



AZ-104

Administer Azure Virtual Machines

Learning Objectives - Administer Azure Virtual Machines

- [Configure Virtual Machines](#)
- [Configure Virtual Machine Availability](#)
- [Lab 08 – Manage Virtual Machines](#)

Fault Domain

Update Domain

Hyper-V
window Core
~~VM~~

VMware Solution

Configure Virtual Machines



Learning Objectives - Configure Virtual Machines

- Review Cloud Services Responsibilities
- Plan Virtual Machines
- Determine Virtual Machine Sizing
- Determine Virtual Machine Storage
- Demonstration - Creating a VM in the Portal
- Connect to Virtual Machines
- Connect to Windows Virtual Machines
- Connect to Linux Virtual Machines
- Learning Recap

Implement and manage Azure compute resources (20-25%): Create and configure virtual machines

- Create a VM
- Manage images with the Compute Gallery
- Configure Azure Disk Encryption
- Move VMs
- Manage VM sizes
- Add data disks
- Configure VM network settings

Configure secure access to virtual networks

- Implement Azure Bastion

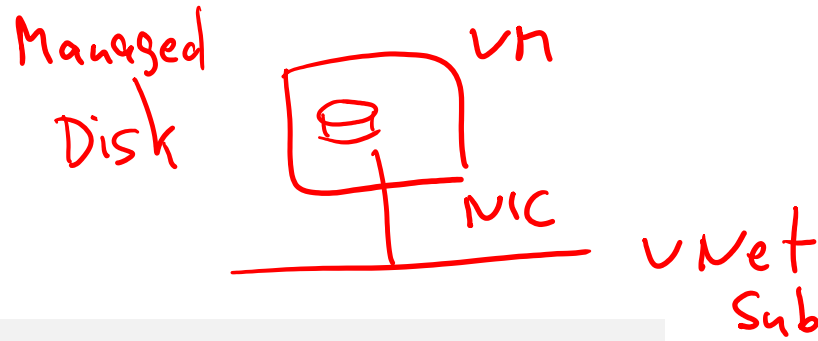
Review Cloud Services Responsibilities

Pizza 12:30 - 13:

	Responsibility	SaaS	PaaS	IaaS	On-prem
Responsibility always retained by the customer	Information and data	Customer	Customer	Customer	Customer
	Devices (Mobile and PCs)	Customer	Customer	Customer	Customer
	Accounts and identities	Customer	Customer	Customer	Customer
Responsibility varies by type	Identity and directory infrastructure	Shared	Shared	Customer	Customer
	Applications	Microsoft	Shared	Customer	Customer
	Network controls	Microsoft	Shared	Customer	Customer
	Operating system	Microsoft	Microsoft	Customer	Customer
Responsibility transfers to cloud provider	Physical hosts	Microsoft	Microsoft	Microsoft	Customer
	Physical network	Microsoft	Microsoft	Microsoft	Customer
	Physical datacenter	Microsoft	Microsoft	Microsoft	Customer

Legend: Microsoft Customer Shared

Plan Virtual Machines



Start with the network ✓

Name the virtual machine ✓

Choose a location = *region*

- Each region has different hardware and service capabilities
- Locate Virtual Machines as close as possible to your users and to ensure compliance and legal obligations

Consider pricing ~~pricing~~

VM Size

Standard-DS2-v3
DS3-v2
A0
B1



70+ Azure regions
Available in 140 countries

Determine Virtual Machine Sizing

"Stopped"
"running"
"Stopped" (deallocated)

Compute Cost ✓
Disk ✓
✓
X ✓

Type	Description
General purpose	Balanced CPU-to-memory ratio.
Compute optimized	High CPU-to-memory ratio.
Memory optimized	High memory-to-CPU ratio.
Storage optimized	High disk throughput and I/O.
GPU	Specialized virtual machines targeted for heavy graphic rendering and video editing.
High performance compute	Our fastest and most powerful CPU virtual machines

