



# AZ-104

## Administer Azure Virtual Machines

# AZ-104 Course Outline

- 01: Administer Identity
- 02: Administer Governance and Compliance
- 03: Administer Azure Resources
- 04: Administer Virtual Networking
- 05: Administer Intersite Connectivity
- 06: Administer Network Traffic Management
- 07: Administer Azure Storage
- 08: Administer Azure Virtual Machines
- 09: Administer PaaS Compute Options
- 10: Administer Data Protection
- 11: Administer Monitoring

# Learning Objectives - Administer Azure Virtual Machines

- Configure Virtual Machines
- Configure Virtual Machine Availability
- Lab 08 – Manage Virtual Machines

VM IaaS | NIST  
vir site PaaS |  
SaaS |




# Configure Virtual Machines



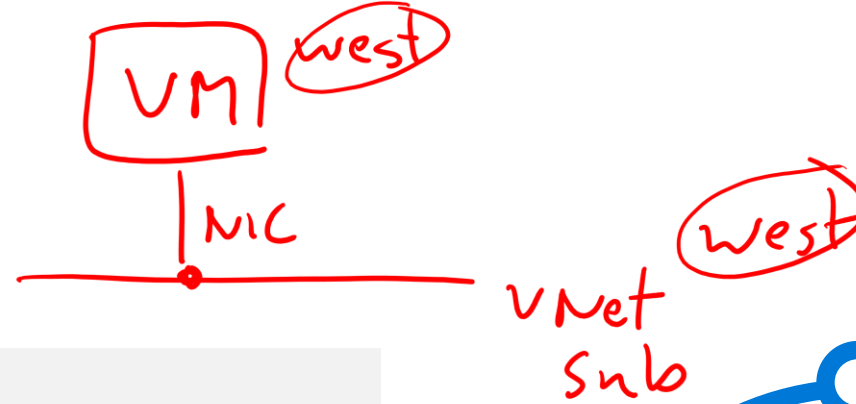
# Review Cloud Services Responsibilities

	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

 Microsoft	 Customer	 Shared
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# 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 |



70+ Azure regions  
Available in 140 countries

## Determine Virtual Machine Sizing

Mark Russinovich    Tetris  
Sysinternals (psexec)

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

Monster

# Determine Virtual Machine Storage

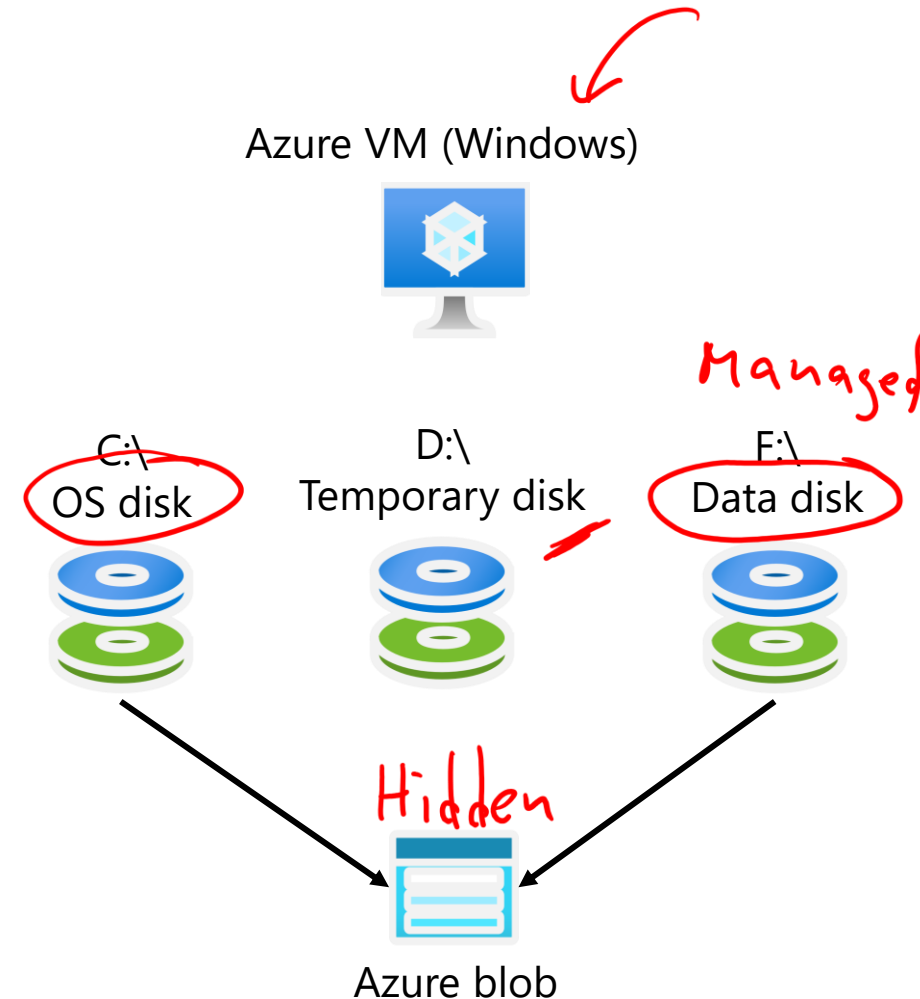
Each Azure VM has two or more disks:

