



# AZ-300T03

## Module 03: Deploying and Managing Virtual Machines (VMs)

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## Module 03: Deploying and Managing Virtual Machines (VMs)

### Lesson 01: Creating Virtual Machines in the Azure Portal

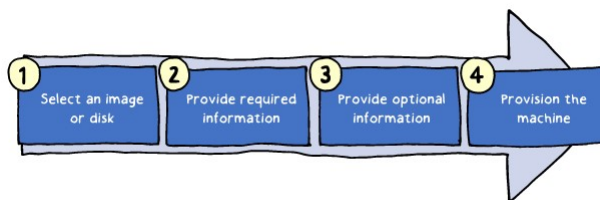


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## Creating Virtual Machines (Portal)

High level steps:

1. **Select a Marketplace image.**
2. **Provide required information, including:**
  - VM name
  - Administrative credentials
  - Virtual network and subnet
  - Storage type
3. **Provide optional information, including:**
  - Availability settings
  - VM extensions
4. **Provision the machine.**



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## Virtual Machine Example (Part 1)

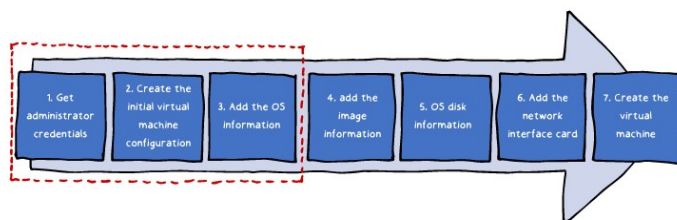
A sample provisioning (steps 1-3):

1. **Set the credentials of the administrator account:**

```
$cred = Get-Credential
```
2. **Create the initial configuration for the virtual machine:**

```
$vm = New-AzureRmVMConfig -VMName myVM -VMSize Standard_D1
```
3. **Add the operating system information to the virtual machine configuration:**

```
$vm = Set-AzureRmVMOperatingSystem `
-VM $vm `
-Windows `
-ComputerName myVM `
-Credential $cred `
-ProvisionVMAgent -EnableAutoUpdate
```



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## Virtual Machine Example (Part 2)

A sample provisioning (steps 4-7):

**4. Add the image information to the virtual machine configuration:**

```
$vm = Set-AzureRmVMSourceImage -VM $vm -PublisherName MicrosoftWindowsServer `
-Offer WindowsServer -Skus 2016-Datacenter -Version latest
```

**5. Add the operating system disk settings to the virtual machine configuration:**

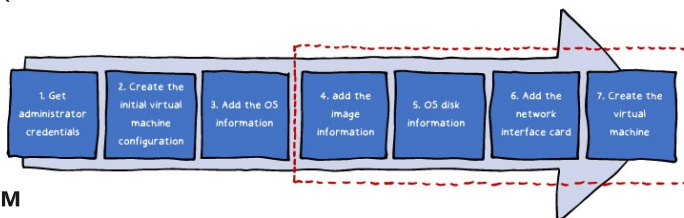
```
$vm = Set-AzureRmVMOSDisk -VM $vm -Name myOsDisk -DiskSizeInGB 128 `
-CreateOption FromImage -Caching ReadWrite
```

**6. Add the network interface card to the virtual machine configuration:**

```
$vm = Add-AzureRmVMNetworkInterface `
-VM $vm -Id $nic.Id
```

**7. Create the virtual machine:**

```
New-AzureRmVM `
-Location EastUS `
-VM $vm `
-ResourceGroupName myResourceGroupVM
```



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## Moving Virtual Machines Between Resource Groups

Supported by using the Azure Portal, PowerShell, CLI, and REST API

Azure PowerShell-based example:

**1. Identify ResourceId of all of the dependent resources:**

```
Get-AzureRMResource -ResourceGroupName <sourceResourceGroupName> | Format-table -Property ResourceId
```

