

1. Go through the following tutorials.

a) AWS

i. Creating the organisation and adding members:

The screenshot shows the AWS Organizations console. The left sidebar contains a navigation menu with 'AWS accounts' selected. The main content area is titled 'AWS accounts' and includes a search bar and a table of organizational units. The table lists the 'Root' account and the 'management account' (AditiDas) with its ID and the date it was joined.

Organizational structure	Account created/joined date
Root r-ucdy	
<input type="checkbox"/> AditiDas management account 129683143422 202001259@daiict.ac.in	Joined 2023/01/26

The screenshot shows the AWS Organizations console with three member accounts added. The table lists the 'Root' account and three member accounts: 'aditi2', 'aditi3', and the 'management account' (AditiDas).

Organizational structure	Account created/joined date
Root r-ucdy	
<input type="checkbox"/> aditi2 307363068961 aditi2@gmail.com	Created 2023/01/26
<input type="checkbox"/> aditi3 497020878638 aditi3@gmail.com	Created 2023/01/26
<input type="checkbox"/> AditiDas management account 129683143422 202001259@daiict.ac.in	Joined 2023/01/26

ii. Creating Organisational Unit:

The screenshot shows the AWS Organizations console. On the left, the 'AWS Organizations' sidebar is visible with options like 'AWS accounts', 'Invitations', 'Services', 'Policies', 'Settings', and 'Get started'. The main area displays the 'Organization' page. At the top, there's a search bar and a table titled 'Organizational structure'. The table lists the hierarchy: Root (r-ucdy), Production (ou-ucdy-fqzmj7iu), MainApp (ou-ucdy-r7jibcd), and three accounts: aditi3, aditi2, and AditiDas (management account). The 'AditiDas' account is highlighted as the management account.

Organizational structure	Account created/joined date
Root r-ucdy	
Production ou-ucdy-fqzmj7iu	
MainApp ou-ucdy-r7jibcd	
aditi3 497020878638 aditi3@gmail.com	Created 2023/01/26
aditi2 307363068961 aditi2@gmail.com	Created 2023/01/26
AditiDas (management account) 129683143422 202001259@daaiict.ac.in	Joined 2023/01/26

iii. Create Service Control Policies:

The screenshot shows the AWS Organizations console with the 'Add tag' button at the top. Below it, a JSON policy is being edited. The policy is a 'Deny' statement that denies all actions on CloudTrail resources. The right sidebar shows the 'Edit statement' panel for 'Statement1', where the actions are listed. The actions 'AddTags' and 'CreateTrail' are selected.

```
1 {
2   "Version": "2012-10-17",
3   "Statement": [
4     {
5       "Sid": "Statement1",
6       "Effect": "Deny",
7       "Action": [
8         "cloudtrail:AddTags",
9         "cloudtrail:CreateTrail",
10        "cloudtrail:DeleteTrail",
11        "cloudtrail:RemoveTags",
12        "cloudtrail:StartLogging",
13        "cloudtrail:StopLogging",
14        "cloudtrail:UpdateTrail"
15      ],
16      "Resource": [
17        "*"
18      ]
19    }
20  ]
21 }
```

Edit statement Statement1

1. Add actions

All services > CloudTrail

Filter actions

☐ All actions (cloudtrail:*)

Access level - read or write

☒ AddTags

☐ CancelQuery

☐ CreateEventDataStore

☐ CreateServiceLinkedChannel

☒ CreateTrail

☐ DeleteEventDataStore

☐ DeleteServiceLinkedChannel

a. Policies for “Root” organisational unit:

The screenshot shows the AWS Organizations console for the Root organizational unit. The left sidebar contains navigation links for AWS accounts, Invitations, Services, Policies, Settings, and Get started. The main content area displays the Root details, including its ID (r-ucdy), ARN (arn:aws:organizations::129683143422:root/o-77tbeggqkp/r-ucdy), and enabled policy types (manage policy types, Service control policies). Below this, a tabbed interface shows the Policies tab, which lists the applied policies for the Root. A notification states that policies attached to the root affect all OUs and AWS accounts. A summary indicates that 4 policy types are available, and 1 has been enabled. The applied policies table lists two policies: Block CloudTrail Configuration Actions and FullAWSAccess (AWS managed policy).

Root details

ID: r-ucdy

ARN: arn:aws:organizations::129683143422:root/o-77tbeggqkp/r-ucdy

Enabled policy types: [manage policy types](#)

Service control policies

Children | **Tags** | **Policies**

ⓘ Policies attached to the root can affect all OUs and AWS accounts in the organization. [Learn more](#)

You have enabled the following policy type out of the 4 available to the organization.

Service control policies

Service control policies (SCPs) enable central administration of the permissions available within the accounts in your organization. Policies attached to the root or to OUs can be inherited by child OUs and accounts. [Learn more](#)

▼ **Applied policies (2)** Detach Attach

	Name	Source	Description
<input type="radio"/>	Block CloudTrail Configuration Actions	Attached directly	-
<input type="radio"/>	FullAWSAccess (AWS managed policy)	Attached directly	Allows access to every operation

b. Policies for “Production” organisational unit :

The screenshot shows the AWS Organizations console for the Production organizational unit. The left sidebar contains navigation links for AWS accounts, Invitations, Services, Policies, Settings, and Get started. The main content area displays the Production details, including its ID (ou-ucdy-fqzmj7iu), ARN (arn:aws:organizations::129683143422:ou/o-77tbeggqkp/ou-ucdy-fqzmj7iu), and enabled policy types (manage policy types, Service control policies). Below this, a tabbed interface shows the Policies tab, which lists the applied policies for the Production unit. A notification states that policies attached to the Production unit affect all accounts in the unit. A summary indicates that 4 policy types are available, and 3 have been enabled. The applied policies table lists three policies: Allow List for All Approved Services, Block CloudTrail Configuration Actions, and FullAWSAccess (AWS managed policy).

Production details

ID: ou-ucdy-fqzmj7iu

ARN: arn:aws:organizations::129683143422:ou/o-77tbeggqkp/ou-ucdy-fqzmj7iu

Enabled policy types: [manage policy types](#)

Service control policies

Children | **Tags** | **Policies**

ⓘ Policies attached to the Production unit can affect all accounts in the unit. [Learn more](#)

You have enabled the following policy type out of the 4 available to the organization.

Service control policies

Service control policies (SCPs) enable central administration of the permissions available within the accounts in your organization. Policies attached to the root or to OUs can be inherited by child OUs and accounts. [Learn more](#)

▼ **Applied policies (3)** Detach Attach

	Name	Source	Description
<input type="radio"/>	Allow List for All Approved Services	Attached directly	-
<input checked="" type="radio"/>	Block CloudTrail Configuration Actions	Inherited from Root	-
<input checked="" type="radio"/>	FullAWSAccess (AWS managed policy)	Inherited from Root	Allows access to every operation

c. Policies for “MainApp” organisational unit :

The screenshot shows the AWS Organizations console. On the left, the 'AWS Organizations' sidebar is visible with options like 'AWS accounts', 'Invitations', 'Services', 'Policies', 'Settings', and 'Get started'. The main content area shows the 'MainApp' organizational unit. The 'Policies' tab is selected, displaying a list of applied policies. The policies are as follows:

Name	Source	Description
Deny List for MainApp Prohibited Services	Attached directly	-
FullAWSAccess (AWS managed policy)	Attached directly	Allows access to every operation
Allow List for All Approved Services	Inherited from Production	-
Block CloudTrail Configuration Actions	Inherited from Root	-
FullAWSAccess (AWS managed policy)	Inherited from Root	Allows access to every operation

iv. Testing Restrictions:

- If I sign in as a user in the management account (AditiDas), all operations allowed by IAM permissions policies can be performed. SCP's cannot control any role or user in the management account.
- If I sign in as the root user or an IAM user in account aditi2, I can perform all actions allowed by the allow list and none of the CloudTrail actions can be performed.
- If I sign in as a user in account aditi3, I can perform all actions allowed by the allow list and not present in the deny list. Also, none of the CloudTrail actions can be performed.

b) Intro to Azure module

learn.microsoft.com/en-us/training/modules/intro-to-azure-fundamentals/

• An understanding of cloud computing is helpful, but isn't necessary.

