

Deployment of 3-Tier Applications Using AWS Services |

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Project Overview

This project demonstrates a manually deployed 3-tier architecture on AWS for a web application where users can submit data, which is then stored in a backend database. The setup does not use DevOps tools (like Jenkins, Docker, or Kubernetes) and relies on AWS native services for hosting, networking, and storage

Step1-Go Jenkins And Create a Node

Business Requirements

Users should be able to submit data via a web form. Data should be stored securely in a backend database. The application should be accessible via a custom domain (using Route 53). Security best practices should be followed (IAM roles, VPC isolation)

Step-by-Step Manual Deployment:

Design and create a Virtual Private Cloud (VPC) to serve as the foundation for the project infrastructure

Create a VPC:

VPC dashboard

Create VPC | **Launch EC2 Instances**

Note: Your Instances will launch in the Asia Pacific region.

Resources by Region

You are using the following Amazon VPC resources

Category	Count	Region
VPCs	1	Mumbai
NAT Gateways	0	Mumbai
Subnets	3	Mumbai
Route Tables	1	Mumbai
Internet gateways	1	Mumbai
Egress-only internet gateways	0	Mumbai
DHCP option sets	0	Mumbai
Elastic IPs	0	Mumbai
Managed prefix lists	0	Mumbai
NAT gateways	0	Mumbai
Peering connections	0	Mumbai
Route servers	0	Mumbai
Security	0	Mumbai
Network ACLs	0	Mumbai
Security groups	0	Mumbai
Private link and	0	Mumbai
CloudShell	Feedback	Console Mobile App

Service Health

Settings

Additional Information

AWS Network Manager

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Create VPC

A VPC is an isolated portion of the AWS Cloud populated by AWS objects, such as Amazon EC2 instances.

VPC settings

Resources to create

VPC only

VPC and more

Name tag - optional

3-tier-vpc

IPv4 CIDR block

IPv4 CIDR manual input

IPAM-allocated IPv4 CIDR block

10.0.0.0/16

IPv6 CIDR block

10 IPv6 CIDR block

IPAM-allocated IPv6 CIDR block

Amazon-provided IPv6 CIDR block

IPv6 CIDR owned by me

Tenancy

Default

VPC encryption control (\$)

None

Monitor mode

See which resources in your VPC are unencrypted but allow the creation of unencrypted resources.

Enforce mode

Requires all resources, except exclusions, in your VPC to be encryption-capable and blocks creation of unencrypted resources.

Tags

A tag is a label that you assign to an AWS resource. Each tag consists of a key and an optional value. You can use tags to search and filter your resources or track your AWS costs.

Key

Name

Value - optional

3-tier-vpc

Add tag

You can add 49 more tags

Create VPC

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Subnet:

The screenshot shows the AWS Management Console interface for creating a new subnet in the VPC section.

Create Subnet Page:

- VPC ID:** vpc-0c77dd311bec0e1db (3-tier-vpc)
- Associated VPC CIDRs:** 10.0.0.0/16
- Subnet settings:**
 - Subnet name:** public-subnet-1
 - Availability Zone:** Asia Pacific (Mumbai) / ap-south-1 (ap-south-1a)
 - IPv4 VPC CIDR block:** 10.0.0.0/16
 - IPv4 subnet CIDR block:** 10.0.1.0/24
 - Tags - optional:** A tag named "Name" with value "public-subnet-1" is added.
- Create subnet** button highlighted.

Subnets Page:

- Subnets (7) Info:**

Name	Subnet ID	State	VPC	Block Public...	IPv4 CIDR	IPv6 CIDR	IPv6 CIDR association ID
-	subnet-078417cfb5b57e8de	Available	vpc-025c225e72949d3bb	Off	172.31.32.0/20	-	-
public-subnet-1	subnet-05040ecc74d4b67b5	Available	vpc-0c77dd311bec0e1db 3-tier...	Off	10.0.1.0/24	-	-
public-subnet-2	subnet-0f4ee2c5d9ee7fd4	Available	vpc-0c77dd311bec0e1db 3-tier...	Off	10.0.20.0/24	-	-
private-subnet-1	subnet-02f9aaeb5c30399b	Available	vpc-0c77dd311bec0e1db 3-tier...	Off	10.0.11.0/24	-	-
private-subnet-2	subnet-0b52760c1a22d2b83	Available	vpc-0c77dd311bec0e1db 3-tier...	Off	10.0.12.0/24	-	-
db-subnet-2	subnet-0e04641474b97ff58	Available	vpc-0c77dd311bec0e1db 3-tier...	Off	10.0.22.0/24	-	-
db-subnet-1	subnet-0b854797d6369b0b	Available	vpc-0c77dd311bec0e1db 3-tier...	Off	10.0.21.0/24	-	-
- Select a subnet** dropdown menu open.
- Create subnet** button highlighted.

Internet Gateway:

Create internet gateway Info

An internet gateway is a virtual router that connects a VPC to the internet. To create a new internet gateway specify the name for the gateway below.

Internet gateway settings

Name tag
Creates a tag with a key of 'Name' and a value that you specify.

Tags - optional
A tag is a label that you assign to an AWS resource. Each tag consists of a key and an optional value. You can use tags to search and filter your resources or track your AWS costs.

Key Value optional

You can add 49 more tags.

The following internet gateway was created: igw-06b5384b02724c081 - 3-tier-igw. You can now attach to a VPC to enable the VPC to communicate with the internet.

Attach to VPC (igw-06b5384b02724c081) Info

VPC
Attach an internet gateway to a VPC to enable the VPC to communicate with the internet. Specify the VPC to attach below.

Available VPCs



NAT Gateway:

The screenshot shows the 'Create NAT gateway' page in the AWS VPC console. The 'Name - optional' field contains '3tier-NAT'. The 'Availability mode' section has 'Regional - new' selected. Under 'VPC', the 'Select a VPC' dropdown is set to 'Select a VPC'. The 'Connectivity type' section has 'Public' selected. The 'Method of Elastic IP (EIP) allocation' section has 'Automatic' selected. The top right corner shows the account ID '4630-0083-7460' and the region 'Asia Pacific (Mumbai)'.

Routetable:

The screenshot shows the 'Create route table' page in the AWS VPC console. The 'Name - optional' field contains 'public-rt'. The 'VPC' dropdown is set to 'vpc-0c77dd311bec0e1db (3-tier-vpc)'. The 'Tags' section has one tag named 'Name' with value 'public-rt'. The bottom right corner has 'Cancel' and 'Create route table' buttons.



<https://ap-south-1.console.aws.amazon.com/vpcconsole/home?region=ap-south-1#CreateRouteTable:>

VPC | ap-south-1

Create route table [Info](#)

A route table specifies how packets are forwarded between the subnets within your VPC, the internet, and your VPN connection.

Route table settings

Name - optional
Create a tag with a key of 'Name' and a value that you specify.

VPC
The VPC to use for this route table.

Tags
A tag is a label that you assign to an AWS resource. Each tag consists of a key and an optional value. You can use tags to search and filter your resources or track your AWS costs.

Key	Value - optional
<input type="text" value="Name"/>	<input type="text" value="private-app-rt"/> Remove

[Add new tag](#)

You can add up to 50 more tags.

[Cancel](#) [Create route table](#)

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Elasticip:

<https://ap-south-1.console.aws.amazon.com/vpcconsole/home?region=ap-south-1#AllocateAddress:>

VPC | ap-south-1

Allocate Elastic IP address [Info](#)

Elastic IP address settings [Info](#)

Public IPv4 address pool
 Amazon's pool of IPv4 addresses
 Public IPv4 address that you bring to your AWS account with BYOIP. (option disabled because no pools found) [Learn more](#)
 Customer-owned pool of IPv4 addresses created from your on-premises network for use with an Outpost. (option disabled because no customer owned pools found) [Learn more](#)
 Allocate using an IPv4 IPAM pool (option disabled because no public IPv4 IPAM pools with AWS service as EC2 were found)

Network border group [Info](#)

Global static IP addresses
 AWS Global Accelerator can provide global static IP addresses that are announced worldwide using anycast from AWS edge locations. This can help improve the availability and latency for your user traffic by using the Amazon global network. [Learn more](#) [Create accelerator](#)

Tags - optional
 A tag is a label that you assign to an AWS resource. Each tag consists of a key and an optional value. You can use tags to search and filter your resources or track your AWS costs.
 No tags associated with the resource.
[Add new tag](#)

You can add up to 50 more tag

[Cancel](#) [Allocate](#)

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2.S3 Bucket and IAM Role Setup

Create an S3 bucket and upload the application code

Clone Repository (Locally)

Github: <https://github.com/rishad3855/AWS3TierApp.git>

S3 Bucket:

The screenshot shows the 'Create bucket' wizard in the AWS Management Console. The top navigation bar includes links for EC2, VPC, Aurora and RDS, IAM, and S3. The account ID is 4630-0085-7460 and the user is ameen. The current step is 'Create bucket'.

General configuration

- AWS Region:** Asia Pacific (Mumbai) ap-south-1
- Bucket type:**
 - General purpose: Recommended for most use cases and access patterns. General purpose buckets are the original S3 bucket type. They allow a mix of storage classes that redundantly store objects across multiple Availability Zones.
 - Directory: Recommended for low-latency use cases. These buckets use only the S3 Express One Zone storage class, which provides faster processing of data within a single Availability Zone.
- Bucket name:** tier-project
- Copy settings from existing bucket - optional:** Only the bucket settings in the following configuration are copied. A 'Choose bucket' button is available.
- Format:** s3://bucket/prefix

Object Ownership

- Object Ownership:** Bucket owner enforced
- ACLs disabled (recommended):** All objects in this bucket are owned by this account. Access to this bucket and its objects is specified using only policies.
- ACLs enabled:** Objects in this bucket can be owned by other AWS accounts. Access to this bucket and its objects can be specified using ACLs.

Block Public Access settings for this bucket

- Block off public access:** Turned on. This setting is on by default and applies to all four settings below.
- Block public access to buckets and objects granted through new access control lists (ACLs):** Turned off.

Block public and cross-account access to buckets and objects through any public bucket or access point policies

Bucket Versioning

- Bucket Versioning:** Versioning is a means of keeping multiple variants of an object in the same bucket. You can use versioning to preserve, retrieve, and restore every version of every object stored in your Amazon S3 bucket. With versioning, you can easily recover from both unintended user actions and application failures. [Learn more](#)
- Disable
- Enable

Tags - optional

- You can use bucket tags to analyze, manage and specify permissions for a bucket. [Learn more](#)
- You can use s3>ListTagsForResource, s3:TagResource, and s3:UntagResource APIs to manage tags on S3 general purpose buckets for access control in addition to cost allocation and resource organization. To ensure a seamless transition, please provide permissions to s3>ListTagsForResource, s3:TagResource, and s3:UntagResource actions. [Learn more](#)
- No tags associated with this bucket.
- Add new tag
- You can add up to 50 tags.

Default encryption

- Server-side encryption is automatically applied to new objects stored in this bucket.
- Encryption type:**
 - Server-side encryption with Amazon S3 managed keys (SSE-S3)
 - Server-side encryption with AWS Key Management Service keys (SSE-KMS)
 - Dual-layer server-side encryption with AWS Key Management Service keys (DSSE-KMS)
- Bucket Key:** Using an S3 Bucket Key for SSE-KMS reduces encryption costs by lowering calls to AWS KMS. S3 Bucket Keys aren't supported for DSSE-KMS. [Learn more](#)
- Disable
- Enable

Advanced settings

- After creating the bucket, you can upload files and folders to the bucket, and configure additional bucket settings.

Buttons:

- Cancel
- Create bucket

The screenshot shows the AWS Management Console interface for an S3 bucket named '3tier-project'. The left sidebar includes sections for General purpose buckets, Storage Lens, and Feature spotlight. The main content area displays the 'Objects (0)' section with a search bar and various actions like Copy S3 URI, Copy URL, Download, Open, Delete, Actions, Create folder, and Upload. A message states 'No objects' and 'You don't have any objects in this bucket.' The top right corner shows the account ID '4630-0083-7460' and the region 'Asia Pacific (Mumbai)'. The 'Upload' button is highlighted with a red box.

This screenshot shows the 'Upload' step in the AWS Management Console. It lists files and folders to be uploaded, including 'nginx-Without-SSL.conf', 'nginx.conf', 'package.json', 'README.md', 'App.css', 'App.js', 'App.test.js', 'global.js', 'hooks.js', and 'index.css'. Below this is the 'Destination' configuration, which points to 's3://3tier-project'. The 'Permissions' and 'Properties' sections are also visible. The 'Upload' button is highlighted with a red box.

The screenshot shows the confirmation of a successful upload. A green banner at the top says 'Upload succeeded' and provides a link to the 'Files and folders' table. Below this is the 'Upload: status' summary, which shows 'Succeeded' (33 files, 192.9 KB (100.00%)) and 'Failed' (0 files, 0 B (0%)). The 'Upload' button is highlighted with a red box.

This screenshot is identical to the previous one, showing the successful upload confirmation and the 'Upload: status' summary. The 'Upload' button is highlighted with a red box.

Set up an IAM role with the necessary permissions and attach it to the EC2 instance

IAMRole:

Screenshot of the AWS IAM 'Create role' wizard - Step 1: Select trusted entity.

The 'Trusted entity type' section shows the following options:

- AWS service: Allow AWS services like EC2, Lambda, or others to perform actions in this account.
- AWS account: Allow entities in other AWS accounts belonging to you or a 3rd party to perform actions in this account.
- Web identity: Allows users federated by the specified external web identity provider to assume this role to perform actions in this account.
- SAML 2.0 federation: Allow users federated with SAML 2.0 from a corporate directory to perform actions in this account.
- Custom trust policy: Create a custom trust policy to enable others to perform actions in this account.

The 'Use case' section shows the following service or use case:

- EC2: Allows EC2 instances to call AWS services on your behalf.
- EC2 Role for AWS Systems Manager: Allows EC2 instances to call AWS services like CloudWatch and Systems Manager on your behalf.
- EC2 Spot Fleet Role: Allows EC2 Spot Fleet to request and terminate Spot Instances on your behalf.
- EC2 - Spot Fleet Auto Scaling: Allows Auto Scaling to access and update EC2 spot fleets on your behalf.
- EC2 - Spot Fleet Tagging: Allows EC2 to launch spot instances and attach tags to the launched instances on your behalf.
- EC2 - Spot Instances: Allows EC2 Spot Instances to launch and manage spot instances on your behalf.
- EC2 - Spot Fleet: Allows EC2 Spot Fleet to launch and manage spot fleet instances on your behalf.
- EC2 - Scheduled Instances: Allows EC2 Scheduled Instances to manage instances on your behalf.