**2. Create a comma separated list of the ResourceIds and use the list as input of the Move-AzureRMResource cmdlet:**

```
Move-AzureRmResource -DestinationResourceGroupName "<myDestinationResourceGroup>" `
-ResourceId <myResourceId,myResourceId,myResourceId>
```

**3. For cross-subscriptions moves, include the -DestinationSubscriptionId parameter.**

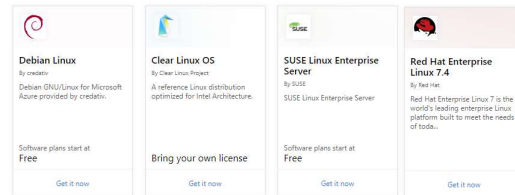
```
Move-AzureRmResource -DestinationSubscriptionId "<myDestinationSubscriptionID>" `
-DestinationResourceGroupName "<myDestinationResourceGroup>" `
-ResourceId <myResourceId,myResourceId,myResourceId>
```

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## Linux Virtual Machines

Azure supports many Linux distributions including:

- **CentOS by OpenLogic**
- **Core OS**
- **Debian**
- **Oracle Linux**
- **Red Hat Enterprise Linux**
- **Ubuntu.**



Azure Marketplace hosts hundreds of community-built images

- **Created with Bitnami**
- **Certified for Azure**

Linux VMs support the same deployment options as Windows VMs

Linux VMs support open-source DevOps tools, e.g. Puppet and Chef

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## Linux VM Connections

When you create a Linux VM, you can decide to authenticate with an **SSH public key** or **Password**.

### ADMINISTRATOR ACCOUNT

Authentication type ☐ Password ☒ SSH public key

\* 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.

### What is SSH?

SSH is an encrypted connection protocol that allows secure sign-ins over unsecured connections.

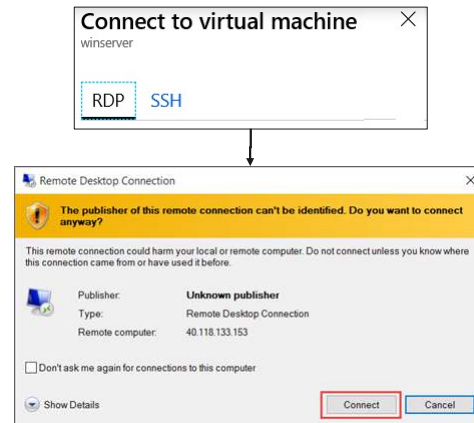
The preferred method of connecting to a VM using SSH is by using a public-private key pair:

- The *public key* is placed on your Linux VM, or any other service that you wish to use with public-key cryptography.
- The *private key* remains on your local system. Protect this private key. Do not share it.

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## 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



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## Module 03: Deploying and Managing Virtual Machines (VMs)

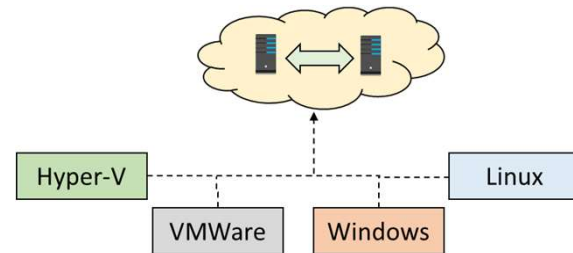
### Lesson 02: Backup and Restore



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## Azure Site Recovery (ASR) Scenarios

- Replicate Azure VMs from one Azure region to another
- Replicate on-premises VMware VMs, Hyper-V VMs, physical servers (Windows and Linux), Azure Stack VMs to Azure
- Replicate on-premises VMware VMs, Hyper-V VMs managed by System Center VMM, and physical servers to a secondary site



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## Virtual Machine Data Protection

