

Module 3

Virtual machines in Microsoft Azure

Module Overview

- Creating and configuring Azure VMs
- Configuring Azure VM storage

Lesson 1: Creating and configuring Azure VMs

- What are Azure VMs?
- Create a VM by using the Azure portal
- Demonstration: Create a VM from the Azure portal by using an Azure Marketplace image
- Creating a VM from an Azure Resource Manager template
- Demonstration: Creating a VM from an Azure Resource Manager template
- Configuring VM availability
- Demonstration: Deploying VMs into an availability set and an availability zone by using the Azure portal
- Configuring an operating system by using VM extensions
- Connecting to a VM
- Demonstration: Connecting to a VM

What are Azure VMs?

- Use Azure VMs to:
 - Extend your datacenter to increase agility
 - Migrate your workloads from on-premises datacenters or from other cloud providers
 - Implement production, test, or development workloads
- Key differences when using Azure VMs:
 - No support for Generation 2 Hyper-V VMs
 - No support for .vhdx virtual disk format
 - No support for dynamically expanding or differencing disks
 - Read-only VM console access (serial console in preview)
- Compute charges calculated on per-second basis:
 - Do not apply when VM is stopped (deallocated)
 - Separate from charges for VM disks in Azure Storage



Azure VM sizes

- General purpose (Av2, Dv2, DSv2, Dv3):
 - Balanced CPU-to-memory ratio
- Burstable (B)
 - Low CPU utilization with occasional usage spikes
- Compute optimized (F, Fs, Fsv2):
 - High CPU-to-memory ratio
- Memory optimized (Dv2, DSv2, Ev3, Esv3, G, GS, M):
 - High memory-to-CPU ratio
- Storage optimized (Ls):
 - High-performance disk I/O
- GPU (NC, NCv2, NCv3, ND, NV):
 - GPU support
- High performance compute (H):
 - Fastest CPUs and optional high-throughput RDMA

Create a VM by using the Azure portal

- VM name
- VM disk type
- User name and password or SSH public key (Linux only)
- Azure AD authentication (Linux only)
- Resource group and location
- Licensing (Windows only)
- VM size
- High availability (availability zone or availability set)
- Storage (managed or non-managed disks)
- Virtual network and subnet
- Public IP address
- Network security group
- Extensions
- Auto-shutdown
- Boot and OS diagnostics
- Managed service identity
- Backup

Demonstration: Create a VM from the Azure portal by using an Azure Marketplace image

In this demonstration, you will see how to create a Windows and Linux Azure VM from the Azure portal by using an Azure Marketplace image

Creating a VM from an Azure Resource Manager template

- Azure PowerShell:
New-AzureRmResourceGroupDeployment
- Azure CLI:
az group deployment create
- Azure portal:
Create a resource > Template deployment
- GitHub (redirects to the Azure portal):
<https://github.com/Azure/azure-quickstart-templates>

📖 README.md

Very simple deployment of an Windows VM



Deploy to Azure



Visualize

This template allows you to deploy a simple Windows VM using a few different options for the Windows version, using the latest patched version. This will deploy in West US on a D1 VM Size.

