

# Module 06: Azure Virtual Machine



# Cloud Service Models

## On-Premises

Applications

Data

Runtime

Middleware

O/S

Virtualization

Servers

Storage

Networking

## Infrastructure (as a Service)

Applications

Data

Runtime

Middleware

O/S

Virtualization

Servers

Storage

Networking

## Platform (as a Service)

Applications

Data

Runtime

Middleware

O/S

Virtualization

Servers

Storage

Networking

## Software (as a Service)

Applications

Data

Runtime

Middleware

O/S

Virtualization

Servers

Storage

Networking

Client/User

Microsoft

# Virtual Machine



# Azure virtual machine creation checklist

- Before you create a VM, you should consider the following:

## Checklist

- ☒ Network configuration
- ☒ VM name
- ☒ Location
- ☒ Size
- ☒ Pricing model
- ☒ Storage
- ☒ Operating system

# Naming a VM

- The VM name is used as the computer name, which is configured as part of the operating system
- Rules:
  - Up to 15 characters for a Windows VM
  - Up to 64 characters for a Linux VM

# Naming a VM (continued)

Current best practices for VM name choices:

Element	Example	Notes
Environment	dev, prod, QA	Identifies the environment for the resource
Location	uw (US West), ue (US East)	Identifies the region into which the resource is deployed
Instance	01, 02	For resources that have more than one named instance (such as web servers)
Product or Service	service	Identifies the product, application, or service that the resource supports
Role	sql, web, messaging	Identifies the role of the associated resource



# IaaS Compute Tiers

## Basic



- ☒ Non-Production
- ☒ Dev/Test Servers
- ☒ No Load Balancer
- ☒ No SSD Support
- ☒ Economical Option

VS.

## Standard



- ☒ Production
- ☒ All Server Types
- ☒ Fully Featured
- ☒ SSD Support
- ☒ Specialized VMs

# VM pricing models

- Two primary costs for every VM:
  - **Storage** – The cost of storing data in every virtual hard disk. This cost is independent of whether the VM is running
  - **Compute** – The usage-based price for compute capacity when the VM is currently allocated
- There are two payment options for compute costs:
  - **Pay as you go** – Compute capacity is billed and paid as it is used without a long-term commitment
  - **Reserved instances** – Compute capacity can be pre-purchased at a reduced rate for anticipated usage

