Microsoft

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

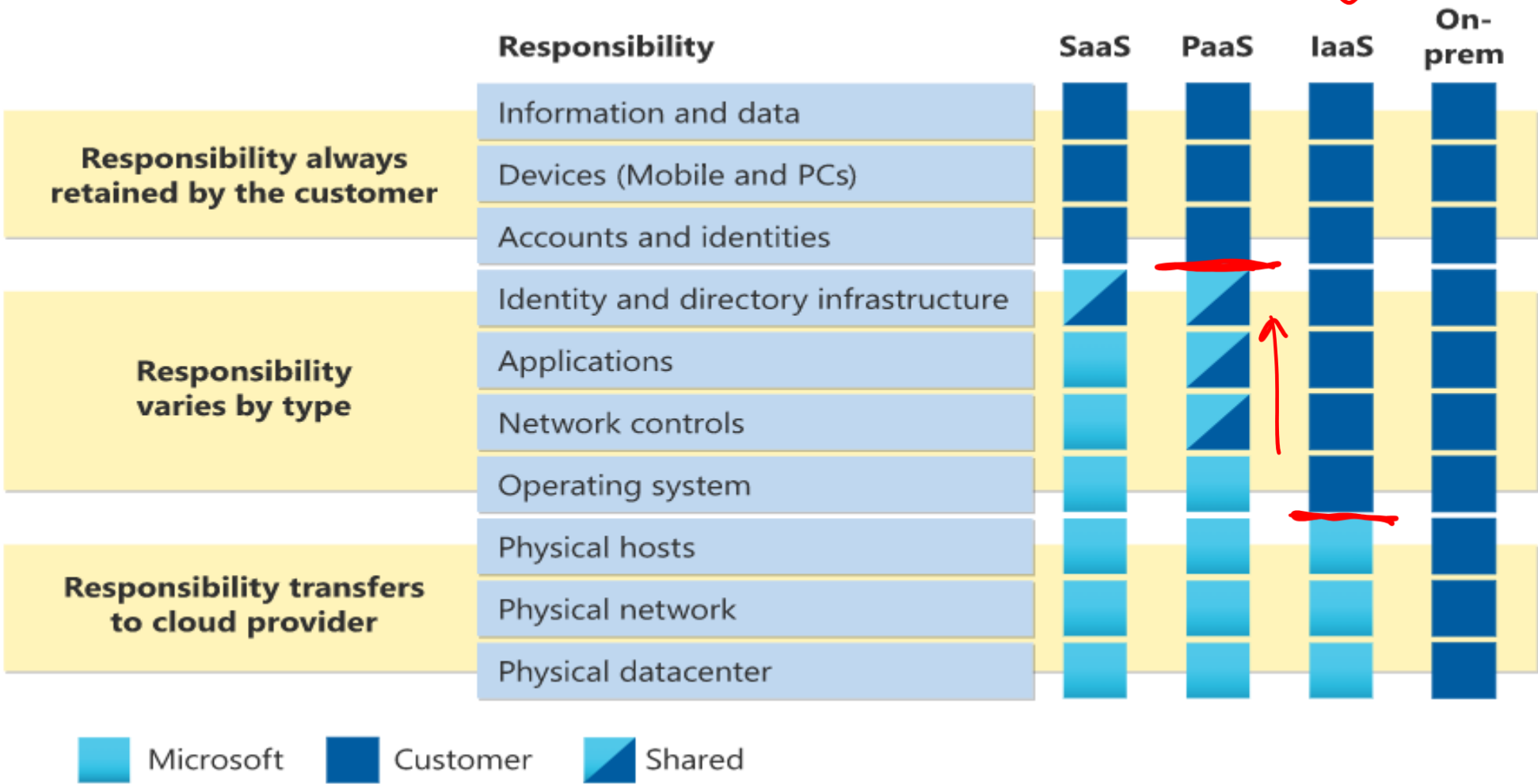Stand alone

out

in

LB
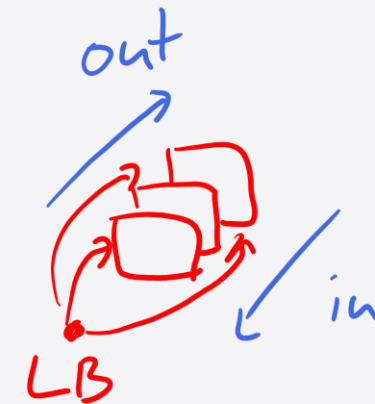
VM
Scale Set
• uniform
• r

Learning Objectives - Administer Azure Virtual Machines

- Configure Virtual Machines

- Configure Virtual Machine Availability

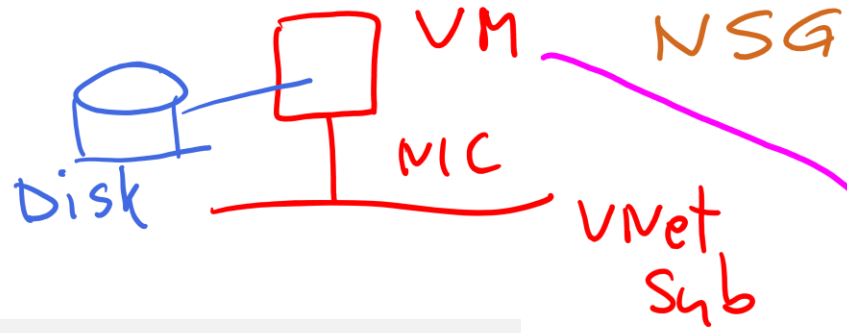- Lab 08 – Manage Virtual Machines

Configure Virtual Machines
OS

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

Legend: Microsoft, Customer, Shared

