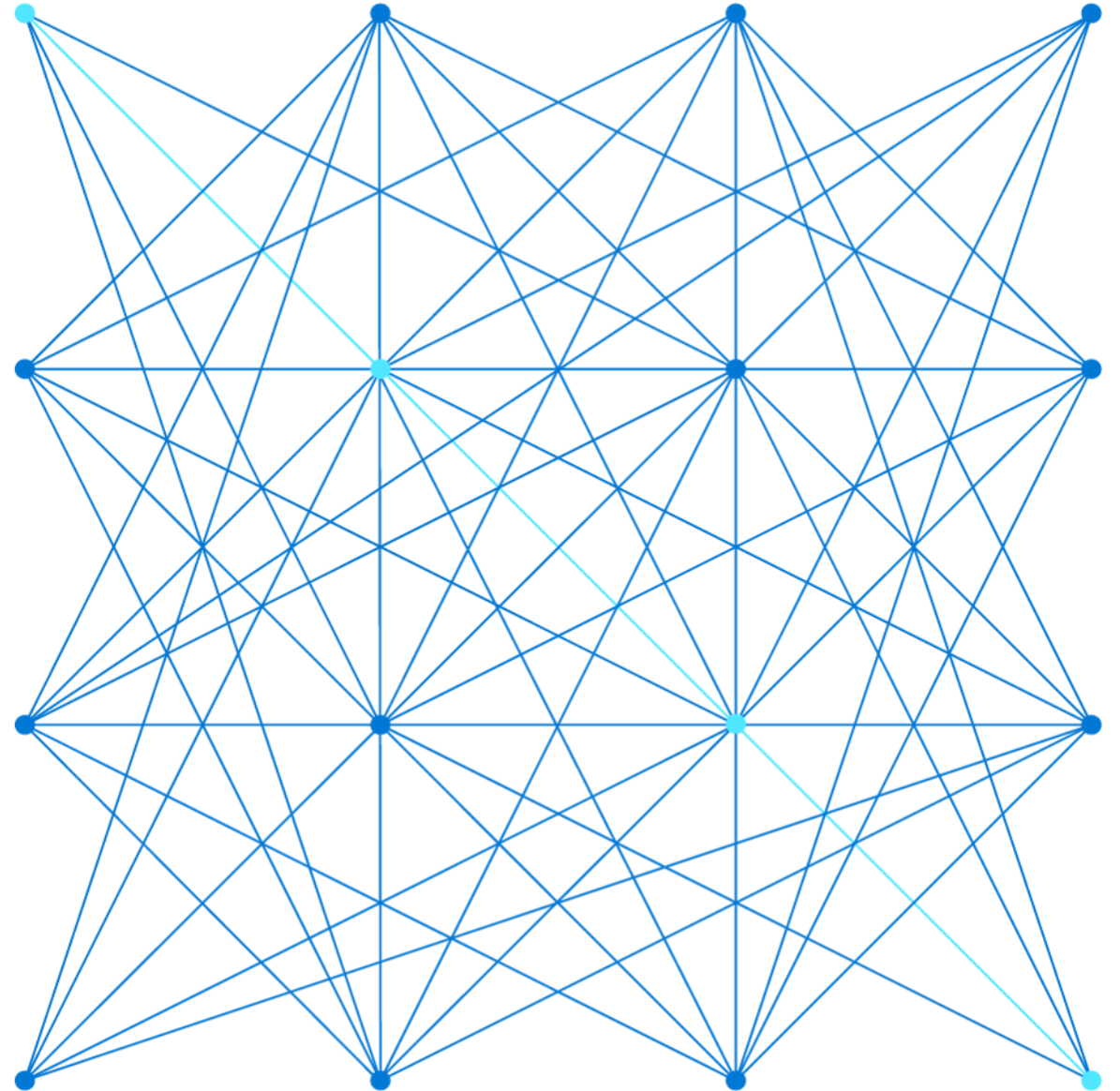
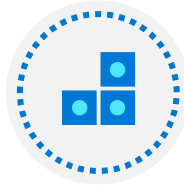


AZ-104T00A

Administer Azure Virtual Machines



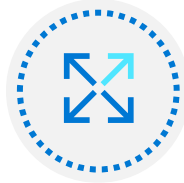
Administer Azure Virtual Machines Overview



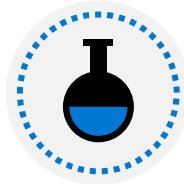
Configure Virtual Machines



Configure Virtual Machine Availability

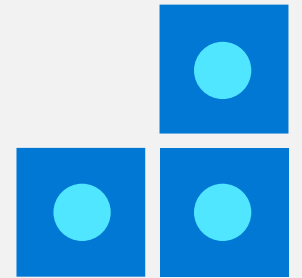


Configure Virtual Machine Extensions



Lab 08 – Manage Virtual Machines

Configure Virtual Machines



Configure Virtual Machines Introduction



Review Cloud Services Responsibilities



Plan Virtual Machines



Determine Virtual Machine Sizing



Determine Virtual Machine Storage



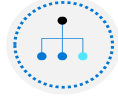
Demonstration - Creating a VM in the Portal



