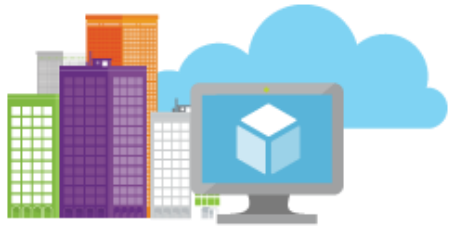
**MICROSOFT AZURE** 

**INFRASTRUCTURE STEP**

**BY STEP**

****

Abstract

This document includes step by step guide for Implementing Microsoft Azure

components including virtual machines, virtual network, storage and websites.





Microsoft Azure Infrastructure step by step

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Mai Ali is a Senior Infrastructure Consultant, with a strong 

focus in Microsoft, virtualization, Management solution and

Unified Communications area. Over 5 years' study and

hands on experience delivering small to large-scale projects

for different industries, mainly based on Microsoft and other

leading-edge technologies, systems applications and

operations running on top of them. She has Broad and

mixed technical background in infrastructure and

communications field, systems integration, Systems

Management, security, as well as an in-depth understanding

of the business of computing and networking. Currently her

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environments, with specific focus on multi-vendor UC solutions, based on Microsoft System Center 2007, Microsoft System Center 2012/1610, Microsoft Lync 2013 with Enterprise Voice, Office 365, Microsoft Enterprise Mobility Suite, Microsoft Operations Management Suite, Exchange Unified Messaging, migrations from Lync 2010 and OCS 2007, load balancers, reverse proxy, firewall, Exchange UM.

Mai Ali has various Technology Certifications and Awards: **Microsoft Valuable Professional System Center Cloud and Data Management, Microsoft Certified Solutions Expert** (Communication, Server Infrastructure, Private Cloud, and Messaging), **MCITP** (Office 365 Administrator), **MCITP** (Enterprise Administrator Windows 2008), MCITP (Enterprise Messaging Administrator), **MCITP** (Lync Server 2010 Administrator), **Microsoft Certified Systems Engineer** (Security, Messaging) Windows 2003, **MCSA** (Office 365, Windows 2012), **MCSA** Windows 2008, **MCSA** (Security) Windows 2003, **Citrix Certified Professional - Virtualization**, **Cisco Certified Network Professional**, **Red Hat Certified Engineer, STS** Symantec Enterprise Vault 10.0 for Exchange and **Symantec Certified Professional Program Data Protection**. =

Mai Ali has been very involved with Windows Server based virtualization, communication and Management solutions including Microsoft System Center, Microsoft Lync, Enterprise Mobility and Office 365. She is currently a prolific blogger at http://expertslab.wordpress.com and has done many Scripts for automatic configuration on Microsoft TechNet Gallery. Mai likes giving

back via community forums: She has contributed thousands of posts to Microsoft System Center, Microsoft Lync and Experts-Exchange community forums over the years.

Mai Ali’s Blog: http://expertslab.wordpress.com

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Microsoft Azure Infrastructure step by step

**Chapter 1**

**Definition for Microsoft Azure**

**What is Microsoft Azure?**

Microsoft Azure is a comprehensive set of cloud platform that enables you to quick build, deploy and manage applications across a global network of Microsoft-managed datacenters. It provides cloud based servers, networks, storage and services. Azure deliver many of services. Some of the major services are listed under:

• **Azure Virtual Machines** is one of several types of on-demand, scalable computing resources that Azure offers. Azure Virtual Machines provide you with an operating system, storage, and networking capabilities and can run a wide range of applications.

• **Azure Content Delivery Network (CDN)** caches static web content at strategically placed locations to provide maximum throughput for delivering content to users. The CDN offers developers a global solution for delivering high-bandwidth content by caching the content at physical nodes across the world.

• **Azure Storage** is a Microsoft-managed cloud service that provides storage that is highly available, secure, durable, scalable, and redundant. Azure Storage consists of three data services: Blob storage, File storage, and Queue storage.

• **Azure SQL Database** is a managed cloud database for application developers. It is a fully managed database-as-a-service built on SQL. The service is useful in scenarios where you want the power of a relational database without the infrastructure and management hassles.

• **Azure Active Directory Domain Services** use to join Azure virtual machines to a domain, without having to deploy domain controllers. Sign in to the virtual machines using their corporate Azure Active Directory credentials and seamlessly access resources. Use Group Policy to more securely administer domain-joined virtual machines—a familiar way to apply and enforce security baselines on all of your Azure virtual machines.

• **Azure App Service** is a cloud service that’s designed to solve the practical problems that engineers face today. App Service focuses on providing superior developer productivity without compromising on the need to deliver applications at cloud scale. App Service also provides the features and frameworks that are necessary for creating enterprise line of-business applications while supporting developers with the most popular development languages (such as Microsoft .NET, Java, PHP, Node.js, and Python). Azure App Service offers several app types and capabilities:

➢ **Web apps**: web based applications that can scale with business requirements ➢ **Mobile Apps:** mobile applications that can run on any device

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➢ **Logic apps**: For automating business processes and integrating systems and data across clouds without writing code.

➢ **API apps**: For hosting RESTful APIs that other services can leverage, such as in IoT scenarios

➢ **Functions**: Event based development and deployment, allowing you to define functions that trigger specific events in App Services, such as spinning up an application under specific circumstances, reducing overall costs

**Why Microsoft Azure?**

Microsoft Azure is Microsoft's cloud-based application platform for developing, managing, and hosting applications off-site. Azure has made significant advances over the years. It now offers a set of features and capabilities far surpassing its competitors. The following are some important aspects wherein Azure scores over AWS:

➢ **Trust the cloud that helps protect your work -** To protect your organization, Azure embeds security, privacy, and compliance into its development methodology, and has been recognized as the most trusted cloud for U.S. government institutions, earning a FedRAMP High authorization that covers 18 Azure services. In addition, Azure IP

Advantage provides best-in-industry intellectual property protection, so you can focus on innovation, instead of worrying about baseless lawsuits.

