



THREE-TIER ARCHITECTURE

PRESENTED BY DHAVANISHA JEGANNATHAN



INTRODUCTION

3-tier architecture is a widely used software design pattern that organizes applications into separate layers or tiers, each responsible for a specific functionality. This approach enhances modularity, scalability, and maintainability, making it ideal for modern web and enterprise applications. By leveraging AWS cloud services, this architecture becomes even more robust and scalable, allowing seamless integration of tools and technologies.

Definition

3-tier architecture separates an application into layers

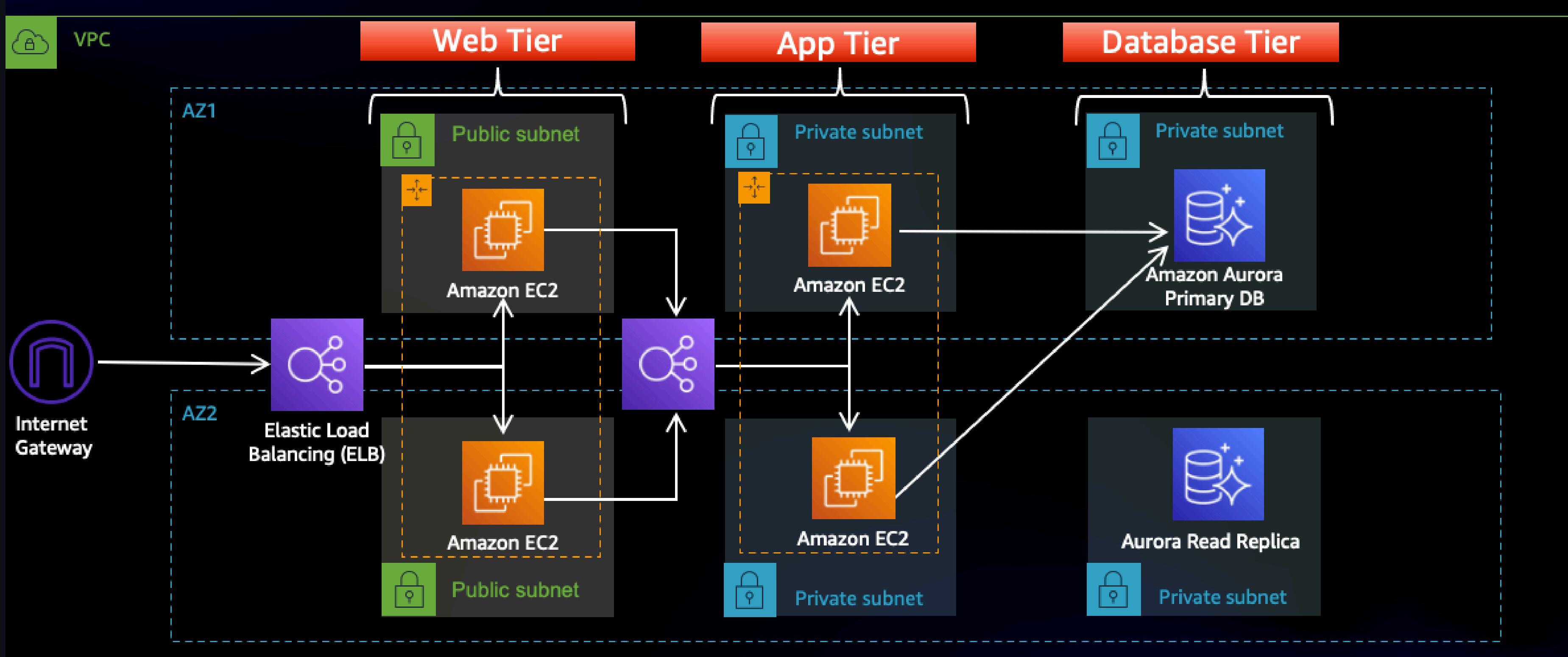
- **Presentation Tier:** The user interface (UI) or front-end of the application.
- **Logic/Application Tier:** Handles business logic, application rules, and processing.
- **Data Tier:** Manages data storage and retrieval, typically involving databases.



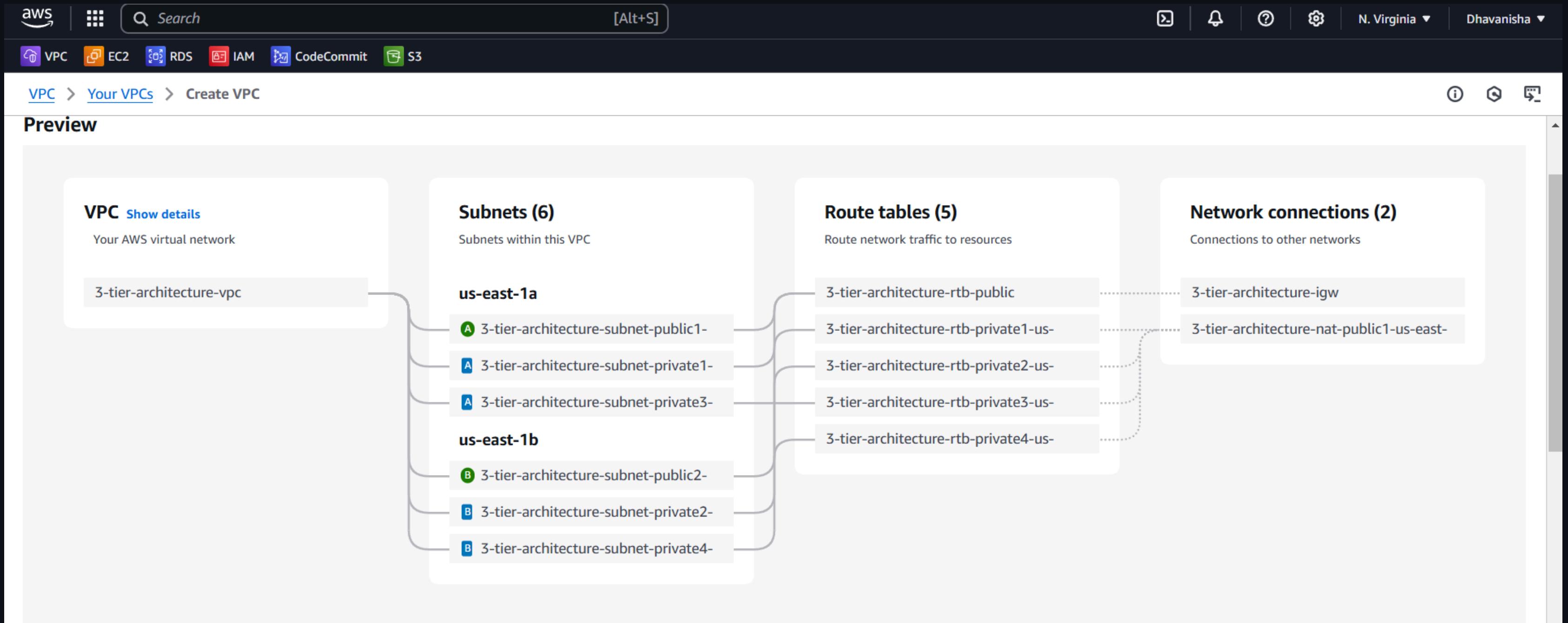
TOOLS USED IN THE PROJECT

- **VPC (Virtual Private Cloud):** Provides isolated networking for secure communication between tiers.
- **EC2 (Elastic Compute Cloud):** Hosts the application logic and ensures scalability.
- **S3 (Simple Storage Service):** Stores static files and media securely.
- **RDS (Relational Database Service):** Manages relational databases for data persistence.
- **IAM (Identity and Access Management):** Ensures secure access and permissions for resources.
- **Load Balancer:** Distributes incoming traffic across multiple EC2 instances for fault tolerance.
- **Route 53:** Manages DNS for efficient traffic routing.
- **AWS Certificate Manager:** Provides SSL certificates for secure communication.
- **Auto Scaling:** Automatically adjusts resources to handle traffic surges.
- **CloudWatch:** Monitors application performance and resource usage.

ARCHITECTURE OF THREE-TIER



3-tier architecture VPC setup in AWS with public and private subnets across two availability zones, route tables, an internet gateway, and a NAT gateway for secure and scalable infrastructure.