Plan Virtual Machines

Start with the network

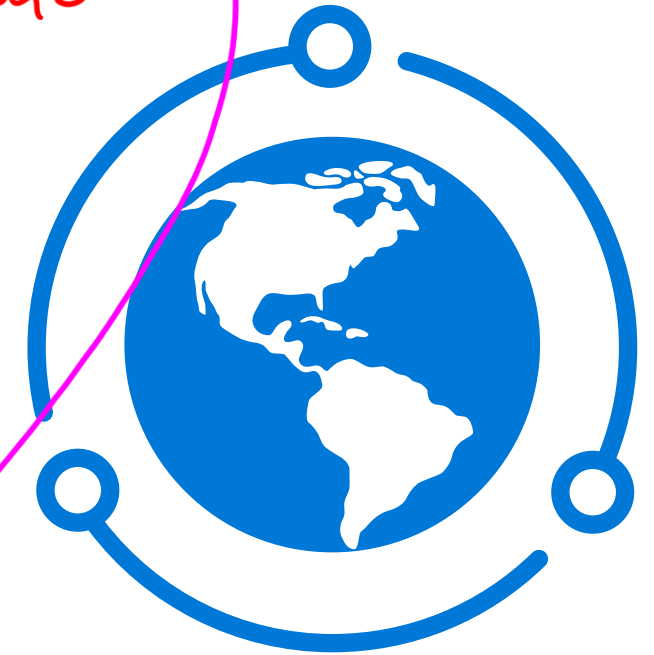## Name the virtual machine

Choose a location

- 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

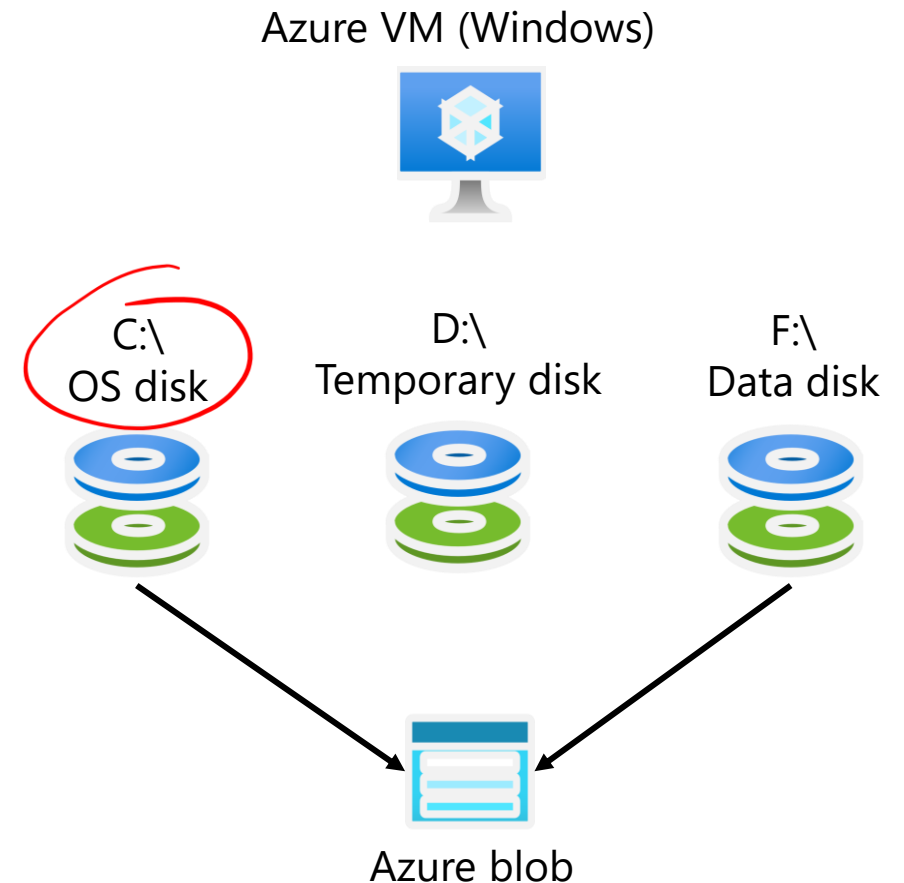| Type	Description
General purpose	Balanced CPU-to-memory ratio.
Compute optimized	High CPU-to-memory ratio.
Memory optimized	High memory-to-CPU ratio.
Storage optimized	High disk throughput and I/O.
GPU	Specialized virtual machines targeted for heavy graphic rendering and video editing.
