

# Assignment-6

Sl. No.	Topic	Page No.
1	Create three subnets : 1. Web tier 2. App tier 3. DB tier DB Tier should not access any tier(Web & App tier) App tier should access the DB tier and Web tier as well, Web tier should access only App tier. Only Web tier is allowed to connect to the internet.Deploy two VM's in each tier(One VM should be Linux & another should be Windows). Configure Apache Server on Linux VM's And IIS Server on Windows.	2-13

**Rajus Kandpal**

# Create a Resource Group

Home > Resource groups >

## Create a resource group

Basics Tags Review + create

**Resource group** - A container that holds related resources for an Azure solution. The resource group can include all the resources for the solution, or only those resources that you want to manage as a group. You decide how you want to allocate resources to resource groups based on what makes the most sense for your organization. [Learn more](#)

Subscription \*

Resource group name \*

Region \*

## Resource groups

UPES (stuupes.ac.in)

+ Create Manage view Refresh Export to CSV Open query Assign tags

Group by none

You are viewing a new version of Browse experience. [Click here to access the old experience.](#)

Filter for any field... Subscription equals all Location equals all Add filter

<input type="checkbox"/>	Name ↑	Subscription	Location
<input type="checkbox"/>	NetworkWatcherRG	Azure subscription 1	East US
<input type="checkbox"/>	RG-TieredApp	Azure subscription 1	Central India

Showing 1 - 2 of 2. Display count: 10

Give feedback

# Create a Virtual Network and 3 subnets representing all the three tiers

Home > Network foundation | Virtual networks >

## Create virtual network

Basics Security IP addresses Tags Review + create

### Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription \*

Resource group \*  [Create new](#)

### Instance details

Virtual network name \*

Region \*  [Deploy to an Azure Extended Zone](#)

Previous Next Review + create

Give feedback

## Create virtual network ...

Basics Security IP addresses Tags Review + create

Virtual network address space into smaller ranges for use by your applications. When you deploy resources into a subnet, Azure assigns the resource an IP address from the subnet. [Learn more](#)

+ Add a subnet

10.0.0.0/16

10.0.0.0

/16

10.0.0.0 - 10.0.255.255

65,536 addresses

Delete address space

Subnets	IP address range	Size	NAT gateway
default	10.0.0.0 - 10.0.0.255	/24 (256 addresses)	-

Add IPv4 address space

[Previous](#) [Next](#) [Review + create](#)

## Create virtual network ...

Basics Security IP addresses Tags Review + create

Virtual network address space into smaller ranges for use by your applications. When you deploy resources into a subnet, Azure assigns the resource an IP address from the subnet. [Learn more](#)

+ Add a subnet

10.0.0.0/16

10.0.0.0

/16

10.0.0.0 - 10.0.255.255

65,536 addresses

Delete address space

Subnets	IP address range	Size	NAT gateway
default	10.0.0.0 - 10.0.0.255	/24 (256 addresses)	-
WebTierSubnet	10.0.1.0 - 10.0.1.255	/24 (256 addresses)	-

[Previous](#) [Next](#) [Review + create](#)

## Create virtual network ...

Basics Security IP addresses Tags Review + create

10.0.0.0/16

10.0.0.0

/16

10.0.0.0 - 10.0.255.255

65,536 addresses

Delete address space

Subnets	IP address range	Size	NAT gateway
default	10.0.0.0 - 10.0.0.255	/24 (256 addresses)	-
WebTierSubnet	10.0.1.0 - 10.0.1.255	/24 (256 addresses)	-
AppTierSubnet	10.0.2.0 - 10.0.2.255	/24 (256 addresses)	-

Add IPv4 address space

[Previous](#) [Next](#) [Review + create](#)

## Add a subnet

Select an address space and configure your subnet. You can customize a default subnet or select from subnet templates if you plan to add select services later. [Learn more](#)

Subnet purpose  Default

Name \*  WebTierSubnet

IPv4

Include an IPv4 address space ☒

IPv4 address range  10.0.0.0/16  
10.0.0.0 - 10.0.255.255

Starting address \*  10.0.1.0

Size  /24 (256 addresses)

Subnet address range  10.0.1.0 - 10.0.1.255

## IPv6

Include an IPv6 address space ☐ This virtual network has no IPv6 address ranges.

