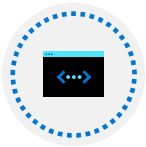
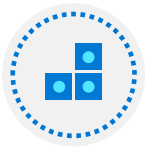
Microsoft Azure

AZ-104T00A
Module 08:
Azure Virtual Machines

Module Overview



Lesson 01: Virtual Machine Planning



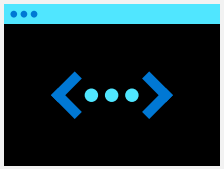
Lesson 02: Creating Virtual Machines

Lesson 03: Virtual Machine Availability

Lesson 04: Virtual Machine Extensions

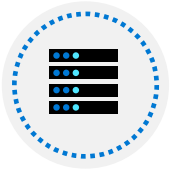
Lesson 05: Module 08 Lab and Review

Lesson 01: Virtual Machine Planning



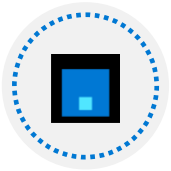
Virtual Machine Planning Overview

IaaS Cloud Services



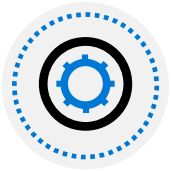
Virtual Machine Disks

Planning Checklist



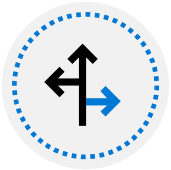
Storage Options

Location and Pricing



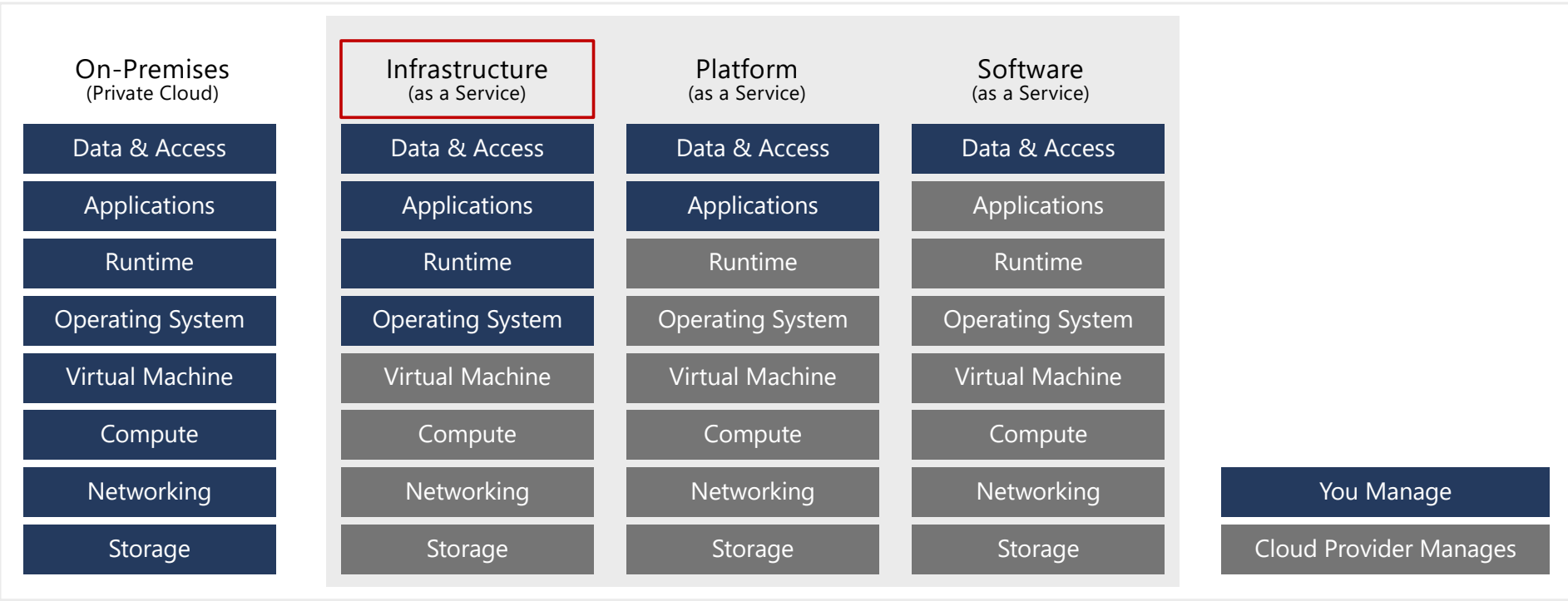
Supported Operating Systems

Virtual Machine Sizing



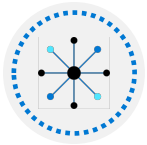
Virtual Machine Connections

IaaS Cloud Services



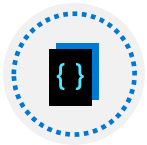
Test and development, website hosting, storage, backup, recovery, high-performance computing, big data analysis, and extended data center

Planning Checklist

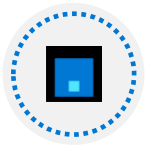


Start with the network

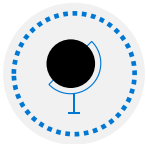
Understand the pricing model



Name the VM



Consider storage for the VM



Decide the location for the VM

Select an operating system

Determine the size of the VM

Location and Pricing

Location:

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

Pricing:

- Compute costs
- Storage costs (consumption-based and reserved instances)

60+ Azure regions
Available in 140 countries

Virtual Machine Sizing

A Series - Entry-level for dev/test

B Series – Economical bursting

D Series – General purpose compute

Dc Series – Protect data in use

E Series – In-memory hyper-threaded applications optimized

F Series – Compute optimized

G Series – Memory and storage optimized

H Series - High performance computing

L Series – Storage optimized

M Series – Memory optimized

Mv2 Series – Largest memory optimized

N Series – GPU enabled

Virtual Machine Storage

Each Azure VM has two or more disks:

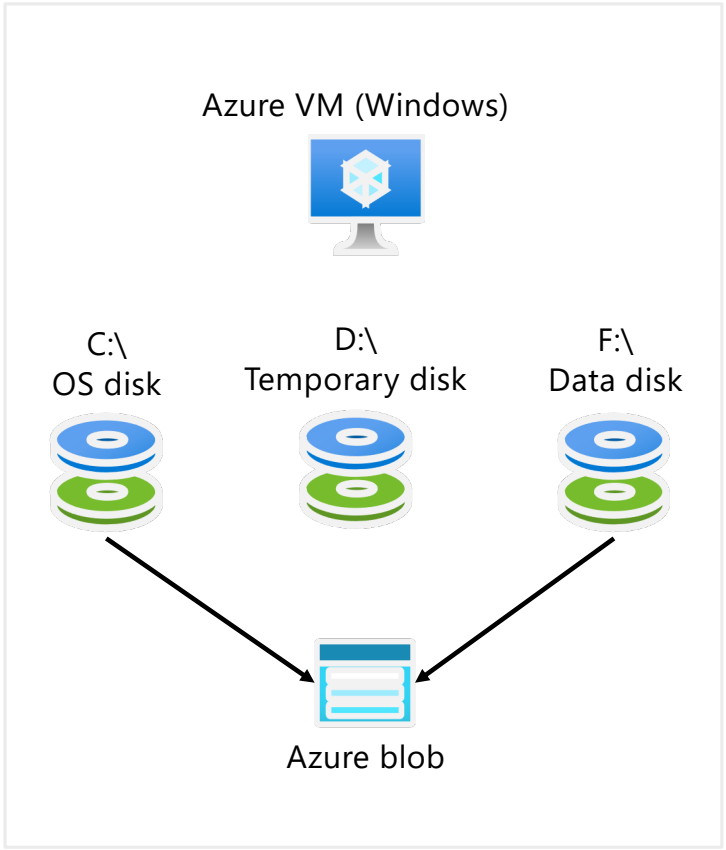
- OS disk
- Temporary disk (contents can be lost)
- Data disks (optional)