➢ **Reduce risk and complexity with real hybrid consistency -** Optimize your existing assets by taking a hybrid approach to the cloud. Azure offers hybrid consistency everywhere—in application development, security and management, identity management, and across the data platform. This helps reduce the risk and cost of a hybrid cloud environment by enabling a common set of skills and offering portability of applications and workloads. Plus, save up to 40 percent when migrating Windows Server virtual machines to Azure using the Azure Hybrid Benefit.

➢ **Expand globally with the most regions -** Achieve global scale with 44 announced Azure regions—more than any other cloud provider. Our priority on geographic expansion means you can choose the datacenter and region that’s right for you and your customers, with the performance and support you need, where you need it.

➢ **Build faster with the leading cloud platform -** Rely on the only cloud provider recognized in the industry as having leading solutions in infrastructure as a service (IaaS), software as a service (SaaS), and platform as a service (PaaS)—in fact, according to this Forrester Total Economic Impact study, you’ll be more productive and increase your ROI with Azure PaaS services. Turn your ideas into solutions faster with more than 100 services, end-to-end management experiences, and app delivery with agile development practices.

➢ **Use any development tool or language -** Develop and build the way you want in Azure, with your choice of tools, applications, and frameworks, like Jenkins and Chef. As a leading open source contributor on GitHub.

➢ **Easily implement ready-to-use IoT -** Quickly start with the most common Internet of Things (IoT) scenarios, such as remote monitoring and predictive maintenance, using

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preconfigured solutions in Azure IoT Suite. Get the most comprehensive portfolio of IoT solutions, ranging from device and edge to data and the cloud, with Azure IoT. It’s open and customizable by design, and 46 percent of Azure Certified for IoT devices run on Linux, Android, or other open source technologies.

➢ **Manage and optimize cloud spend with a complete cost management solution -** Optimize your cloud resources, manage departmental budgets, and allocate costs with free Azure Cost Management. Drive accountability through cost allocation and chargeback reports. Maximize resource utilization by right-sizing virtual machines and visualizing the cost-benefits of various purchasing options that Azure offers.

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**Chapter 2**

**Azure Virtual Network**

Azure virtual networks define an organization’s network in the cloud, where the administrators can have full control over IP address assignments, name resolution, security settings, and routing rules.

**Implement and Manage Virtual Networks**

An Azure virtual network is a representation of your own network in the cloud. The organization that provisions the virtual network fully controls the IP address blocks, DNS settings, security groups and route tables within the network. The virtual network can be segmented into as many subnets as are required to support the workload.

**Creating Virtual Networks**

In this exercise, you will create a new virtual network and deploy a virtual machine to each network

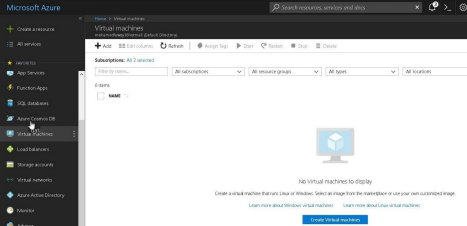
**Task 1: Assign Static IP address**

In this exercise, you will assign a static IP address to an existing Windows Server 2012 R2 VM using PowerShell. By default, all VMs have dynamic IP addresses. You can use a static IP address for specific use cases such as building a domain controller.

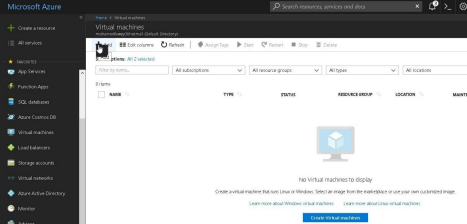
1. Navigate to the Azure Portal and sign in, then click virtual machine.

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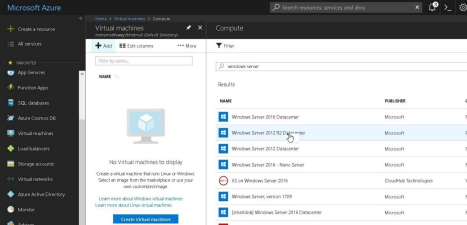


2. On the Hub menu, click **Add**.

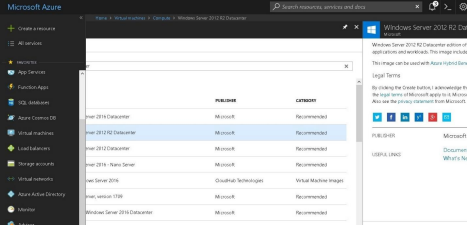
3. On the New blade, search for **Server 2012**. In the search results, click **Windows Server 2012 Datacenter**.

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4. On the Windows Server 2012 R2 Datacenter blade, notice the default deployment model is set to Resource Manager. Click **Create**.

5. On the Create Virtual Machine blade, fill in the following values for basic settings (substituting your information for the user name, subscription, and location) and click **OK**.

▪ Name: **Server-01**

▪ VM disk type: **HDD**

▪ User name: **<Your first name>**

▪ Password: **Pa$$w0rd12345**

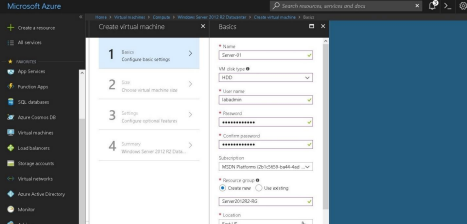
▪ Subscription: **<Your subscription>**

▪ Resource group: **Create a new one named “Server2012R2-RG”**

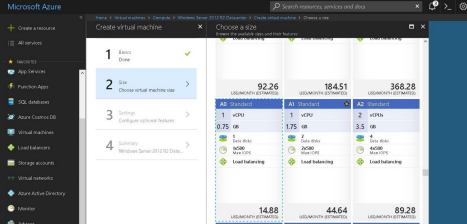
▪ Location: **<Your location>**

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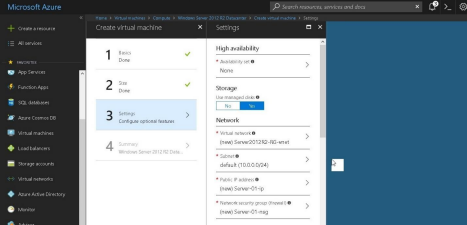


6. On the Choose a size blade, click **View all**. Click the **A0 Standard** size and then click **Select**. Note that we are choosing a larger size VM to support multiple NICs in a later exercise.