## Private subnet

Private subnets enhance security by not providing default outbound access. To enable

Add

Cancel

[Give feedback](#)

## Add a subnet

Select an address space and configure your subnet. You can customize a default subnet or select from subnet templates if you plan to add select services later. [Learn more](#)

Subnet purpose  Default

Name \*  AppTierSubnet

IPv4

Include an IPv4 address space ☒

IPv4 address range  10.0.0.0/16  
10.0.0.0 - 10.0.255.255

Starting address \*  10.0.2.0

Size  /24 (256 addresses)

Subnet address range  10.0.2.0 - 10.0.2.255

## IPv6

Include an IPv6 address space ☐ This virtual network has no IPv6 address ranges.

## Private subnet

Private subnets enhance security by not providing default outbound access. To enable

Add

Cancel

[Give feedback](#)

## Add a subnet

Select an address space and configure your subnet. You can customize a default subnet or select from subnet templates if you plan to add select services later. [Learn more](#)

Subnet purpose  Default

Name \*  DBTierSubnet

IPv4

Include an IPv4 address space ☒

IPv4 address range  10.0.0.0/16  
10.0.0.0 - 10.0.255.255

Starting address \*  10.0.3.0

Size  /24 (256 addresses)

Subnet address range  10.0.3.0 - 10.0.3.255

## IPv6

Include an IPv6 address space ☐ This virtual network has no IPv6 address ranges.

## Private subnet

Private subnets enhance security by not providing default outbound access. To enable

Add

Cancel

[Give feedback](#)

Home >

## VNet-TieredApp-1752389179930 | Overview

Deployment

Search Delete Cancel Redeploy Download Refresh

### Overview

Inputs

Outputs

Template

### Your deployment is complete

Deployment name : VNet-TieredApp-1752389179930  
Subscription : Azure subscription 1  
Resource group : RG-TieredApp

Start time : 7/13/2025, 12:16:22 PM  
Correlation ID : 727dd801-f611-4d1b-bb15-3d5c5f821fa8

> Deployment details

Next steps

Go to resource

Give feedback

Tell us about your experience with deployment



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Home > Network foundation | Virtual networks > VNet-TieredApp

## VNet-TieredApp | Subnets

Virtual network

Search Subnet Refresh Manage users Delete

Overview

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Access control (IAM)

Tags

Diagnose and solve problems

Resource visualizer

Settings

Address space

Connected devices

Subnets

Bastion

DDoS protection

Firewall

Microsoft Defender for Cloud

Network manager

Create subnets to segment the virtual network address space into smaller ranges for use by your applications. When you deploy resources into a subnet, Azure assigns the resource an IP address from the subnet.

Search subnets

<input type="checkbox"/>	Name ↑	IPv4	IPv6	Available IPs	Delegated to	Security group	Route table		
<input type="checkbox"/>	default	10.0.0.0/24	-	251	-	-	-		
<input type="checkbox"/>	DBTierSubnet	10.0.3.0/24	-	251	-	NSG-DBTier	-		
<input type="checkbox"/>	AppTierSubnet	10.0.2.0/24	-	249	-	NSG-AppTL...	-		
<input type="checkbox"/>	WebTierSubnet	10.0.1.0/24	-	251	-	NSG-WebT...	-		

Showing 4 subnets

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Show Microsoft Learn menu

## Network foundation | Virtual networks

Preview

Search Create Manage view Refresh Export to CSV Open query Assign tags

Overview

Virtual network

Virtual Network overview

Virtual networks

NAT gateways

Public IP addresses

Network interfaces

Network security groups

Application security groups

Bastions

Route tables

Route servers

> Private Link

> DNS

> Monitoring and management

Filter for any field...