- 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:

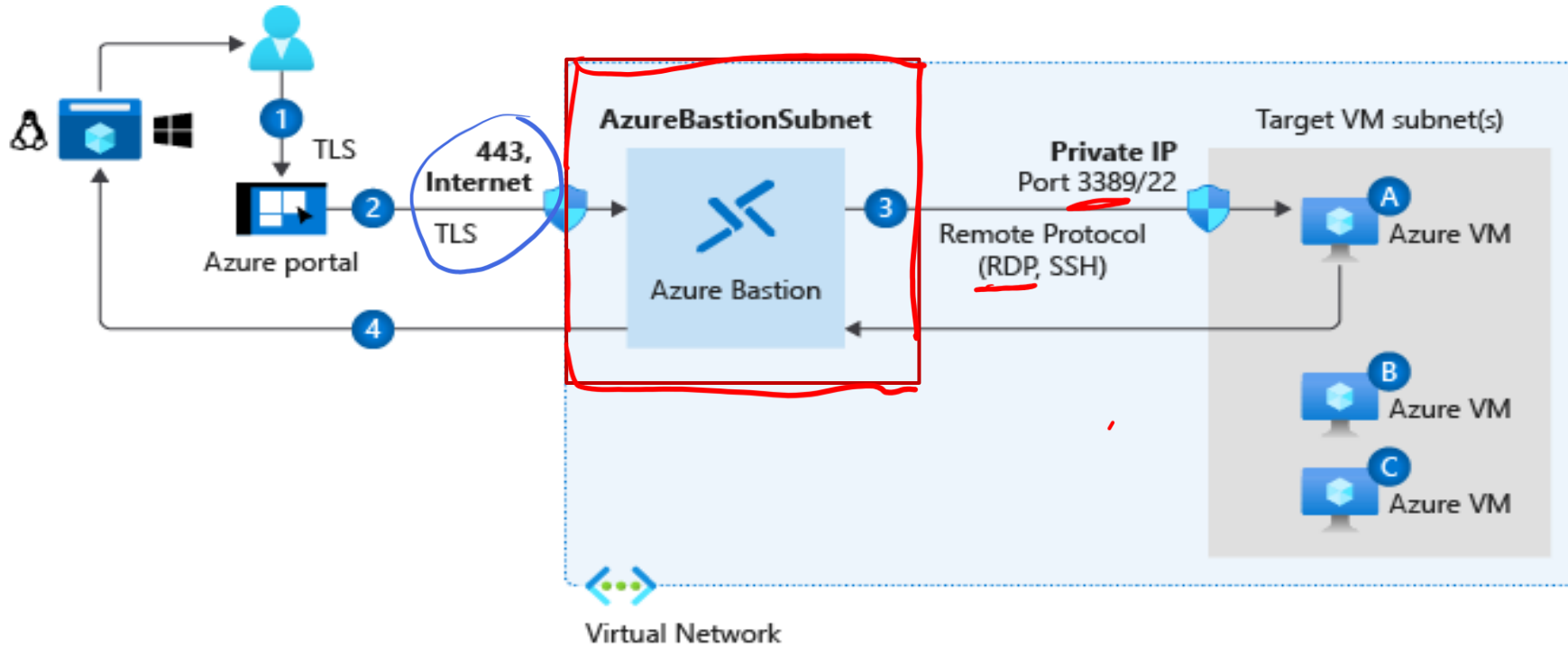
- Azure-based storage service
- Standard (HDD, SSD) or Premium (SSD), or Ultra (SSD)