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



Disk Comparison

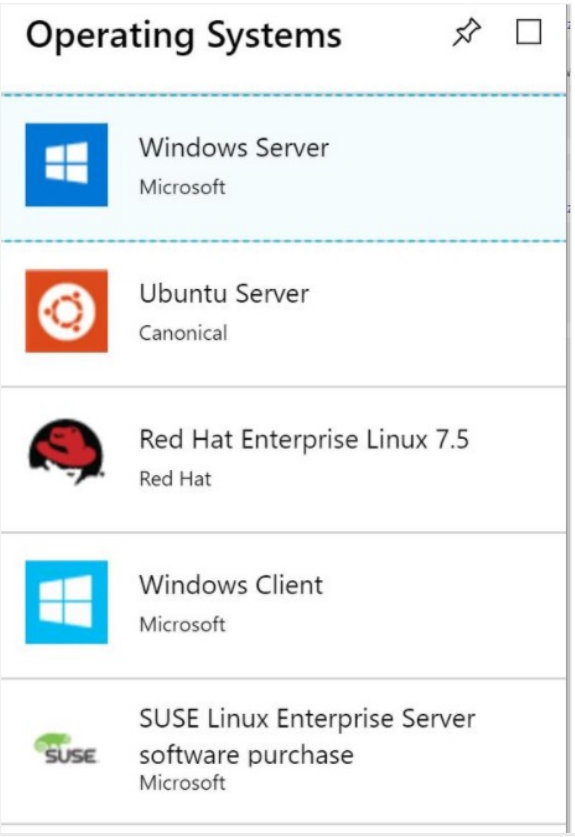
Detail	Ultra disk	Premium SSD	Standard SSD	Standard HDD
Disk type	SSD	SSD	SSD	HDD
Scenario	IO-intensive workloads such as SAP HANA, top tier databases (for example, SQL, Oracle), and other transaction-heavy workloads.	Production and performance sensitive workloads	Web servers, lightly used enterprise applications and dev/test	Backup, non-critical, infrequent access
Max disk size	65,536 gibibyte (GiB)	32,767 GiB	32,767 GiB	32,767 GiB
Max throughput	2,000 MB/s	900 MB/s	750 MB/s	500 MB/s
Max IOPS	160,000	20,000	6,000	2,000

* Ultra disks limited to selective regions, and limited redundancy design

Supported Operating Systems

Windows Server includes many common products, requires a license, doesn't support OS upgrades

Linux distributions are supported, upgrade of the OS is supported

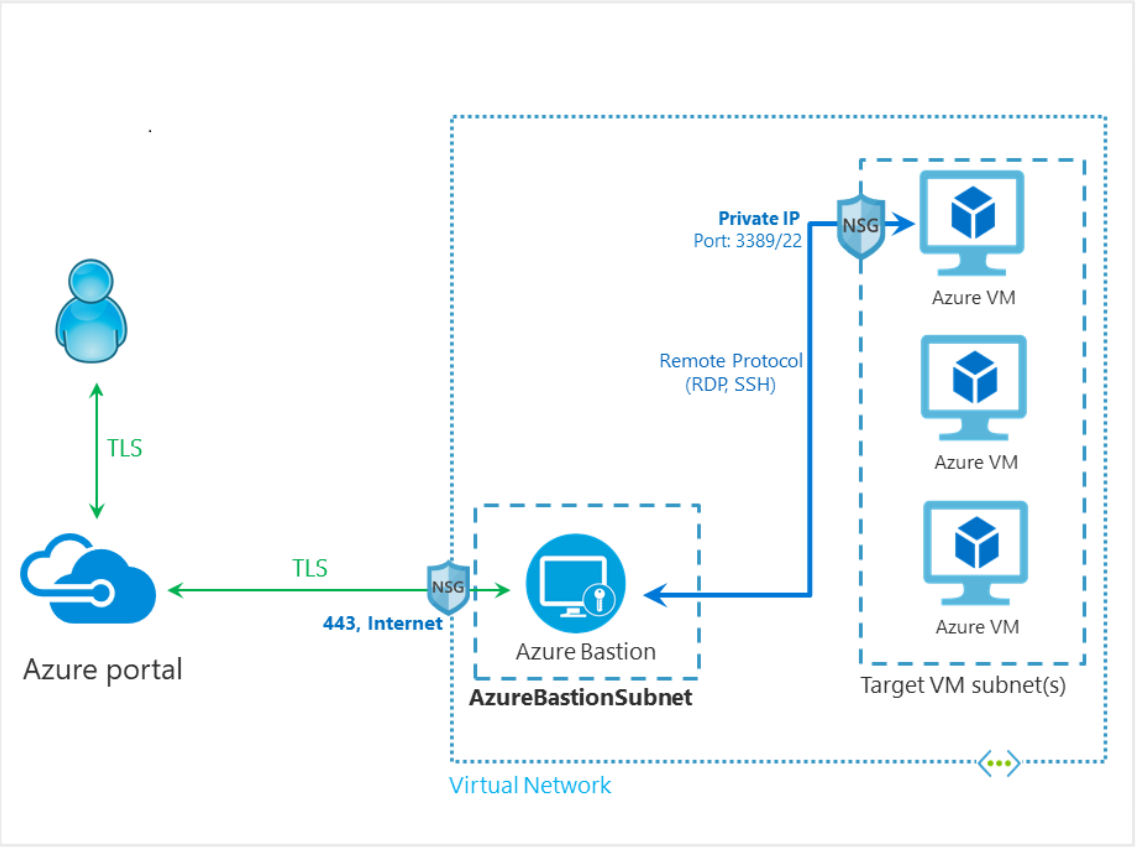


Virtual Machine Connections

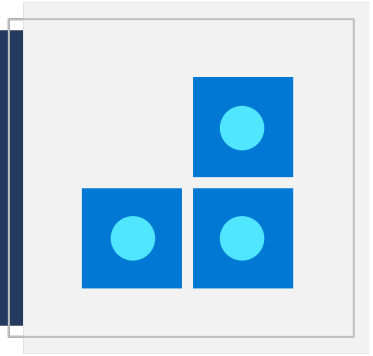
Remote Desktop Protocol for Windows-based Virtual Machines

Secure Shell Protocol for Linux based Virtual Machines

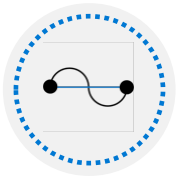
Bastion Subnet for RDP/SSH through the Portal over SSL



