What is IaaS?

Cloud Computing Terminology

IaaS

Infrastructure-as-a-Service

host

PaaS

Platform-as-a-Service

build

SaaS

Software-as-a-Service

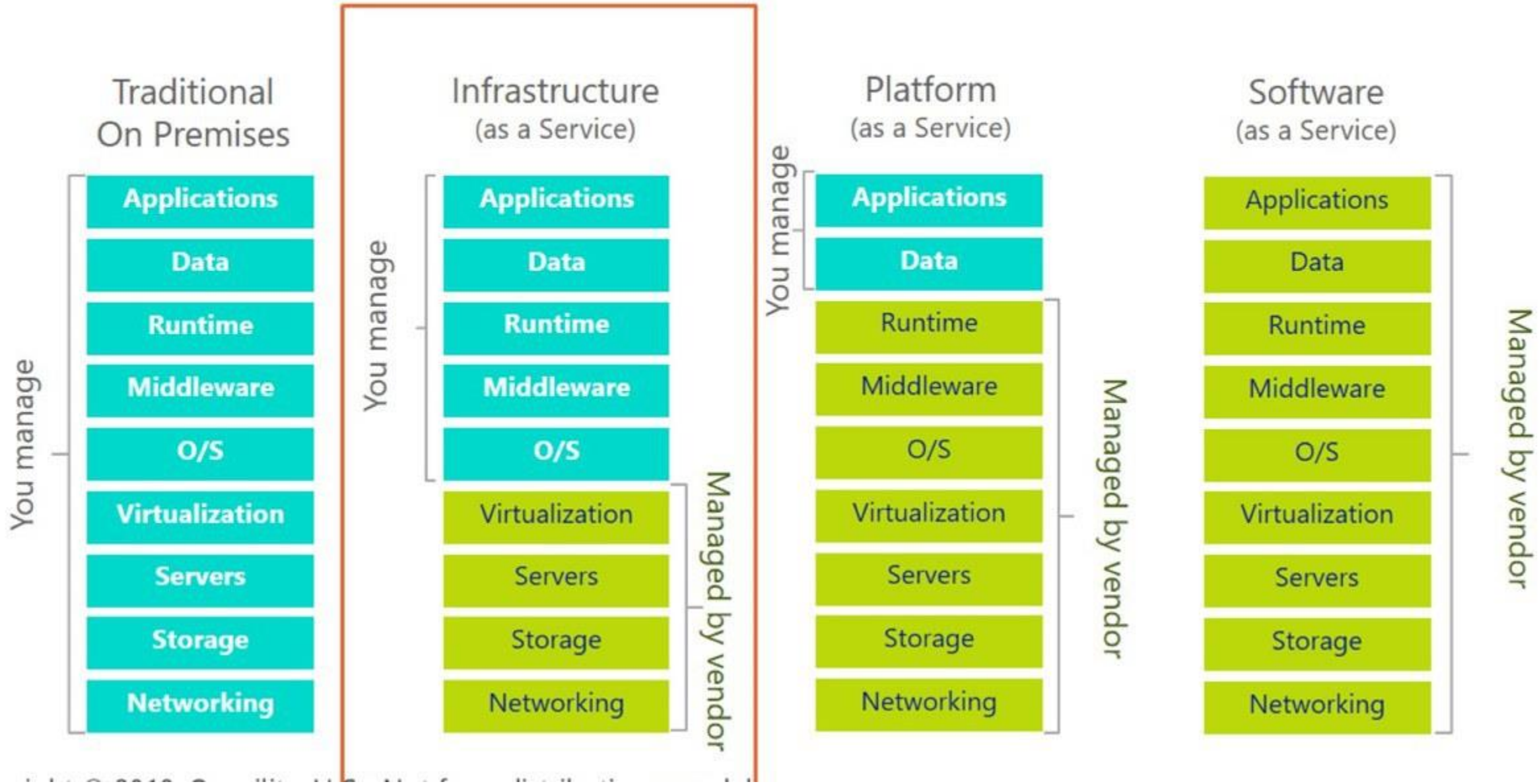
consume

Microsoft Azure

Office 365

Microsoft Dynamics

Cloud Service Models



Azure IAAS Building Blocks

- Virtual Networks
- Storage
- Virtual Machines
- Other Azure Infrastructure Services

Azure IAAS Building Blocks

- Virtual Networks
  - VNets, Subnets, VPN, ExpressRoute,…
- Storage
  - Managed Disks, Storage Accounts,…
- Virtual Machines
  - 75 different VM Sizes, Windows & Linux
- Other Azure Infrastructure Services
  - Backup, ASR, DNS, Load Balancers,…

Virtual Machines

Support for Windows Server & Linux

Certified Azure Solutions

Online marketplace to discover, purchase and provision services such as Azure Certified Appliances, VM images, extensions application services and datasets which complement and extend Microsoft Azure ecosystem.

Supported Microsoft Workloads

SQL Server		SharePoint	BizTalk Server	System Center 2012
SQL Server 2008/R2 SQL Server 2012 SQL Server 2014 SQL Server 2016	Server 2008 R2 Server 2012 R2 Server 2016	SharePoint 2010, 2013, 2016	BizTalk 2013, 2016	System Center 2012, 2016

Exchange	Microsoft Dynamics	Visual Studio Team Foundation Server	Project Server	Forefront Identity Manager
Exchange Server 2013, 2016	Dynamics CRM 2013/2015 GP and NAV	Visual Studio Team Foundation Server	Project Server	Forefront Identity Manager

Most Windows Server roles except roles that have dependencies on specific hardware or low level network control (DHCP, Windows Deployment Services etc…)

Complete list of supported products and server roles and features
http://support.microsoft.com/kb/2721672

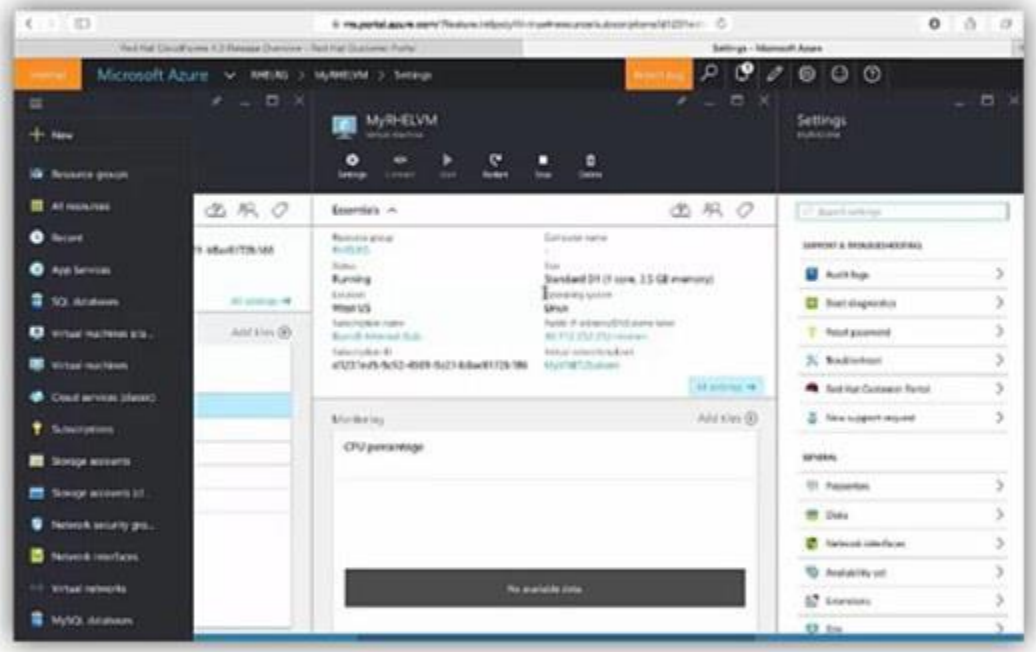
Linux Supported distributions - versions

- Linux Images in Marketplace, provided by Partners
- Linux Integration Services (LIS) are Hyper-V drivers that Microsoft contributes to the upstream Linux Kernel
- The Azure Linux Agent gets preinstalled
- Azure Platform SLA only on these Distros
- BYOLinux is supported

Distro	Version
CentOS by OpenLogic	CentOS 6.3+, 7.0+
CoreOS	494.4.0+
Debian by Credativ	Debian 7.9+(Wheezy), 8.2+(Jessie)
Oracle Linux	6.4+, 7.0+
Red Hat Enterprise Linux	RHEL 6.7+, 7.1+
SUSE Linux Enterprise	SLES/SLES for SAP 11 SP4, 12 SP1+
openSUSE	openSUSE Leap 42.1+
Ubuntu	12.04+

Red Hat + Microsoft: Integrated Support

- Use Red Hat Subscriptions on Azure
- Red Hat participation in Azure forums
- Red Hat & Microsoft security response team collaboration
- Support staff from Red Hat & Microsoft co-located @Redmond Campus
- Integrated ticketing systems
- Red Hat Technical Account Management & Microsoft Premier Services



redhat

Azure VMs and Hyper-V Compatibility

- Support for Generation 1 VMs
- Storage
  - Support for VHD fixed format only **(no VHDX)**
  - 2 TB Maximum Size of OS Disk
  - 4 TB Maximum Size of a Data Disk
  - Maximum of 64 data disks
  - 256TB of Diskspace
- Performance
  - Up to 128 vCPUs
  - Up to 500 IOPs per disk (Standard Storage)
  - Up to 7500 IOPs per disk with premium (Premium Storage)

IaaS Compute Tiers

Production Servers should always be Standard Tier

Basic

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

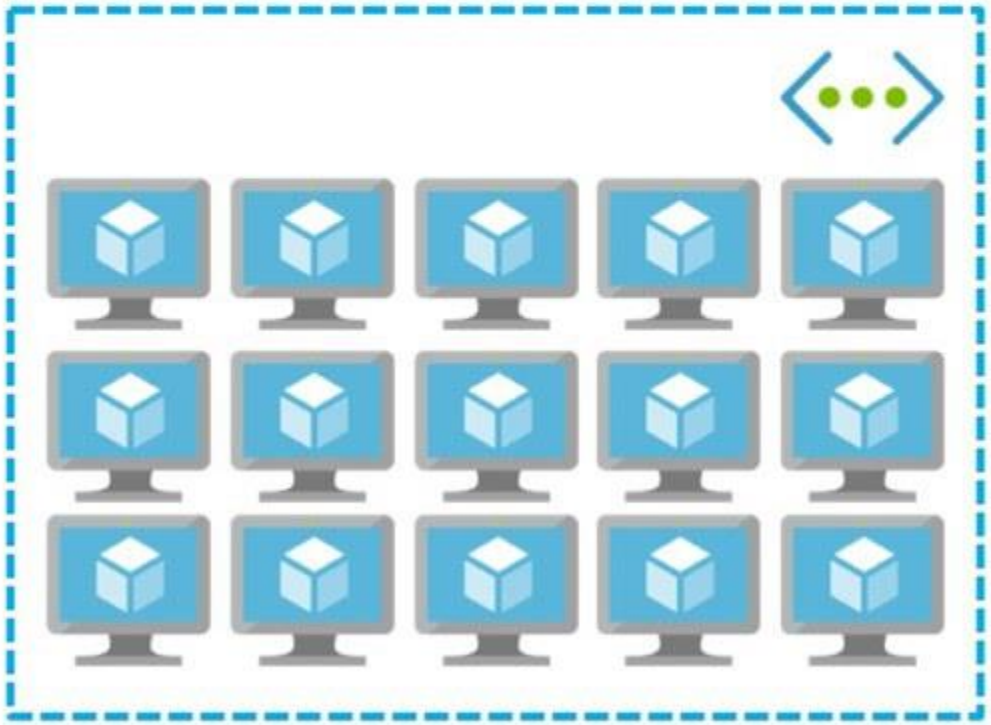
VS.

Standard

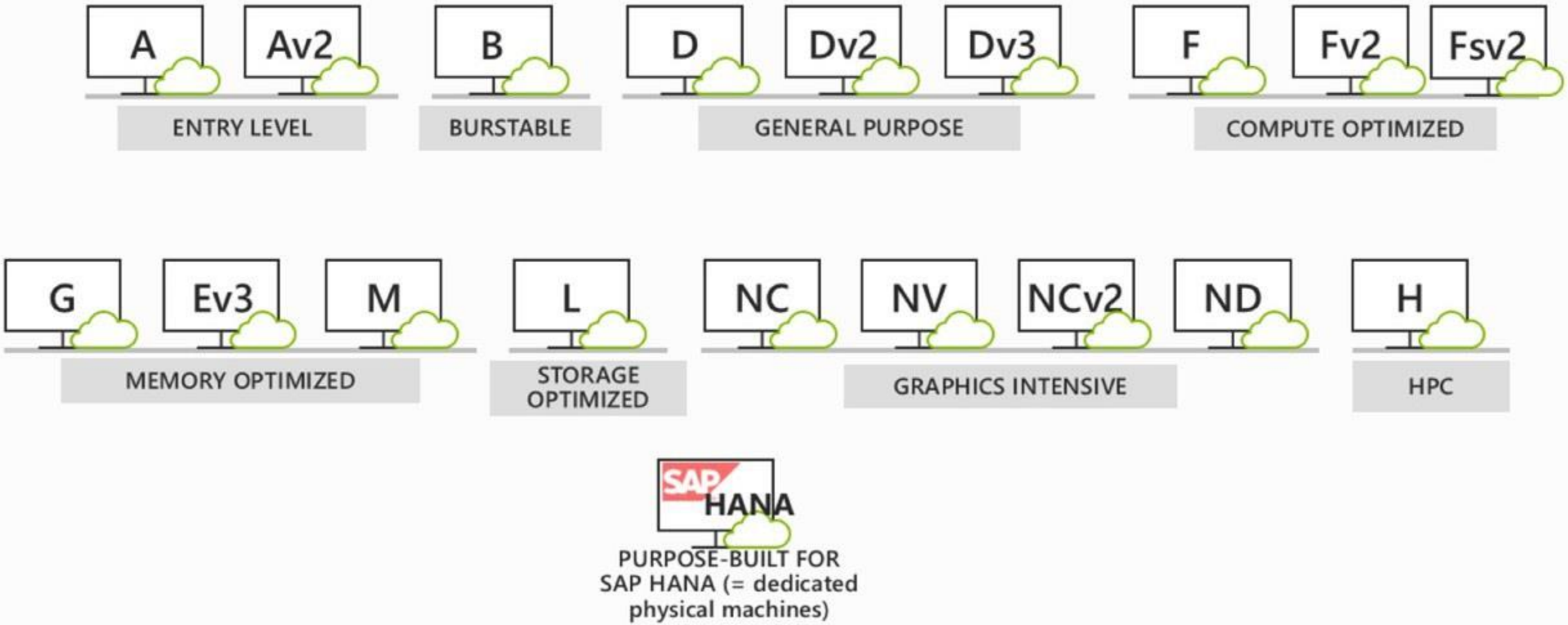
- ✓ Production
- ✓ All Server Types
- ✓ Fully Featured
- ✓ SSD Support
- ✓ Specialized VMs