Determine Virtual Machine Storage

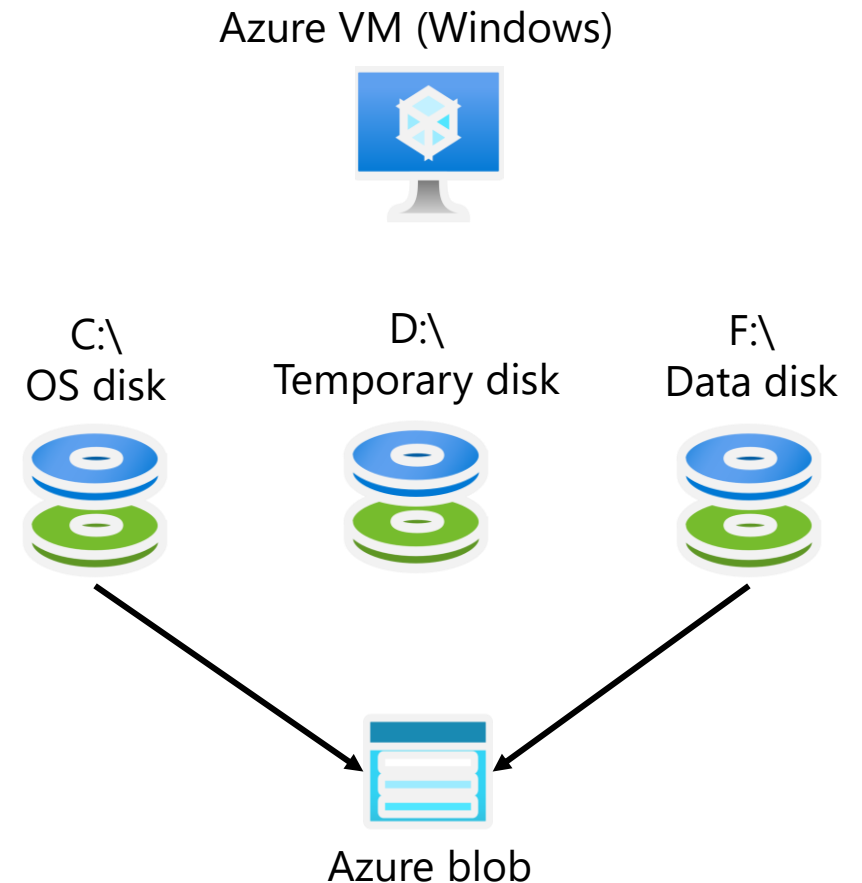
Each Azure VM has two or more disks:

- OS disk
- Temporary disk (not all SKUs have one, content can be lost)
- Data disks (optional)

OS and data disks reside in Azure Storage accounts:

- Azure-based storage service
- Standard (HDD, SSD) or Premium (SSD), or Ultra (SSD)

Azure VMs use managed disks



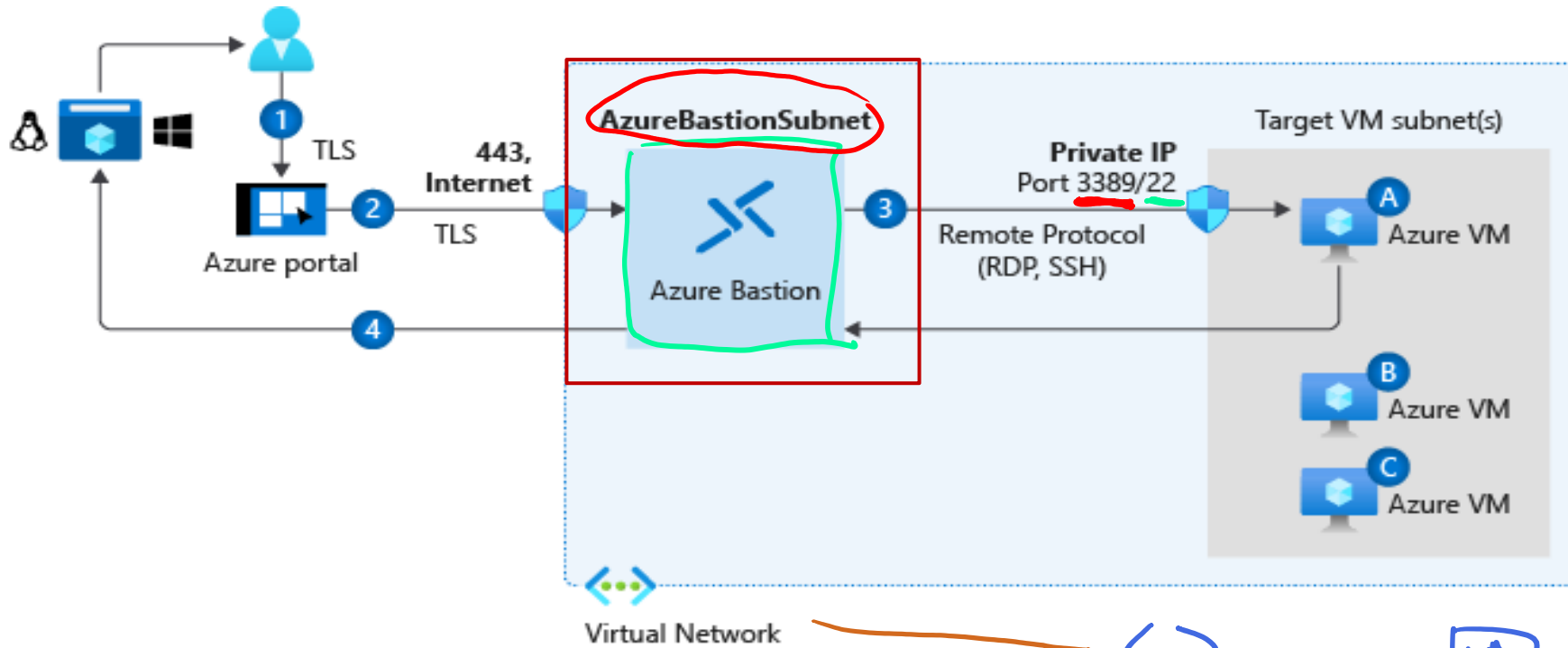
Demonstration – Creating a VM in the Portal

- Create a virtual machine
- Connect to the virtual machine – Bastion, RDP, or SSH



Connect to Virtual Machines ?