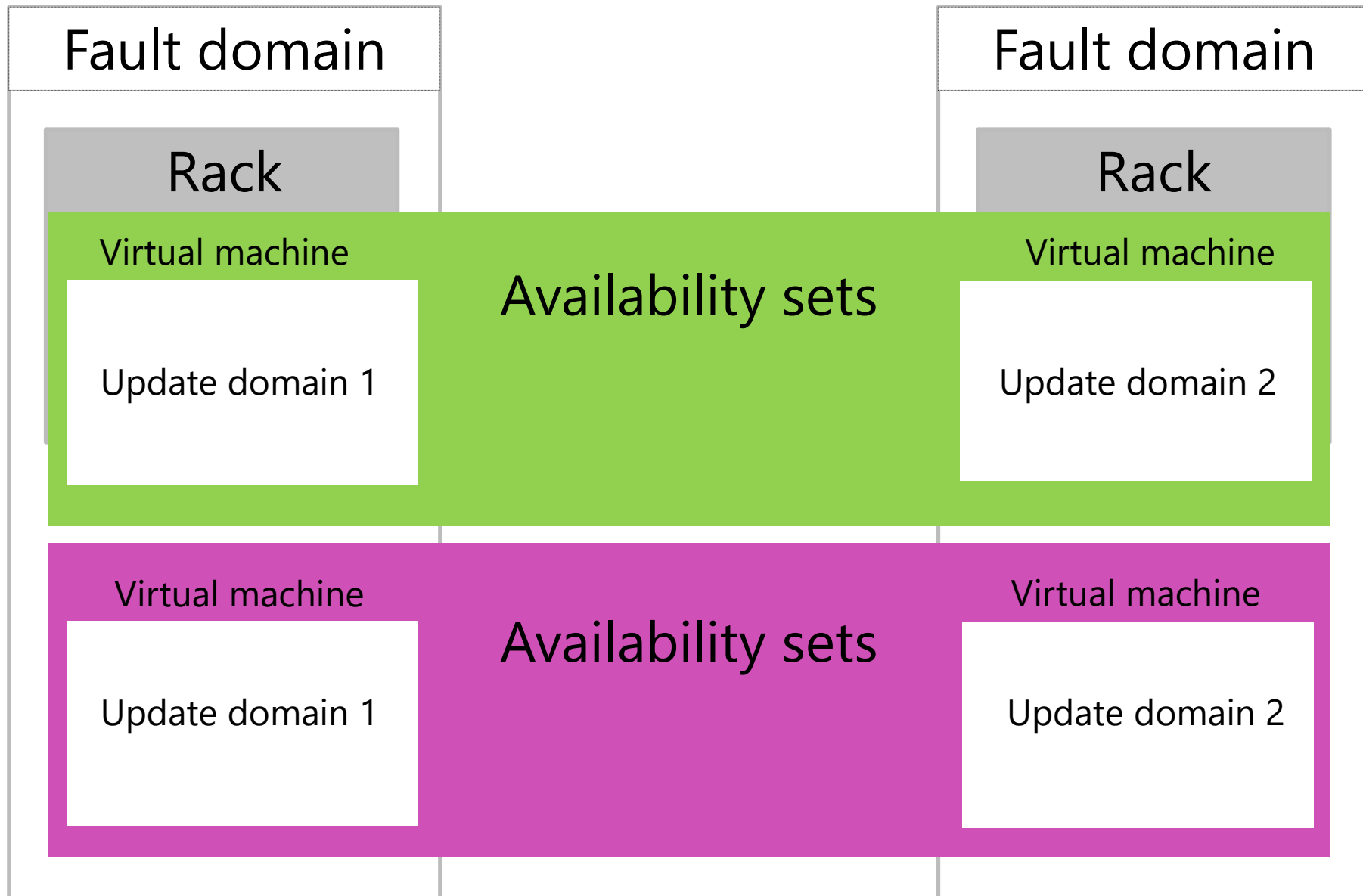
Demonstration: Creating a VM from an Azure Resource Manager template

In this demonstration, you will see how to create an Azure VM from an Azure Resource Manager template

Configuring VM availability

- Azure VMs in an availability zone:
 - 99.99% availability SLA
 - Logical grouping of two or more standalone Azure VMs, Azure VMs in availability sets, or Azure VM scale sets in the same virtual network
 - Must be assigned during Azure VM or Azure VM scale set deployment
 - Availability zones correspond to different fault and update domains
 - Supports Azure Load Balancer Standard or Web Application Gateway
- Azure VMs in an availability set:
 - 99.95% availability SLA
 - Logical grouping of two or more Azure VMs in the same subnet
 - Must be assigned during Azure VM deployment
 - Up to 3 fault domains and up to 20 update domains
 - Supports Azure Load Balancer Basic/Standard and Web Application Gateway
- Standalone VMs:
 - 99.9% availability SLA if using Premium storage disks