Standard Service Tier

- Most VMs are Standard Tier in Azure
- Single or Multiple instance workloads
  - Production Workloads
  - Load balancing, Auto-scale and VM Scale Sets Supported
- Higher IOPS
  - 500 standard tier and up to 7500 for Premium

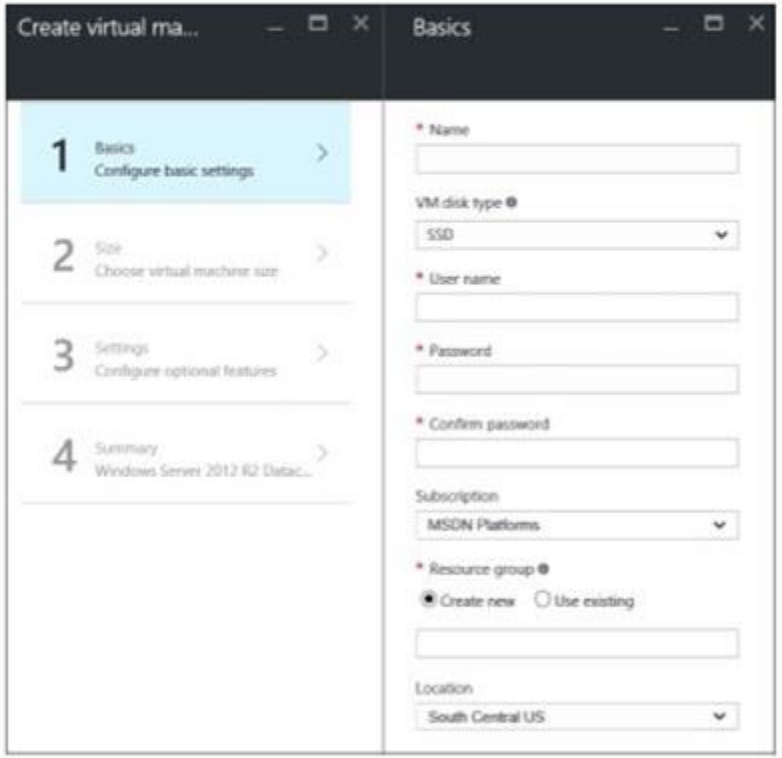


Azure Compute Families



Creating an Azure Virtual Machine

Azure Management Portal



Command Line

PowerShell

```
New-AzureRmVM -ResourceGroupName $rg -VM $vm ...
```

Azure CLI

```
azure-cli@2.0.0:/# azure vm quick-create
info:  Executing command vm quick-create
```

REST API

```
"OSDisk": {
   "EncryptionSettings": null,
   "OperatingSystemType": "Windows",
   "Caching": "ReadWrite",
   "CreateOption": "FromImage",
...
```

Connecting to a Windows OS VM

- Connect to a Windows VM via RDP
- RDP File is downloaded from Portal
- User Name & Password set when creating VM

1

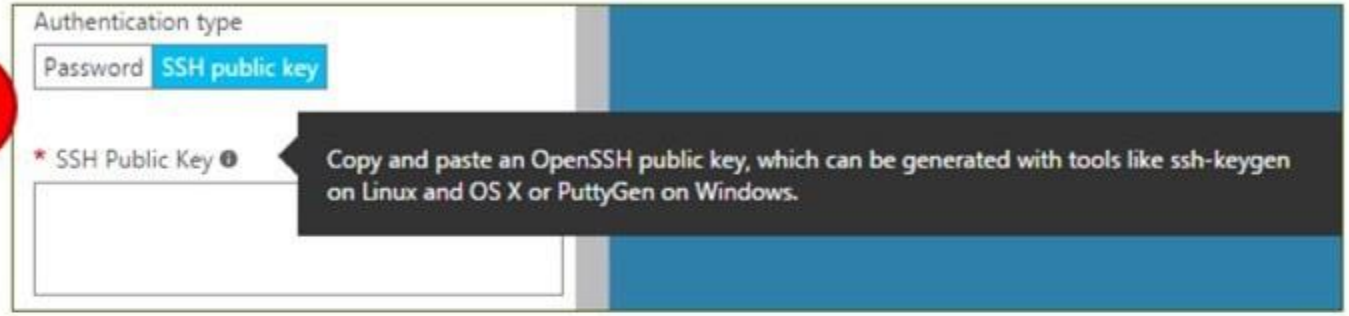
2

3

Connecting to a Virtual Machine

- Connect to a Linux VM via SSH
- Connect from SSH-client or Shell
- Authentication Type can be password or SSH public key

1



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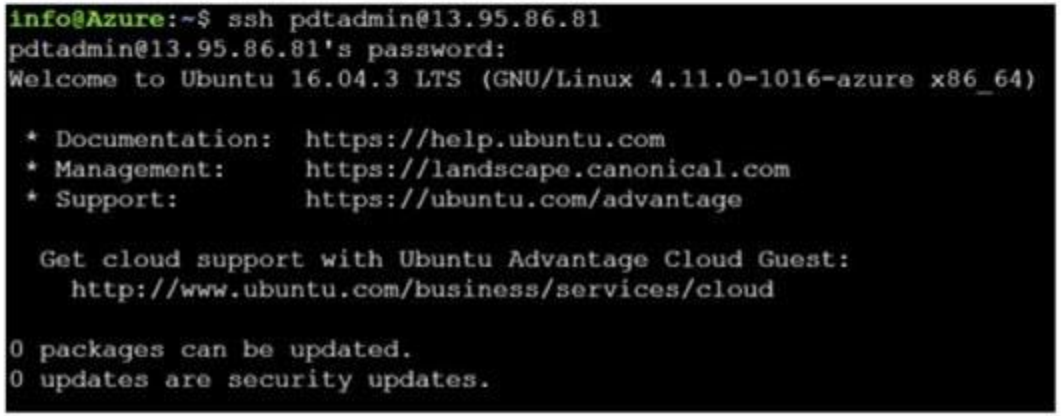
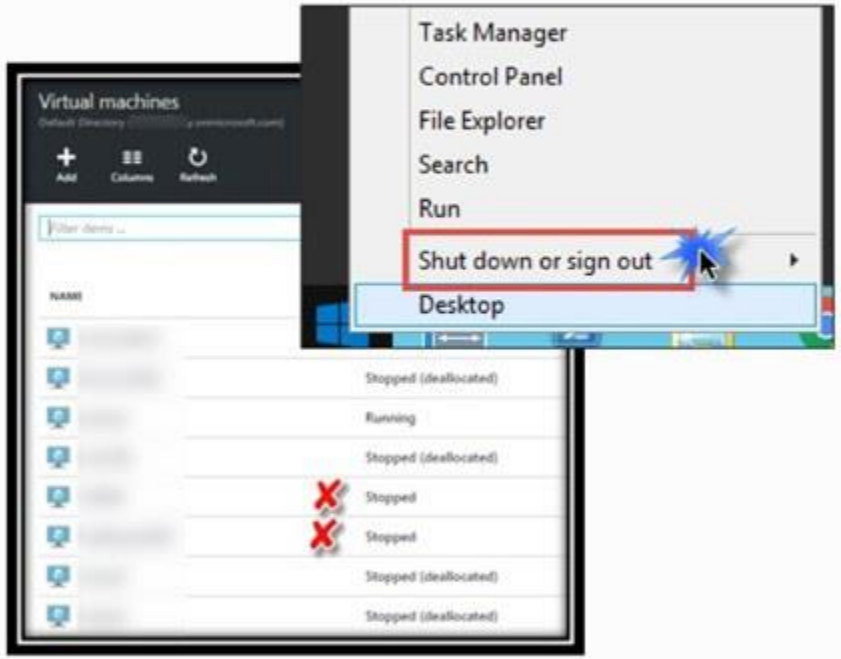


Stopping a Virtual Machine

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)

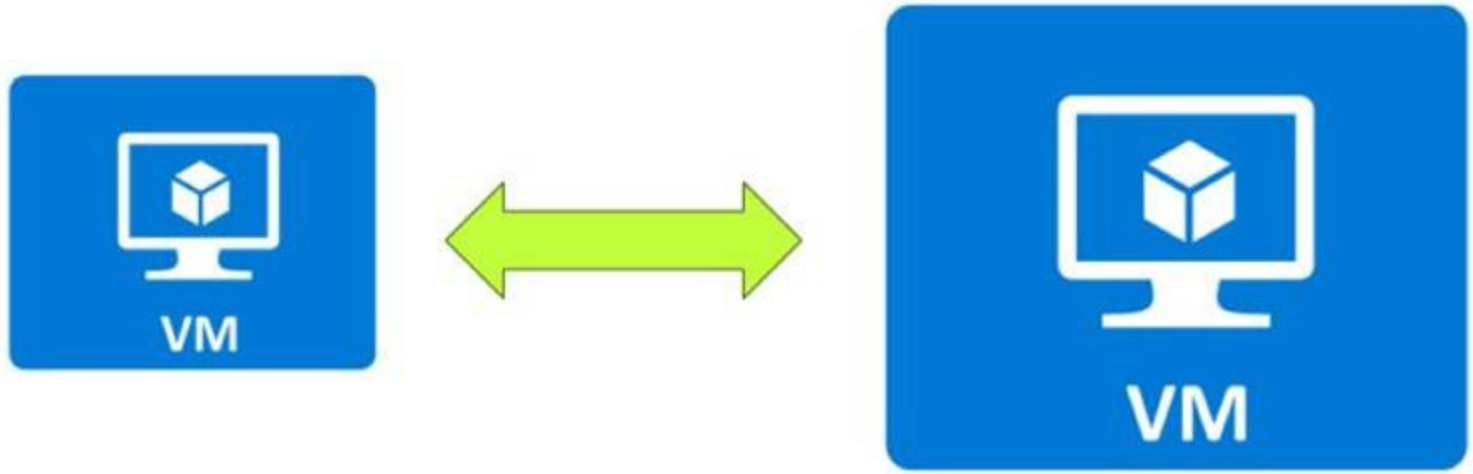
Portal Denotes VM Status

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

Changing Virtual Machine Sizes

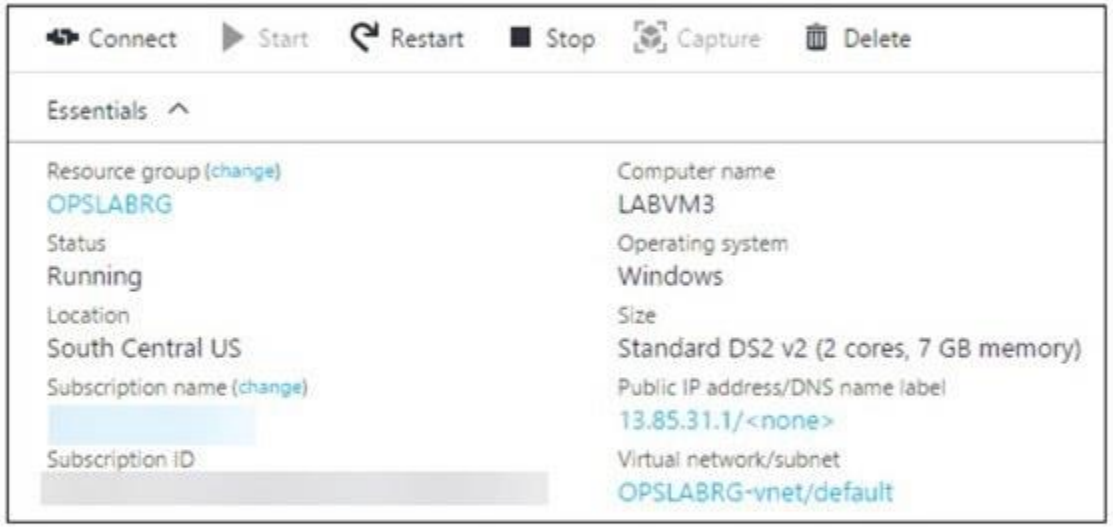
Scaling Up (or down) is an Option

- 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



Changing a VM's Size in the Portal

Browse to the VM in the Portal & Click All Settings

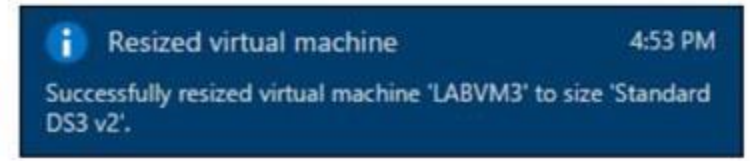


Under Manage, Click Size

Choose the Size Desired

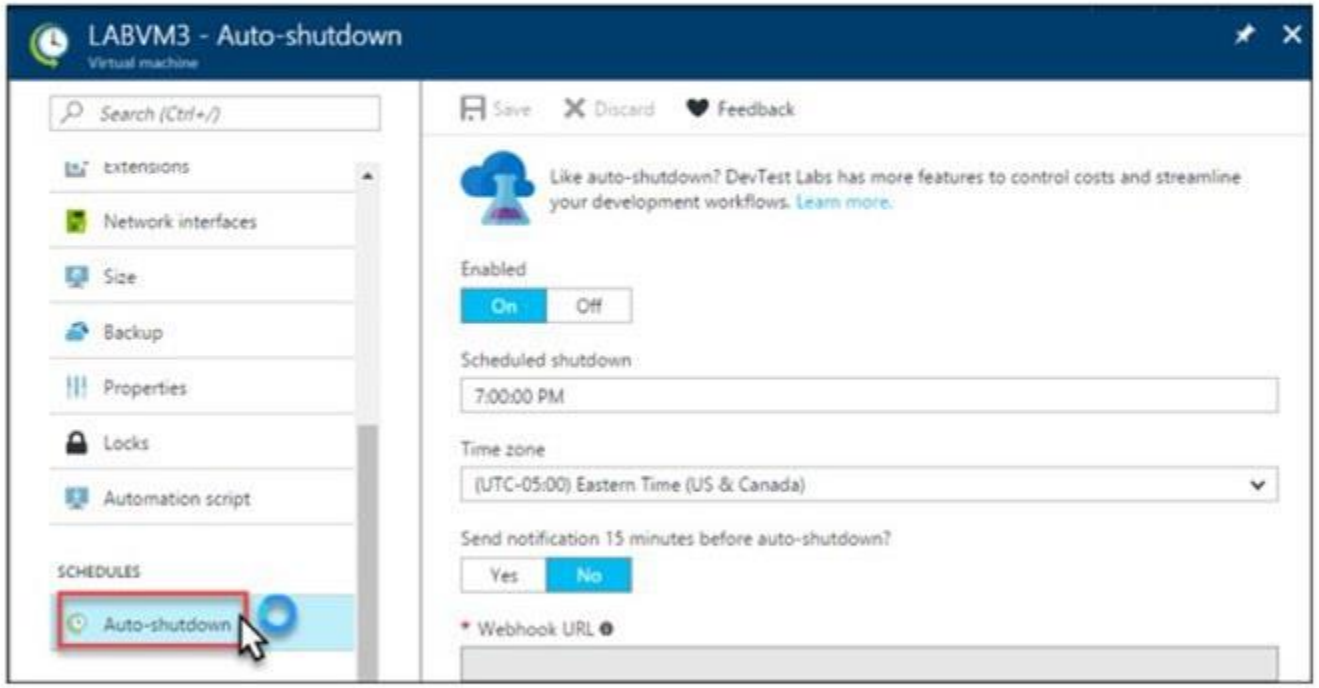
The VM will **immediately** resize itself and **Restart**