VM Extension
Script
DSC
Ansible
Puppet



Automation Account

Desired state
Config text
VM

Bastion Subnet for RDP/SSH through the Portal over SSL

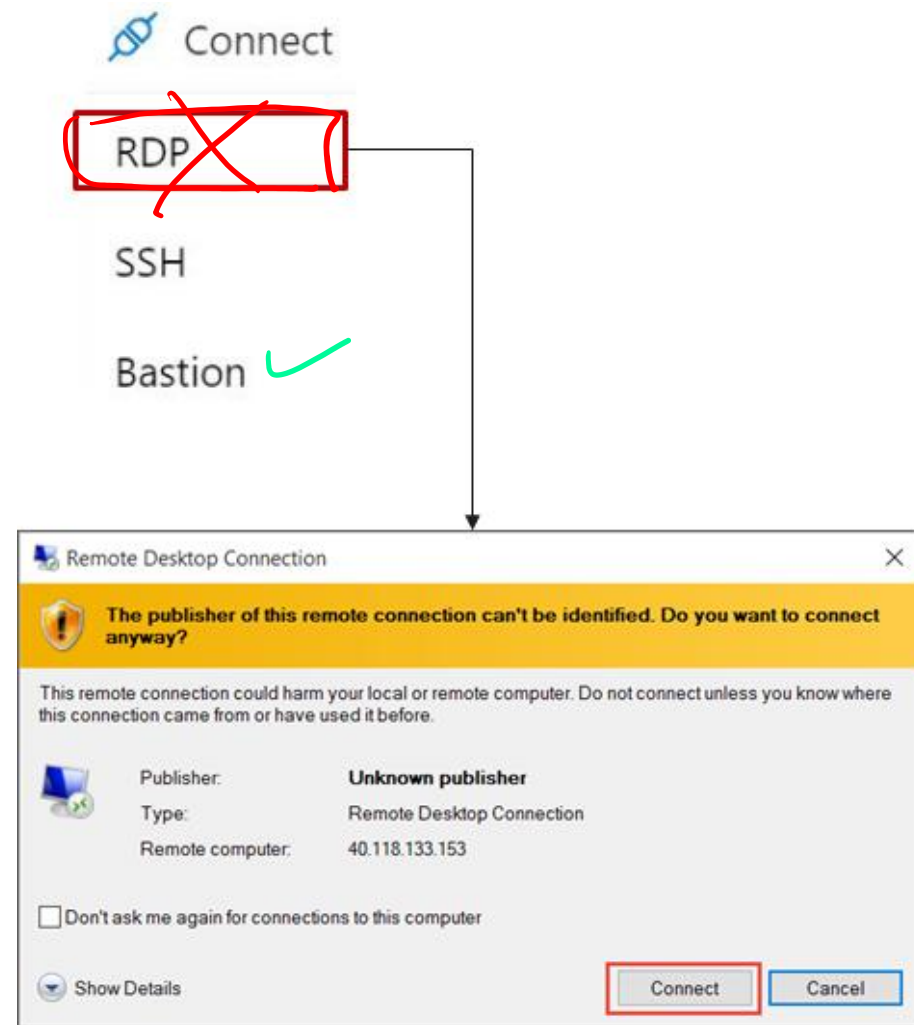
Remote Desktop Protocol for Windows-based Virtual Machines

Secure Shell Protocol for Linux based Virtual Machines

Connect to Windows Virtual Machines

Remote Desktop Protocol (RDP) creates a GUI session and accepts inbound traffic on TCP port 3389

WinRM creates a command-line session so you can run scripts



Connect to Linux Virtual Machines

Administrator account

Authentication type

Username * ⓘ

SSH public key * ⓘ

Provide an RSA public key in the single-line format (starting with "ssh-rsa") or the multi-line PEM format. You can generate SSH keys using ssh-keygen on Linux and OS X, or PuTTYGen on Windows.



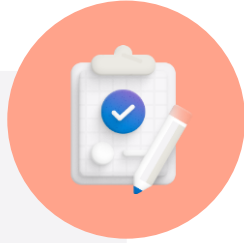
[Learn more about creating and using SSH keys in Azure](#)

Authenticate with a SSH public key or password

SSH is an encrypted connection protocol that allows secure logins over unsecured connections

There are public and private keys

Learning Recap - Configure Virtual Machines



Check your
knowledge
questions and
additional
study

- [Introduction to Azure virtual machines \(sandbox\)](#)
- [Choose the right disk storage for your virtual machine workload](#)
- [Create a Linux virtual machine in Azure \(sandbox\)](#)
- [Create a Windows virtual machine in Azure \(sandbox\)](#)
- [Connect to virtual machines through the Azure portal by using Azure Bastion](#)

A *sandbox* indicates an additional hands-on exercise.

