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Administer Azure Virtual Machines

Learning Objectives

01

Configure Virtual Machines

02

Configure Virtual Machine availability



Planning VMs

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- A repeatable way to deliver software and infrastructure code to its destination
- Build and test code
- Deploy to on-prem or cloud resources
- CICD isn't just for software developers. It's also for infrastructure pros

Shared Responsibility Model

Responsibility	SaaS	PaaS	IaaS	On-Premises
Responsibility always owned by the customer	Information & data	●	●	●
	Devices	●	●	●
	Accounts & identities	●	●	●
Responsibility changes by service type	Identity & directory infrastructure	●	●	●
	Applications	●	●	●
	Network controls	●	●	●
Responsibility handovers to cloud provider	Operating system	●	●	●
	Physical hosts	●	●	●
	Physical network	●	●	●
	Physical datacenter	●	●	●

● Customer ● Microsoft

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Image source: <https://docs.microsoft.com/en-us/azure/security/fundamentals/shared-responsibility>

Virtual Machine Planning

We need to plan certain aspects before deploying our virtual machines.

Networking



- Plan address spaces
- Consider VM count
- Avoid overlaps

Naming



- Use naming convention
- Include environment, role, service
- Add region details

Location



- Check VM sizes
- Consider cost
- Prioritize proximity
- 60+ Azure regions

Pricing



- Explore pricing models
- Consider Pay-as-You-Go
- Evaluate Reserved Instances
- Use Spot VMs for low priority
- Reduce licensing costs with Azure Hybrid Benefit



Managing VM Sizes

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Virtual Machine Sizing

Choosing the virtual machine size and family depends on what type of workload you are running. Azure offers different VM families targeting different types of workloads.

Type	Sizes	Targeted Workloads
General purpose	B, Dsv3, Dv3, Dasv4, Dav4, DSv2, Dv2, Av2, DC, DCv2, Dv4, Dsv4, Ddv4, Ddsv4, Dv5, Dsv5, Ddv5, Ddsv5, Dasv5, Dadsv5	Balanced CPU-to-memory ratio. Ideal for testing and development, small to medium databases, and low to medium traffic web servers.
Compute optimized	F, Fs, Fsv2, FX	High CPU-to-memory ratio. Good for medium traffic web servers, network appliances, batch processes, and application servers.
Memory optimized	Esv3, Ev3, Easv4, Eav4, Ebdsv5, Ebsv5, Ev4, Esv4, Edv4, Edsv4, Ev5, Esv5, Edv5, Edsv5, Easv5, Eadsv5, Mv2, M, DSv2, Dv2	High memory-to-CPU ratio. Great for relational database servers, medium to large caches, and in-memory analytics.

Virtual Machine Sizing

Type	Sizes	Targeted Workloads
Storage optimized	LSv2	High disk throughput and IO. Ideal for Big Data, SQL, NoSQL databases, data warehousing, and large transactional databases.
GPU	NC, NCv2, NCv3, NCasT4_v3, ND, NDv2, NV, NVv3, NVv4, NDasrA100_v4, NDm_A100_v4	Specialized virtual machines targeted for heavy graphic rendering and video editing, as well as model training and inferencing (ND) with deep learning. Available with single or multiple GPUs.
HPC	HB, HBv2, HBv3, HC, H	Our fastest and most powerful CPU virtual machines with optional high-throughput network interfaces (RDMA).
Confidential computing	DCsv2, DCsv3, and DCcsv3	Confidential computing allows you to isolate your sensitive data while it's being processed. Ideal for banks and hospitals which handle customer PII.