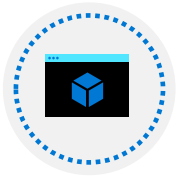
Lesson 02: Creating Virtual Machines



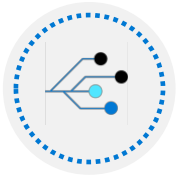
Creating Virtual Machines Overview



Creating Virtual Machines in the Portal



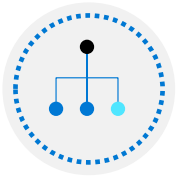
Windows Virtual Machines



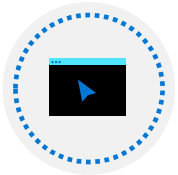
Windows VM Connections

Demonstration – Creating a VM in the Portal

Linux Virtual Machines



Linux VM Connections



Demonstration – Connect to Linux Virtual Machines

Creating Virtual Machines in the Portal

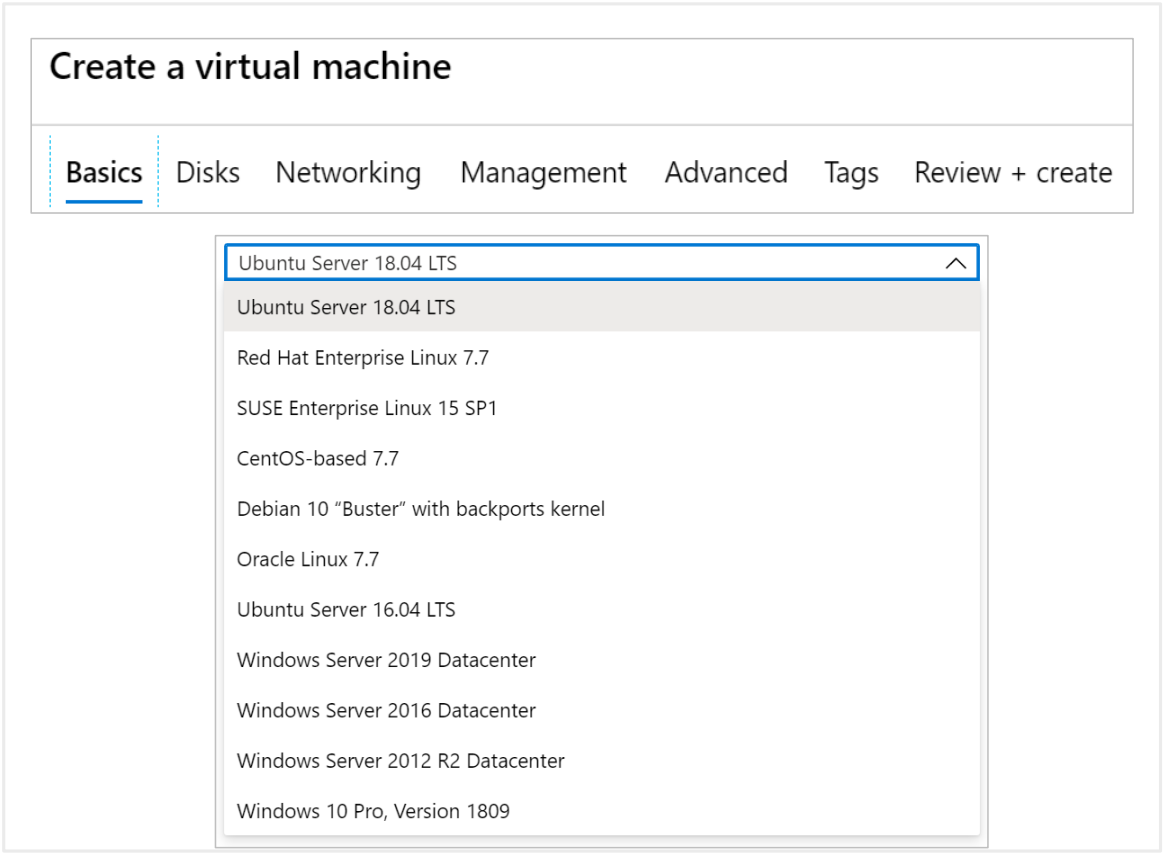
Basic (required) – Project details, Administrator account, Inbound port rules