Azure VMs use managed disks





# Connect to Virtual Machines



Bastion Subnet for RDP/SSH through the Portal over SSL

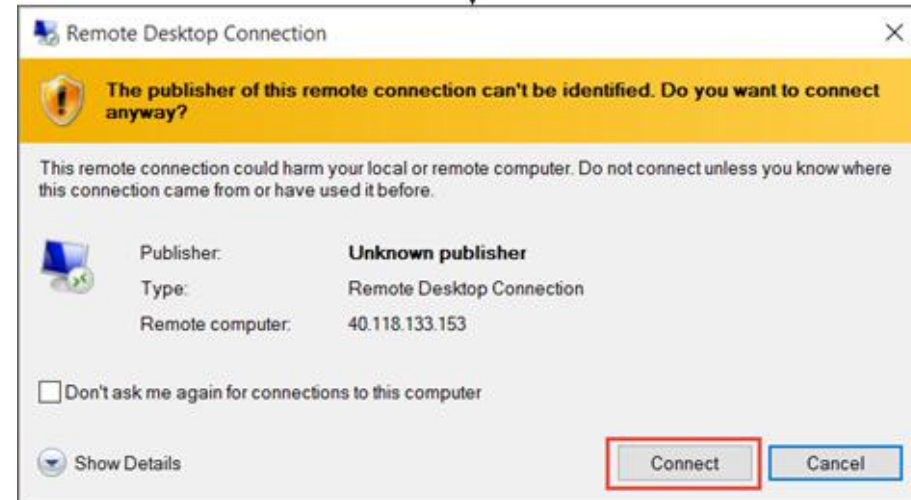
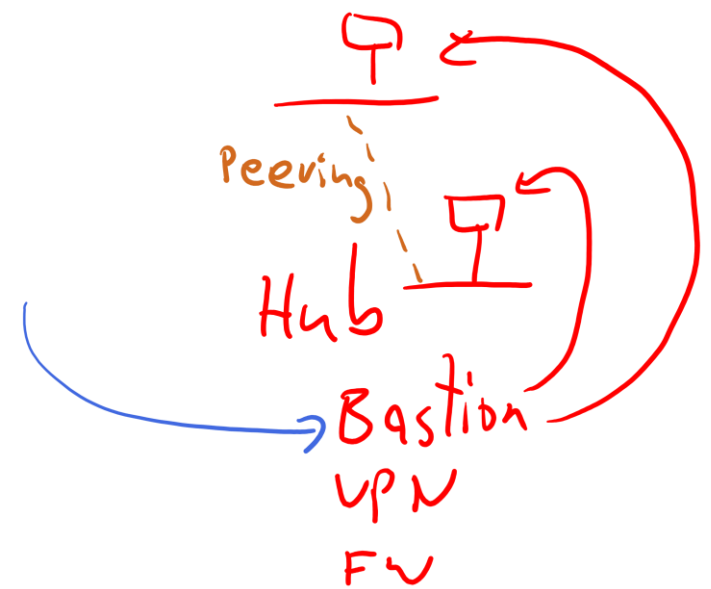
Remote Desktop Protocol for Windows-based Virtual Machines