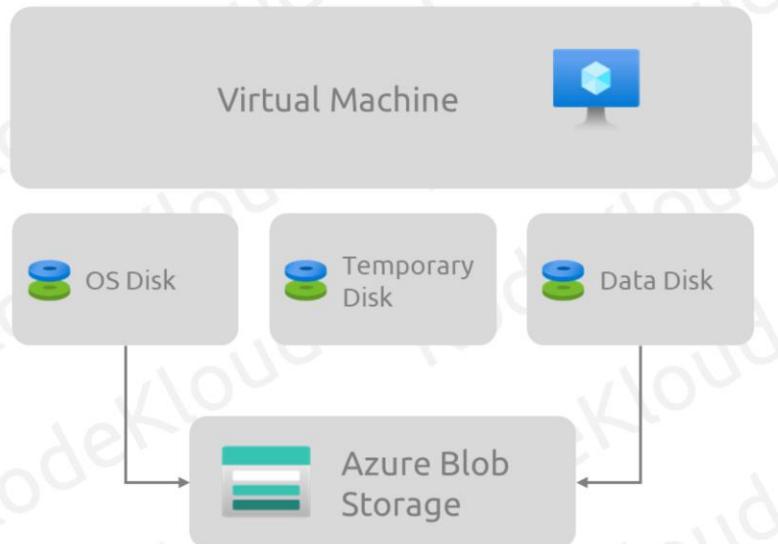


Virtual Machine Storage

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Virtual Machine Storage



Performance Tiers



- Choose disk tier
- Options: HDD, SSD
- Consider IOPS, cost
- Premium for intensive apps

Management



- Choose disk type
- Managed or Unmanaged
- Microsoft recommends Managed



Creating VMs

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Creating Virtual Machine (Portal)

Create a virtual machine ...

Basics (mandatory)

Subscription, Resource group, Region, VM
Image, Size, Port rules

Disks

Disk type, size, data disks

Networking

Virtual Network, subnet, NSG, load balancing

Management

Monitoring, Diagnostic Account, Azure AD
login, Backup, Auto-shutdown

Basics

Disks

Networking

Management

Advanced

Tags

Review + create

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription * ⓘ

Visual Studio Enterprise Subscription

Resource group * ⓘ

myRG

Create new

Instance details

Virtual machine name * ⓘ

vm-01

Region * ⓘ

(US) East US

Availability options ⓘ

No infrastructure redundancy required

Security type ⓘ

Standard

Image * ⓘ

Ubuntu Server 20.04 LTS - Gen2

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

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Create a virtual machine that runs Linux or Windows. Select an image from Azure marketplace or use your own customized image. Complete the Basics tab then Review + create to provision a virtual machine with default parameters or review each tab for full customization. [Learn more](#)

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

Creating Virtual Machine (PowerShell and Azure CLI)

```
PS > New-AzVm `  
-ResourceGroupName "web-rg" `  
-Name "vm-01" `  
-Location "East US" `  
-VirtualNetworkName "vm-01-vnet" `  
-SubnetName "default" `  
-SecurityGroupName "vm-01-nsg" `  
-PublicIpAddressName "vm-01-pip"
```

```
$ az vm create \  
--name vm-01 \  
--resource-group web-rg \  
--image UbuntuLTS \  
--location EastUS2 \  
--admin-username adminuser \  
--admin-password Pa$$w0rd1234
```