High performance 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)
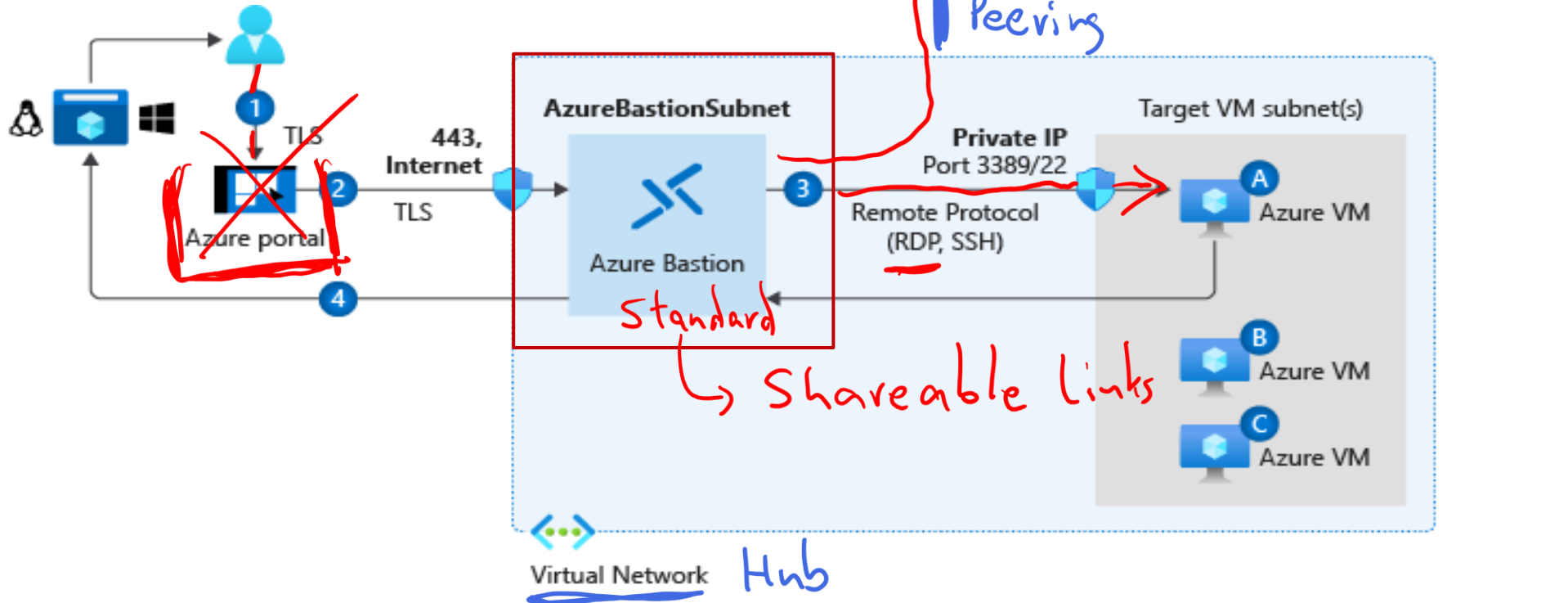- Data disks (optional)

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

Azure VM (Windows)

C:\
OS disk

D:\
Temporary disk

F:\
Data disk

Azure blob

Connect to Virtual Machines

vNet 2 Spoke

Peering

AzureBastionSubnet

TLS

443, Internet

TLS

Azure portal

Azure Bastion

Standard

Shareable Links

Virtual Network Hub

Private IP
Port 3389/22

Remote Protocol
(RDP, SSH)

