# Module 2: Implementing and managing Azure networking

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

### Scenario

A. Datum Corporation's Azure VMs currently reside on an IaaS v1 virtual network in the branch region. To prepare for deployment of IaaS v2 VMs, A. Datum must deploy an IaaS v2 virtual network in the Headquarters region. You determined this is a relatively straightforward process if you use an existing deployment template and modify its parameters during deployment. However, you want to also test deployment of a virtual network by using Azure PowerShell. In addition, you need to prepare your existing IaaS v1 virtual network for establishing connectivity to the IaaS v2 virtual network by creating a virtual network gateway and deploy a test IaaS v2 VM to the virtual network deployed by using the template.

### Objectives

After completing this lab, you will be able to:

* Create a virtual network by using deployment templates.
* Create a virtual network by using PowerShell.

### Lab Setup

Estimated Time: 30 minutes

Virtual Machine: **20533C-MIA-CL1**

User Name: **Student**

Password: **Pa$$w0rd**

Before starting this lab, ensure that you have performed the *Preparing the Environment* demonstration tasks at the beginning of the first lesson in this module, and that the setup script has completed.

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

### Scenario

A. Datum now wishes to implement virtual networks for the A. Datum headquarters and branch resources. You have been asked to configure these virtual networks by using deployment templates from GitHub.

The main tasks for this exercise are as follows:

1. Access the template on GitHub
2. Load the template into new deployment on the Azure portal
3. Run the deployment from the Azure portal

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

1. Ensure that you are logged on to MIA-CL1 as **Student** with the password **Pa$$w0rd**.
2. Start Internet Explorer and browse to the following address: http://aka.ms/Mt32e4.
3. 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** link.
4. Review the structure of the JSON file. Examine the placeholders for values that can be edited during the deployment. This template contains the following parameters that you can edit: *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 text box and enter **AdatumLabRG** as the name of the *Resource Group*.
4. In the **Location** drop-down list, select *<Location1>.*
5. Type the following information in the **SETTINGS** section:

* VNETNAME: **HQ**
* VNETADDRESSPREFIX: **10.0.0.0/16**
* SUBNET1NAME: **Subnet1**
* SUBNET1PREFIX: **10.0.0.0/24**
* SUBNET2NAME: **Subnet2**
* SUBNET2PREFIX: **10.0.1.0/24**

1. In the **Terms and Conditions** section, check **I agree to the terms and conditions stated above** 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

### Scenario

A. Datum is expanding their services in Azure by using both declarative and imperative deployment methods and they ask you to test provisioning of a new network by using Azure PowerShell.

The main tasks for this exercise are as follows:

1. Create a virtual network by using PowerShell

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

1. From the taskbar start Windows PowerShell and sign in to your subscription by using the **Login-AzureRMAccount** command.
2. Select your subscription by using the **Set-AzureRMContext** command, and then use **New-AzureRMResourceGroup** command to create a new resource group named **AdatumTestRG** in the primary Azure region provided by the instructor.
3. By using the **New-AzureRMVirtualNetwork** command, create a new virtual network named **AdatumTestVnet** with the address space **10.0.0.0/16** in the same region as the resource group.
4. Add a subnet named **FrontEnd** with the IP range of 10.0.0.0/24 to the virtual network **AdatumTestVNet**.

**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

### Scenario

As part of expanding their network environment, A. Datum needs to prepare for connecting IaaS v1 virtual networks and IaaS v2 virtual networks by creating a virtual network gateway on an IaaS v1 virtual network. You also need to test provisioning of an Azure IaaS v2 VM onto an IaaS v2 virtual network.

The main tasks for this exercise are as follows:

1. Create an IaaS v1 virtual network gateway
2. Deploy an IaaS v2 virtual machine into an IaaS v2 virtual network

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

1. Switch to Internet Explorer and in the new tab navigate to the classic Azure portal.
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, select networks, and then click **ADATUM-BRANCH-VNET.**
4. Create a new dynamic routing 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.

**Question** What are the two methods that you can use to create an Azure virtual network?

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

### Scenario

Now that A. Datum has deployed an IaaS v2 VNet, the company wants to be able to provide direct connectivity to the IaaS v1 VMs on the existing IaaS v1 VNet. To allow for direct communication between VMs on both virtual networks, you need to implement VNet-to-VNet connection between them. You will accomplish this by modifying and running an Azure PowerShell script. You also want to implement a point-to-site VPN, so that you can connect from your administrative computer.

### Objectives

After completing this lab, you should be able:

* Connect Azure virtual networks using a VNet-to-VNet VPN.
* Configure and test a point-to-site VPN.
* Validate virtual network connectivity using Azure-based and VM-based tools.

### Lab Setup

Estimated Time: 35 minutes

Virtual Machine: **20533C-MIA-CL1**

User Name: **Student**

Password: **Pa$$w0rd**

Before you begin this lab, ensure that you have completed the first lab in this module: Creating virtual networks.