Subscription equals all

Resource group equals all

Location equals all

Add filter

Showing 1 to 1 of 1 records.

No grouping

List view

<input type="checkbox"/>	Name ↑	Resource group ↑	Location ↑	Subscription ↑	
<input type="checkbox"/>	VNet-TieredApp	RG-TieredApp	Central India	Azure subscription 1	...

https://portal.azure.com/?hina Ctrl+Shift+F

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Give feedback

# Create Network Security Groups for all the tiers

Home > Network foundation | Network security groups >

## Create network security group

Basics Tags Review + create

### Project details

Subscription \* Azure subscription 1

Resource group \* RG-TieredApp

Create new

### Instance details

Name \* NSG-WebTier

Region \* Central India

Review + create

< Previous

Next: Tags >

Download a template for automation

## Microsoft.NetworkSecurityGroup-20250713122212 | Overview

Deployment

Search

Delete Cancel Redeploy Download Refresh

### Overview

Inputs

Outputs

Template

### Your deployment is complete

Deployment name : Microsoft.NetworkSecurityGroup-20250713122212 Start time : 7/13/2025, 12:22:34 PM

Subscription : Azure subscription 1 Correlation ID : 96329d86-3227-46c1-8a82-3722c3f831fd

Resource group : RG-TieredApp

### Deployment details

Resource	Type	Status	Operation details
NSG-AppTier	Network security group	OK	Operation details

### Next steps

Go to resource

### Give feedback

Tell us about your experience with deployment



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Home >

## Microsoft.NetworkSecurityGroup-20250713122338 | Overview

Deployment

Search

Delete Cancel Redeploy Download Refresh

### Overview

Inputs

Outputs

Template

### Your deployment is complete

Deployment name : Microsoft.NetworkSecurityGroup-20250713122338 Start time : 7/13/2025, 12:25:31 PM

Subscription : Azure subscription 1 Correlation ID : b7535314-34dc-4d84-98ca-5326c54fe46b

Resource group : RG-TieredApp

### Deployment details

Resource	Type	Status	Operation details
NSG-DBTier	Network security group	OK	Operation details

### Next steps

Go to resource

### Give feedback

Tell us about your experience with deployment

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# Connect the NSGs to the Respective Subnets

Home > Network foundation | Network security groups > NSG-WebTier

NSG-WebTier | Subnets

Network security group

Search

Associate

Search subnets

Name	Address range	Virtual network
WebTierSubnet	10.0.1.0/24	VNet-TieredApp

Give feedback

Saving subnet

Successfully saved network security group for subnet 'WebTierSubnet'.

Home > Network foundation | Network security groups > NSG-DBTier

NSG-DBTier | Subnets

Network security group

Search

Associate

Search subnets

Name	Address range	Virtual network
DBTierSubnet	10.0.3.0/24	VNet-TieredApp

Give feedback

Home > Network foundation | Network security groups > NSG-AppTier

NSG-AppTier | Subnets

Network security group

Search

Associate

Search subnets

Name	Address range	Virtual network
AppTierSubnet	10.0.2.0/24	VNet-TieredApp

Give feedback

# Create Inbound and outbound rules for the NSGs

Home > Network foundation > Network security groups > NSG-WebTier

NSG-WebTier | Inbound security rules

Network security group

Search

+ Add Hide default rules Refresh Delete Give feedback

Overview

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Access control (IAM)

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Inbound security rules

Outbound security rules

Network interfaces

Subnets

Properties

Locks

Monitoring

Automation

Help

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Network security group security rules are evaluated by priority using the combination of source, source port, destination, destination port, and protocol to allow or deny the traffic. A security rule can't have the same priority and direction as an existing rule. You can't delete default security rules, but you can override them with rules that have a higher priority. [Learn more](#)