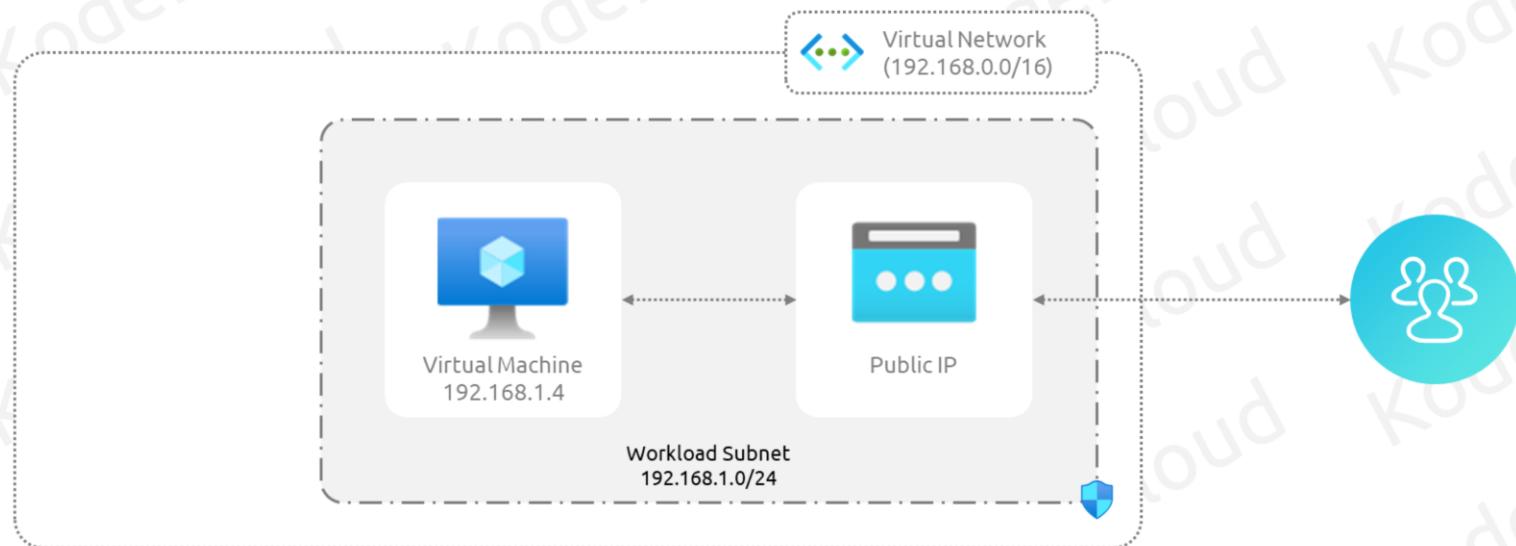
Connecting to VMs

Connecting to Virtual Machines

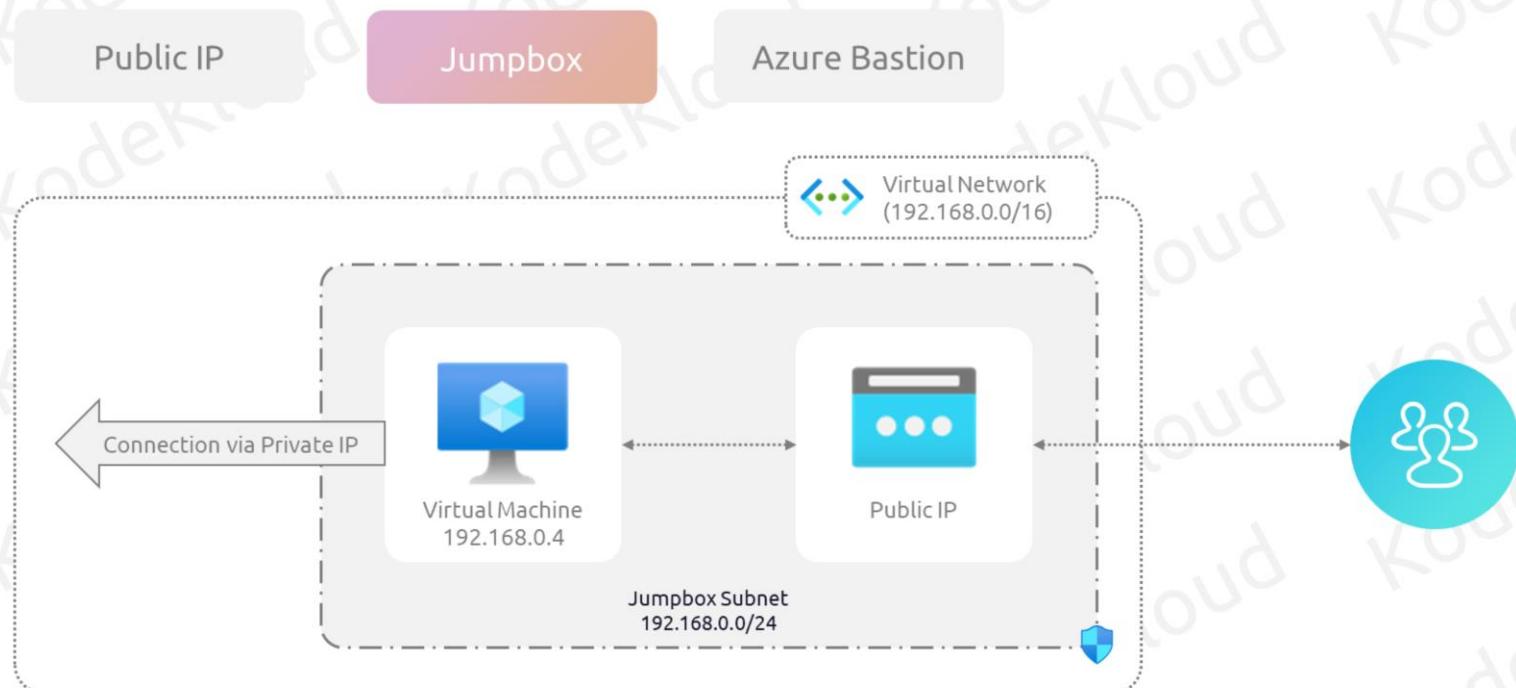
Public IP

Jumpbox

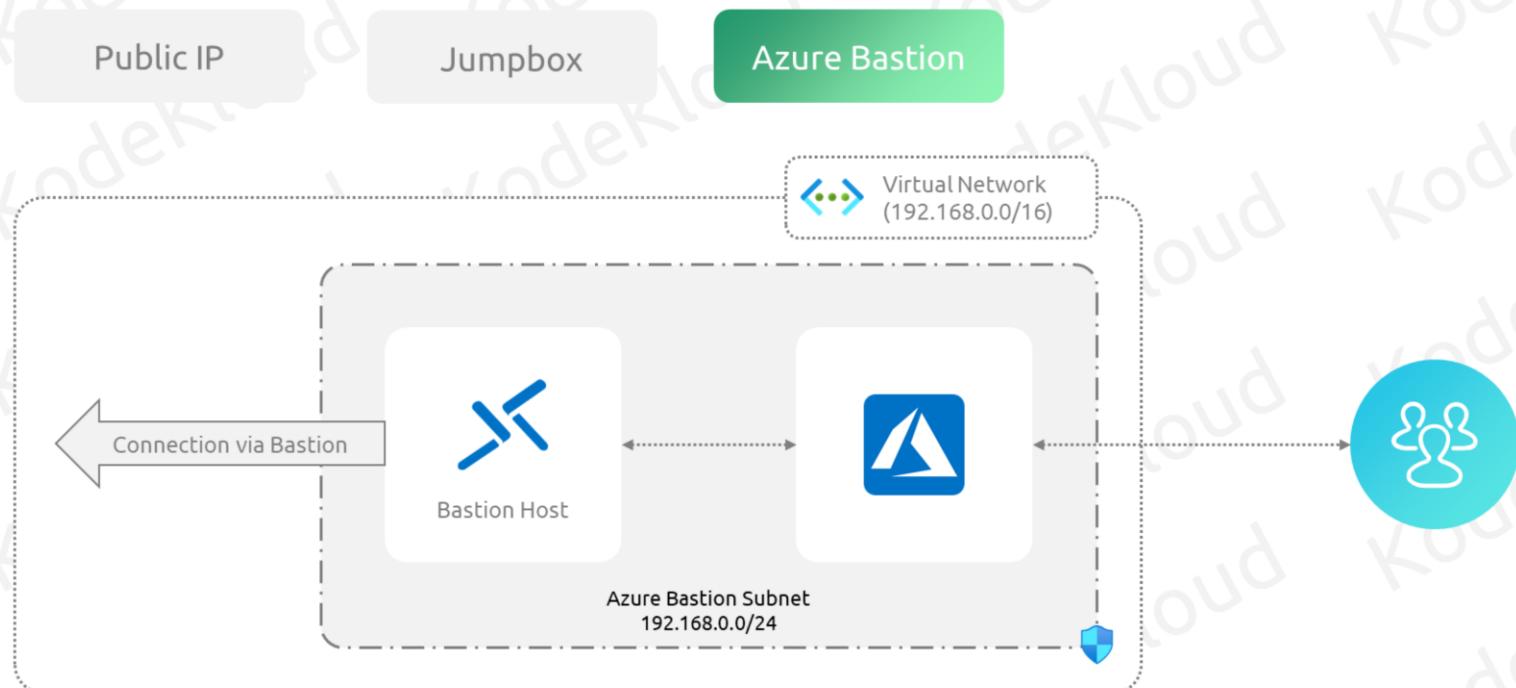
Azure Bastion



Connecting to Virtual Machines



Connecting to Virtual Machines



Connecting to Virtual Machines

Operating System



Protocol/Port

RDP (TCP/3389)

WinRM (TCP5986)

Authentication Method

Password

Certificates



SSH (TCP/22)