Screenshot of the AWS IAM '3tier-ec2-role' details page.

Summary

- Creation date: November 24, 2025, 16:03 (UTC+05:30)
- Last activity: -
- ARN: arn:aws:iam::463000837460:role/3tier-ec2-role
- Maximum session duration: 1 hour
- Instance profile ARN: arn:aws:iam::463000837460:instance-profile/3tier-ec2-role

Permissions

Permissions policies (2):

- Policy name: AmazonRDSDDataFullAccess (AWS managed)
- Policy name: AmazonS3ReadOnlyAccess (AWS managed)

Permissions boundary (not set)

Generate policy based on CloudTrail events

Generate policy

3. Database Configuration

Launch and configure an RDS instance to serve as the backend database

Screenshot of the AWS RDS 'Create database' configuration page.

Header: AWS navigation bar, Account ID: 4630-0083-7460, ameen, Asia Pacific (Mumbai).

Status Bar: Successfully modified db-subnet. View subnet group.

Create database Info:

- Free plan has access to limited features and resources: The free plan limits the features and resources that are available for RDS and Aurora databases. Upgrade your account plan to remove all limitations. Learn more.
- Upgrade plan

Choose a database creation method:

- Full configuration: You set all of the configuration options, including ones for availability, security, backups, and maintenance.
- Easy create: Use recommended best-practice configurations. Some configuration options can be changed after the database is created.

Engine options:

- Aurora (MySQL Compatible)
- Aurora (PostgreSQL Compatible)
- MySQL
- PostgreSQL
- MariaDB
- Oracle
- ORACLE**
- Microsoft SQL Server
- IBM Db2
- IBM Db2**

Edition:

- MySQL Community

Engine version:

- Info: View the engine versions that support the following database features.
- Hide filters
- Show only versions that support the Multi-AZ DB cluster: Create a Multi-AZ DB cluster with one primary DB instance and two readable standby DB instances. Multi-AZ DB clusters provide up to 2x faster transaction commit latency and automatic failover in typically under 35 seconds.
- Show only versions that support the Amazon RDS Optimized Writes: Amazon RDS Optimized Writes improves write throughput by up to 2x at no additional cost.
- Hide filters
- Show only versions that support the Multi-AZ DB cluster: Create a Multi-AZ DB cluster with one primary DB instance and two readable standby DB instances. Multi-AZ DB clusters provide up to 2x faster transaction commit latency and automatic failover in typically under 35 seconds.
- Show only versions that support the Amazon RDS Optimized Writes: Amazon RDS Optimized Writes improves write throughput by up to 2x at no additional cost.

Engine version: MySQL 8.0.43

Enable RDS Extended Support: Info: Amazon RDS Extended Support is a paid offering. By selecting this option, you consent to being charged for this offering if you are running your database major version past the RDS end of standard support date for that version. Check the end of standard support date for your major version in the RDS for MySQL documentation.

Templates:

- Production: Use defaults for high availability and fast, consistent performance.
- Dev/Test: This instance is intended for development use outside of a production environment.
- Free tier: Use RDS Free Tier to develop new applications, test existing applications, or gain hands-on experience with Amazon RDS.

Availability and durability:

Deployment options: Info: Choose the deployment option that provides the availability and durability needed for your use case. AWS is committed to a certain level of uptime depending on the deployment option you choose. Learn more in the Amazon RDS service level agreement (SLA).

- Multi-AZ DB cluster deployment (3 instances): Creates a primary DB instance with two readable standbys in separate Availability Zones. This setup provides:
 - 99.95% uptime
 - Redundancy across Availability Zones
 - Increased read capacity
 - Reduced write latency
- Multi-AZ DB instance deployment (2 instances): Creates a primary DB instance with a non-readable standby instance in a separate Availability Zone. This setup provides:
 - 99.95% uptime
 - Redundancy across Availability Zones
- Single-AZ DB instance deployment (1 instance): Creates a single DB instance without standby instances. This setup provides:
 - 99.5% uptime
 - No data redundancy

Screenshot of the AWS RDS 'Create database' configuration page.

Account ID: 4630-0085-7460
ameen

DB instance identifier: **Info**
Provide a name for your DB instance. The value must be unique across all the instances created by your AWS account in the current AWS Region.
webabpd

The DB instance identifier is case-insensitive, but is stored as all lowercase (as in "mydbinstance"). Constraints: 1 to 63 alphanumeric characters or hyphens. First character must be a letter. Can't contain two consecutive hyphens. Can't end with a hyphen.

Credentials Settings

Master username: **Info**
Type a login ID for the master user of your DB instance.
admin

1 to 16 alphanumeric characters. The first character must be a letter.

Credentials management:
You can use AWS Secrets Manager or manage your master user credentials.

Managed in AWS Secrets Manager - most secure
RDS generates a password for you and manages it throughout its lifecycle using AWS Secrets Manager.

Auto generate password
Amazon RDS can generate a password for you, or you can specify your own password.

Master password: **Info**

Password strength: **Very weak**

Minimum constraints: At least 8 printable ASCII characters. Can't contain any of the following symbols: / \ * @

Confirm master password: **Info**

Instance configuration

DB instance class: **Info**
Hide filters

Show instance classes that support Amazon RDS Optimized Writes **Info**
Amazon RDS Optimized Writes improves write throughput by up to 2x at no additional cost.

Include previous generation classes

Burstable classes (includes t classes)

db.t4g.micro
2 vCPUs - 1 GiB RAM EBS Bandwidth: Up to 2,085 Mbps Network: Up to 5 Gbps

Storage

Storage type: **Info**
Provisioned IOPS SSD (io2) storage volumes are now available.

General Purpose SSD (gp2)
Baseline performance determined by volume size

Allocated storage: **Info**
20 GiB

Allocated storage value must be 20 GiB to 6,144 GiB

Additional storage configuration

Connectivity: **Info**

Compute resource:
Choose whether to set up a connection to a compute resource for this database. Setting up a connection will automatically change connectivity settings so that the compute resource can connect to this database.

Don't connect to an EC2 compute resource
Don't set up a connection to a compute resource for this database. You can manually set up a connection to a compute resource later.

Connect to an EC2 compute resource
Set up a connection to an EC2 compute resource for this database.

Virtual private cloud (VPC): **Info**
Choose the VPC. The VPC defines the virtual networking environment for this DB instance.

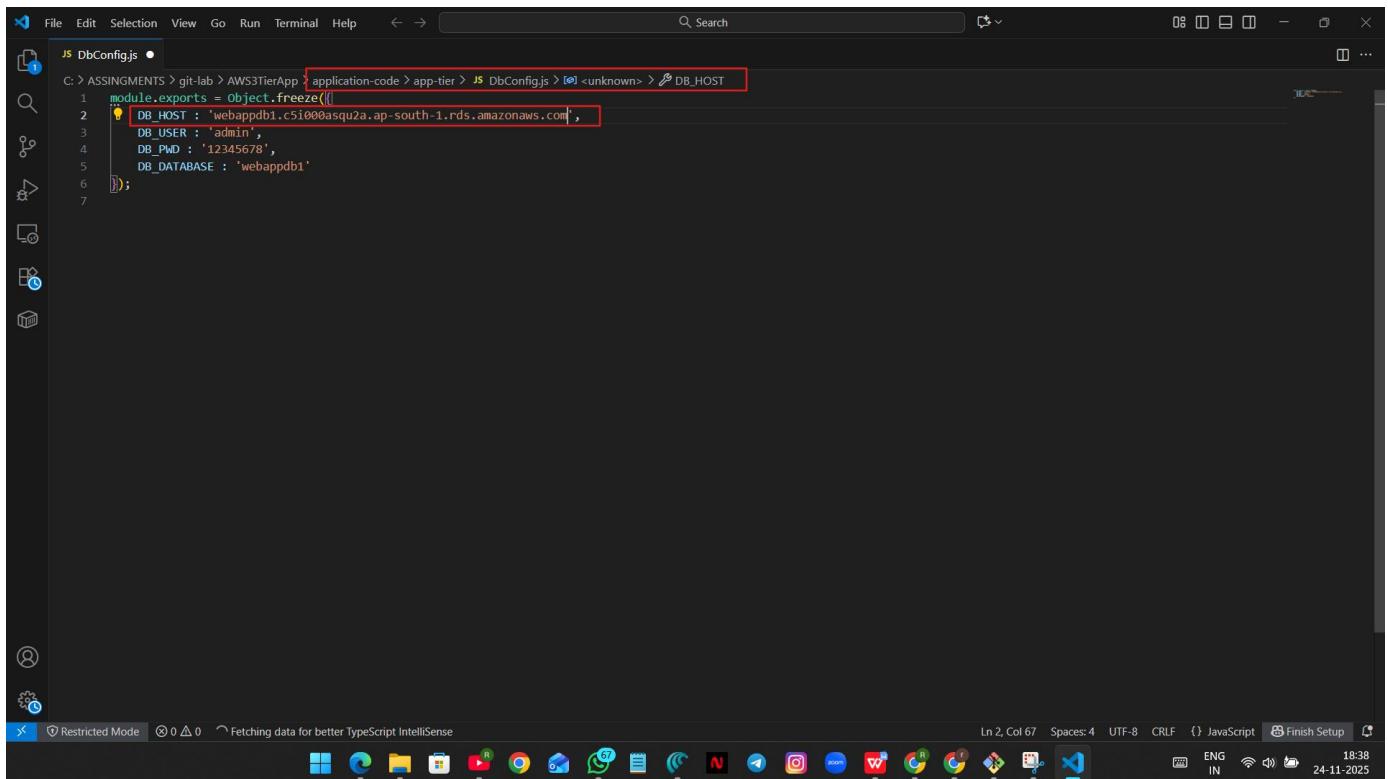
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The screenshot shows the 'Create database' step in the AWS RDS wizard. The 'Connectivity' section is highlighted with a red box. It includes fields for 'Compute resource' (radio buttons for 'Don't connect to an EC2 compute resource' and 'Connect to an EC2 compute resource'), 'Virtual private cloud (VPC)' (radio button for '3-tier-vpc (vpc-0c7dd311bec0e1db)'), 'DB subnet group' (radio button for 'db-subnet'), 'Public access' (radio button for 'No'), 'VPC security group (firewall)' (radio button for 'Choose existing'), 'Existing VPC security groups' (dropdown containing 'database-sg'), 'Availability Zone' (dropdown containing 'ap-south-1a'), and 'RDS Proxy' (checkbox for 'Create an RDS Proxy'). The top right corner shows the account ID and user name.

Copy the Endpoint Address:

The screenshot shows the 'Database Details' page for the 'webappdb' database. A green success message at the top says 'Successfully modified db-subnet. View subnet group'. The main area displays the database summary and connectivity details. The 'Endpoint' field in the 'Connectivity & security' section is highlighted with a red box and contains the value 'webappdb.c5i000asqu2a.ap-south-1.rds.amazonaws.com'. The bottom right corner shows the AWS footer with copyright information and language/region settings.

Go to application-code/app-tier/DbConfig.js:(Locally)



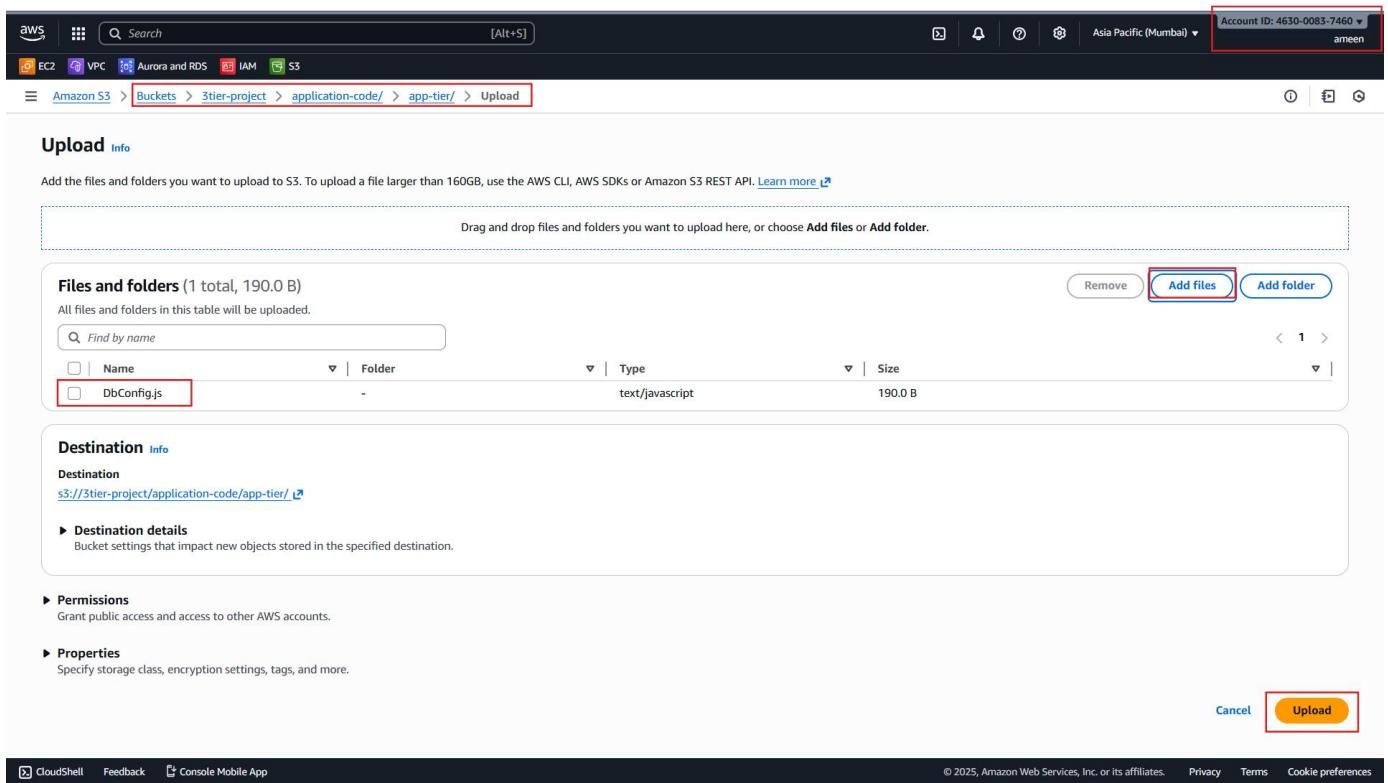
```

JS DbConfig.js
C: > ASSIGNMENTS > git-lab > AWS3TierApp > application-code > app-tier > JS DbConfig.js > [?] <unknown> > DB_HOST
1 module.exports = Object.freeze({
2   DB_HOST : 'webappdb1.c5i000asqu2a.ap-south-1.rds.amazonaws.com',
3   DB_USER : 'admin',
4   DB_PWD : '12345678',
5   DB_DATABASE : 'webappdb1'
6 });
7

```

VS Code status bar: Restricted Mode, 0 ▲ 0, Fetching data for better TypeScript IntelliSense, Line 2, Col 67, Spaces: 4, UTF-8, CRLF, JavaScript, Finish Setup, ENG IN, 18:38, 24-11-2025

Update the above code and upload the Dbconfig.js file in the S3 bucket of 'app-tier' folder:



Upload Info

Add the files and folders you want to upload to S3. To upload a file larger than 160GB, use the AWS CLI, AWS SDKs or Amazon S3 REST API. [Learn more](#)

Drag and drop files and folders you want to upload here, or choose [Add files](#) or [Add folder](#).