Disks – OS disk type, data disks

Networking – Virtual networks, load balancing

Management – Monitoring, Auto-shutdown, Backup

Advanced – Add additional configuration, agents, scripts or applications



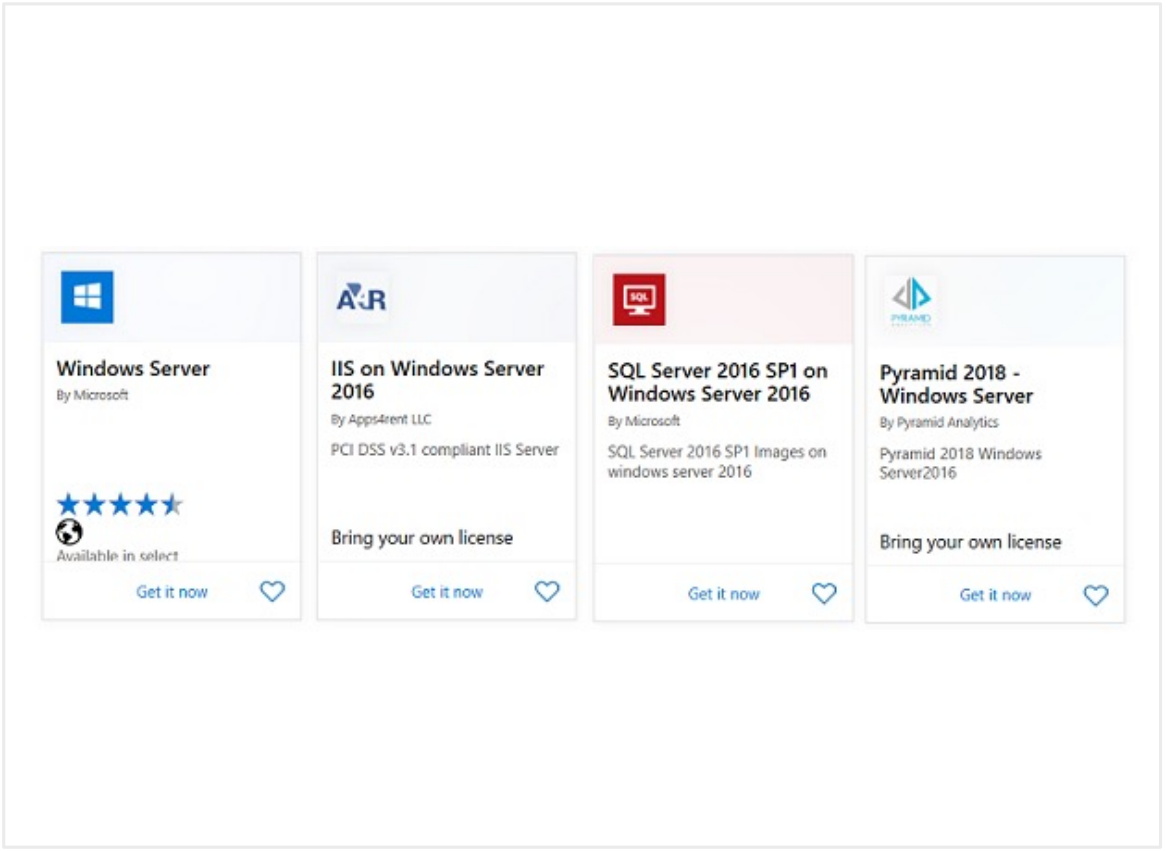
Windows Virtual Machines

Unique hybrid capabilities

Advanced multi-layer security

Faster innovation for applications

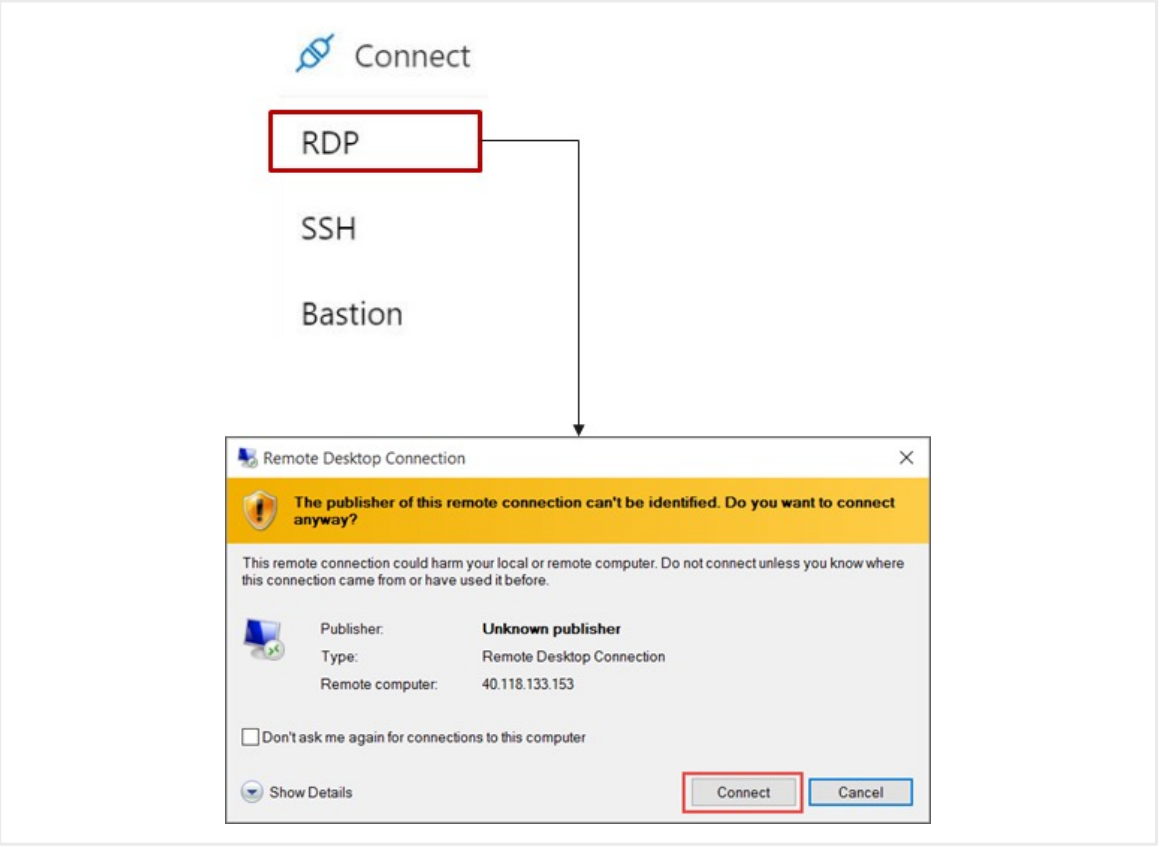
Unprecedented hyper-converged infrastructure



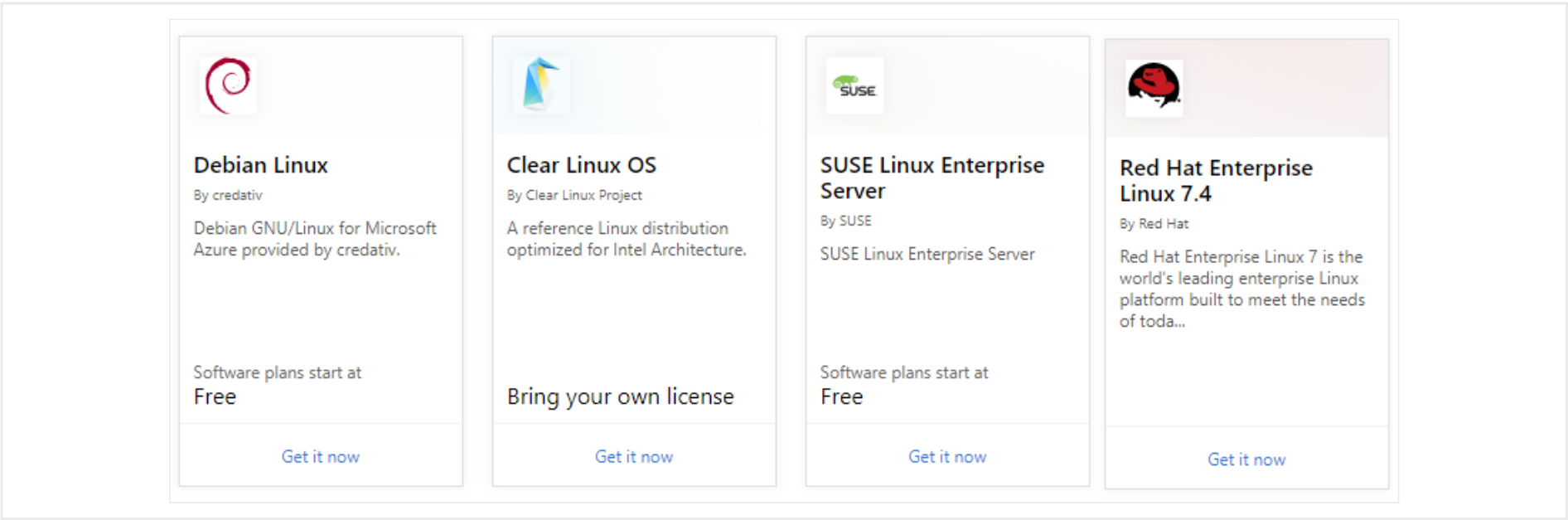
Windows VM Connections

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

WinRM creates a command-line session so can run scripts



Linux Virtual Machines

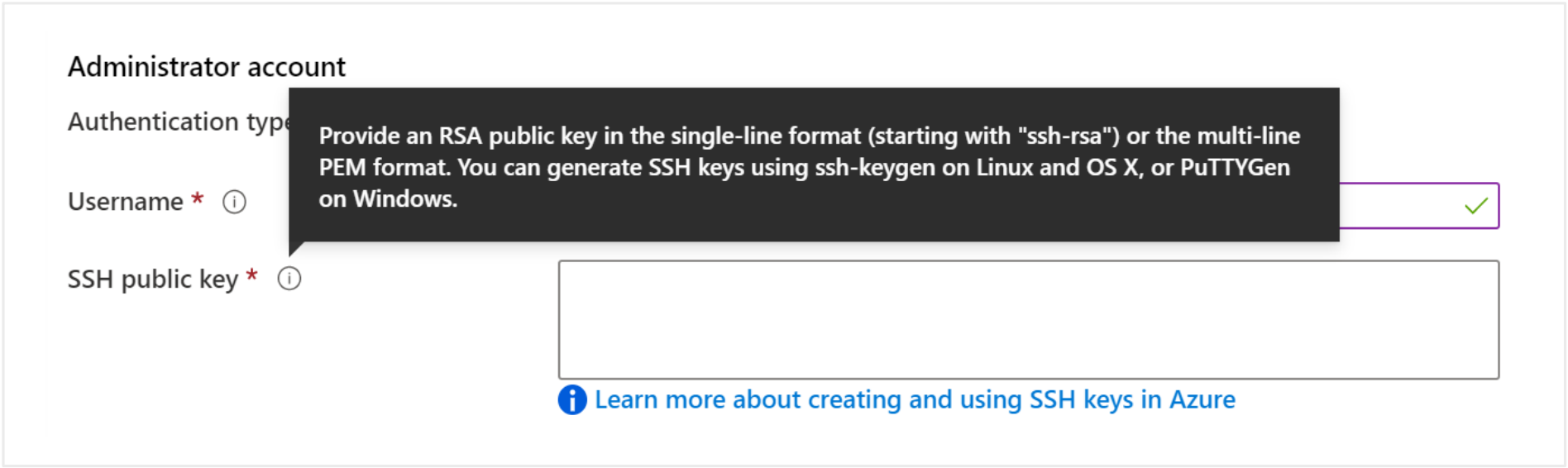


Hundreds of community-built images in the Azure Marketplace

Linux has the same deployment options as for Windows VMs

Manage Linux VMs with many popular open-source DevOps tools

Linux VM Connections



Authenticate with a SSH public key or password

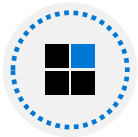
SSH is an encrypted connection protocol that allows secure logins over unsecured connections