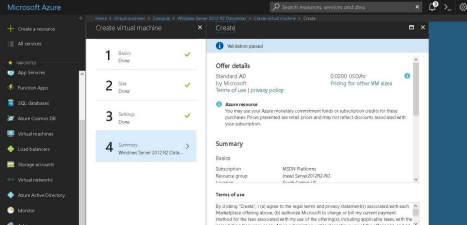
7. On the Settings blade, review the default options for storage, network, extensions, high availability, and monitoring. Click **OK**.

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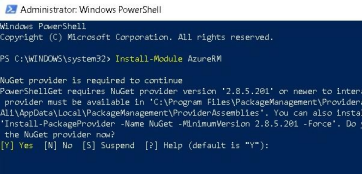


8. On the Summary blade, review the configuration and then click **Ok**.

9. Open an elevated PowerShell prompt. Run the **Install-Module AzureRM** command. This will install the AzureRM module which represents resource management.

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10. If you get prompted to install and import the NuGet provider, Type **Y** and then press the **Enter** key. If you are notified that the repository is untrusted, confirm that you want to install the modules by typing **Y** and then pressing the **Enter** key. The installation process will take several minutes as packages are downloaded and installed.

11. After the download and installation is finished, run the **Import-Module AzureRM** command.

12. Run the **Install-Module Azure** command. This will install the Azure module which represents service management.

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13. If you are notified that the repository is untrusted, confirm that you want to install the modules by typing **Y** and then pressing the **Enter** key.

14. Once the download and installation is finished, run the **Import-Module Azure** command.

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15. Run the **Login-AzureRmAccount** command and then authenticiate with your Azure administrative credentials.

16. Run the **Get-AzureRmVM** command to list all of the VMs deployed with the Resource Manager model. Locate SERVER-01 (or your existing test VM). Note the values for ResourceGroupName and NetworkInterfaceIDs.

17. Run the **Get-AzureRmNetworkInterface -Name <NetworkInterfaceID> - ResourceGroupName <ResourceGroupName>** command. Review the output. Note the values for PrivateIPAddress and PrivateIpAllocationMethod.

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18. Run the following commands in sequence to update the PrivateIpAllocationMethod to static and assign a new private IP address:

▪ **$NIC = Get-AzureRmNetworkInterface -Name <NetworkInterfaceID> -**

**ResourceGroupName ”Server-RG”**

▪ **$NIC.IpConfigurations[0].PrivateIpAllocationMethod = "Static"**

▪ **$NIC.IpConfigurations[0].PrivateIpAddress = "10.0.0.50"**

▪ **Set-AzureRmNetworkInterface -NetworkInterface $NIC**

****19. Run **Get-AzureRmNetworkInterface -Name <NetworkInterfaceID> - ResourceGroupName ”Server2012R2-RG”**. Review the output and confirm that the PrivateIPAddress and PrivateIpAllocationMethod have been updated.

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20. When you are finished with this exercise, run the **Get-AzureRmVM -Name "SERVER 01" -ResourceGroupName “Server-RG” | Stop-AzureRmVM** command to shut down the VM.

**Task 2: Create Virtual Networks in the Management Portal**

In this exercise, you will be working with virtual networks within the Azure Portal. You will create a new virtual network and explore the various management options.

1. Navigate to the Azure Portal and sign in. On the Hub menu, click **More Services**. 2. Type **virtual networks** in the filter to reveal the available options for managing virtual networks in the Azure Portal. Mark Virtual networks as a favorite to add it to your Hub menu.

3. Click **Virtual networks**. If you have any existing virtual networks they should appear in this list. Click **Add**.

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4. On the Create virtual network blade, fill in the following values to create a new virtual network. Click **Create** when you are finished entering the information

▪ Name: **Server-VNET**

▪ Address space: **172.168.0.0/16**

▪ Subnet name: **Server-Subnet**

▪ Subnet address range: **172.168.0.0/24**

▪ Subscription: **<Your subscription>**

▪ Resource group: **Create a new one named “Server-VNET”**

▪ Location: **<Your location>**

****5. On the menu bar, monitor the alerts for progress as the new virtual network is created. 6. On the Hub menu, click **Virtual networks**. Confirm that the new virtual network has been created. Click **Server-VNET**.

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7. On the Server-VNET blade, review the list of available management options under Settings, such as address space, connected devices, subnets, DNS servers, and peerings. 8. When you are finished exploring the new virtual network, close the web page.

**Connecting Virtual Networks**

In this exercise, you will deploy Virtual Machine for each virtual network. **Task 1: Deploy a Virtual Machine into a Virtual Network**

In this exercise, you will deploy a new Windows Server 2016 VM to a new virtual network within the Azure Portal.

1. Navigate to the Azure Portal and sign in.

2. On the Hub menu, click **Add.**

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3. On the New blade, search for **Server 2016**.

4. In the search results, click **Windows Server 2016 Datacenter**.

5. On the Windows Server 2016 Datacenter blade, notice the default deployment model is set to Resource Manager. Click **Create**.

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6. On the Create Virtual Machine blade, fill in the following values for basic settings (substituting your information for the user name, subscription, and location) and click **OK**.