This module is part of these learning paths

[Azure for Researchers part 1: Introduction to Cloud Computing](#)

Introduction

4 min

✓

What is cloud computing?

9 min

✓

What is Azure?

9 min

✓

Tour of Azure services

11 min

✓

Get started with Azure accounts

4 min

✓

Case study introduction

2 min

✓

Knowledge check

3 min

✓

Summary

1 min

✓

2. Making Availability Set in Azure

Microsoft Azure Upgrade Search resources, services, and docs (G+)

Home > Virtual machines > vm-aditi001 > RG-ADITI001 >

avail-aditi001

Availability set

Delete Refresh

Search

- Overview
- Activity log
- Access control (IAM)
- Tags
- Settings
 - Configuration
 - Virtual machines
- Properties
 - Locks
 - Automation
 - Tasks (preview)
 - Export template
 - Help
 - New Support Request

We recommend that new customers choose virtual machine scale sets with flexible orchestration mode for high availability with the widest range of features. Virtual machine scale sets allow VM instances to be centrally managed, configured, and updated, and will automatically increase or decrease the number of VM instances in response to demand or a defined schedule. Availability sets only offer high availability.

Essentials

Resource group (move) : [RG-aditi001](#)

Location : East US

Subscription (move) : [Free Trial](#)

Subscription ID : a4755c01-cd03-49bb-a058-76e19f8da29e

Fault domains : 3

Update domains : 5

Virtual machines : 4

Managed : Yes

Colocation status : N/A

JSON View

Search virtual machines

Name	Status	Colocation status	Fault Domain	Update Domain
vm-aditi001	Running		1	1
vm-aditi002	Running		2	2
vm-aditi003	Running		0	0
vm-aditi004	Running		0	3

3. Quickstart: Create a public load balancer - Azure portal - Azure Load Balancer

VM1:

i. Code:

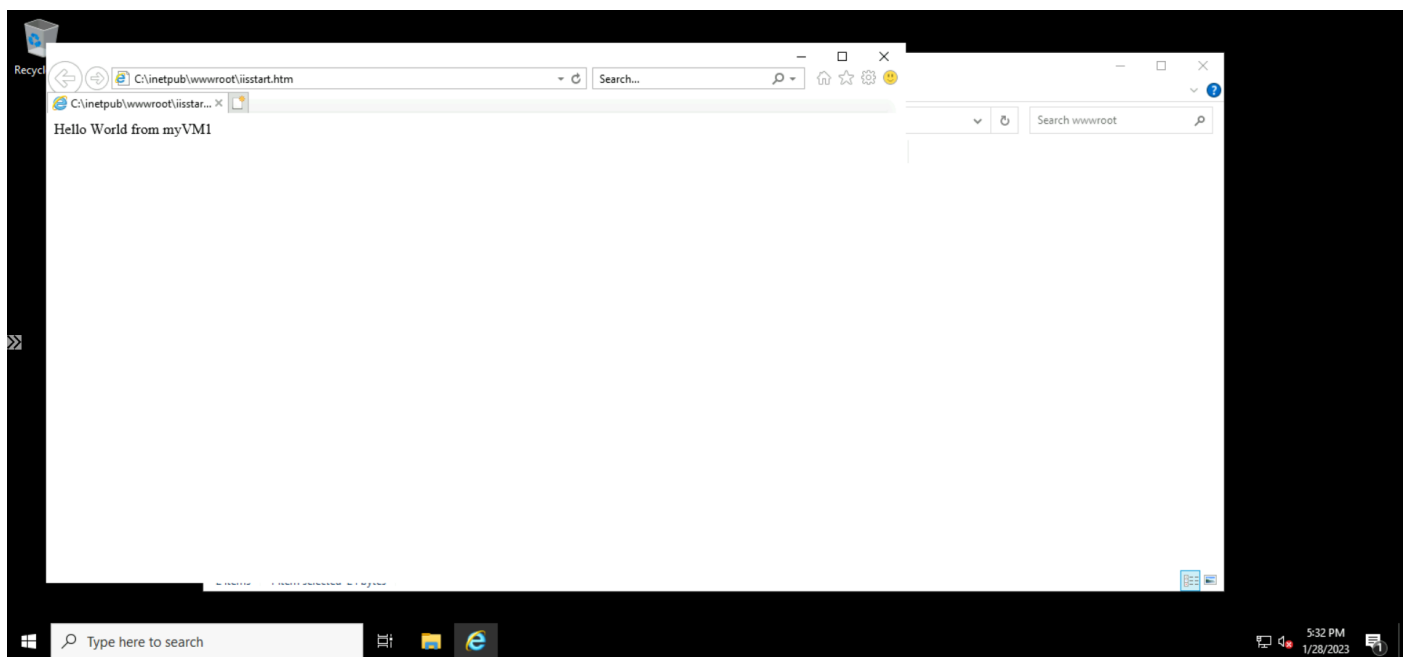
```
Administrator: Windows PowerShell
PS C:\Users\AditiDasDaiict2020> Install-WindowsFeature -name Web-Server -IncludeManagementTools

Success Restart Needed Exit Code      Feature Result
-----
True      No              Success      {Common HTTP Features, Default Document, D...

PS C:\Users\AditiDasDaiict2020> Remove-Item C:\inetpub\wwwroot\iisstart.htm
PS C:\Users\AditiDasDaiict2020> Add-Content -Path "C:\inetpub\wwwroot\iisstart.htm" -Value$("Hello World from " + $env:computername)
Add-Content : A parameter cannot be found that matches parameter name 'Value$'.
At line:1 char:53
+ Add-Content -Path "C:\inetpub\wwwroot\iisstart.htm" -Value$("Hello Wo ...
+ ~~~~~
+ CategoryInfo          : InvalidArgument: (:) [Add-Content], ParameterBindingException
+ FullyQualifiedErrorId : NamedParameterNotFound,Microsoft.PowerShell.Commands.AddContentCommand

PS C:\Users\AditiDasDaiict2020> Add-Content -Path "C:\inetpub\wwwroot\iisstart.htm" -Value $("Hello World from " + $env:computername)
PS C:\Users\AditiDasDaiict2020>
```

ii. Output:



VM2:

i. Code:

```
Administrator: Windows PowerShell
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