Connect to Virtual Machines



Connect to Windows Virtual Machines



Connect to Linux Virtual Machines



Demonstration – Connect to Linux VMs (optional)



Summary and Resources

Review Cloud Services Responsibilities

Responsibility	SaaS	PaaS	IaaS	On-prem	
Information and data	Customer	Customer	Customer	Customer	RESPONSIBILITY ALWAYS RETAINED BY CUSTOMER
Devices (Mobile and PCs)	Customer	Customer	Customer	Customer	
Accounts and identities	Customer	Customer	Customer	Customer	
Identity and directory infrastructure	Microsoft	Microsoft	Customer	Customer	RESPONSIBILITY VARIES BY SERVICE TYPE
Applications	Microsoft	Microsoft	Customer	Customer	
Network controls	Microsoft	Microsoft	Customer	Customer	
Operating system	Microsoft	Microsoft	Customer	Customer	
Physical hosts	Microsoft	Microsoft	Microsoft	Customer	RESPONSIBILITY TRANSFERS TO CLOUD PROVIDER
Physical network	Microsoft	Microsoft	Microsoft	Customer	
Physical datacenter	Microsoft	Microsoft	Microsoft	Customer	

 Microsoft  Customer

Test and development, website hosting, storage, backup, recovery, high-performance computing, big data analysis, and extended data center

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



60+ 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

✓ [Share VM images in a compute gallery](#)

Determine Virtual Machine Storage

Each Azure VM has two or more disks:

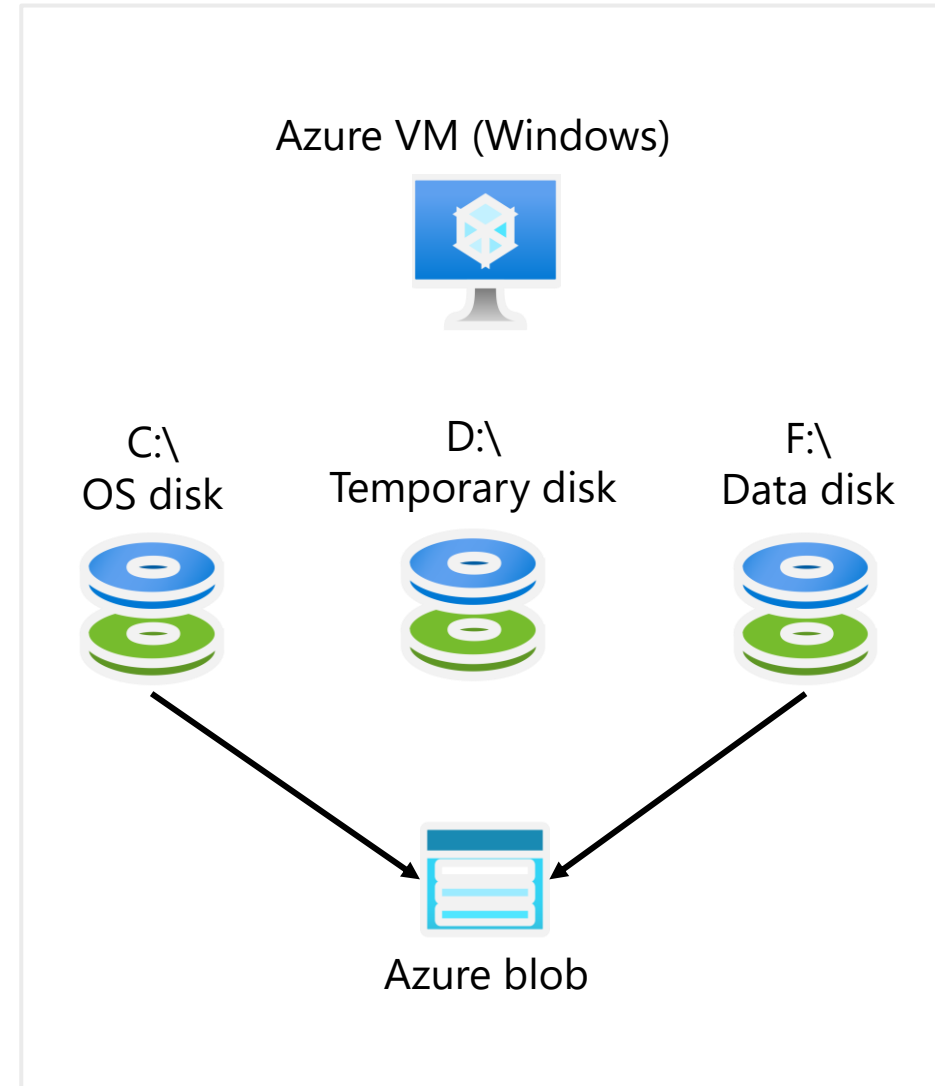
- OS disk
- Temporary disk (contents can be lost)
- Data disks (optional)

OS and data disks reside in Azure Storage accounts:

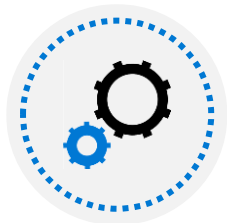
- Azure-based storage service
- Standard (HDD, SSD) or Premium (SSD), or Ultra (SSD)

When creating an Azure VM, you can choose between:

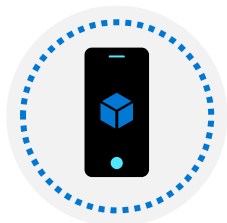
- Managed disks (recommended)
- Unmanaged disks



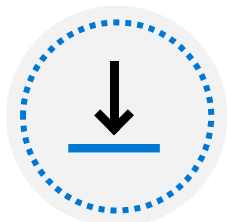
Demonstration – Creating a VM in the Portal



Create the virtual machine



Connect to the virtual machine

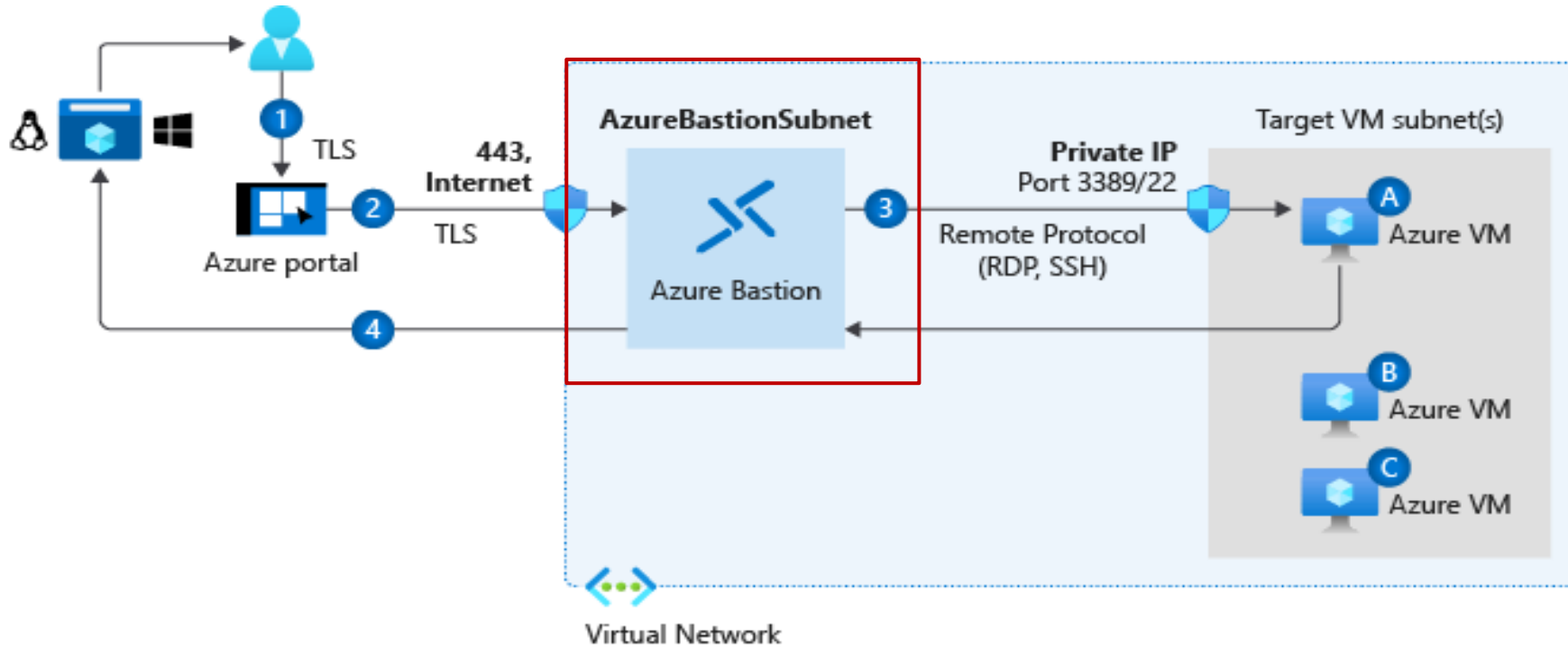


Install the Web Server role



View the IIS welcome page

Connect to Virtual Machines



Bastion Subnet for RDP/SSH through the Portal over SSL

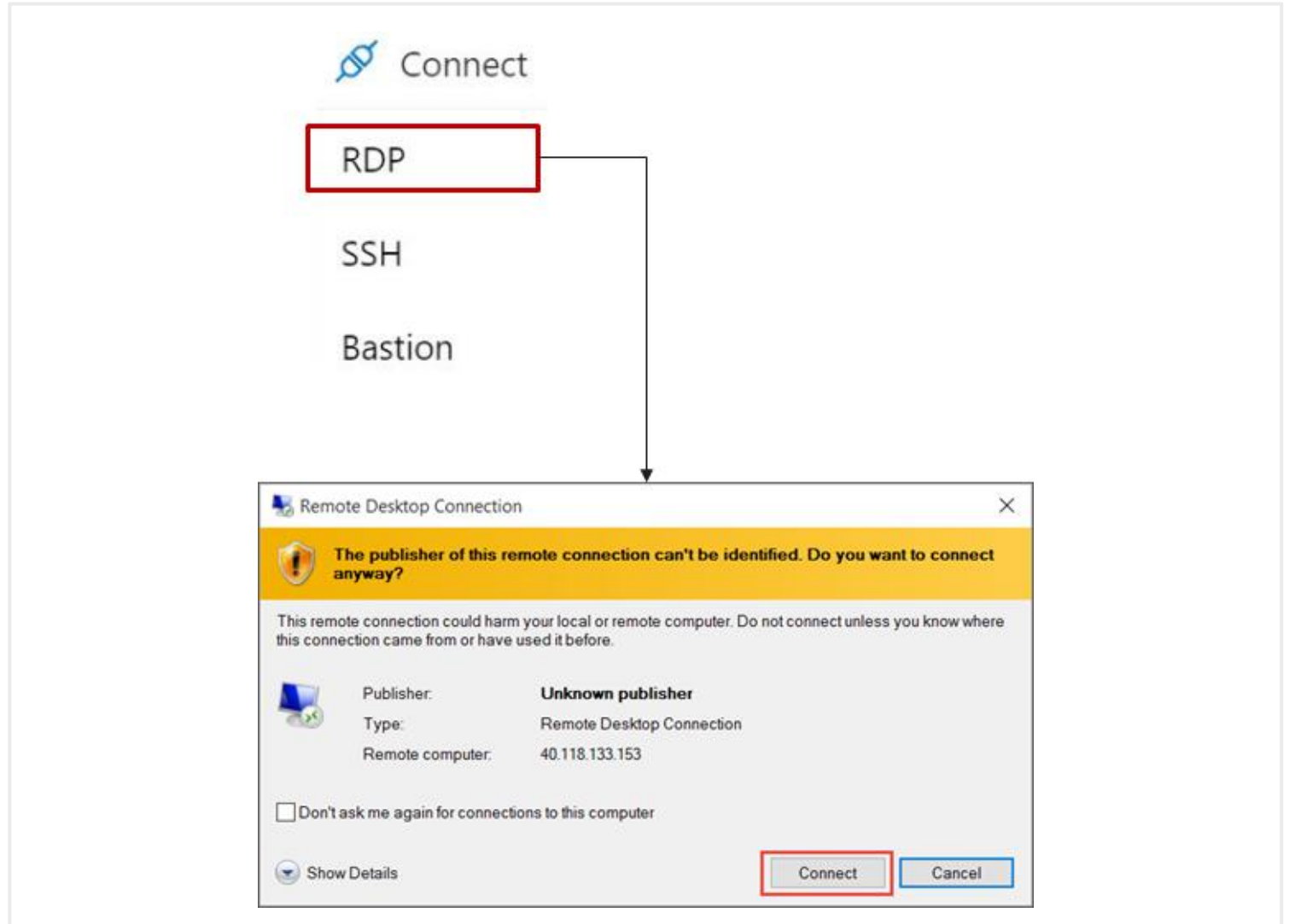
Remote Desktop Protocol for Windows-based Virtual Machines

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

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

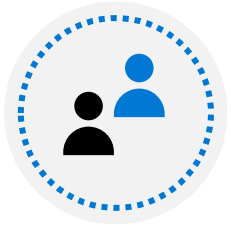
SSH is an encrypted connection protocol that allows secure logins over unsecured connections

There are public and private keys

Demonstration – Connect to Linux VMs (optional)



Create the SSH keys



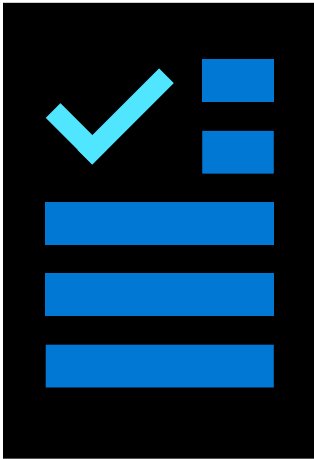
Create the Linux machine and assign the public SSH key



Access the server using SSH

Summary and Resources - Configure Virtual Machines

Knowledge Check Questions



Microsoft Learn Modules (docs.microsoft.com/Learn)

[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 \(Sandbox\)](#)

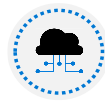
[Connect to virtual machines through the Azure portal by using Azure Bastion](#)

A sandbox indicates a 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



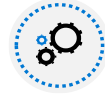
Review Availability Zones



Compare Vertical to Horizontal Scaling



Create Scale Sets (2 student topics)



Configure Autoscale (2 student topics)