Target VM subnet(s)

A — Azure VM

B — Azure VM

C — Azure VM

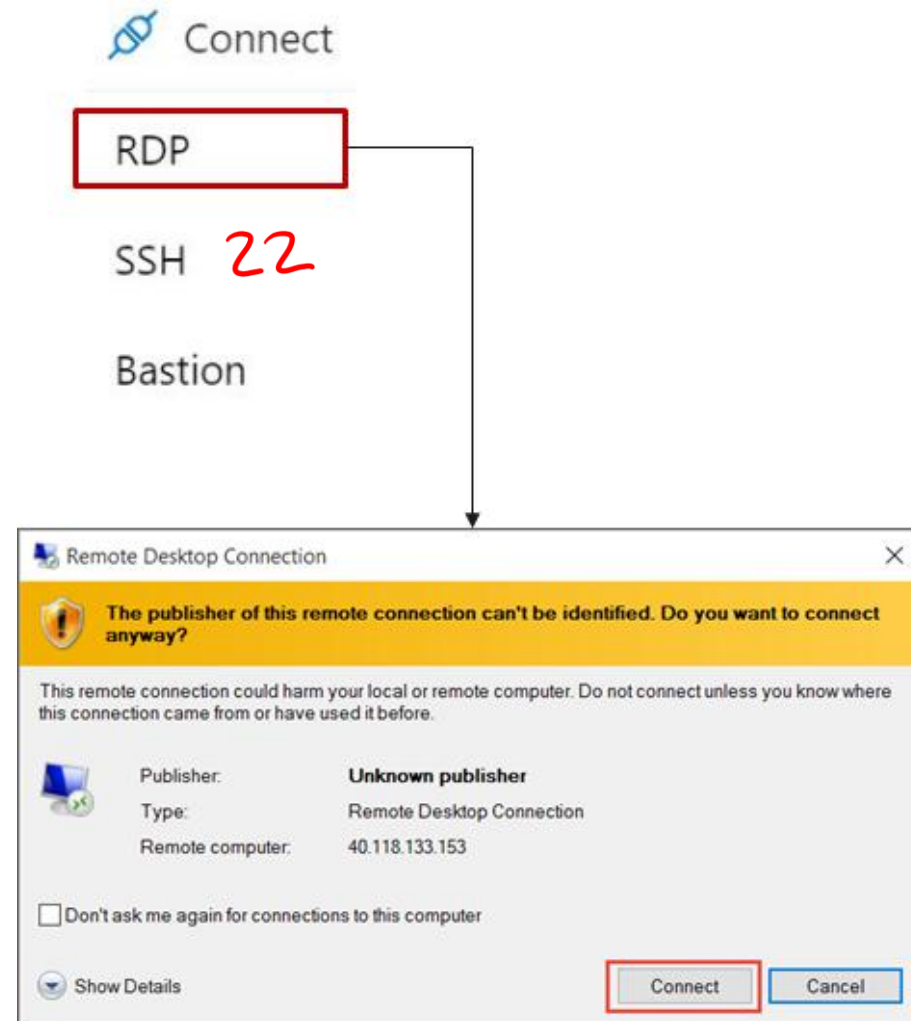| Bastion Subnet for RDP/SSH through the Portal over SSL	Remote Desktop Protocol for Windows-based Virtual Machines	Secure Shell Protocol for Linux based Virtual Machines

Connect to Windows Virtual Machines

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

= *Powershell Remote*

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

Connect

RDP

SSH *22*

Bastion

Remote Desktop Connection   ✕

⚠ **The publisher of this remote connection can't be identified. Do you want to connect anyway?**

This remote connection could harm your local or remote computer. Do not connect unless you know where this connection came from or have used it before.

Publisher:	**Unknown publisher**
Type:	Remote Desktop Connection
Remote computer:	40.118.133.153

☐ Don't ask me again for connections to this computer

🔽 Show Details   Connect   Cancel

Connect to Linux Virtual Machines

Administrator account

Authentication type

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.