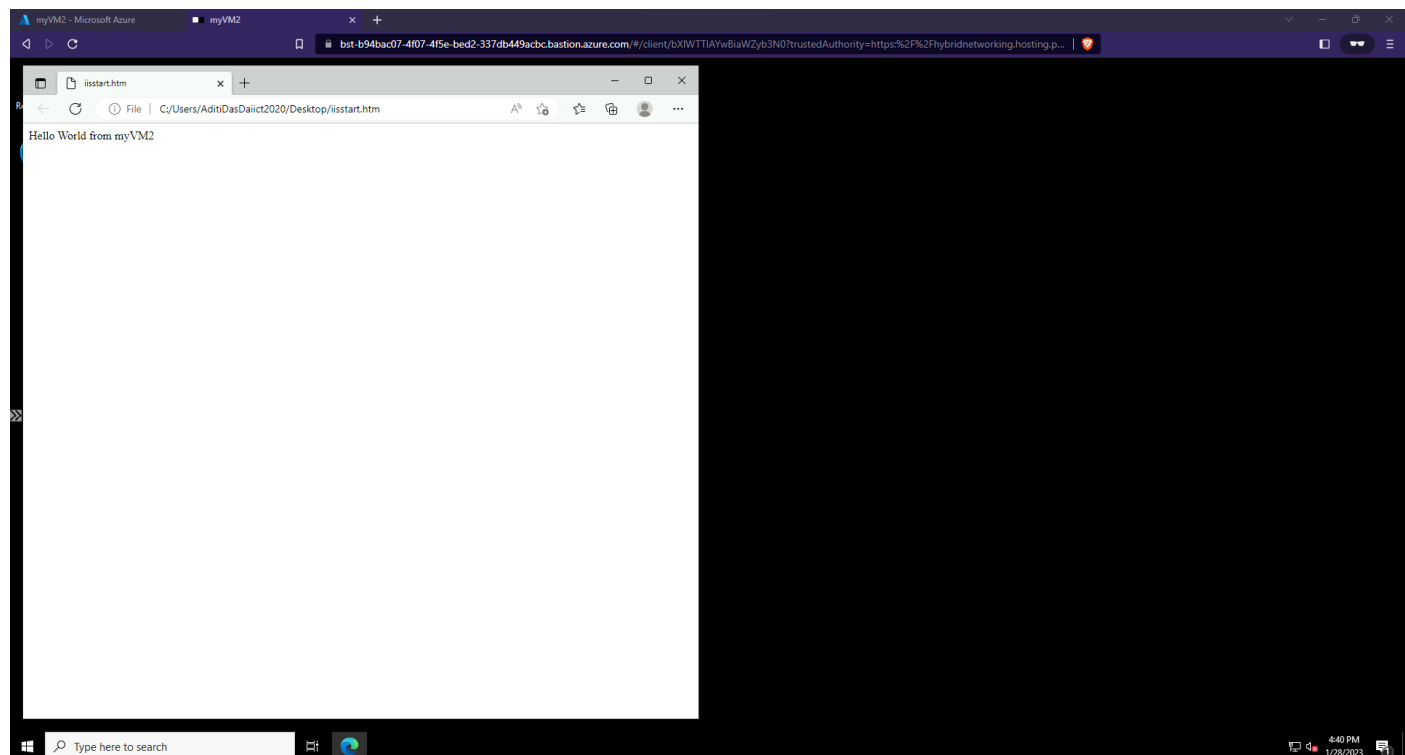
Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\Users\AditiDasDaiict2020> Install-WindowsFeature -name Web-Server -IncludeManagementTools

Success Restart Needed Exit Code      Feature Result
-----
True      No      NoChangeNeeded {}

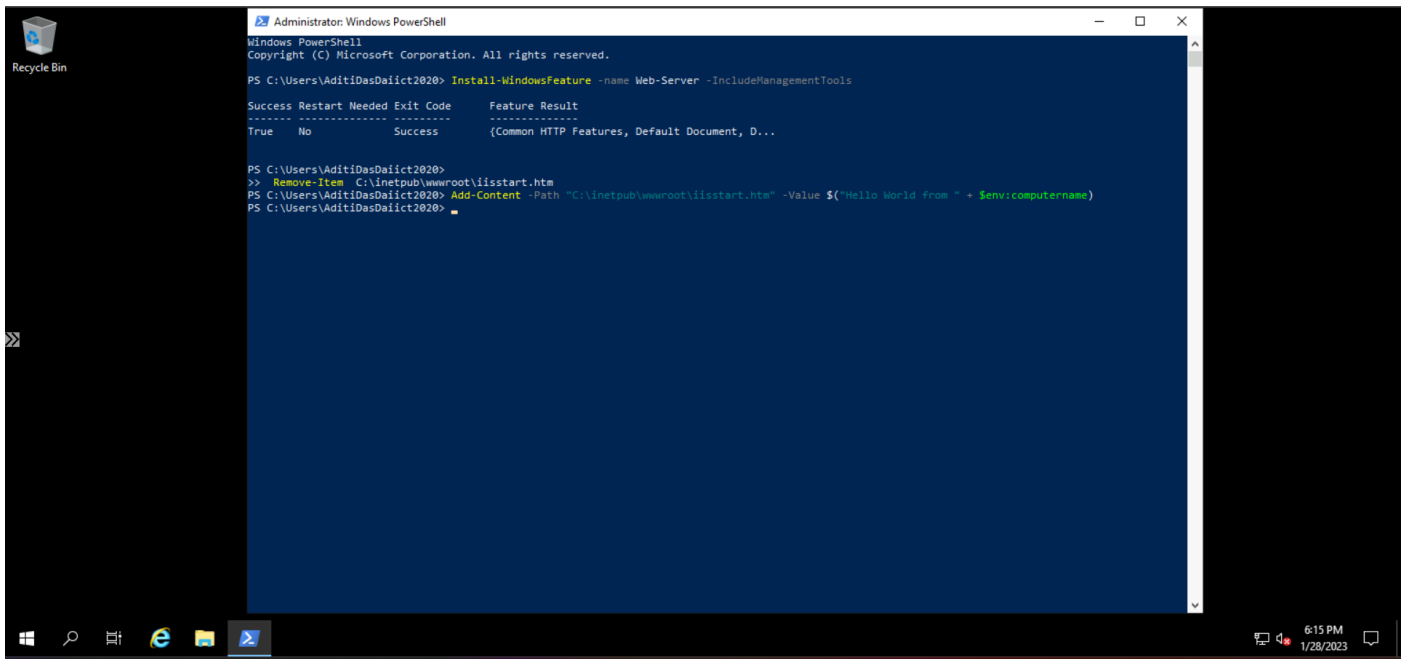
PS C:\Users\AditiDasDaiict2020> Remove-Item C:\inetpub\wwwroot\iisstart.htm
PS C:\Users\AditiDasDaiict2020> Add-Content -Path "C:\inetpub\wwwroot\iisstart.htm" -Value $("Hello World from " + $env:computername)
PS C:\Users\AditiDasDaiict2020>
```

ii. Output:



4. Quickstart: Create an internal load balancer - Azure portal - Azure Load Balancer

VM1:



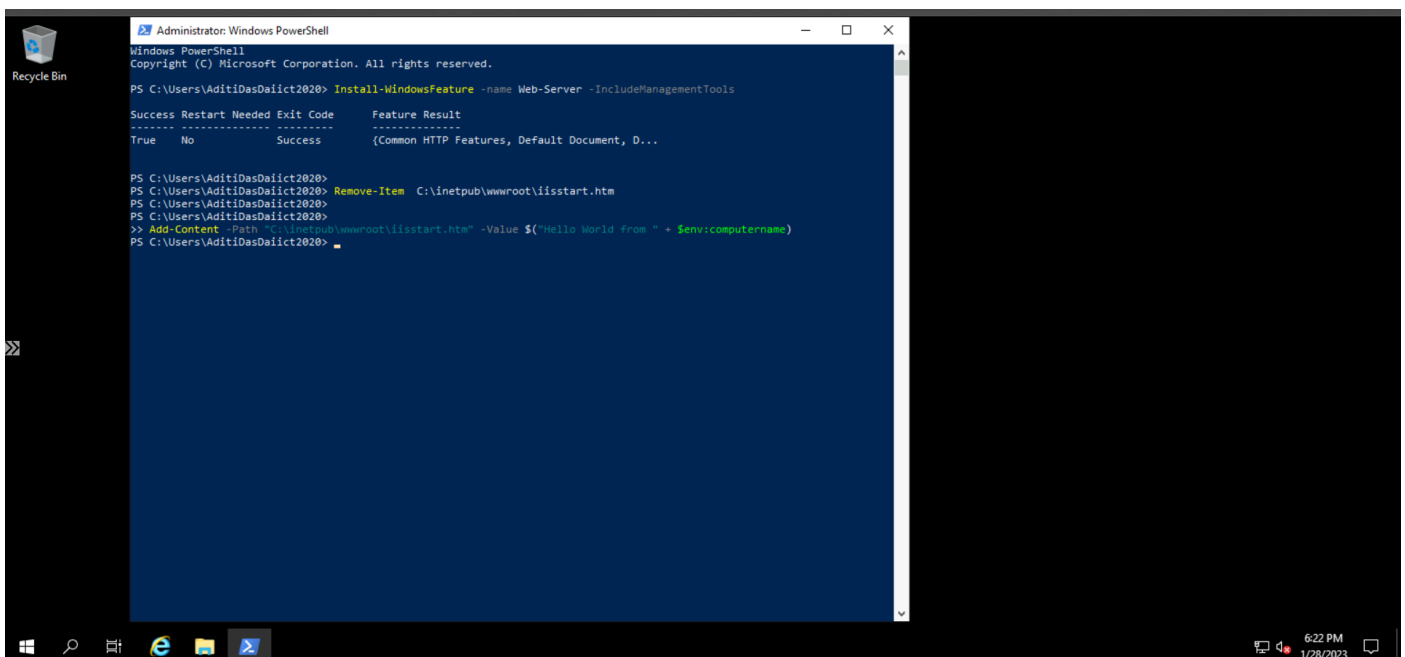
```
Administrator: Windows PowerShell
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