Configure Virtual Machine Availability



Configure Azure Virtual Machine Availability Introduction

- Plan for Maintenance and Downtime
- Setup Availability Sets
- Review Update and Fault Domains
- Review Availability Zones
- Compare Vertical to Horizontal Scaling
- Create Scale Sets (2 student topics)
- Configure Autoscale (2 student topics)
- Demonstration – Virtual Machine Scaling
- Learning Recap

Implement and manage Azure compute resources (20-25%): Create and configure virtual machines

- Configure VM availability options
- Deploy and configure VM scale sets

Plan for Maintenance and Downtime

Unplanned Hardware Maintenance

When the platform predicts a failure, it will issue an **unplanned hardware maintenance** event

Action: Live migration

Unexpected Downtime

Unexpected Downtime is when a virtual machine fails unexpectedly

Action: Automatically migrate (heal)

Planned Maintenance

Planned Maintenance events are periodic updates made to the Azure platform

Action: No action

Setup Availability Sets

Instance details

Name * ⓘ

avset01

Region * ⓘ

(US) East US

Fault domains ⓘ

2

Update domains ⓘ

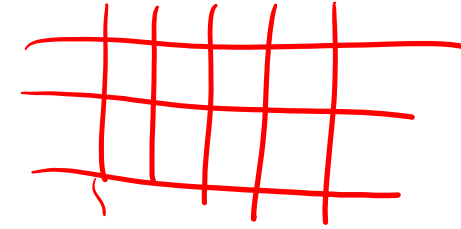
5

Use managed disks ⓘ

No (Classic)

Yes (Aligned)

Fault Domain



Update Domain

Two or more instances in
Availability Sets = 99.95% SLA

Configure multiple
Virtual Machines in
an Availability Set

Configure each
application tier
into separate
Availability Sets

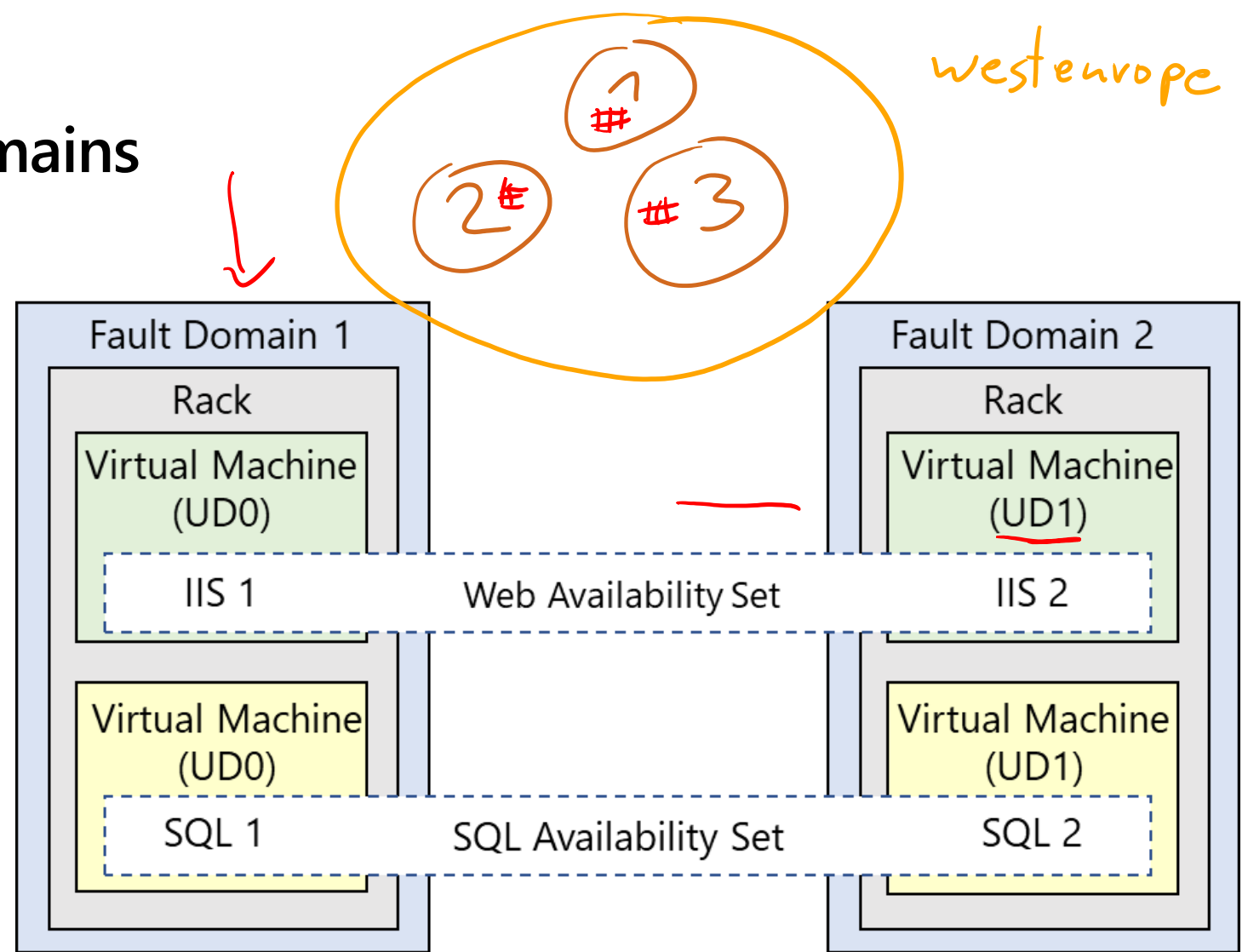
Combine a Load
Balancer with
Availability Sets