Search

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X | 🔔 | ? | ⚙ | N. Virginia | Dhavanisha

VPC EC2 RDS IAM CodeCommit S3



VPC dashboard

EC2 Global View

Filter by VPC

Virtual private cloud

Your VPCs

Subnets

Route tables

Internet gateways

Egress-only internet
gateways

Carrier gateways

DHCP option sets

Elastic IPs

Managed prefix lists

NAT gateways

Peering connections

Security

Network ACLs

Security groups

PrivateLink and Lattice

Getting started Updated

Endpoints Updated

Your VPCs (1) Info

Last updated
1 minute ago



Actions

Create VPC

< 1 >



<input type="checkbox"/>	Name	VPC ID	State	Block Public...	IPv4 CIDR	IPv6 CIDR
<input type="checkbox"/>	3-tier-architecture-vpc	vpc-028733503722f6eca	Available	Off	10.0.0.0/16	-

Select a VPC above





VPC dashboard

EC2 Global View

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Carrier gateways

DHCP option sets

Elastic IPs

Managed prefix lists

NAT gateways

Peering connections

Security

Network ACLs

Security groups

PrivateLink and Lattice

Getting started [Updated](#)Endpoints [Updated](#)

Route tables (6) [Info](#)

Last updated
less than a minute ago

Actions ▾

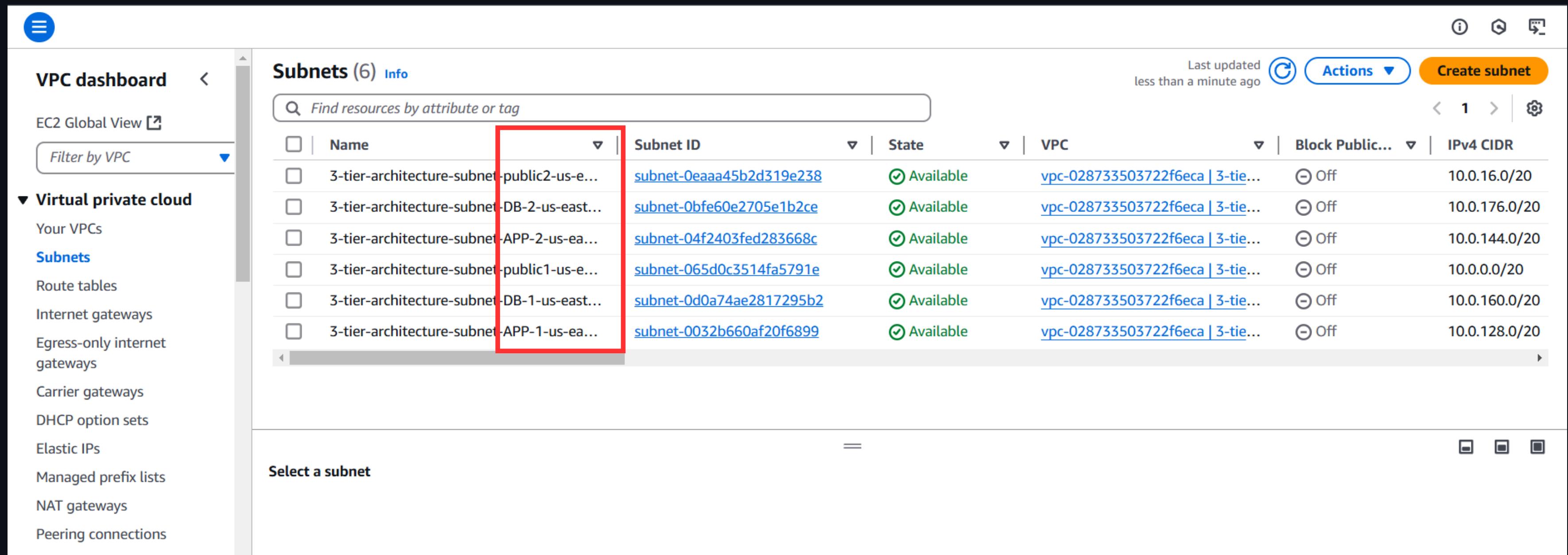
Create route table

<input type="checkbox"/>	Name	Route table ID	Explicit subnet associ...	Edge associations	Main	VPC
<input type="checkbox"/>	3-tier-architecture-rtb-private2-us-east...	rtb-064435f03c2dcac13	subnet-04f2403fed2836...	-	No	vpc-028733503722f6eca 3-tier
<input type="checkbox"/>	3-tier-architecture-rtb-private3-us-east...	rtb-0f367360a3f6a4ad2	subnet-0d0a74ae281729...	-	No	vpc-028733503722f6eca 3-tier
<input type="checkbox"/>	-	rtb-0a63e27af004305d	-	-	Yes	vpc-028733503722f6eca 3-tier
<input type="checkbox"/>	3-tier-architecture-rtb-private1-us-east...	rtb-0bf545b9ee2bf171a	subnet-0032b660af20f6...	-	No	vpc-028733503722f6eca 3-tier
<input type="checkbox"/>	3-tier-architecture-rtb-public	rtb-0a74927c553f8238d	2 subnets	-	No	vpc-028733503722f6eca 3-tier
<input type="checkbox"/>	3-tier-architecture-rtb-private4-us-east...	rtb-0660edf2272aa05a0	subnet-0bfe60e2705e1b...	-	No	vpc-028733503722f6eca 3-tier

Select a route table



I modified private1,2 to APP-1 AND APP-2 for the application tier, private3,4 to DB1,2 for the database tier, and public for the web tier.



The screenshot shows the AWS VPC Subnets dashboard. On the left, there's a sidebar with 'Virtual private cloud' selected, listing 'Your VPCs', 'Subnets', 'Route tables', 'Internet gateways', 'Egress-only internet gateways', 'Carrier gateways', 'DHCP option sets', 'Elastic IPs', 'Managed prefix lists', 'NAT gateways', and 'Peering connections'. The main area is titled 'Subnets (6)' and shows a table with the following data:

Name	Subnet ID	State	VPC	Block Public...	IPv4 CIDR
3-tier-architecture-subnet-public2-us-east-1	subnet-0eaaa45b2d319e238	Available	vpc-028733503722f6eca 3-tier...	Off	10.0.16.0/20
3-tier-architecture-subnet-DB-2-us-east-1	subnet-0bfe60e2705e1b2ce	Available	vpc-028733503722f6eca 3-tier...	Off	10.0.176.0/20
3-tier-architecture-subnet-APP-2-us-east-1	subnet-04f2403fed283668c	Available	vpc-028733503722f6eca 3-tier...	Off	10.0.144.0/20
3-tier-architecture-subnet-public1-us-east-1	subnet-065d0c3514fa5791e	Available	vpc-028733503722f6eca 3-tier...	Off	10.0.0.0/20
3-tier-architecture-subnet-DB-1-us-east-1	subnet-0d0a74ae2817295b2	Available	vpc-028733503722f6eca 3-tier...	Off	10.0.160.0/20
3-tier-architecture-subnet-APP-1-us-east-1	subnet-0032b660af20f6899	Available	vpc-028733503722f6eca 3-tier...	Off	10.0.128.0/20

A red box highlights the first two rows of the table, corresponding to the modified subnet names mentioned in the text above.

I transferred my files from git[<https://github.com/DHAVANISHAJ/aws-three-tier-web-architecture.git>]to s3 bucket. The files contain javascript, CSS, HTML, and shell.

The screenshot shows a GitHub repository page for 'aws-three-tier-web-architecture'. The repository is public and has 1 branch and 0 tags. The main file listed is 'README.md' updated by DHAVANISHAJ 8 hours ago. The repository has 29 commits. The repository details show 0 stars, 1 watching, and 0 forks. There are sections for Releases (No releases published), Packages (No packages published), and Languages (JavaScript 48.7%, Shell 42.5%, CSS 4.4%, HTML 4.4%). The README file content includes a section titled 'Three-Tier Web Architecture: Step-by-Step Process' and a 'Tier Architecture explanation'.

DHAVANISHAJ / aws-three-tier-web-architecture

Type ⌘ to search

Code Issues Pull requests Actions Projects Wiki Security Insights Settings

aws-three-tier-web-architecture Public

Pin Unwatch 1 Fork 0 Star 0

main 1 Branch 0 Tags Go to file Add file Code

DHAVANISHAJ Update README.md 23214c6 · 8 hours ago 29 Commits

application-code Add files via upload 3 days ago

Implementation_Steps.md Update Implementation_Steps.md 8 hours ago

README.md Update README.md 8 hours ago

app-server-commands.txt Add files via upload 3 days ago

install.sh Add files via upload 3 days ago

web-server-commands.txt Add files via upload 3 days ago

README

Three-Tier Web Architecture: Step-by-Step Process

Tier Architecture explanation

About

aws-three-tier-web-architecture

Readme

Activity

0 stars

1 watching

0 forks

Releases

No releases published

Create a new release

Packages

No packages published

Publish your first package

Languages

JavaScript 48.7% Shell 42.5%

CSS 4.4% HTML 4.4%

Create an S3 bucket and upload a file from Git.

The screenshot shows the AWS S3 'Create bucket' wizard interface. At the top, the AWS logo and search bar are visible, along with navigation links for VPC, EC2, RDS, IAM, CodeCommit, and S3. The current location is 'Amazon S3 > Buckets > Create bucket'. The main content area is divided into two sections: 'General configuration' and 'Object Ownership'.

General configuration

AWS Region: US East (N. Virginia) us-east-1

Bucket type: General purpose (selected)

Bucket name: dhavanisha-3-tier-bucket

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: Control ownership of objects written to this bucket from other AWS accounts and the use of access control lists (ACLs). Object ownership determines who can specify access to objects.

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.

