

## Microsoft Azure: Infrastructure as a Service (IaaS)

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## Module 5: Managing Virtual Machines (VMs) from Windows PowerShell

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## Introduction

### Management mechanisms

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## Microsoft Azure Subscription

- Unique user account in Microsoft Azure.
- All resources are scoped under the Azure Subscription
- Uniquely identified by a subscription ID
- Security boundary for administration
- Unit of billing



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## Microsoft Azure Resource Group

- Resource Groups exist within a subscription
- A resource group can be secured via Role Based Access Control
- Resource groups are created via the Portal <http://go.microsoft.com> or through RM PowerShell cmdlets
- Security boundary for administration of individual or group resources
- Unit of billing



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**Service Management API (SMAPI) - Classic**

The Service Management API provides programmatic access to much of the functionality available through the Management Portal.

The Service Management API is a REST API. All API operations are performed over SSL and mutually authenticated using X.509 v3 certificates.

The subscription ID forms part of the URI for every call made to the Service Management API.  
<https://management.core.windows.net/<subscriptionId>/...>

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**Azure Resource Manager API (ARMAPI) – V2**

The Azure Resource Manager API provides programmatic access to much of the functionality available through the Management Portal.  
<https://portal.azure.com> .

The ARMAPI is a REST API. All API operations are performed over SSL and mutually authenticated using Azure Active Directory.

The subscription ID forms part of the URI for every call made to the ARMAPI  
<https://management.azure.com/subscriptions/<subscriptionId>/resourceGroups/<resourceGroupName>/...>

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**Module 5: PowerShell**

**V2 (ARM)**

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**Logging in to Azure**

 **Login-AzureRmAccount**

- With no parameters, will ask you to log in, then will automatically select first Azure subscription it finds
- With -SubscriptionName or -SubscriptionId parameter, will ask you to log in, then select specific subscription
- Use -Credential if you already have credentials file

 Before executing any other 'RM' commands, you need to first log in

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### How do I create an Azure Credential?

- An Azure Credential will allow you run a PowerShell script without a login prompt
- Does not use an .X509 Certificate (although you can)
- Uses an Azure Service Principal for an Azure AD Application
- You don't need to write a physical application, you just need to register an application name in Azure AD
- You must use an organizational account as the service principal identity. Microsoft accounts will not work (ie @Hotmail.com).

<https://azure.microsoft.com/en-in/documentation/articles/resource-group-authenticate-service-principal/>

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### Retrieving your Azure Subscription



`Get-AzureRmSubscription | Select SubscriptionName, SubscriptionId`

- Returns all subscriptions related to previous `Login-AzureRMAccount` command
- Provides subscription name and ID
- With `-SubscriptionName` or `-SubscriptionId` parameter, will return information about this particular subscription

Generally used to gather list of subscriptions or a particular subscription

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### Selecting your Azure Subscription



`Select-AzureRmSubscription`

- With `-SubscriptionName` or `-SubscriptionId` parameter, will select this subscription into the running PowerShell session

Generally used to gather list of subscriptions or a particular subscription

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## Creating a new Resource Group

An empty resource group

```
New-AzureRmResourceGroup -Name $resourceGroupName -Location $location
```

A resource group from a custom template

```
New-AzureRmResourceGroup -Name $resourceGroupName -Location $location -TemplateFile
'.\ContosoHosting.json' -DeploymentName $deploymentName -TemplateParameterFile
'.\ContosoHostingParams.json'
```

## Creating a new V2 Storage account

An new locally redundant V2 storage account

```
New-AzureRmStorageAccount -ResourceGroupName $resourceGroupName -Name $storageAcctName -
Type Standard_LRS -Location $location
```

## Creating a Virtual Network

### Configure a Subnet to put the VM in

```
$subnet = New-AzureRmVirtualNetworkSubnetConfig
-Name $subnetName
-AddressPrefix "10.0.64.0/24"
```

### Create the Virtual Network to put the subnet in

```
$vnet = New-AzureRmVirtualNetwork -Name $vnetName
-ResourceGroupName $resourceGroupName
-Location $location
-AddressPrefix "10.0.0.0/16" -Subnet $subnet
```

### Confirm Subnet configuration

```
$subnet = Get-AzureRmVirtualNetworkSubnetConfig
-Name $subnetName -VirtualNetwork $vnet
```