Use managed disks
with the Virtual
Machines

Review Update and Fault Domains

Update domains allows Azure to perform incremental or rolling upgrades across a deployment. During planned maintenance, only one update domain is rebooted at a time

Fault Domains are a group of Virtual Machines that share a common set of hardware, switches, that share a single point of failure. VMs in an availability set are placed in at least two fault domains



Review Availability Zones

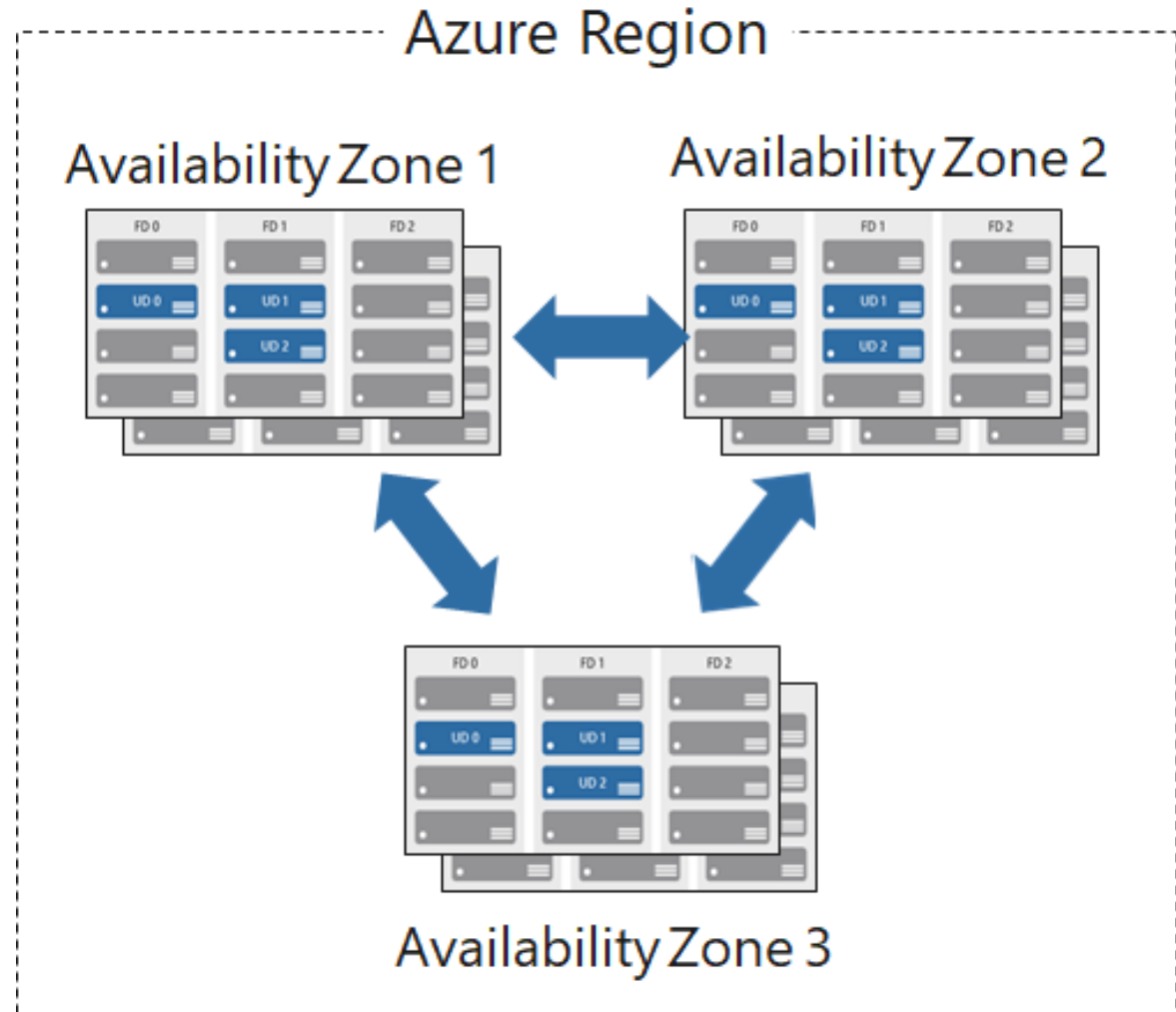
Unique physical locations
in a region

Includes datacenters with independent
power, cooling, and networking

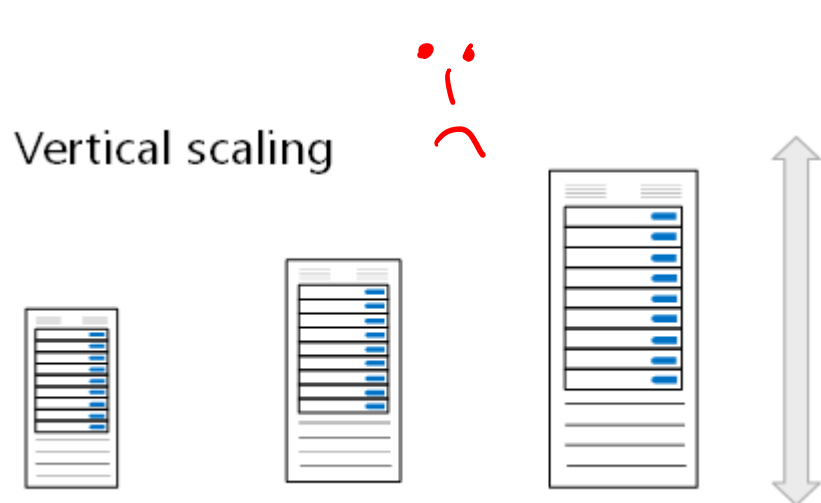
Protects from datacenter failures

Combines update and
fault domains

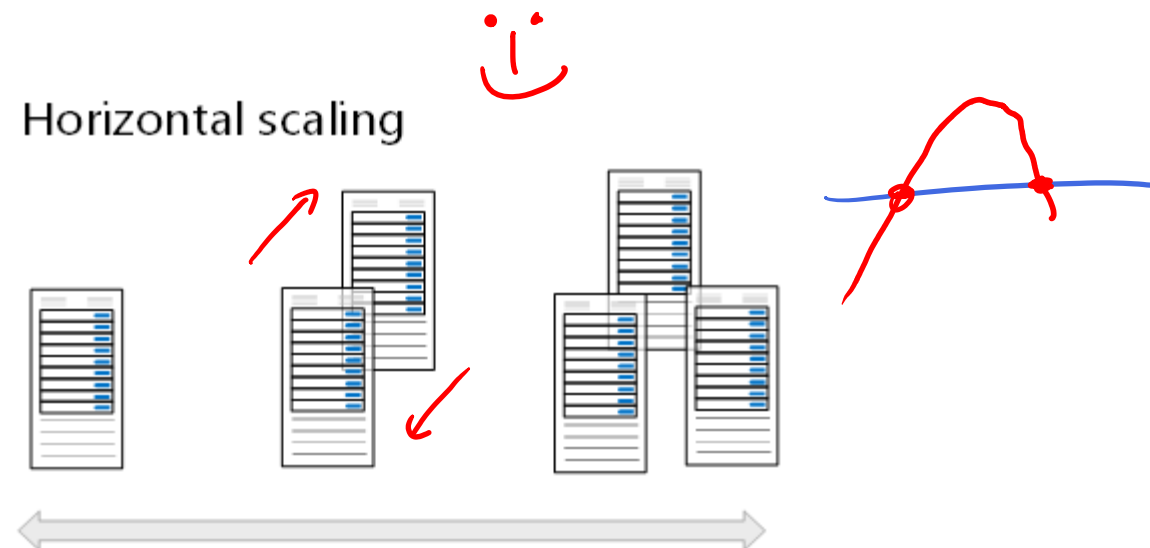
Provides 99.99% SLA



Compare Vertical to Horizontal Scaling

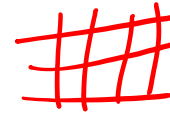


Vertical scaling (scale up and scale down) is the process of increasing or decreasing power to a single instance of a workload; usually manual



Horizontal scaling (scale out and scale in) is the process of increasing or decreasing the number of instances of a workload; frequently automated

Create Scale Sets



Instance count. Number of VMs in the scale set (0 to 1000)

Instance size. The size of each virtual machine in the scale set

Azure Spot Instance. Unused capacity at a discounted rate

Use managed disks

Enable scaling beyond 100 instances

Orchestration

A scale set has a "scale set model" that defines the attributes of virtual machine instances (size, number of data disks, etc). As the number of instances in the scale set changes, new instances are added based on the scale set model.