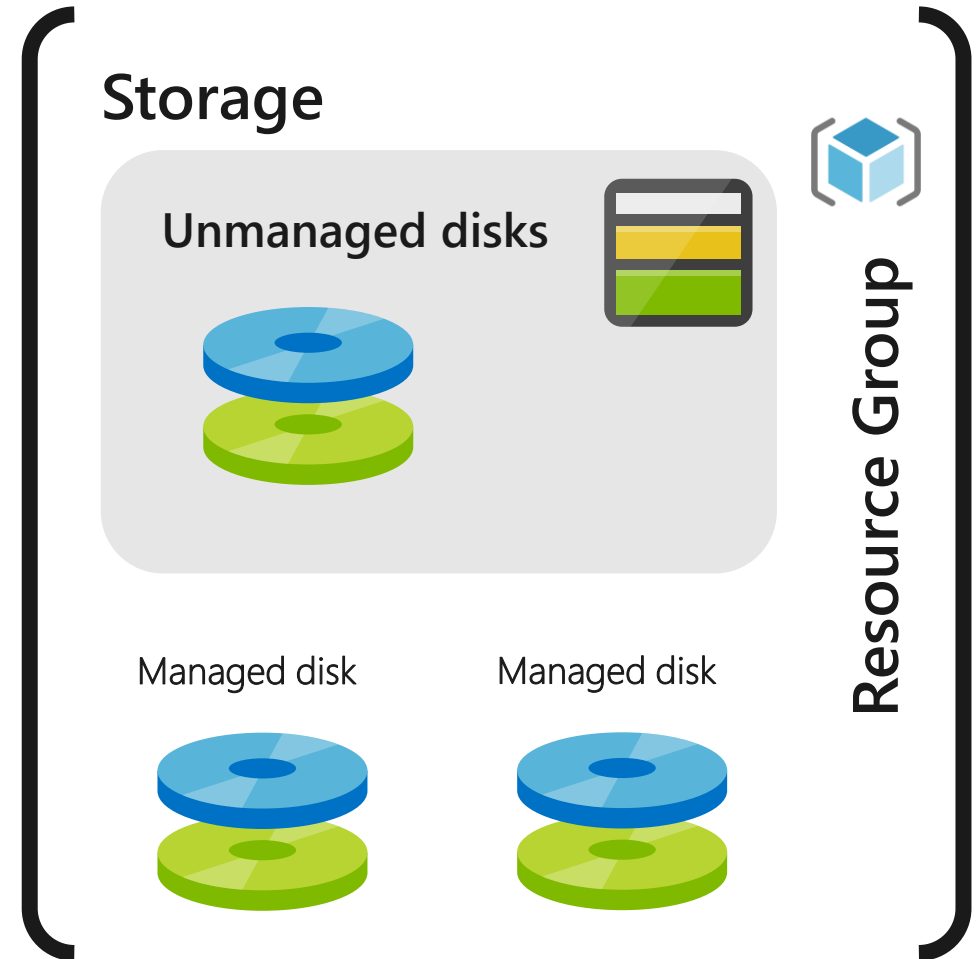


# VM storage options

- Virtual disks can be backed by either Standard or Premium Storage accounts
  - Azure Premium Storage leverages solid-state drives (SSDs) to enable high performance and low latency for VMs running I/O-intensive workloads
- Two types of disks: Unmanaged and Managed
  - Unmanaged disks require you to manage the storage accounts and VHDs
  - Managed disks are maintained by Azure (recommended)

# Managed and unmanaged disks






- Managed disks
  - The Azure platform manages the disk and the backing storage
  - You don't have to worry about storage account limits and thresholds
- Unmanaged disks
  - You manually create and manage virtual hard disks (VHDs) in your Storage account
  - You will need to consider account throughput and capacity limits when using this model



# Azure virtual machine creation and management

- Azure portal
  - Browser-based user interface that allows you to create and manage all your Azure resources
- Azure Resource Manager
  - Allows you to create templates, which can be used to create and deploy specific configurations of multiple Azure resources
- Azure PowerShell
  - Optional package that adds Azure-specific commands to PowerShell
- Azure CLI
  - Cross-platform command-line tool for managing Azure resources
- Programmatic (APIs)

# VM configuration options

	Computational performance	1 virtual CPU (vCPU) - 128 vCPUs
	Memory	1 gibibyte (GiB) - 4 tebibyte (TiB)
	Disk storage	4GiB - 64TiB Up 160,000 IOPs
	Networking	30 GB Ethernet 100 GB InfiniBand
	Availability	Single VM service-level agreement (SLA) 99.9% Multi AZ SLA 99.99%