## Create IL Public IP address and NIC

### Create a new instance level public IP address

```
$pip = New-AzureRmPublicIpAddress
-ResourceGroupName $resourceGroupName
-Name $ipName -Location $location
-AllocationMethod Dynamic
-DomainNameLabel $domainLabel
```

### Create a new Network Interface

```
$nic = New-AzureRmNetworkInterface
-ResourceGroupName $resourceGroupName
-Name "nic1" -Subnet $subnet
-Location $location -PublicIpAddress $pip
-PrivateIpAddress "10.0.64.4"
```

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## VM image retrieval

### Image identification (example)

- Publisher - MicrosoftWindowsServer
- Offer - WindowsServer
- SKU – 2012-R2-Datacenter
- Version – 4.0.201506
- Location – westus

### PowerShell

```
$publisher = Get-AzureRmVMImagePublisher -Location $location
$offer = Get-AzureRmVMImageOffer -Location $location -PublisherName $publisher
$sku = Get-AzureRmVMImageSKU -Location $location -PublisherName $publisher -Offer $offer
$imageName = Get-AzureRmVMImage -Location $location -Offer $offer -PublisherName $publisher -SKU $sku
Save-AzureRmVMImage
```

## General Output of Get-AzureRmVMImage...

Windows	SQL
Get-AzureRmVMImagePublisher <ul style="list-style-type: none"> <li>• MicrosoftWindowsServer</li> </ul>	Get-AzureRmVMImagePublisher <ul style="list-style-type: none"> <li>• MicrosoftSQLServer</li> </ul>
Get-AzureRmVMImageOffer <ul style="list-style-type: none"> <li>• WindowsServer</li> </ul>	Get-AzureRmVMImageOffer <ul style="list-style-type: none"> <li>• SQL2008R2SP1-WS2008R2SP1</li> <li>• SQL2012SP2-WS2012</li> <li>• SQL2012SP2-WS2012R2</li> <li>• SQL2014-WS2012R2</li> <li>• SQL2014SP1-WS2012R2</li> <li>• SQL2016CT2-WS2012R2</li> </ul>
Get-AzureRmVMImageSKU <ul style="list-style-type: none"> <li>• 2008-R2-SP1</li> <li>• 2012-D-Datacenter</li> <li>• 2012-R2-Datacenter</li> <li>• 2016-Technical-Preview-3-with-Containers</li> <li>• Windows Server-Technical-Preview</li> </ul>	Get-AzureRmVMImageSKU (SQL2012SP2-WS2012) <ul style="list-style-type: none"> <li>• Enterprise</li> <li>• Enterprise-Optimized-for-DW</li> <li>• Enterprise-Optimized-for-OLTP</li> <li>• Standard</li> <li>• Web</li> </ul>

## Configuring a VM prior to creation

### Setup a new VM configuration

```
$vmConfig = New-AzureRmVMConfig -VMName $vmName -VMSize $vmSize |
```

### Set the Operating System Parameters

```
Set-AzureRmVMOperatingSystem -Windows -ComputerName $vmName -Credential $cred -ProvisionVMAgent -EnableAutoUpdate |
```

### Set the VM Image Source location

```
Set-AzureRmVMSourceImage -PublisherName $publisher -Offer $offer -Skus $sku -Version $version |
```

## Deploying a VM

### Setup OS Disk caching parameters (optional)

```
Set-AzureRmOSDisk -Name $vmName ` 
    -VhdUri $vhdUri -Caching ReadWrite ` 
    -CreateOption fromImage |
```

### Add the network interface to the VM configuration

```
Add-AzureRmVMNetworkInterface -Id $nic.Id
```

### Create the new VM

```
New-AzureRmVM -ResourceGroupName $resourceGroupName ` 
    -Location $location -VM $vmConfig -Name $vmName
```

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## Complete Command for VM configuration

```
$vmConfig = New-AzureRmVMConfig -VMName $vmName -VMSize "Standard_D1" | Set-AzureRmVMOperatingSystem -Windows ` 
    ComputerName $vmName -Credential $cred -ProvisionVMAgent -EnableAutoUpdate | Set-AzureRmVMSourceImage -PublisherName 
    $publisher -Offer $offer -Skus $sku -Version "4.0.201506" | Set-AzureRmOSDisk -Name $osDiskName -VhdUri $osDiskUri -` 
    Caching ReadWrite -CreateOption fromImage | Add-AzureRmVMNetworkInterface -Id $nic.Id

New-AzureRmVM -ResourceGroupName $resourceGroupName -Location $location -VM $vmConfig -Name $vmName
```