▪ Name: **Server-02**

▪ VM disk type: **HDD**

▪ User name: **<Your first name>**

▪ Password: **Pa$$w0rd12345**

▪ Subscription: **<Your subscription>**

▪ Resource group: **Create a new one named “Server-RG”**

▪ Location: **<Your location>**

****7. On the Choose a size blade, click **View all**. Click the A0 Standard size and then click **Select**.

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8. On the Settings blade, click **Network**.

9. On the Choose virtual network blade, click **Server-VNET**

****10. On the Settings blade, under Network, confirm that the Virtual network and Subnet reflect your selected network. Click **OK**.

11. On the Summary blade, review the configuration and then click **OK**.

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12. On the menu bar, monitor the alerts for progress as the new virtual machine is created. 13. When the VM is created, click **Virtual machines** in the left pane.

14. In the Virtual machines blade, click the server name for the VM that you deployed. 15. In the Server-02 blade, click **Stop** at the top of the blade to stop the VM. This ensures that you don’t consume resources unnecessarily.

**Task 2: Add a new domain to DNS Zones**

In this exercise, you will explore DNS zones in the Azure Portal, including how to add and manage them.

1. Navigate to the Azure Portal and sign in.

2. On the Hub menu, click **More Services**.

3. Type **dns zones** in the filter. Mark DNS zones as a favorite to add it to your Hub menu.

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4. Click **DNS zones**. If you have any existing DNS zones they will appear in this list. Click **Add**.

5. On the Create DNS zone blade, fill in the following values to create a new DNS zone. Click **Create** when you are finished entering the information.

▪ Name: **Labtest10.com**

▪ Subscription: **<Your subscription>**

▪ Resource group: **Create a new one named “Server-DNS”**

▪ Resource group location: **<Your location>**

****6. On the menu bar, monitor the alerts for progress as the new DNS zone is created. 7. On the Hub menu, click **DNS zones**. Confirm that the new DNS zone has been created. Click **Labtest10.com**.

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8. On the Labtest10.com DNS zone blade, review the available options and information, such as the list of existing records sets. Click **+ Record set**.

9. On the Add record set blade, fill in the following values to add a new record for WWW. Click **OK** when you are finished entering the information.

▪ Name: **WWW**

▪ Type: **A**

▪ TTL: **1**

▪ TTL unit: **Hours**

▪ IP address: **10.0.0.100**

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10. On the menu bar, monitor the alerts for progress as the new DNS record set is created. Confirm that the new record set has been added by reviewing the Labtest10.com DNS zone blade.

11. On the Labtest10.com DNS zone blade, click **+ Record set**.

12. On the Add record set blade, fill in the following values to add a new record for syslog. Click **OK** when you are finished entering the information.

▪ Name: **Syslog**

▪ Type: **A**

▪ TTL: **1**

▪ TTL unit: **Hours**

▪ IP address: **10.0.0.110**

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13. On the menu bar, monitor the alerts for progress as the new DNS record set is created. Confirm that the new record set has been added by reviewing the Labtest10.com DNS zone blade.

**Configuring a Point-to-Site VPN**

In this exercise, you will configure and test a point-to-site VPN connection.

**Task 1: Configuring a VPN Connection using PowerShell**

In this exercise, you will configure a point-to-site VPN connection.

1. Run the **Login-AzureRMAccount** command from a PowerShell prompt.

2. Type **Y** to enable data collection. Authenticate with your administrative credentials. 3. Run the **Select-AzureRmSubscription -SubscriptionName**

**"<YourSubscriptionName>"** command.

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4. Run the following commands to declare your PowerShell variables using the following information. Note that you could opt to run through this exercise without relying heavily on variables but the reusability of the code is degraded in that scenario. ▪ $VNetName = **"VNet1"**

▪ $FESubName = **"FrontEnd"**

▪ $BESubName = **"Backend"**

▪ $GWSubName = **"GatewaySubnet"**

▪ $VNetPrefix1 = **"192.168.0.0/16"**

▪ $VNetPrefix2 = **"10.254.0.0/16"**

▪ $FESubPrefix = **"192.168.1.0/24"**

▪ $BESubPrefix = **"10.254.1.0/24"**

▪ $GWSubPrefix = **"192.168.200.0/26"**

▪ $VPNClientAddressPool = **"172.16.201.0/24"**

▪ $RG = **"TestRG"**

▪ $Location = **"East US"**

▪ $DNS = **"8.8.8.8"**

▪ $GWName = **"GW"**

▪ $GWIPName = **"GWIP"**

▪ $GWIPconfName = **"gwipconf"**

▪ $P2SRootCertName = **"ARMP2SRootCert.cer"**

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5. Create a resource group by running the **New-AzureRmResourceGroup -Name $RG - Location $Location** command.

6. Run the **$fesub = New-AzureRmVirtualNetworkSubnetConfig -Name $FESubName -AddressPrefix $FESubPrefix** command.

7. Run the **$besub = New-AzureRmVirtualNetworkSubnetConfig -Name $BESubName -AddressPrefix $BESubPrefix** command.

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8. Run the **$gwsub = New-AzureRmVirtualNetworkSubnetConfig -Name $GWSubName -AddressPrefix $GWSubPrefix** command.

9. Run the **New-AzureRmVirtualNetwork -Name $VNetName -ResourceGroupName $RG -Location $Location -AddressPrefix $VNetPrefix1,$VNetPrefix2 -Subnet $fesub, $besub, $gwsub -DnsServer $DNS** command.

10. Run the **$vnet = Get-AzureRmVirtualNetwork -Name $VNetName -**

**ResourceGroupName $RG** command.

11. Run the **$subnet = Get-AzureRmVirtualNetworkSubnetConfig -Name "GatewaySubnet" -VirtualNetwork $vnet** command.

12. Request a public IP address for the VPN gateway by running the **$pip = New AzureRmPublicIpAddress -Name $GWIPName -ResourceGroupName $RG - Location $Location -AllocationMethod Dynamic** command.