[Learn more about the scale set model](#)

Orchestration mode * ⓘ

- ☒ **Flexible:** achieve high availability at scale with identical or multiple virtual machine types
- ☐ **Uniform:** optimized for large scale stateless workloads with identical instances

Security type ⓘ

Standard

Instance details

Image * ⓘ

Ubuntu Server 20.04 LTS - x64 Gen2

[See all images](#) | [Configure VM generation](#)

VM architecture ⓘ

- ☐ Arm64
- ☒ x64

Run with Azure Spot discount ⓘ

☐

Size * ⓘ

Standard_D2s_v3 - 2 vcpus, 8 GiB memory (\$70.08/month)

[See all sizes](#)

Configure Autoscale

Define a minimum, maximum, and default number of VM instances

Create more advanced scale sets with scale out and scale in parameters

Scaling

Scaling policy ⓘ

☐ Manual scaling

☒ Autoscaling

Minimum number of instances * ⓘ

1

Maximum number of instances * ⓘ

10

Scale out

CPU threshold (%) * ⓘ

75

Duration in minutes * ⓘ

10

Number of instances to increase by * ⓘ

1



Scale in

CPU threshold (%) * ⓘ

25

Number of instances to decrease by * ⓘ

1

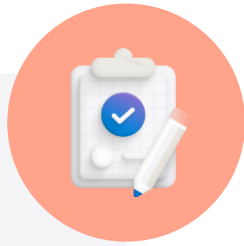


Demonstration – Virtual Machine Scaling



- Configure Virtual Machine Scale Sets
- Review manual scaling, scale-in policies, and custom scaling options

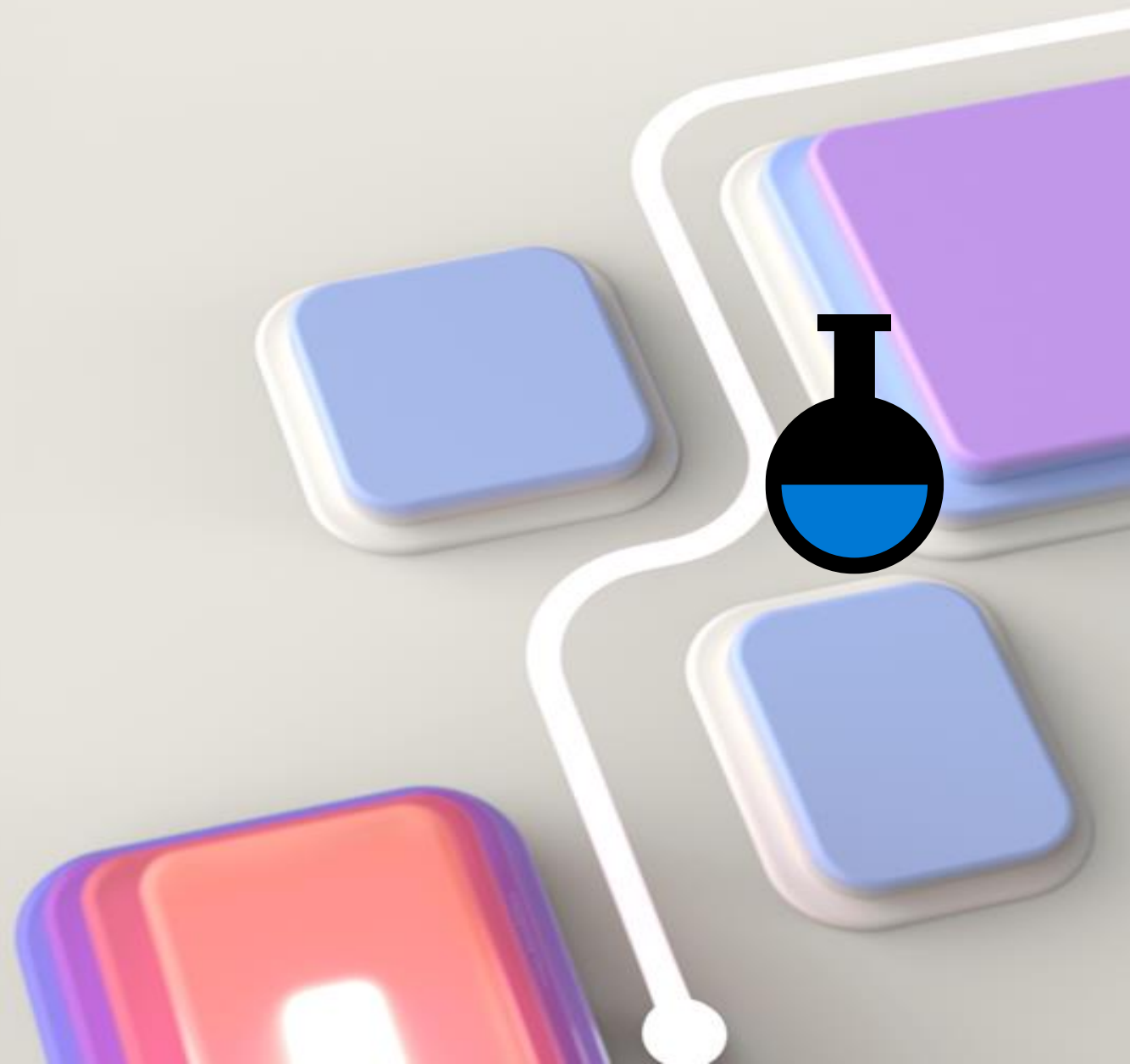
Learning Recap – Configure Virtual Machine Availability