AWS | Search [Alt+S] | N. Virginia | Dhavanisha

VPC EC2 RDS IAM CodeCommit S3

Uploading 2% Total remaining: 28 files: 238.2 KB (97.60%) Estimated time remaining: 3 minutes Transfer rate: 1.4 KB/s Cancel

Files and folders (33 total, 244.0 KB)

Name	Folder	Type	Size	Status	Error
Burger.styled.js	application-code/web-tier/src...	text/javascript	902.0 B	Succeeded	-
index.js	application-code/web-tier/src...	text/javascript	35.0 B	Succeeded	-
DatabaseDemo.css	application-code/web-tier/src...	text/css	614.0 B	Succeeded	-
DatabaseDemo.js	application-code/web-tier/src...	text/javascript	3.9 KB	Succeeded	-
Home.js	application-code/web-tier/src...	text/javascript	448.0 B	Succeeded	-
index.js	application-code/web-tier/src...	text/javascript	34.0 B	Succeeded	-
Menu.js	application-code/web-tier/src...	text/javascript	992.0 B	In progress (100%)	-
Menu.styled.js	application-code/web-tier/src...	text/javascript	899.0 B	Pending	-
nginx-Without-SSL.conf	application-code/	-	1.5 KB	Pending	-
nginx.conf	application-code/	-	1.5 KB	Pending	-



Search

[Alt+S]



N. Virginia ▾

Dhavanisha ▾



S3

Amazon S3 > Buckets > dhavanisha-3-tier-bucket

Info |

dhavanisha-3-tier-bucket Info

[Objects](#)[Metadata - Preview](#)[Properties](#)[Permissions](#)[Metrics](#)[Management](#)[Access Points](#)**Objects (1)** Info[Copy S3 URI](#)[Copy URL](#)[Download](#)[Open](#)[Delete](#)[Actions ▾](#)[Create folder](#)[Upload](#)

Objects are the fundamental entities stored in Amazon S3. You can use [Amazon S3 inventory](#) to get a list of all objects in your bucket. For others to access your objects, you'll need to explicitly grant them permissions. [Learn more](#)

 Find objects by prefix

< 1 > |

 Name

▲ Type

▼ Last modified

▼ Size

▼ Storage class

▼

 [application-code/](#)

Folder

Files are uploaded.

The screenshot shows the AWS S3 console interface. The URL in the address bar is `us-east-1.console.aws.amazon.com/s3/buckets/dhavanisha-3-tier-bucket?region=us-east-1&bucketType=general&prefix=application-code/&showversions=false`. The top navigation bar includes links for VPC, EC2, RDS, IAM, CodeCommit, S3, and Route 53. The user is in the N. Virginia region and is signed in as Dhavanisha. The breadcrumb navigation shows the path: Amazon S3 > Buckets > dhavanisha-3-tier-bucket > application-code/. The main content area displays the 'application-code/' folder with three objects: 'app-tier/' (Folder), 'nginx.conf' (conf file), and 'web-tier/' (Folder). The 'Objects' tab is selected. A 'Copy S3 URI' button is visible above the object list. The object list table has columns for Name, Type, Last modified, Size, and Storage class. The 'nginx.conf' file is listed with a size of 1.5 KB and Standard storage class. The 'app-tier/' and 'web-tier/' entries are folders.

Name	Type	Last modified	Size	Storage class
app-tier/	Folder	-	-	-
nginx.conf	conf	December 22, 2024, 21:48:47 (UTC+05:30)	1.5 KB	Standard
web-tier/	Folder	-	-	-

I created a security group for database (rds).

The screenshot shows the AWS VPC Security Groups creation interface. At the top, there's a navigation bar with the AWS logo, a search bar, and various service icons like VPC, EC2, RDS, IAM, CodeCommit, and S3. The current page is 'Create security group' under 'Security Groups' in the 'VPC' section.

Basic details

- Security group name**: RDS-SG (Info)
- Description**: RDS-SG (Info)
- VPC**: vpc-028733503722f6eca (3-tier-architecture-vpc) (Info)

Inbound rules (Info)

Type	Protocol	Port range	Source	Description - optional
MySQL/Aurora	TCP	3306	Cus... ▾	10.0.0.0/16 (X)
VPC CIDR RANGE				
10.0.0.0/16 (X)				

Add rule

Created a security group for External load balancer.

The screenshot shows the AWS VPC Security Groups creation interface. At the top, there's a navigation bar with the AWS logo, a search bar, and links for VPC, EC2, RDS, IAM, CodeCommit, and S3. The user is in the 'VPC' section under 'Security Groups'. The title is 'Create security group'.

Basic details

- Security group name**: WEB-ALB-SG
- Description**: WEB-ALB-SG
- VPC**: vpc-028733503722f6eca (3-tier-architecture-vpc)

Inbound rules

Type	Protocol	Port range	Source	Description - optional	Action
HTTP	TCP	80	Any... 0.0.0.0/0		Delete
HTTPS	TCP	443	Any... 0.0.0.0/0		Delete

Created a security group for Web Tier(instance).

us-east-1.console.aws.amazon.com/vpcconsole/home?region=us-east-1#CreateSecurityGroup:

VPC | EC2 | RDS | IAM | CodeCommit | S3

VPC > Security Groups > Create security group

Create security group Info

A security group acts as a virtual firewall for your instance to control inbound and outbound traffic. To create a new security group, complete the fields below.

Basic details

Security group name Info
WEB-SG

Name cannot be edited after creation.

Description Info
WEB-SG

VPC Info
vpc-028733503722f6eca (3-tier-architecture-vpc)

Inbound rules Info

Type <small>Info</small>	Protocol <small>Info</small>	Port range <small>Info</small>	Source <small>Info</small>	Description - optional <small>Info</small>	Action
HTTP	TCP	80	Cus... <small>Info</small>	sg-08e332667167a4e23 <small>X</small>	PIPING TO ELB <small>Delete</small>
HTTP	TCP	80	Cus... <small>Info</small>	sg-08e332667167a4e23 <small>X</small>	10.0.0.0/16 <small>Delete</small>
				10.0.0.0/16 <small>X</small>	VPC CIDR <small>Delete</small>

Created a security group for Internal load balancer.

The screenshot shows the AWS VPC Security Groups creation interface. At the top, there's a navigation bar with the AWS logo, search bar, and various service links like VPC, EC2, RDS, IAM, CodeCommit, and S3. The current page is 'Create security group' under 'Security Groups' in the 'VPC' section. A sub-header 'Create security group' includes an 'Info' link. Below it, a note states: 'A security group acts as a virtual firewall for your instance to control inbound and outbound traffic. To create a new security group, complete the fields below.' The main form is divided into sections:

- Basic details**:
 - Security group name** (Info): INT-APP. A note says 'Name cannot be edited after creation.'
 - Description** (Info): INT-APP
 - VPC** (Info): A dropdown menu shows 'vpc-028733503722f6eca (3-tier-architecture-vpc)'.
- Inbound rules** (Info):

Type	Protocol	Port range	Source	Description - optional
HTTP	TCP	80	Cus... ▾	10.0.0.0/16
CIDR VPC				
10.0.0.0/16				

Buttons include 'Add rule' and 'Delete'.
- Outbound rules** (Info): This section is partially visible at the bottom.

Created a security group for App tier(instance).

The screenshot shows the 'Create security group' page in the AWS VPC console. The top navigation bar includes the AWS logo, a search bar, and links for VPC, EC2, RDS, IAM, CodeCommit, and S3. The user is signed in as 'Dhavanisha' in the N. Virginia region.

The main content area has a heading 'Create security group' with an 'Info' link. A descriptive text states: 'A security group acts as a virtual firewall for your instance to control inbound and outbound traffic. To create a new security group, complete the fields below.'

Basic details

- Security group name** (Info): APP-SG
- Description** (Info): APP-SG
- VPC** (Info): **vpc-028733503722f6eca (3-tier-architecture-vpc)**

Inbound rules (Info)

Type	Protocol	Port range	Source	Description - optional
Custom TCP	TCP	4000	Cus... 10.0.0.0/16	CIDR VPC 10.0.0.0/16

Add rule

Outbound rules (Info)

aws | Search [Alt+S] | N. Virginia | Dhavanisha

VPC EC2 RDS IAM CodeCommit S3

VPC dashboard <

EC2 Global View

Filter by VPC

Virtual private cloud

- Your VPCs
- Subnets
- Route tables
- Internet gateways
- Egress-only internet gateways
- Carrier gateways
- DHCP option sets
- Elastic IPs
- Managed prefix lists
- NAT gateways
- Peering connections

Security

- Network ACLs
- Security groups

PrivateLink and Lattice

- Getting started Updated
- Endpoints Updated

Security Groups (6) Info

Actions Export security groups to CSV Create security group

Find resources by attribute or tag

<input type="checkbox"/>	Name	Security group ID	Security group name	VPC ID	Description
<input type="checkbox"/>	-	sg-0baaa12da5d551b71	default	vpc-028733503722f6eca	default VPC s
<input type="checkbox"/>	-	sg-0562bd41b1eb6026d	WEB-SG	vpc-028733503722f6eca	WEB-SG
<input type="checkbox"/>	-	sg-08598f59b92cef8e2	RDS-SG	vpc-028733503722f6eca	RDS-SG
<input type="checkbox"/>	-	sg-00baf0ff64b670bc7	APP-SG	vpc-028733503722f6eca	APP-SG
<input type="checkbox"/>	-	sg-0c501b7d351aea163	INT-APP	vpc-028733503722f6eca	INT-APP
<input type="checkbox"/>	-	sg-08e332667167a4e23	WEB-ALB-SG	vpc-028733503722f6eca	WEB-ALB-SG

Created a subnet group to attach in the RDs database.

Screenshot of the AWS RDS Subnet groups creation interface.

The top navigation bar shows the AWS logo, search bar, [Alt+S] keyboard shortcut, and account information for N. Virginia and Dhavanisha.

The breadcrumb navigation shows: RDS > Subnet groups > Create DB subnet group.