Username * (i) ✓

SSH public key * (i)

ℹ 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

Configure Virtual Machine Availability

Plan for Maintenance and Downtime

| Unplanned Hardware Maintenance	Unexpected Downtime	Planned Maintenance
When the platform predicts a failure, it will issue an **unplanned hardware maintenance** event **Action:** Live migration	**Unexpected Downtime** is when a virtual machine fails unexpectedly **Action:** Automatically migrate (heal)	**Planned Maintenance** events are periodic updates made to the Azure platform **Action:** No action

Setup Availability Sets

in einem DC

FD 1
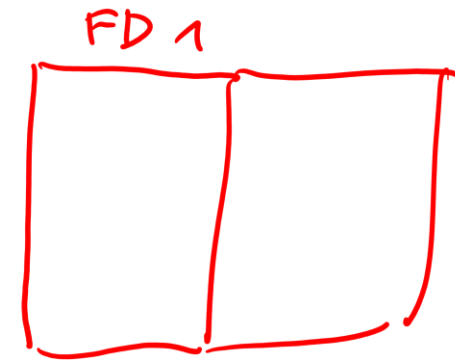
Instance details

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
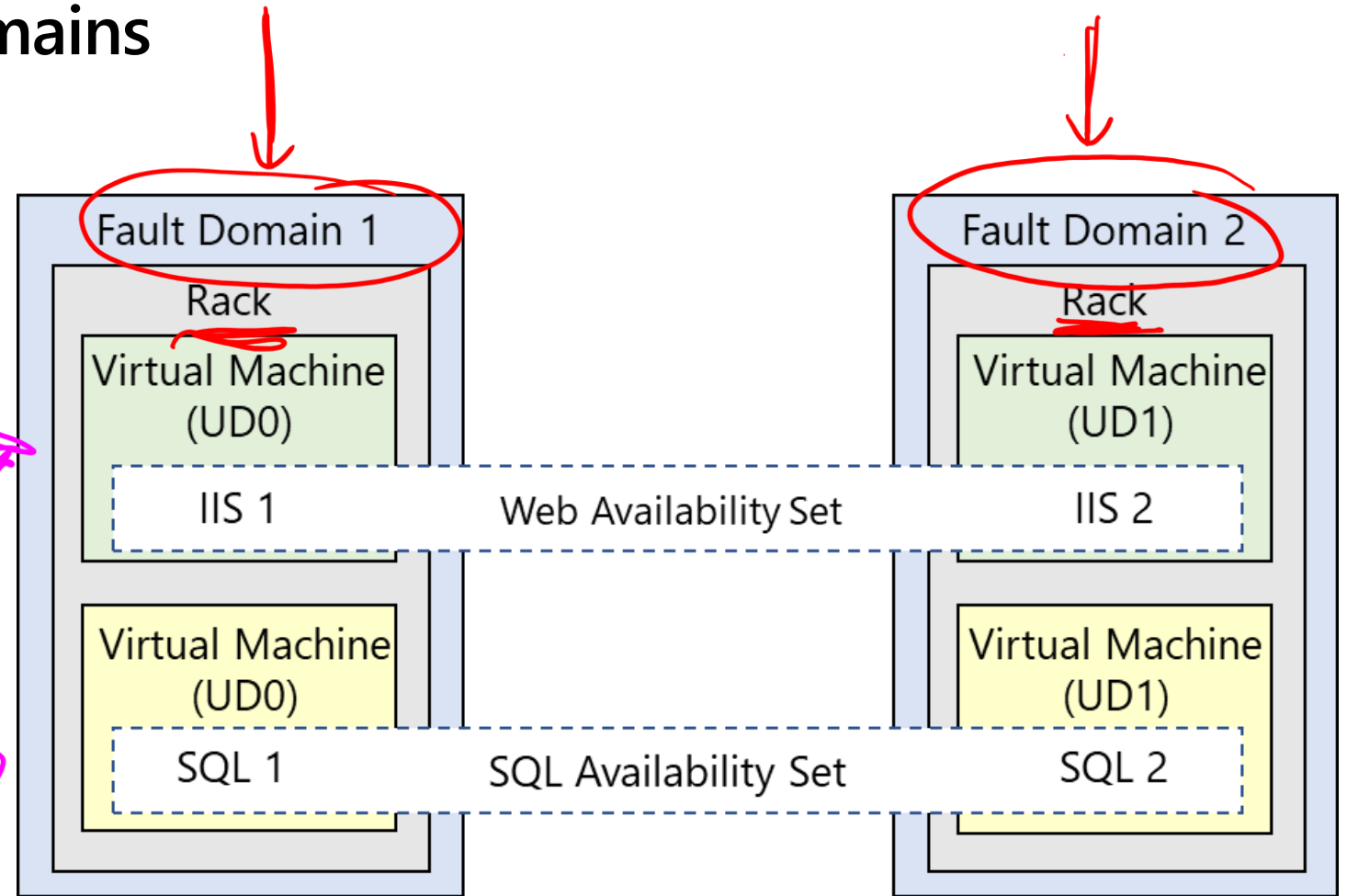
Combine a Load Balancer with Availability Sets