PS C:\Users\AditiDasDaiict2020> Install-WindowsFeature -name Web-Server -IncludeManagementTools

Success Restart Needed Exit Code      Feature Result
-----
True      No              Success      {Common HTTP Features, Default Document, D...

PS C:\Users\AditiDasDaiict2020>
>> Remove-Item C:\inetpub\wwwroot\iisstart.htm
PS C:\Users\AditiDasDaiict2020> Add-Content -Path "C:\inetpub\wwwroot\iisstart.htm" -Value $("Hello World from " + $env:computername)
PS C:\Users\AditiDasDaiict2020>
```

VM2:



```
Administrator: Windows PowerShell
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

PS C:\Users\AditiDasDaiict2020> Install-WindowsFeature -name Web-Server -IncludeManagementTools

Success Restart Needed Exit Code      Feature Result
-----
True      No              Success      {Common HTTP Features, Default Document, D...

PS C:\Users\AditiDasDaiict2020>
PS C:\Users\AditiDasDaiict2020> Remove-Item C:\inetpub\wwwroot\iisstart.htm
PS C:\Users\AditiDasDaiict2020>
PS C:\Users\AditiDasDaiict2020>
>> Add-Content -Path "C:\inetpub\wwwroot\iisstart.htm" -Value $("Hello World from " + $env:computername)
PS C:\Users\AditiDasDaiict2020>
```


TestVM:

a. From VM1



>>



b. From VM2:

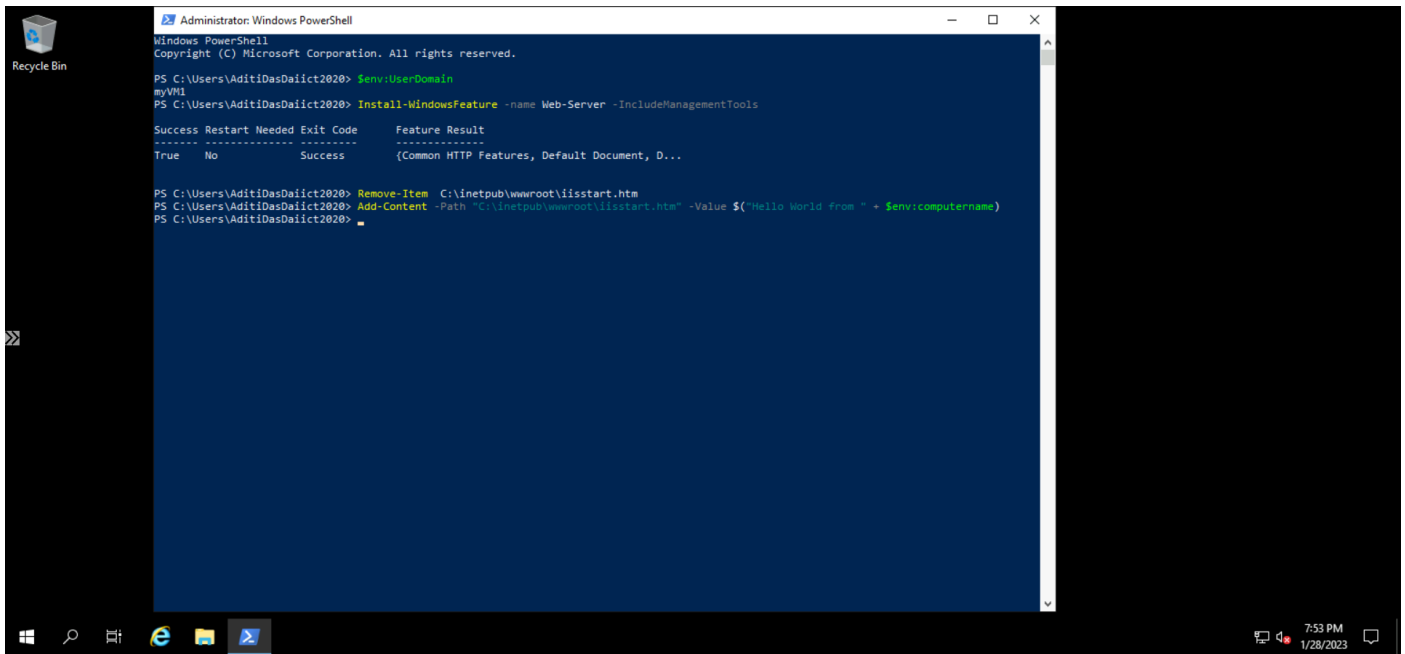


>>



5. Tutorial: Create a load balancer with more than one availability set in the backend pool - Azure portal - Azure Load Balancer

i. VM1



A screenshot of a Windows PowerShell terminal window titled "Administrator: Windows PowerShell". The terminal shows the following commands and output:

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

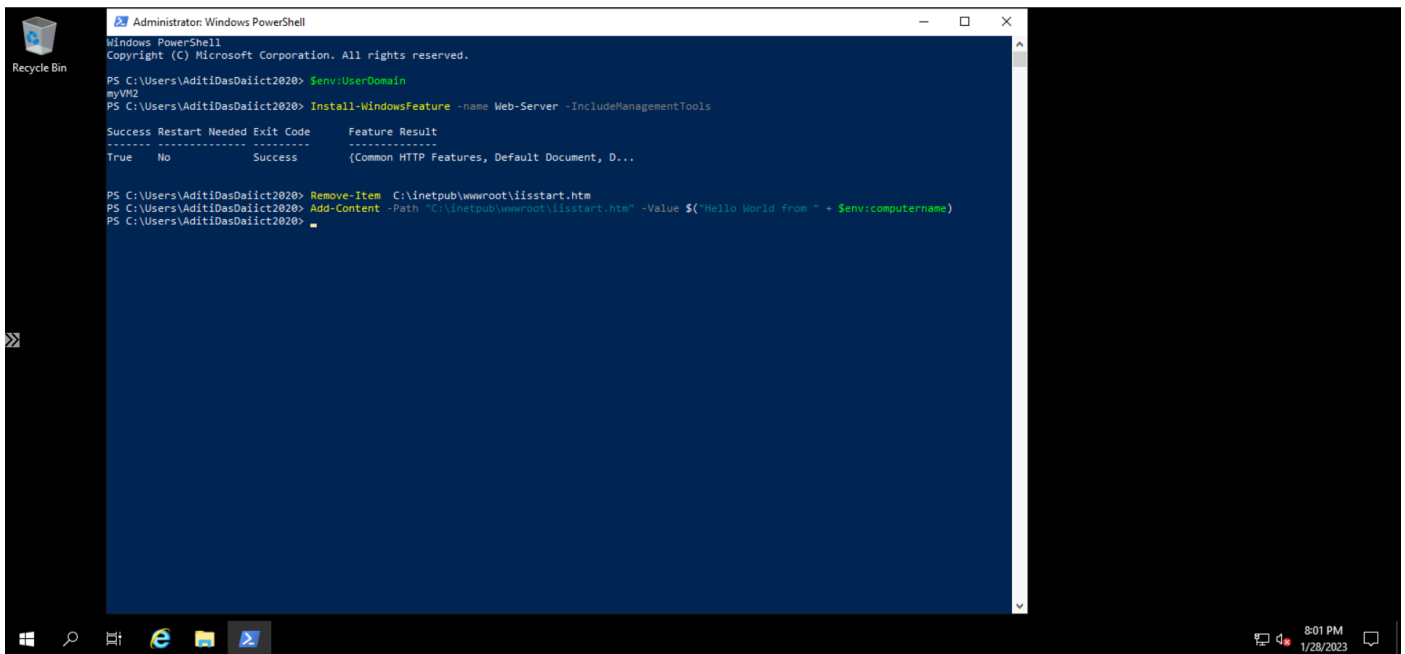
PS C:\Users\AditiDasDaiict2020> $env:UserDomain
myVM1
PS C:\Users\AditiDasDaiict2020> Install-WindowsFeature -name Web-Server -IncludeManagementTools

Success Restart Needed Exit Code      Feature Result
-----
True      No              Success      {Common HTTP Features, Default Document, D...

PS C:\Users\AditiDasDaiict2020> Remove-Item C:\inetpub\wwwroot\iisstart.htm
PS C:\Users\AditiDasDaiict2020> Add-Content -Path "C:\inetpub\wwwroot\iisstart.htm" -Value $("Hello World from " + $env:computername)
PS C:\Users\AditiDasDaiict2020>
```