Successful Message



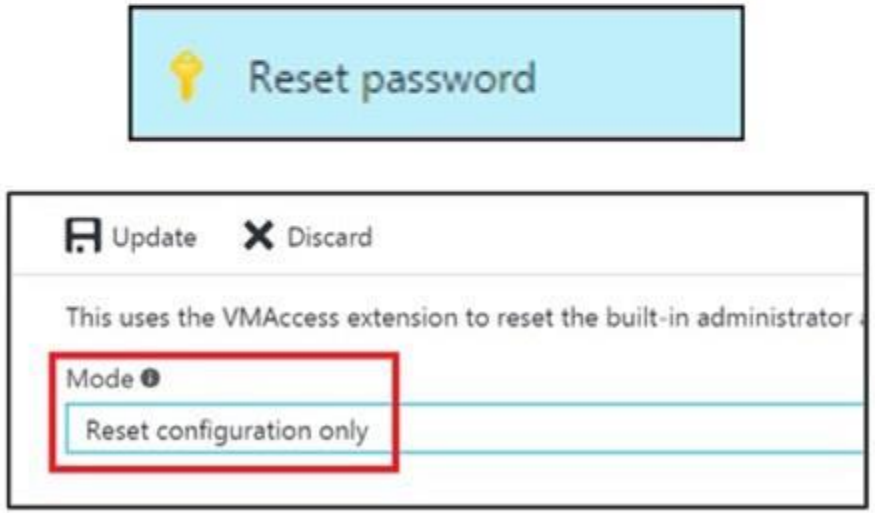
Auto-Shutdown Virtual Machines

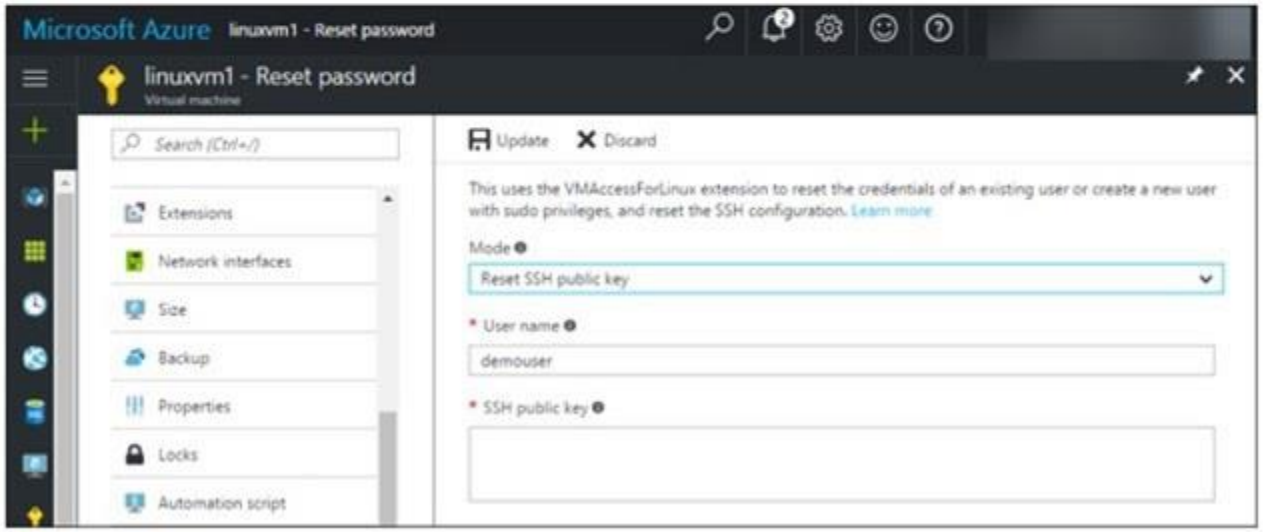
- VMs can easily be configured to Auto-Shutdown
- Useful for management VMs that do not need to be on 24x7
- Dev/Test VMs that are only used when needed



Resetting Password on Azure VMs

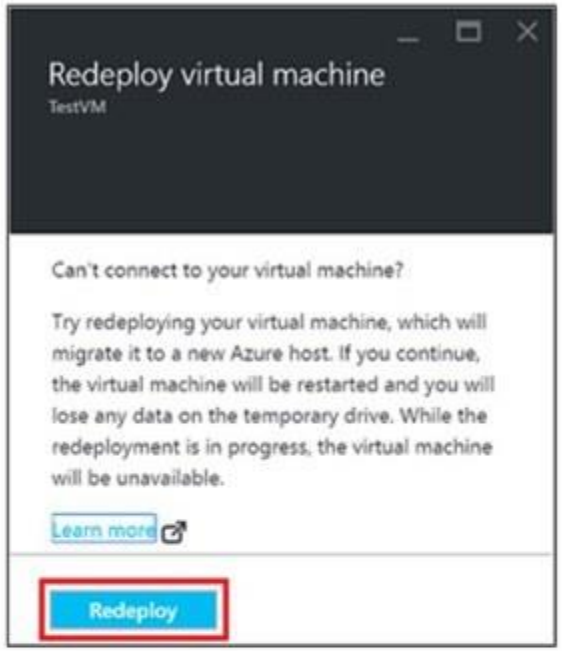
- Completed using the Portal, CLI or PowerShell
- Windows: User Name, Password, Remote Configuration (RDP)
- Linux: User Name, Password, Reset SSH Public Key, Remote Configuration (SSH)





Redeploy an Azure VM

- If having issues with a VM responding or booting use Redeploy
- Moves the VM to a new node within the Azure infrastructure and then powers it back on, retaining all its configuration options and resources




```
Set-AzureRmVm -Redeploy -ResourceGroupName
"OGDEMOTM" -Name "WebVMUS"
```

```
az vm redeploy -n WebVMUS -g OGDEMOTM
```

WARNING

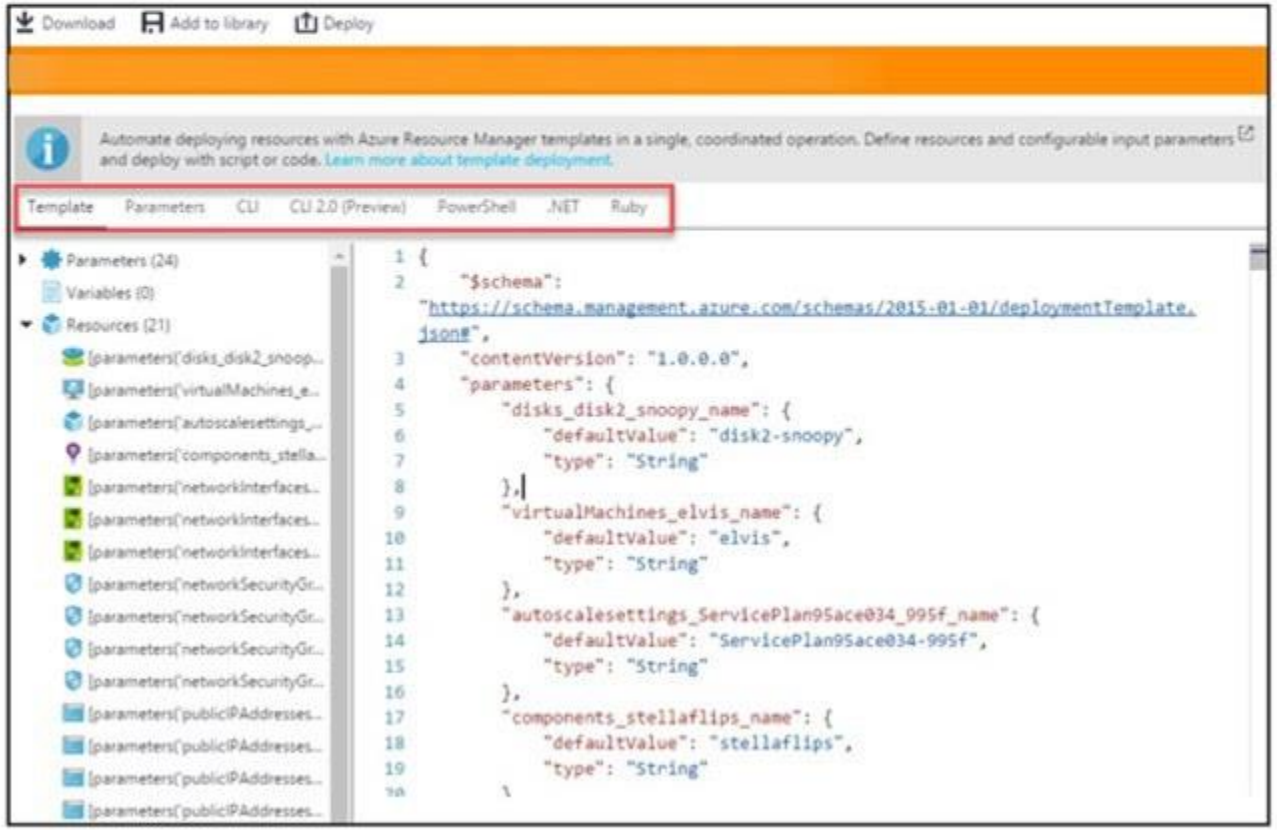
All Data on non-persistent drives will be lost!

DEMO

Creating VMs – Windows + Linux

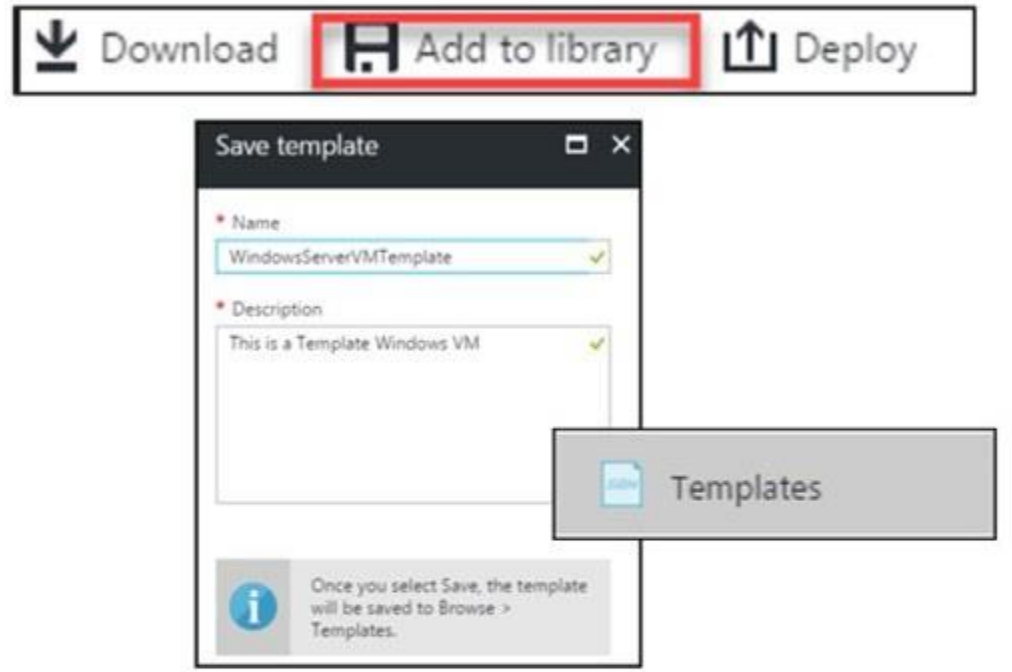
Deployment Templates Auto-generation

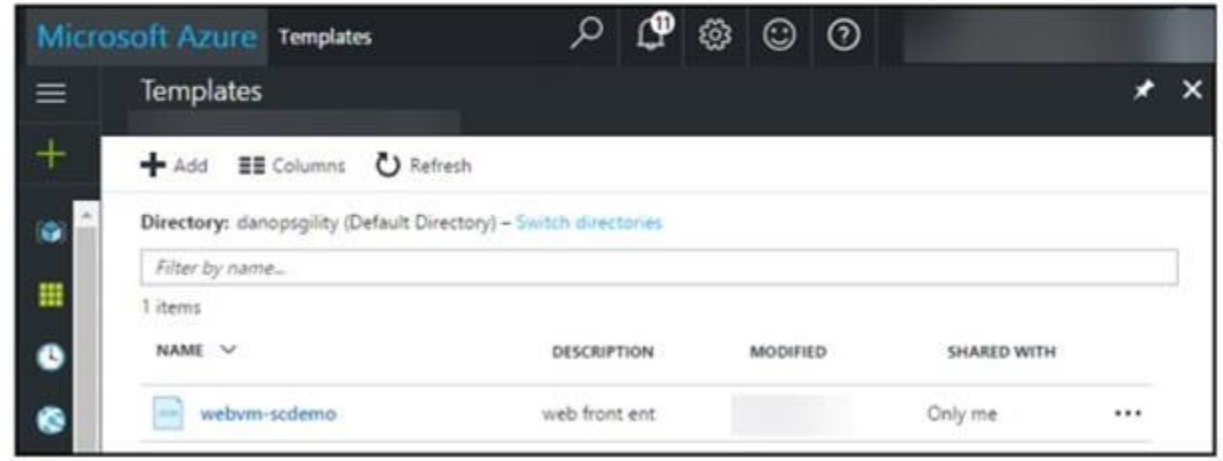
- Automation Scripts Created by Azure Portal
  - ARM Template w/Parameters, CLI, PowerShell, .NET, Ruby
  - Download, Add to Library or Deploy