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

Applied Skills

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

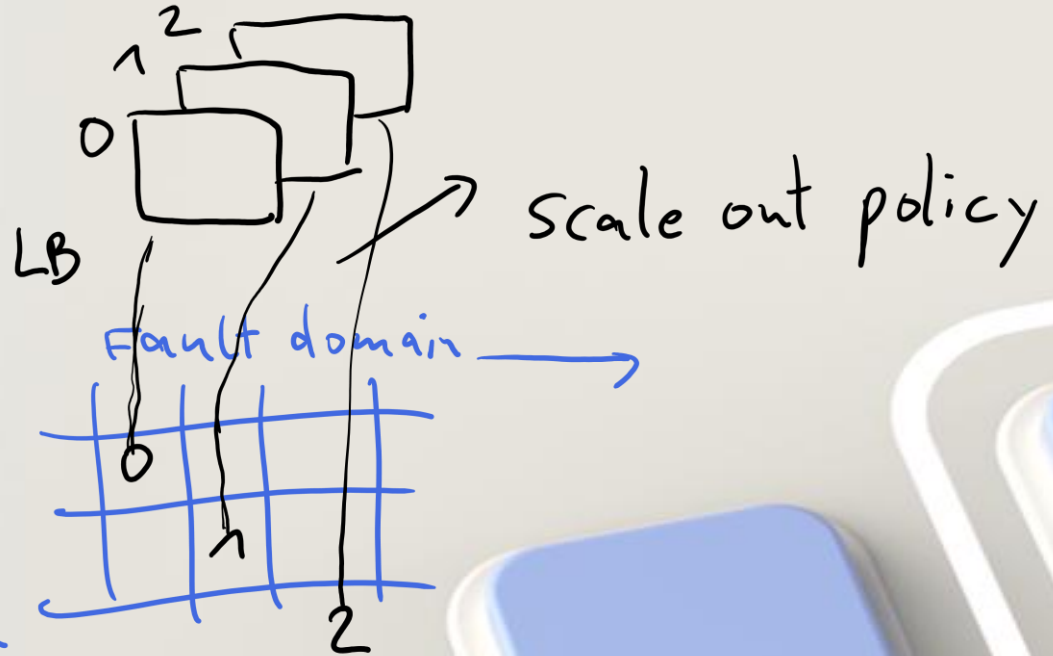
# Learning Recap - Configure Virtual Machines



**Check your  
knowledge  
questions and  
additional  
study**

- Introduction to Azure virtual machines
- Choose the right disk storage for your virtual machine workload
- Create a Linux virtual machine in Azure
- Create a Windows virtual machine in Azure
- Connect to virtual machines through the Azure portal by using Azure Bastion