Subnet group details

Name
You won't be able to modify the name after your subnet group has been created.
Input field: three-tier-subnet-group
Validation message: Must contain from 1 to 255 characters. Alphanumeric characters, spaces, hyphens, underscores, and periods are allowed.

Description
Input field: three-tier-subnet-group

VPC
Choose a VPC identifier that corresponds to the subnets you want to use for your DB subnet group. You won't be able to choose a different VPC identifier after your subnet group has been created.
Input field: 3-tier-architecture-vpc (vpc-028733503722f6eca)
Details: 6 Subnets, 2 Availability Zones

Add subnets

Availability Zones
Choose the Availability Zones that include the subnets you want to add.
Input field: Choose an availability zone
Selected zones: us-east-1a X, us-east-1b X

Subnets
Choose the subnets that you want to add. The list includes the subnets in the selected Availability Zones.
Input field: Select subnets
Listed subnets:

- 3-tier-architecture-subnet-DB-1-us-east-1a X
Subnet ID: subnet-0d0a74ae2817295b2 CIDR: 10.0.160.0/20
- 3-tier-architecture-subnet-DB-2-us-east-1b X
Subnet ID: subnet-0bfe60e2705e1b2ce CIDR: 10.0.176.0/20

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After creating a subnet group, navigate to database and build a database.

Screenshot of the AWS RDS "Create database" wizard:

The top navigation bar shows the AWS logo, search bar, and region (N. Virginia). The main navigation bar includes VPC, EC2, RDS, IAM, CodeCommit, and S3. The current page is "Create database".

Create database Info

Choose a database creation method

- Standard create
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

Engine type Info

- Aurora (MySQL Compatible)
- Aurora (PostgreSQL Compatible)
- MySQL
- MariaDB
- Oracle

MySQL >

MySQL is the most popular open source database in the world. MySQL on RDS offers the rich features of the MySQL community edition with the flexibility to easily scale compute resources or storage capacity for your database.

- Supports database size up to 64 TiB.
- Supports General Purpose, Memory Optimized, and Burstable Performance instance classes.
- Supports automated backup and point-in-time recovery.
- Supports up to 15 Read Replicas per instance, within a single Region or 5 read replicas cross-region.

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Settings

DB instance identifier

Type a name for your DB instance. The name must be unique across all DB instances owned by your AWS account in the current AWS Region.

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

Type a login ID for the master user of your DB instance.

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.

 Self managed

Create your own password or have RDS create a password that you manage.

 Auto generate password

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

Master password

Password strength

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

Confirm master password

MySQL

MySQL is the most popular open source database in the world. MySQL on RDS offers the rich features of the MySQL community edition with the flexibility to easily scale compute resources or storage capacity for your database.

- Supports database size up to 64 TiB.
- Supports General Purpose, Memory Optimized, and Burstable Performance instance classes.
- Supports automated backup and point-in-time recovery.
- Supports up to 15 Read Replicas per instance, within a single Region or 5 read replicas cross-region.

us-east-1.console.aws.amazon.com/rds/home?region=us-east-1#databases:

aws | Search [Alt+S]

VPC EC2 RDS IAM CodeCommit S3

RDS > Databases

Amazon RDS

Dashboard

Databases

Query Editor

Performance insights

Snapshots

Exports in Amazon S3

Automated backups

Reserved instances

Proxies

Subnet groups

Parameter groups

Option groups

Custom engine versions

Zero-ETL integrations [New](#)

Events

Event subscriptions

Recommendations 0

Certificate update

Databases (1)

Group resources Modify Actions ▾ Restore from S3 Create database

Filter by databases

DB identifier	Status	Role	Engine	Region ...	Size	Recommendations
three-tier-database	Available	Instance	MySQL Co...	us-east-1a	db.t4g.micro	

RDS and endpoints were successfully created.

The screenshot shows the AWS RDS console interface for a database named 'three-tier-database'. The 'Summary' section displays the DB identifier as 'three-tier-database', status as 'Available', role as 'Instance', engine as 'MySQL Community', and region as 'us-east-1a'. The 'Connectivity & security' tab is selected, showing the endpoint and port details. The endpoint is listed as 'three-tier-database.cxsiuc4uc98l.us-east-1.rds.amazonaws.com' with port 3306. The networking section shows the availability zone as 'us-east-1a' and the VPC as '3-tier-architecture-vpc (vpc-028733503722f6eca)'. The security section indicates that the VPC security group 'RDS-SG (sg-08598f59b92cef8e2)' is active. Other tabs like 'Monitoring', 'Logs & events', 'Configuration', 'Zero-ETL integrations', 'Maintenance & backups', and 'Data' are also visible.

Amazon RDS

Databases

three-tier-database

Summary

DB identifier	Status	Role	Engine	Recommendations
three-tier-database	Available	Instance	MySQL Community	
CPU	Class	Current activity	Region & AZ	
3.67%	db.t4g.micro	0 Connections	us-east-1a	

Connectivity & security

Endpoint & port	Networking	Security
Endpoint three-tier-database.cxsiuc4uc98l.us-east-1.rds.amazonaws.com	Availability Zone us-east-1a VPC 3-tier-architecture-vpc (vpc-028733503722f6eca)	VPC security groups RDS-SG (sg-08598f59b92cef8e2) Active
Port 3306	Subnet group three-tier-subnet-group	Publicly accessible No
	Subnets subnet-0bfe60e2705e1b2ce subnet-0d0a74ae2817295b2	Certificate authority rds-ca-rsa2048-g1

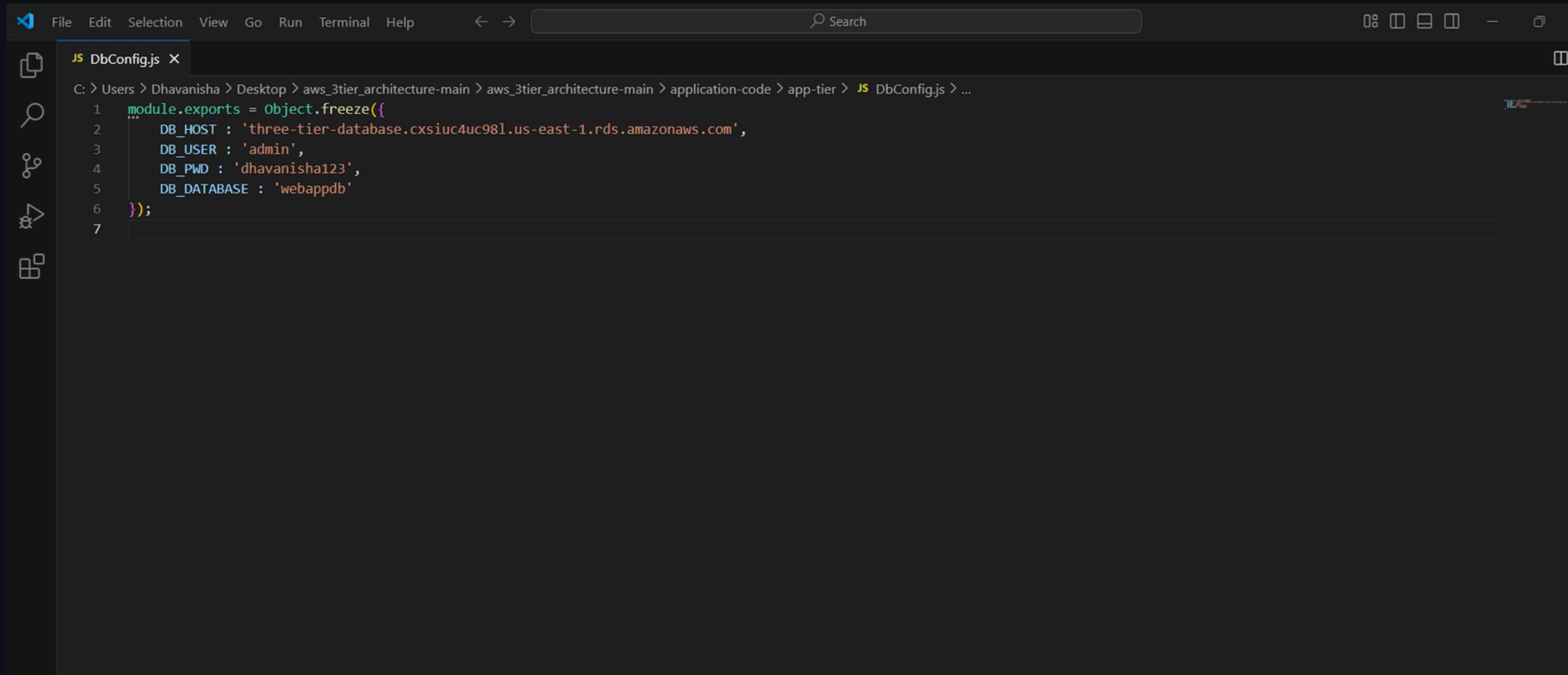
Events

Event subscriptions

Recommendations 0

Certificate update

Copy and paste the endpoint in the Dbconfig file where you have already uploaded in the S3 bucket the path was application code/app-tier/.



```
File Edit Selection View Go Run Terminal Help Search JS DbConfig.js X C: > Users > Dhavanisha > Desktop > aws_3tier_architecture-main > aws_3tier_architecture-main > application-code > app-tier > JS DbConfig.js > ...  
1 module.exports = Object.freeze({  
2     DB_HOST : 'three-tier-database.cxsiuc4uc981.us-east-1.rds.amazonaws.com',  
3     DB_USER : 'admin',  
4     DB_PWD : 'dhavanisha123',  
5     DB_DATABASE : 'webappdb'  
6 };  
7
```