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

Fault Domain 1

Rack

Virtual Machine (UD0)

IIS 1 — Web Availability Set — IIS 2

Virtual Machine (UD0)

SQL 1 — SQL Availability Set — SQL 2

Fault Domain 2

Rack

Virtual Machine (UD1)

Virtual Machine (UD1)

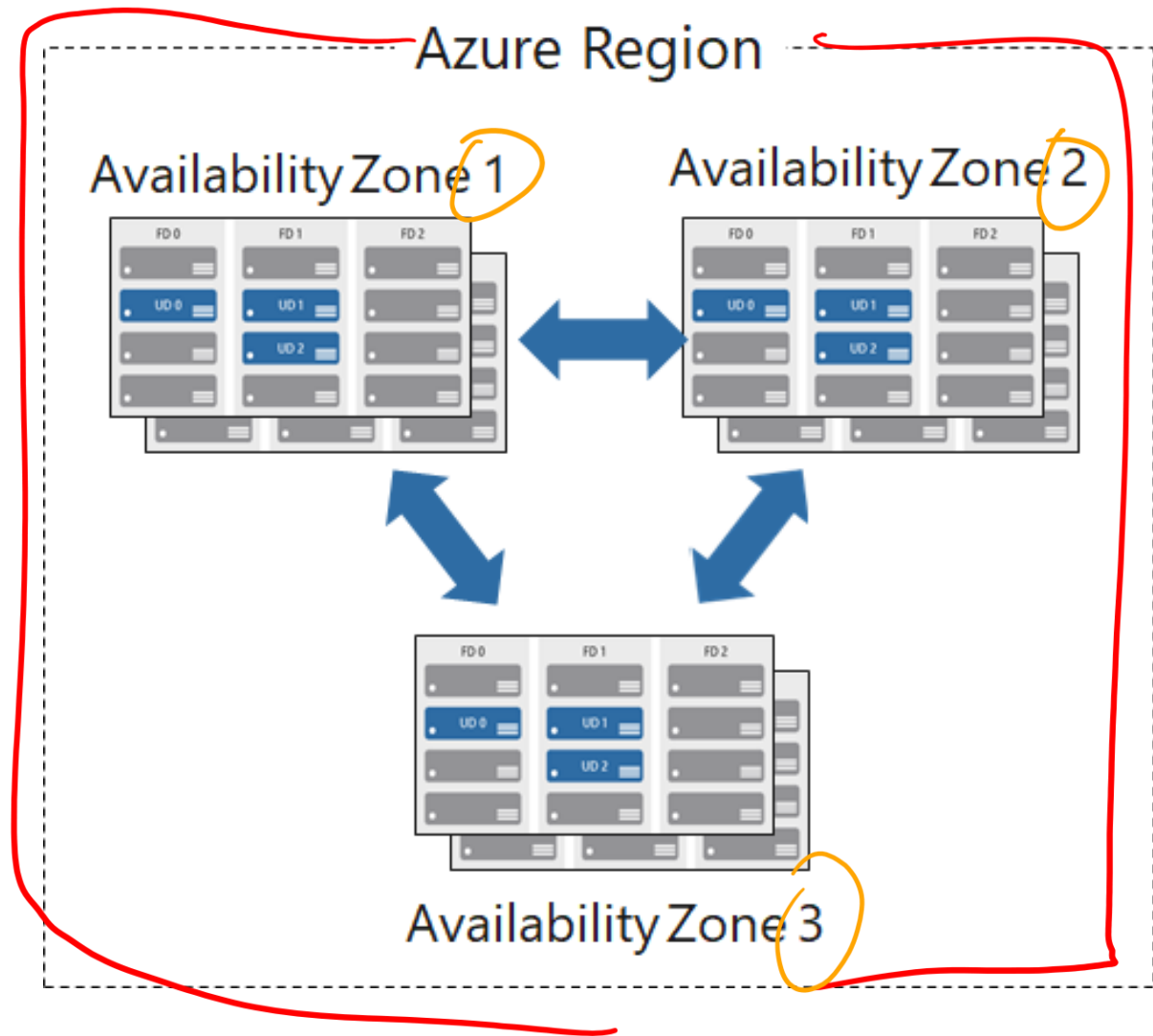# Review Availability Zones

Unique physical locations in a region

Includes datacenters with independent power, cooling, and networking

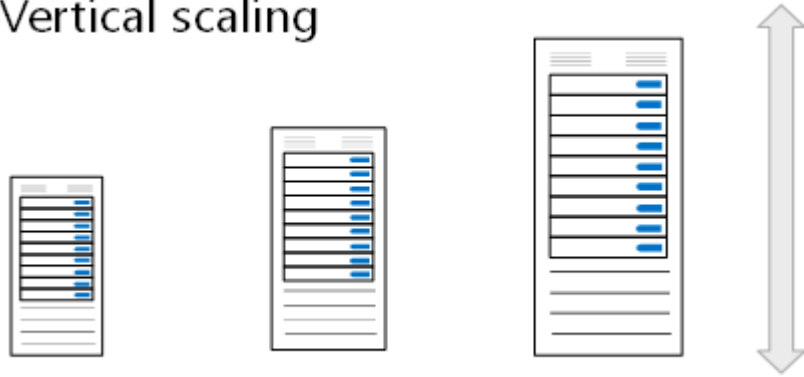Protects from datacenter failures