Fault domains and update domains in a VM availability set



Additional scalability and availability considerations

- Scalability considerations:
 - Vertical (by changing VM size)
 - Horizontal (by using VM scale sets):
 - Manual and automatic
 - Up to 1,000 VMs divided into placement groups of 100 VMs
 - 5 update domains and 5 fault domains per placement group
- Availability considerations:
 - Use availability sets or availability zones:
 - One per application tier
 - Combine with load balancing
 - Account for maintenance events:
 - Whenever possible, rely on update domains
 - Use self-service to facilitate exceptions and single VMs

Demonstration: Deploying VMs into an availability set and an availability zone by using the Azure portal

In this demonstration, you will see how to deploy an Azure VM into an availability set and an availability zone

Configuring an operating system by using VM extensions

- VM Agent:
 - Included by default in Marketplace VM images
 - Recommended but optional for Windows VMs
 - Mandatory for Linux VMs
- 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

Connecting to a VM

- Windows VMs:
 - RDP:
 - Password-based authentication
 - By default, uses .rdp file generated from the portal or via Windows PowerShell
 - WinRM:
 - Supports certificate-based security
- Linux VMs:
 - SSH:
 - Password-based or certificate-based authentication
 - Use an SSH client
 - RDP:
 - xfce4 – desktop environment
 - xrdp – RDP server
- Inbound connections are subject to:
 - Operating system firewall (RDP and SSH allowed by default)
 - Network security group (subnet or VM network interface level)