updated the Dbconfig file in the s3 bucket

The screenshot shows the AWS S3 'Upload' interface. The URL in the browser is `us-east-1.console.aws.amazon.com/s3/upload/dhavanisha-3-tier-bucket?region=us-east-1&bucketType=general&prefix=application-code/app-tier/`. The navigation bar includes links for VPC, EC2, RDS, IAM, CodeCommit, and S3. The breadcrumb path is `Amazon S3 > Buckets > dhavanisha-3-tier-bucket > application-code/ > app-tier/ > Upload`. The main area is titled 'Upload' with an 'Info' link. It instructs users to add files or folders by dragging and dropping them into a large dashed box or by clicking 'Add files' or 'Add folder'. Below this, a table lists the 'Files and folders' being uploaded, showing 1 total item: 'DbConfig.js' (text/javascript, 197.0 B). The table has columns for Name, Folder, Type, and Size. A search bar labeled 'Find by name' is present. To the right of the table are buttons for 'Remove', 'Add files', and 'Add folder'. The 'Destination' section shows the destination as `s3://dhavanisha-3-tier-bucket/application-code/app-tier/`. It includes sections for 'Destination details' (Bucket settings), 'Permissions' (Grant public access and access to other AWS accounts), and 'Properties' (Specify storage class, encryption settings, tags, and more).

us-east-1.console.aws.amazon.com/s3/upload/dhavanisha-3-tier-bucket?region=us-east-1&bucketType=general&prefix=application-code/app-tier/

VPC EC2 RDS IAM CodeCommit S3

Amazon S3 > Buckets > dhavanisha-3-tier-bucket > application-code/ > app-tier/ > Upload

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**.

Name	Folder	Type	Size
DbConfig.js	-	text/javascript	197.0 B

Files and folders (1 total, 197.0 B)

All files and folders in this table will be uploaded.

Name ▾ | **Folder** ▾ | **Type** ▾ | **Size** ▾

DbConfig.js - text/javascript 197.0 B

Destination [Info](#)

Destination

<s3://dhavanisha-3-tier-bucket/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.

aws | Search [Alt+S] | Global ▾ | Dhavanisha ▾

VPC EC2 RDS IAM CodeCommit S3

IAM > Roles > Create role

Step 1
 Select trusted entity
 Step 2 Add permissions
 Step 3 Name, review, and create

Select trusted entity Info

Trusted entity type

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.

Use case

Allow an AWS service like EC2, Lambda, or others to perform actions in this account.

Service or use case

Choose a use case for the specified service.

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 Guest Fleet Role

aws | Search [Alt+S] | Global ▾ Dhavanisha ▾

VPC EC2 RDS IAM CodeCommit S3

IAM > Roles > Create role

Step 1
Select trusted entity

Step 2
Add permissions

Step 3
Name, review, and create

Add permissions Info

Permissions policies (1/1026) Info

Choose one or more policies to attach to your new role.

Filter by Type

Policy name	Type	Description
<input checked="" type="checkbox"/> AmazonEC2RoleforSSM	AWS managed	This policy will soon be deprecated. Pl...

▶ Set permissions boundary - *optional*

Cancel Previous Next

Create a role for session manager to have access.

The screenshot shows the AWS IAM 'Create role' wizard. The top navigation bar includes a search bar, a global dropdown, and user information. Below the navigation is a toolbar with icons for VPC, EC2, RDS, IAM, CodeCommit, and S3. The breadcrumb trail indicates the current step: IAM > Roles > Create role. On the left, a sidebar lists three steps: Step 1 (Select trusted entity), Step 2 (Add permissions), and Step 3 (Name, review, and create). The third step is currently selected and highlighted in blue. The main content area is titled 'Name, review, and create' and contains a 'Role details' section. It includes fields for 'Role name' (set to '3-tier-role') and 'Description' (set to 'Allows EC2 instances to call AWS services on your behalf.'), both with character limits and allowed characters specified below them. At the bottom of the main content area, there is a 'Step 1: Select trusted entities' section and an 'Edit' button.

Search [Alt+S]

VPC EC2 RDS IAM CodeCommit S3

IAM > Roles > Create role

Step 1
Select trusted entity

Step 2
Add permissions

Step 3
Name, review, and create

Name, review, and create

Role details

Role name
Enter a meaningful name to identify this role.
3-tier-role
Maximum 64 characters. Use alphanumeric and '+,.@-_` characters.

Description
Add a short explanation for this role.
Allows EC2 instances to call AWS services on your behalf.
Maximum 1000 characters. Use letters (A-Z and a-z), numbers (0-9), tabs, new lines, or any of the following characters: _+=,. @-/\[\]!#\$%^&*();;"`

Step 1: Select trusted entities

Edit

aws | Search [Alt+S] | N. Virginia ▾ Dhavanisha ▾

VPC EC2 RDS IAM CodeCommit S3

EC2 > Instances > Launch an instance

Launch an instance [Info](#)

Amazon EC2 allows you to create virtual machines, or instances, that run on the AWS Cloud. Quickly get started by following the simple steps below.

Name and tags [Info](#)

Name

APP-TIER-INSTANCE [Add additional tags](#)

Application and OS Images (Amazon Machine Image) [Info](#)

An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. Search or Browse for AMIs if you don't see what you are looking for below

Search our full catalog including 1000s of application and OS images

[Recents](#) [Quick Start](#)

[Browse more AMIs](#)
Including AMIs from AWS, Marketplace and the Community

Amazon Machine Image (AMI)

Amazon Linux 2 AMI (HVM) - Kernel 5.10, SSD Volume Type
ami-0166fe664262f664c (64-bit (x86)) / ami-07bc5cc4add81dad9 (64-bit (Arm))

Free tier eligible

Summary

Number of instances [Info](#)

1

Software Image (AMI)
Amazon Linux 2 Kernel 5.10 AMI... [read more](#)
ami-0166fe664262f664c

Virtual server type (instance type)
t2.micro

Firewall (security group)
New security group

Storage (volumes)
1 volume(s) - 8 GiB

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 750 hours of public IPv4 address usage per month, 30 GiB of EBS storage, 2 million IOPS, 1 GB of

[Cancel](#) [Launch instance](#) [Preview code](#)

AWS CloudWatch Metrics

Search [Alt+S]

N. Virginia ▾ Dhavanisha ▾

VPC EC2 RDS IAM CodeCommit S3

EC2 Instances Launch an instance

Network settings Info

VPC - required Info

vpc-028733503722f6eca (3-tier-architecture-vpc)
10.0.0.0/16

Subnet Info

subnet-0032b660af20f6899
3-tier-architecture-subnet-APP-1-us-east-1a
VPC: vpc-028733503722f6eca Owner: 515966521120
Availability Zone: us-east-1a Zone type: Availability Zone
IP addresses available: 4091 CIDR: 10.0.128.0/20

Create new subnet

Auto-assign public IP Info

Disable

Firewall (security groups) Info

A security group is a set of firewall rules that control the traffic for your instance. Add rules to allow specific traffic to reach your instance.

Create security group Select existing security group

Common security groups Info

Select security groups

APP-SG sg-00baf0ff64b670bc7 X
VPC: vpc-028733503722f6eca

Compare security group rules

Security groups that you add or remove here will be added to or removed from all your network interfaces.

Advanced network configuration

Summary

Number of instances Info

1

Software Image (AMI)
Amazon Linux 2 Kernel 5.10 AMI... [read more](#)
ami-0166fe664262f664c

Virtual server type (instance type)
t2.micro

Firewall (security group)
APP-SG

Storage (volumes)
1 volume(s) - 8 GiB

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 750 hours of public IPv4 address usage per month, 30 GiB of EBS storage, 2 million I/Os, 1 GB of

Launch instance

Preview code

Launch an instance for the app tier.

The screenshot shows the AWS EC2 "Launch an instance" wizard. The left side displays "Advanced details" settings, while the right side shows a "Summary" of the configuration and a callout box detailing the free tier benefits.