Template Library

- In the Automation Scripts Blade the Template can be saved to a Library
- Portal: More Services>Templates
- Supports RBAC to restrict access to templates





Command Line Options

Azure PowerShell Cmdlets

- Rich PowerShell Language
- Supported on Windows, Mac and Linux
- Support for imperative script execution
- Support for deploying templates
- Historically updated with new features faster than Azure CLI
- Open Source (written in C#)

Azure CLI Tools

- Run from console
- Supported on Windows, Mac and Linux
- Support for imperative script execution
- Support for deploying templates
- Open Source (written in node.js)
- Docker Image

```
$docker run -it microsoft/azure-cli
```

Downloadable from: https://azure.microsoft.com/en-us/downloads

Configuration Management

Virtual Machine Guest Agent

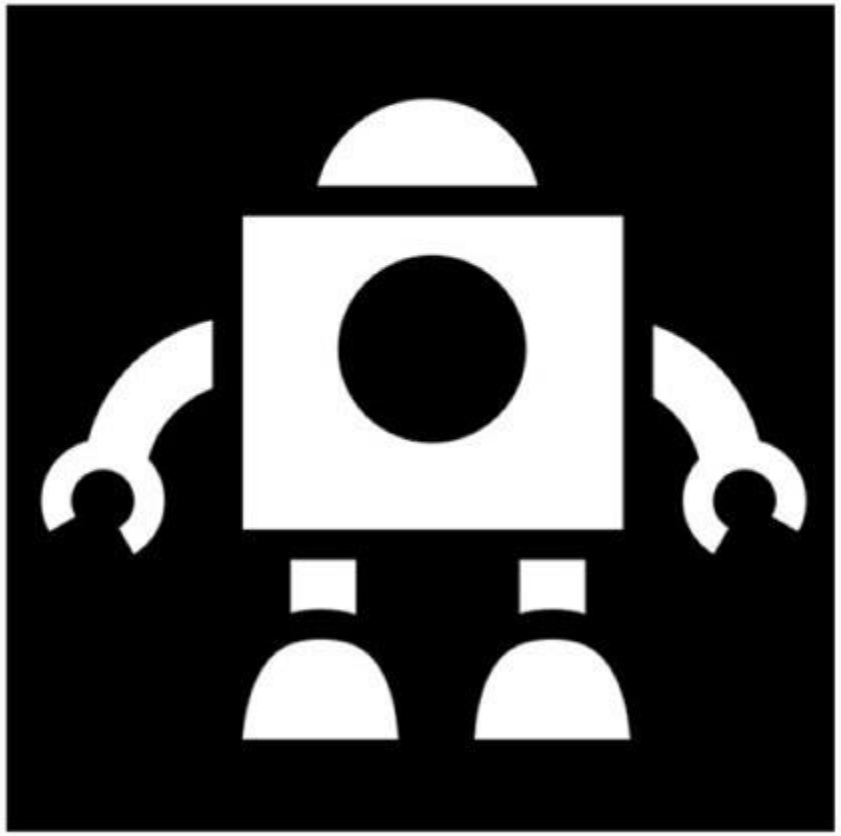
The Azure virtual machine agent is automatically installed on VMs created in the Azure Portal (optional on Windows)

When uploading OS disks created you can install the agent .MSI file separately

During deployment specify the agent is installed

PowerShell

```
Set-AzureRmVMOperatingSystem -ProvisionVMAgent
```



Virtual Machine Extensions

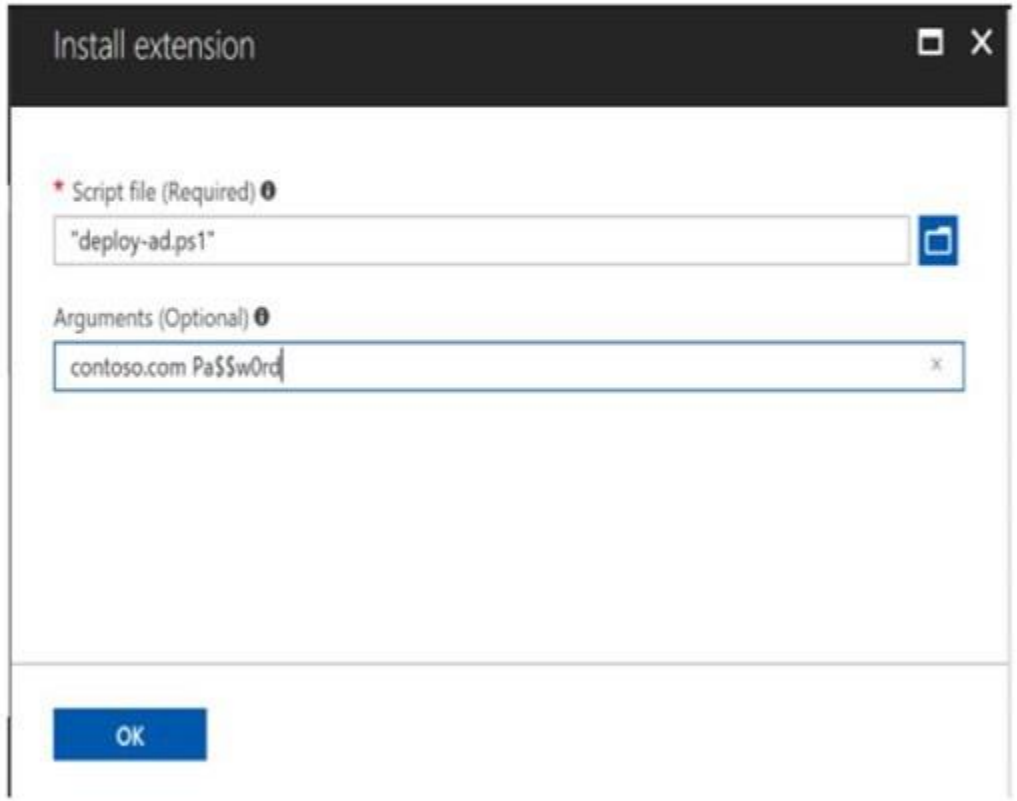
Extensibility points for Azure Virtual Machines

- Security
- Configuration Management
- Access Control
- Many Others

Execute from the portal, script, or as part of a template.

Custom Script Extension

- Automatically execute a script
- Supports
  - Windows or Linux
  - Bash, PowerShell, Command
- Deployable
  - Portal
  - ARM Template
  - PowerShell
  - CLI



Executing the Custom Script Extension

PowerShell

```
$rgName      = “ContosoRG"
$scriptName = "deploy-ad.ps1"
$scriptUri = http://$storageAccount.blob.core.windows.net/scripts/$scriptName
$scriptArgument = "contoso.com $password"
Set-AzureRmVMCustomScriptExtension -ResourceGroupName $rgName `
                                   -VMName $vmName `
                                   -FileUri $scriptUri `
                                   -Argument "$domain $password" `
                                   -Run $scriptName
```

Executing the Custom Script Extension

(Azure CLI)

```
# cseconfig.json
{
  "fileUris": [
"https://examplestorageaccount.blob.core.windows.net/scripts/apache.sh" ],
  "commandToExecute": "./apache.sh"
}
```

```
rgName="ContosoRG"
vmName="LinuxWebServer"
az vm extension set --resource-group $rgName --vm-name $vmName --name
$scriptName --publisher Microsoft.Azure.Extensions --settings ./cseconfig.json
```

Executing the VM Access Extension from PowerShell Example

- Resets the user name, password, and re-enables RDP or SSH (Windows or Linux)

```
$rgName   = "MyResourceGroup"
$vmName   = "MyVM"
$extName  = "MyVMAccessExt"
$userName = "demouser"
$password = "demo@pass123"

Set-AzureRmVMAccessExtension -ResourceGroupName $rgName `
                             -VMName $vmName `
                             -Name $extName `
                             -UserName $userName `
                             -Password $password
```

VM Extension Cmdlets

Specialized Extension Cmdlets

Get-AzureRmVMAccessExtension
Get-AzureRmVMCustomScriptExtension
Get-AzureRmVMDiagnosticsExtension
Get-AzureRmVMDscExtension
Get-AzureRmVMDscExtensionStatus
Get-AzureRmVMSqlServerExtension

Remove-AzureRmVMAccessExtension
Remove-AzureRmVMCustomScriptExtension
Remove-AzureRmVMDiagnosticsExtension
Remove-AzureRmVMDiskEncryptionExtension
Remove-AzureRmVMDscExtension

Set-AzureRmVMAccessExtension
Set-AzureRmVMBackupExtension
Set-AzureRmVMBginfoExtension
Set-AzureRmVMCustomScriptExtension
Set-AzureRmVMDiagnosticsExtension
Set-AzureRmVMDiskEncryptionExtension
Set-AzureRmVMDscExtension
Set-AzureRmVMSqlServerExtension

Generic cmdlets for all extensions

Get-AzureRmVMExtension
Set-AzureRmVMExtension
Remove-AzureRmVMExtension

What is Desired State Configuration?

- New with PowerShell 4.0 in Server 2012 R2
  - Windows 7, Windows Embedded Standard 7, Windows Server 2008 R2, Windows Server 2012, Server 2012 R2 (Requires .NET 4.5)

- A declarative PowerShell script that describes the state of the configuration of one or more machines
  - New language extensions and resource providers
  - Declarative, Autonomous and Idempotent
  - Supports continuous deployment and prevents configuration drift
  - Supports parameterized deployments. Script once and parameterize for multiple environments like development, test, and production

Simple Example

myapp.ps1

```
configuration WebsiteConfig
{
    Node "localhost"
    {
        # Install the IIS role
        WindowsFeature IIS
        {
            Ensure          = "Present"
            Name            = "Web-Server"
        }
        # Install the ASP .NET 4.5 role
        WindowsFeature AspNet45
        {
            Ensure          = "Present"
            Name            = "Web-Asp-Net45"
        }
        # Copy the website content
        File WebContent
        {
            Ensure          = "Present"
            SourcePath      = $Node.SourcePath
            DestinationPath = "C:\Inetpub\wwwroo
            Recurse         = $true
            Type            = "Directory"
            DependsOn       = "[WindowsFeature]A
        }
    }
}
```

The computer(s) to apply the configuration to.

Resource

Define what the configuration should do.

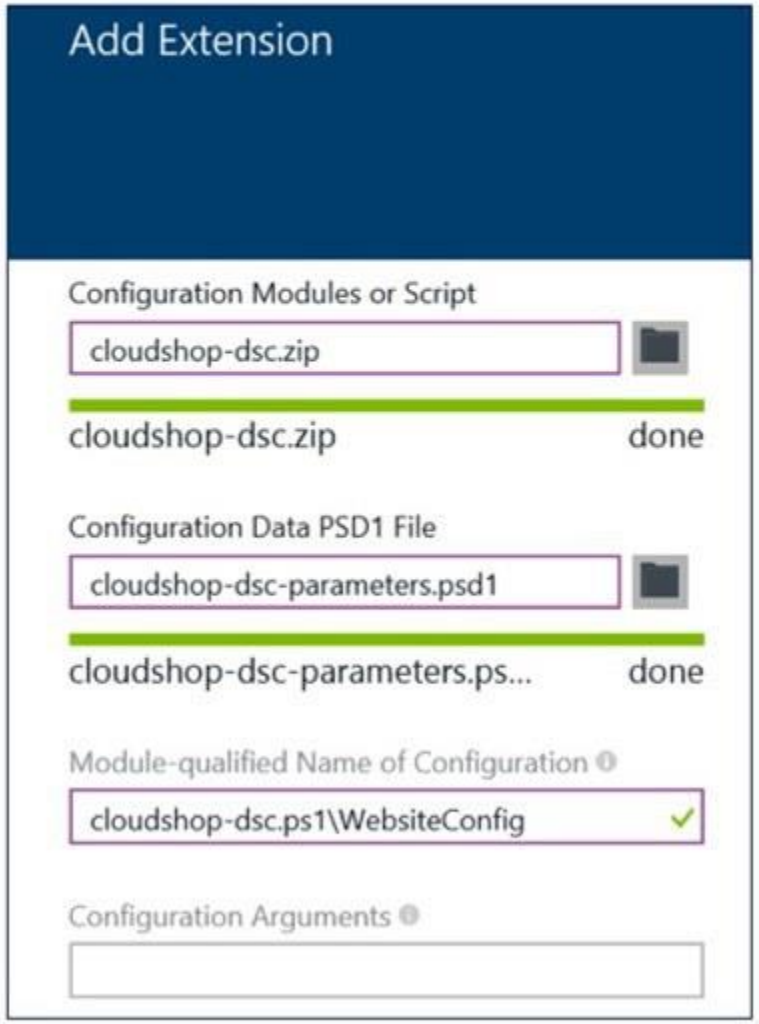
myapp-parameters.psd1

```
@{
    AllNodes = @(
        @{
            NodeName    = "localhost"
            SourcePath  = "\\ad-dc\fileshare"
        }
    );
}
```

PowerShell DSC Extension

Desired State Configuration (DSC) allows for the declarative configuration of a virtual machine

The extension allows a DSC configuration to be applied at provision time or as an update



PowerShell DSC Extension

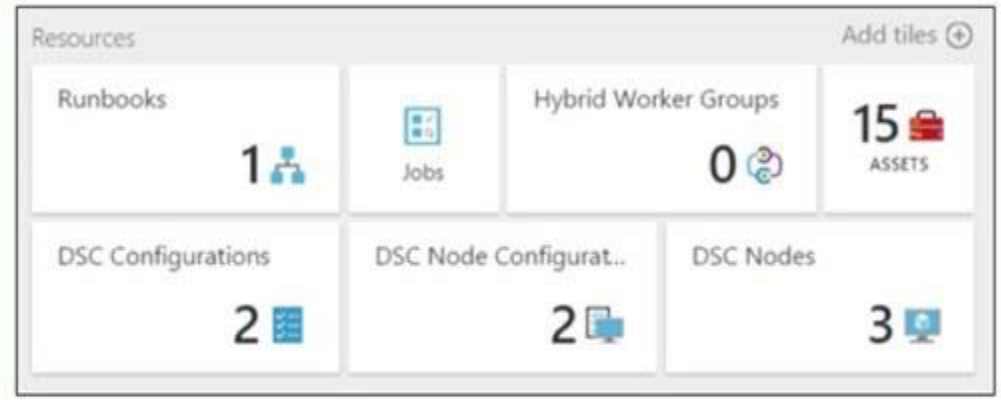
```
$rgName = "ContosoRG"
$location = "westus"
$vmName = "DSCVM"
$storageName = "dscstorage"
$configurationName = "ContosoWeb"
$archiveBlob = "ContosoWeb.ps1.zip"
$configurationPath = ".\ContosoWeb.ps1“

#Publish the configuration script into Azure storage
Publish-AzureRmVMDscConfiguration -ConfigurationPath $configurationPath `
                                  -ResourceGroupName $rgName `
                                  -StorageAccountName $storageName

#Set the VM to run the DSC configuration
Set-AzureRmVmDscExtension -Version 2.26 `
                          -ResourceGroupName $resourceGroup `
                          -VMName $vmName `
                          -ArchiveStorageAccountName $storageName `
                          -ArchiveBlobName $archiveBlob `
                          -AutoUpdate:$false `
                          -ConfigurationName $configurationName
```