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

### Scenario

A. Datum now wishes to connect the A. Datum HQ and branch virtual networks by using a VPN.

The main tasks for this exercise are as follows:

1. Configure Resource Manager virtual network
2. Configure classic virtual network

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

1. On MIA-CL1, launch Internet Explorer and sign in to the classic Azure portal using an account that is either a Service Admin or a co-admin of your Azure subscription.
2. From the navigation bar on the left hand side, select networks, and then click **ADATUM-BRANCH-VNET**.
3. On the **adatum-branch-vnet** page, click **DASHBOARD**,
4. Ensure that the provisioning of the new virtual gateway that you started in the first lab of this module has been completed. If not, wait until the provisioning is completed.
5. On MIA-CL1, from the Azure PowerShell window, first review and then run **D:02 ConfigureARMGateway.ps1**
6. When prompted to sign-in (twice), use an account that is either a Service Admin or a co-admin of your Azure subscription.
7. 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.
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, navigate to the list of Virtual networks **.**
4. In the Virtual networks blade, click **HQ**.
5. In the HQ blade, in the **Connected devices** section, take the note of the value in the **IP ADDRESS** column for **gatewayARM**.
6. On MIA-CL1, launch File Explorer and browse to D:02 folder.
7. Open the **NetworkConfig.xml** file by using Notepad.
8. 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, replace **location1** with the name of the Azure region of the **adatum-branch-vnet** location, save the changes to **NetworkConfig.xml**, and then close the file.
9. On MIA-CL1, launch Windows PowerShell as Administrator.
10. 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. Update the network configuration by running the following command at the Windows PowerShell command prompt:

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

1. Set the IPSec shared key for the classic VNet gateway by running the following command at the Windows PowerShell command prompt:

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 and browse to the Azure classic portal. If prompted, sign in by using the Microsoft account that is either the Service Admin or a co-Admin of your subscription.
3. From the **DASHBOARD** page of the **ADATUM-BRANCH-VNET**, verify that this network is connected to the **HQ** virtual network. You might need to click **CONNECT** in the menu bar or refresh the Internet Explorer page.
4. 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

### Scenario

A. Datum now wants to implement secure communications from on-premises resources to Azure. Management wishes to start by configuring and testing a point-to-site VPN connection to a virtual network in Azure.

The main tasks for this exercise are as follows:

1. Configure a VPN from a client to the headquarters virtual network
2. Connect to the HQ virtual network

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

1. In the Azure classic portal, navigate to the **CONFIGURE** tab of the **ADATUM-BRANCH-VNET** virtual network.
2. On the **CONFIGURE** tab, select **Configure point-to-site connectivity**, set the address space to **172.16.0.0/24** and save the change.
3. Open a Command Prompt window with elevated privileges, and navigate to **C:Files (x86)Kits064**.
4. At the command prompt, 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. From the **adatum-branch-vnet** page, upload the root certificate.
3. Switch back to the Command Prompt window, and type the following command:

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. Click the cogwheel in the upper right corner of the Internet Explorer window, click **Internet Options**, and then on the **Content** tab, click **Certificates**.
3. Verify that the **AdatumClientCertificate** and \*\* AdatumRootCertificate\*\* display in the Personal store.
4. Close Certificates, and close Internet Options.

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

1. Configure a VPN client by downloading the 64-bit Client VPN Package from the Azure classic portal and installing it on the local client.
2. From the local client, connect by using the newly configured VPN connection, and verify the resulting IP configuration by examining the output of **ipconfig/all**.
3. Verify the VPN connection by initiating an RDP session to the private IP address of ClassicSrv1 Azure virtual machine > **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.
4. Close the RDP session and disconnect the VPN connection.

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

## Exercise 3: Validating virtual network connectivity

### Scenario

A. Datum now wants to test the new Azure networking configuration, and validate the connectivity between the A. Datum headquarters and the branch virtual network. > **Note:** **Important:** Even if you do not complete this exercise, you must ensure that you complete the *Reset the Environment* task. This task resets your Azure subscription in preparation for later labs and ensures that no unnecessary costs accrue.

The main tasks for this exercise are as follows:

1. Connect to the A. Datum VMs
2. Test TCP/IP connectivity between the sites
3. Reset the environment

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

1. Connect to **ClassicSrv1** via an Remote Desktop Protocol (RDP) session from the Azure classic portal.
2. Sign in by using the following credentials:

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

1. Minimize the **ClassicSrv1** RDP session.
2. Connect to **ARMSrv2** via an RDP session from the Azure portal.
3. Sign in by using the following credentials:

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

#### 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. Turn **Windows Firewall** off for the **Public** profile.
3. Switch to the **ClassicSrv1** RDP session.
4. Turn **Windows Firewall** off for the **Public** profile.
5. From the **ClassicSrv1** RDP session, ping **ARMSrv2** **(10.0.2.4)** by its IP address and verify that you are receiving a response.

#### 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, click **Yes**.
3. 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, ready for the next lab. The script removes all storage, 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.

**Question** What are the key steps for configuring a point-to-site VPN?

**Question** How can you enable communications between VMs that are created with the Azure classic deployment model and VMs that are created with the ARM model?

©2016 Microsoft Corporation. All rights reserved.

The text in this document is available under the [Creative Commons Attribution 3.0 License](https://creativecommons.org/licenses/by/3.0/legalcode), additional terms may apply. All other content contained in this document (including, without limitation, trademarks, logos, images, etc.) are **not** included within the Creative Commons license grant. This document does not provide you with any legal rights to any intellectual property in any Microsoft product. You may copy and use this document for your internal, reference purposes.

This document is provided "as-is." Information and views expressed in this document, including URL and other Internet Web site references, may change without notice. You bear the risk of using it. Some examples are for illustration only and are fictitious. No real association is intended or inferred. Microsoft makes no warranties, express or implied, with respect to the information provided here.