There are public and private keys

Lesson 03: Virtual Machine Availability

Virtual Machine Availability Overview

Maintenance and Downtime



Availability Sets

Update and Fault Domains

Availability Zones

Scaling Concepts

Scale Sets

Implementing Scale Sets

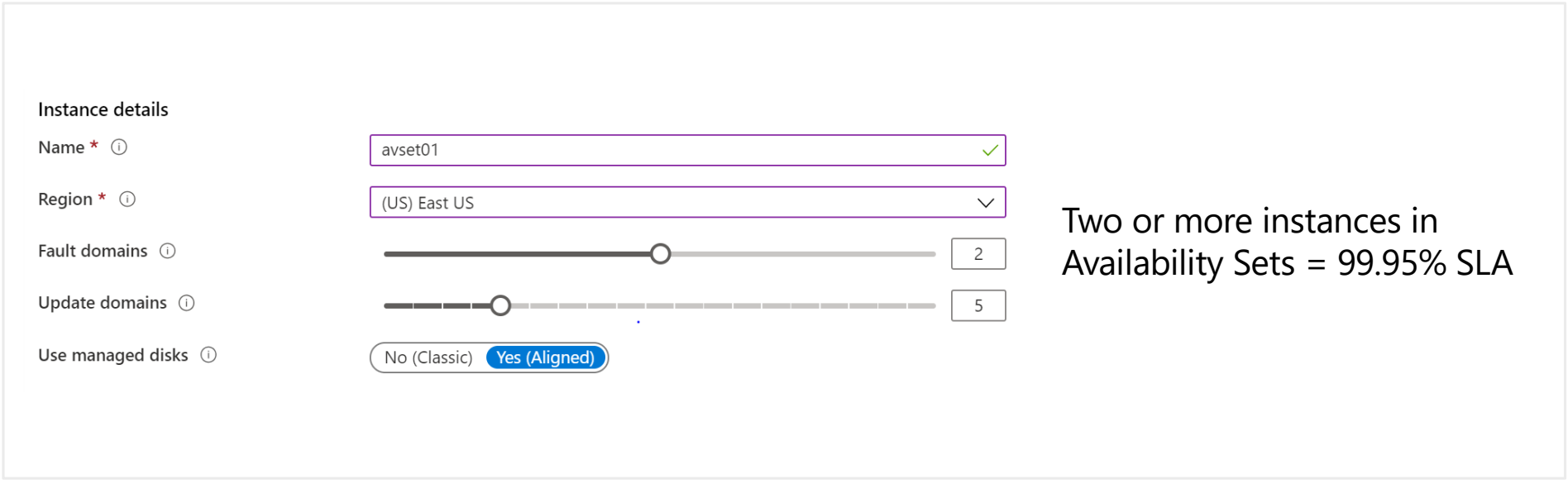
Autoscale

Implementing Autoscale

Maintenance vs. 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

Availability Sets



Two or more instances in Availability Sets = 99.95% SLA

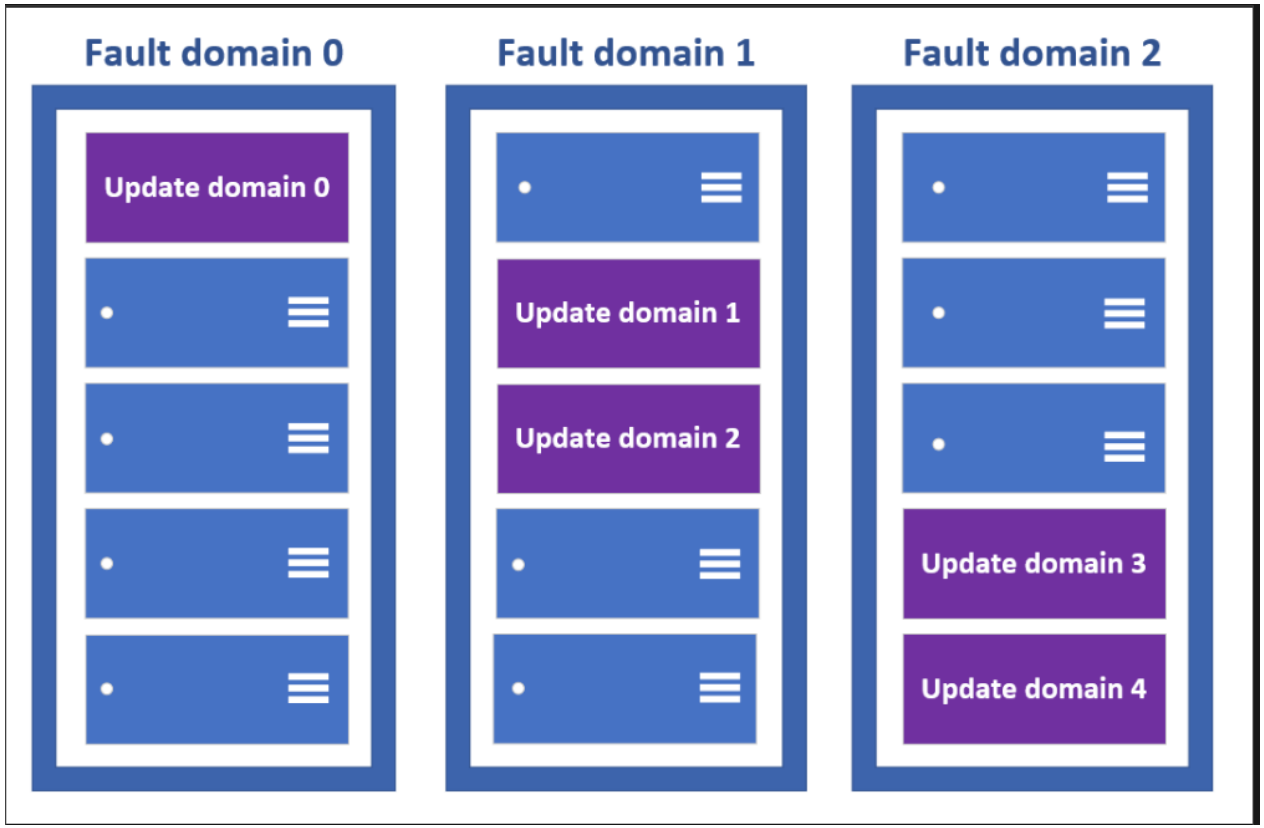
Configure multiple Virtual Machines in an Availability Set