Demonstration – Virtual Machine Scaling



Summary and Resources

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

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

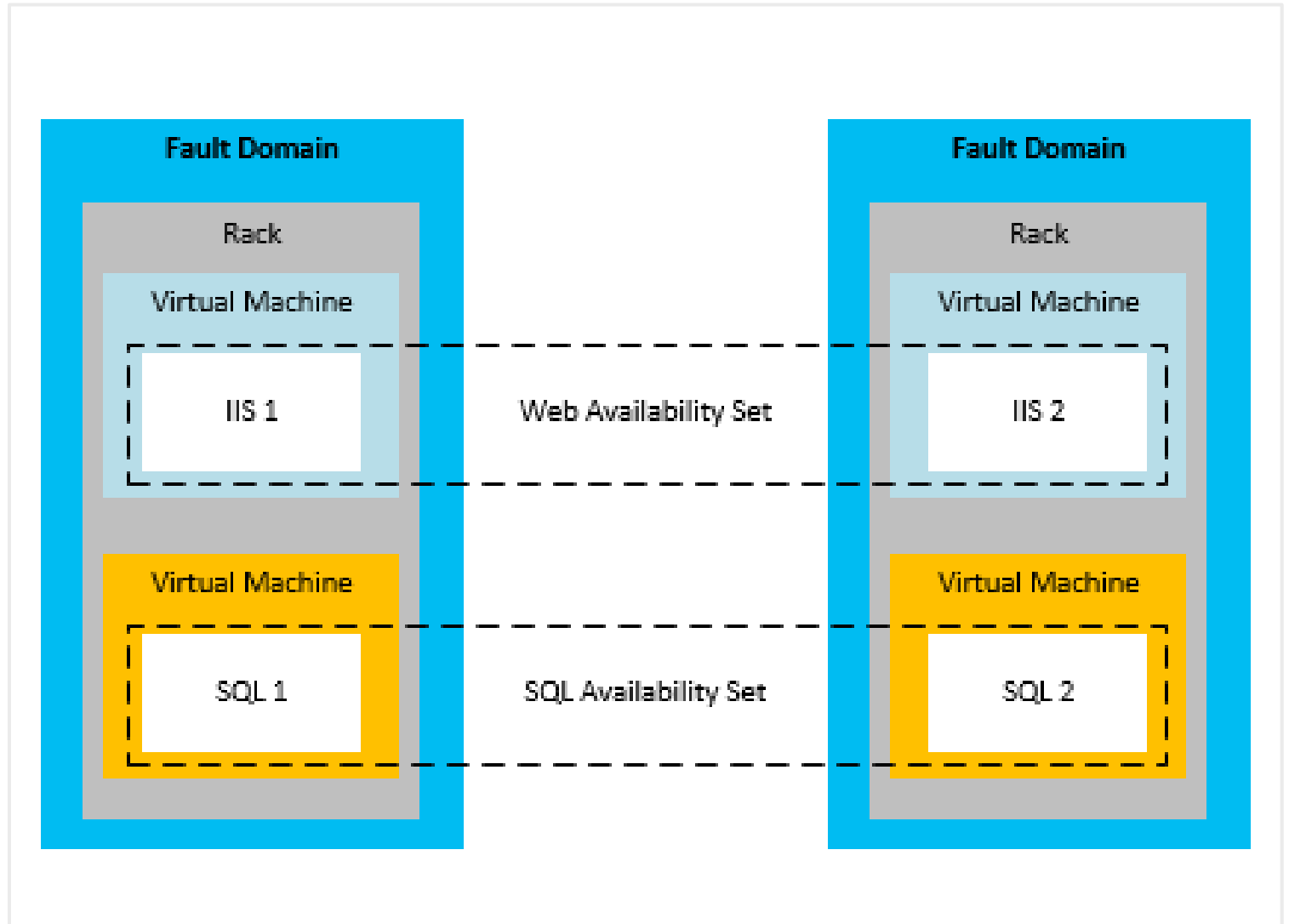
Combine a Load Balancer with Availability Sets