13. Run the **$ipconf = New-AzureRmVirtualNetworkGatewayIpConfig -Name $GWIPconfName -Subnet $subnet -PublicIpAddress $pip** command.

14. Download the standalone Windows 10 SDK at https://developer.microsoft.com/en us/windows/downloads/windows-10-sdk.The Windows 10 SDK includes a command line utility named makecert.exe that you can use to create self-signed certificates.

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**Note**: The makecert.exe tool is deprecated and its functionality will be replaced by Windows PowerShell.

15. Once the download has completed, begin the installation.

16. On the Specify Location page, click **Next**.

17. On the License Agreement page, click **Accept**.

18. On the Select the feature you want to install page, update the feature selections so that only the .Net Framework 4.6.2 Software Development Kit and the Windows Software Development Kit are selected for installation.

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19. Click **Install**. If you receive a User Account Control notification, click **Yes**. 20. When the installation is finished, click **Close**.

21. Open an elevated command prompt. Change the directory to **C:\Program Files (x86)\Windows Kits\10.0.16299.0\x64**.

22. Generate the root certificate by running the **makecert -sky exchange -r -n "CN= ARMP2SRootCert" -pe -a sha1 -len 2048 -ss My "ARMP2SRootCert.cer"** command. The certificate will be installed in the Current User\Personal\Certificates store. 

23. Open the Certificates MMC and export the certificate to **c:\temp**. Export the certificate without the private key in Base-64 encoded X.509 (.CER) format.

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**The next commands upload the exported certificate to Microsoft Azure and uses it as the VPN client root certificate**.

24. Run the **$filePathForCert = “c:\temp\ARMP2SRootCert.cer"** command. 25. Run the **$cert = new-object**

**System.Security.Cryptography.X509Certificates.X509Certificate2($filePathForCert )** command.

26. Run the **$CertBase64 = [system.convert]::ToBase64String($cert.RawData)** command. 27. Run the **$p2srootcert = New-AzureRmVpnClientRootCertificate -Name $P2SRootCertName -PublicCertData $CertBase64** command.

**The next command creates the VPN gateway. It can take as many as 30 minutes to complete.**

28. Run the **New-AzureRmVirtualNetworkGateway -Name $GWName -**

**ResourceGroupName $RG -Location $Location -IpConfigurations $ipconf -**

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**GatewayType Vpn -VpnType RouteBased -EnableBgp $false -GatewaySku Standard -VpnClientAddressPool $VPNClientAddressPool -**

**VpnClientRootCertificates $p2srootcert** command.

**Task 2: Connecting Client to the HQ Virtual Network**

In this exercise, you will test a point-to-site VPN connection.

1. Open Azure Portal, Select Virtual Network for VPN.

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2. Select Virtual Network Gateway

3. Select Point-to-site Connection.

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4. Once the package has been downloaded, run the installer.

5. You may receive a Windows SmartScreen security prompt. If so, click **More info** and then click **Run anyway**.

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6. In the installer confirmation window, click **Yes** install the VPN client.



7. On the client computer, navigate to Network Connections. You should see a new connection with the name of the virtual network you previously created.



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8. Back at the elevated command prompt, run the following command to install a client certificate: **makecert.exe -n "CN=<YourCommonName>" -pe -sky exchange -m 96 - ss My -in "ARMP2SRootCert" -is my -a sha1**

****9. On the VPN page of Network &Internet settings, select your virtual network and then click **Connect**.



10. On the Windows Azure Virtual Network prompt, click **Connect** and then click **Continue**. 

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11. Once connected, you will have full access to any service and virtual machine hosted in your virtual network. Verify your connection by running the **ipconfig /all** command and confirming that you have an IP address from the point-to-site network range.41 | P a g e

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**Chapter 3**

**Azure Virtual Machine**

An Azure virtual machine gives you the flexibility of virtualization without having to buy and maintain the physical hardware that runs the virtual machine. However, you still need to maintain the virtual machine — configuring, patching, and maintaining the software that runs on the virtual machine.

Azure Virtual Machines lets you create and use virtual machines in the cloud. Providing what’s known as ***Infrastructure as a Service (IaaS)***, virtual machine technology can be used in variety of ways. Some examples are:

▪ **Test and Development.** Virtual machines provide a quick and easy way to create different operating system and application configurations. Test and Development can then easily delete the VMs when they are no longer needed.

▪ **Running applications in the cloud.** The ability to run certain applications in the public cloud as opposed to creating a traditional infrastructure to run those applications can provide substantial economic benefits. For example, if an application needs to handle

fluctuations in demand, being able to shut VMs down when you don’t need them or quickly start them up to meet a sudden increased demand means you only pay for the resources you are using.

▪ **Extending your data center to the cloud.** An organization can extend the capabilities of its own on-premises network by creating a virtual network (VNET) in Azure and adding VMs to that VNET. Applications like SharePoint can then run on an Azure VM instead of running locally, making it easier to deploy or less expensive to do so than in an on premises environment.

▪ **Disaster recovery.** Similar to running certain types of applications in the cloud and extending an on-premises network to the cloud, you can use an IaaS-based approach to disaster recovery, and obtain significant costs savings. If a primary datacenter fails, you can create the VMs running on Azure to run your critical applications, then shut them down when the primary datacenter is once more operational.

**Implementing Virtual Machine**

**Deploying Windows Virtual Machines**

In this exercise you will create a new windows virtual machine with a Resource Manager deployment model.

**Task 1: Deploy a Custom Windows Virtual Machine**

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In this exercise you will create a new windows virtual machine using Azure Portal.

1. Start Internet Explorer, browse to the new Azure Preview Portal

(**https://portal.azure.com**), and sign in using the Microsoft account that is associated with your Azure subscription.

2. On the Hub menu, click **New**.

3. On the **New** blade, click **Everything**.

4. Under **Virtual Machines** click on **Windows Server**. In the image list, click **Windows Server 2016 Datacenter**.

5. On the **Windows Server 2016 Datacenter** blade, click **Create**.

6. On the **Create VM** blade, in the **Host Name** box, type **WebVM2**.

▪ In the **Username** box, type **labadmin**.