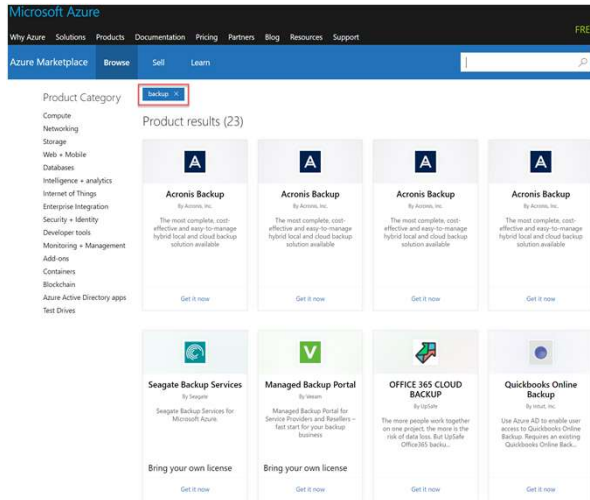


- Managed snapshots provide a quick and simple option for backing up VMs that use Managed Disks
- Azure Backup supports application-consistent backups for both Windows and Linux VMs
- Azure Site Recovery protects your VMs from a major disaster scenario when a whole region experiences an outage

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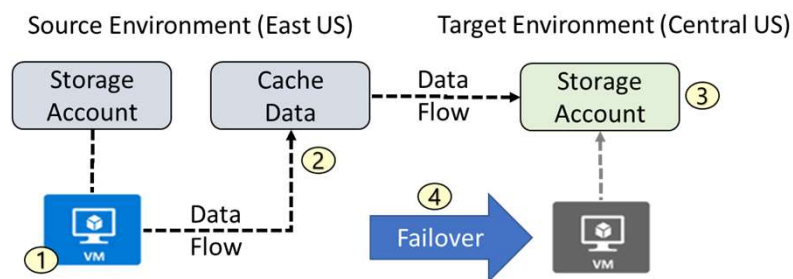
## Workload Protection Needs

- Many backup options are available
- How the workload is being protected today?
- How often is the workload is backed up?
- What types of backups are being done?
- Is disaster recovery protection in place?



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## Azure to Azure Architecture



1. VM is registered with Azure Site Recovery
2. Data is continuously replicated to cache
3. Cache is replicated to the target storage account
4. During failover the virtual machine is added to the target environment

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## Recovery Services Vault VM Backup Options

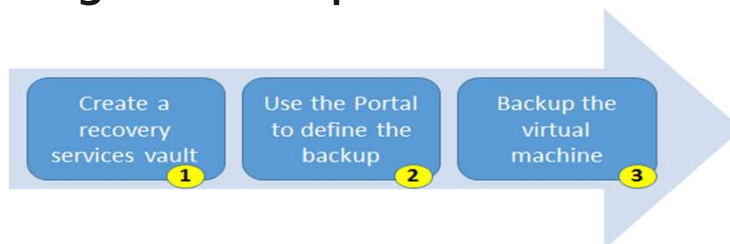
### • Azure Workloads

✓ Multiple servers can be protected using the same Recovery Services vault

### • On-Premises Workloads

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## Implementing VM Backups



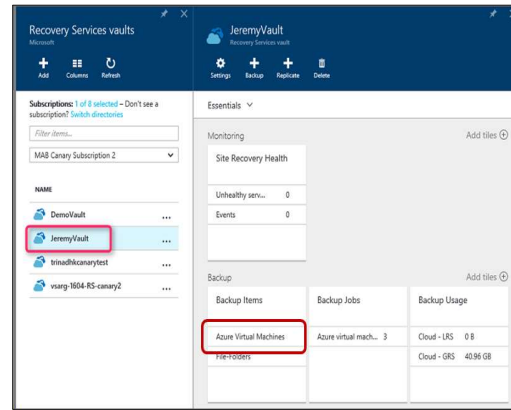
1. Use a Recovery Services vault in the region where you want to store the data To backup your files and folders. Also determine how you want your storage replicated.
2. Take snapshots (recovery points) of your data at defined intervals. These snapshots are stored in recovery services vaults.
3. For the Backup extension to work, the Azure VM Agent must be installed on the Azure virtual machine.