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

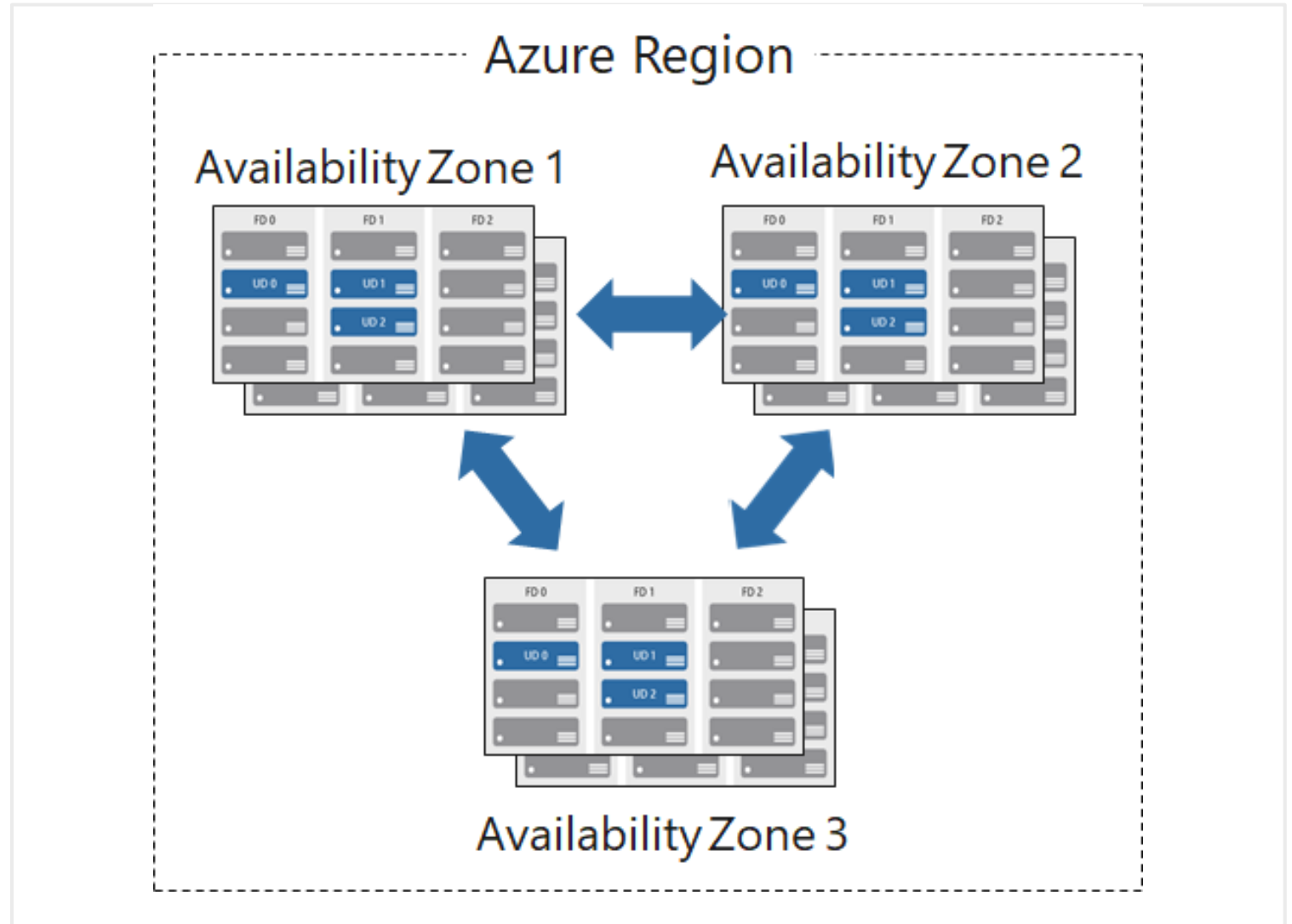
Unique physical locations in a region

Includes datacenters with independent power, cooling, and networking

Protects from datacenter failures

Combines update and fault domains

Provides 99.99% SLA

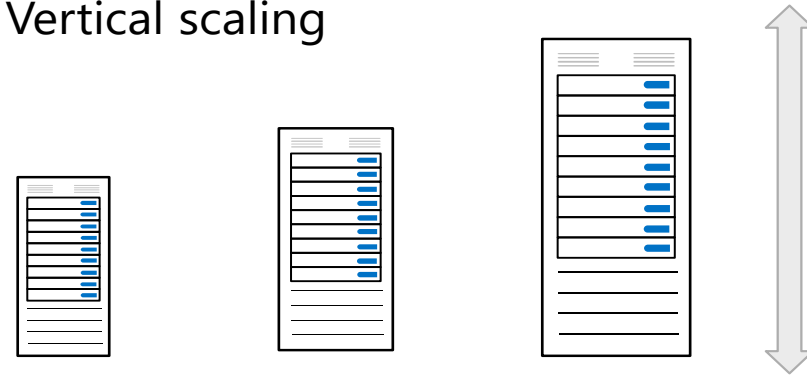


Compare Vertical to Horizontal Scaling

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

Vertical scaling



Horizontal scaling



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

Instance

Initial instance count * ⓘ

Size * ⓘ

Standard D2s v3

2 vcpus, 8 GiB memory (\$85.41/month)

[Change size](#)

Azure Spot instance ⓘ

☐ Yes ☒ No

Use managed disks ⓘ

☐ No ☒ Yes

Allocation policy

Enable scaling beyond 100 instances ⓘ

☒ No ☐ Yes

Spreading algorithm ⓘ

☐ Max spreading ☒ Fixed spreading (not recommended with zones)

Configure Autoscale

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

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

Instance	
Initial instance count * ⓘ	<input type="text" value="2"/>
Scaling	
Scaling policy ⓘ	<input type="radio"/> Manual <input checked="" type="radio"/> Custom
Minimum number of VMs * ⓘ	<input type="text" value="1"/>
Maximum number of VMs * ⓘ	<input type="text" value="10"/>
Scale out	
CPU threshold (%) * ⓘ	<input type="text" value="75"/>
Duration in minutes * ⓘ	<input type="text" value="10"/>
Number of VMs to increase by * ⓘ	<input type="text" value="1"/>
Scale in	
CPU threshold (%) * ⓘ	<input type="text" value="25"/>
Number of VMs to decrease by * ⓘ	<input type="text" value="1"/>