The terminal window is part of a desktop environment with a taskbar at the bottom showing icons for Recycle Bin, Search, Task View, Edge, File Explorer, and PowerShell. The system clock in the bottom right corner indicates 7:53 PM on 1/28/2023.

ii. VM2



A screenshot of a Windows PowerShell terminal window titled "Administrator: Windows PowerShell". The terminal shows the following commands and output:

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

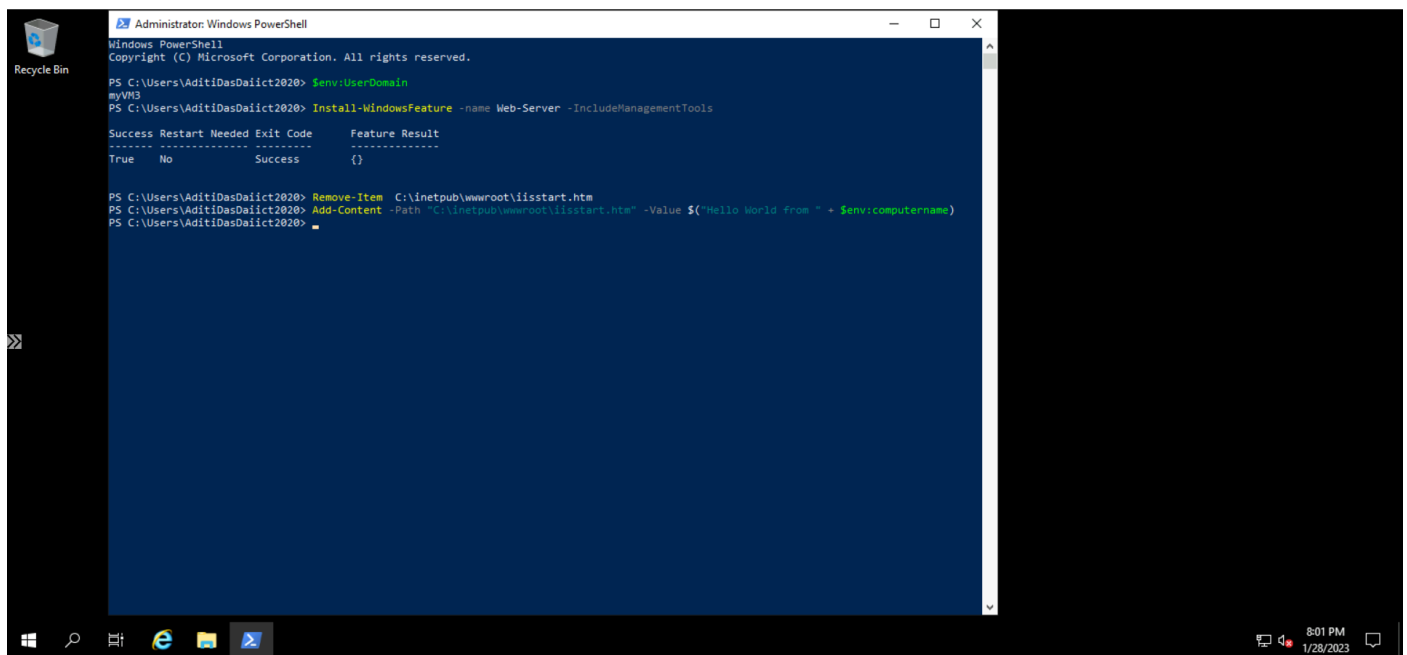
PS C:\Users\AditiDasDaiict2020> $env:UserDomain
myVM2
PS C:\Users\AditiDasDaiict2020> Install-WindowsFeature -name Web-Server -IncludeManagementTools

Success Restart Needed Exit Code      Feature Result
-----
True      No              Success      {Common HTTP Features, Default Document, D...