# VM categories

## Virtual machines



Entry level



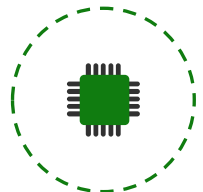
Burstable



General  
purpose



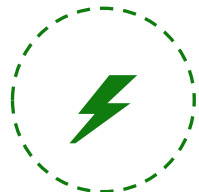
Compute  
intensive



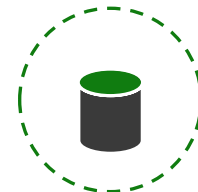
Memory  
optimized



GPU  
accelerated



High  
performance  
computing

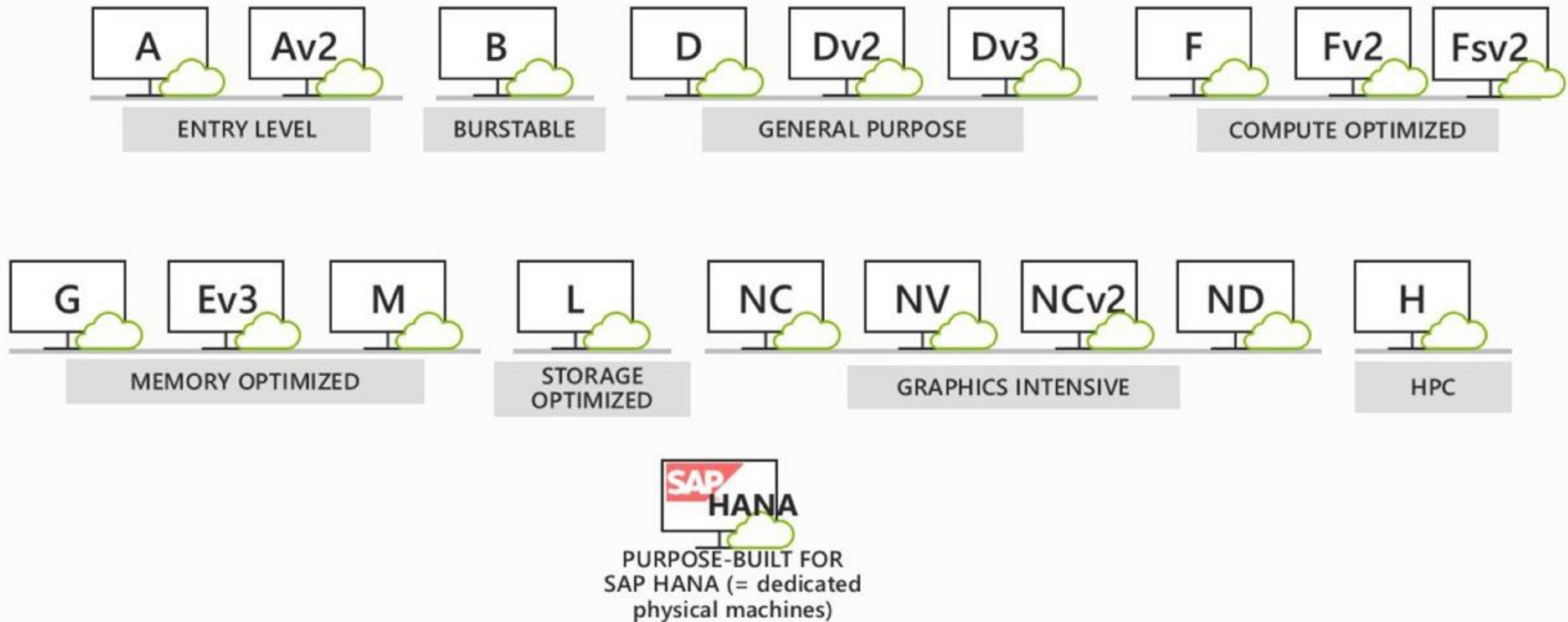


Storage  
optimized

## Purpose built



# VM categories (cont.)



# Virtual Machine Sizing

VM Type	Sizes	Purpose
General Purpose	B, Dsv3, Dv3, DSv2, Dv2, Av2, DC	Testing and development, small to medium databases, and low to medium traffic web servers.
Compute Optimized	Fsv2, Fs, F	Medium traffic web servers, network appliances, batch processes, and application servers.
Memory Optimized	Esv3, Ev3, M, GS, G, DSv2, Dv2	Relational database servers, medium to large caches, and in-memory analytics.
Storage Optimized	Lsv2, Ls	Ideal for VMs running databases.
GPU	NV, NVv2, NC, NCv2, NCv3, ND, NDv2 (Preview)	Ideal for model training and inferencing with deep learning.
High Performance Compute	H	Fastest and most powerful CPU virtual machines with optional high-throughput network interfaces.