Demonstration – Virtual Machine Scaling



Create a scale out rule



Create a scale in rule

Summary and Resources – Configure Virtual Machine Availability

Knowledge Check Questions

Microsoft Learn Modules (docs.microsoft.com/Learn)



[Build a scalable application with virtual machine scale sets](#)

[Implement scale and high availability with Windows Server VM](#)

Configure Virtual Machine Extensions



Configure Virtual Machine Extensions Introduction



Implement Virtual Machine Extensions



Implement Custom Script Extensions



Implement Desired State Configuration



Demonstration – Custom Script Extension (optional)



Summary and Resources

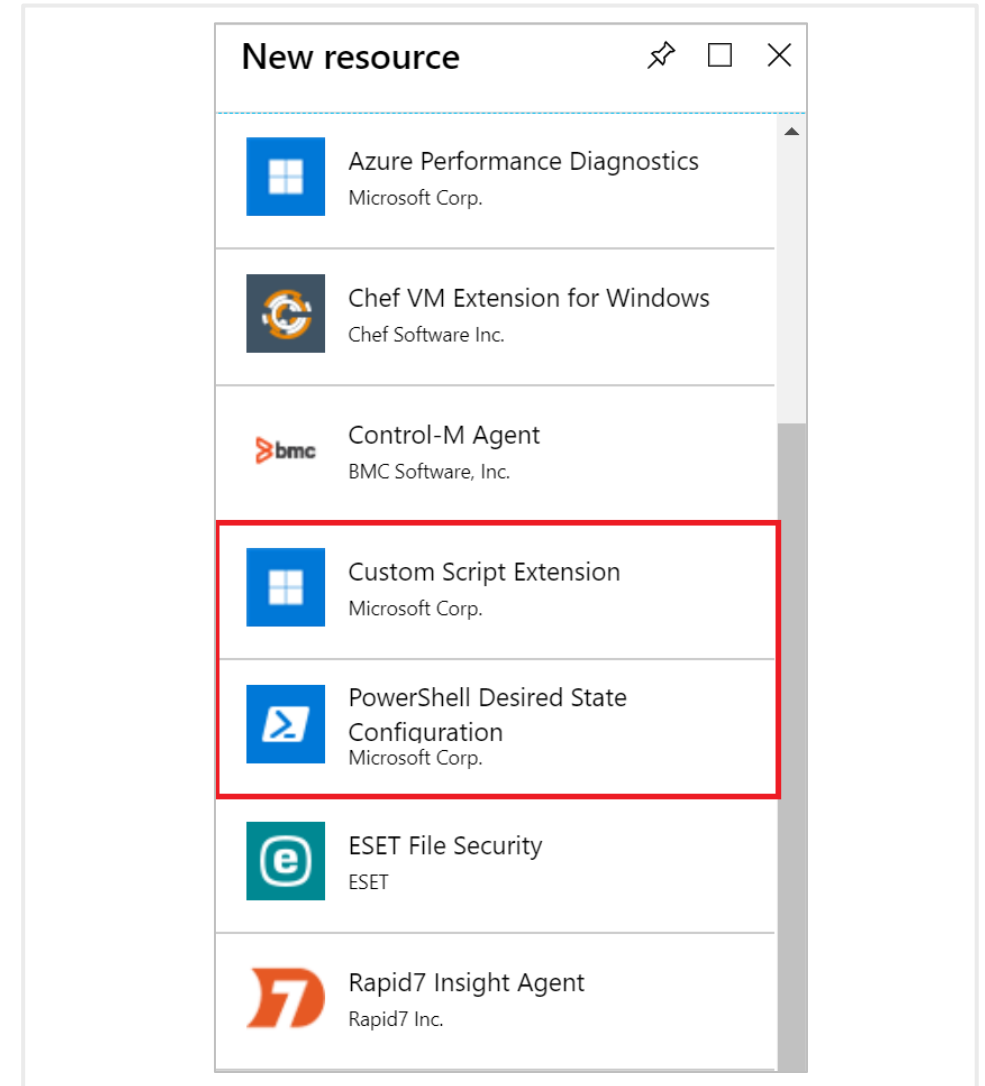
Implement Virtual Machine Extensions

Extensions are small applications that provide post-deployment VM configuration and automation tasks

Managed with Azure CLI, PowerShell, Azure Resource Manager templates, and the Azure portal