PS C:\Users\AditiDasDaiict2020> Remove-Item C:\inetpub\wwwroot\iisstart.htm
PS C:\Users\AditiDasDaiict2020> Add-Content -Path "C:\inetpub\wwwroot\iisstart.htm" -Value $("Hello World from " + $env:computername)
PS C:\Users\AditiDasDaiict2020>
```

The terminal window is part of a desktop environment with a taskbar at the bottom showing icons for Recycle Bin, Search, Task View, Edge, File Explorer, and PowerShell. The system clock in the bottom right corner indicates 8:01 PM on 1/28/2023.

iii. VM3



A screenshot of a Windows PowerShell terminal window titled "Administrator: Windows PowerShell". The terminal shows the following commands and output:

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

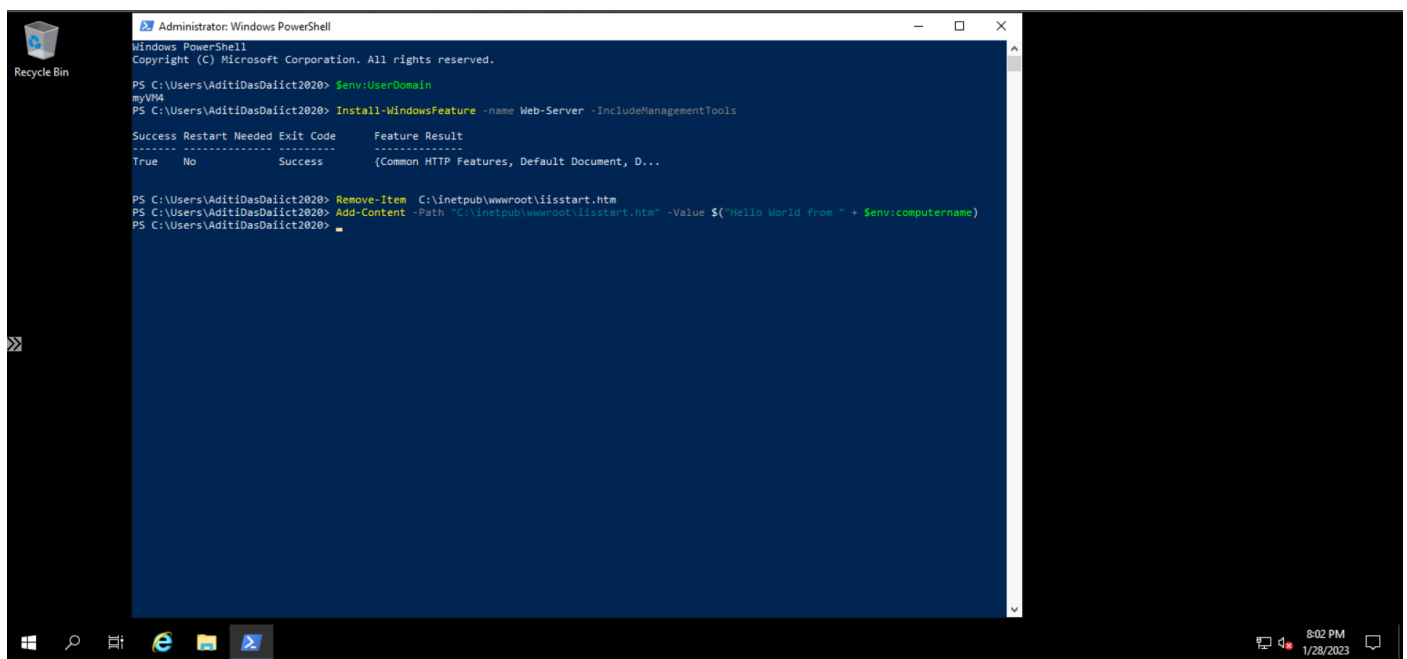
PS C:\Users\AditiDasDaiict2020> $env:UserDomain
myVM3
PS C:\Users\AditiDasDaiict2020> Install-WindowsFeature -name Web-Server -IncludeManagementTools

Success Restart Needed Exit Code      Feature Result
-----
True      No          Success      {}

PS C:\Users\AditiDasDaiict2020> Remove-Item C:\inetpub\wwwroot\iisstart.htm
PS C:\Users\AditiDasDaiict2020> Add-Content -Path "C:\inetpub\wwwroot\iisstart.htm" -Value $("Hello World from " + $env:computername)
PS C:\Users\AditiDasDaiict2020>
```

The terminal window is set against a dark blue background. The taskbar at the bottom shows the Recycle Bin icon, the Start button, and several application icons. The system clock in the bottom right corner indicates 8:01 PM on 1/28/2023.

iv. VM4



A screenshot of a Windows PowerShell terminal window titled "Administrator: Windows PowerShell". The terminal shows the following commands and output:

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

PS C:\Users\AditiDasDaiict2020> $env:UserDomain
myVM4
PS C:\Users\AditiDasDaiict2020> Install-WindowsFeature -name Web-Server -IncludeManagementTools

Success Restart Needed Exit Code      Feature Result
-----
True      No          Success      {Common HTTP Features, Default Document, D...

PS C:\Users\AditiDasDaiict2020> Remove-Item C:\inetpub\wwwroot\iisstart.htm
PS C:\Users\AditiDasDaiict2020> Add-Content -Path "C:\inetpub\wwwroot\iisstart.htm" -Value $("Hello World from " + $env:computername)
PS C:\Users\AditiDasDaiict2020>
```

The terminal window is set against a dark blue background. The taskbar at the bottom shows the Recycle Bin icon, the Start button, and several application icons. The system clock in the bottom right corner indicates 8:02 PM on 1/28/2023.

Output:

i. Public-IP address

myPublicIP-lb

Public IP address

Search

AssociateDissociateMoveDeleteRefresh

Overview

Activity log

Access control (IAM)

Tags

Settings

Configuration

Properties

Locks

Monitoring

Essentials

Resource group (move)
TutorLBmultiAVS-rg

Location
West US 3 (Zone 3, 2, 1)

Subscription (move)
Free Trial

Subscription ID
a4755c01-cd03-49bb-a058-76e19f8da29e

Tags (edit)
Click here to add tags

SKU
Standard

Tier
Regional

IP address
20.118.183.16

DNS name
-

Associated to
myLoadBalancer

ii. From VM1

Not secure | 20.118.183.16

GmailYouTubeMapsTranslateSBG, DA-IICTCheck Off All The C...Students E-CampusRD Web AccessSeason 5New episo...Moodle DashboardDAIICT IntranetEntelechy

Hello World from myVM1

iii. From VM2

Not secure | 20.118.183.16

GmailYouTubeMapsTranslateSBG, DA-IICTCheck Off All The C...Students E-CampusRD Web AccessSeason 5New episo...Moodle DashboardDAIICT IntranetEntelechy

Hello World from myVM2

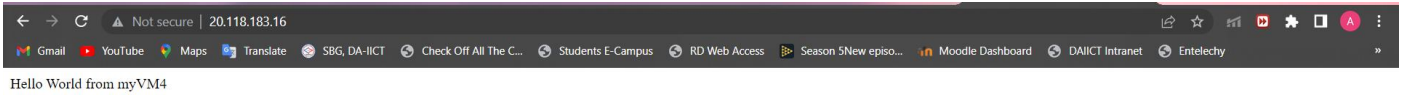
iv. From VM3

Not secure | 20.118.183.16

GmailYouTubeMapsTranslateSBG, DA-IICTCheck Off All The C...Students E-CampusRD Web AccessSeason 5New episo...Moodle DashboardDAIICT IntranetEntelechy

Hello World from myVM3

v. From VM4



6. Create a VM using CLI

i. Setting the variables in CMD :

```
C:\Users\ADMIN>set resourceGroup=VMTutorialResources001
C:\Users\ADMIN>set location=eastus2
C:\Users\ADMIN>set vnetName=TutorialVNet1
C:\Users\ADMIN>set subnetName=TutorialSubnet1
C:\Users\ADMIN>set vnetAddressPrefix=10.0.0.0/16
C:\Users\ADMIN>set subnetAddressPrefix=10.0.0.0/24
C:\Users\ADMIN>set vmName=TutorialVM1
```

ii. Creating a resource group using CLI :

```
C:\Users\ADMIN>az group create --name %resourceGroup% --location %location%
{
  "id": "/subscriptions/a4755c01-cd03-49bb-a058-76e19f8da29e/resourceGroups/VMTutorialResources001",
  "location": "eastus2",
  "managedBy": null,
  "name": "VMTutorialResources001",
  "properties": {
    "provisioningState": "Succeeded"
  },
  "tags": null,
  "type": "Microsoft.Resources/resourceGroups"
}
```

iii. Creating a virtual network using CLI :