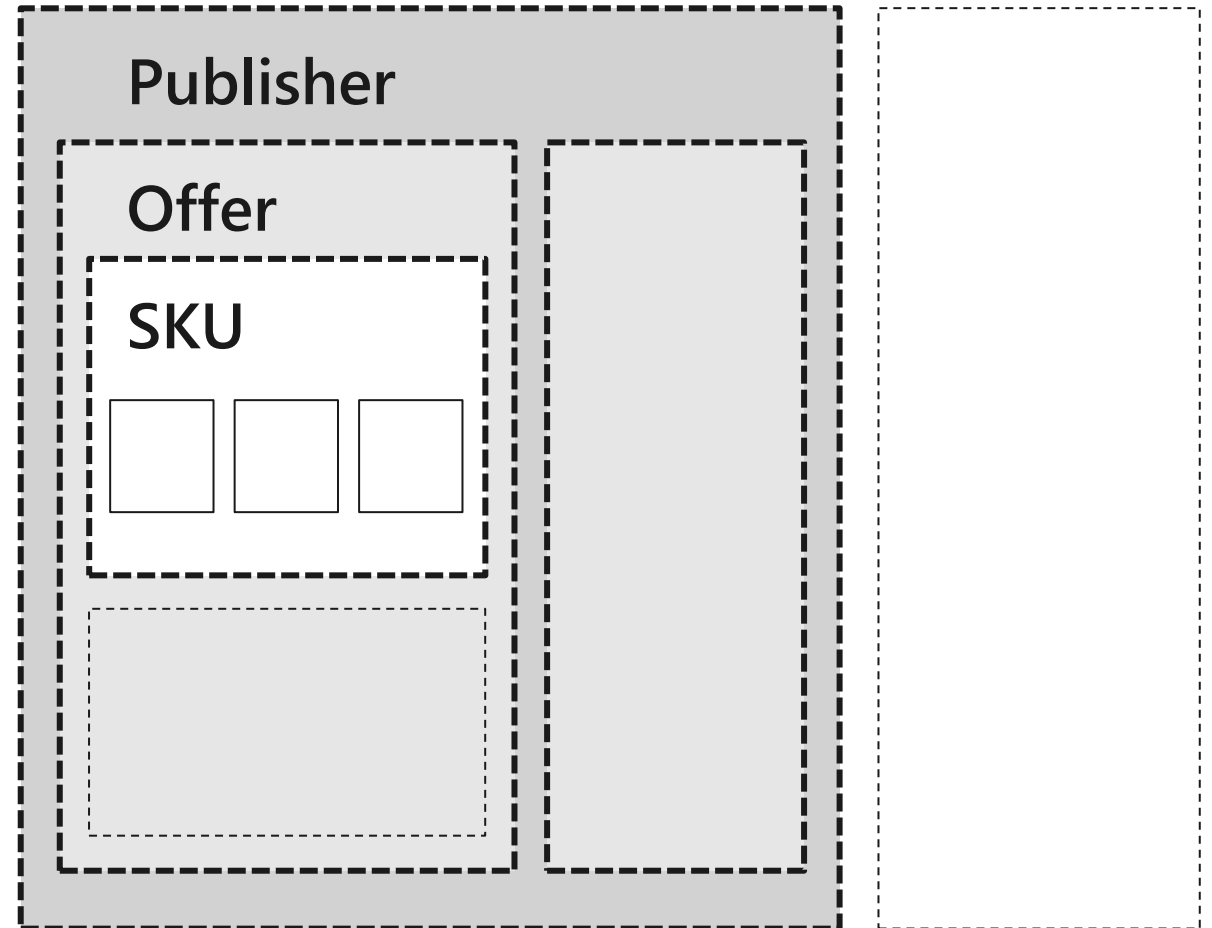
# Support for Windows Server & Linux



# Image in Azure Marketplace

- Images in Azure Marketplace are grouped into the following categories:

- Publisher
  - Organization that creates an image
- Offer
  - Group of related images
- SKU
  - Instance of an offer, typically a release
- Version
  - A specific release version number