Configure each application tier into separate Availability Sets

Combine a Load Balancer with Availability Sets

Use managed disks with the Virtual Machines

Update and Fault Domain



Availability Zones

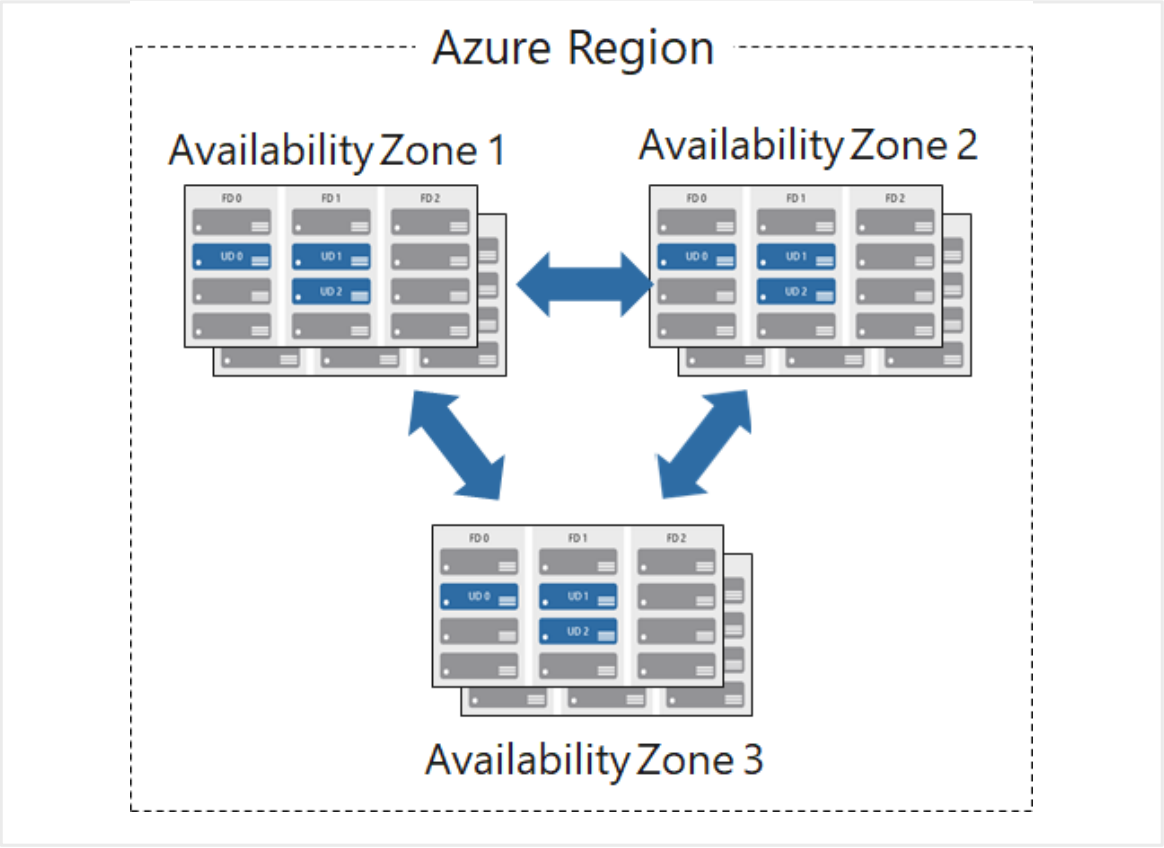
Unique physical locations in a region

Includes datacenters with independent power, cooling, and networking

Protects from datacenter failures

Combines update and fault domains

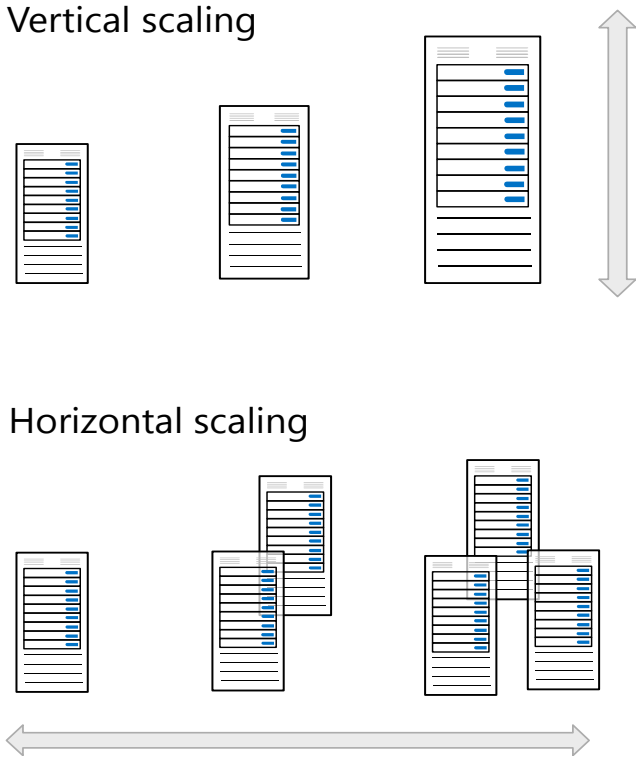
Provides 99.99% SLA



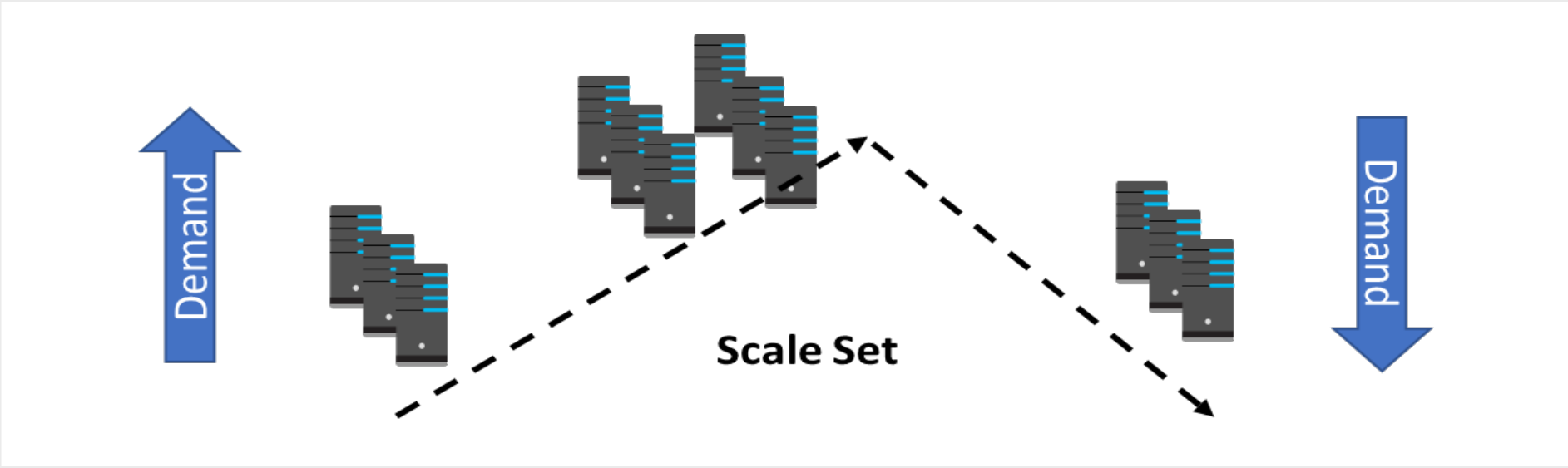
Scaling Concepts

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



Scale Sets



Scale sets deploy a set of identical VMs

No pre-provisioning of VMs is required

As demand goes up VMs are added

As demand goes down VM are removed

The process can be manual, automated, or a combination of both

Implementing Scale Sets

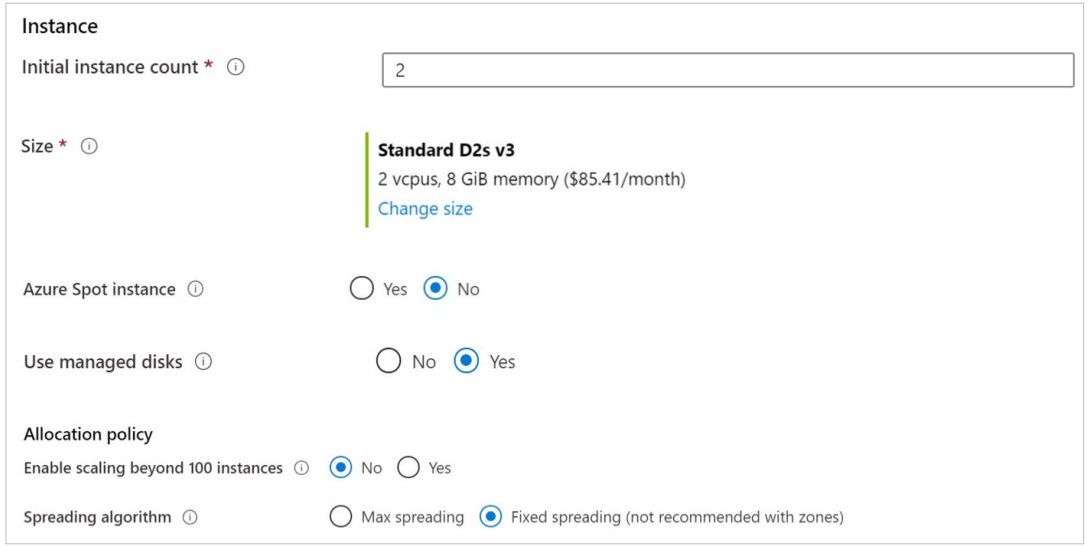
Instance count. Number of VMs in the scale set (0 to 1000)

