

3-Tier Architecture

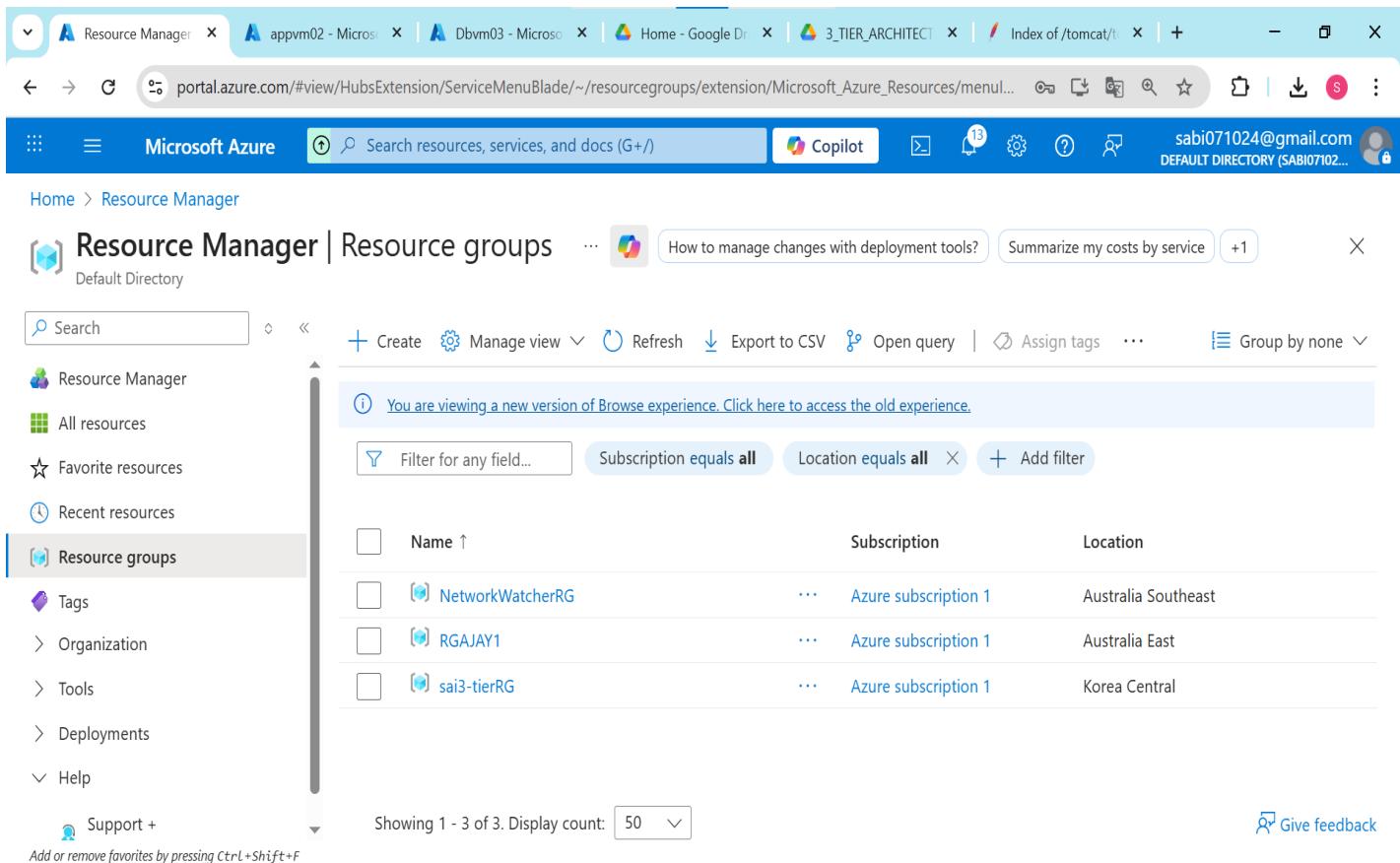
Introduction:

3-Tier Architecture is a widely used cloud application design pattern that separates an application into three logical layers: Presentation Tier, Application Tier, and Data Tier. This architecture improves scalability, security, and maintainability by isolating user interaction, business logic, and data storage into independent layers.

1. Create Resource Groups:

A Resource Group is a logical container in Azure that groups and manages all related resources for an application.

Resource Group: sai3-tierRG



The screenshot shows the Microsoft Azure Resource Manager portal. The left sidebar navigation bar is visible, with 'Resource groups' selected. The main content area displays a table of resource groups. The table has columns for Name, Subscription, and Location. Three resource groups are listed: NetworkWatcherRG (Subscription: Azure subscription 1, Location: Australia Southeast), RGAJAY1 (Subscription: Azure subscription 1, Location: Australia East), and sai3-tierRG (Subscription: Azure subscription 1, Location: Korea Central). A message at the top of the table says, 'You are viewing a new version of Browse experience. Click here to access the old experience.' There are also filter options for 'Subscription equals all' and 'Location equals all'. At the bottom of the table, it says 'Showing 1 - 3 of 3. Display count: 50'.

Name	Subscription	Location
NetworkWatcherRG	Azure subscription 1	Australia Southeast
RGAJAY1	Azure subscription 1	Australia East
sai3-tierRG	Azure subscription 1	Korea Central

2. Create Virtual Networks and Subnets

Virtual Networks:

An Azure Virtual Network is a private network that securely connects Azure resources and controls traffic between them.