Filter by name

Port == all Protocol == all Source == all Destination == all Action == all

Priority	Name	Port	Protocol	Source	Destination	Action
100	Allow-AppTier	80,443	TCP	10.0.2.0/24	Any	Allow
110	Allow-Internet-In	80,443	Any	Any	Any	Allow
65000	AllowVnetInBound	Any	Any	VirtualNetwork	VirtualNetwork	Allow
65001	AllowAzureLoadBalancerIn	Any	Any	AzureLoadBalancer	Any	Allow
65500	DenyAllInBound	Any	Any	Any	Any	Deny

Home > Network foundation > Network security groups > NSG-AppTier

NSG-AppTier | Inbound security rules

Network security group

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+ Add Hide default rules Refresh Delete Give feedback

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Inbound security rules

Outbound security rules

Network interfaces

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Help

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Created security rule  
Successfully created security rule 'Allow-App-To-DB'.

Network security group security rules are evaluated by priority using the combination of source, source port, destination, destination port, and protocol to allow or deny the traffic. A security rule can't have the same priority and direction as an existing rule. You can't delete default security rules, but you can override them with rules that have a higher priority. [Learn more](#)

Filter by name

Port == all Protocol == all Source == all Destination == all Action == all

Priority	Name	Port	Protocol	Source	Destination	Action
100	Allow-Web-In	80,443	Any	10.0.1.0/24	Any	Allow
110	Allow-App-To-DB	1433,3306,80,443	Any	10.0.3.0/24	Any	Allow
65000	AllowVnetInBound	Any	Any	VirtualNetwork	VirtualNetwork	Allow
65001	AllowAzureLoadBalancerIn	Any	Any	AzureLoadBalancer	Any	Allow
65500	DenyAllInBound	Any	Any	Any	Any	Deny

Home > Network foundation > Network security groups > NSG-DBTier

NSG-DBTier | Inbound security rules

Network security group

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+ Add Hide default rules Refresh Delete Give feedback

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Access control (IAM)

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Filter by name

Port == all Protocol == all Source == all Destination == all Action == all

Priority	Name	Port	Protocol	Source	Destination	Action
100	Deny-App-In	Any	Any	10.0.2.0/24	Any	Deny
110	Deny-Web-In	Any	Any	10.0.1.0/24	Any	Deny
65000	AllowVnetInBound	Any	Any	VirtualNetwork	VirtualNetwork	Allow
65001	AllowAzureLoadBalancerIn	Any	Any	AzureLoadBalancer	Any	Allow
65500	DenyAllInBound	Any	Any	Any	Any	Deny

<https://go.microsoft.com/fwlink/?linkid=2174617>

Home > Network foundation | Network security groups > NSG-DBTier

## NSG-DBTier | Outbound security rules

Network security group

Search

+ Add Hide default rules Refresh Delete Give feedback

Overview Activity log Access control (IAM) Tags Diagnose and solve problems Resource visualizer Settings

Inbound security rules

**Outbound security rules**

Network interfaces Subnets Properties Locks Monitoring Automation

Network security group security rules are evaluated by priority using the combination of source, source port, destination, destination port, and protocol to allow or deny the traffic. A security rule can't have the same priority and direction as an existing rule. You can't delete default security rules, but you can override them with rules that have a higher priority. [Learn more](#)

Filter by name

Port == all Protocol == all Source == all Destination == all Action == all

Priority	Name	Port	Protocol	Source	Destination	Action
120	Deny-Internet-Out	80,443	Any	Any	Internet	Deny
65000	AllowVnetOutBound	Any	Any	VirtualNetwork	VirtualNetwork	Allow
65001	AllowInternetOutBound	Any	Any	Any	Internet	Allow
65500	DenyAllOutBound	Any	Any	Any	Any	Deny

<https://portal.azure.com/#home>

Create VMs for each tier and connect them to their respective subnet

Home > Compute infrastructure

## Compute infrastructure | Virtual machines

Microsoft

Search

Virtual machines Get started

+ Create Switch to classic Reservations Manage view Refresh Export to CSV Open query Assign tags Start Group by none

**Virtual machine**  
Best for lower-traffic workloads, testing, or to control or highly customize apps, OS, or file system. If your workload or traffic starts to grow, a VM can later be attached to a Virtual Machine Scale Set (VMSS).