Files and folders (1 total, 190.0 B)			
All files and Folders in this table will be uploaded.			
<input type="text"/> Find by name			
Name	Folder	Type	Size
DbConfig.js	-	text/javascript	190.0 B

Destination Info

Destination [s3://3tier-project/application-code/app-tier/](#)

▶ **Destination details**
Bucket settings that impact new objects stored in the specified destination.

▶ **Permissions**
Grant public access and access to other AWS accounts.

▶ **Properties**
Specify storage class, encryption settings, tags, and more.

[Cancel](#) [Upload](#)

4. Application Tier Setup

Create two Instance

1-App-Tier(Private)

The screenshot shows the AWS EC2 Instances page for an instance named "i-0f58cc8faee36a357 (App-tier)". The instance is running and assigned to a VPC and subnet. The VPC ID and Subnet ID are highlighted with red boxes.

Instance summary for i-0f58cc8faee36a357 (App-tier)

- Public IPv4 address:** -
- Instance state:** Running
- Private IP DNS name (IPv4 only):** ip-10-0-11-61.ap-south-1.compute.internal
- Instance type:** t3.small
- VPC ID:** vpc-0c77dd311bec0e1db (3-tier-vpc)
- Subnet ID:** subnet-02f99aaeb5c30399b (private-subnet-1)
- Instance ARN:** arn:aws:ec2:ap-south-1:463000837460:instance/i-0f58cc8faee36a357

Details | Status and alarms | Monitoring | Security | Networking | Storage | Tags

Instance details

- AMI ID:** ami-02b8269d5e85954ef
- AMI name:** ubuntu/images/hvm-ssd-gp3/ubuntu-noble-24.04-amd64-server-20251022
- Stop protection:** Disabled
- Monitoring:** disabled
- Allowed image:** -
- Launch time:** Mon Nov 24 2025 16:48:25 GMT+0530 (India Standard Time) (1 minute)

Platform details

- Termination protection:** Disabled
- AMI location:** amazon/ubuntu/images/hvm-ssd-gp3/ubuntu-noble-24.04-amd64-server-20251022

2-Web-Tier(Public)

The screenshot shows the AWS EC2 Instances page for an instance named "i-0dd472b32d44ace9c (web-tier)". The instance is running and assigned to a VPC and subnet. The VPC ID and Subnet ID are highlighted with red boxes.

Instance summary for i-0dd472b32d44ace9c (web-tier)

- Public IPv4 address:** 15.207.106.50
- Instance state:** Running
- Private IP DNS name (IPv4 only):** ip-10-0-1-107.ap-south-1.compute.internal
- Instance type:** t3.small
- VPC ID:** vpc-0c77dd311bec0e1db (3-tier-vpc)
- Subnet ID:** subnet-05040ecc74d4b67b5 (public-subnet-1)
- Instance ARN:** arn:aws:ec2:ap-south-1:463000837460:instance/i-0dd472b32d44ace9c

Details | Status and alarms | Monitoring | Security | Networking | Storage | Tags

Instance details

- AMI ID:** 15.207.106.50 [Public IP]
- Monitoring:** -

Platform details

Using bastion host (jump server):

App Server Setup and DB Server Configuration:

Install MySQL:

Configure MySQL Database:

```

root@ip-10-0-12-11:/home/ubuntu# mysql -h webappdb1.c5i000asqu2a.ap-south-1.rds.amazonaws.com -u admin -p
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 57
Server version: 8.0.43 Source distribution

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owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> CREATE DATABASE webappdb;
Query OK, 1 row affected (0.07 sec)

mysql> USE webappdb;
Database changed

mysql> CREATE TABLE IF NOT EXISTS transactions (
    -> id INT NOT NULL AUTO_INCREMENT,
    -> amount DECIMAL(10,2),
    -> description VARCHAR(100),
    -> created_at TIMESTAMP DEFAULT CURRENT_TIMESTAMP,
    -> PRIMARY KEY(id),
    -> INDEX idx_created (created_at)
    -> );
Query OK, 0 rows affected (0.07 sec)

mysql> SHOW TABLES;
+----------------+
| Tables_in_webappdb |
+----------------+
| transactions      |
+----------------+
1 row in set (0.00 sec)

mysql> 
```

i-0dd472b32d44ace9c (web-tier)

Public IPs: 15.207.106.50 Private IPs: 10.0.1.107

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Install and Configure Node.js and PM2:

```

root@ip-10-0-12-11:/home/ubuntu# curl -o https://raw.githubusercontent.com/avizwayl/aws_3tier_architecture/main/install.sh | bash
% Total    % Received % Xferd  Average Speed   Time   Time     Current
          Dload  Upload   Total   Spent    Left  Speed
100 14926  100 14926    0     0  53024  0:--:-- --:--:--:--:--:-- 52929
-> Downloading nvm from git to '/root/.nvm'
-> Cloning into '/root/.nvm'...
remote: Enumerating objects: 383, done.
remote: Counting objects: 100% (383/383), done.
remote: Compressing objects: 100% (326/326), done.
remote: Total 383 (delta 43), reused 180 (delta 29), pack-reused 0 (from 0)
Receiving objects: 100% (383/383), 391.80 KiB | 16.33 MiB/s, done.
Resolving deltas: 100% (43/43), done.
* (HEAD detached at FETCH_HEAD)
 * master
-> Compressing and cleaning up git repository

=> Appending nvm source string to /root/.bashrc
=> Appending bash_completion source string to /root/.bashrc
=> Close and reopen your terminal to start using nvm or run the following to use it now:

export NVM_DIR="$HOME/.nvm"
[ -s "$NVM_DIR/nvm.sh" ] && . "$NVM_DIR/nvm.sh" # This loads nvm
[ -s "$NVM_DIR/bash_completion" ] && . "$NVM_DIR/bash_completion" # This loads nvm bash_completion
root@ip-10-0-12-11:/home/ubuntu# source ~/.bashrc
root@ip-10-0-12-11:/home/ubuntu# 
```

i-0dd472b32d44ace9c (web-tier)

Public IPs: 15.207.106.50 Private IPs: 10.0.1.107

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```

aws Search [Alt+S] Account ID: 4630-0083-7460
EC2 VPC Aurora and RDS IAM S3
root@ip-10-0-12-11:/home/ubuntu# npm install -g pm2
Downloading and installing node v16.20.2...
Downloaded https://nodejs.org/dist/v16.20.2/node-v16.20.2-linux-x64.tar.xz...
Computing checksum with sha256sum
Checksums matched!
Now using node v16.20.2 (npm v8.19.4)
Creating default alias: default -> v16 (> v16.20.2)
root@ip-10-0-12-11:/home/ubuntu# npm use 16
Now using node v16.20.2 (npm v8.19.4)
root@ip-10-0-12-11:/home/ubuntu# node --version
v16.20.2
root@ip-10-0-12-11:/home/ubuntu# npm --version
8.19.4
root@ip-10-0-12-11:/home/ubuntu# npm install -g pm2
added 133 packages, and audited 134 packages in 7s

13 packages are looking for funding
  run `npm fund` for details

1 moderate severity vulnerability

To address all issues, run:
  npm audit fix --force

Run `npm audit` for details.
npm notice New major version of npm available! 8.19.4 -> 11.6.3
npm notice Changelog: https://github.com/npm/cli/releases/tag/v11.6.3
npm notice Run npm install -g npm@11.6.3 to update!
npm notice
root@ip-10-0-12-11:/home/ubuntu# ~

```

i-0dd472b32d44ace9c (web-tier)
Public IPs: 15.207.106.50 Private IPs: 10.0.1.107
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Download application code from S3 and start the application:

```

https://ap-south-1.console.aws.amazon.com/ec2-instance-connect/ssh/home?region=ap-south-1&connType=standard&instanceId=i-0dd472b32d44ace9c&osUser=ubuntu&sshPort=22
aws Search [Alt+S] Account ID: 4630-0083-7460
EC2 VPC Aurora and RDS IAM S3
root@ip-10-0-12-11:~# sudo aws s3 cp s3://3tier-project/application-code/app-tier/ app-tier --recursive
download: s3://3tier-project/application-code/app-tier/README.md to app-tier/README.md
download: s3://3tier-project/application-code/app-tier/package.json to app-tier/package.json
download: s3://3tier-project/application-code/app-tier/TransactionService.js to app-tier/TransactionService.js
download: s3://3tier-project/application-code/app-tier/index.js to app-tier/index.js
download: s3://3tier-project/application-code/app-tier/DbConfig.js to app-tier/DbConfig.js
download: s3://3tier-project/application-code/app-tier/package-lock.json to app-tier/package-lock.json
root@ip-10-0-12-11:~# ls
app-tier aws .zip snap
root@ip-10-0-12-11:~# cd app-tier
root@ip-10-0-12-11:~/app-tier# npm install
added 68 packages, and audited 99 packages in 2s

2 packages are looking for funding
  run `npm fund` for details

7 vulnerabilities (3 low, 4 high)

To address all issues, run:
  npm audit fix

Run `npm audit` for details.
root@ip-10-0-12-11:~/app-tier# ls
DbConfig.js README.md TransactionService.js index.js node_modules package-lock.json package.json
root@ip-10-0-12-11:~/app-tier# pm2 start index.js
(PM2) Starting /root/app-tier/index.js in fork_mode (1 instance)
(PM2) Done.

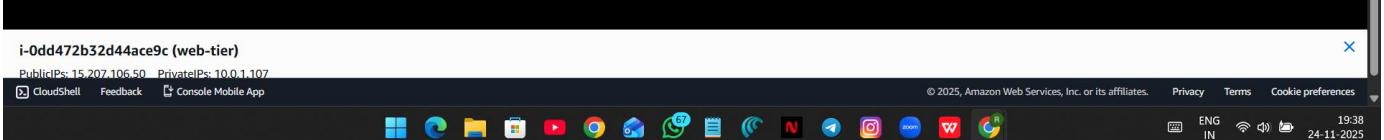
root@ip-10-0-12-11:~/app-tier# pm2 status


| <b>id</b> | <b>name</b> | <b>namespace</b> | <b>version</b> | <b>mode</b> | <b>pid</b> | <b>uptime</b> | <b>o</b> | <b>status</b> | <b>cpu</b> | <b>mem</b> | <b>user</b> | <b>watching</b> |
|-----------|-------------|------------------|----------------|-------------|------------|---------------|----------|---------------|------------|------------|-------------|-----------------|
| <b>0</b>  | index       | default          | 1.0.0          | fork        | 7226       | 0s            | 0        | online        | 0%         | 25.6mb     | root        | disabled        |


root@ip-10-0-12-11:~/app-tier#

```

i-0dd472b32d44ace9c (web-tier)
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Root Log Output:

```
root@ip-10-0-12-11:~/app-tier# pm2 logs
[TAILING] Tailing last 15 lines for [all] processes (change the value with --lines option)
/root/.pm2/logs/index-out.log last 15 lines:
PM2 | 2025-11-24T13:21:17: PM2 log: Node.js version : 16.20.2
PM2 | 2025-11-24T13:21:17: PM2 log: Current arch : x64
PM2 | 2025-11-24T13:21:17: PM2 log: PM2 home : /root/.pm2
PM2 | 2025-11-24T13:21:17: PM2 log: PM2 PID file : /root/.pm2/pm2.pid
PM2 | 2025-11-24T13:21:17: PM2 log: RFC socket file : /root/.pm2/rpc.sock
PM2 | 2025-11-24T13:21:17: PM2 log: BUS socket file : /root/.pm2/pub.sock
PM2 | 2025-11-24T13:21:17: PM2 log: Application log path : /root/.pm2/logs
PM2 | 2025-11-24T13:21:17: PM2 log: Worker Interval : 30000
PM2 | 2025-11-24T13:21:17: PM2 log: Process dump file : /root/.pm2/dump.pm2
PM2 | 2025-11-24T13:21:17: PM2 log: Concurrent actions : 2
PM2 | 2025-11-24T13:21:17: PM2 log: SIGTERM timeout : 1600
PM2 | 2025-11-24T13:21:17: PM2 log: Runtime Binary : /root/.nvm/versions/node/v16.20.2/bin/node
PM2 | 2025-11-24T14:08:45: PM2 log: App [index:0] starting in -fork mode-
PM2 | 2025-11-24T14:08:45: PM2 log: App [index:0] online
/root/.pm2/logs/index-error.log last 15 lines:
/root/.pm2/logs/index-out.log last 15 lines:
0|index | AB3 backend app listening at http://localhost:4000
```

Systemctl Configuration Output:

```
root@ip-10-0-12-11:~/app-tier# pm2 startup
[PM2] Init System found: systemd
Platform systemd
Template
[Unit]
Description=PM2 process manager
Documentation=https://pm2.keymetrics.io/
After=network.target

[Service]
Type=forking
User=root
LimitNOFILE=infinity
LimitNPROC=infinity
LimitCORE=infinity
Environment=PATH=/root/.nvm/versions/node/v16.20.2/bin:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin
Environment=PM2_HOME=/root/.pm2
PIDFile=/root/.pm2/pm2.pid
Restart=on-failure

ExecStart=/root/.nvm/versions/node/v16.20.2/lib/node_modules/pm2/bin/pm2 resurrect
ExecReload=/root/.nvm/versions/node/v16.20.2/lib/node_modules/pm2/bin/pm2 reload all
ExecStop=/root/.nvm/versions/node/v16.20.2/lib/node_modules/pm2/bin/pm2 kill

[Install]
WantedBy=multi-user.target

Target path
/etc/systemd/system/pm2-root.service
Command list
```

Health Check Output:

```
i-0dd472b32d44ace9c (web-tier)
Public IPs: 15.207.106.50 Private IPs: 10.0.1.107
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ENG IN 19:41 24-11-2025

root@ip-10-0-12-11:~/app-tier# pm2 save
[PM2] Saving current process list...
[PM2] Successfully saved in /root/.pm2/dump.pm2
root@ip-10-0-12-11:~/app-tier# curl http://localhost:4000/health
"This is the health check"root@ip-10-0-12-11:~/app-tier#
```

Creation of Internal Load Balancer for App Tier:

Targetgroup:

Create target group

A target group can be made up of one or more targets. Your load balancer routes requests to the targets in a target group and performs health checks on the targets.

Settings - immutable

Choose a target type and the load balancer and listener will route traffic to your target. These settings can't be modified after target group creation. *

Target type

Indicate what resource type you want to target. Only the selected resource type can be registered to this target group.

- Instances

Supports load balancing to instances in a VPC. Integrate with Auto Scaling Groups or ECS services for automatic management.

Suitable for: ALB NLB GWLB
- IP addresses

Supports load balancing to VPC and on-premises resources. Facilitates load routing to IP addresses and network interfaces on the same instance. Supports IPv6 targets.

Suitable for: ALB NLB GWLB
- Lambda function

Supports load balancing to a single Lambda function. ALB required as traffic source.

Suitable for: ALB
- Application Load Balancer

Allows use of static IP addresses and PrivateLink with an Application Load Balancer. NLB required as traffic source.

Suitable for: NLB

Target group name

Name must be unique per Region per AWS account.

app-tier-tg

Accepts: a-z, A-Z, 0-9, and hyphen (-). Can't begin or end with hyphen. 1-32 total characters; Count: 11/32

Protocol

Protocol for communication between the load balancer and targets.

HTTP

Port

Port number where targets receive traffic. Can be overridden for individual targets during registration.

4000

1-65535

IP address type

Only targets with the indicated IP address type can be registered to this target group.

IPv4

Each instance has a default network interface (eth0) that is assigned the primary private IPv4 address. The instance's primary private IPv4 address is the one that will be applied to the target.

IPv6

Each instance you register must have an assigned primary IPv6 address. This is configured on the instance's default network interface (eth0). [Learn more](#)

VPC

Select the VPC with the instances that you want to include in the target group. Only VPCs that support the IP address type selected above are available in this list.

vpc-0c77dd311bec0e1db (3-tier-vpc)

10.0.0.16

Create VPC

Protocol version

HTTP1

Send requests to targets using HTTP/1.1. Supported when the request protocol is HTTP/1.1 or HTTP/2.

HTTP2

Send requests to targets using HTTP/2. Supported when the request protocol is HTTP/2 or gRPC, but gRPC-specific features are not available.

gRPC

Send requests to targets using gRPC. Supported when the request protocol is gRPC.

Health checks

The associated load balancer periodically sends requests, per the settings below, to the registered targets to test their status.

Health check protocol

HTTP

Health check path

/health

Up to 1024 characters allowed.

Parameters

Parameter key: VPC_ID	Value: vpc-0c77d311bec0e1db
-----------------------	-----------------------------

Outputs

Output key: PublicSubnetA	Value: subnet-0b52760c1a22d2b83
Output key: PublicSubnetB	Value: subnet-0b52760c1a22d2b83

Next Step

Internal Load Balancer:

Parameters

Parameter key: VPC_ID	Value: vpc-0c77d311bec0e1db
-----------------------	-----------------------------

Outputs

Output key: PublicSubnetA	Value: subnet-0b52760c1a22d2b83
Output key: PublicSubnetB	Value: subnet-0b52760c1a22d2b83

Next Step

Network mapping [Info](#)

The load balancer routes traffic to targets in the selected subnets, and in accordance with your IP address settings.

VPC [Info](#)

The load balancer will exist and scale within the selected VPC. The selected VPC is also where the load balancer targets must be hosted unless routing to Lambda or on-premises targets, or if using VPC peering. To confirm the VPC for your targets, view [target groups](#).

vpc-0c77dd311bec0e1db (3-tier-vpc) [Create VPC](#)

IP pools [Info](#)

You can optionally choose to configure an IPAM pool as the preferred source for your load balancers IP addresses. Create or view [Pools](#) in the [Amazon VPC IP Address Manager console](#).

Use IPAM pool for public IPv4 addresses

Compatible with Internet-facing scheme, IPv4 and Dualstack IP address types.

Availability Zones and subnets [Info](#)

Select at least two Availability Zones and a subnet for each zone. A load balancer node will be placed in each selected zone and will automatically scale in response to traffic. The load balancer routes traffic to targets in the selected Availability Zones only.

ap-south-1a (aps1-az1)

Subnet

Only CIDR blocks corresponding to the load balancer IP address type are used. At least 8 available IP addresses are required for your load balancer to scale efficiently.

subnet-02f99eaeb5c30399b
IPv4 subnet CIDR: 10.0.11.0/24

ap-south-1b (aps1-az3)

Subnet

Only CIDR blocks corresponding to the load balancer IP address type are used. At least 8 available IP addresses are required for your load balancer to scale efficiently.

subnet-0b527601a22a2b83
IPv4 subnet CIDR: 10.0.12.0/24

Security groups [Info](#)

A security group is a set of firewall rules that control the traffic to your load balancer. Select an existing security group, or you can [create a new security group](#).

Security groups

Select up to 5 security groups

internal-alb-sg
sg-079bb5c12551032fb VPC vpc-0c77dd311bec0e1db

CloudShell [Feedback](#) [Console Mobile App](#)

Listeners and routing [Info](#)

A listener is a process that checks for connection requests using the port and protocol you configure. The rules that you define for a listener determine how the load balancer routes requests to its registered targets.

Listener HTTP:80 [Remove](#)

Protocol	Port
HTTP	80 1-65535

Default action [Info](#)

The default action is used if no other rules apply. Choose the default action for traffic on this listener.

Routing action

Forward to target group Redirect to URL Return fixed response

Forward to target group [Info](#)

Choose a target group and specify routing weight or [create target group](#).

Target group	Weight	Percent
app-tier-tg Target type: Instance, IPv4 Target stickiness: Off	HTTP	1 0-999

Add target group

You can add up to 4 more target groups.

Target group stickiness [Info](#)

Enables the load balancer to bind a user's session to a specific target group. To use stickiness the client must support cookies. If you want to bind a user's session to a specific target, turn on the Target Group attribute Stickiness.

Turn on target group stickiness

Listener tags - optional

Consider adding tags to your listener. Tags enable you to categorize your AWS resources so you can more easily manage them.

Add listener tag

You can add up to 50 more tags.

Add listener

You can add up to 49 more listeners.

Review
Review the load balancer configurations and make changes if needed. After you finish reviewing the configurations, choose **Create load balancer**.

Summary
Review and confirm your configurations. [Estimate cost](#)

Basic configuration Edit Name: internal-alb Scheme: Internal IP address type: IPv4	Network mapping Edit VPC: vpc-0c77dd311bec0e1db Availability Zones and subnets: <ul style="list-style-type: none">• ap-south-1a<ul style="list-style-type: none">subnet-02f99aea85c30399bprivate-subnet-1• ap-south-1b<ul style="list-style-type: none">subnet-0b52760c1a22d2b83private-subnet-2	Security groups Edit internal-alb-sg sg-079bb5c12551032fb	Listeners and routing Edit HTTP:80 Forward to 1 target group...
Service integrations Edit AWS WAF: - AWS Global Accelerator: -	Tags Edit -		
Attributes Certain default attributes will be applied to your load balancer. You can view and edit them after creating the load balancer.			

Creation workflow and status

Server-side tasks and status
After completing and submitting the above steps, all server-side tasks and their statuses become available for monitoring.

[Cancel](#) **Create load balancer**

Copy DNS name:

EC2 Successfully created load balancer: app-internal-lb
It might take a few minutes for your load balancer to fully set up and route traffic. Targets will also take a few minutes to complete the registration process and pass initial health checks.

Introducing token validation of JWTs for ALB
Authenticate machine-to-machine and service-to-service communications by validating JSON Web Tokens (JWTs) directly at the load balancer level. [Learn more](#)

app-internal-lb

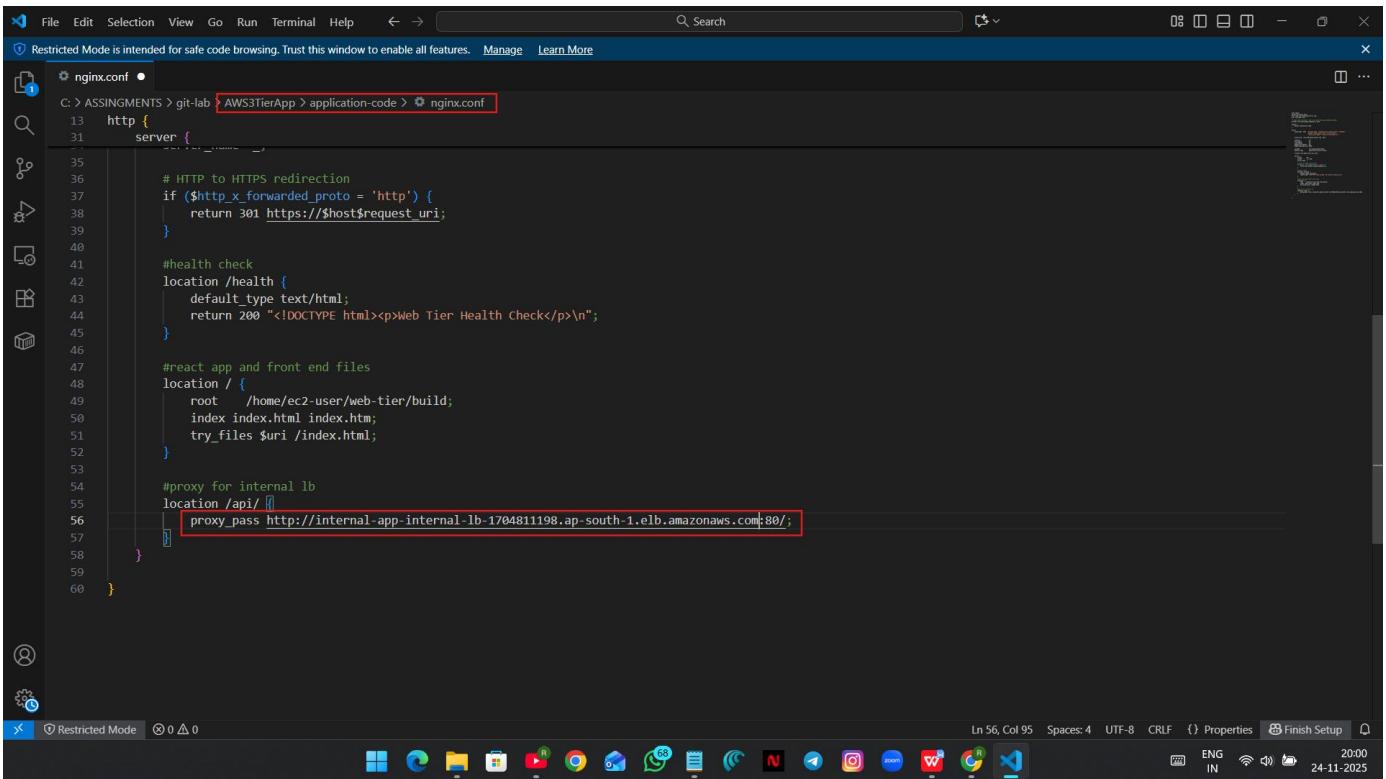
Details

Load balancer type Application	Status Provisioning	VPC vpc-0c77dd311bec0e1db	Load balancer IP address type IPv4
Scheme Internal	Hosted zone ZP9TAFLXTNZK	Availability Zones subnet-02f99aea85c30399b ap-south-1a (aps1-az1) subnet-0b52760c1a22d2b83 ap-south-1b (aps1-az3)	Date created November 24, 2025, 19:59 (UTC+05:30)
Load balancer ARN arn:aws:elasticloadbalancing:ap-south-1:463000837460:loadbalancer/app/app-internal-lb/0b4070b169c286ea	DNS name info internal-app-internal-lb-1704811198.ap-south-1.elb.amazonaws.com (A Record)		

Listeners and rules (1) [Info](#)
A listener checks for connection requests on its configured protocol and port. Traffic received by the listener is routed according to the default action and any additional rules.

Protocol:Port	Default action	Rules	ARN	Security policy	Default SSL/TLS certificate	mTLS	Trust store
HTTP:80	Forward to target group app-tier-tg : 1 (100%) Target group stickiness: Off	1 rule	ARN	Not applicable	Not applicable	Not applicable	Not applicable

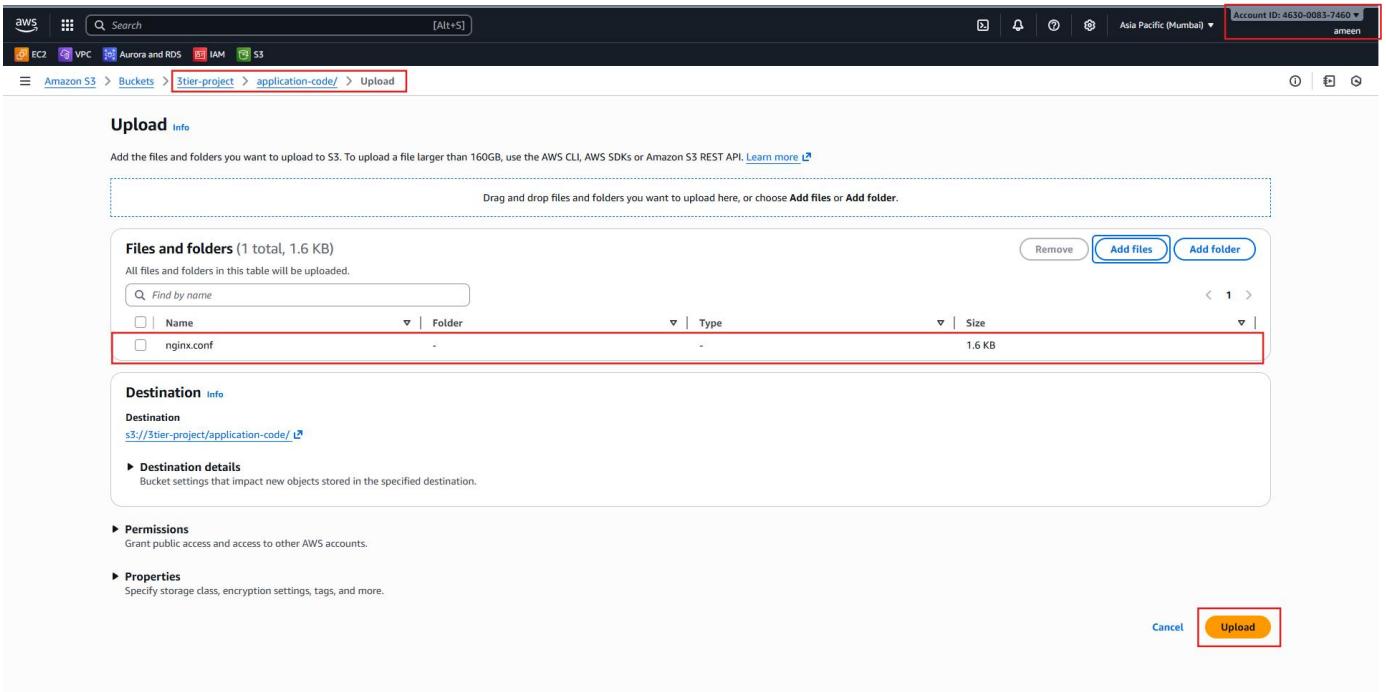
Go to application-code/nginx.conf:(Locally)