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## Create a Static Public IP address



### New-AzureRmPublicIpAddress Options

```
$vip = New-AzureRmPublicIpAddress -ResourceGroupName $resourceGroupName -Name 
    "VIP1" -Location $location -AllocationMethod Static -DomainNameLabel $domainName
    • Name – the name to be applied to the VIP
    • Allocation method = static or dynamic, depends on if you want a reserved IP address
    • DomainNameLabel – provides a DNS name like contoso.eastus.cloudapp.azure.com
```

### Get information about IP address

```
Get-AzureRmPublicIpAddress -Name "VIP1" -ResourceGroupName $resourceGroupName
```

- Public static IP addresses, 20 per subscription
- Public dynamic IP addresses, 60 per subscription
- Public front end IP per load balancer ~ 5
- Private front end IP per load balancer ~ 1

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## Create a Static Private IP



### New-AzureRmVMNetworkInterface Options

```
$nic1 = New-AzureRmNetworkInterface -ResourceGroupName $resourceGroupName ` 
    -Name "nic1" -Subnet $subnet -Location $location -PrivateIpAddress '10.0.0.54' ` 
    -LoadBalancerInboundNatRule $lb.InboundNatRules[0] ` 
    -LoadBalancerBackendAddressPool $lb.BackendAddressPools[0]
```

- ARM VMs are associated with NICs
- NICs are connected to a subnet
- You do not need to specify 'Static' to have a static IP address, that is the default when you specify -PrivateIpAddress

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## Configuring Load Balancing (example)

```
# establish load balancer configuration using pre-recreated public IP address
$ipConfig = New-AzureRmLoadBalancerFrontendIpConfig -Name "FEIP" ` 
    -PublicIpAddress $ipv4

# establish a NAT rule to allow RDP access
$inboundNATRule = New-AzureRmLoadBalancerInboundNatRuleConfig -Name "RDP1" ` 
    -Protocol TCP -FrontendPort 3441 -BackendPort 3389

# establish the backend pool configuration
$beAddressPool = New-AzureRmLoadBalancerBackendAddressPoolConfig -Name "LBEP"

# establish a health probe
$healthProbe = New-AzureRmLoadBalancerProbeConfig -Name "HealthProbe" ` 
    -RequestPath "/HealthProbe" -Protocol http -Port 80

# establish a load balancer rule for http access
$rule = New-AzureRmLoadBalancerRuleConfig -Name "HTTP" ` 
    -FrontendIpConfig $ipConfig -BackendAddressPool $beAddressPool ` 
    -Probe $healthProbe -Protocol Tcp -FrontendPort 80 -BackendPort 80

# Configure the load balancer
$lb = New-AzureRmLoadBalancer -ResourceGroupName "SomeResourceGroup" ` 
    -Name "LB" -FrontendIpConfig $ipConfig -InboundNatRule $inboundNATRule ` 
    -LoadBalancingRule $rule -BackendAddressPool $beAddressPool
```

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## User Defined Routes



### New-AzureRmRouteTable Options

```
$myTable = New-AzureRmRouteTable -Name FrontEndSubnetRouteTable -Location 'West US' ` 
    -ResourceGroupName $resourceGroupName
```

#### Add a Route to a Route Table

```
$myTable | Add-AzureRmRouteConfig -Name FirewallRoute -AddressPrefix 10.2.0.0/16 ` 
    -NextHopType VirtualAppliance -NextHopIpAddress 10.1.1.10 | Set-AzureRmRouteTable
```

#### Apply to Subnet

```
Set-AzureRmVirtualNetworkSubnetConfig -VirtualNetwork $vnet -Name $subnetName -AddressPrefix 
    $subnetAddressPrefix -RouteTableId $myTable.Id | Set-AzureRmVirtualNetwork
```

#### View Applied Routes

```
Get-AzureRmRouteTable -ResourceGroupName $rgName -Name $routeTableName
```

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Demo: V2 PowerShell Script

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### What Can You Do with Azure PowerShell?



#### Automation

- Query, manage and configure VMs across multiple subscriptions, cloud services, and storage accounts.