Combines update and fault domains

Provides 99.99% SLA

Compare Vertical to Horizontal Scaling

Stateless apps!

Vertical scaling

VMSS

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

Handwritten annotations:
- + 1 Instance   auto scale
- + 50%   > 80%   5 min
- LB
- Microsoft.Compute   metric   Percent CPU
- Lab →
- Richard Feynman

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

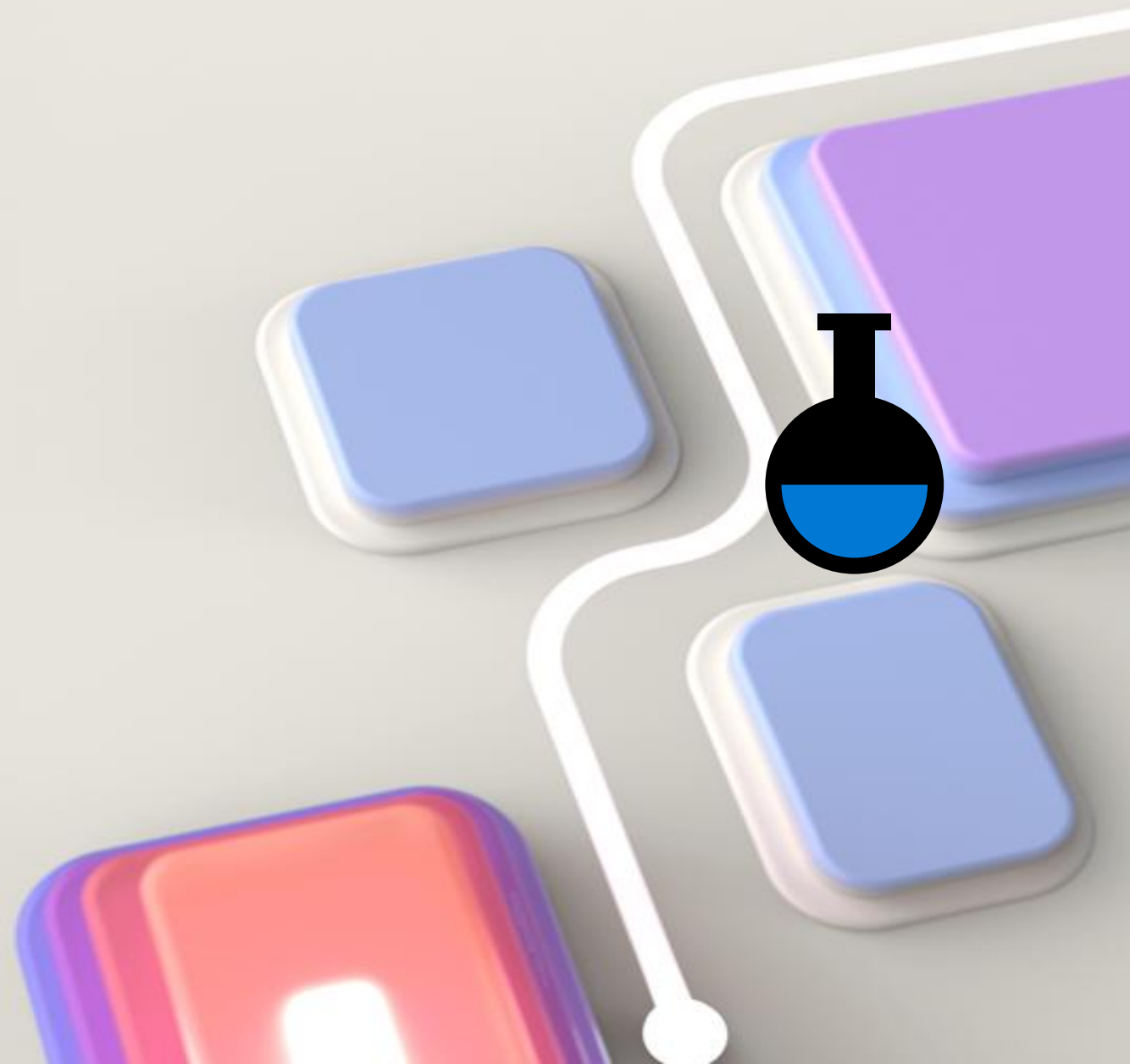|	
CPU threshold (%) * ⓘ	25
Number of instances to decrease by * ⓘ	1 ✓