Azure Automation DSC

- Host DSC Scripts and clients pull their configurations automatically
- Support cloud or on-premises based VMs
- Part of the Azure Automation service
- Easy to on-board Azure Virtual Machines
- Capabilities
  - Import, Authoring, Compiling
  - Integrated source control versioning, Distribution to nodes
  - Reporting

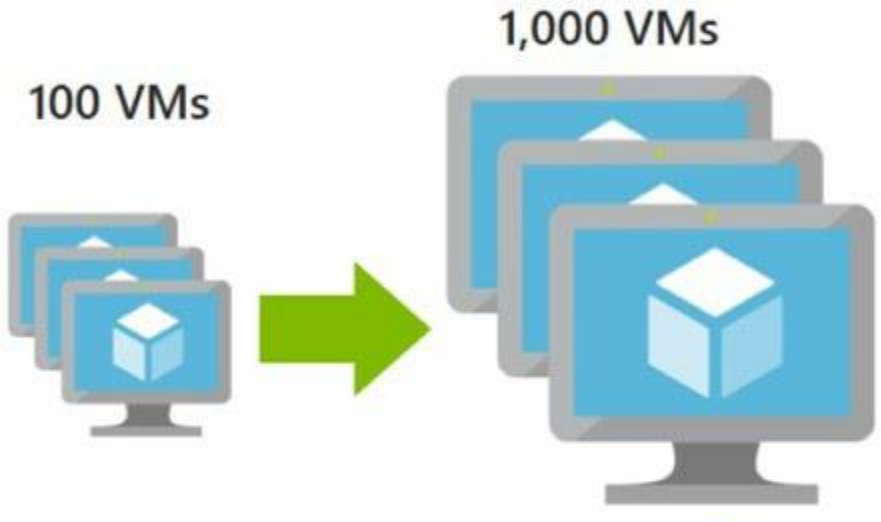


Azure Automation supports both Azure VMs and on-prem machines

DEMO
PowerShell DSC

Virtual Machine Scale Sets (VMSS)

VM Scale Sets

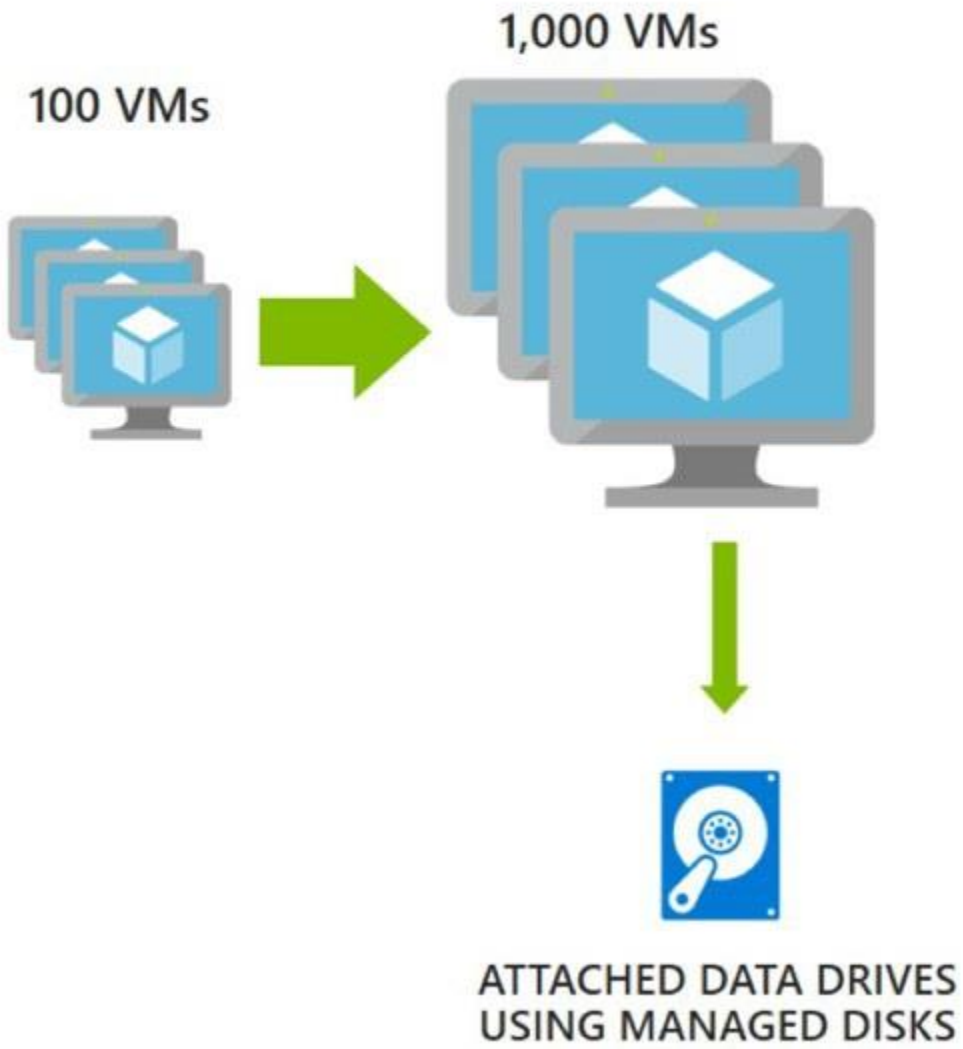


TTACHED DATA DRIVES
USING MANAGED DISKS

VM Scale Sets can be deployed to Availability Zones

- Windows or Linux
- Deploy and Manage a collection of VMs as a Set (Via: Portal, CLI, PS, ARM Templates)
- Used for deploying large numbers of identical VMs
  - big compute, big data, containerized workloads, web farms
- Implicitly deploys to an availability set (5 FD, 5UD)

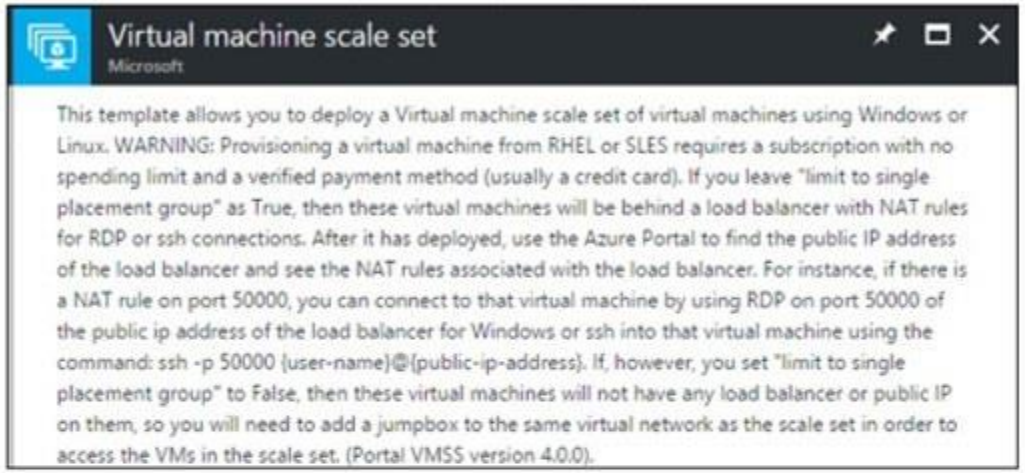
VM Scale Sets



- Works with Azure Load Balancer (Layer 4) or Azure App Gateway (Layer-7) Load Balancer
- Data disk support via managed disks
- Instance count support
  - Over 100 set: singlePlacementGroup = false at creation time
  - Up to 300 instances using a custom image
  - Up to 1000 instances using a gallery supplied image

VMSS– Deployment Options

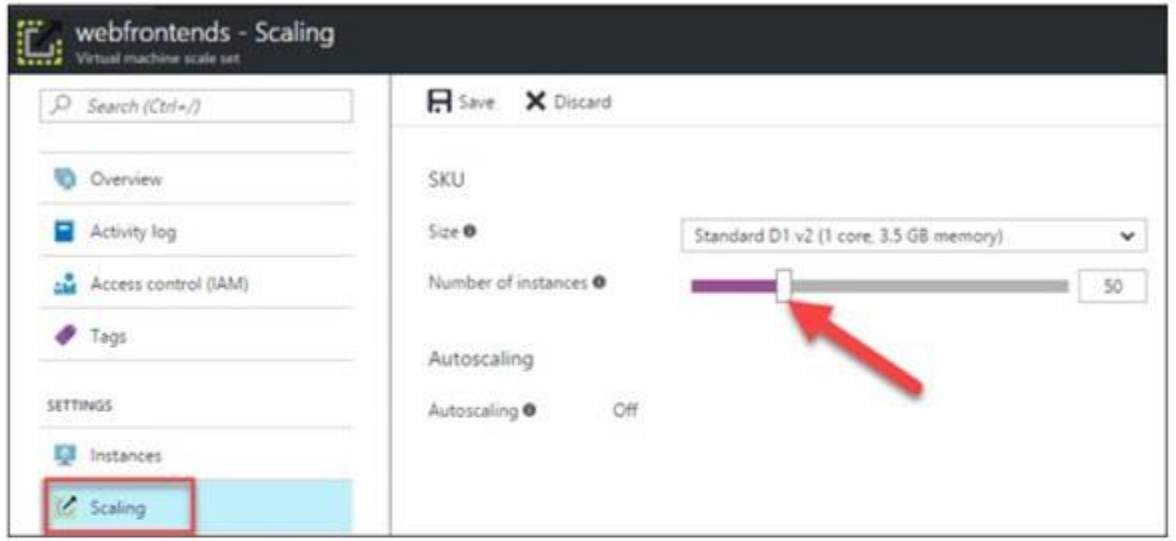
- Portal
- PowerShell
- CLI
- ARM Templates




```
{
    "type": "Microsoft.Compute/virtualMachineScaleSets",
    "name": "[variables('namingInfix')]",
    "location": "[resourceGroup().location]",
    "apiVersion": "[variables('computeApiVersion')]",
    "dependsOn": [
      "[concat('Microsoft.Network/loadBalancers/', variables('loadBalancerName'))]",
      "[concat('Microsoft.Network/virtualNetworks/', variables('virtualNetworkName'))]"
    ],
    "sku": {
      "name": "[parameters('vmSku')]",
      "tier": "Standard",
      "capacity": "[parameters('instanceCount')]"
      },
```

VMSS – Changing the Capacity

- Portal using the "Scaling" section



- Azure CLI

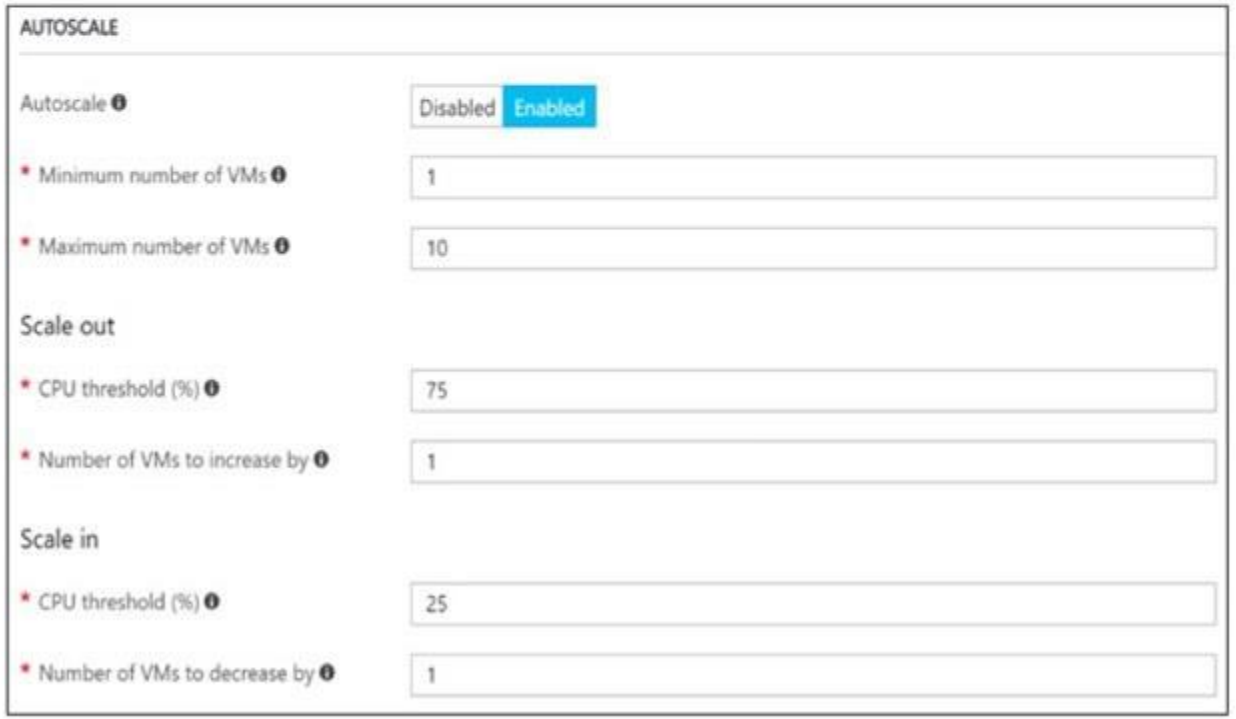
```
az vmss scale -g resourcegroupname -n
scalesetname --new-capacity 10
```

- PowerShell

```
$vmss = Get-AzureRmVmss -ResourceGroupName resourcegroupname
-VMScaleSetName scalesetname
$vmss.Sku.Capacity = 10
Update-AzureRmVmss -ResourceGroupName resourcegroupname -Name
scalesetname -VirtualMachineScaleSet $vmss
```

VMSS – Autoscale

- VM Scale Sets can Autoscale based on defined rules typically CPU Metrics
  - ARM Template
  - PowerShell