#### Provision Fully Configured VMs

- Domain-joined
- Storage and networking configured



#### Virtual Networking

- Completely configure virtual networks from a script

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## Getting Subscription Information



Use `Add-AzureAccount`  
to import subscription information into the PowerShell session window



Automatically pulls in all subscription information and configures one of the subscriptions as the default subscription. You can change this by calling `Get-AzureSubscription` and then `Select-AzureSubscription`  
Allows non-interactive mode by using the `-Credentials` parameter

Minerals Co-distribution

## Subscription Management



Subscription Settings Persisted  
C:\Users\user\AppData\Roaming\Microsoft Azure Powershell



```
<Subscription name="someSub1">
<SubscriptionId>13d83b03-6d06-4770-943c-3d467663ca35</SubscriptionId>
<Thumbprint>CA8C112B34C840A3089C2716AE84D5DC107510</Thumbprint>
<ServiceEndpoint>https://management.core.windows.net/</ServiceEndpoint>
</Subscription>
```

## Manual Subscription Configuration



```
$cert = Get-Item cert:\CurrentUser\My\CERTITHUMBPRINT  
Set-AzureSubscription 'mysub' -Certificate $cert -SubscriptionID $id
```

### Switching Between Subscription Settings



**Multiple Subscription Support**  
Get-AzureSubscription | foreach {  
 Select-AzureSubscription -SubscriptionName \$\_.SubscriptionName  
 # Perform Management Operation Against Each Subscription  
}

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### Setting the Current Storage Account



**Returns Storage Account**  
Get-AzureStorageAccount | Select-StorageAccountName  
"returns only the storage account(s) in the currently selected subscription"



**Sets the Current Storage Account**  
Set-AzureSubscription 'somesub1' -CurrentStorageAccount 'mystorage'

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### Getting Subscription Information



**Use Get-AzurePublishSettingsFile and Import-AzurePublishSettingsFile**  
to import downloaded Publish Profile (publishsettings)  
<http://windows.azure.com/download/publishprofile.aspx>



**Automatically configures:**  

- SubscriptionID
- Certificate
- Service Endpoint
- Subscription Name

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### Information Needed to Create a VM

**Image Name**  
Get-AzureVMImage | select ImageName

**Disk Name**  
Get-AzureDisk | select DiskName

```
Get-ImageName ~ latestWS2012R2
$imageName = (Get-AzureVMImage | Where { $_.ImageFamily -eq "Windows Server 2012 R2 Datacenter" } | sort PublishedDate -Descending | Select-Object -First 1).ImageName
```

**Data Center Location**  
Get-AzureLocation

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### Virtual Machine Management

**Quick VM Provisioning Mode**  
Supports VM creation in a single cmdlet (New-AzureQuickVM)

**Advanced Provisioning Configuration Mode**  
Provision with: Endpoints, Data Disks  
Configure: Cache settings for OS/Data Disks and Subnet Names

**Create Multiple Pre-Defined VMs in a Batch**  
New-AzureVM -VMs \$vm1, \$vm2, \$vm3

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### Simple VM Creation

- First VM in a new Cloud Service (-Location parameter used)
 

```
New-AzureQuickVM -Windows -ServiceName $svc -Name $vm1 -ImageName $wimg -Location $location -Password $pwd -AdminUserName $adminName
```
- New VM in an existing Cloud Service (-Location parameter not used)
 

```
New-AzureQuickVM -Windows -ServiceName $svc -Name $vm2 -ImageName $wimg -AdminUserName $adminName Password $pwd
```
- Creating a Linux VM in an existing Cloud Service
 

```
New-AzureQuickVM -Linux -ServiceName $svc -Name $vm3 -ImageName $limg -LinuxUser $lu -Password $pwd
```

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## Configuring VM at Provisioning

- Create a Configuration Object with New-AzureVMConfig
- Modify with Add-\* cmdlets
- Add with New-AzureVM

```
New-AzureVMConfig -Name $vm1 -InstanceSize Medium -ImageName $img |
| Add-AzureProvisioningConfig -Windows -AdminUserName $adminName -Password $pwd
```

```
Add-AzureDataDisk -CreateNew -DiskLabel 'data' -DiskSizeInGB 10 -LUN 0 |
| Add-AzureEndpoint -Name 'web' -PublicPort 80 -LocalPort 80 -Protocol tcp |
| New-AzureVM -ServiceName $newSvc -Location $location
```