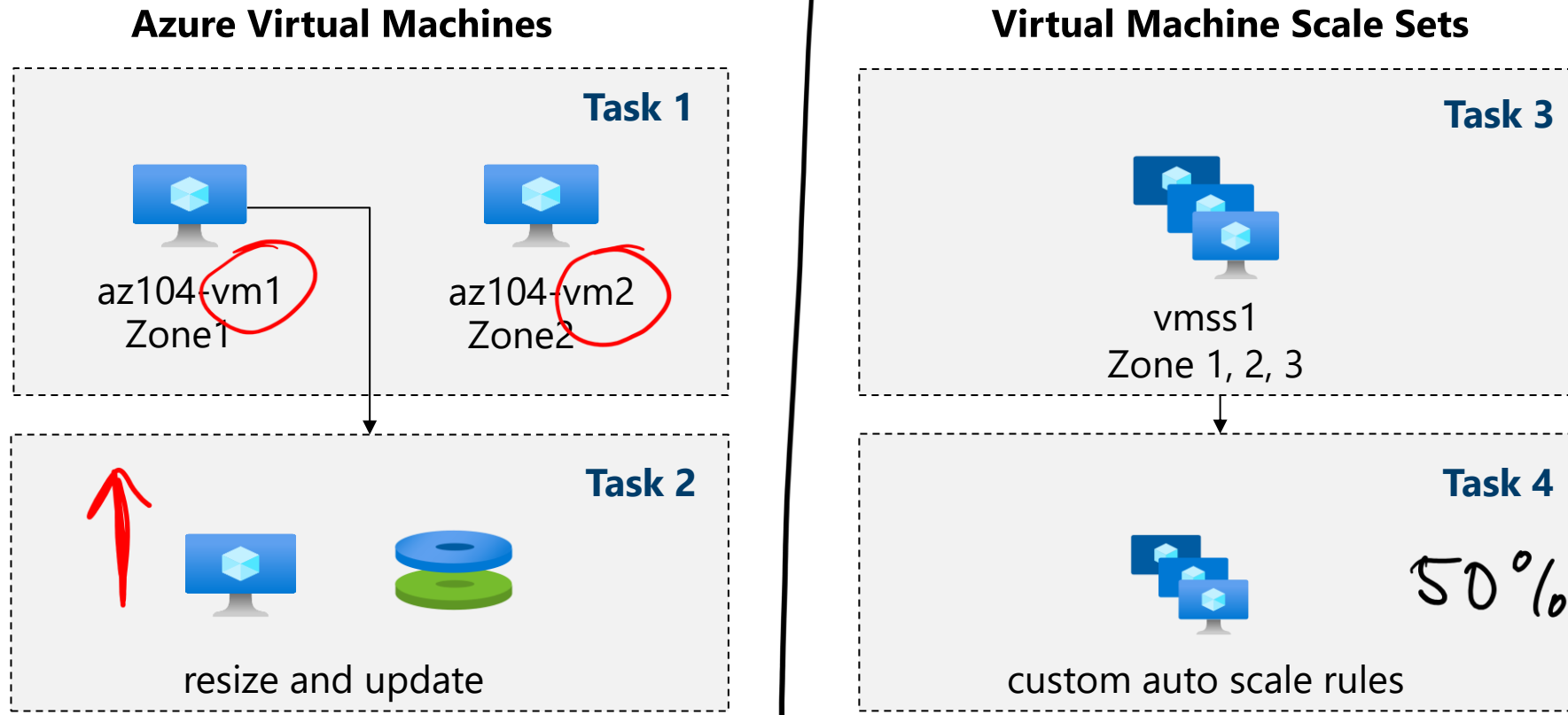# Learning Recap – Configure Virtual Machine Availability

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

Azure Virtual Machines

Virtual Machine Scale Sets

Task 1

az104-vm1
Zone1

az104-vm2
Zone2

Task 3

vmss1
Zone 1, 2, 3

Task 2

resize and update

Task 4

50%

custom auto scale rules

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