Advanced details:

- File systems: 0 x File systems
- Domain join directory: Select (dropdown menu)
- IAM instance profile: 3-tier-role (arn:aws:iam::515966521120:instance-profile/3-tier-role)
- Hostname type: IP name
- DNS Hostname:
 - Enable IP name IPv4 (A record) DNS requests:
 - Enable resource-based IPv4 (A record) DNS requests:
 - Enable resource-based IPv6 (AAAA record) DNS requests:
- Instance auto-recovery: Select (dropdown menu)

Summary:

- Number of instances: 1
- Software Image (AMI): Amazon Linux 2 Kernel 5.10 AMI... [read more](#) ami-0166fe664262f664c
- Virtual server type (instance type): t2.micro
- Firewall (security group): APP-SG
- Storage (volumes): 1 volume(s) - 8 GiB

Free tier callout:

i Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 750 hours of public IPv4 address usage per month, 30 GiB of EBS storage, 2 million IOPS, 1 GB of

Buttons: Cancel, Launch instance, Preview code

AWS | Search [Alt+S] | N. Virginia | Dhavanisha

VPC EC2 RDS IAM CodeCommit S3

Instances (1/1) Info Last updated less than a minute ago Connect Instance state Actions Launch instances

Find Instance by attribute or tag (case-sensitive) All states

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IP
APP-TIER-INST...	i-025a4538726c67133	Running	t2.micro	2/2 checks passed	View alarms +	us-east-1a	-

Dashboard EC2 Global View Events Instances Instances Instance Types Launch Templates Spot Requests Savings Plans Reserved Instances Dedicated Hosts Capacity Reservations Images AMIs AMI Catalog Elastic Block Store Volumes Snapshots Lifecycle Manager Network & Security Security Groups Elastic IPs

i-025a4538726c67133 (APP-TIER-INSTANCE)

Details Status and alarms Monitoring Security Networking Storage Tags

Instance summary Info

Instance ID i-025a4538726c67133	Public IPv4 address -	Private IPv4 addresses 10.0.143.90
IPv6 address -	Instance state Running	Public IPv4 DNS -

AWS | Search [Alt+S] | N. Virginia ▾ | Dhavanisha ▾

VPC EC2 RDS IAM CodeCommit S3

EC2 Instances i-025a4538726c67133 Connect to instance

Connect to instance Info

Connect to your instance i-025a4538726c67133 (APP-TIER-INSTANCE) using any of these options

EC2 Instance Connect **Session Manager** SSH client EC2 serial console

Session Manager usage:

- Connect to your instance without SSH keys, a bastion host, or opening any inbound ports.
- Sessions are secured using an AWS Key Management Service key.
- You can log session commands and details in an Amazon S3 bucket or CloudWatch Logs log group.
- Configure sessions on the Session Manager [Preferences](#) page.

Cancel **Connect**

```
sh-4.2$ sudo su
[root@ip-10-0-143-90 bin]# whoami
root
[root@ip-10-0-143-90 bin]# cd /home/ec2-user
[root@ip-10-0-143-90 ec2-user]# sudo yum install mysql -y
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
amzn2-core
| 3.6 kB 00:00:00
Resolving Dependencies
--> Running transaction check
--> Package mariadb.x86_64 1:5.5.68-1.amzn2.0.1 will be installed
--> Finished Dependency Resolution

Dependencies Resolved

=====
Package           Arch      Version       Repository      Size
=====
Installing:
mariadb          x86_64   1:5.5.68-1.amzn2.0.1   amzn2-core    8.8 M

Transaction Summary
=====
Install 1 Package

Total download size: 8.8 M
Installed size: 49 M
Downloading packages:
mariadb-5.5.68-1.amzn2.0.1.x86_64.rpm
| 8.8 MB 00:00:00
Running transaction check
Running transaction test
Transaction test succeeded
Running transaction
  Installing : 1:mariadb-5.5.68-1.amzn2.0.1.x86_64      1/1
  Verifying  : 1:mariadb-5.5.68-1.amzn2.0.1.x86_64      1/1

Installed:
  mariadb.x86_64 1:5.5.68-1.amzn2.0.1

Complete!
[root@ip-10-0-143-90 ec2-user]#
```

I opened a mysqlclient with rds endpoint and password.

```
[root@ip-10-0-143-90 ec2-user]# mysql -h three-tier-database.cxsiuc4uc981.us-east-1.rds.amazonaws.com -u admin -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MySQL connection id is 34
Server version: 8.0.39 Source distribution
```

```
Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

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

```
MySQL [(none)]> CREATE DATABASE webappdb;
Query OK, 1 row affected (0.02 sec)
```

```
MySQL [(none)]> SHOW DATABASES;
+-----+
| Database      |
+-----+
| information_schema |
| mysql          |
| performance_schema |
| sys            |
| webappdb       |
+-----+
5 rows in set (0.00 sec)
```

```
MySQL [(none)]> USE webappdb;
Database changed
MySQL [webappdb]> CREATE TABLE IF NOT EXISTS transactions(
    ->   id INT NOT NULL AUTO_INCREMENT,
    ->   amount DECIMAL(10,2),
    ->   description VARCHAR(100),
    ->   PRIMARY KEY(id)
    -> );
Query OK, 0 rows affected (0.04 sec)
```

```
MySQL [webappdb]> SHOW TABLES;
+-----+
| Tables_in_webappdb |
+-----+
```

```
| Database           |
+-----+
| information_schema |
| mysql              |
| performance_schema |
| sys                |
| webappdb           |
+-----+
5 rows in set (0.00 sec)
```

MySQL [(none)]> USE webappdb;

Database changed

```
MySQL [webappdb]> CREATE TABLE IF NOT EXISTS transactions(
    ->   id INT NOT NULL AUTO_INCREMENT,
    ->   amount DECIMAL(10,2),
    ->   description VARCHAR(100),
    ->   PRIMARY KEY(id)
    -> );
```

Query OK, 0 rows affected (0.04 sec)

MySQL [webappdb]> SHOW TABLES;

```
+-----+
| Tables_in_webappdb |
+-----+
| transactions      |
+-----+
1 row in set (0.01 sec)
```

MySQL [webappdb]> INSERT INTO transactions (amount, description) VALUES ('400', 'Dhavanisha');

Query OK, 1 row affected (0.00 sec)

```
MySQL [webappdb]> SELECT * FROM transactions;
+----+----+-----+
| id | amount | description |
+----+----+-----+
| 1  | 400.00 | Dhavanisha |
+----+----+-----+
1 row in set (0.00 sec)
```

MySQL [webappdb]> █

Session ID: root-4pndfsrbff64bpy3vvf6u4sxv4

Instance ID: i-025a4538726c67133

Terminate

```
[root@ip-10-0-143-90 ec2-user]# curl -o- https://raw.githubusercontent.com/DHAVANISHAJ/aws-three-tier-web-architecture/main/install.sh | bash
% Total    % Received % Xferd  Average Speed   Time     Time      Time  Current
                                         Dload  Upload   Total Spent    Left  Speed
100 14926  100 14926    0      0   114k      0 --:--:-- --:--:-- --:--:--  114k
=> Downloading nvm as script to '/root/.nvm'

=> 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-10-0-143-90 ec2-user]# source ~/.bashrc
[root@ip-10-0-143-90 ec2-user]# 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-10-0-143-90 ec2-user]# nvm use 16
Now using node v16.20.2 (npm v8.19.4)
[root@ip-10-0-143-90 ec2-user]# npm install -g pm2

added 137 packages, and audited 138 packages in 7s

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

found 0 vulnerabilities
npm notice
npm notice New major version of npm available! 8.19.4 -> 11.0.0
npm notice Changelog: https://github.com/npm/cli/releases/tag/v11.0.0
npm notice Run npm install -g npm@11.0.0 to update!
npm notice

[root@ip-10-0-143-90 ec2-user]#
[root@ip-10-0-143-90 ec2-user]#
[root@ip-10-0-143-90 ec2-user]#
```

```
[root@ip-10-0-143-90 ec2-user]# cd ~/
[root@ip-10-0-143-90 ~]# aws s3 cp s3://dhavanisha-3-tier-bucket/application-code/app-tier/ app-tier --recursive
download: s3://dhavanisha-3-tier-bucket/application-code/app-tier/README.md to app-tier/README.md
download: s3://dhavanisha-3-tier-bucket/application-code/app-tier/TransactionService.js to app-tier/TransactionService.js
download: s3://dhavanisha-3-tier-bucket/application-code/app-tier/package.json to app-tier/package.json
download: s3://dhavanisha-3-tier-bucket/application-code/app-tier/package-lock.json to app-tier/package-lock.json
download: s3://dhavanisha-3-tier-bucket/application-code/app-tier/index.js to app-tier/index.js
download: s3://dhavanisha-3-tier-bucket/application-code/app-tier/DbConfig.js to app-tier/DbConfig.js
[root@ip-10-0-143-90 ~]# ls
app-tier
[root@ip-10-0-143-90 ~]# cd ~/app-tier
[root@ip-10-0-143-90 app-tier]# ls
DbConfig.js  README.md  TransactionService.js  index.js  package-lock.json  package.json
[root@ip-10-0-143-90 app-tier]# npm install

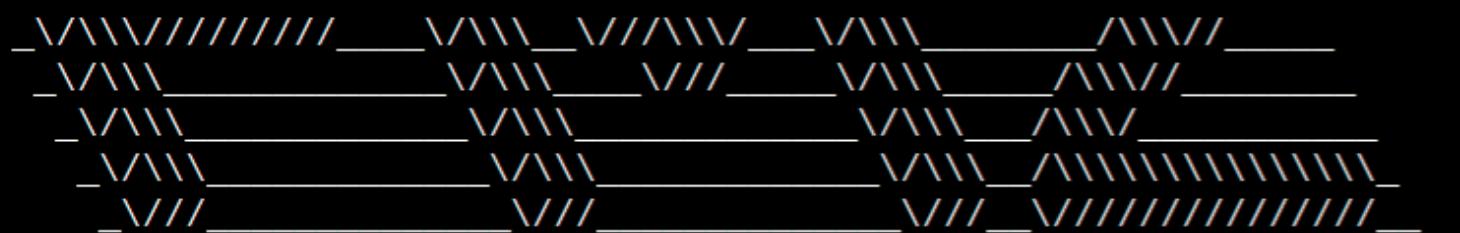
added 68 packages, and audited 69 packages in 2s