Bundled with a new VM deployment or run against any existing system

Different for Windows and Linux machines



Implement Custom Script Extensions

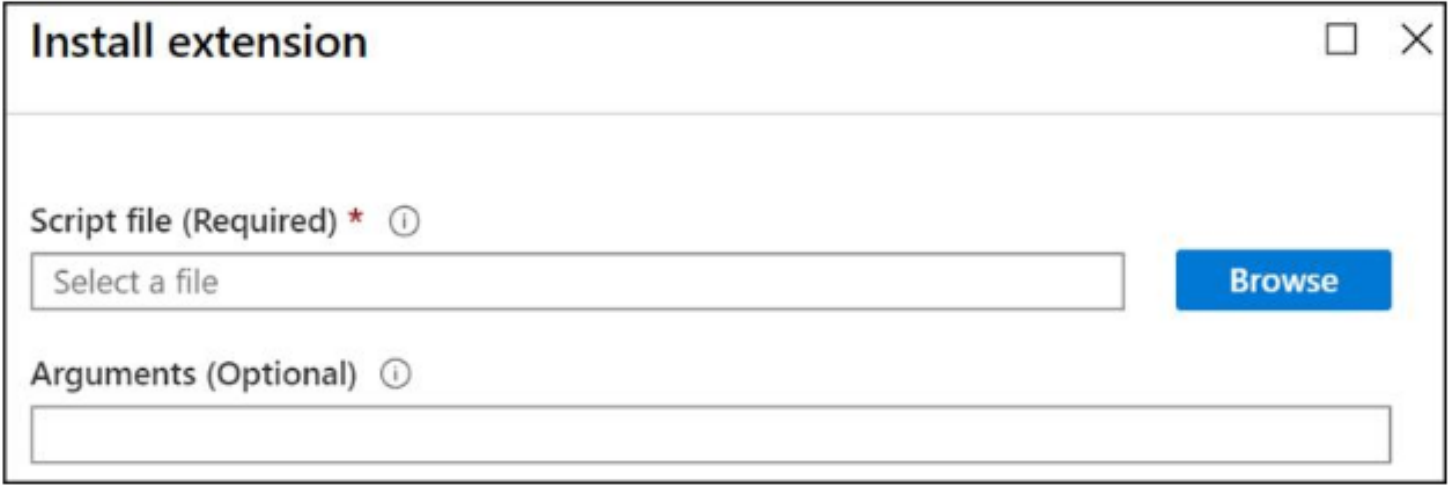
Extension scripts can be simple or complex

Extensions have 90 minutes to run

Double check dependencies to ensure availability

Account for any errors that might occur

Protect/encrypt sensitive information



The screenshot shows a dialog box titled "Install extension" with a close button (X) in the top right corner. Inside the dialog, there are two main sections. The first section is labeled "Script file (Required) *" with an information icon (i) to its right. Below this label is a text input field containing the placeholder text "Select a file". To the right of this input field is a blue button labeled "Browse". The second section is labeled "Arguments (Optional)" with an information icon (i) to its right. Below this label is a large, empty text input field.

Implement Desired State Configuration

Configuration block(s) have a name

Node blocks define the computers or VMs that you are configuring

Resource block(s) configure the resource and its properties

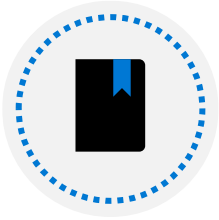
There are many built-in configuration resources

```
configuration IISInstall
{
    Node "localhost"
    {
        WindowsFeature IIS
        {
            Ensure = "Present"
            Name = "Web-Server"
        }
    }
}
```

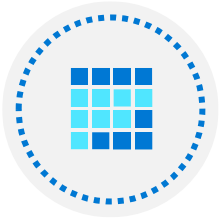
Demonstration – Custom Script Extension



Verify the Web Server feature is available on a virtual machine



Create a PowerShell script file to install the Web Server



Configure an Extension in the Portal to run the script



Verify the Web Server feature was installed

Summary and Resources - Configure Virtual Machine Extensions

Knowledge Check Questions



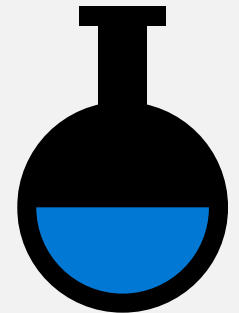
Microsoft Learn Modules (docs.microsoft.com/Learn)

[Automate the configuration of Windows Server IaaS Virtual Machines](#)

[Protect your virtual machine settings with Azure Automation State Configuration \(Sandbox\)](#)

A *sandbox* indicates a hands-on exercise.

Lab 08 – Manage Virtual Machines



Lab 08 – Manage Virtual Machines

Lab scenario

You are tasked with identifying different options for deploying and configuring Azure Virtual Machines

Objectives

Task 1:

Deploy zone-resilient Virtual Machines in the Azure portal and with templates

Task 2:

Configure Azure Virtual Machines by using virtual machine extensions

Task 3:

Scale compute and storage for Azure Virtual Machines

Task 4:

Deploy zone-resilient scale sets by using the Azure portal

Task 5:

Configure Azure virtual machine scale sets by using extensions

Task 6:

Scale compute and storage for Azure virtual machine scale sets

Next slide for an architecture diagram 

Lab 08 – Architecture diagram

Task 1



az104-08-rg01



az104-06-vnet01 10.80.0.0/20

Subnet0 10.80.0.0/24



az104-08-vm0
10.80.0.4

Zone1



az104-08-vm1
10.80.0.5

Zone2

Task 2



az10408rg01diag938



scripts



az104-08-install_IIS.ps1

Task 3, Task 4, Task 5, Task 6, Task 7



az104-08-rg02



az104-08-rg02-vnet 10.82.0.0/20

Subnet0 10.82.0.0/24



az10408vmss0



az10408vmss0-lb



az10408vmss0-nsg



az10408vmss0-ip

End of presentation