```

13 http {
31   server {
35
36     # HTTP to HTTPS redirection
37     if ($http_x_forwarded_proto = 'http') {
38       return 301 https://$host$request_uri;
39     }
40
41     #health check
42     location /health {
43       default_type text/html;
44       return 200 "<!DOCTYPE html><p>Web Tier Health Check</p>n";
45     }
46
47     #react app and front end files
48     location / {
49       root    /home/ec2-user/web-tier/build;
50       index index.html index.htm;
51       try_files $uri /index.html;
52     }
53
54     #proxy for internal lb
55     location /api/ {
56       proxy_pass http://internal-app-internal-lb-1704811198.ap-south-1.elb.amazonaws.com:80/;
57     }
58   }
59 }
60 }
```

Upload the updated nginx.conf file to the S3 bucket:



Upload Info

Add the files and folders you want to upload to S3. To upload a file larger than 160GB, use the AWS CLI, AWS SDKs or Amazon S3 REST API. [Learn more](#)

Drag and drop files and folders you want to upload here, or choose **Add files** or **Add folder**.

Files and folders (1 total, 1.6 KB)			
All files and folders in this table will be uploaded.			
<input type="checkbox"/> Name	Folder	Type	Size
<input type="checkbox"/> nginx.conf	-	-	1.6 KB

Destination Info

Destination
[s3://3tier-project/application-code/](#)

Destination details
Bucket settings that impact new objects stored in the specified destination.

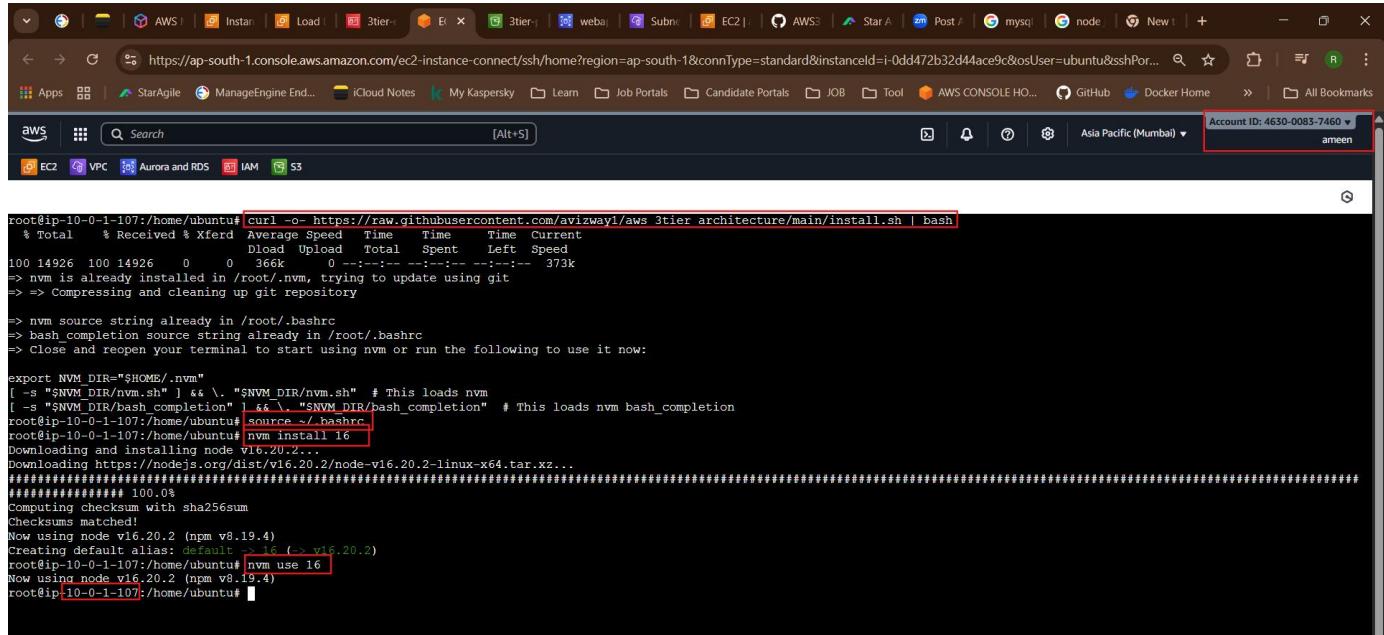
Permissions
Grant public access and access to other AWS accounts.

Properties
Specify storage class, encryption settings, tags, and more.

Upload

5. Web Tier Setup

Creation of Web tier resources including External Load Balancer:



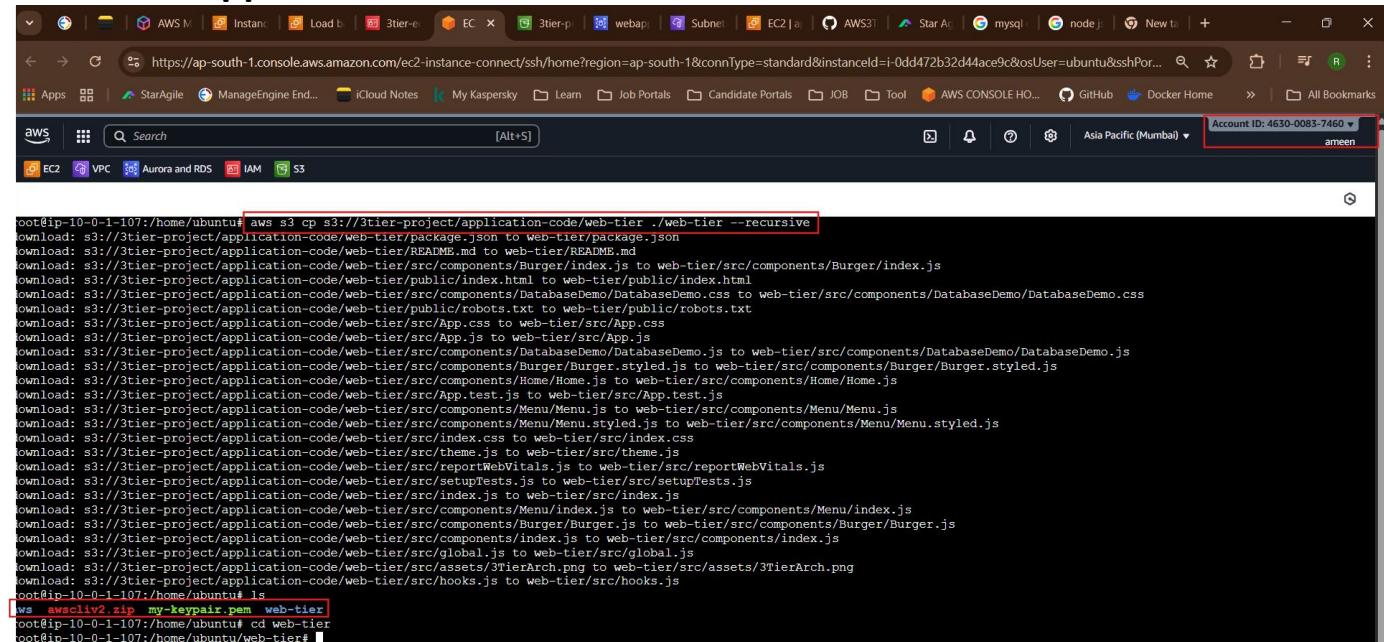
```
root@ip-10-0-1-107:/home/ubuntu# curl -o https://raw.githubusercontent.com/avizwayl/aws_3tier_architecture/main/install.sh | bash
  % Total    % Received % Xferd  Average Speed   Time     Time      Current
          Dload  Upload   Total Spent  Left Speed
100 14926  100 14926    0      0  366k    0:00:00 --:--:-- 373k
-> nvm is already installed in /root/.nvm, trying to update using git
-> => Compressing and cleaning up git repository

-> nvm source string already in /root/.bashrc
-> bash_completion source string already in /root/.bashrc
-> Close and reopen your terminal to start using nvm or run the following to use it now:

export NVM_DIR="$HOME/.nvm"
[ -s "$NVM_DIR/nvm.sh" ] && . "$NVM_DIR/nvm.sh" # This loads nvm
[ -s "$NVM_DIR/bash_completion" ] && . "$NVM_DIR/bash_completion" # This loads nvm bash_completion
root@ip-10-0-1-107:/home/ubuntu# source ~/.bashrc
root@ip-10-0-1-107:/home/ubuntu# nvm install 16
Downloading and installing node v16.20.2...
Downloading https://nodejs.org/dist/v16.20.2/node-v16.20.2-linux-x64.tar.xz...
#####
100.0%
computing checksum with sha256sum
checksums matched!
Now using node v16.20.2 (npm v8.19.4)
Creating default alias: default -> 16 (> v16.20.2)
root@ip-10-0-1-107:/home/ubuntu# nvm use 16
Now using node v16.20.2 (npm v8.19.4)
root@ip-10-0-1-107:/home/ubuntu#
```

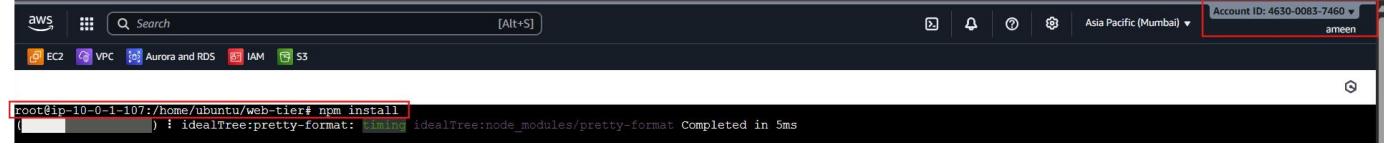
i-0dd472b32d44ace9c (web-tier)
PublicIPs: 15.207.106.50 PrivateIPs: 10.0.1.107
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Download application code from S3



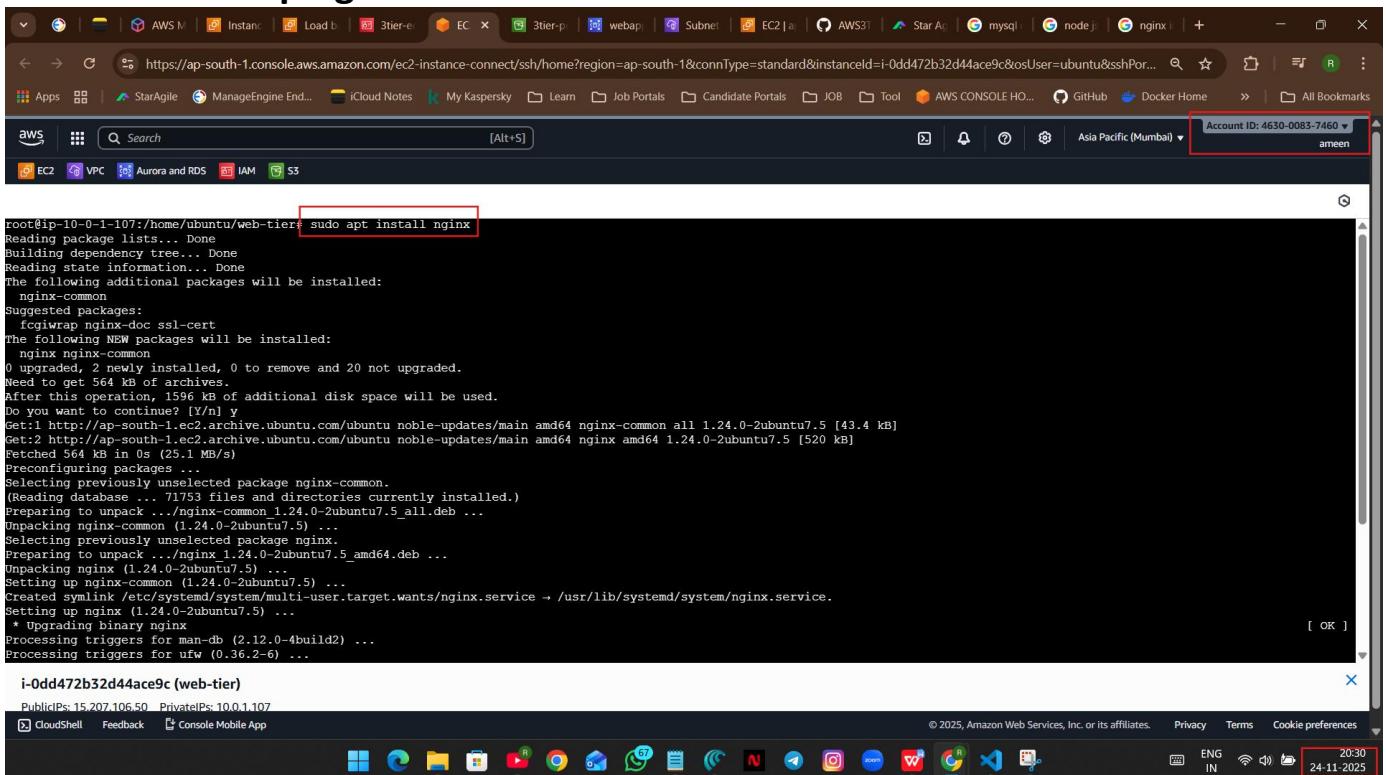
```
root@ip-10-0-1-107:/home/ubuntu# aws s3 cp s3://3tier-project/application-code/web-tier ./web-tier --recursive
download: s3://3tier-project/application-code/web-tier/package.json to web-tier/package.json
download: s3://3tier-project/README.md to web-tier/README.md
download: s3://3tier-project/application-code/web-tier/src/components/Burger/index.js to web-tier/src/components/Burger/index.js
download: s3://3tier-project/application-code/web-tier/src/public/index.html to web-tier/public/index.html
download: s3://3tier-project/application-code/web-tier/src/components/DatabaseDemo/DatabaseDemo.css to web-tier/src/components/DatabaseDemo/DatabaseDemo.css
download: s3://3tier-project/application-code/web-tier/public/robots.txt to web-tier/public/robots.txt
download: s3://3tier-project/application-code/web-tier/src/App.css to web-tier/src/App.css
download: s3://3tier-project/application-code/web-tier/src/App.js to web-tier/src/App.js
download: s3://3tier-project/application-code/web-tier/src/components/DatabaseDemo/DatabaseDemo.js to web-tier/src/components/DatabaseDemo/DatabaseDemo.js
download: s3://3tier-project/application-code/web-tier/src/components/Burger/Burger.styled.js to web-tier/src/components/Burger/Burger.styled.js
download: s3://3tier-project/application-code/web-tier/src/components/Home/Home.js to web-tier/src/components/Home/Home.js
download: s3://3tier-project/application-code/web-tier/src/App.test.js to web-tier/src/App.test.js
download: s3://3tier-project/application-code/web-tier/src/components/Menu/Menu.js to web-tier/src/components/Menu/Menu.js
download: s3://3tier-project/application-code/web-tier/src/components/Menu/Menu.styled.js to web-tier/src/components/Menu/Menu.styled.js
download: s3://3tier-project/application-code/web-tier/src/index.css to web-tier/src/index.css
download: s3://3tier-project/application-code/web-tier/src/theme.js to web-tier/src/theme.js
download: s3://3tier-project/application-code/web-tier/src/reportWebVitals.js to web-tier/src/reportWebVitals.js
download: s3://3tier-project/application-code/web-tier/src/setupTests.js to web-tier/src/setupTests.js
download: s3://3tier-project/application-code/web-tier/src/index.js to web-tier/src/index.js
download: s3://3tier-project/application-code/web-tier/src/components/Menu/index.js to web-tier/src/components/Menu/index.js
download: s3://3tier-project/application-code/web-tier/src/components/Burger/Burger.js to web-tier/src/components/Burger/Burger.js
download: s3://3tier-project/application-code/web-tier/src/components/index.js to web-tier/src/components/index.js
download: s3://3tier-project/application-code/web-tier/src/global.js to web-tier/src/global.js
download: s3://3tier-project/application-code/web-tier/src/assets/3TierArch.png to web-tier/src/assets/3TierArch.png
download: s3://3tier-project/application-code/web-tier/src/hooks.js to web-tier/src/hooks.js
root@ip-10-0-1-107:/home/ubuntu# ls
aws awscli2.zip my-keypair.pem web-tier
root@ip-10-0-1-107:/home/ubuntu# cd web-tier
root@ip-10-0-1-107:/home/ubuntu/web-tier#
```

i-0dd472b32d44ace9c (web-tier)
PublicIPs: 15.207.106.50 PrivateIPs: 10.0.1.107
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```
root@ip-10-0-1-107:/home/ubuntu/web-tier# npm install
( [ ] ) : idealTree:pretty-format: timing idealTree:node_modules/pretty-format Completed in 5ms
```