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

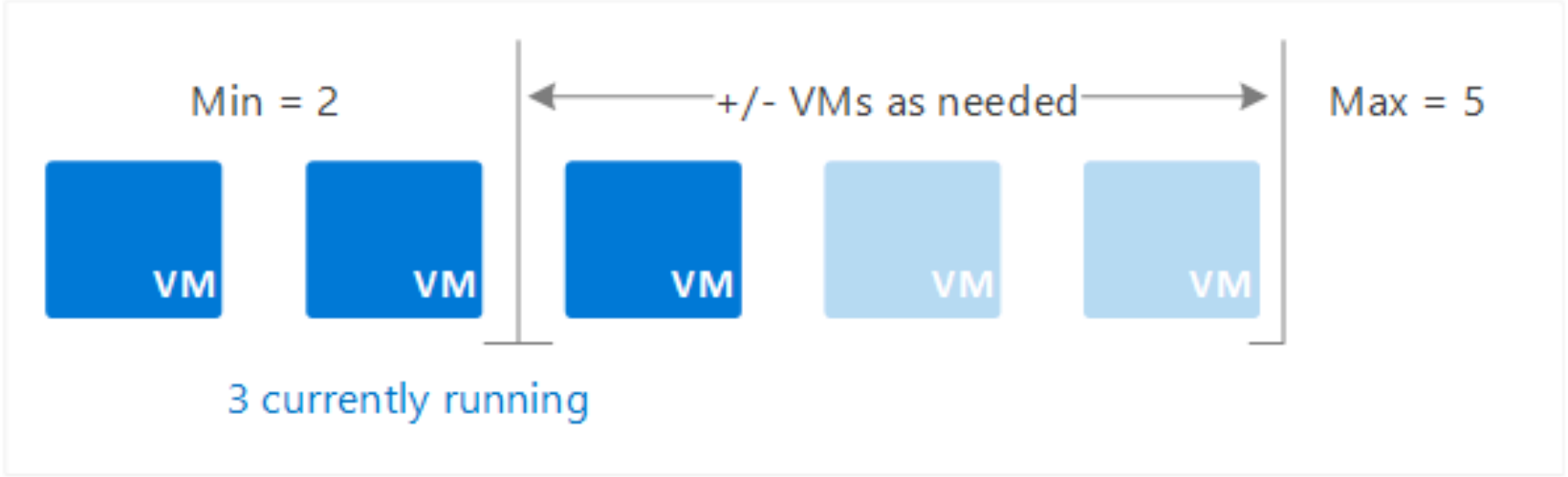
Azure Spot Instance. Unused capacity at a discounted rate

Use managed disks

Enable scaling beyond 100 instances



Autoscale



Define rules to automatically adjust capacity

Scale out (increase) the number of VMs in the set

Scale in (reduce) the number of VMs in the set

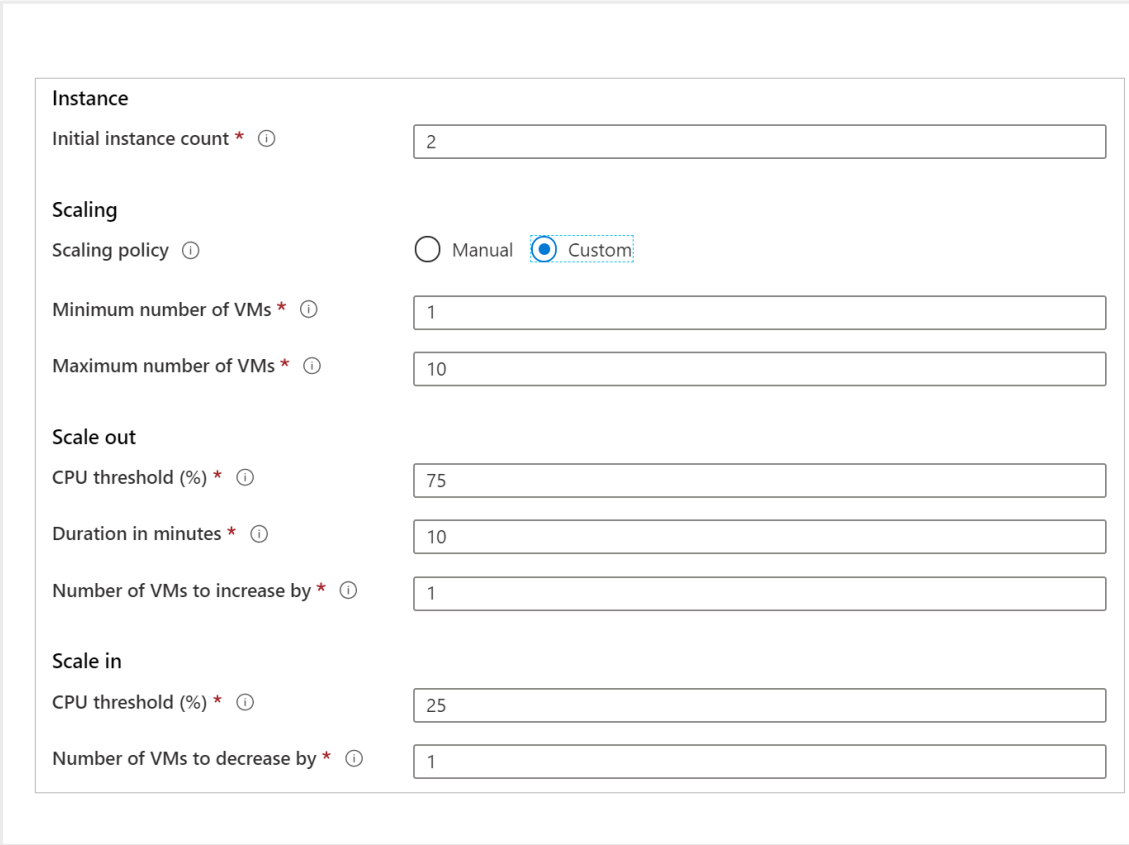
Schedule events to increase or decrease at a fixed time

Reduces monitoring and optimizes performance

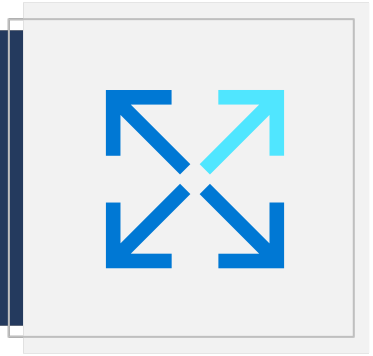
Implementing Autoscale

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

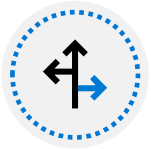
Create more advanced scale sets with scale out and scale in parameters