# Image Sources - Windows Server example

- Microsoft Windows Server **PUBLISHER**

- Windows Server Semi-Annual **OFFER**

- Windows Server **OFFER**

- 2012 Datacenter **SKU**

- 2012-R2-Datacenter **SKU**

- 2016-Datacenter **SKU**

- 2016-Datacenter-Core **SKU**

- 2016-Datacenter-with-Containers **SKU**

- 2019-Datacenter **SKU**

- 2019-Datacenter-Core **SKU**

- 2019-Datacenter-with-Containers **SKU**

2019.0.20181107

**IMAGE**

2019.0.20181122

**IMAGE**

2019.0.20181218

**IMAGE**

2019.0.20190115

**IMAGE**

2019.0.20190214

**IMAGE**

2019.0.20190314

**IMAGE**

2019.0.20190410

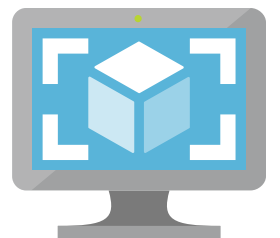
**IMAGE**

2019.0.20190603

**IMAGE**

2019.0.20190620

**IMAGE**

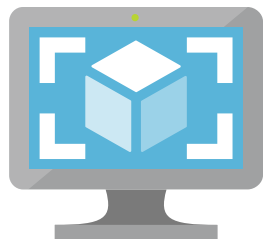


# Image Sources - Ubuntu example

- Canonical **PUBLISHER**
- Ubuntu Core **OFFER**
- Ubuntu Snappy **OFFER**
- Ubuntu Server **OFFER**
  - 12.04 **SKU**
  - 14.04 **SKU**
  - 16.04 **SKU**
  - 18.04-LTS **SKU**
  - 18.10 **SKU**
  - 19.04 **SKU**
  - 19.10-DAILY **SKU**

A diagram illustrating the flow of image sources. On the left, a list of Ubuntu versions and their categories (PUBLISHER, OFFER, SKU) is shown. A large black arrow points from this list to a large black curly bracket on the right. Inside the bracket, a list of image IDs is shown, each followed by the word 'IMAGE' in an orange box. A smaller black arrow points from the bottom of the bracket to a monitor icon on the right.

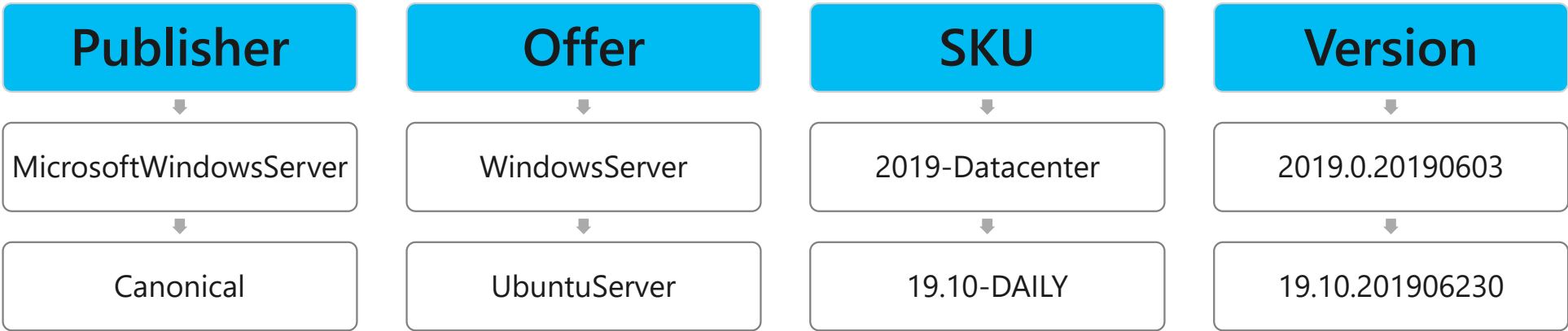
19.10.201905250	IMAGE
19.10.201905290	IMAGE
19.10.201905300	IMAGE
19.10.201905310	IMAGE
19.10.201906040	IMAGE
19.10.201906050	IMAGE
19.10.201906120	IMAGE
19.10.201906140	IMAGE
19.10.201906220	IMAGE
19.10.201906230	IMAGE