Name	Resource Group	Location	Subscription
DB_vnet02	sai3-tierRG	Central India	Azure subscription 1
sai_VNET01	sai3-tierRG	Korea Central	Azure subscription 1
VNETAJAY1	RGAJAY1	Australia East	Azure subscription 1

Subnets:

A Subnet divides an Azure Virtual Network into smaller, manageable networks for better security and organization.

Name	IPv4	IPv6	Available IPs	Delegated to	Security group	Route table
websubnet	10.0.0.0/24	-	250	-	-	-
appsubnet	10.0.1.0/24	-	250	-	-	-

3. Create Virtual Machines

An Azure Virtual Machine is a scalable cloud server used to host applications and services.

- Web Virtual Machine
- App Virtual Machine
- Db Virtual Machine

The screenshot shows the Microsoft Azure Compute infrastructure Virtual machines page. The left sidebar has a 'Virtual machines' section selected, showing a list of VMs: appvm02, Dbvm03, DBVM1, and webvm01. The main area displays a table of VM details with filters at the top. The table includes columns for Name, Type, Resource Group, Location, Status, and OS Type. The VMs listed are all running and Linux-based.

Name	Type	Resource Group	Location	Status	OS Type
appvm02	Azure subscription	sai3-tierRG	Korea Central	Running	Linux
Dbvm03	Azure subscription	sai3-tierRG	Central India	Running	Linux
DBVM1	Azure subscription	RGAJAY1	Australia East	Running	Linux
webvm01	Azure subscription	sai3-tierRG	Korea Central	Running	Linux

VNet Peering:

VNet Peering connects Azure virtual networks privately, enabling secure communication between them.

The screenshot shows the Microsoft Azure Network foundation | Virtual networks page. The left sidebar has a 'Peerings' section selected, showing a list of peerings: peer01to02. The main area displays a table of peering details with filters at the top. The table includes columns for Name, Peering sync status, Peer IP, Remote IP, Virtual network, and Cross-tenant. The peering listed is 'Fully Synchronized' and 'Connected'.

Name	Peering sync status	Peer IP	Remote IP	Virtual network	Cross-tenant
peer01to02	Fully Synchronized	Connected	DB_vnet...	Disabled	No

4. Create Network Security Groups (NSGs)

A **Network Security Group (NSG)** is a security feature in Azure that controls inbound and outbound network traffic to Azure resources. It uses rules to allow or deny traffic based on source, destination, port, and protocol, helping protect virtual machines and subnets from unauthorized access.

webvm01 | Network settings

port rules (6)

Name	Port	Protocol	Source	Destination	Action
SSH	22	TCP	27.74.3.206	Any	Allow
allow	80	Any	Any	10.0.0.4	Allow
allow_	8080	Any	Any	Any	Allow
AllowVnetInBound	Any	Any	VirtualNetwork	VirtualNetwork	Allow
AllowAzureLoadBalancerInBound	Any	Any	AzureLoadBalancer	Any	Allow
DenyAllInBound	Any	Any	Any	Any	Deny

appvm02 | Network settings

port rules (4)

Name	Port	Protocol	Source	Destination	Action
Allow	8080	Any	10.0.0.4	10.0.1.4	Allow
AllowVnetInBound	Any	Any	VirtualNetwork	VirtualNetwork	Allow
AllowAzureLoadBalancerInBound	Any	Any	AzureLoadBalancer	Any	Allow
DenyAllInBound	Any	Any	Any	Any	Deny

The screenshot shows the Microsoft Azure portal interface. The user is navigating to the 'Compute infrastructure | Virtual machines' section and has selected the 'Dbvm03' virtual machine. Under the 'Network settings' tab, the 'Port rules' section is displayed. There are five port rules listed:

Name	Port	Protocol	Source	Destination	Action
allow	3306	Any	10.0.1.4	10.1.2.4	✓ A
deny	Any	Any	10.0.0.4	10.1.2.4	✗ D
AllowVnetInBound	Any	Any	VirtualNetwork	VirtualNetwork	✓ A
AllowAzureLoadBalancerInB...	Any	Any	AzureLoadBalancer	Any	✓ A
DenyAllInBound	Any	Any	Any	Any	✗ D

Below the port rules, there is a section for 'Load port rules (3)' which is currently empty.

5. Connect Web to App Server:

Using MobaXterm, the web server securely connects to the application server in Linux, enabling seamless request processing in a 3-tier architecture.

The screenshot shows the MobaXterm application window. On the left, the file explorer sidebar shows the directory structure of the user's home folder: /home/saiadmin/.cache, .ssh, .bash_logout, .bashrc, and .profile. The main terminal window displays the following command-line session:

```
root@webvm01:~# telnet 10.0.1.4 8080
Trying 10.0.1.4...
Connected to 10.0.1.4.
Escape character is '^]'.
```

At the bottom of the window, the system status bar provides information about the session: 'webvm01', '0% CPU', '0.46 GB / 0.88 GB', '0.01 Mb/s', '0.00 Mb/s', '70 min', 'saiadmin (x4) root', '/: 7%', '/boot: 8%', '/boot/efi: 6%', and a red 'X' icon.

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6. Connect App to Database Server:

Using MobaXterm, the application server securely connects to the database server in Linux, enabling backend services to access stored data.