Scale Set



Hyper-V

Avail Set

Update domain

# Configure Virtual Machine Availability

# 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)

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

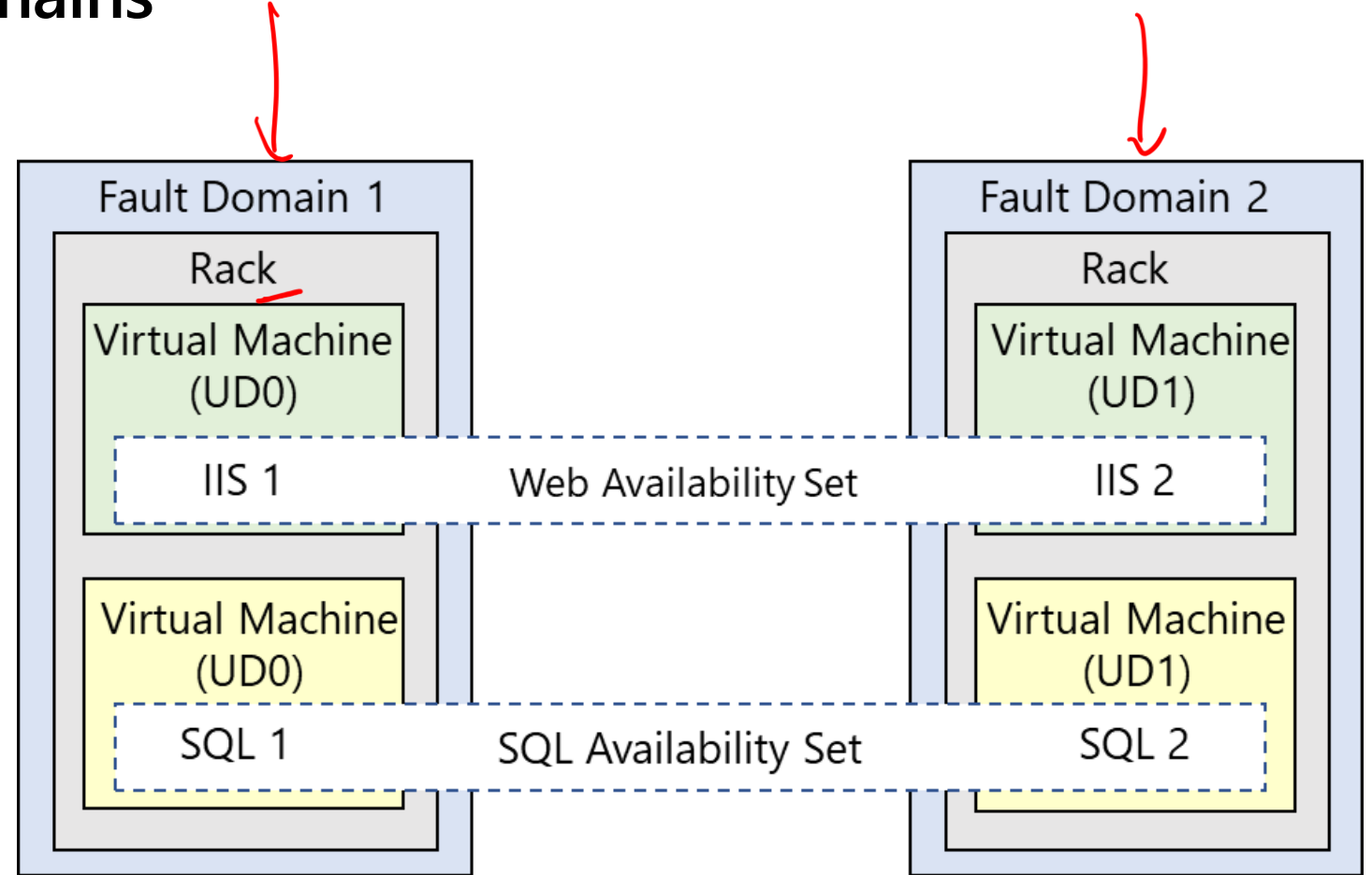
Combine a Load  
Balancer with  
Availability Sets