# Image Uniform Resource Name (URN)

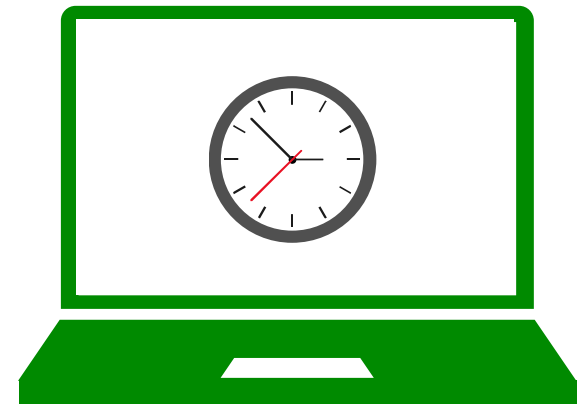
Short-hand string to quickly access a known VM image Format

PUBLISHER:OFFER:SKU:VERSION



# Demo & Lab: Create Azure Virtual Machine

- Windows Server
- Linux Server



# Stopping a Virtual Machine

## Virtual Machines Support two Stopped States:

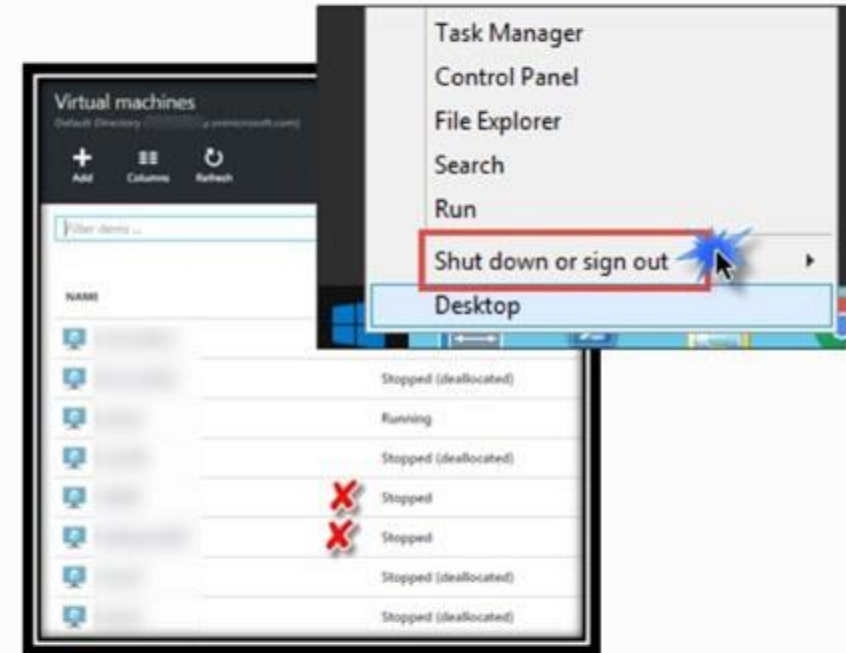
### Stopped (deallocated)

- No longer paying for CPU (still paying for storage)
- Will lose IP address if not marked static (public or private)
- Stop via portal or command line tools

### Stopped

- OS is shutdown, but still paying for compute
- Stop from within OS or command line tools (optional)