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## VM Batch Creation

- Create multiple configured VMs and pass them to New-AzureVM

```
$vm1 = New-AzureVMConfig -Name 'myvm1' -InstanceSize 'Small' -ImageName
$img | Add-AzureProvisioningConfig -Windows -AdminUserName $adminName -
>Password $pwd
```

```
$vm2 = New-AzureVMConfig -Name 'myvm1' -InstanceSize 'Small' -ImageName $img
| Add-AzureProvisioningConfig -Windows -AdminUserName $adminName -Password
$pwd
```

```
$vm3 = New-AzureVMConfig -Name 'myvm1' -InstanceSize 'Small' -ImageName $img
| Add-AzureProvisioningConfig -Windows -AdminUserName $adminName -Password
$pwd
```

```
New-AzureVM -CreateService -ServiceName $cloudSvcName -VMs $vm1,$vm2,$vm3
-Location $dc
```

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## VM Batch Creation - Using an Array

- Create multiple configured VMs and pass them to New-AzureVM

```
$vmCount = 5
$vms = @()
for($i = 0; $i -lt 5; $i++)
{
    $vnn = 'myvm' + $i
    $vms += New-AzureVMConfig -Name $vnn -InstanceSize 'Small' -ImageName
$img |
    Add-AzureProvisioningConfig -Windows -AdminUserName $adminName -Password
$pwd |
    Add-AzureDataDisk -CreateNew -DiskLabel 'data' -DiskSizeInGB 10 -LUN 0 |
    Add-AzureDataDisk -CreateNew -DiskLabel 'logs' -DiskSizeInGB 10 -LUN 1
}
```

```
New-AzureVM -ServiceName $cloudSvcName -VMs $vms -Location $dc
```

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### Common Settings

**Name**  
The name of the VM

**AvailabilitySetName**  
The availability set (used for high availability)

**InstanceSize**  
A0 – A11, D1 – 4, D11 – D14, G1 – G5 + 'S' Series machines

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### Windows Provisioning Options

**Add-AzureProvisioningConfig Options**

```
-Windows -AdminUserName $adminName -Password $pwd
-WindowsDomain -Password $pwd
-Domain $dom -JoinDomain $fqdn -DomainUser $domUser
-DomainPassword $domPwd -MachineObjectOU $ou
-DisableAutomaticUpdates
-NoRDPEndpoint -TimeZone, Certificates
```

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### Setting a Static Internal IP

**New-AzureVMConfig Options**

```
New-AzureVMConfig -Name "myNewVM" -InstanceSize "Small" -ImageName $imageName | Add-AzureProvisioningConfig -Windows -AdminUsername $user -Password $pwd | Set-AzureSubnet -SubnetNames "AppSubnet" | Set-AzureStaticVNetIP -IPAddress "10.0.0.15" | New-AzureVM -ServiceName "vnetsvc"
```

- Cloud Service already exists (vnetsvc) in a virtual network
- Virtual network has a subnet named 'AppSubnet'
- Subnet address range must be within the -IPAddress range
- If a machine in the subnet already has this address, you will receive an error when you run Set-AzureStaticVNetIP
- If all machines in the subnet are shut down and you restart this VM first, it will grab the static IP address listed above

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## Setting an Instance Level Public IP Address for a VM



### New-AzureVMConfig Options

```
New-AzureVMConfig -Name "WebAppVM" -InstanceSize Small -ImageName $imageName | Add-AzureProvisioningConfig -Windows -AdminUsername $username -Password $password | Set-AzureVMConfig -PublicIPName "http" | New-AzureVM -ServiceName "MyWebAppService" -ReservedIPName "MyWebSiteIP" -Location "East US"
```

### Get information about VM

```
Get-AzureRole -ServiceName FTPInAzure -Slot Production -InstanceDetails
```

- Instance level IP address is public and is PER VM
- Does not replace the VIP of the Cloud Service that contains the VM
- 5 instance level IP addresses allowed, per subscription

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## Setting a Reserved Public IP Address



### New-AzureReservedIP Options

```
New-AzureReservedIP -ReservedIPName "MyWebsiteIP" -Label "WebsiteIP" -Location "East US"
```

### New-AzureVMConfig Options

```
New-AzureVMConfig -Name "WebAppVM" -InstanceSize Small -ImageName $imageName | Add-AzureProvisioningConfig -Windows -AdminUsername $username -Password $password | New-AzureVM -ServiceName "MyWebAppService" -ReservedIPName "MyWebsiteIP" -Location "East US"
```

### Get-AzureReservedIP

```
Get-AzureReservedIP -ReservedIPName "MyWebsiteIP"
```

- Note that the -ReservedIPName does not refer to an IP address
- The Cloud Service with VMs can not already exist, they need to be created new via PowerShell
- To retrieve the reserved address information for confirmation of the IP address, use Get-AzureReservedIP

