

3-tier Architecture

Name: M.Nandhini

Architecture Overview:

Webserver layer:Nginx (virtual machine with publicsubnet)

Appserver layer:Tomcat (virtual machine by using ip address)

Database layer:MYSQL(virtual machine by using ip address)

Steps to create the 3-tier Architecture

Subscription: Azure subscription 1
Resource group: (new) haritha-rg
Virtual machine name: webserver
Region: West US
Availability options: No infrastructure redundancy required
Zone options: Self-selected zone
Security type: Trusted launch virtual machines
Enable secure boot: Yes
Enable vTPM: Yes
Integrity monitoring: No
Image: Ubuntu Server 24.04 LTS - Gen2
VM architecture: x64
Size: Standard D2s v3 (2 vcpus, 8 GiB memory)

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Network interface / IP configuration: webserver700 (primary) / ipconfig1 (primary)

Essentials

- Network interface: webserver700
- Virtual network / subnet: vnet-westus / websubnet
- Public IP address: 20.66.114.76
- Private IP address: 172.16.1.4
- Admin security rules: 0 (Configure)
- Load balancers: 0 (Configure)
- Application security groups: 0 (Configure)
- Network security group: webserver-nsg
- Accelerated networking: Enabled
- Effective security rules: 0

The screenshot shows the Microsoft Azure portal interface. The URL is https://portal.azure.com/#@lskr2026outlook.onmicrosoft.com/resource/subscriptions/a3107e0d-376f-4650-b383-aa7b2b3c0c9a/resourceGroups/haritha-rg/providers/Microsoft.Network/networkSecurityGroups/webserver-nsg. The page title is "webserver | Network settings". The left sidebar shows "Networking" selected under "Network settings". The main content area displays the "Network security group webserver-nsg" attached to networkInterface: webserver530. It lists "Inbound port rules (5)" and "Outbound port rules (3)". The inbound rules include: rule 300 (SSH) allowing port 22; rule 310 (HTTP) allowing port 80; and three Azure-specific rules (AllowVnetInBound, AllowAzureLoadBalancerInB..., DenyAllInBound). The outbound rules are listed below.

The screenshot shows a web browser displaying the NGINX welcome page at http://20.66.114.76. The title is "Welcome to nginx!". The page includes a message stating "If you see this page, the nginx web server is successfully installed and working. Further configuration is required.", links to "nginx.org" and "nginx.com", and a "Thank you for using nginx." footer.

To create a virtual machine for (appserver)

The screenshot shows the Microsoft Azure portal interface for creating a virtual machine. The URL is https://portal.azure.com/?idpc=1#create/Microsoft.VirtualMachine-ARM. The page title is "Create a virtual machine". A green banner at the top indicates "Validation passed". The form fields are as follows:

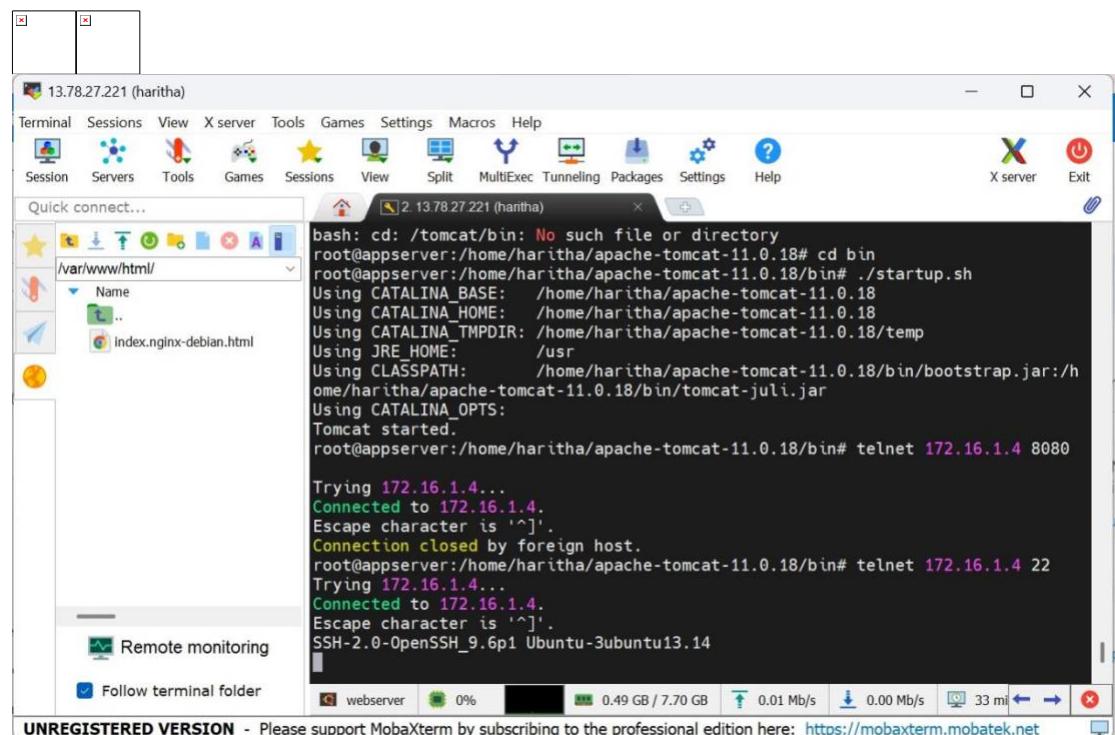
Resource group	haritha-rg
Virtual machine name	appserver
Region	West US
Availability options	No infrastructure redundancy required
Zone options	Self-selected zone
Security type	Trusted launch virtual machines
Enable secure boot	Yes
Enable vTPM	Yes
Integrity monitoring	No
Image	Ubuntu Server 24.04 LTS - Gen2
VM architecture	x64
Size	Standard D2s v3 (2 vcpus, 8 GiB memory)
Enable Hibernation	No

