Module 4

Managing Azure VMs

Module Overview

- Configuring Azure VMs
- Managing disks of Azure VMs
- Managing and monitoring Azure VMs

Lesson 1: Configuring Azure VMs

- Demonstration: Preparing the lab environment
- Connecting to an Azure VM
- Demonstration: Connecting to a Linux Azure VM via SSH
- Scaling Azure VMs
- Configuring security of Azure VMs

Demonstration: Preparing the lab environment

In this demonstration, you will learn how to prepare the lab environment

Note: To prepare the lab environment for this module, you must complete this task

Connecting to an Azure VM

- Windows VMs:
  - RDP:
    - User-based authentication
      - Generates .rdp file from the Azure portal or via Azure PowerShell
  - WinRM:
    - Generates a certificate and uploads it to Azure Key Vault
    - References the URL of the certificate in the VM configuration
- Linux VMs:
  - SSH:
    - User based or certificate- based authentication
    - Use an SSH client
  - Remote Desktop:
    - xfce4 – desktop environment
    - xrdp – RDP server
    - When using SSH key to authenticate, assign a password to the admin user

Demonstration: Connecting to a Linux Azure VM via SSH

In this demonstration, you will see how to connect to a Linux Azure VM via SSH

Scaling Azure VMs

- VM Scale Sets provide VM autoscaling:
  - With managed disks:
    - Up to 1000 VMs when using VM Marketplace image
    - Up to 300 VMs when using custom images
  - With unmanaged disks:
    - Up to 100 VMs when using VM Marketplace image
    - Up to 40 VMs when using custom images (**overprovision** = **$true**)
    - Up to 20 VMs when using custom images (**overprovision** = **$false**)
  - 5 fault domains and 5 update domains
  - Stateless workloads
- Implement by using:
  - **Microsoft.Compute** resource provider
  - **Microsoft.Insights** resource provider