VMSS – Connecting to VMs using NAT

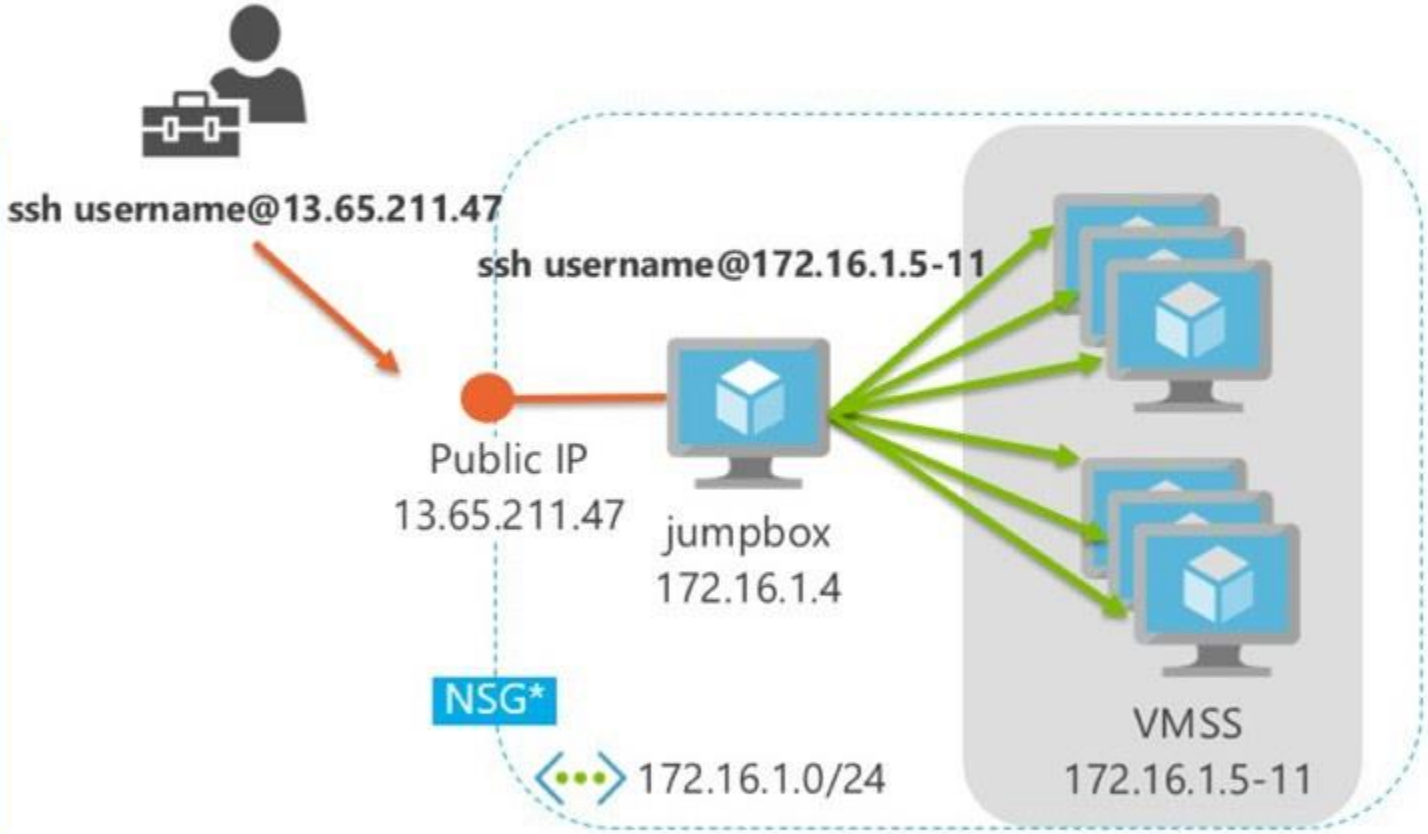
- Create a Public IP Address and assign to external Load Balancer
- Define inbound NAT Pool which maps to ports on the Public IP to custom ports on VMs in the scale set

Source	Source Port	Destination	Destination Port
Public IP	Port 50000	vmss_0	Port 22
Public IP	Port 50001	vmss_1	Port 22
Public IP	Port 50002	vmss_2	Port 22

https://github.com/Azure/azure-quickstart-templates/tree/master/201-vmss-linux-nat

VMSS – Connecting using Jumpbox

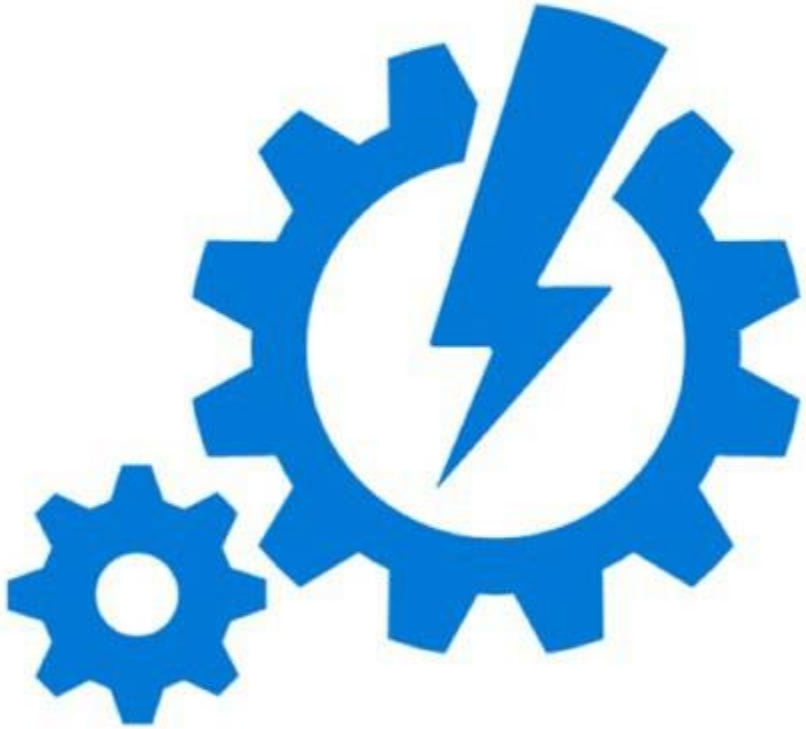
- Create a scale set in a VNET with an additional VM
- The stand-alone VM will then be able to connect to the scale set instances using their internal IP Addresses
- If the stand-alone VM has a Public IP then the scale set would be accessible



* Inbound Rule: Any/172.16.1.0/24 | Port: 22 | Allow

Customizing VM Scale Sets

- Use VM Extensions to customize VM instances
- CustomScriptExtension
  - Run PowerShell or BASH
- PowerShell DSC Extension
  - Apply DSC Configuration



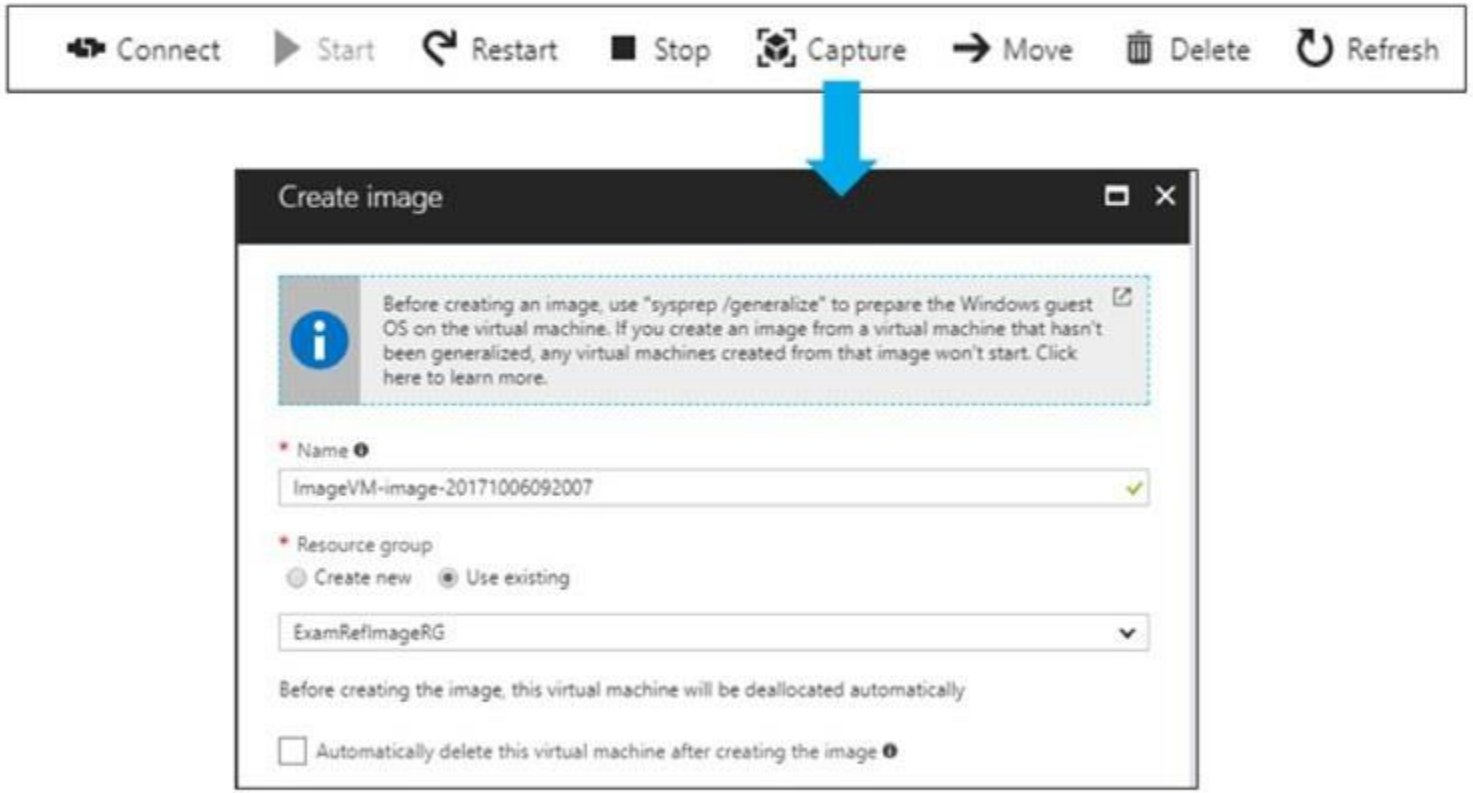
Virtual Machine Images

Generalized Images

- VM that has had sysprep or waagent executed
- Captures data disks if attached
- Used for creating identically configured instances with unique computer/host names
- Managed Image (preferred)
  - VHD location is managed by Azure can create anywhere
- Unmanaged Image
  - VHD is stored in the same storage account as source disks. Can only create in the same region as source
- Process
  - Run SysPrep with Generalize and Shutdown prior to capture
  - sysprep.exe /oobe /generalize /shutdown
  - Capture
  - Create new VM(s) from image

Capturing a VM Image (managed)

- Portal
- PowerShell
- CLI



Capturing a VM Image (managed)

```
# Set to Generalized
Set-AzureRmVM -ResourceGroupName $rgName -Name $vmName -Generalized

# Capture the image to a storage account and the configuration locally
$vm = Get-AzureRmVM -Name $vmName -ResourceGroupName $rgName
$image = New-AzureRmImageConfig -Location $location -SourceVirtualMachineId $vm.ID
New-AzureRmImage -Image $image -ImageName $imageName -ResourceGroupName $rgName
```

```
# Generalize the Source VM
az vm generalize --resource-group WebImageRG --name WebImageVM

# Create an image from the Image
az image create --resource-group WebImageRG --name myNewVM --source WebImageVM
```

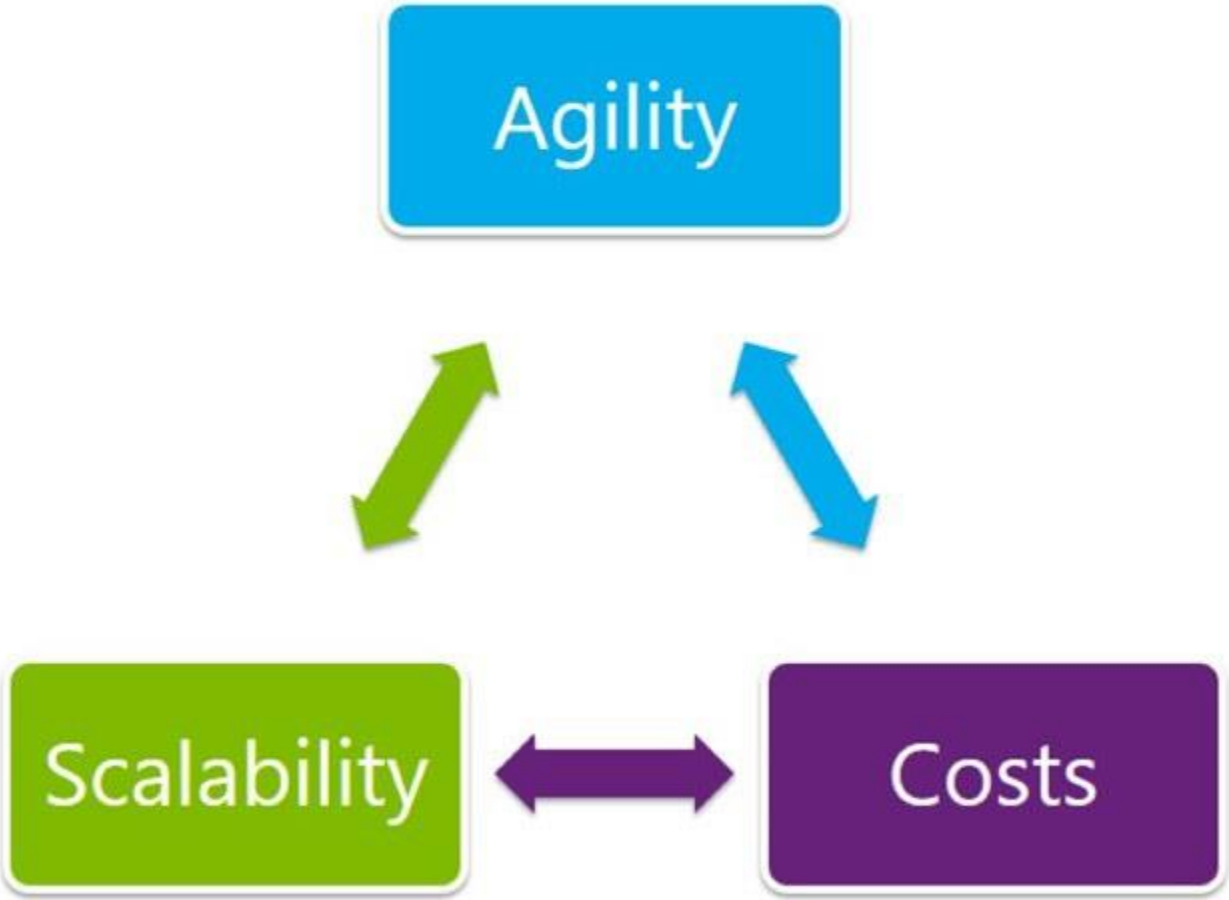
Capturing a VM Image (unmanaged)

```
# Set to Generalized
Set-AzureRmVM -ResourceGroupName 'WebImageRG' -Name 'WebImageVM' -Generalized

# Capture the image to a storage account and the configuration locally
Save-AzureRmVMImage -ResourceGroupName 'WebImageRG' `
                    -VMName 'WebImageVM' `
                    -DestinationContainerName 'images' `
                    -VHDNamePrefix 'webimage' `
                    -Path C:\VMConfigs\WebImageConfig.json
```