At the bottom, there are buttons for "< Previous" and "Next >" and a prominent blue "Create" button. There are also links for "Download a template for automation" and "Give feedback".

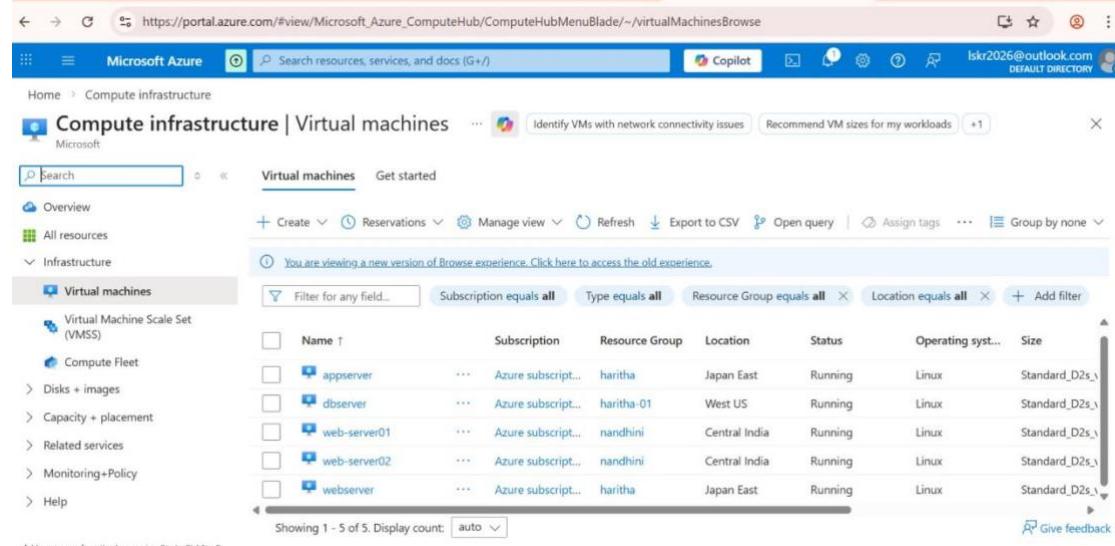
To connect a appserver by using these commands
Ssh username@webpvti

To install tomcat

Sudo su
Apt update
Apt install default-jdk -y
Java-version



```
bash: cd: /tomcat/bin: No such file or directory
root@appserver:/home/haritha/apache-tomcat-11.0.18# cd bin
root@appserver:/home/haritha/apache-tomcat-11.0.18/bin# ./startup.sh
Using CATALINA_BASE: /home/haritha/apache-tomcat-11.0.18
Using CATALINA_HOME: /home/haritha/apache-tomcat-11.0.18
Using CATALINA_TMPDIR: /home/haritha/apache-tomcat-11.0.18/temp
Using JRE_HOME: /usr
Using CLASSPATH: /home/haritha/apache-tomcat-11.0.18/bin/bootstrap.jar:/home/haritha/apache-tomcat-11.0.18/bin/tomcat-juli.jar
Using CATALINA_OPTS:
Tomcat started.
root@appserver:/home/haritha/apache-tomcat-11.0.18/bin# telnet 172.16.1.4 8080
Trying 172.16.1.4...
Connected to 172.16.1.4.
Escape character is '^]'.
Connection closed by foreign host.
root@appserver:/home/haritha/apache-tomcat-11.0.18/bin# telnet 172.16.1.4 22
Trying 172.16.1.4...
Connected to 172.16.1.4.
Escape character is '^]'.
SSH-2.0-OpenSSH_9.6p1 Ubuntu-3ubuntu13.14
```



Compute infrastructure | Virtual machines

Name	Subscription	Resource Group	Location	Status	Operating system	Size
appserver	Azure subscription	haritha	Japan East	Running	Linux	Standard_D2s_v3
dbserver	Azure subscription	haritha-01	West US	Running	Linux	Standard_D2s_v3
web-server01	Azure subscription	nandhini	Central India	Running	Linux	Standard_D2s_v3
web-server02	Azure subscription	nandhini	Central India	Running	Linux	Standard_D2s_v3
webserver	Azure subscription	haritha	Japan East	Running	Linux	Standard_D2s_v3

