. At the command prompt, type the following command, and then press Enter:

Reset-Azure

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

**Note:** This script might remove Azure services in your subscription. Therefore, we 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 5-10 minutes to reset your Microsoft Azure environment, and ready it for the next lab. The script removes all storage, virtual machines (VMs), virtual networks and gateways, cloud services, and resource groups. **Important**: The script might not be able to get exclusive access to a storage account to delete it (you will see an error, if this occurs). If you find objects remaining after the reset script is complete, you can re-run **Reset-Azure** script, or use the full Azure Management Portal to manually delete all the objects in your Azure subscription, with the exception of the default directory.

**Result**: After completing this exercise, you should have verified that VMs can communicate between the virtual networks.

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