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-10-0-143-90 app-tier]# cat DbConfig.js
module.exports = Object.freeze({
  DB_HOST : 'three-tier-database.cxsiuc4uc981.us-east-1.rds.amazonaws.com',
  DB_USER : 'admin',
  DB_PWD : 'dhavanisha123',
  DB_DATABASE : 'webappdb'
});
[root@ip-10-0-143-90 app-tier]#
```



Runtime Edition

PM2 is a Production Process Manager for Node.js applications with a built-in Load Balancer.

Start and Daemonize any application:

```
$ pm2 start app.js
```

Load Balance 4 instances of api.js:

```
$ pm2 start api.js -i 4
```

Monitor in production:

```
$ pm2 monitor
```

Make pm2 auto-boot at server restart:

```
$ pm2 startup
```

To go further checkout:

<http://pm2.io/>

```
[PM2] Spawning PM2 daemon with pm2_home=/root/.pm2
[PM2] PM2 Successfully daemonized
[PM2] Starting /root/app-tier/index.js in fork_mode (1 instance)
[PM2] Done.
```

id	name	namespace	version	mode	pid	uptime	↳	status	cpu	mem	user	watching
0	index	default	1.0.0	Fork	4401	0s	0	online	0%	23.6mb	root	disabled

[root@ip-10-0-143-90 app-tier]#

```
[root@ip-10-0-143-90 app-tier]# pm2 status
```

id	name	namespace	version	mode	pid	uptime	ø	status	cpu	mem	user	watching
0	index	default	1.0.0	fork	4401	2m	0	online	0%	51.4mb	root	disabled

```
[root@ip-10-0-143-90 app-tier]# pm2 list
```

id	name	namespace	version	mode	pid	uptime	ø	status	cpu	mem	user	watching
0	index	default	1.0.0	fork	4401	3m	0	online	0%	51.7mb	root	disabled

```
[root@ip-10-0-143-90 app-tier]# pm2 logs
```

```
[TAILING] Tailing last 15 lines for [all] processes (change the value with --lines option)
```

```
/root/.pm2/pm2.log last 15 lines:
```

```
PM2 | 2024-12-19T12:19:55: PM2 log: PM2 version      : 5.4.3
PM2 | 2024-12-19T12:19:55: PM2 log: Node.js version   : 16.20.2
PM2 | 2024-12-19T12:19:55: PM2 log: Current arch       : x64
PM2 | 2024-12-19T12:19:55: PM2 log: PM2 home          : /root/.pm2
PM2 | 2024-12-19T12:19:55: PM2 log: PM2 PID file       : /root/.pm2/pm2.pid
PM2 | 2024-12-19T12:19:55: PM2 log: RPC socket file     : /root/.pm2/rpc.sock
PM2 | 2024-12-19T12:19:55: PM2 log: BUS socket file     : /root/.pm2/pub.sock
PM2 | 2024-12-19T12:19:55: PM2 log: Application log path : /root/.pm2/logs
PM2 | 2024-12-19T12:19:55: PM2 log: Worker Interval     : 30000
PM2 | 2024-12-19T12:19:55: PM2 log: Process dump file    : /root/.pm2/dump.pm2
PM2 | 2024-12-19T12:19:55: PM2 log: Concurrent actions   : 2
PM2 | 2024-12-19T12:19:55: PM2 log: SIGTERM timeout      : 1600
PM2 | 2024-12-19T12:19:55: PM2 log: =====
PM2 | 2024-12-19T12:19:55: PM2 log: App [index:0] starting in -fork mode-
PM2 | 2024-12-19T12:19:55: 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
```

```
[root@ip-10-0-143-90 app-tier]# ls
DbConfig.js  README.md  TransactionService.js  index.js  node_modules  package-lock.json  package.json
[root@ip-10-0-143-90 app-tier]# cat index.js
const transactionService = require('./TransactionService');
const express = require('express');
const bodyParser = require('body-parser');
const cors = require('cors');
const os = require('os');
const fetch = require('node-fetch');

const app = express();
const port = 4000;

app.use(bodyParser.urlencoded({ extended: true }));
app.use(bodyParser.json());
app.use(cors());

// ROUTES FOR OUR API
// =====

//Health Checking
app.get('/health', (req,res)=>{
    res.json("This is the health check");
});

// ADD TRANSACTION
app.post('/transaction', (req,res)=>{
    var response = "";
    try{
        console.log(req.body);
        console.log(req.body.amount);
        console.log(req.body.desc);
        var success = transactionService.addTransaction(req.body.amount,req.body.desc);
        if (success = 200) res.json({ message: 'added transaction successfully'});
    }catch (err){
        res.json({ message: 'something went wrong', error : err.message});
    }
});

// GET ALL TRANSACTIONS
```

Session ID: root-4pnndfsrbff64bpy3vvf6u4s xv4

Instance ID: i-025a4538726c67133

[Terminate](#)

After=network.target

```
[Service]
Type=forking
User=root
LimitNOFILE=infinity
LimitNPROC=infinity
LimitCORE=infinity
Environment=PATH=/root/.nvm/versions/node/v16.20.2/bin:/sbin:/bin:/usr/sbin:/usr/bin:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/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
['systemctl enable pm2-root']
[PM2] Writing init configuration in /etc/systemd/system/pm2-root.service
[PM2] Making script booting at startup...
[PM2] [-] Executing: **systemctl enable pm2-root...**
Created symlink from /etc/systemd/system/multi-user.target.wants/pm2-root.service to /etc/systemd/system/pm2-root.service.
[PM2] [v] Command successfully executed.
+-----+
[PM2] Freeze a process list on reboot via:
\$ pm2 save

[PM2] Remove init script via:
\$ pm2 unstartup systemd
[root@ip-10-0-143-90 app-tier]# pm2 save
[PM2] Saving current process list...
[PM2] Successfully saved in /root/.pm2/dump.pm2
[root@ip-10-0-143-90 app-tier]# curl http://localhost:4000/health
"This is the health check"[root@ip-10-0-143-90 app-tier]#

I setup a target group for internal load balancer.

The screenshot shows the 'Create target group' wizard in the AWS Management Console. The top navigation bar includes the AWS logo, search bar, and various service links like VPC, EC2, RDS, IAM, CodeCommit, and S3. The breadcrumb trail indicates the user is in the EC2 service under Target groups. The main content area is titled 'Create target group' and contains the following fields:

- Target group name:** APP-INT-ALB
- Protocol : Port:** HTTP : 4000
- IP address type:** IPv4 (selected)
- VPC:** 3-tier-architecture-vpc (selected)
- Protocol version:** HTTP1 (selected)

Additional notes in the top right of the form area state: "Offers the flexibility for a Network Load Balancer to accept and route TCP requests within a specific VPC. Facilitates using static IP addresses and PrivateLink with an Application Load Balancer."

A note below the target group name field specifies: "A maximum of 32 alphanumeric characters including hyphens are allowed, but the name must not begin or end with a hyphen."

Below the protocol field, a note states: "Choose a protocol for your target group that corresponds to the Load Balancer type that will route traffic to it. Some protocols now include anomaly detection for the targets and you can set mitigation options once your target group is created. This choice cannot be changed after creation."

The 'IP address type' section includes a note: "Only targets with the indicated IP address type can be registered to this target group." It lists two options: IPv4 (selected) and IPv6.

The 'VPC' section includes a note: "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." It lists one option: 3-tier-architecture-vpc.

The 'Protocol version' section includes a note: "Send requests to targets using HTTP/1.1. Supported when the request protocol is HTTP/1.1 or HTTP/2." It lists two options: HTTP1 (selected) and HTTP2.



Search

[Alt+S]



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VPC



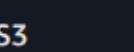
EC2



RDS



IAM



CodeCommit



S3

EC2 > Target groups > Create target group



i-025a4538726c67133

ALL INSTANCE

Running

ATT-1a

us-east-1a

AS CAST 1a

Creating a Load Balancer with Target Group

Screenshot of the AWS CloudFront console showing the process of creating a new load balancer.

The navigation bar includes the AWS logo, a search bar, and links for VPC, EC2, RDS, IAM, CodeCommit, and S3. The top right shows account information for "N. Virginia" and "Dhavanisha".

The breadcrumb path indicates the user is in the EC2 service under Load balancers, specifically creating an 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 is publicly resolvable.
- Requires a public subnet.

Internal

- Serves internal traffic.
- Has private IP addresses.
- DNS name is publicly resolvable.
- 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.

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VPC EC2 RDS IAM CodeCommit S3

EC2 > Load balancers > Create Application Load Balancer

Select at least two Availability Zones and one subnet per zone. The load balancer routes traffic to targets in these Availability Zones only. Availability Zones that are not supported by the load balancer or the VPC are not available for selection.

Availability Zones

us-east-1a (use1-az2)

Subnet

subnet-0032b660af20f6899 3-tier-architecture-subnet-APP-1-us-east-1a ▾
IPv4 subnet CIDR: 10.0.128.0/20

IPv4 address
Assigned from CIDR 10.0.128.0/20

us-east-1b (use1-az4)

Subnet

subnet-04f2403fed283668c 3-tier-architecture-subnet-APP-2-us-east-1b ▾
IPv4 subnet CIDR: 10.0.144.0/20

IPv4 address
Assigned from CIDR 10.0.144.0/20

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](#).