Licensing and Pricing

Business Value of the Cloud



Only Pay for what you use…

- No upfront costs
- No termination fees
- Pay for only what you use
- Per minute billing

Practical Details

- You are not charged for stopped (deallocated) virtual machine compute time
  - Seasonal workloads
  - Scheduled workloads
  - Burst workloads
  - Development and test environments

- Simple to change the size of a virtual machine depending on changing requirements
- Use automation such as PowerShell and Azure Automation, or auto-scale to save money

Flexible Purchasing Options

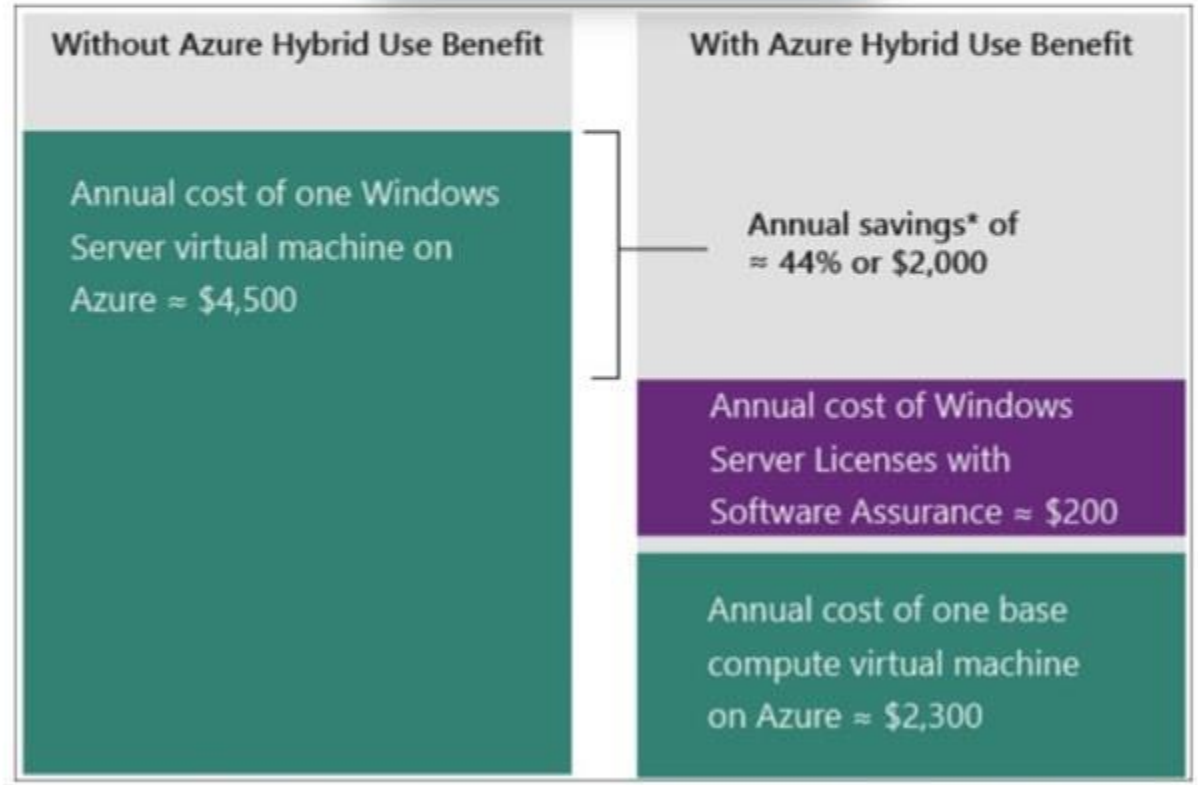
- Pay-As-You-Go Subscriptions (Credit card)
- Prepaid Subscriptions
- Microsoft Resellers
  - Cloud Solution Providers
  - Open
- Enterprise Agreements
- Microsoft Azure Compute Option

Enterprise Agreements

- Any Enterprise Agreement customer can add Azure to their EA by making an upfront monetary commitment to Azure
- That commitment is consumed throughout the year by using any combination of the wide variety of cloud services Azure offers from its global datacenters
- Pay for added usage at the same great EA rates!

Hybrid Use Benefits

- Run Windows Server Virtual Machines on Azure at base compute pricing
- Windows Server customers with Software Assurance are eligible for this benefit



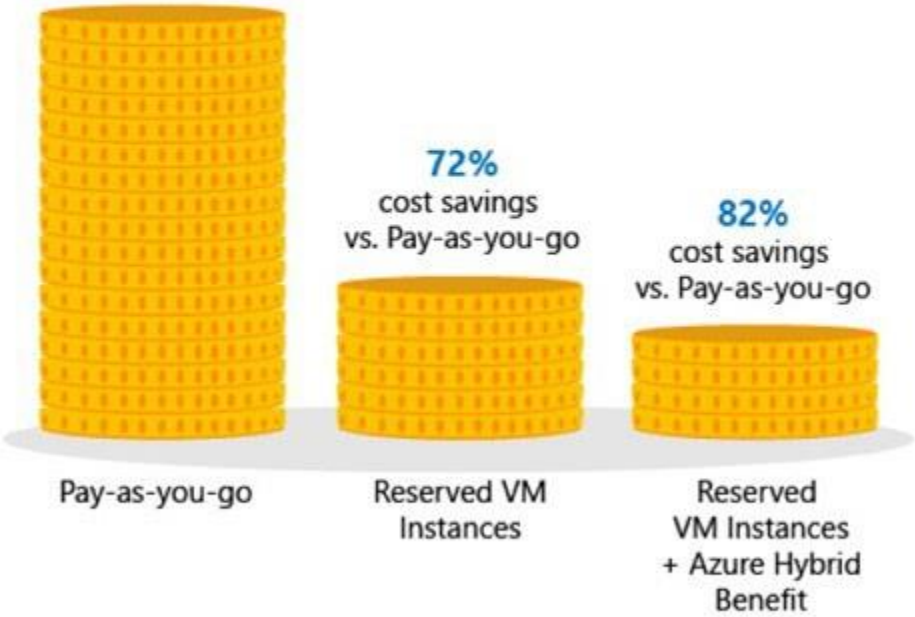
https://azure.microsoft.com/en-us/overview/azure-for-microsoft-software/faq/

Microsoft Azure Reserved Instances

- Significantly reduce costs—up to 72 percent on pay-as-you-go prices—with one-year or three-year terms on Windows and Linux VMs.
- When combined with savings inherent to Azure Reserved VM Instances with the added value of the Azure Hybrid Benefit, you can save up to 82 percent.

https://azure.microsoft.com/en-us/pricing/reserved-vm-instances/

Save up to **82%** with
RIs and Azure Hybrid Benefit



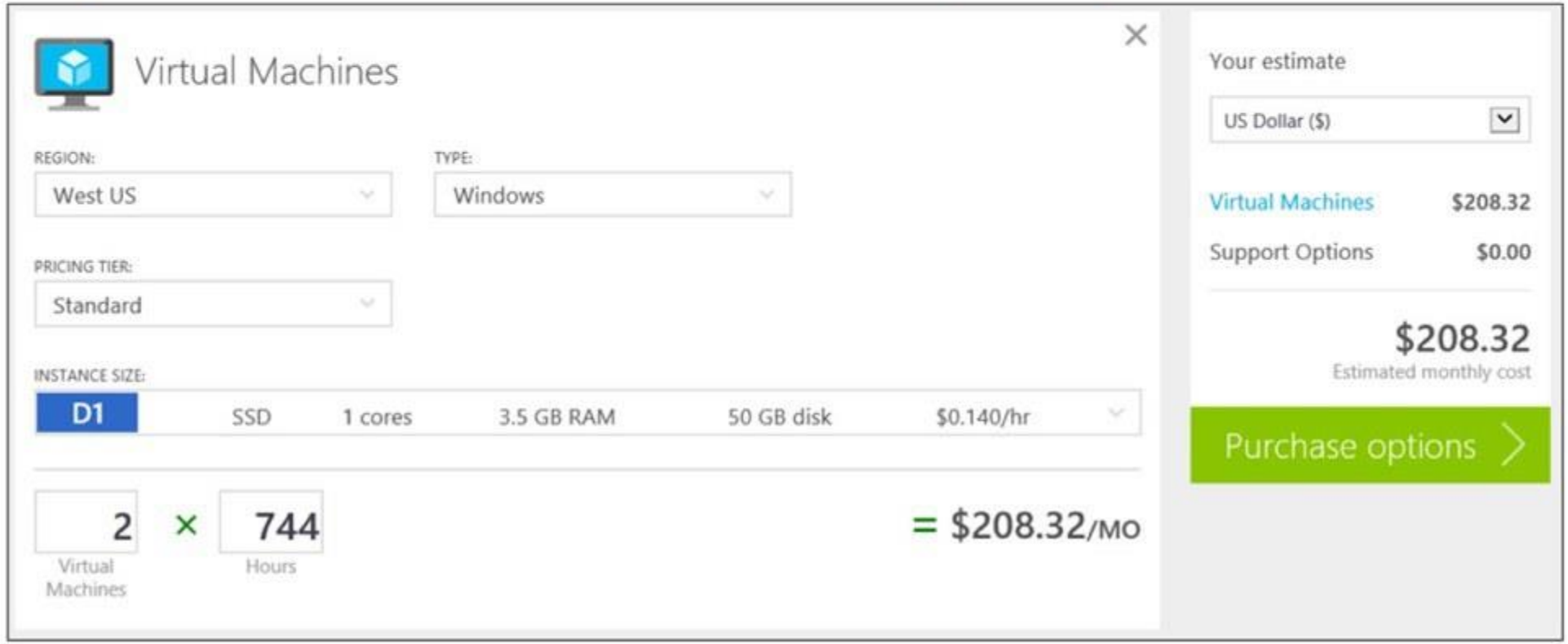
Virtual Machine Licensing Basics

- ## Image Gallery Licensing
  - Images such as Windows Server 2012 R2 Data Center are available in Microsoft Azure and do not require separate licensing. These images are billed by the minute and include compute resources and licensing as part of the cost
- ## License Mobility
  - License Mobility through Software Assurance gives Microsoft Volume Licensing customers the flexibility to deploy eligible server applications with active Software Assurance on Azure. With this Software Assurance benefit, there is no need to purchase new licenses and no associated mobility fees so, you can easily deploy existing licenses on the Azure cloud platform.
  - http://azure.microsoft.com/en-us/pricing/license-mobility/

Pricing an IaaS Solution

Use the Pricing Calculator to Estimate Costs:

https://azure.microsoft.com/en-us/pricing/calculator/



MSDN and Visual Studio Azure Benefits

$50
PER MONTH
professional

$100
PER MONTH
platforms

$150
PER MONTH
enterprise

- MSDN Enabled Subscriptions Provide
  - Discounted rates for VMS dev/test (pay only the Linux rate for MSDN enabled images like Windows, SQL and BizTalk
  - Access to client operating systems for dev/test
  - Windows client operating systems are only supported for development and test on MSDN enabled subscriptions

Securing Virtual Machines

Virtual Machine Security

- Virtual Disk Encryption
- Operating System Patching
- Anti-Malware
- Credentials Security

Virtual Machine Security

- Virtual Disk Encryption
  - Bitlocker (Windows) / DM-Crypt (Linux)
  - Azure Storage Encryption (Encryption at Rest)
- Operating System Patching
  - VM Update Management (Preview)
- Anti-Malware
  - VM Extensions
  - 3rd party software installations (AV/AM agents)

Virtual Machine Security

- Credentials Security
  - Azure Key Vault
  - Role Based Access Control (RBAC)

- Azure Security Center
  - Detects potential security risks
  - gives recommendations
  - Broader than just VM security (Networking, SQL, Applications,…)

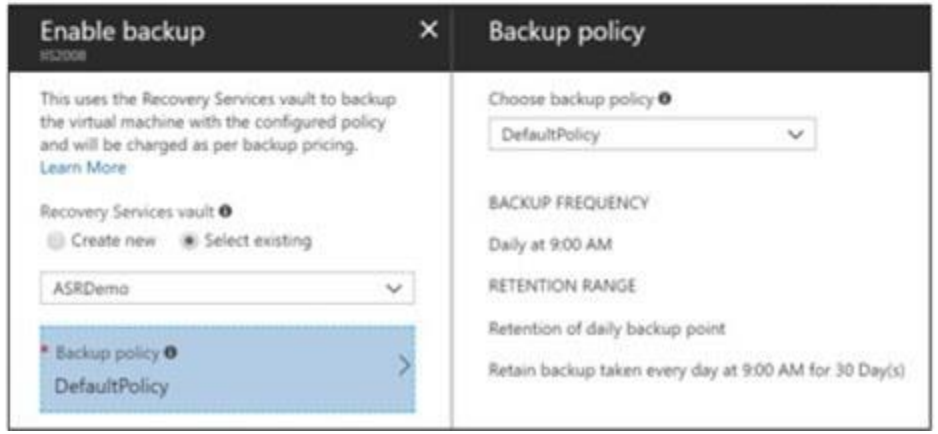
Protecting Virtual Machines

Virtual Machine Protection

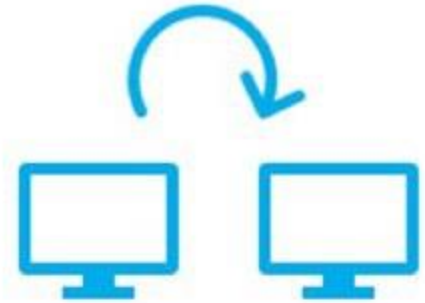
- Azure VM Backup
  - "Azure Backup"
  - Built-in into the Azure VM Settings
- Azure VM Disaster Recovery
  - "Azure Site Recovery"
  - Replicate Azure VMs to an Azure Recovery Vault
  - Allows failover when needed

Azure VM Backup

- Enable Azure VM Backup
- Define custom backup policy
  - Daily, Weekly, Monthly, Yearly retention
- Backups can be stored encrypted
- Easily restore full VM image, or restore individual files & folders