Password / Keys



Configuring High Availability

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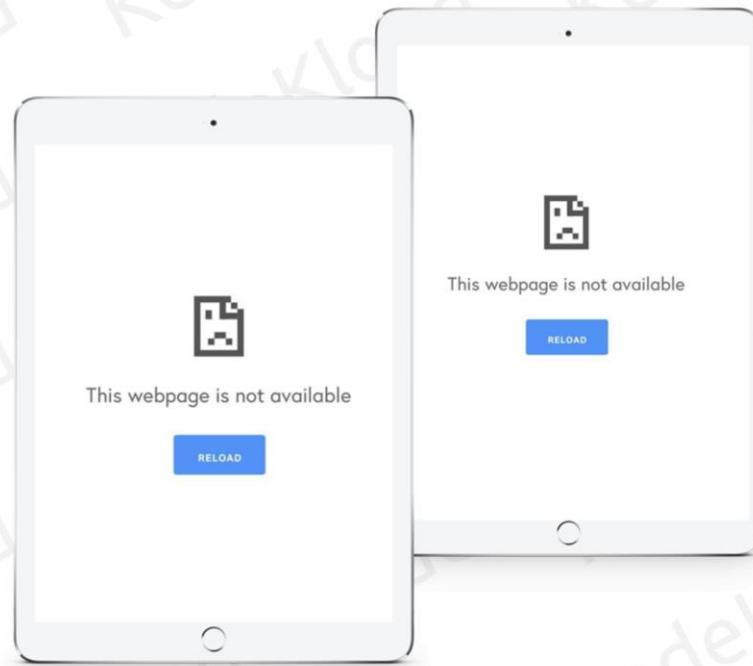
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Configuring High Availability