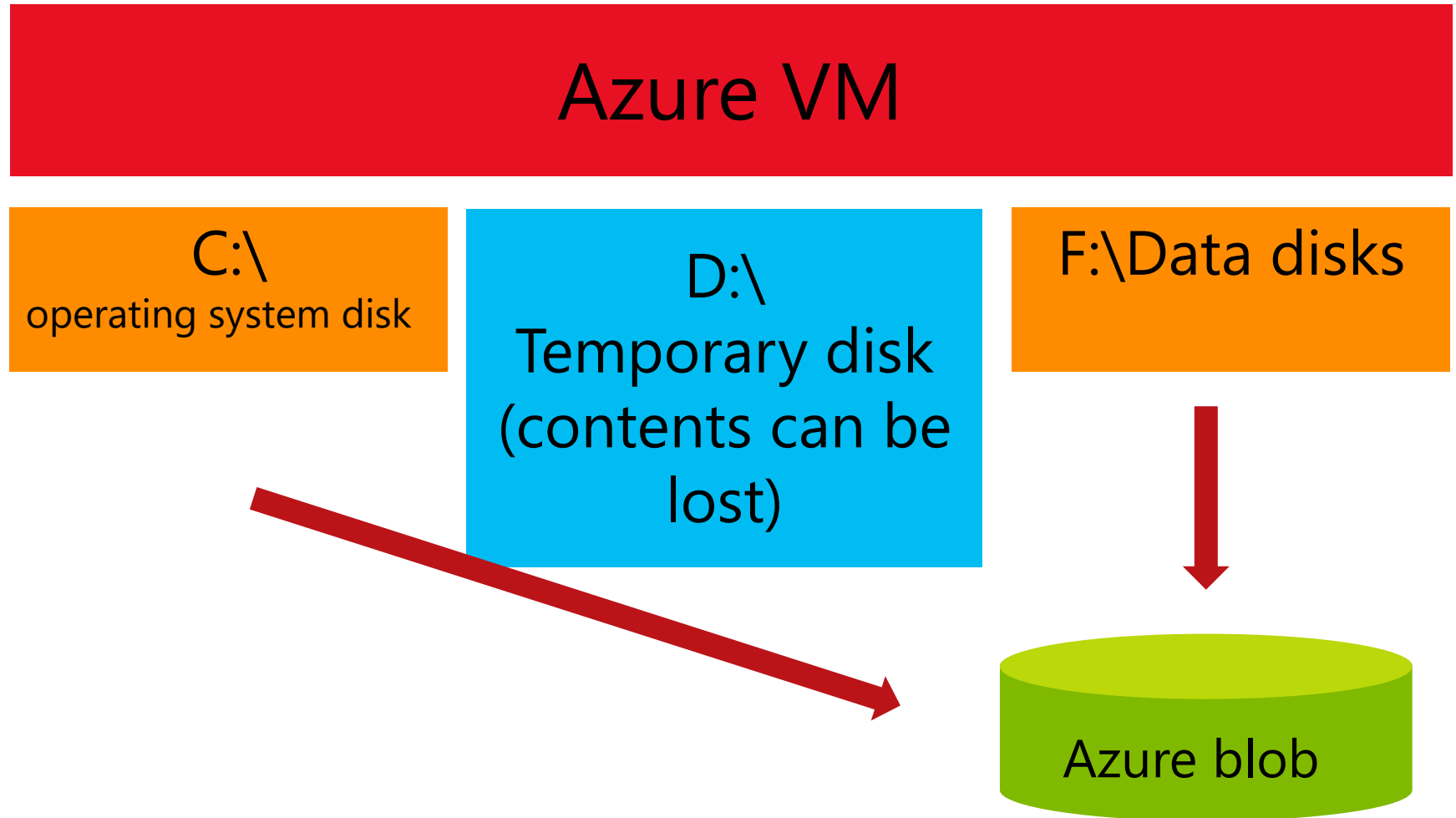
Demonstration: Connecting to a VM

In this demonstration, you will see how to connect to an Azure VM

Lesson 2: Configuring Azure VM storage

- Overview of Azure VM storage
- Overview of unmanaged and managed disks
- Azure VMs disk mobility
- Configuring storage in Windows and Linux VMs
- Demonstration: Configuring disks

Overview of Azure VM storage



Overview of unmanaged and managed disks

- Unmanaged disks:
 - Up to 250 Storage accounts per region
 - Up to 40 disks per Standard storage account
 - Storage accounts for VMs in the same availability set could reside in the same stamp (this should be avoided)
 - A custom image must reside in the same Storage account as VM disks
- Managed disks:
 - Up to 10,000 disks per region per disk type
 - Storage account performance limits are not relevant
 - Disks of VMs in the same availability set automatically are placed in different stamps
 - A custom image can reside anywhere in the same region

Azure VMs disk mobility

- Azure virtual disk files:
 - .vhd format (.vhdx not supported)
 - Fixed type (dynamic not supported)
 - 4-TB maximum size (use multidisk volumes if 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**
 - Azure Portal
 - Import/Export service (for larger disk sizes)
- Azure virtual disk files copy and snapshot:
 - Managed and non-managed disks (full snapshots only)

Configuring storage in Windows and Linux VMs

- The same multidisk management tools as in on-premises implementations:
 - Server Manager (Storage Spaces)
 - Windows PowerShell (Storage Spaces)
 - LVM (Linux)
 - mdadm (Linux)
- Multi-disk volumes considerations:
 - Increased (aggregated) I/O throughput up to the limit dependent on the VM size
 - Support for volume larger than 4-TB disk size limit
 - Maximum supported number of data disks depends on the Azure VM size

Demonstration: Configuring disks

In this demonstration, you will see how to attach a new data disk to an Azure VM

Lab: Creating a VM in Azure

- Exercise 1: Creating a VM from the Azure portal by using an Azure Marketplace image
- Exercise 2: Verifying the functionality of the VM
- Exercise 3: Configuring storage of a VM

Logon Information

Virtual machine:	10979F-MIA-CL1
User name:	Admin
Password:	Pa55w.rd

Estimated Time: 30 minutes

Lab Scenario

Orders at Adatum Corporation have increased significantly. Currently, the order system runs on on-premises servers which provides other services. You have decided to migrate the order system to dedicated Azure VMs. The Azure VMs must include sufficient storage to accommodate increased volume of orders.

Lab Review

- What type of connectivity can you use to manage Azure VMs?

Module Review and Takeaways

- Review Questions