Vertical scaling of Azure VMs

- Vertical scaling:
  - Current configuration must comply with constraints of the target VM size:
    - Hardware characteristics
    - Maximum number of network adapters or disks
  - Requires temporary downtime:
    - Restart if resizing within the same cluster
    - Stop (deallocate) if resizing requires cluster change
- Horizontal scaling:
  - Deploy additional VMs (behind a load balancer)
  - Increase or decrease the number of VMs in a scale set (behind a load balancer)
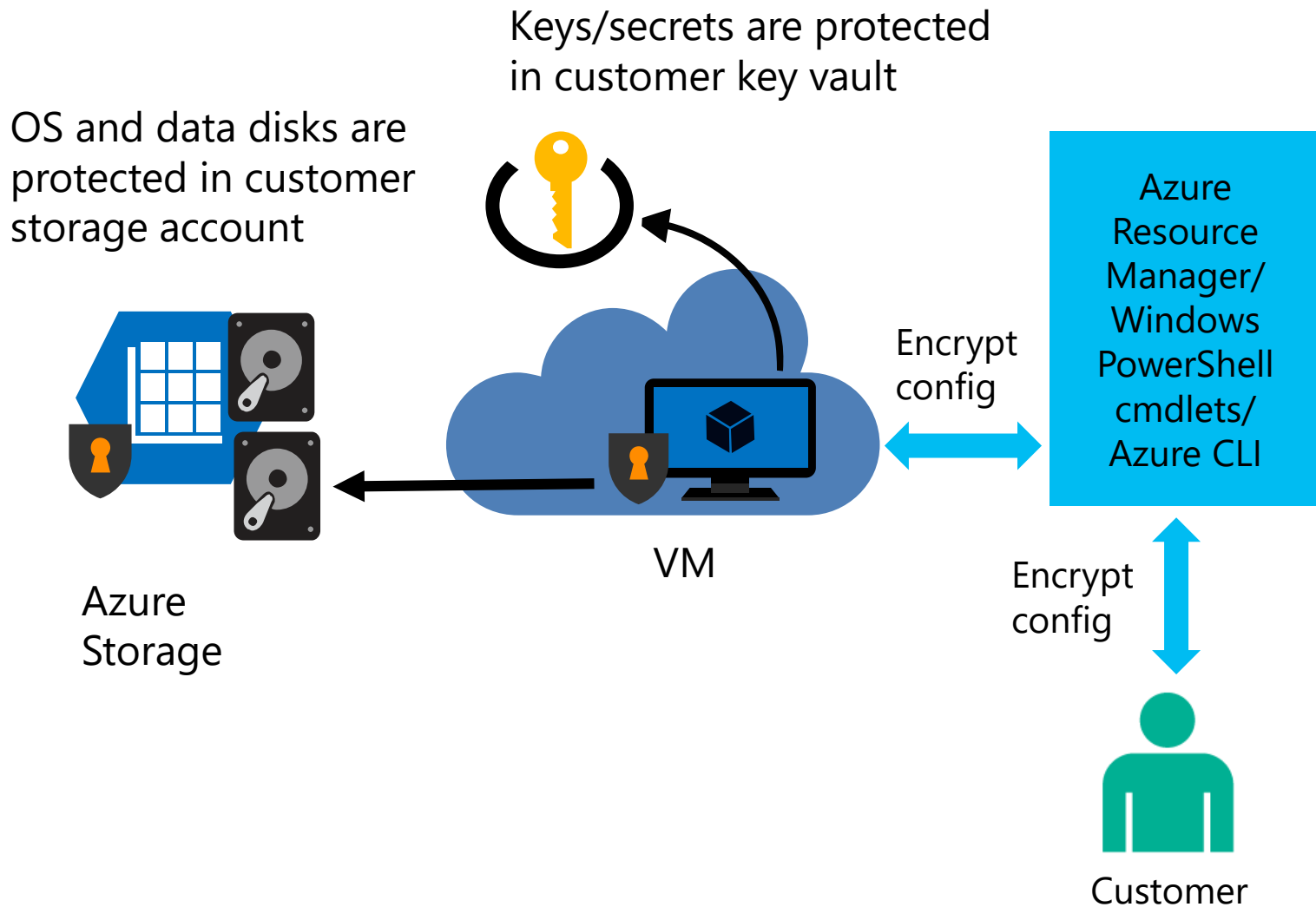
Configuring security of Azure VMs

- Network security groups
  - Restrict access to individual IP addresses
  - Combine with OS-level protection
- Azure Key Vault
  - Store secrets and keys
  - Assign access policies
  - Use Azure AD authentication
- Azure Drive Encryption
  - Encrypt OS and data volumes on Windows and Linux VMs
  - Integrate with Azure Key Vault
  - Encrypt by using existing keys

Configuring VM security

Keys/secrets are protected in customer key vault

OS and data disks are protected in customer storage account

Azure Resource Manager/ Windows PowerShell cmdlets/ Azure CLI

Encrypt config

VM

Azure Storage

Encrypt config

Customer

Lesson 2: Managing disks of Azure VMs

- Managing VM disks
- Azure VM disk mobility
- Managing disk volumes in Azure VMs
- Demonstration: Configuring Azure VM disks

Managing VM disks

- Attach an OS or data disk:
  - Unmanaged disks:
    - New (empty)
    - Existing blob
  - Managed disks:
    - New (empty)
    - Existing blob
    - Snapshot
- Detach a data disk
- Modify disk settings:
  - Host caching mode
  - Disk size (up to 2 TB for the OS disk and up to 4 TBs for data disks)
  - Storage account type (standard unmanaged disks only)
  - Performance tier (managed disks only)

Azure VM disk mobility

- Azure virtual disk files:
  - .vhd format (.vhdx not supported)
  - Fixed type (dynamic not supported)
  - 4 TB maximum size (use multi-disk volumes if larger size is needed)
- Azure virtual disk mobility:
  - Upload and download:
    - **Add-AzureRmVHD** and **Save-AzureRmVHD**
    - **az storage blob upload** and **az storage blob download**
  - Attach and detach:
    - **Add-AzureRmVmDataDisk** and **Remove-AzureRmVMDataDisk**
    - **azure vm disk attach-new** and **azure vm disk detach**
  - Import/Export service (for larger disk sizes)
  - AzCopy and Azure portal
- Azure virtual disk files copy and snapshot:
  - Managed and unmanaged disks (managed disks - full snapshots only)