Install and Setup nginx:



```
root@ip-10-0-1-107:/home/ubuntu/web-tier# sudo apt install nginx
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  nginx-common
Suggested packages:
  fcgiwrap nginx-doc ssl-cert
The following NEW packages will be installed:
  nginx nginx-common
0 upgraded, 2 newly installed, 0 to remove and 20 not upgraded.
Need to get 564 kB of archives.
After this operation, 1596 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 nginx-common all 1.24.0-2ubuntu7.5 [43.4 kB]
Get:2 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 nginx amd64 1.24.0-2ubuntu7.5 [520 kB]
Fetched 564 kB in 0s (25.1 MB/s)
Preconfiguring packages ...
Selecting previously unselected package nginx-common.
(Reading database ... 71753 files and directories currently installed.)
Preparing to unpack .../nginx-common 1.24.0-2ubuntu7.5_all.deb ...
Unpacking nginx-common (1.24.0-2ubuntu7.5) ...
Selecting previously unselected package nginx.
Preparing to unpack .../nginx 1.24.0-2ubuntu7.5_amd64.deb ...
Unpacking nginx (1.24.0-2ubuntu7.5) ...
Setting up nginx-common (1.24.0-2ubuntu7.5) ...
Created symlink /etc/systemd/system/multi-user.target.wants/nginx.service → /usr/lib/systemd/system/nginx.service.
Setting up nginx (1.24.0-2ubuntu7.5) ...
 * Upgrading binary nginx
Processing triggers for man-db (2.12.0-4build2) ...
Processing triggers for ufw (0.36.2-6) ...

i-0dd472b32d44ace9c (web-tier)
```

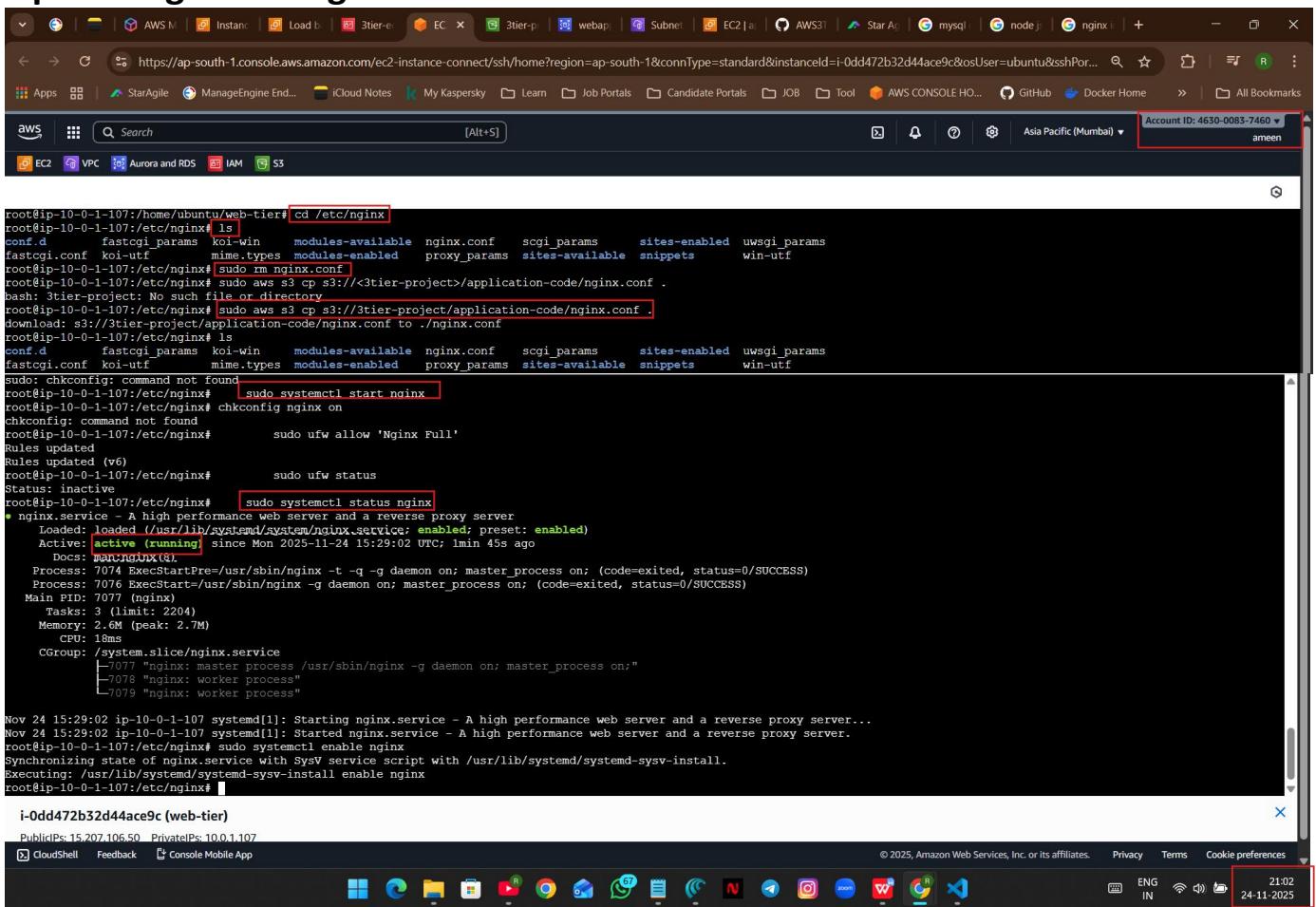
PublicIPs: 15.207.106.50 PrivateIPs: 10.0.1.107

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ENG IN 20:30 24-11-2025

Update Nginx configuration:



```
root@ip-10-0-1-107:/home/ubuntu/web-tier# cd /etc/nginx
root@ip-10-0-1-107:/etc/nginx# ls
conf.d  fastcgi_params  koi-win  modules-available  nginx.conf  scgi_params  sites-enabled  uwsgi_params
fastcgi.conf  koi-utf  mime.types  modules-enabled  proxy_params  sites-available  snippets  win-utf
root@ip-10-0-1-107:/etc/nginx# sudo rm nginx.conf
root@ip-10-0-1-107:/etc/nginx# sudo cp s3://3tier-project/application-code/nginx.conf .
bash: 3tier-project: No such file or directory
root@ip-10-0-1-107:/etc/nginx# sudo aws s3 cp s3://3tier-project/application-code/nginx.conf .
download: s3://3tier-project/application-code/nginx.conf to ./nginx.conf
root@ip-10-0-1-107:/etc/nginx# ls
conf.d  fastcgi_params  koi-win  modules-available  nginx.conf  scgi_params  sites-enabled  uwsgi_params
fastcgi.conf  koi-utf  mime.types  modules-enabled  proxy_params  sites-available  snippets  win-utf
root@ip-10-0-1-107:/etc/nginx# sudo systemctl start nginx
root@ip-10-0-1-107:/etc/nginx# sudo systemctl status nginx
● nginx.service - A high performance web server and a reverse proxy server
   Loaded: loaded (/usr/lib/systemd/system/nginx.service; enabled; preset: enabled)
   Active: active (running) since Mon 2025-11-24 15:29:02 UTC; 1min 45s ago
     Docs: man:nginx(7)
   Tasks: 2 (limit: 2204)
     Memory: 2.6M (peak: 2.7M)
        CPU: 18ms
      CGroup: /system.slice/nginx.service
              ├─7077 "nginx: master process /usr/sbin/nginx -g daemon on; master_process on;"
              ├─7078 "nginx: worker process"
              └─7079 "nginx: worker process"

Nov 24 15:29:02 ip-10-0-1-107 systemd[1]: Starting nginx.service - A high performance web server and a reverse proxy server...
Nov 24 15:29:02 ip-10-0-1-107 systemd[1]: Started nginx.service - A high performance web server and a reverse proxy server.
root@ip-10-0-1-107:/etc/nginx# sudo systemctl enable nginx
Synchronizing state of nginx.service with SysV service script with /usr/lib/systemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable nginx
root@ip-10-0-1-107:/etc/nginx#
```

i-0dd472b32d44ace9c (web-tier)

PublicIPs: 15.207.106.50 PrivateIPs: 10.0.1.107

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'AWS 3-TIER APP BY MOHAMMED RISHAD TP'

AWS PROJECT

AWS THREE TIER ARCHITECTURE

VPC Amazon EC2 AWS RDS

KASTRO KIRAN V

AURORA DATABASE DEMO PAGE

X

HOME

DB DEMO

ID	AMOUNT	DESC
ADD	<input type="text"/>	<input type="text"/>
1	400	groceries
2	500	Fish

DEL

21:17 24-11-2025

ENG IN

21:18 24-11-2025

Creation of External Load Balancer for Web Tier:

Targetgroup:

Settings - immutable

Choose a target type and the load balancer and listener will route traffic to your target. These settings can't be modified after target group creation.

Target type

Indicate what resource type you want to target. Only the selected resource type can be registered to this target group.

- Instances

Supports load balancing to instances in a VPC. Integrate with Auto Scaling Groups or ECS services for automatic management.

Suitable for: ALB NLB GWLB
- IP addresses

Supports load balancing to VPC and on-premises resources. Facilitates routing to IP addresses and network interfaces on the same instance. Supports IPv6 targets.

Suitable for: ALB NLB GWLB
- Lambda function

Supports load balancing to a single Lambda function. ALB required as traffic source.

Suitable for: ALB
- Application Load Balancer

Allows use of static IP addresses and PrivateLink with an Application Load Balancer. NLB required as traffic source.

Suitable for: NLB

Target group name

Name must be unique per Region per AWS account.

Accepts: a-z, A-Z, 0-9, and hyphen (-). Can't begin or end with hyphen. 1-32 total characters; Count: 11/32

Protocol

Protocol for communication between the load balancer and targets.

Port

Port number where targets receive traffic. Can be overridden for individual targets during registration.

1-65535

IP address type

Only targets with the indicated IP address type can be registered to this target group.

- IPv4

Each instance has a default network interface (eth0) that is assigned the primary private IPv4 address. The instance's primary private IPv4 address is the one that will be applied to the target.
- IPv6

Each instance you register must have an assigned primary IPv6 address. This is configured on the instance's default network interface (eth0). [Learn more](#)

VPC

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aws Search [Alt+S]

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Account ID: 4630-0083-7460 ameen

EC2 Target groups Create target group

Register targets Step 3 Review and create

Available instances (2)

Filter instances

Instance ID	Name	State	Security groups	Zone	Private IPv4
i-0dd472b32d44ace9c	web-tier	Running	web-tier-sg	ap-south-1a	10.0.1.107
i-057c97018051f06aa	App-tier	Running	app-tier-sg	ap-south-1b	10.0.12.11

0 selected

Ports for the selected instances

Ports for routing traffic to the selected instances.

1-65535 (separate multiple ports with commas)

Include as pending below

1 selection is now pending below. Include more or register targets when ready.