## Portal Denotes VM Status



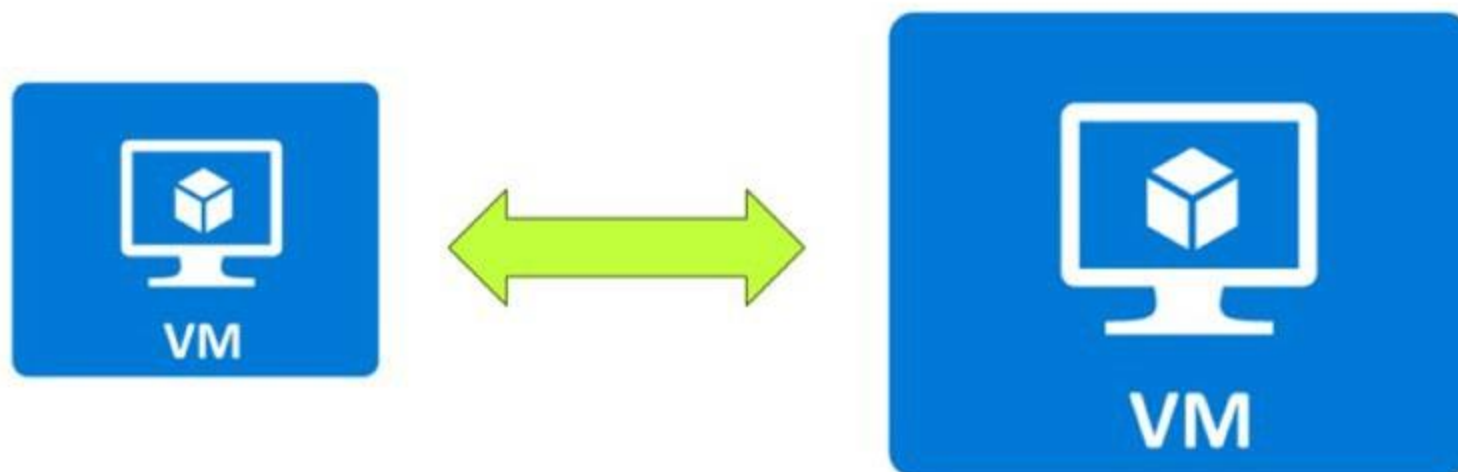
```
az vm stop -- WebVMUS - OGDEMOTM
az vm deallocate -n WebVMEU -g OGDEMOTM
```



# Changing Virtual Machine Sizes

## Scaling Up (or down) is an Option

- Not automatic as part of the auto-scale rules but can be scripted with the PowerShell
- Requires a Reboot
- Cannot scale down if you have more data disks attached than the lower size supports or if the instance size is not supported in the cluster your cloud service is created in