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## Configuring Azure Load Balancing (ILB)



### Add-AzureInternalLoadBalancer Options

```
Add-AzureInternalLoadBalancer -ServiceName $svc -InternalLoadBalancerName $lb -SubnetName $subnet -StaticVNetAddress $IP
```

### Add-AzureEndpoint Options

```
Get-AzureVM -ServiceName $svc -Name Symname | Add-AzureEndpoint -Name $epname -Protocol $prot -LocalPort $lport -PublicPort $pport -DefaultProbe -InternalLoadBalancerName $lb -LBSetName $elBS | Update-AzureVM
```

### Get-AzureService

```
Get-AzureService -ServiceName $svc | Get-AzureInternalLoadBalancer
```

- The virtual network that contains the Cloud Service and VM must be a regional level network
- A static internal IP address can also be requested (optional)
- Default, None or Custom load balance probes can be specified
- Get-AzureService confirms the load balanced IP address to use for incoming traffic

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## User Defined Routes



### New-AzureRouteTable Options

```
New-AzureRouteTable -Name FrontEndSubnetRouteTable -Location 'West US' -Label 'Route table for front end subnet'
```

### Add a Route to a route table

```
Get-AzureRouteTable FrontEndSubnetRouteTable | Set-AzureRoute -RouteName FirewallRoute -AddressPrefix 10.20.0.0/16 -NextHopType VirtualAppliance -NextHopIpAddress 10.1.1.10
```

### View Applied Routes

```
Get-AzureVM -Name FWAppliance1 -ServiceName Production VMs | Get-AzureEffectiveRouteTable
```

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## RDP Changes



### Updating RDP Username/Password

```
Get-AzureVM -ServiceName $cloudSvcName -Name $vmName | Set-AzureVMAccessExtension -UserName $adminUsername -Password $adminPassword | Update-AzureVM
```



### Fixing RDP Issues

```
Get-AzureVM -ServiceName $cloudSvcName -Name $vmName | Set-AzureVMAccessExtension | Update-AzureVM
```

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## Linux Provisioning Options



### Add-AzureProvisioningConfig Options

Linux  
-LinuxUser \$user -Password \$pwd  
-DisableSSH -NoSSHEndpoint  
-SSHKeyPairs -SSHPublicKeys  
installed from certificates deployed in cloud service

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### Deploying into a Virtual Network



#### Virtual Machine Settings

Set Subnet on VM with Set-AzureSubnet



#### Deployment Settings

Set Virtual Network -vNetName  
Set DNS Servers - New-AzureDns and -DNSSettings

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### Provisioning into a Virtual Network and Active Directory

```
$dom = 'contoso'
$dom = 'contoso.com'
$onPremDNS = New-AzureDns -IPAddress '192.168.1.4' -Name 'OnPremDNS'
$cldDNS = New-AzureDns -IPAddress '10.1.1.4' -Name CloudDNS
$computerOU = $advmou = 'OU=AzureVMs,DC=contoso,DC=com'

New-AzureVMConfig -Name 'myvm1' -InstanceSize 'Small' -ImageName $img |
Add-AzureProvisioningConfig -WindowsDomain -AdminUserName $adminName -Password $pwd -Domain $dom |
-DomainUserName $domUser -DomainPassword $pwd -JoinDomain $dom |
-MachineObjectOU 'AzureVMs' |
Set-AzureSubnet -SubnetNames 'AppSubnet' |
New-AzureVM -ServiceName $svc -AffinityGroup 'adag' -
-VNetName 'ADVNet' -DnsSettings $onPremDNS, $cldDNS
```

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### VM Storage



#### Data Disks

Add/Remove data disks at boot or while running

Create a blank data disk or attach an existing disk



#### Modify Cache Settings of OS Disk or Data Disk

Modifying OS Disk while running requires reboot

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## Data Disk Creation

- Creating a new VM with a Data Disk

```
New-AzureVMConfig -Name 'myvm1' -InstanceSize 'Small' -ImageName $img |  
    Add-AzureProvisioningConfig -Windows -AdminUserName $adminName -Password  
    $pwd |  
    Add-AzureDataDisk -CreateNew -DiskSizeInGB 10 -DiskLabel 'mydiskd' -LUN 0 |  
    New-AzureVM -ServiceName $cloudSvcName
```