▪ In the **Password** box, type **Pa$$w0rd123**.

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7. Click **Size,** Select **Standard A0 Standard**.

8. On the **Optional config** blade, click **Network**

9. On the **Network** blade, click **Virtual Network**.

10. On the **Virtual Network** blade, under **Use an existing virtual network**, click **Server VNET**.

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11. On the **Network** blade, click **OK**.

12. On the **Optional config** blade, click **OK**.

13. On the **Create VM** blade, verify that **Add to Dashboard** is checked, and click **Create**. 14. On the Hub menu, click **Notifications**, which indicates that the virtual machine is still

being provisioned. The virtual machine provisioning process should take approximately 20-25 minutes. If the process appears to be taking longer than this, on the Dashboard, click **Azure Portal** to switch to the full portal, click **Virtual Machines**, and check the status of **WebVM1**.

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15. When provisioning is complete, the tile on the Dashboard will be updated to display the name of the new virtual machine and the **WebVM1** virtual machine blade will open, displaying all the information about the new virtual machine

**Task 2: Configuring Endpoints on Virtual Machines (Resource Manager)**

In this exercise you will explore virtual machine endpoints and how to add them. When you need connectivity over to the internet to a VM, you need to use endpoints. If you are using an operating system firewall, you might need to configure the firewall to enable connectivity too.

1. Navigate to the new Azure Portal and sign in.

2. On the Hub menu, click **Virtual machines**.

3. Click **Server-01**. This will reveal the properties page for the VM.

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4. Under Settings, click **Networking**.

5. On the Network interfaces blade, click the interface for this VM. For example, click **server-01134**.

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6. On the Network interface blade for this VM, under Settings, click **Network security group**.

7. On the Network security group blade, click the NSG for this VM. For example, click the name of the network security group. For example, **Server01-nsg**.

8. On the Network security group blade for this VM, review the available options, such as inbound security rules and outbound security rules. Click **Inbound security rules**. Review the existing endpoints configured for the virtual machine, such as the default allow-rdp inbound rule (which enables you to connect to the VM with Remote Desktop Connection).

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9. Click **Inbound security rules**. On the Inbound security rules blade, click **Add**. Fill in the following values to add HTTPS as a new endpoint to this VM. Click **OK** to apply your changes. Now, you can connect to the VM over HTTPS (TCP port 443). This is the default port for secure web services.

▪ Name: **HTTPS**

▪ Priority: **1010**

▪ Source: **Any**

▪ Protocol: **Any**

▪ Source port range: **443**

▪ Destination: **Any**

▪ Destination port range: **443**

▪ Action: **Allow**

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10. On the menu bar, monitor the progress alerts as the new security rule is applied. 11. When you are finished adding your new endpoint, close the web page.

**Task 3: Deploy a Windows Virtual Machine in Microsoft Azure PowerShell**

In this exercise you will create a new virtual machine using PowerShell script.

1. On the taskbar, right-click **Microsoft Azure PowerShell** and click **Run ISE as Administrator**. Click **Yes** when prompted.

2. Edit on this script, you can add the Network IP, Name of resources, VM name & size and credentials for admin

3. On the toolbar, click the **Run Selection** button and wait for the script to complete. 4. In the **Microsoft Azure Preview Portal**, click **BROWSE**, then click **Virtual machines**.

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5. On the **Virtual machines** blade, note the new virtual machine listed called **mlab2017-dc**. (The virtual machine provisioning process should take approximately 15-20 minutes.) You can continue to the next task while the **mlab2017-dc** virtual machine is deploying.

**Results**: After completing this exercise, you will have: Deployed a custom Windows virtual machine using the Preview Portal. Deployed a Windows virtual machine using Windows PowerShell.

**Deploying Linux Virtual Machines**

In this exercise you will create a new Linux virtual machine with a Resource Manager deployment model.

**Task 1: Deploy a Custom Linux Virtual Machine**

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In this exercise you will create a new Linux virtual machine using PowerShell Script

**1.** In the PowerShell ISE, in the command prompt pane, Enter **Login-AzureRMAccount **2. Enter **Select-AzureRMSubscription -SubscriptionName "Sub. Name"**

****3. Enter the following command and press Enter, where *uniquecloudservicename* is a unique name: **Test-AzureName –service "uniquecloudservicename"**. The response must be ‘False’ for it to be unique; if the response is ‘True’, try another name for the service. If this command failed, run Add-AzureAccount and enter administrative account first

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4. In the PowerShell ISE, enter the following command and press Enter, where *uniquecloudservicename* is the unique name from the previous test step:

▪ $cloudSvcName = **"uniquecloudservicename"**

▪ $location = **“Central South US”**

****5. In the PowerShell ISE, in the Script pane, select the following code: **$linuximage = (Get-AzureVMImage | where {$\_.ImageFamily -like "Ubuntu Server 17.10"} | where {$\_.ImageName -like "\*Ubuntu\*"}| sort PublishedDate -**

**Descending)[0].ImageName**

****6. In the PowerShell ISE, you need to verify that you already have storage account if not, you need to run below commands.

▪ **New-AzureStorageAccount –StorageAccountName “azure15”-Label**

**“azureone” –Location "South Central US"**

▪ **Get-AzureStorageAccount | ft StorageAccountName**

▪ **Set-AzureSubscription -SubscriptionId “Sub. ID” -**

**CurrentStorageAccountName azure15**

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7. In the PowerShell ISE, in the Script pane, select the following code: **New AzureQuickVM -Linux -ServiceName $cloudSvcName -Name "LinuxVM1" - ImageName $linuximage -LinuxUser “Labadmin” –Location $location – InstanceSize Small –Password 'Pa$$w0rd123'**

****8. On the toolbar, click the **Run Selection** button and wait for the script to complete. (The virtual machine provisioning process should take approximately 5-10 minutes.)