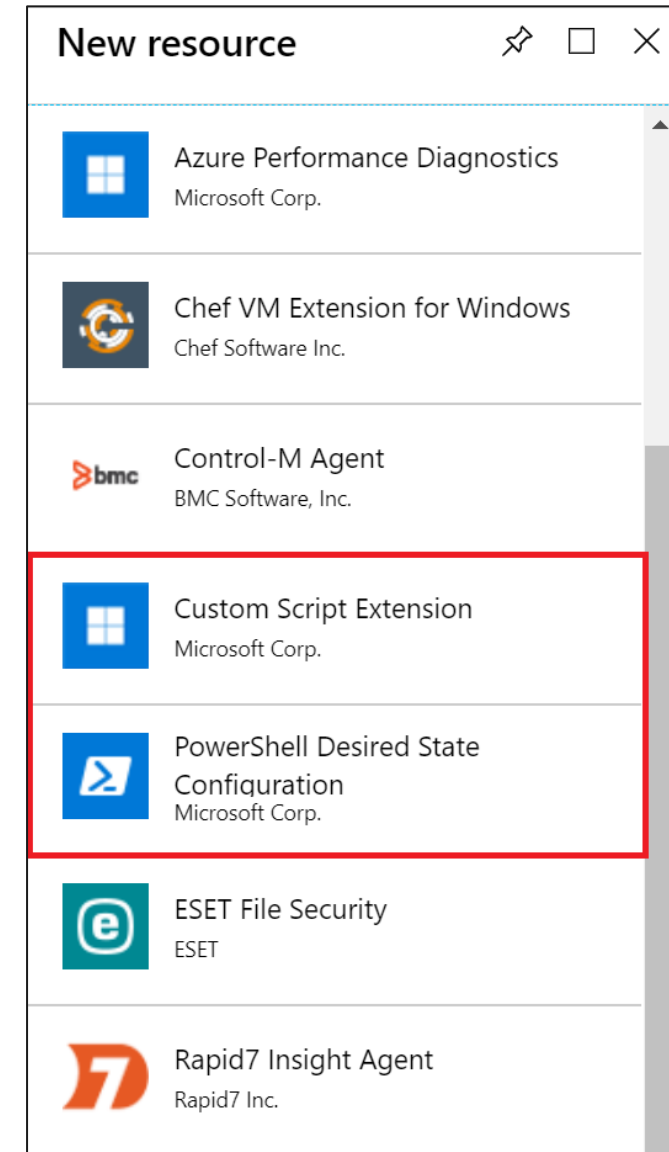




# Virtual Machine Extensions

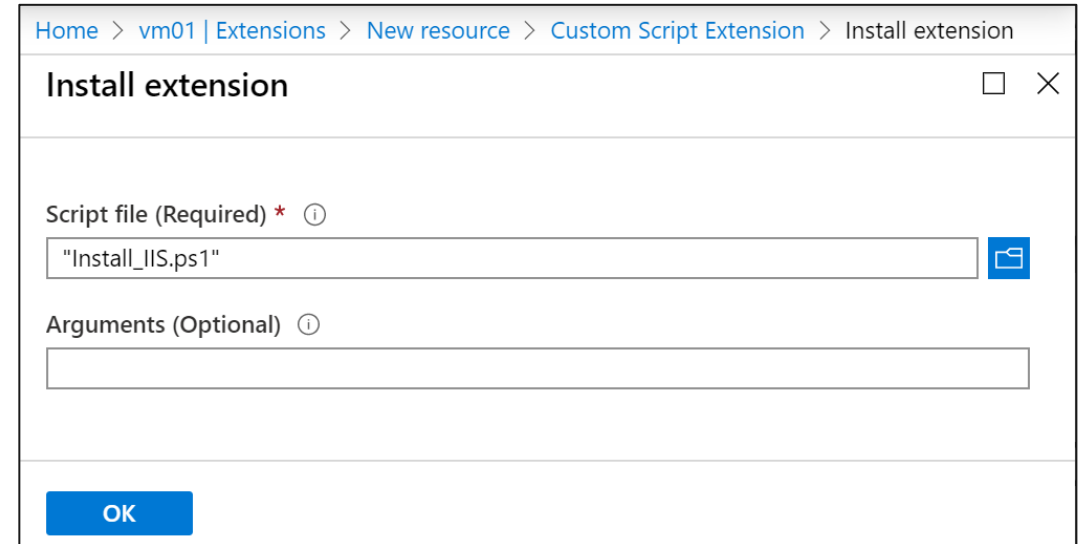
# Virtual Machine Extensions

- 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
- ✓ For PowerShell use the Set-AzVmCustomScriptExtension command



The screenshot shows the 'Install extension' dialog box in the Azure portal. The breadcrumb navigation at the top reads: Home > vm01 | Extensions > New resource > Custom Script Extension > Install extension. The dialog has a title bar 'Install extension' with a close button. It contains two main input fields: 'Script file (Required)' with a red asterisk and an information icon, which has the value '"Install\_IIS.ps1"' and a file selection icon to its right; and 'Arguments (Optional)' with an information icon, which is currently empty. At the bottom left of the dialog is a blue 'OK' button.

# 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"
        }
    }
}
```







# Create an Azure VM by using PowerShell

Connect-AzAccount

New-AzResourceGroup -Name "myResourceGroup" -Location EastUS

New-AzVM `

```
-ResourceGroupName "myResourceGroup" `
-Name "myVM" `
-Location "East US" `
-VirtualNetworkName "myVnet" `
-SubnetName "mySubnet" `
-SecurityGroupName "myNetworkSecurityGroup" `
-PublicIpAddressName "myPublicIpAddress" `
-OpenPorts 80,3389
```



Demo:  
Create Azure  
Virtual Machine  
using PowerShell