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## Implementing VM Restore

- Once you trigger the restore operation, the Backup service creates a job for tracking the restore operation
- The Backup service also creates and temporarily displays notifications, so you monitor how the backup is proceeding



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## Azure Backup Server



- App-aware backups, file/folder/volume backups, and machine state backups (bare-metal, system state)
- Each machine runs the DPM/MABS protection agent, and the MARS agent runs on the MABS/DPM
- Flexibility and granular scheduling options
- Manage backups for multiple machines in a protection group

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## Backup Component Comparison

Component	Benefits	Limits	Protects	Backup Storage
Azure Backup (MARS) agent	<ul style="list-style-type: none"> <li>Backup files and folders on physical or virtual Windows OS</li> <li>No separate backup server required.</li> </ul>	<ul style="list-style-type: none"> <li>Backup 3x per day</li> <li>Not application aware</li> <li>File, folder, and volume-level restore only</li> <li>No support for Linux</li> </ul>	<ul style="list-style-type: none"> <li>Files</li> <li>Folders</li> </ul>	<ul style="list-style-type: none"> <li>Recovery services vault</li> </ul>
Azure Backup Server	<ul style="list-style-type: none"> <li>App aware snapshots</li> <li>Full flex for when to backups</li> <li>Recovery granularity</li> <li>Linux support on Hyper-V and VMware VMs</li> <li>Backup and restore VMware VMs</li> <li>Doesn't require a System Center license</li> </ul>	<ul style="list-style-type: none"> <li>Cannot backup Oracle workloads</li> <li>Always requires live Azure subscription</li> <li>No support for tape backup</li> </ul>	<ul style="list-style-type: none"> <li>Files</li> <li>Folders,</li> <li>Volumes</li> <li>VMs</li> <li>Applications</li> <li>Workloads</li> </ul>	<ul style="list-style-type: none"> <li>Recovery services vault</li> <li>Locally attached disk</li> </ul>

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## Module 03: Deploying and Managing Virtual Machines (VMs)

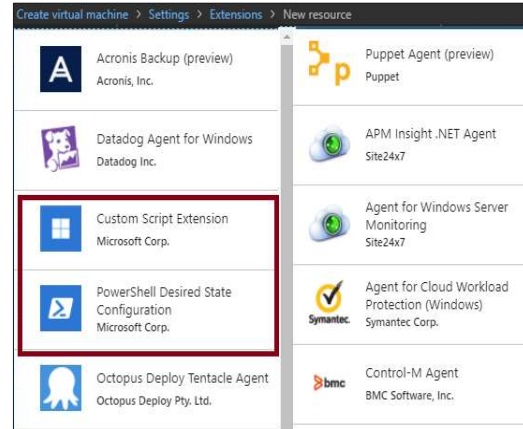
### Lesson 03: Virtual Machine Extensions



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## 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.




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## 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