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**Task 2: Configure SSH**

In this exercise you will configure SSH to connect with Linux VM

1. Start Internet Explorer, and browse to

https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html.

2. Right-click **putty.exe**, and click **Save target as**. Save the executable to the Downloads folder on the local computer.

3. Start Internet Explorer, browse to http://portal.azure.com, and sign in using the Microsoft account that is associated with your Azure subscription.

4. On the Browse blade, click **Virtual machines**.

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5. On the Virtual machines blade, click **LinuxVM1**.

6. On the LinuxVM1 blade, **Settings**, and then click **Properties**.

7. On the Properties blade, under **SSH**, click the **Copy** button to copy the host name and port number (for example **uniquecloudservicename.cloudapp.net:49460**).

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8. In the Microsoft Azure portal, close all the open blades.

9. Open the **Downloads** folder and double-click **putty.exe**. Setup putty.exe 10. In the **Host Name** text box, paste the host name from step 7 in the previous task, and in the **Port** textbox, paste the port number from step 7 in the previous task. Click **Open**.

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11. If you get a **PuTTY Security Alert** dialog box, click **Yes**.



12. In the PuTTY command window, at the **login as:** prompt, type **Labadmin** and press Enter.

13. At the **Password:** prompt, type **Pa$$w0rd123** and press Enter.

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14. At the command prompt, type **who** and press Enter.

15. At the command prompt, type **dir** and press Enter.

16. At the command prompt, type **df** and press Enter.

17. At the command prompt, type **ps** and press Enter.

18. At the command prompt, type **top** and press Enter.

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19. Press **q** to stop the command.

20. At the command prompt, type **exit** and press Enter.

**Managing Virtual Machine**

Azure virtual machines provide a fully configurable and flexible computing environment. This topic covers basic Azure virtual machine deployment items such as selecting a VM size, selecting a VM image, and deploying a VM.

**Exploring Availability**

In this exercise, you will configure an availability set and a load-balanced set between 2 VMs. **Task 1: Specify Availability Sets**

VMs must be created within the availability set to make sure they are correctly distributed across the hardware. You can't add an existing VM to an availability set after it is created.

In this exercise, you will configure an availability set

1. Start Internet Explorer, browse to the new Azure Preview Portal

(**https://portal.azure.com**), and sign in using the Microsoft account that is associated with your Azure subscription.

2. On the Hub menu, click **NEW**.

3. On the **New** blade, click **Everything**.

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4. Under **Virtual Machines** click on **Windows Server**. In the image list, click **Windows Server 2016 Datacenter**.

5. On the **Windows Server 2016 Datacenter** blade, click **Create**.

6. On the **Create VM** blade, in the **Host Name** box, type **Web1**.

▪ In the **Username** box, type **labadmin**.

▪ In the **Password** box, type **Pa$$w0rd123**.

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7. Click **Size,** Select **Standard A0 Basic**.

8. On the **Optional config** blade, click **Network**.

9. On the **Network** blade, click **Virtual Network**.

10. On the **Virtual Network** blade, under **Use an existing virtual network**, click **Server VNET**.

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11. On the **setting** blade, click **Availability set**.

12. On the **Availability set** blade, click **create**.

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13. On the **Create VM** blade, verify that **Add to Dashboard** is checked, and click **Create**. 14. On the Hub menu, click **NOTIFICATIONS**, which indicates that the virtual machine is still being provisioned. The virtual machine provisioning process should take

approximately 20-25 minutes. If the process appears to be taking longer than this, on the Dashboard, click **AZURE PORTAL** to switch to the full portal, click **VIRTUAL MACHINES**, and check the status of **Web1**.

**Create Availability set & virtual machine using PowerShell**

15. On the taskbar, right-click Microsoft Azure PowerShell and click **Run ISE as Administrator**. Click **Yes** when prompted.

16. In the PowerShell ISE, in the command prompt pane, enter the following command to add an Azure account to the local PowerShell environment: Add-AzureAccount 17. When prompted, sign in using the Microsoft account associated with your Azure subscription.

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18. In the PowerShell ISE, run this command to create availability set using powershell ▪ **New-AzureRmAvailabilitySet `**

▪ **-Location "South Central US" `**

▪ **-Name "SRV2012R2AVR" `**

▪ **-ResourceGroupName "Server2012R2-RG" `**

▪ **-Sku aligned `**

▪ **-PlatformFaultDomainCount 2 `**

▪ **-PlatformUpdateDomainCount 2**

****19. In the PowerShell ISE, in the command prompt pane, enter the following command and press Enter:

▪ **New-AzureRmVm `**

▪ **-ResourceGroupName "Server-VNET" `**

▪ **-Name "Web3" `**

▪ **-VirtualNetworkName "Server-Vnet" `**

▪ **-SubnetName "Server-Subnet" `**

▪ **-SecurityGroupName "Web3-ip" `**

▪ **-PublicIpAddressName "Web3-nsg" `**

▪ **-Location "South Central US" `**

▪ **-size "Basic\_A0"`**

▪ **-AvailabilitySetName "SRVAvailability"**

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20. In Azure portal, you will VM web3 created.

21. Select **Availability set**, you should find SRVAvailability.

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**Task 2: Create the Azure Load Balancer**

Use the following steps to create an internal load balancer from the Azure portal.

1. Open a browser, navigate to the Azure portal, and sign in with your Azure account. 2. In the upper left-hand side of the screen, click **Create a resource** > **Networking** > **Load balancer**.

3. In the **Create load balancer** blade, enter a **Name** for your load balancer.

4. Under **Type**, click **Internal**.

5. Click **Virtual network**, and then select the virtual network where you want to create the load balancer.

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6. Click **Subnet**, and then select the subnet where you want to create the load balancer. 7. Under **IP address assignment**, click either **Dynamic** or **Static**, depending on whether you want the IP address for the load balancer to be fixed (static) or not.