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

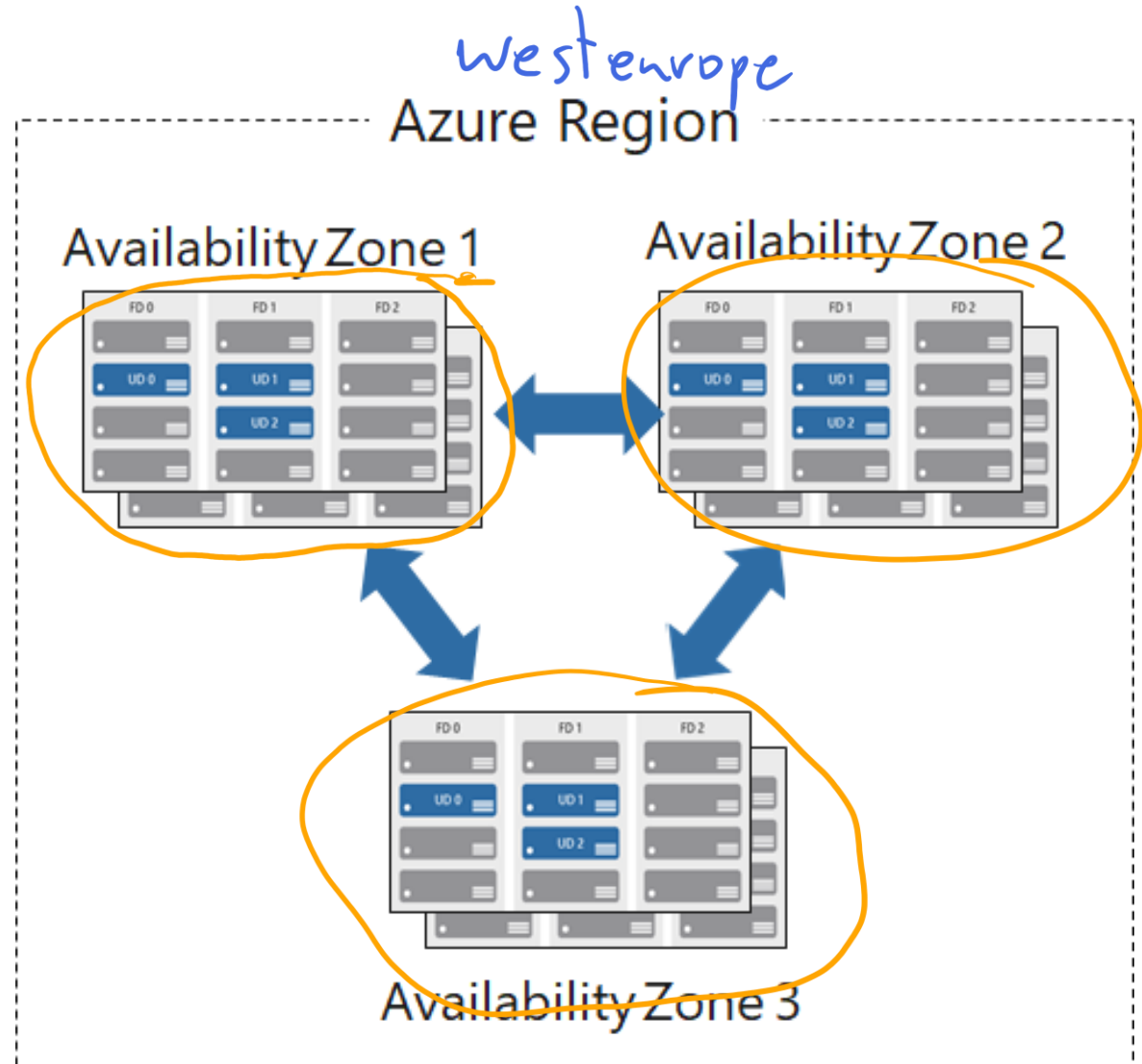
Unique physical locations  
in a region

Includes datacenters with independent  
power, cooling, and networking

Protects from datacenter failures

Combines update and  
fault domains

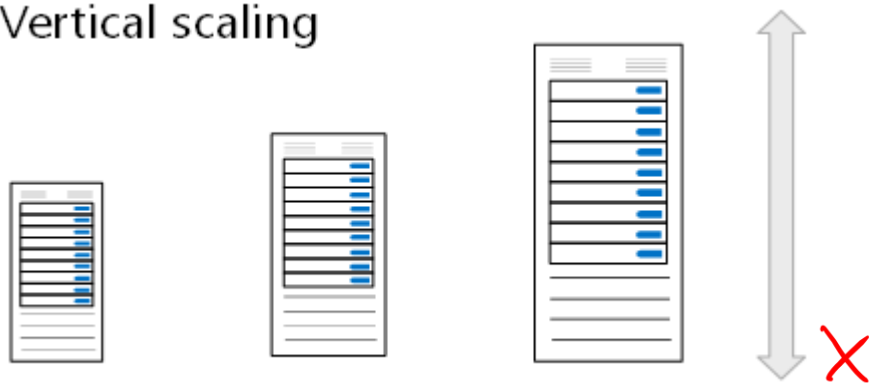