- Add a new Data Disk to an existing VM

```
Get-AzureVM -ServiceName 'myvm1' |  
Add-AzureDataDisk -CreateNew -DiskSizeInGB 10 -DiskLabel 'myddisk' -LUN 1 |  
Update-AzureVM
```

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## Modifying Cache Settings

- Set host caching on an OS Disk during provisioning

```
(if no service exists) New-AzureService -ServiceName Svc1 -Location Location
$myVM = New-AzureVMConfig -Name myvm1 -InstanceSize Small -ImageName $img
    Add-AzureProvisioningConfig -Windows -AdminUserName $adminName -Password $pwd
Set-AzureOSDisk -HostCaching 'ReadOnly' -VM $myVM
New-AzureVM -ServiceName $cloudSvcName -VMs $myVM
Set host caching on an existing Data Disk in a running VM
Get-AzureVM -ServiceName $cloudSvcName -Name 'myvm1' |
    Set-AzureDataDisk -HostCaching ReadWrite -LUN 0 |
        Update-AzureVM
```

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## Configuring Endpoints

- Add endpoints at creation

```
New-AzureVMConfig -Name 'myvm1' -InstanceSize 'Small' -ImageName $img |  
    Add-AzureProvisioningConfig -Windows -AdminUserName $adminName -Password  
    $pwd |
```

- ```
Add-AzureEndpoint -Local
```

```
Add-AzureEndpoint -LocalPort 443 -PublicPort 443 -Name https -Protocol tcp  
New-AzureVM -ServiceDescription $cloudSvcName  
Modify endpoints at runtime  
Get-AzureVM -ServiceName $cloudSvcName -Name 'myvm1' |  
Add-AzureEndpoint -LocalPort 53 -PublicPort 53 -Name dns -Protocol udp |  
Remove-AzureEndpoint -Name https |  
Update-AzureVM -ServiceDescription $cloudSvcName
```

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## Disk and Image Repository



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Virtual Network Operations

- View and set virtual network configuration

```
Get-AzureVNetConfig | Select -Expand XMLConfiguration  
Set-AzureVNetConfig -ConfigurationPath 'c:\Network\MyNetCFG.xml'
```

- Start and stop virtual network gateway

```
Set-AzureVNetGateway -Disconnect -VNetName 'MyVNet'  
    -LocalNetworkSiteName 'MySite'  
Set-AzureVNetGateway -Connect -VNetName 'MyVNet'  
    -LocalNetworkSiteName 'MySite'
```

- View virtual network status

```
Get-AzureVNetConnection -VNetName 'MyVNet'
```

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# PowerShell Progression ...



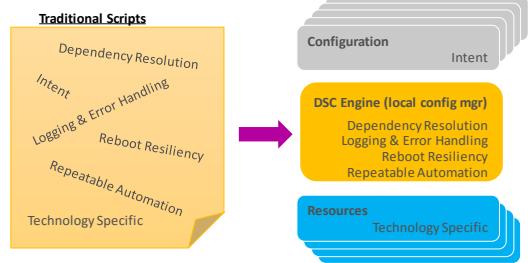
### PowerShell Desired State Configuration (DSC)...

- Simplifies configuration
- Prevents configuration drift
- Flexible deployment options
- Enables continuous deployment



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### DSC Leveraged



### DSC Terminology

- **Configuration** – this is a new PowerShell keyword used to collect a block of configuration information for the VM
- **Node** – this is the name of the target computer, which can be a variable
- **Resource** – DSC comes with a set of built-in system configuration resources that will be deployed to the VM for configuration
- **MOF file** - DSC tells the target nodes what configuration they should have by sending a MOF file with that information to each node, where the Local Configuration Manager implements the desired configuration
- **Local Configuration Manager (LCM)** – DSC engine that runs on all target nodes. Calls configuration resources that are included in the configuration script
- **DSC Pull Server** – LCM on node performs compliance check and if necessary pulls script from another server