Lesson 04: Virtual Machine Extensions



Virtual Machine Extensions Overview



Virtual Machine Extensions

Custom Script Extensions

Desired State Configuration

Demonstration – Custom Script Extension

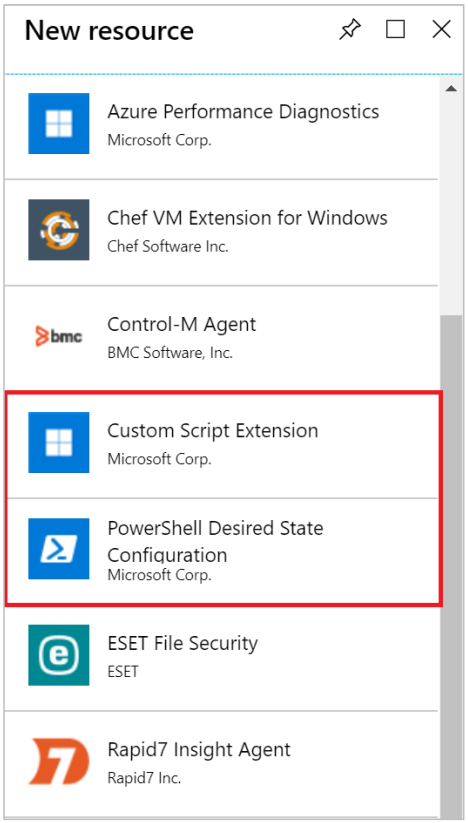
Virtual Machine Extensions

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

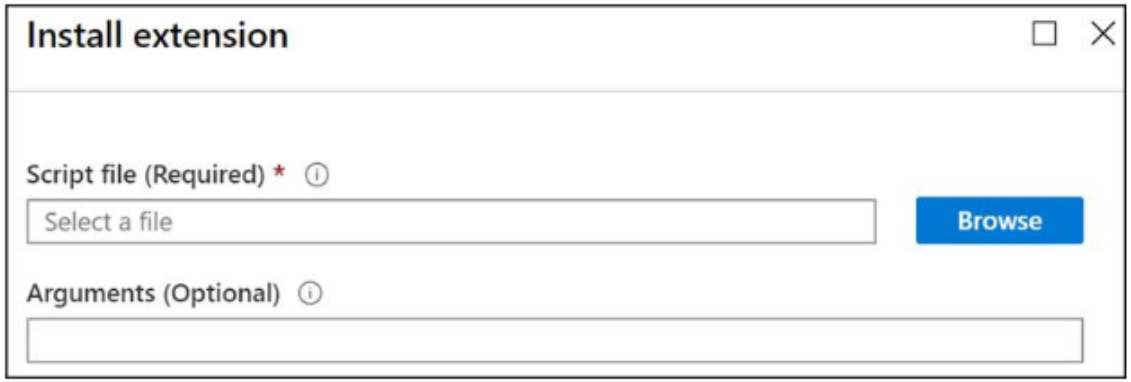
Bundled with a new VM deployment or run against any existing system

Different for Windows and Linux machines



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



Desired State Configuration

Configuration block(s) have a name

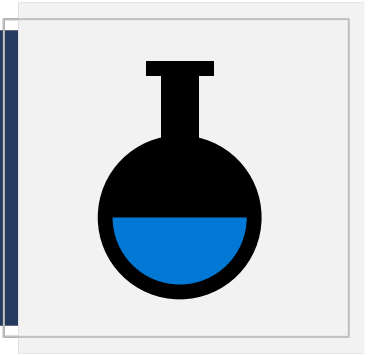
Node blocks define the computers or VMs that you are configuring

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”
 }
 }
}
```

Lesson 05: Module 08 Lab and Review



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

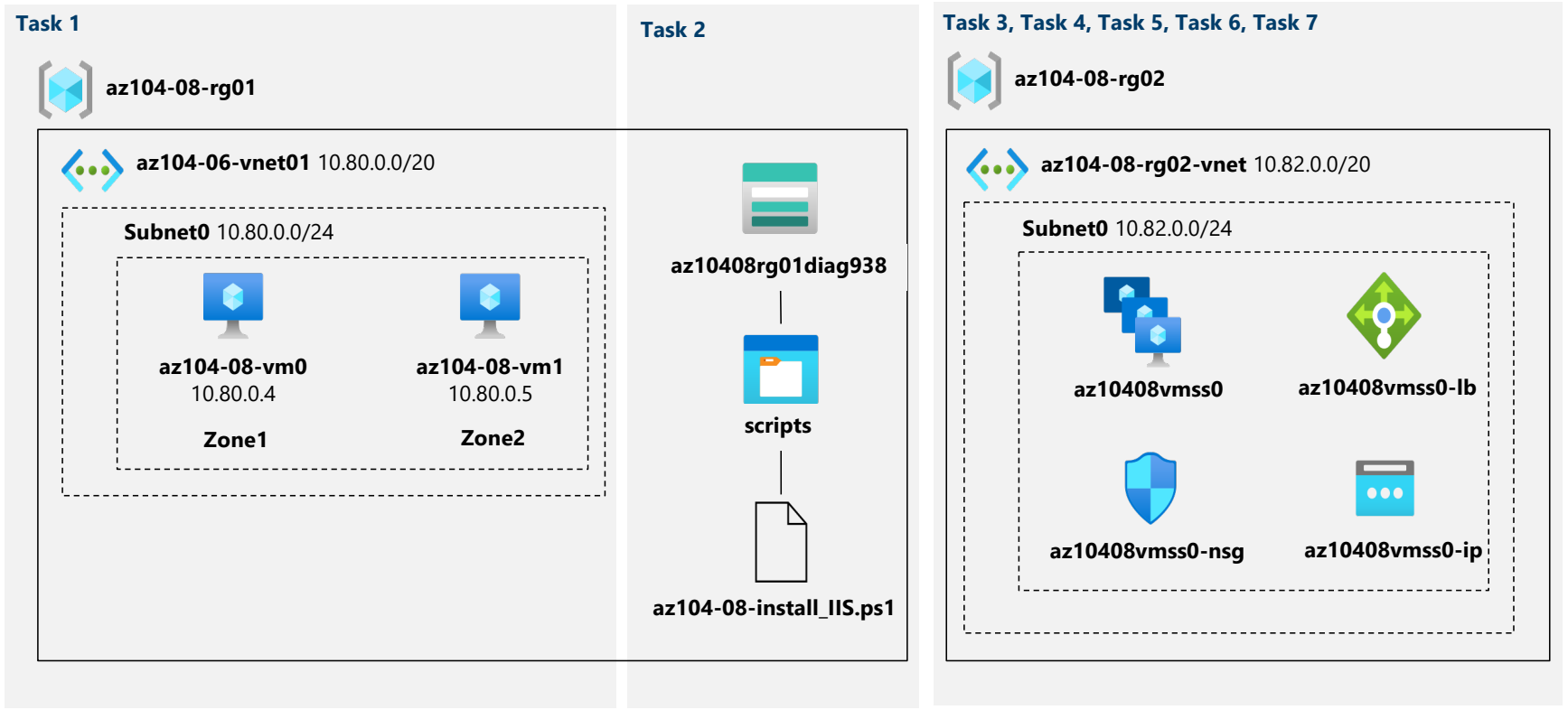
Task 4:
Deploy zone-resilient scale sets by using the Azure portal

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



Module Review

Module Review Questions

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

Build a scalable application with virtual machine scale sets

Deploy Azure Virtual Machines from VHD templates

Choose the right disk storage for your virtual machine workload

Add and size disks in Azure Virtual Machines

Protect your virtual machine settings with Azure Automation State Configuration

Connect to virtual machines through the Azure portal by using Azure Bastion

End of presentation