```
C:\Users\ADMIN>az network vnet create --name %vnetName% --resource-group %resourceGroup% --address-prefixes %vnetAddressPrefix% --subnet-name %subnetName% --subnet-prefixes %subnetAddressPrefix%
{
  "newVNet": {
    "addressSpace": {
      "addressPrefixes": [
        "10.0.0.0/16"
      ]
    },
    "enableDdosProtection": false,
    "etag": "W/\"aeb4fadd-feff-46ec-a106-a1fb76eaa97a\"",
    "id": "/subscriptions/a4755c01-cd03-49bb-a058-76e19f8da29e/resourceGroups/VMTutorialResources001/providers/Microsoft.Network/virtualNetworks/TutorialVNet1",
    "location": "eastus2",
    "name": "TutorialVNet1",
    "provisioningState": "Succeeded",
    "resourceGroup": "VMTutorialResources001",
    "resourceGuid": "dee3c3fb-7eba-4148-a1d3-a21efc0ac9f6",
    "subnets": [
      {
        "addressPrefix": "10.0.0.0/24",
        "delegations": [],
        "etag": "W/\"aeb4fadd-feff-46ec-a106-a1fb76eaa97a\"",
        "id": "/subscriptions/a4755c01-cd03-49bb-a058-76e19f8da29e/resourceGroups/VMTutorialResources001/providers/Microsoft.Network/virtualNetworks/TutorialVNet1/subnets/TutorialSubnet1",
        "name": "TutorialSubnet1",
        "privateEndpointNetworkPolicies": "Disabled",
        "privateLinkServiceNetworkPolicies": "Enabled",
        "provisioningState": "Succeeded",
        "resourceGroup": "VMTutorialResources001",
        "type": "Microsoft.Network/virtualNetworks/subnets"
      }
    ],
    "type": "Microsoft.Network/virtualNetworks",
    "virtualNetworkPeerings": []
  }
}
```

iv. Creating a Virtual Machine using CLI :

```
C:\Users\ADMIN>az vm create --resource-group %resourceGroup% --name %vmName% --image UbuntuLTS --vnet-name %vnetName% --subnet %subnetName% --generate-ssh-keys --output json --verbose
Default username ADMIN is a reserved username. Use azureuser instead.
Starting Build 2023 event, "az vm/vmss create" command will deploy Trusted Launch VM by default. To know more about Trusted Launch, please visit https://docs.microsoft.com/en-us/azure/virtual-machines/trusted-launch
it is recommended to use parameter "-public-ip-sku Standard" to create new VM with Standard public IP. Please note that the default public IP used for VM creation will be changed from Basic to Standard in the future.
{
  "fqdns": "",
  "id": "/subscriptions/a4755c01-cd03-49bb-a058-76e19f8da29e/resourceGroups/VMTutorialResources001/providers/Microsoft.Compute/virtualMachines/TutorialVM1",
  "location": "eastus2",
  "macAddress": "60-45-80-BC-E6-68",
  "powerState": "VM running",
  "privateIpAddress": "10.0.0.4",
  "publicIpAddress": "20.122.83.126",
  "resourceGroup": "VMTutorialResources001",
  "zones": ""
}
Command ran in 86.717 seconds (init: 0.369, invoke: 86.349)
```

v. Output in Azure portal :

a. Resource Group

Resource groups ✨ ...		
Default Directory (AditiDasDaiict2020outlook.onmicrosoft.com)		
+ Create ⚙️ Manage view ▾ 🔄 Refresh ⬇️ Export to CSV 🔗 Open query 🏷️ Assign tags		
Filter for any field... Subscription equals all Location equals all × Location equals East US 2 × + Add filter		
🔍 0 Unsecure resources 🔍 0 Recommendations		
<input type="checkbox"/> Name ↑↓	Subscription ↑↓	Location ↑↓
<input type="checkbox"/> ResourceMoverRG-eastus-centralus-eus2	Free Trial	East US 2
<input type="checkbox"/> VMTutorialResources001	Free Trial	East US 2

b. Virtual Network

Virtual networks ✨ ...		
Default Directory (AditiDasDaiict2020outlook.onmicrosoft.com)		
+ Create ⚙️ Manage view ▾ 🔄 Refresh ⬇️ Export to CSV 🔗 Open query 🏷️ Assign tags		
Filter for any field... Subscription equals all Resource group equals all × Location equals East US 2 × + Add filter		
<input type="checkbox"/> Name ↑↓	Resource group ↑↓	Location ↑↓
<input type="checkbox"/> TutorialVNet1	VMTutorialResources001	East US 2

c. Virtual Machine

[Home](#) >

Virtual machines

Default Directory (AditiDasDaiict2020outlook.onmicrosoft.com)

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Filter for any field...


Subscription equals **all**

Type equals **all**

Resource group equals **all** ✕

Location equals **all** ✕

[+🔍](#) Add filter

<input type="checkbox"/> Name ↑↓	Type ↑↓	Subscription ↑↓	Resource group ↑↓	Location ↑↓
<input type="checkbox"/>  TutorialVM1	Virtual machine	Free Trial	VMTutorialResources001	East US 2

vi. Code :

```
%Setting the variables
set resourceGroup=VMTutorialResources001
set location=eastus2
set vnetName=TutorialVNet1
set subnetName=TutorialSubnet1
set vnetAddressPrefix=10.0.0.0/16
set subnetAddressPrefix=10.0.0.0/24
set vmName=TutorialVM1

%Creating Resource Group
az group create --name %resourceGroup% --location %location%

%Creating Virtual Network
az network vnet create --name %vnetName% --resource-group %resourceGroup% --address-
prefixes %vnetAddressPrefix% --subnet-name %subnetName% --subnet-prefixes
%subnetAddressPrefix%

%Creating Virtual Machine
az vm create --resource-group %resourceGroup% --name %vmName% --image UbuntuLTS --vnet-
name %vnetName% --subnet %subnetName% --generate-ssh-keys --output json --verbose
```

7. Introduction to ARM templates

i. Create first template

Microsoft Azure Upgrade Search resources, services, and docs (G+/)

Home > myResourceGroup | Deployments

myResourceGroup | Deployments

Filter by deployment name or resources in the deployment...

Deployment name	Status	Last modified	Duration	Related events
blanktemplate	Succeeded	1/28/2023, 1:33:18 PM	1 second	Related events

JSON:

```
{
  "$schema": "https://schema.management.azure.com/schemas/2019-04-01/deploymentTemplate.json#",
  "contentVersion": "1.0.0.0",
  "resources": []
}
```

ii. Adding resource

Home > myResourceGroup

myResourceGroup | Deployments

Resource group

Search

Refresh Cancel Redeploy Delete View template

Filter by deployment name or resources in the deployment...

Deployment name	Status	Last modified	Duration	Related events
<input type="checkbox"/> addstorage	✓ Succeeded	1/28/2023, 1:52:42 PM	31 seconds	Related events
<input type="checkbox"/> blanktemplate	✓ Succeeded	1/28/2023, 1:33:18 PM	1 second	Related events

Overview

Activity log

Access control (IAM)

Tags

Resource visualizer

Events

Settings

JSON:

```
{
  "$schema": "https://schema.management.azure.com/schemas/2019-04-01/deploymentTemplate.json#",
  "contentVersion": "1.0.0.0",
  "resources": [
    {
      "type": "Microsoft.Storage/storageAccounts",
      "apiVersion": "2021-09-01",
      "name": "store1abcad280123",
      "location": "eastus2",
      "sku": {
        "name": "Standard_LRS"
      },
      "kind": "StorageV2",
      "properties": {
        "supportsHttpsTrafficOnly": true
      }
    }
  ]
}
```

iii. a. Adding parameters : (Deployment 1)

Home > myResourceGroup

myResourceGroup | Deployments

Resource group

Search

Refresh Cancel Redeploy Delete View template

Filter by deployment name or resources in the deployment...

Deployment name	Status	Last modified	Duration	Related events
<input type="checkbox"/> addnameparameter	✓ Succeeded	1/28/2023, 2:02:55 PM	9 seconds	Related events
<input type="checkbox"/> addstorage	✓ Succeeded	1/28/2023, 1:52:42 PM	31 seconds	Related events
<input type="checkbox"/> blanktemplate	✓ Succeeded	1/28/2023, 1:33:18 PM	1 second	Related events

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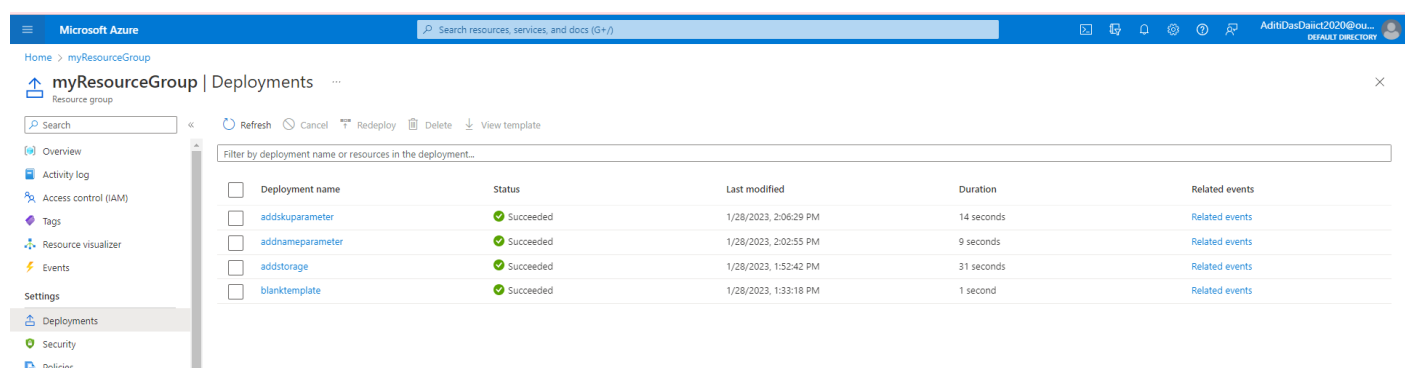
Settings

Deployments

JSON:

```
{
  "$schema": "https://schema.management.azure.com/schemas/2019-04-01/deploymentTemplate.json#",
  "contentVersion": "1.0.0.0",
  "parameters": {
    "storageName": {
      "type": "string",
      "minLength": 3,
      "maxLength": 24
    }
  },
  "resources": [
    {
      "type": "Microsoft.Storage/storageAccounts",
      "apiVersion": "2021-09-01",
      "name": "[parameters('storageName')]",
      "location": "eastus2",
      "sku": {
        "name": "Standard_LRS"
      },
      "kind": "StorageV2",
      "properties": {
        "supportsHttpsTrafficOnly": true
      }
    }
  ]
}
```

iii. b. Adding Parameters (Deployment 2) :



Deployment name	Status	Last modified	Duration	Related events
addskuparameter	Succeeded	1/28/2023, 2:06:29 PM	14 seconds	Related events
addnameparameter	Succeeded	1/28/2023, 2:02:55 PM	9 seconds	Related events
addstorage	Succeeded	1/28/2023, 1:52:42 PM	31 seconds	Related events
blanktemplate	Succeeded	1/28/2023, 1:33:18 PM	1 second	Related events

JSON:

```
{
  "$schema": "https://schema.management.azure.com/schemas/2019-04-01/deploymentTemplate.json#",
  "contentVersion": "1.0.0.0",
  "parameters": {
    "storageName": {
      "type": "string",
      "minLength": 3,
      "maxLength": 24
    },
    "storageSKU": {
      "type": "string",
      "defaultValue": "Standard_LRS",
      "allowedValues": [
        "Standard_LRS",
        "Standard_GRS",
        "Standard_RAGRS",
        "Standard_ZRS",
        "Premium_LRS",
        "Premium_ZRS",
        "Standard_GZRS",
        "Standard_RAGZRS"
      ]
    }
  },
  "resources": [
    {
      "type": "Microsoft.Storage/storageAccounts",
      "apiVersion": "2021-09-01",
      "name": "[parameters('storageName')]",
      "location": "eastus2",
      "sku": {
        "name": "[parameters('storageSKU')]"
      },
      "kind": "StorageV2",
      "properties": {
        "supportsHttpsTrafficOnly": true
      }
    }
  ]
}
```

This deployment is flexible as long as the SKU parameters are within the permissible values.

Code :

```
az group create --name myResourceGroup --location eastus2

set templateFile=C:\Users\ADMIN\Desktop\azuredeploy.json

az deployment group create --name blanktemplate --resource-group myResourceGroup --
template-file %templateFile%

az deployment group create --name addstorage --resource-group myResourceGroup --template-
file %templateFile%

az deployment group create --name addnameparameter --resource-group myResourceGroup --
template-file %templateFile% --parameters storageName=store1abcad280123
az deployment group create --name addskupparameter --resource-group myResourceGroup --
template-file %templateFile% --parameters storageName=store1abcad280123
```

8. Go through the following tutorial on N-Tier architecture

Check your knowledge

1. A three-tier application needs to be updated to integrate with a partner API. Which layer should this functionality be added to?

☐ Presentation tier

☒ Application tier

✓ API calls to other systems are best located in the application tier, where returned data can be easily integrated with new or existing business logic.

☐ Data tier

2. On which layer is it acceptable to allow access to users?

☒ Presentation tier

✓ This tier handles the interaction with the end user, and should be the tier accessed by the end user.

☐ Application tier

☐ Data tier

```

Requesting a Cloud Shell.Succeeded.
Connecting terminal...

Welcome to Azure Cloud Shell

Type "az" to use Azure CLI
Type "help" to learn about Cloud Shell

aditidasdaiict2020 [ ~ ]$ az deployment group create \
  --resource-group learn-ef0ebf82-2105-4fb7-bf74-9af9d781dd52 \
  --template-uri https://raw.githubusercontent.com/MicrosoftDocs/mslearn-n-tier-architecture/master/Deployment/azure
deploy.json \
  --parameters password="$(head /dev/urandom | tr -dc A-Za-z0-9 | head -c 32)"
{
  "id": "/subscriptions/d6d5f527-564e-46e8-a8c1-1853446b9d96/resourceGroups/learn-ef0ebf82-2105-4fb7-bf74-9af9d781dd52/providers/Microsoft.Resources/deployments/azuredeploy",
  "location": null,
  "name": "azuredeploy",
  "properties": {
    "correlationId": "9498fb6c-d111-497d-bbb7-ddcfd6a6d497",
    "debugSetting": null,
    "dependencies": [
      {
        "dependsOn": [
          {
            "id": "/subscriptions/d6d5f527-564e-46e8-a8c1-1853446b9d96/resourceGroups/learn-ef0ebf82-2105-4fb7-bf74-9af9d781dd52/providers/Microsoft.Sql/servers/demo-dbserver-r26gtui33jh4g",
            "name": "demo-dbserver-r26gtui33jh4g",
            "type": "Microsoft.Sql/servers"
          }
        ]
      }
    ]
  }
}

```

What's For Lunch?

Add a lunch suggestion

+ Add

Click to vote

pizza

16 Votes

✕ Remove

tacos

12 Votes

✕ Remove

sushi

2 Votes

✕ Remove

Check your knowledge

1. Which of the following might be a way to improve performance of an application on an N-tier architecture, while keeping costs optimized?

☐ Deploy larger virtual machines to each tier.

☒ Use autoscaling to handle fluctuations in load.

✓ This is a good way to minimize your costs. As load increases or decreases, your compute resources can adjust with them, ensuring your costs are optimized to your load.

☐ Place your application behind a load balancer.

2. Which of the following actions would improve the security of an application?

☒ Restrict access to your data tier from the internet.

✓ Isolating access to your data tier is a recommended way to improve the security of your application.

☐ Allow remote administration of your application tier servers from the internet.

☐ Add a caching technology between your application and data tiers.