Check your
knowledge
questions and
additional
study

- [Build a scalable application with virtual machine scale sets](#)
- [Implement scale and high availability with Windows Server VM](#)

Lab – Manage Virtual Machines



Lab 08 – Manage Virtual Machines



In this lab, you compare manual scaling of virtual machines to automatic scaling of virtual machines.

You learn how to configure and resize a single virtual machine.

You learn how create a virtual machine scale set and configure autoscaling.

Optionally, you learn to use scripting to deploy a virtual machine.

Job Skills

Task 1: Deploy zone-resilient Azure virtual machines by using the Azure portal.

Task 2: Manage compute and storage scaling for virtual machines.

Task 3: Create and configure Azure Virtual Machine Scale Sets.

Task 4: Scale Azure Virtual Machine Scale Sets.

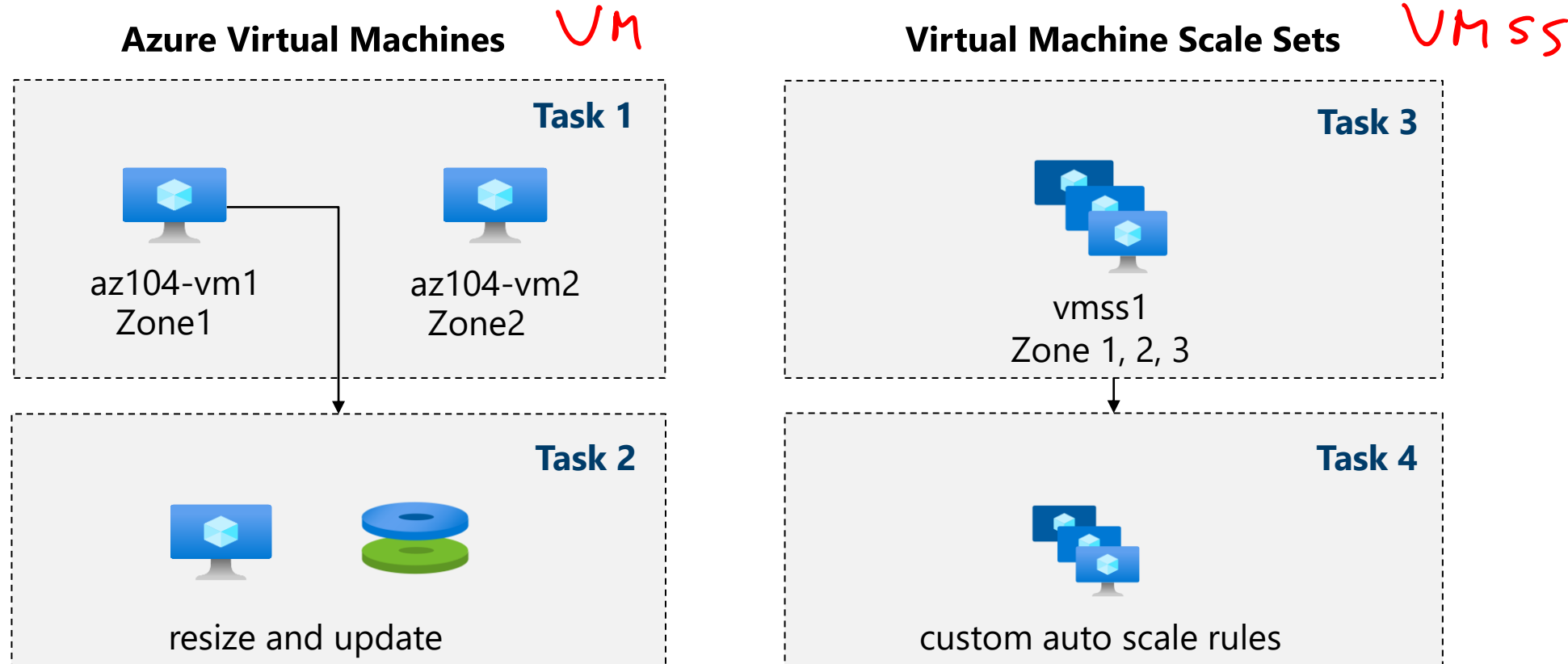
Task 5: Create a virtual machine using Azure PowerShell (option 1).

Task 6: Create a virtual machine using the CLI (option 2).

Next slide for an architecture diagram



Lab 08 – Architecture diagram



Task 5: Create a virtual machine using Azure PowerShell (option 1)

Task 6: Create a virtual machine using the CLI (option 2)

End of presentation