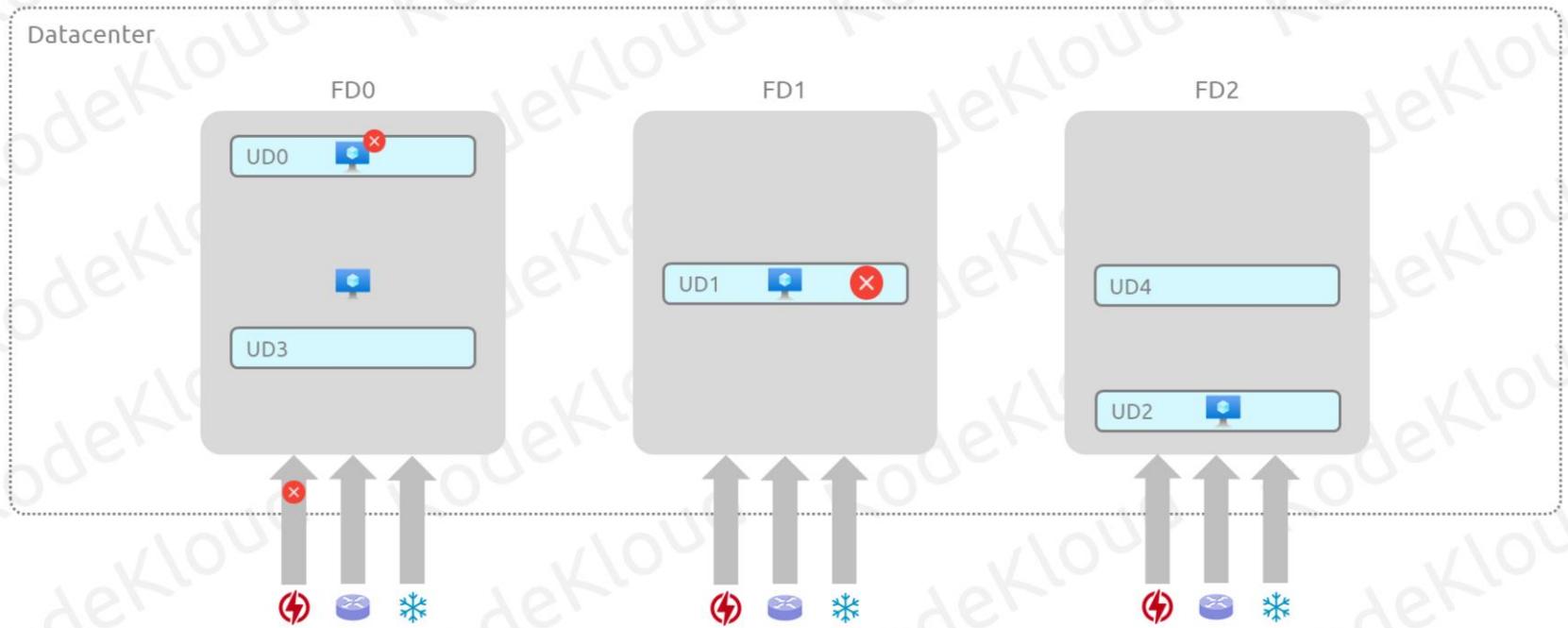
Unplanned hardware maintenance

Unexpected downtime

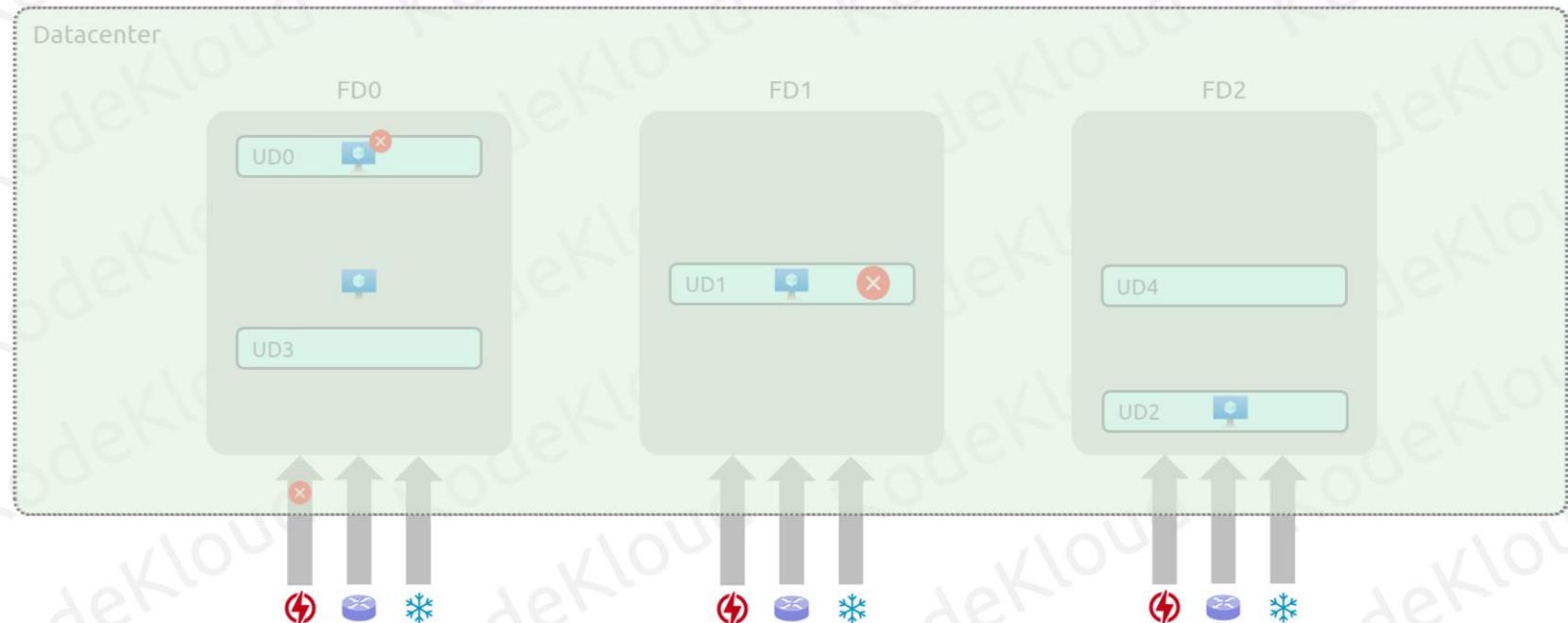
Planned maintenance



Availability Set



Availability Set



Availability Zones





Deploying VM Scale Sets

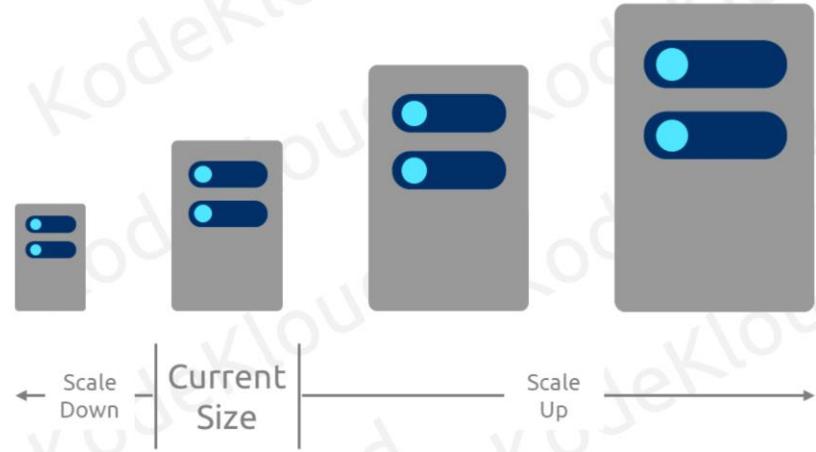
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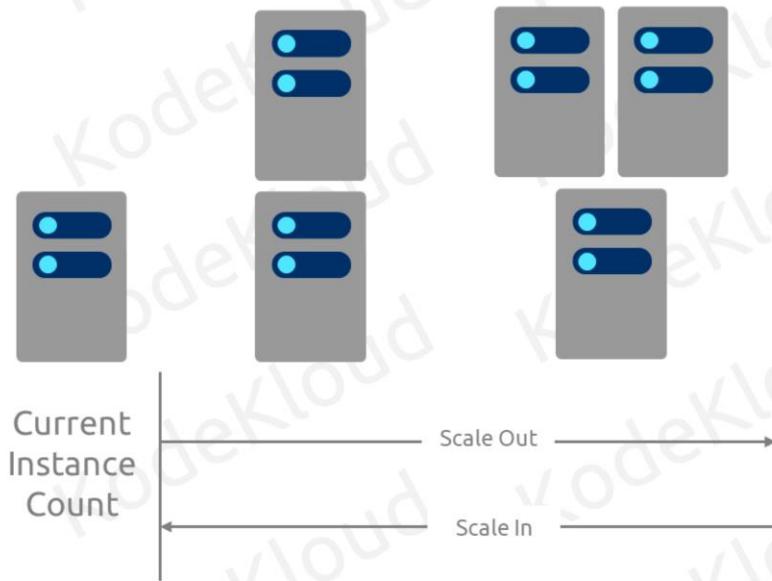
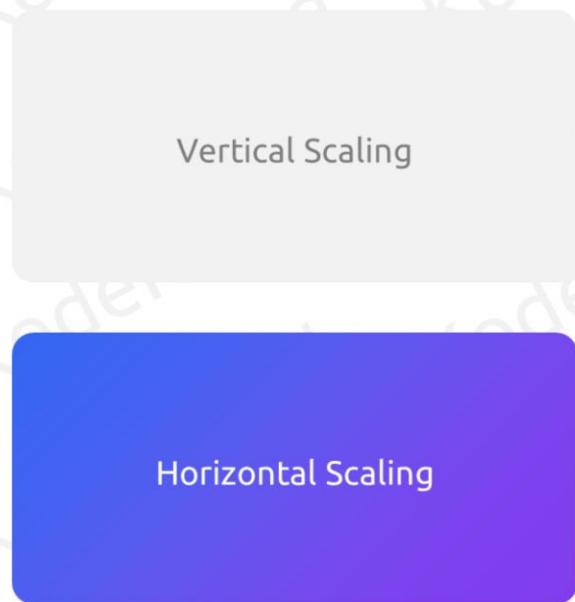
Deploying VM Scale Sets

Vertical Scaling

Horizontal Scaling



Deploying VM Scale Sets



Deploying VM Scale Sets

- Use VM Scale Set
- Create load-balanced VM group
- Manage with Azure Load Balancer
- Support for Application Gateway

Create a virtual machine scale set ...

Basics Disks Networking Scaling Management Health Advanced Tags Review + create

Azure virtual machine scale sets let you create and manage a group of load balanced VMs. The number of VM instances can automatically increase or decrease in response to demand or a defined schedule. Scale sets provide high availability to your applications, and allow you to centrally manage, configure, and update a large number of VMs.

[Learn more about virtual machine scale sets ↗](#)

Project details

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Subscription *

MSFT Dev/Test

Resource group *

demo-rg

[Create new](#)

Scale set details

Virtual machine scale set name *

vmss-01

Region *

(US) East US

Availability zone ⓘ

None

Deploying VM Scale Sets

- Adjust instances dynamically
- Schedule, metrics, on-demand
- Uniform base OS
- Shared configuration

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Availability zone ⓘ

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Deploying VM Scale Sets

- Distribute across zones
- High availability
- Access via other VMs
- Scale set resilience

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Deploying VM Scale Sets

- Marketplace, custom images: 1000 instances
- Managed image: Limit is 600

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