Review targets

Targets (1)

Filter targets

Show only pending

Instance ID	Name	Port	State	Security groups	Zone	Private IPv4 address	Subnet ID	Launch time
i-0dd472b32d44ace9c	web-tier	80	Running	web-tier-sg	ap-south-1a	10.0.1.107	subnet-05040ecc74d4b67b5	November 24, 2022

External Load Balancer:

aws  Search [Alt+S]     Asia Pacific (Mumbai) ▾ Account ID: 4630-0083-7460 ameen

EC2 VPC Aurora and RDS IAM S3

EC2 > Load balancers > Create Application Load Balancer

Create Application Load Balancer Info

The Application Load Balancer distributes incoming HTTP and HTTPS traffic across multiple targets such as Amazon EC2 instances, microservices, and containers, based on request attributes. When the load balancer receives a connection request, it evaluates the listener rules in priority order to determine which rule to apply, and if applicable, it selects a target from the target group for the rule action.

▶ How Application Load Balancers work

Basic configuration

Load balancer name
Name must be unique within your AWS account and can't be changed after the load balancer is created.
 A maximum of 32 alphanumeric characters including hyphens are allowed, but the name must not begin or end with a hyphen.

Scheme | **Info**
Scheme can't be changed after the load balancer is created.

Internet-facing

- Serves internet-facing traffic.
- Has public IP addresses.
- DNS name resolves to public IPs.
- Requires a public subnet.

Internal

- Serves internal traffic.
- Has private IP addresses.
- DNS name resolves to private IPs.
- Compatible with the IPv4 and Dualstack IP address types.

Load balancer IP address type | **Info**
Select the front-end IP address type to assign to the load balancer. The VPC and subnets mapped to this load balancer must include the selected IP address types. Public IPv4 addresses have an additional cost.

IPv4
Includes only IPv4 addresses.

Dualstack
Includes IPv4 and IPv6 addresses.

Dualstack without public IPv4
Includes a public IPv6 address, and private IPv4 and IPv6 addresses. Compatible with **internet-facing** load balancers only.

Network mapping Info

The load balancer routes traffic to targets in the selected subnets, and in accordance with your IP address settings.

VPC | **Info**

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The screenshot shows the AWS CloudFormation console interface. The top navigation bar includes the AWS logo, a search bar, and account information (Account ID: 4630-0083-7460, Region: Asia Pacific (Mumbai)). Below the navigation bar, the main menu shows EC2 selected, followed by VPC, Aurora and RDS, IAM, and S3. The breadcrumb trail indicates the user is in the EC2 > Load balancers section, specifically creating an Application Load Balancer.

Network mapping [Info](#)

The load balancer routes traffic to targets in the selected subnets, and in accordance with your IP address settings.

VPC | [Info](#)

The load balancer will exist and scale within the selected VPC. The selected VPC is also where the load balancer targets must be hosted unless routing to Lambda or on-premises targets, or if using VPC peering. To confirm the VPC for your targets, view [target groups](#).

vpc-0c77dd511bec0e1db (3-tier-vpc)
10.0.0.0/16

Create VPC [Create](#)

IP pools | [Info](#)

You can optionally choose to configure an IPAM pool as the preferred source for your load balancers IP addresses. Create or view [Pools](#) in the [Amazon VPC IP Address Manager console](#).

Use IPAM pool for public IPv4 addresses

The IPAM pool you choose will be the preferred source of public IPv4 addresses. If the pool is depleted IPv4 addresses will be assigned by AWS.

Availability Zones and subnets | [Info](#)

Select at least two Availability Zones and a subnet for each zone. A load balancer node will be placed in each selected zone and will automatically scale in response to traffic. The load balancer routes traffic to targets in the selected Availability Zones only.

ap-south-1a (aps1-az1)

Subnet

Only CIDR blocks corresponding to the load balancer IP address type are used. At least 8 available IP addresses are required for your load balancer to scale efficiently.

subnet-05040ecc74d4b67b5
IPv4 subnet CIDR: 10.0.1.0/24

ap-south-1b (aps1-az2)

Subnet

Only CIDR blocks corresponding to the load balancer IP address type are used. At least 8 available IP addresses are required for your load balancer to scale efficiently.

subnet-0d4ee2c3d9ee7fdb4
IPv4 subnet CIDR: 10.0.2.0/24

Warning: The selected subnet does not have a route to an internet gateway. This means that your load balancer will not receive internet traffic. You can proceed with this selection; however, for internet traffic to reach your load balancer, you must update the subnet's route table in the [VPC console](#).

Security groups [Info](#)

The screenshot shows the AWS CloudFormation console with the following details:

- Stack Name:** MyFirstStack
- Region:** Asia Pacific (Mumbai)
- Stack Status:** CREATE_IN_PROGRESS
- Outputs:**
 - MyFirstStackBucket: arn:aws:s3:::myfirststackbucket
 - MyFirstStackBucketArn: arn:aws:s3:::myfirststackbucket
 - MyFirstStackBucketName: myfirststackbucket
 - MyFirstStackBucketRegion: ap-south-1
 - MyFirstStackBucketWebsiteUrl: https://myfirststackbucket.ap-south-1.amazonaws.com/
 - MyFirstStackBucketWebsiteIndexDocument: index.html
 - MyFirstStackBucketWebsiteRedirectAllTraffic: true
 - MyFirstStackBucketVersioningEnabled: false
 - MyFirstStackBucketCors: null
 - MyFirstStackBucketLifecycle: null
 - MyFirstStackBucketPolicy: null
 - MyFirstStackBucketReplication: null
 - MyFirstStackBucketStorageClass: Standard
 - MyFirstStackBucketWebsite: null
- Resources:**
 - MyFirstStackBucket:** An AWS S3 Bucket resource.
- Dependences:** None
- Outputs:** None

6.SSL Certification and Domain Mapping

Register a domain:

The screenshot shows the AWS Route 53 service page with the following details:

- Section:** Network & Content Delivery
- Title:** Amazon Route 53
- Description:** A reliable way to route users to internet applications
- Text:** Amazon Route 53 is a highly available and scalable cloud Domain Name System (DNS) web service.
- Call-to-action:** Get started with Route 53
- Links:**
 - View pricing
 - Documentation
 - API reference
 - FAQs
 - Forum - DNS and health checks
 - Forum - Domain name registration
- Diagram:** How it works diagram showing a connection from a device to the internet through Amazon Route 53.

Screenshot of the AWS Management Console Route 53 - Get started page.

The page shows a "Get started" section with a "Choose your starting point" heading. There are six options:

- Register a domain**: Selected. Description: Register the name, such as example.com, that your users use to access your application. Icon: A shield with "53" and a computer monitor.
- Transfer domain**: Description: You can transfer domain names to Route 53 that you registered with another domain registrar. Icon: Two shields with "53" connected by dashed lines to a third shield.
- Create hosted zones**: Description: A hosted zone tells Route 53 how to respond to DNS queries for a domain such as example.com. Icon: Three shields with "53" connected to a central cloud icon.
- Configure health checks**: Description: Health checks monitor your applications and web resources, and direct DNS queries to healthy resources. Icon: A heart rate monitor and a shield with "53".
- Configure traffic flow**: Description: A visual tool that lets you easily create policies for multiple endpoints in complex configurations. Icon: A shield with "53" connected to multiple small circles.
- Configure resolvers**: Description: A regional service that lets you route DNS queries between your VPCs and your network. Icon: A VPC endpoint icon, a shield with "53", and a cloud icon.

Buttons at the bottom right: "Cancel" and "Get started" (highlighted with a red box).

Screenshot of the AWS Management Console Route 53 Global - Registered domains - Register domains page.

The page shows a "Register domains" section with a "Search for domain" input field containing "rishadameen.click" (highlighted with a red box) and a "Search" button. Below it is a "Standard pricing" section and a "Search result" table.

Domain	Price/year	Actions
rishadameen.click <small>Exact match</small>	3.00 USD Renews at 3.00 USD	Select

A "Selected domains (0/5)" sidebar shows a "Proceed to checkout" button.

A "Suggested available domains (8)" section lists:

Domain	Price/year	Actions
rishadameen.com	15.00 USD	Select
rishadameen.net	17.00 USD	Select
rishadameen.org	15.00 USD	Select

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Screenshot of the AWS Management Console showing the Route 53 domain registration process.

The browser address bar shows: https://us-east-1.console.aws.amazon.com/route53/domains/home?region=us-east-1#/RegisterDomain

The AWS navigation bar includes: Apps, StarAgile, ManageEngine End..., iCloud Notes, My Kaspersky, Learn, Job Portals, Candidate Portals, JOB, Tool, AWS CONSOLE HOME, GitHub, Docker Home, All Bookmarks.

The top right corner shows Account ID: 4630-0083-7460 and a user name ameen.

The main content area shows the "Pricing" step of the registration process. It displays the domain name rishadameen.click, a duration of 1 year (3.00 USD), and an "Auto-renew" option set to "Off". A note states: "Auto-renew is turned off for this domain and the registration will expire after the selected registration period." Below this, the subtotal is listed as 3.00 USD.

At the bottom right of the pricing screen are "Cancel" and "Next" buttons.

The timestamp in the top right corner of the browser window is 15:05 on 25-11-2025.

The second screenshot shows the "Contact information" step of the registration process. It asks for registrant contact details, including first name, last name, email, and phone number. It also asks for address information, including address 1 (Ranadhan) and address 2 (optional). The timestamp in the top right corner is 15:06 on 25-11-2025.

The third screenshot shows the same "Contact information" step, with the same fields filled out. The timestamp in the top right corner is 15:06 on 25-11-2025.

The screenshot shows the AWS Route 53 Requests page. On the left, a sidebar navigation menu includes options like Dashboard, Hosted zones, Health checks, Profiles, IP-based routing, Traffic flow, Domains, Resolver, and DNS Firewall. The main content area displays a table titled "Requests". The table has columns for Operation ID, Domain name, Message, Status, Type, and Submitted. A single row is shown, with the Domain name "rishadameen.click" and Status "Successful" highlighted with red boxes. The "Submitted" timestamp is November 25, 2025, 15:07 (UTC+05:30). The top right corner of the browser window shows the account ID "4630-0083-7460" and the user "ameen". The bottom right corner shows the date "25-11-2025" and time "15:19".

Setup Hosted Zones and Records:

The screenshot shows the AWS Route 53 Hosted zones page. The sidebar navigation menu is identical to the previous screenshot. The main content area displays a table titled "Hosted zones (1)". The table has columns for Hosted zone name, Type, Created by, Record count, Description, and Hosted zone ID. One entry is listed: "rishadameen.click" (Type: Public, Created by: Route 53, Record count: 2, Description: HostedZone created by Route53..., Hosted zone ID: Z0756626CW58FRGKJ1). The "Create hosted zone" button is visible at the top right of the table. The top right corner of the browser window shows the account ID "4630-0083-7460" and the user "ameen". The bottom right corner shows the date "25-11-2025" and time "15:20".

Screenshot of the AWS Management Console showing the Route 53 service. The left sidebar shows navigation options like IP-based routing, Traffic flow, Domains, Resolver, and DNS Firewall. The main content area displays the 'Hosted zone details' for 'rishadameen.click'. It shows two records: 'rishadameen.click' (NS, Simple, TTL 172800) and 'rishadameen.click' (SOA, Simple, TTL 900). A red box highlights the 'Account ID: 4630-0083-7460 ameen' in the top right corner.

Records (2)

Record name	Type	Routing	Alias	Value/Route traffic to	TTL (s...)
rishadameen.click	NS	Simple	-	ns-89.awsdns-11.com. ns-1547.awsdns-01.co.uk. ns-1206.awsdns-22.org. ns-807.awsdns-36.net.	172800
rishadameen.click	SOA	Simple	-	ns-89.awsdns-11.com. awsdns...	900

Create record

Quick create record

Record name: 3tier.rishadameen.click

Record type: A – Routes traffic to an IPv4 address and some AWS resources

Route traffic to: Alias to Application and Classic Load Balancer, Asia Pacific (Mumbai)

Routing policy: Simple routing

Was this content helpful? Yes, No

Create records

Record for rishadameen.click was successfully created.

Route 53 propagates your changes to all of the Route 53 authoritative DNS servers within 60 seconds. Use "View status" button to check propagation status.

Hosted zones

Records (3)

Type	Name	Value	TTL	Health	Evaluate	Record ID
NS	rishadameen.click	ns-89.awsdns-11.com, ns-1547.awsdns-01.co.uk, ns-1206.awsdns-22.org, ns-807.awsdns-36.net	172800	-	-	-
SOA	rishadameen.click	rs-89.awsdns-11.com.awsdns-01.co.uk.awsdns-22.org.awsdns-36.net	900	-	-	-
A	3tier.rishadameen.click	dualstack.web-external-lb...	-	-	Yes	-

Generate an SSL certificate:

Certificate type

ACM certificates can be used to establish secure communications access across the internet or within an internal network. Choose the type of certificate for ACM to provide.

Request a public certificate
Request a public SSL/TLS certificate from Amazon. By default, public certificates are trusted by browsers and operating systems.

Request a private certificate
No private CAs available for issuance.

Requesting a private certificate requires the creation of a private certificate authority (CA). To create a private CA, visit [AWS Private Certificate Authority](#).

Next

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AWS Certificate Manager (ACM)

Certificate status

Identifier: 0e1f7cda-bf41-447e-b753-d5f51b10ac88

ARN: arn:aws:acm:ap-south-1:463000837460:certificate/0e1f7cda-bf41-447e-b753-d5f51b10ac88

Type: Amazon Issued

Domains (1)

Domain	Status	Renewal status	Type	CNAME name
rishadameen.click	Success	-	CNAME	_be26aa47e1b7bd20e47e7c4f898d1d60.rishadameen.click

Create records in Route 53 | **Export to CSV**

Details

In use: Yes | Serial number: 0e1f7cda-bf41-447e-b753-d5f51b10ac88 | Requested at: November 24, 2025 | Renewal eligibility: November 24, 2026

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Add Listener in Web-Load Balancer:

Load balancers > web-external-lb

Listeners and rules (1)

A listener checks for connection requests on its configured protocol and port. Traffic received by the listener is routed according to the default action and any additional rules.

Protocol:Port	Default action	Rules	ARN	Security policy	Default SSL/TLS certificate	mTLS
HTTP:80	Forward to target group web-tier-tg (100%) Target group stickiness: Off	1 rule	ARN	Not applicable	Not applicable	Not applicable

Listeners and rules (1)

Add listener

Filter listeners

Protocol:Port: HTTP:80 | Default action: Forward to target group web-tier-tg (100%) | Target group stickiness: Off

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Screenshot of the AWS CloudFront console showing the creation of a new distribution.