Managing disk volumes in Azure VMs

- OS multi-disk management tools:
  - Server Manager (Storage Spaces)
  - Windows PowerShell (Storage Spaces)
  - LVM (Linux)
  - mdadm (Linux)
- Multidisk volumes considerations:
  - Aggregate I/O throughput
  - Support for volumes larger than 4 TB disk size limit
  - Maximum number of data disks depends on VM size

Demonstration: Configuring Azure VM disks

In this demonstration, you will see how to attach data disks to an Azure VM and create a multidisk volume

Lesson 3: Managing and monitoring Azure VMs

- Overview of VM Agent and VM extensions
- What is the VM Agent Custom Script extension?
- What is the VM Agent DSC extension?
- Monitoring Azure VMs
- Demonstration: Configuring an Azure VM running Linux by using the Custom Script extension

Overview of VM Agent and VM extensions

- VM Agent:
  - Recommended but optional for Azure VMs
  - Mandatory for Linux
- VM Extensions:
  - Azure VM Access Extension
  - Chef Client and Puppet Enterprise Agent
  - Custom Script extension for Windows and Linux
  - DSC extension for Windows and Linux
  - Azure Diagnostics extension for Windows and Linux
  - Docker extension
  - Microsoft Antimalware extension and many others

What is the VM Agent Custom Script extension?

- Custom Script VM Agent extension enables to run:
  - Windows PowerShell scripts
  - Linux shell scripts
- Implement by:
  - Azure portal
  - Azure PowerShell
    - **Set-AzureRmVMCustomScriptExtension**
    - **Set-AzureRMVMExtension**
  - Azure CLI
    - **az vm extension set**
  - Azure Resource Manager templates

What is the VM Agent DSC extension?

- Leverages Windows DSC and DSC for Linux:
  - Windows Management Framework–based (Windows)
  - Open Management Infrastructure–based (Linux)
- Implemented as VM Agent extensions:
  - DSC extension for Windows Azure VMs
  - Azure DSCForLinux extension for Linux Azure VMs
- Deployment support:
  - Azure portal
  - Windows PowerShell
  - Azure CLI
  - Azure Resource Manager templates

Monitoring Azure VMs

- Metrics:
  - Available for VMs running Windows and Linux
  - Displayed in the Azure portal
- Diagnostics:
  - Implemented as a VM extension
  - Stored in Azure Storage (tables and blobs)
  - Windows – basic metrics, performance counters, logs, ETW, crash dumps, Application Insights data, boot diagnostics
  - Linux – basic metrics and boot diagnostics
- Alerts:
  - Based on metric, condition, threshold, and time period
  - Can trigger
    - Email notification
    - Webhook
    - Azure Automation runbook
    - Azure Logic App

Demonstration: Configuring an Azure virtual machine running Linux by using Custom Script Extension

In this demonstration, you will see how to use the Custom Script extension to configure an Azure VM running Linux

Lab: Managing Azure VMs

- Exercise 1: Implementing DSC
- Exercise 2: Implementing Storage Spaces–based volumes

Logon Information

Virtual machine: **20533E-MIA-CL1**
User name: **Student**
Password: **Pa55w.rd**

Estimated Time: 60 minutes

Lab Scenario

Now that you have tested basic deployment options of Azure VMs, you need to start testing more advanced configuration scenarios. Your plan is to step through a sample implementation a two-tier Adatum ResDev application. As part of your tests, you will install IIS by using the VM DSC extension on the front-end tier. You will also set up a multi-disk volume by using Storage Spaces in a Windows Azure VM in the back-end tier.

Lab Review

- Why would you use Storage Spaces in an Azure VM considering that Azure already provides highly available storage built into a storage account?

Module Review and Takeaways

- Review Question