### Install extension

\* Script file (Required) ⓘ



Arguments (Optional) ⓘ

✓ For PowerShell use the Set-AzVmCustomScriptExtension command

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## 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"
    }
  }
}
```

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## Module 03: Deploying and Managing Virtual Machines (VMs)

### Lesson 04: Monitoring Virtual Machines

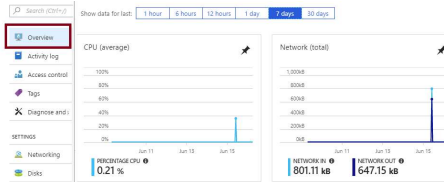


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## Monitoring

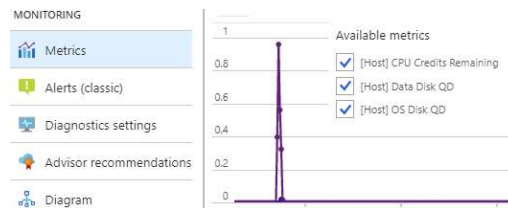
The Azure VM Overview blade in the Azure portal shows:

- CPU
- Network
- Disk bytes
- Disk operations



The Azure VM Monitoring section in the Azure portal shows:

- Metrics
- Diagnostic settings
- Advisor recommendations
- Diagram.



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## Advisor Recommendations

Personalized cloud service for optimizing Azure deployments:

- **Analyzes resource configuration and usage telemetry**
- **Offers recommendations grouped in four categories:**
  - **High availability:** To ensure and improve the continuity of your business-critical applications.
  - **Security:** To detect threats and vulnerabilities that might lead to security breaches.