Account ID: 4630-0083-7460
Region: Asia Pacific (Mumbai)
User: ameen

Add listener Info

Add a listener to your Application Load Balancer (ALB) to define how client requests and network traffic are routed within your application. Every listener is made up of a default action that's required and can only be edited. Additional rules can be added, edited and deleted from the listener.

Load balancer details: web-external-lb

Listener: HTTPS:443

A listener checks for connection requests using the protocol and port that you configure. The default action and any additional rules that you create determine how the Application Load Balancer routes requests to its registered targets.

Protocol Used for connections from clients to the load balancer

Port The port on which the load balancer is listening for connections

Protocol: HTTPS **Port:** 443 **Port range:** 1-65535

Default action Info

The default action is used if no other rules apply. Choose the default action for traffic on this listener.

Pre-routing action Info

- No pre-routing action
- Authenticate user User auth with OIDC or Amazon Cognito
- Validate token Validate client-presented JSON Web Token (JWT)

Routing action

- Forward to target groups
- Redirect to URL
- Return fixed response

Forward to target group Info

Choose a target group and specify routing weight or [create target group](#).

Target group	Protocol	Weight	Percent
web-tier-tg	HTTP	1	100%

Target group stickiness Info

Enables the load balancer to bind a user's session to a specific target group. To use stickiness the client must support cookies. If you want to bind a user's session to a specific target, turn on the Target Group attribute Stickiness.

Turn on target group stickiness

Secure listener settings Info

Security policy Info

Your load balancer uses a Secure Socket Layer (SSL) negotiation configuration called a security policy to manage SSL connections with clients. [Compare security policies](#)

Security category

Policy name: New [ELBSecurityPolicy-TLS13-1-2-Res-PQ-2025-09 \(Recommended\)](#)

Default SSL/TLS server certificate

The certificate used if a client connects without SNI protocol, or if there are no matching certificates. You can source this certificate from AWS Certificate Manager (ACM), Amazon Identity and Access Management (IAM), or import a certificate. This certificate will automatically be added to your listener certificate list.

Certificate source

- From ACM
- From IAM
- Import certificate

Certificate (from ACM)

The selected certificate will be applied as the default SSL/TLS server certificate for this load balancer's secure listeners.

rishadameen.click
0e1f7cda-bf41-447e-b753-d5f51b10ac88

[Request new ACM certificate](#)

Client certificate handling Info

Certificates are used to make authenticated requests to remote servers. [Learn more](#)

Mutual authentication (mTLS)

Mutual TLS (Transport Layer Security) authentication offers two-way peer authentication. It adds a layer of security over TLS and allows your services to verify the client that's making the connection.

Listener tags - optional

Tags can help you manage, identify, organize, search for and filter resources.

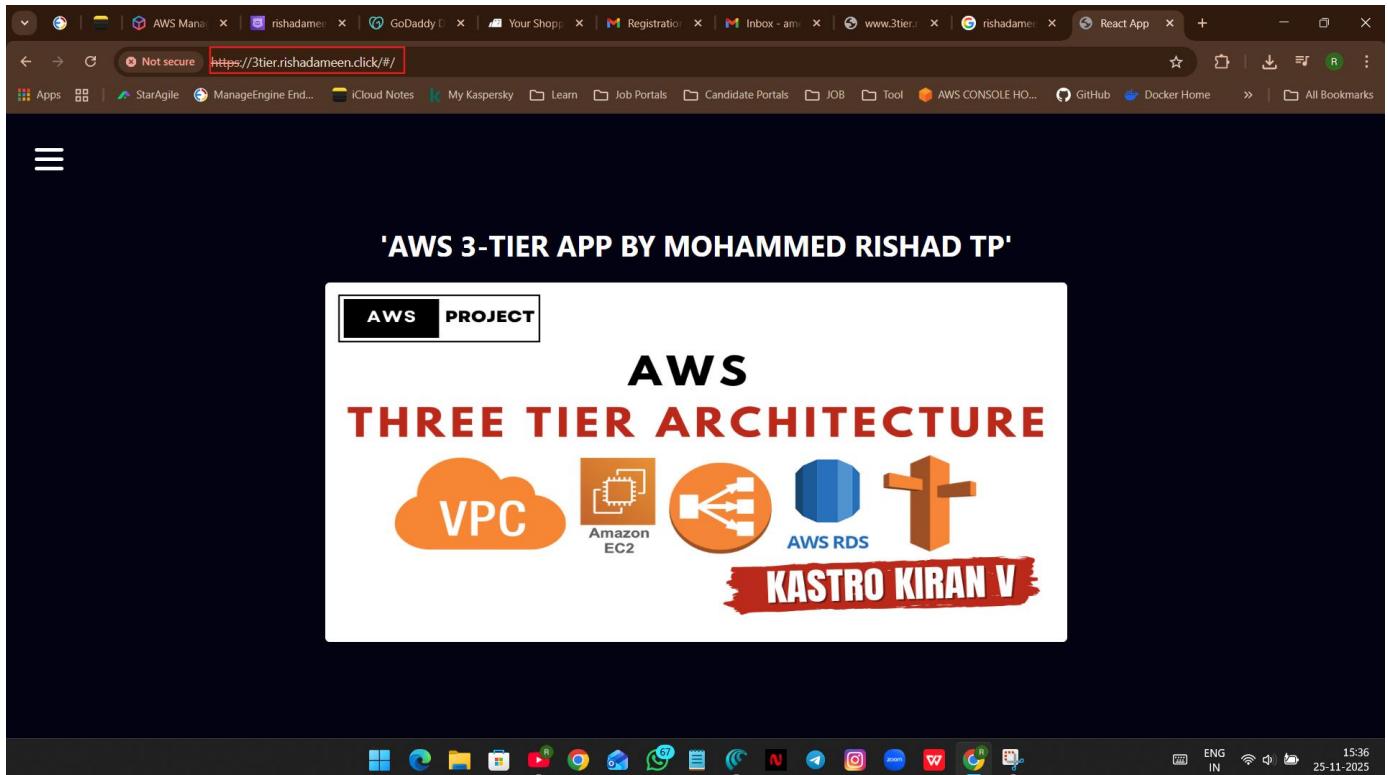
Server-side tasks and status

After completing and submitting the above steps, all server-side tasks and their statuses become available for monitoring.

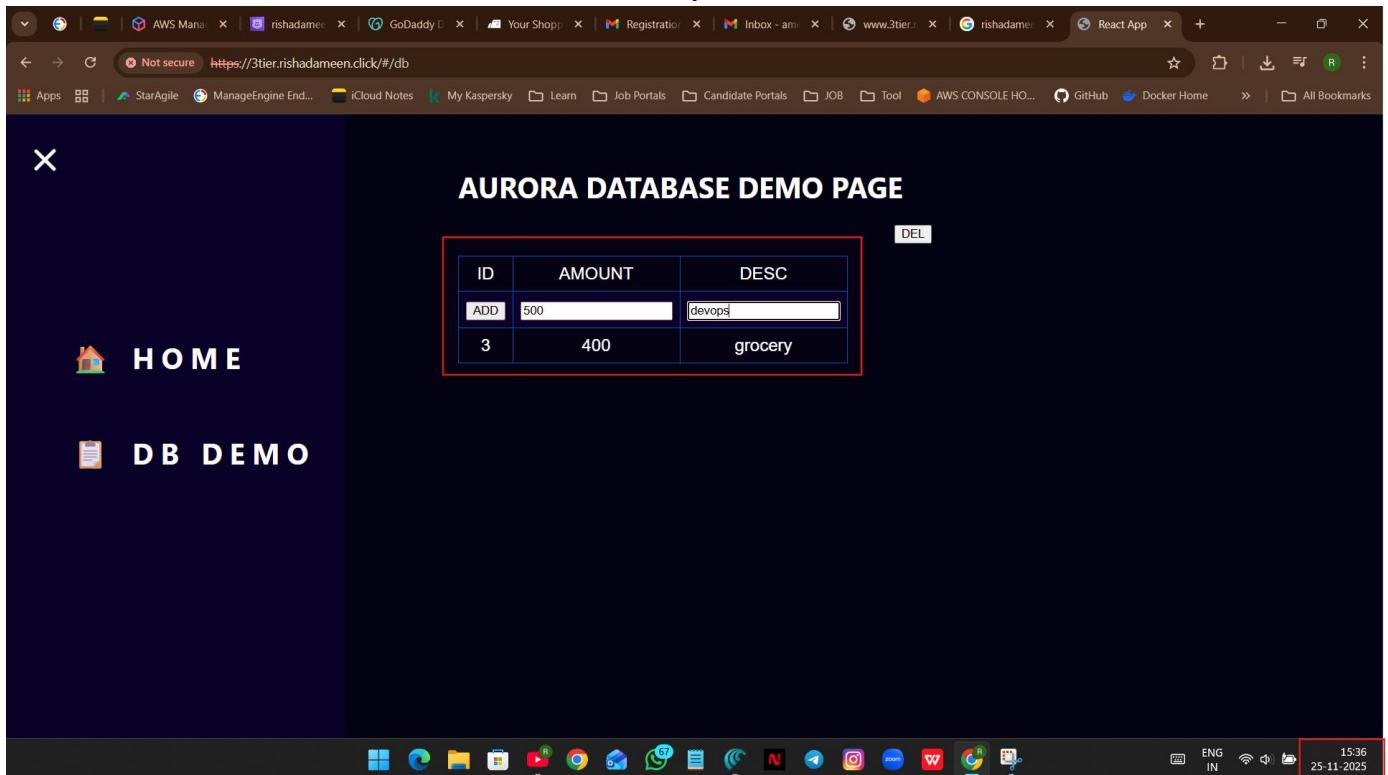
Add listener Adds the listener to the load balancer

7. Test the Application:

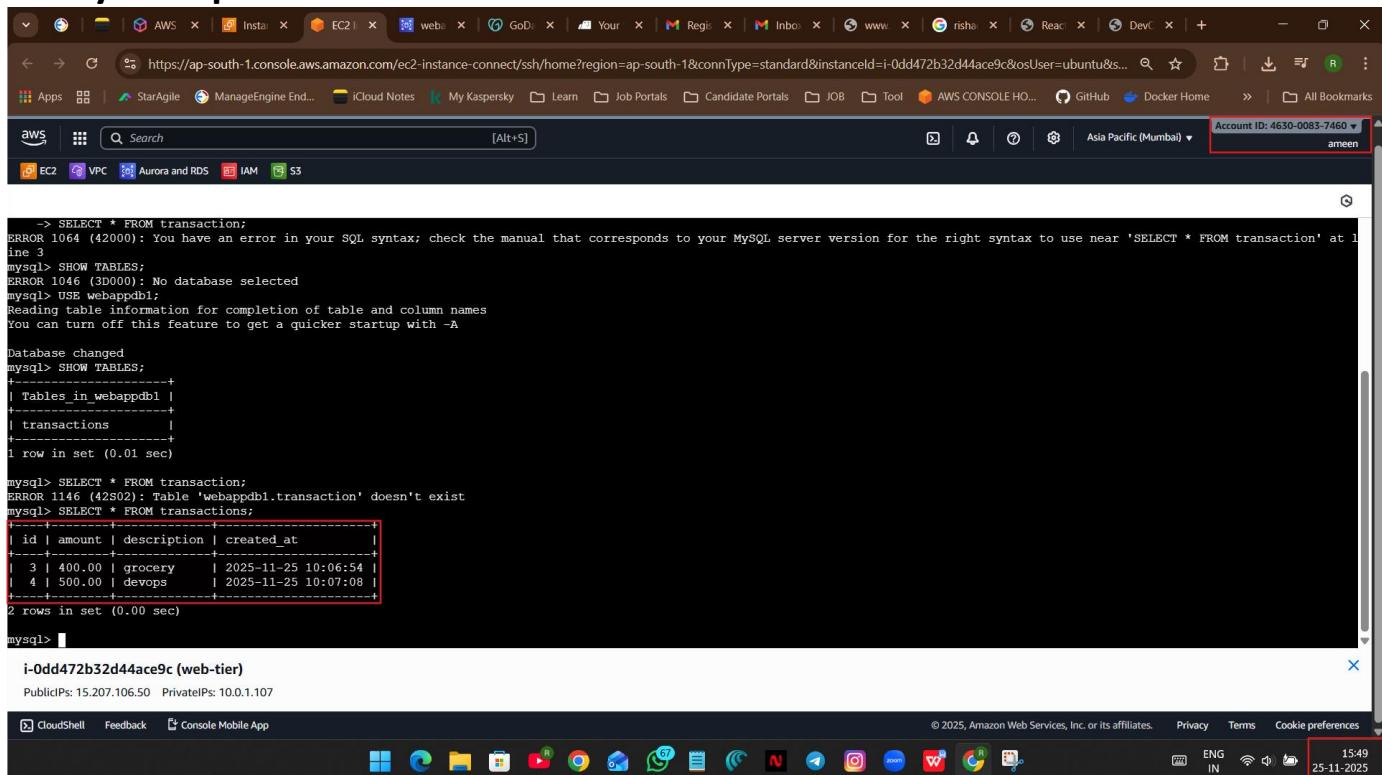
Users access the website via the Route 53 domain:



Data entered in the form is sent to EC2, which stores it in RDS:



Verify data persistence in the RDS database:



The screenshot shows a CloudShell terminal window with the following MySQL session:

```

-> SELECT * FROM transaction;
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near 'SELECT * FROM transaction' at line 3
mysql> SHOW TABLES;
ERROR 1046 (3D000): No database selected
mysql> USE webappdb1;
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A
Database changed
mysql> SHOW TABLES;
+-----+
| Tables_in_webappdb1 |
+-----+
| transactions |
+-----+
1 row in set (0.01 sec)

mysql> SELECT * FROM transaction;
ERROR 1146 (42S01): Table 'webappdb1.transaction' doesn't exist
mysql> SELECT * FROM transactions;
+----+----+----+----+
| id | amount | description | created_at   |
+----+----+----+----+
| 3  | 400.00 | grocery    | 2025-11-25 10:06:54 |
| 4  | 500.00 | devops     | 2025-11-25 10:07:08 |
+----+----+----+----+
2 rows in set (0.00 sec)

mysql> 
```

At the bottom of the terminal, it shows the instance ID: i-0dd472b32d44ace9c (web-tier), Public IPs: 15.207.106.50, Private IPs: 10.0.1.107.

The system tray at the bottom right shows the date and time: 25-11-2025 and 15:49.

Project Conclusion:

This manual 3-tier AWS deployment successfully hosts a secure web app with S3 frontend, EC2 backend, and private RDS database, enabling user data submission via custom Route 53 domain. VPC isolation, security groups, and IAM roles ensure best-practice security without DevOps tools.