**Virtual machine scale set (VMSS)**  
Built-in scaling, performance optimization, load balancing, and batch management for 1 to 1,000 VMs (no added cost). Include multiple VM sizes, zones, regions, and domains, along with discounted Spot VMs.

**Presets**  
Create a pre-configured VM designed to optimize memory, capacity, or for general use. Deploy as-is, or customize as needed.

**Hybrid, preconfigured, and high volume solutions**  
Explore pre-configured Starter kits for Linux and Windows, Azure Arc hybrid infrastructure solutions, and more.

No virtual machines to display

virtual machine that runs Linux or Windows. Select an image from the marketplace or use your own customized image.

[Learn more about Windows virtual machines](#)

[Learn more about Linux virtual machines](#)

[Give feedback](#)

Home >

## CreateVm-canonical.ubuntu-24\_04-lts-server-20250713140415 | Overview

Deployment

Search

Delete Cancel Redeploy Download Refresh

**Your deployment is complete**

Deployment name: CreateVm-canonical.ubuntu-24\_04-lts-server-2... Start time: 7/13/2025, 2:45:51 PM  
Subscription: Azure subscription 1 Correlation ID: 9ebad969-aeeb-4c5d-8c25-076ee28082ea

Resource group: RG-TieredApp

**Deployment details**

Resource	Type	Status	Operation details
Web-Linux	Microsoft.Compute/virtualMachines	OK	<a href="#">Operation details</a>
web-linux105_z1	Microsoft.Network/networkInterfaces	OK	<a href="#">Operation details</a>
Web-Linux-ip	Microsoft.Network/publicIPAddresses	OK	<a href="#">Operation details</a>

**Next steps**

[Setup auto-shutdown](#) Recommended

[Monitor VM health, performance and network dependencies](#) Recommended

[Run a script inside the virtual machine](#) Recommended

[Go to resource](#) [Create another VM](#)

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CreateVm-canonical.ubuntu-24\_04-lts-server-20250713140415 | Overview

Deployment

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Overview

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Outputs

Template

✓ Your deployment is complete

Deployment name: CreateVm-canonical.ubuntu-24\_04-lts-server-2...

Subscription: Azure subscription 1

Resource group: RG-TieredApp

Start time: 7/13/2025, 2:45:51 PM

Correlation ID: 9ebad969-aebe-4c5d-8c25-076ee28082ea

Deployment details

Resource	Type	Status	Operation details
✓ Web-Linux	Microsoft.Compute/virtualMachin...	OK	<a href="#">Operation details</a>
✓ web-linux105_z1	Microsoft.Network/networkInterf...	OK	<a href="#">Operation details</a>
✓ Web-Linux-ip	Microsoft.Network/publicIpAddre...	OK	<a href="#">Operation details</a>

Next steps

Setup auto-shutdown Recommended

Monitor VM health, performance and network dependencies Recommended

Run a script inside the virtual machine Recommended

Go to resource

Create another VM

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CreateVm-canonical.ubuntu-24\_04-lts-server-20250713144824 | Overview

Deployment

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✓ Your deployment is complete

Deployment name: CreateVm-canonical.ubuntu-24\_04-lts-server-2...