  - **Performance:** To improve the speed of your applications.
  - **Cost:** To optimize and reduce your overall Azure spending.



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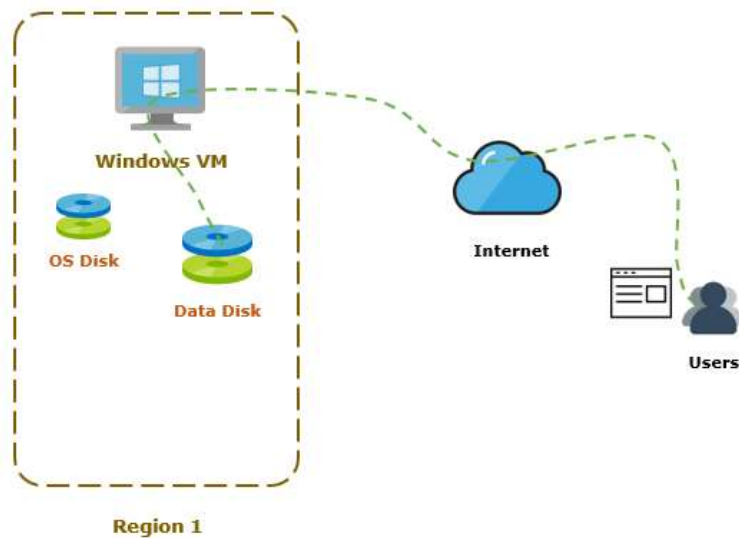
## LAB [300TO01-M03-01]

1. Build DR Solution for Application to Maintain Business Continuity (Minimum RPO & RTO).



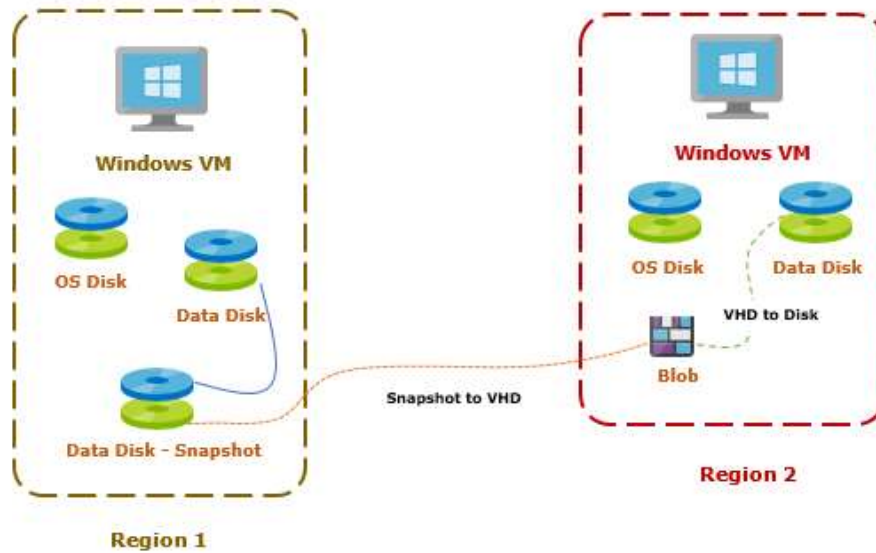
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### Part A



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## Part B



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## LAB [300TO01-M03-01]

### 1. Build DR Solution for Application to Maintain Business Continuity (Minimum RPO & RTO).

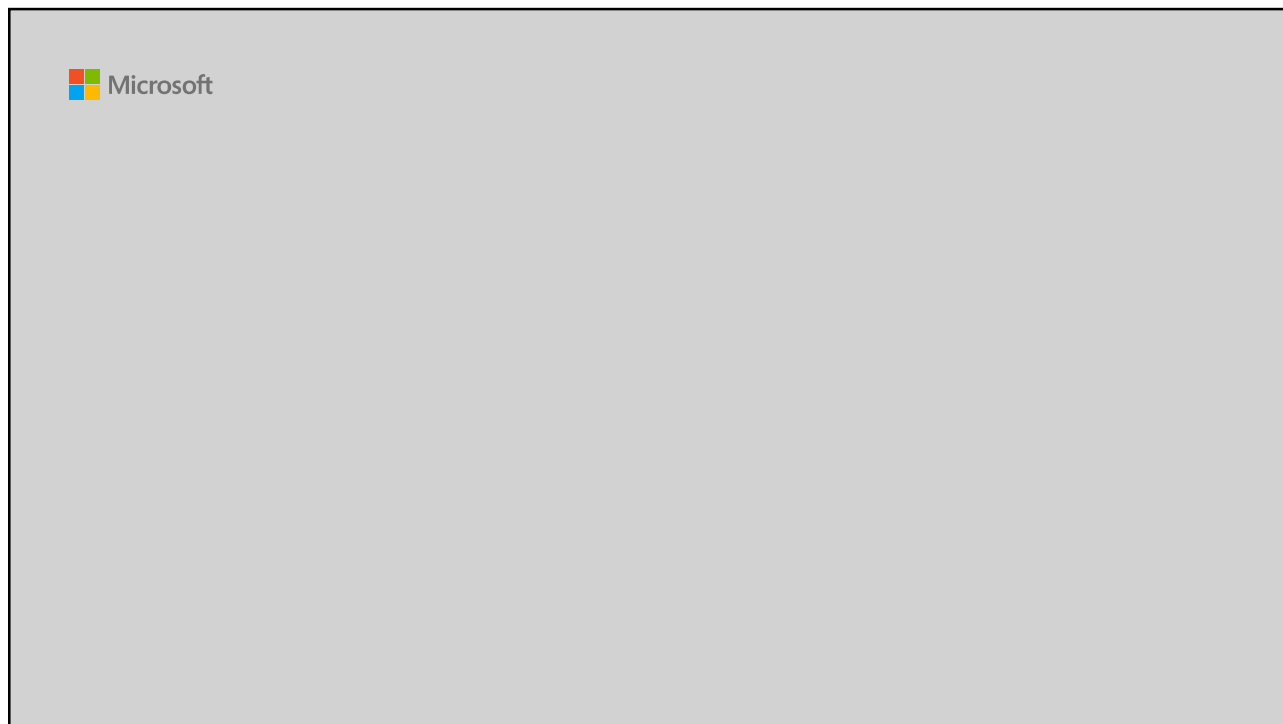
#### a. Services, Tools & Code used

- |                                  |                             |
|----------------------------------|-----------------------------|
| i. Azure Windows Virtual Machine | vii. Azure Disk Snapshot    |
| ii. IIS Web Server               | viii. Azure Storage         |
| iii. HTML Code                   | ix. Azure Blob              |
| iv. Windows PowerShell Script    | x. Azure PowerShell         |
| v. Azure Data Disk               | xi. Custom Script Extension |

**Duration: 60 mnts.**



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