Azure VM Recovery (Preview)



- Enable Azure VM Recovery
- Define custom ASR Protection Plan
  - Replication timings
  - Dependencies and Failover Logic

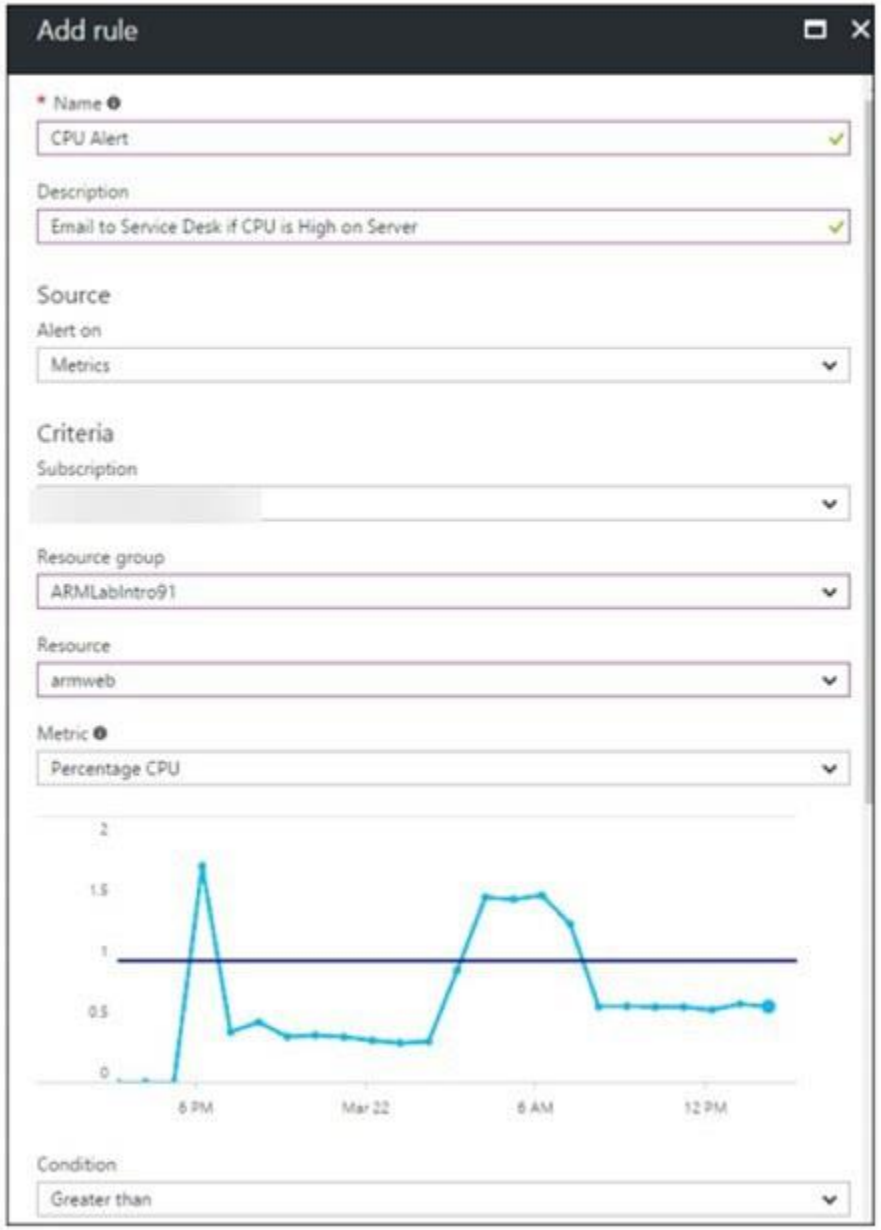
- Replicate to offline VMs (=only storage cost)
- Replicate to another Azure Region
- Change target VM characteristics (e.g. Size)
- Recover full VM in <20min

Managed Disks VMs are not supported yet

Monitoring Virtual Machines

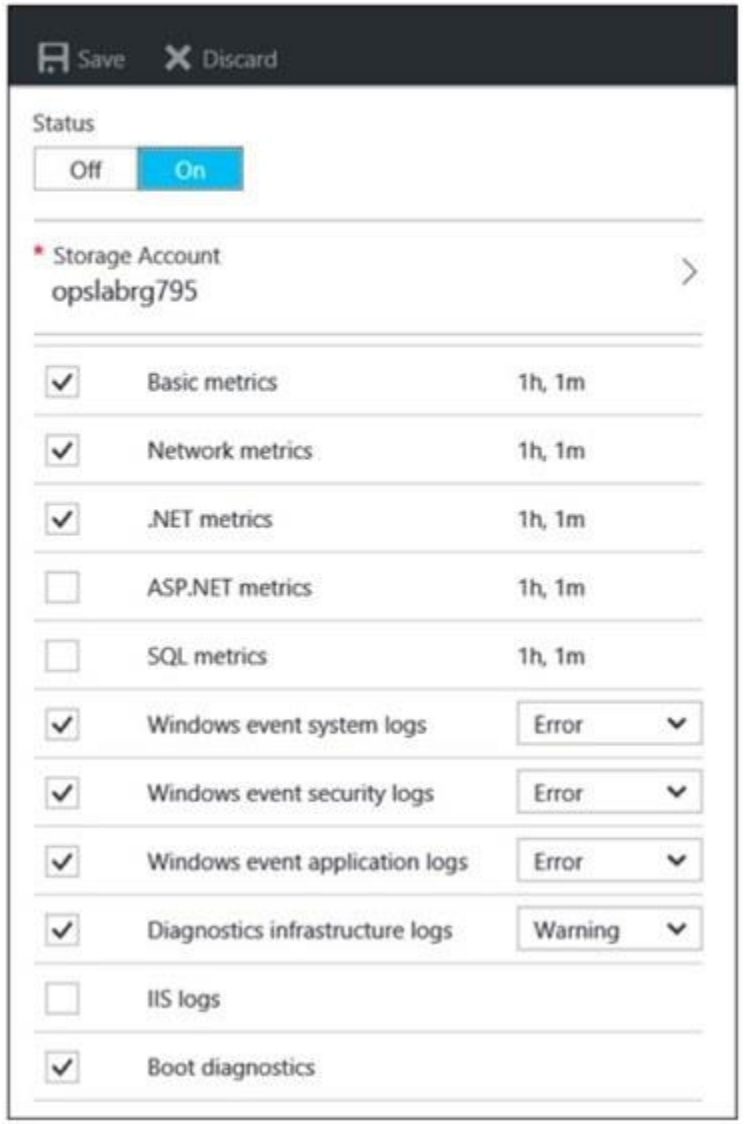
Azure Diagnostics Agent

- Enabled via Diagnostics Extension at VM create or update
- Capture performance metrics
- Configure notifications based on configurable thresholds



VM Diagnostics Configuration

- Configurable VM Extension for Windows Server that transfers diagnostics data to Azure Storage
- Support for custom configuration file (XML or JSON)
- Sources
  - Guest Level Performance Metrics (Windows and Linux)
  - Capture and transfer of Event, Security, and System event logs (Windows Only)
  - .NET and SQL Server Metrics (Windows Only)
  - IIS Logs and Custom Directories (Windows Only)
  - Boot Diagnostics (Windows and Linux)



Azure Alerts

- Configurable thresholds based on captured diagnostics metrics
- Notification Support
  - Send Email to administrators or alternate email
  - Support for webhooks to allow custom actions to take place
  - Execute Runbook
  - Execute Logic App

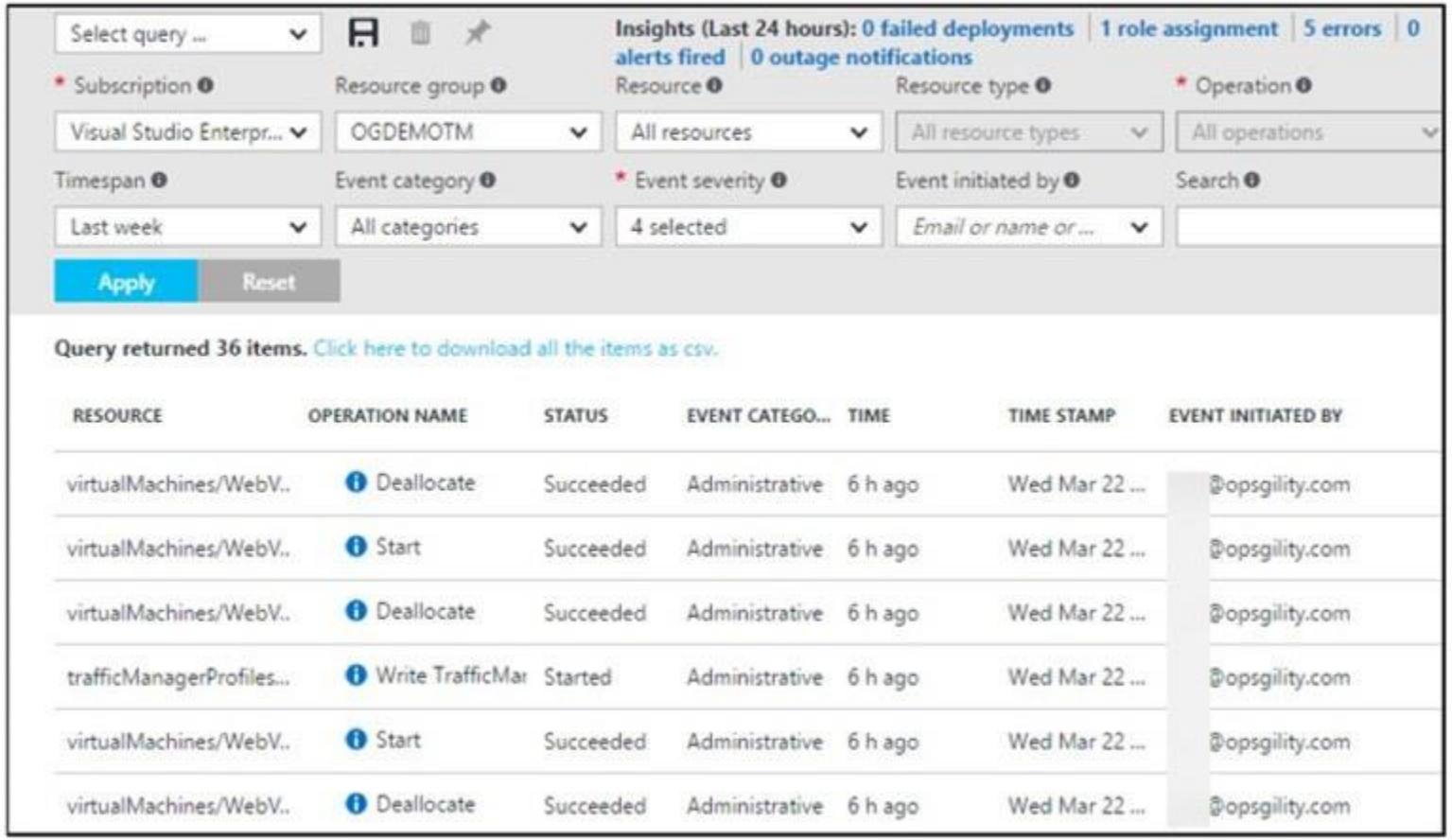
⚠ 'CPU percentage guest OS GreaterThan 25 (Percent) in the last 5 minutes' was activated for virtualMachines: WebVM-1 (OpsVMRmRG)

Activity Logs

Changes to resources are captured in Activity Logs

Captured Information

- Operation
- Time
- User
- Client IP
- Alert Notifications



Boot Diagnostics

- View Console output from Linux VMs
- See screenshots from Linux and Windows
- Non-Interactive

Console Output

Log Screenshot Settings

```
[H[J[1;1H[    0.000000] Initializing cgroup subsys cpuset
[    0.000000] Initializing cgroup subsys cpu
[    0.000000] Initializing cgroup subsys cpuacct
[    0.000000] Linux version 4.2.0-41-generic (buildd@lgw01-52) (gcc version 5.2.1 20151010 (Ubuntu
5.2.1-22ubuntu2) ) #48-Ubuntu SMP Fri Jun 24 11:28:43 UTC 2016 (Ubuntu 4.2.0-41.48-generic
4.2.8-ckt11)
[    0.000000] Command line: BOOT_IMAGE=/boot/vmlinuz-4.2.0-41-generic
root=UUID=c6ca03a3-2d7b-430b-8769-5d086ee49acc ro console=tty1 console=ttyS0 earlyprintk=ttyS0
rootdelay=300
[    0.000000] KERNEL supported cpus:
[    0.000000]   Intel GenuineIntel
[    0.000000]   AMD AuthenticAMD
[    0.000000]   Centaur CentaurHauls
[    0.000000] x86/fpu: xstate_offset[2]: 0240, xstate_sizes[2]: 0100
[    0.000000] x86/fpu: Supporting XSAVE feature 0x01: 'x87 floating point registers'
[    0.000000] x86/fpu: Supporting XSAVE feature 0x02: 'SSE registers'
[    0.000000] x86/fpu: Supporting XSAVE feature 0x04: 'AVX registers'
[    0.000000] x86/fpu: Enabled xstate features 0x7, context size is 0x340 bytes, using 'standard'
format.
[    0.000000] x86/fpu: Using 'eager' FPU context switches.
[    0.000000] e820: BIOS-provided physical RAM map:
[    0.000000] BIOS-e820: [mem 0x0000000000000000-0x000000000009fbff] usable
[    0.000000] BIOS-e820: [mem 0x000000000009fc00-0x000000000009ffff] reserved
[    0.000000] BIOS-e820: [mem 0x00000000000e0000-0x00000000000fffff] reserved
[    0.000000] BIOS-e820: [mem 0x0000000000100000-0x000000001ffefffff] usable
[    0.000000] BIOS-e820: [mem 0x000000001fff0000-0x000000001fffefff] ACPI data
[    0.000000] BIOS-e820: [mem 0x000000001ffff000-0x000000001fffffff] ACPI NVS
[    0.000000] BIOS-e820: [mem 0x0000000100000000-0x000000015fffffff] usable
[    0.000000] bootconsole [earlyser0] enabled
[    0.000000] NX (Execute Disable) protection: active
[    0.000000] SMBIOS 2.3 present.
[    0.000000] Hypervisor detected: Microsoft HyperV
[    0.000000] HyperV: features 0xe7f, hints 0x2c
```

Boot Screenshot

```
Boot failure. Reboot and Select proper Boot device
or Insert Boot Media in selected Boot device
```

https://azure.microsoft.com/en-us/blog/boot-diagnostics-for-virtual-machines-v2/