Subscription: Azure subscription 1

Resource group: RG-TieredApp

Start time: 7/13/2025, 3:01:15 PM

Correlation ID: 1e4a164d-0c4b-484d-b2e6-61166628b14e

Deployment details

Resource	Type	Status	Operation details
✓ App-Linux	Microsoft.Compute/virtualMachin...	OK	<a href="#">Operation details</a>
✓ app-linux836_z1	Microsoft.Network/networkInterf...	OK	<a href="#">Operation details</a>
✓ App-Linux-ip	Microsoft.Network/publicIpAddre...	OK	<a href="#">Operation details</a>

Next steps

Setup auto-shutdown Recommended

Monitor VM health, performance and network dependencies Recommended

Run a script inside the virtual machine Recommended

Go to resource

Create another VM

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CreateVm-canonical.ubuntu-24\_04-lts-server-20250713150209 | Overview

Deployment

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Overview

Inputs

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Template

✓ Your deployment is complete

Deployment name: CreateVm-canonical.ubuntu-24\_04-lts-server-2...

Subscription: Azure subscription 1

Resource group: RG-TieredApp

Start time: 7/13/2025, 3:03:05 PM

Correlation ID: 364dcc75-38d1-4942-861d-3ebdaaa19e4a

Deployment details

Next steps

Setup auto-shutdown Recommended

Monitor VM health, performance and network dependencies Recommended

Run a script inside the virtual machine Recommended

Go to resource

Create another VM

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Home > CreateVm-canonical.ubuntu-24\_04-lts-server-20250713150209 | Overview

Deployment

Search Delete Cancel Redeploy Download Refresh

Overview

Inputs

Outputs

Template

**Your deployment is complete**

Deployment name: CreateVm-canonical.ubuntu-24\_04-lts-server-2... Start time: 7/13/2025, 3:03:05 PM  
Subscription: Azure subscription 1 Correlation ID: 364dcd75-38d1-4942-861d-3ebdaa19e4a

Resource group: RG-TieredApp

Deployment details

Resource	Type	Status	Operation details
DB-Linux	Microsoft.Compute/virtualMachines	OK	Operation details
db-linux679_x1	Microsoft.Network/networkInterf...	Created	Operation details

Next steps

Setup auto-shutdown Recommended

Monitor VM health, performance and network dependencies Recommended

Run a script inside the virtual machine Recommended

Go to resource Create another VM

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## Connect the linux VM and run Apache Server on it

Home > Compute infrastructure | Virtual machines > App-Linux

Compute infrastructure | Virtual machines

Search Virtual machines Get started

Overview

All resources

Infrastructure

Virtual machines

Virtual Machine Scale Set (VMSS)

Compute Fleet

Disks + images

Capacity + placement

Related services

Help

Showing 1 - 3 of 3. Display count: 10

App-Linux | Connect

Search Overview Activity log Access control (IAM) Tags Diagnose and solve problems Resource visualizer Connect Bastion Networking Network settings Load balancing Application security groups Network manager Settings

Native SSH

Connect from your local machine (Windows)

Just in Time on the virtual machine has temporarily configured a network security group rule for all incoming traffic from the local machine IP (49.36.176.50) to port 22. Learn more >

Change the port for connecting to this virtual machine on the Connect page of the virtual machine.

Public IP address: 20.193.252.45

A public IP address is required to connect via this connection method.

I understand just-in-time policy on the virtual machine may be re-configured to allow local machine IP (49.36.176.50) to request just-in-time access to port 22.

Configured

Open a local shell (on Windows)

Open Terminal (Windows 11), PowerShell (Windows 10 or less), or a shell of your choice. Or switch the local machine OS above to view more instructions.

Copy and execute SSH command

Provide a path to your SSH private key file on your local machine.

C:\Users\veera\Downloads\App-Linux\_key.pem

Can't find your private key? Reset your SSH private key

SSH to VM with specified private key.

ssh -i C:\Users\veera\Downloads\App-Linux\_key.pem azureuser@20.1...

Copied

Other Information

Using a Linux subsystem like WSL or Ubuntu on Terminal?