Provides 99.99% SLA



# Compare Vertical to Horizontal Scaling

80% ~~Percentage CPU~~

Vertical 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



**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



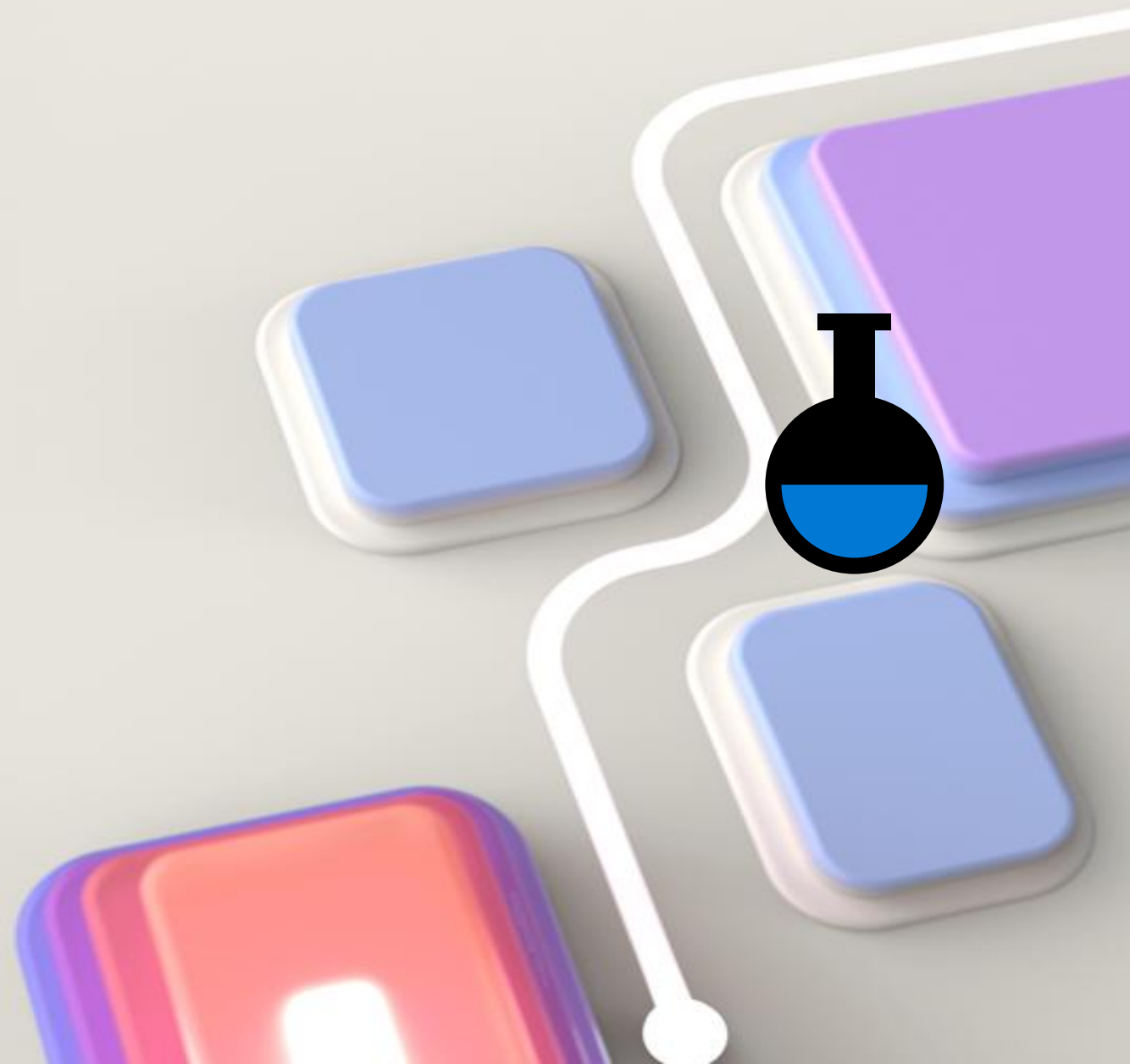
# Learning Recap – Configure Virtual Machine Availability