8. Under **Resource group** either specify the name of a new resource group for the load balancer, or click **select existing** and select an existing resource group.

9. Click **Create**.

**Task 3: Configure load balancing rules**

After the load balancer creation, navigate to the load balancer resource to configure it. Configure a backend address pool and a probe before configuring a load balancing rule.

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**Step 1: Configure a backend pool**

To configure a backend pool, you need to follow steps

1. In the Azure portal, click **Browse** > **Load balancers**, and then click the load balancer that you created earlier.

2. In the **Settings** page, click **Backend pools**.

3. In the **Backend address pools** page, click **Add**.

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4. In the **Add backend pool** page, enter a **Name** for the backend pool, and then click **OK**. **Step 2: Configure a probe**

To configure a probe, you need to follow steps

1. In the Azure portal, click **Browse** > **Load balancers**, and then click the load balancer that you created earlier.

2. In the **Settings** page, click **Health probes**.

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3. In the **Health probes** page, click **Add**.

4. In the **Add health probe** page, enter a **Name** for the probe.

▪ Under **Protocol**, select **HTTP** (for web sites) or **TCP** (for other TCP-based applications). ▪ Under **Port**, specify the port to use when accessing the probe.

▪ Under **Path** (for HTTP probes only), specify the path to use as a probe.

▪ Under **Interval** specify how frequently to probe the application.

▪ Under **Unhealthy threshold**, specify how many attempts should fail before the backend virtual machine is marked as unhealthy.

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5. Click **OK** to create probe.

**Step 3: Configure load balancing rules**

To configure load balancing rules, you need to follow steps

1. In the Azure portal, click **Browse** > **Load balancers**, and then click the load balancer that you created earlier.

2. In the **Settings** page, click **Load balancing rules**.

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3. In the **Load balancing rules** page, click **Add**.

▪ In the **Add load balancing rule** page, enter a **Name** for the rule.

▪ Under **Protocol**, select **TCP** or **UDP**.

▪ Under **Port**, specify the port clients connect to in the load balancer.

▪ Under **Backend port**, specify the port to be used in the backend pool (usually, the load balancer port and the backend port are the same).

▪ Under **Backend pool**, select the backend pool you created earlier.

▪ Under **Session persistence**, select how you want sessions to persist.

▪ Under **Idle timeout (minutes)**, specify the idle timeout.

▪ Under **Floating IP (direct server return)**, click **Disabled** or **Enabled**.

4. Click **OK**.

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**Task 3: Add Test Pages**

In this exercise, you will add Test pages

1. Double-click **Web1.rdp**. If the Remote Desktop Connection message box appears, click **Connect**.

2. On the Windows **Start** screen, click **This PC**. Browse to **C:\inetpub\wwwroot**. 3. Click the **Home** menu, click **New Item** and then click **Text Document**.

4. Type **Test** and then press Enter. Double-click the **Test.txt** file.

5. In the **How do you want to open this type of file** dialog box, click **Notepad**. ▪ Type the following code, and then press Enter: **<h1>Mai Ali Page</h1>**

▪ Type the following code, and then press Enter: **<p>This is the Web1 server</p>**

6. Click **File** and then click **Save**. Close **Notepad**.

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7. In the **Windows Explorer**, click **View** and then select the **File name extensions** check box. Right-click **Test.txt** and then click **Rename**.

8. Type **Test.htm** and then press Enter. In the **Rename** dialog box, click **Yes**. 9. In the RDP tab at the top, click **Close** and then click **OK**.

10. Double-click **Web3.rdp**. If the Remote Desktop Connection message box appears, click **Connect**.

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11. Click the **Home** menu, click **New Item** and then click **Text Document**.

12. Type **Test** and then press Enter. Double-click the **Test.txt** file.

13. In the **How do you want to open this type of file** dialog box, click **Notepad**. ▪ Type the following code, and then press Enter: **<h1>Mai Ali Page</h1>**

▪ Type the following code, and then press Enter: **<p>This is the Web3 server</p>** 14. Click **File** and then click **Save**. Close **Notepad**.



15. In the **Windows Explorer**, click **View** and then select the **File name extensions** check box. Right-click **Test.txt** and then click **Rename**.

16. Type **Test.htm** and then press Enter. In the **Rename** dialog box, click **Yes**.

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17. In the RDP tab at the top, click **Close** and then click **OK**.

**Task 4: Test Availability**

In this exercise, you will test Availability set

1. In the Window Azure preview portal, in the list of virtual machines, click **Web3**. 2. In the **Web3** blade, click **stop** and then click **YES**.

3. When the virtual machine shutdown is complete, switch to the Internet Explorer tab that shows the **Mai Ali Page**. Press CTRL+F5. The page refreshes.

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4. Note that the page is now served by the other virtual machine in the load balanced set. **Configuring Virtual Machine Storage**

In this exercise, you will configure two virtual data disks on an Azure virtual machine. **Task 1: Upload a VHD to Azure**

In this exercise, you will upload VHD to Azure.

1. Switch to the PowerShell ISE.

2. In the PowerShell ISE, in the command prompt pane, enter the following command and press Enter: **Get-AzureSubscription**

3. In the PowerShell ISE, in the command prompt pane, select the subscription name, then right-click, and click **Copy**.

4. In the PowerShell ISE, in the command prompt pane, enter the following command and press Enter: **Get-AzureStorageAccount**

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5. In the PowerShell ISE, in the command prompt pane, select the string to the right of **Label**, then right-click, and click **Copy**.

6. In the PowerShell ISE, locate the following code: **Set-AzureSubscription - CurrentStorageAccountName <#Copy your storage account name here#> - SubscriptionName <#Copy your subscription name here in quote marks#> **

7. In the PowerShell ISE, in the command prompt pane, enter the following command and press Enter: **Get-AzureStorageKey**

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