Close Troubleshooting Give feedback

```
Enabling module authn_file.
Enabling module authz_user.
Enabling module alias.
Enabling module dir.
Enabling module autoindex.
Enabling module env.
Enabling module mime.
Enabling module negotiation.
Enabling module setenvif.
Enabling module filter.
Enabling module deflate.
Enabling module status.
Enabling module reqtimeout.
Enabling conf charset.
Enabling conf localized-error-pages.
Enabling conf other-vmhosts-access-log.
Enabling conf security.
Enabling conf serve-cgi-bin.
Enabling site 000-default.
Created symlink /etc/systemd/system/multi-user.target.wants/apache2.service + /usr/lib/systemd/system/apache2.service.
Created symlink /etc/systemd/system/multi-user.target.wants/apache-htcacheclean.service + /usr/lib/systemd/system/apache-htcacheclean.service.
Processing triggers for ufw (0.36.2-6) ...
Processing triggers for man-db (2.12.0-4build2) ...
Processing triggers for libc-bin (2.39-0ubuntu8.4) ...
Scanning processes...
Scanning linux images...

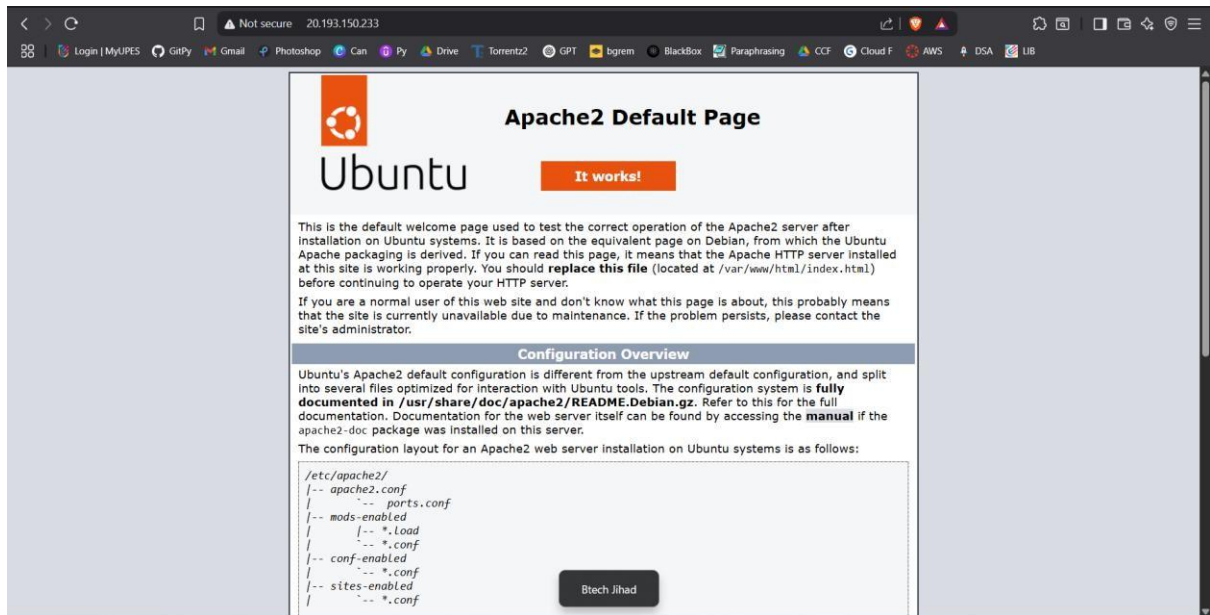
Running kernel seems to be up-to-date.

No services need to be restarted.

No containers need to be restarted.

No user sessions are running outdated binaries.

No VM guests are running outdated hypervisor (qemu) binaries on this host.
azureuser@Web-Linux:~$ sudo systemctl start apache2
azureuser@Web-Linux:~$ sudo systemctl enable apache2
Synchronizing state of apache2.service with SysV service script with /usr/lib/systemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable apache2
azureuser@Web-Linux:~$
```



Create VMs for Windows and connect them and host the IIS server on them