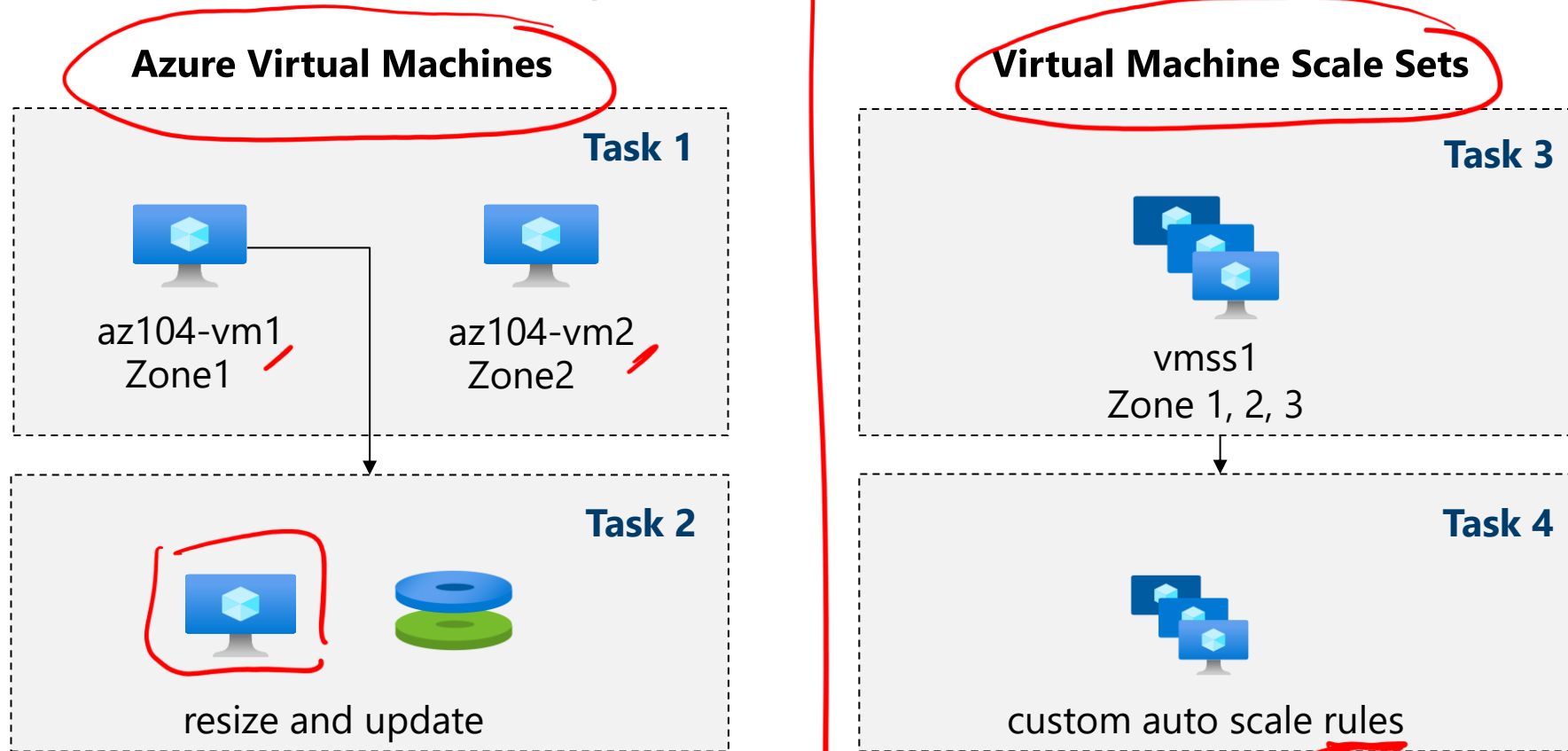
Check your  
knowledge  
questions and  
additional  
study

- Build a scalable application with virtual machine scale sets
- Implement scale and high availability with Windows Server VM

# Lab – Manage Virtual Machines



# Lab 08 – 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