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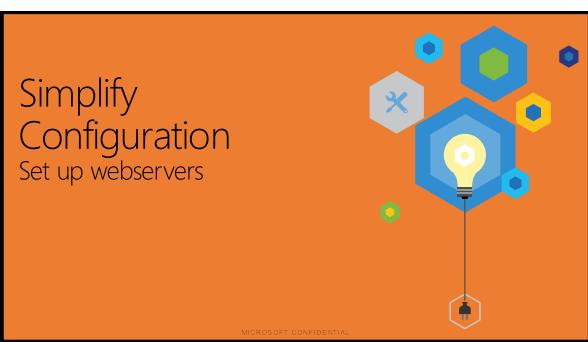
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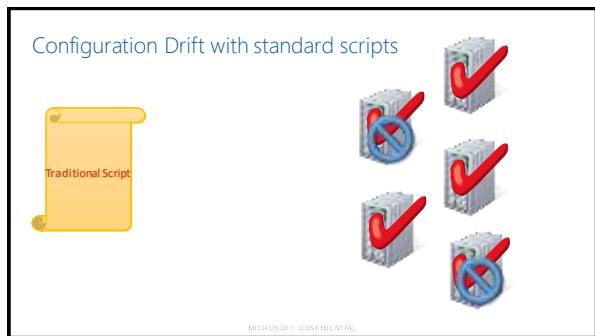
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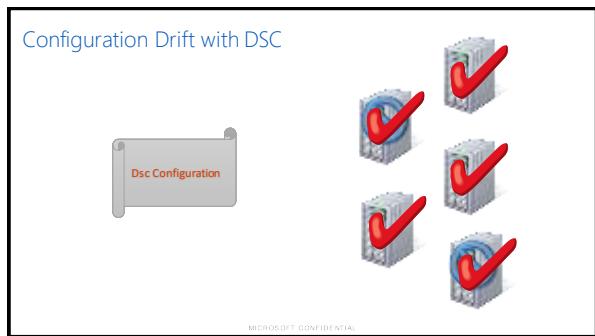
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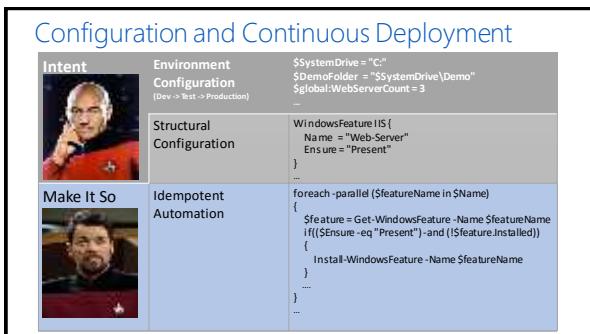
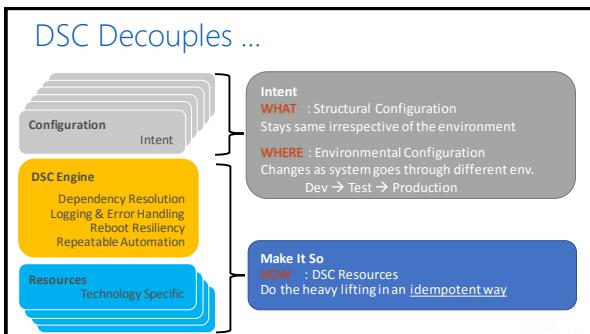
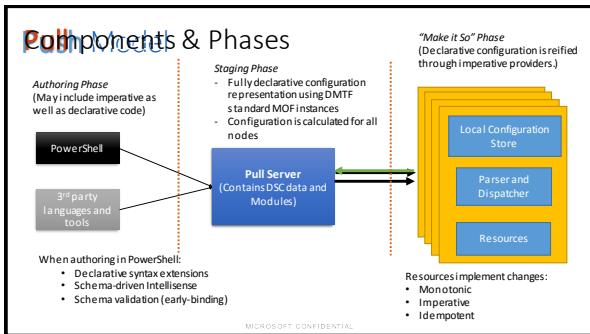
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## DSC Enables ...

### Configuration as Code

- Conflict detection
- Single source, multiple environments
- Composable, common components

### DevOps

- Common toolset for Dev & Ops
- Apply Dev practices to Ops
- Continuous deployment

### Cloud Scale

- Reduce complexity from within
- On-demand system creation and tear down

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## Troubleshooting DSC

- Locating the DSC Event logs
  - Operation Log – contains all error messages and is used to identify problems
  - Analytic Log – shows a higher volume of events and can be used to identify *where* a problem occurred
  - Debug Log – contains logs that can help you understand *how* the errors occurred



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## Troubleshooting DSC (con't)

- Locating the log files – located at C:\WindowsAzure\Logs\Plugins\Microsoft.PowerShell.DSC\dscversion#



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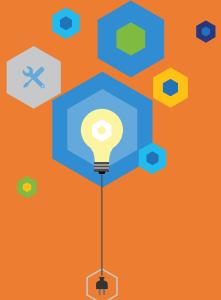


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## DSC Log Files



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