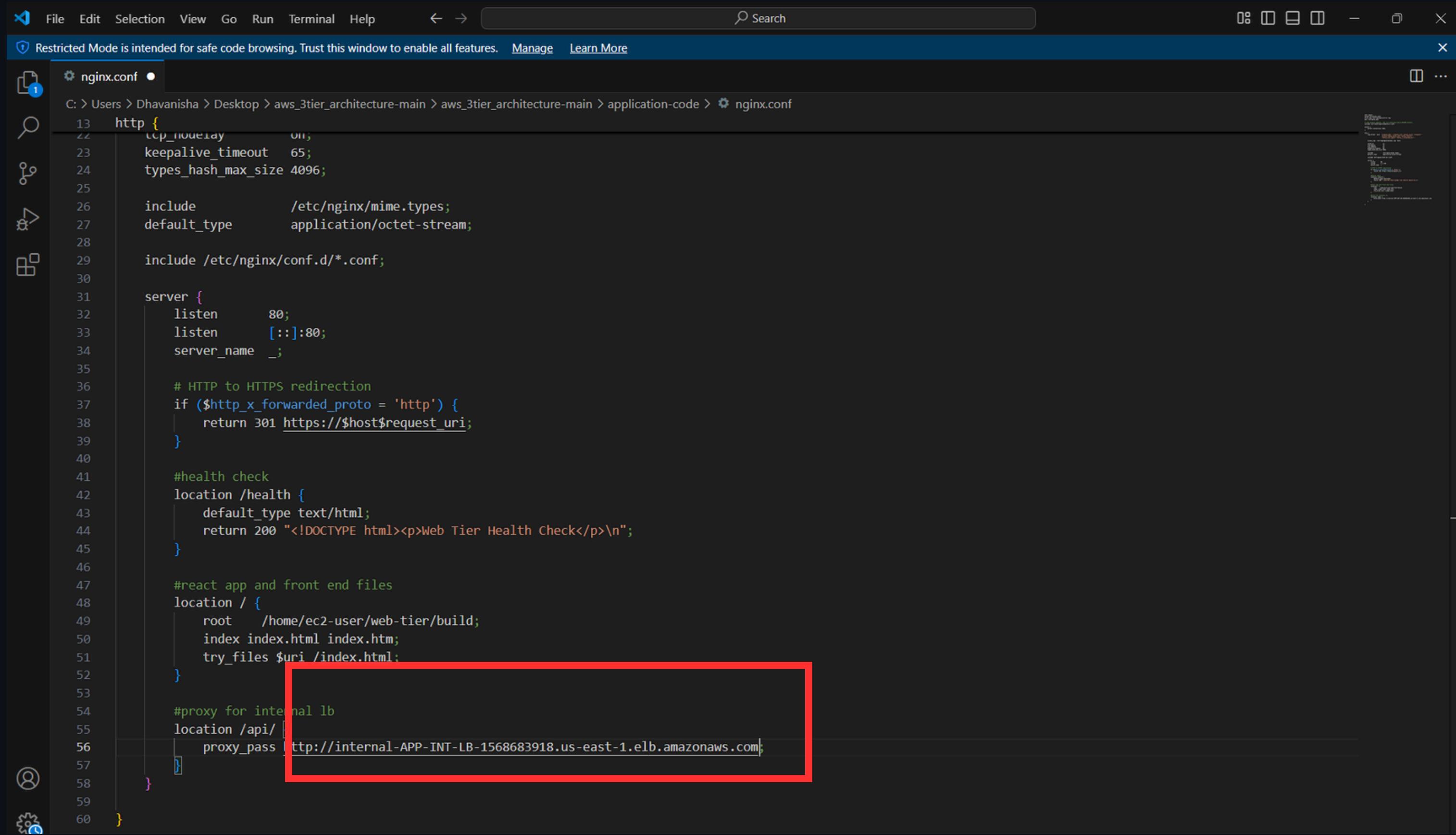
Security groups

Select up to 5 security groups ▾

INT-APP sg-0c501b7d351aea163 VPC: vpc-028733503722f6eca

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After creating an internal load balancer, copy the DNS name and modify it in the nginx.conf file where you have already uploaded the file to the S3 bucket path:/application.



The screenshot shows a code editor window with the file "nginx.conf" open. The file path is C:\Users\DHAVANISHA\Desktop\aws_3tier_architecture-main\aws_3tier_architecture-main\application-code\nginx.conf. The code is a standard Nginx configuration file with syntax highlighting for keywords like "http", "server", and "location". A red box highlights the "proxy_pass" directive in the "location /api/" block, which currently points to an internal ELB DNS address. The rest of the file includes configurations for TCP keepalive, MIME types, server listening on port 80, health checks, and React app files.

```
13 http {
14     tcp_nodelay          on;
15     keepalive_timeout    65;
16     types_hash_max_size 4096;
17
18     include               /etc/nginx/mime.types;
19     default_type         application/octet-stream;
20
21     include /etc/nginx/conf.d/*.conf;
22
23 server {
24     listen      80;
25     listen      [::]:80;
26     server_name _;
27
28     # HTTP to HTTPS redirection
29     if ($http_x_forwarded_proto = 'http') {
30         return 301 https://$host$request_uri;
31     }
32
33     #health check
34     location /health {
35         default_type text/html;
36         return 200 "<!DOCTYPE html><p>Web Tier Health Check</p>\n";
37     }
38
39     #react app and front end files
40     location / {
41         root   /home/ec2-user/web-tier/build;
42         index index.html index.htm;
43         try_files $uri /index.html;
44     }
45
46     #proxy for internal lb
47     location /api/ {
48         proxy_pass http://internal-APP-INT-LB-1568683918.us-east-1.elb.amazonaws.com;
49     }
50 }
```

modified the nginx.conf file in the s3 bucket that I have already edited.

The screenshot shows the AWS S3 'Upload' interface. The top navigation bar includes the AWS logo, search bar, and tabs for VPC, EC2, RDS, IAM, CodeCommit, and S3. The breadcrumb path indicates the user is in the 'Amazon S3 > Buckets > dhavanisha-3-tier-bucket > application-code/ > Upload' section. The main area is titled 'Upload' with an 'Info' link. It instructs users to add files or folders by dragging and dropping them or choosing 'Add files' or 'Add folder'. A large dashed blue box highlights the upload area. Below this, a table lists the 'Files and folders (1 total, 1.5 KB)' being uploaded. The table has columns for Name, Folder, Type, and Size. A single file, 'nginx.conf', is listed with a size of 1.5 KB. To the right of the table are 'Remove', 'Add files', and 'Add folder' buttons. A pagination indicator shows page 1 of 1. The 'Destination' section shows the target as 's3://dhavanisha-3-tier-bucket/application-code/'. It includes sections for 'Destination details', 'Permissions', and 'Properties'.

aws | Search [Alt+S]

VPC EC2 RDS IAM CodeCommit S3

Amazon S3 > Buckets > dhavanisha-3-tier-bucket > application-code/ > Upload

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, 1.5 KB)

All files and folders in this table will be uploaded.

<input type="checkbox"/>	Name	Folder	Type	Size
<input type="checkbox"/>	nginx.conf	-	-	1.5 KB

Destination Info

Destination
<s3://dhavanisha-3-tier-bucket/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.

Launch an instance for the web tier.

The screenshot shows the AWS EC2 'Launch an instance' wizard. The top navigation bar includes the AWS logo, search bar, and various service links like VPC, EC2, RDS, IAM, CodeCommit, and S3. The breadcrumb path is 'EC2 > Instances > Launch an instance'. The main content area is divided into sections: 'Name and tags', 'Application and OS Images (Amazon Machine Image)', and a summary panel on the right.

Name and tags

Name: WEB-TIER-INSTANCES

Add additional tags

Application and OS Images (Amazon Machine Image)

An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. Search or Browse for AMIs if you don't see what you are looking for below.

Search our full catalog including 1000s of application and OS images

Recent AMIs: Amazon Linux, macOS, Ubuntu, Windows, Red Hat, SUSE Linux

Quick Start AMIs: Amazon Linux, macOS, Ubuntu, Windows, Red Hat, SUSE Linux

Browse more AMIs: Including AMIs from AWS, Marketplace and the Community

Summary

Number of instances: 1

Software Image (AMI): Amazon Linux 2 Kernel 5.10 AMI... [read more](#)
ami-0166fe664262f664c

Virtual server type (instance type): t2.micro

Firewall (security group): WEB-SG

Storage (volumes): 1 volume(s) - 8 GiB

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 750 hours of public IPv4 address usage per month, 30 GiB of EBS storage, 2 million I/Os, 1 GB of

Cancel

Launch instance

Preview code

▼ Network settings [Info](#)

VPC - required [Info](#)

vpc-028733503722f6eca (3-tier-architecture-vpc)
10.0.0.0/16



Subnet [Info](#)

subnet-065d0c3514fa5791e

3-tier-architecture-subnet-public1-us-east-1a



VPC: vpc-028733503722f6eca Owner: 515966521120
Availability Zone: us-east-1a Zone type: Availability Zone
IP addresses available: 4090 CIDR: 10.0.0.0/20

Create new subnet

Auto-assign public IP [Info](#)

Enable



Additional charges apply when outside of free tier allowance

Firewall (security groups) [Info](#)

A security group is a set of firewall rules that control the traffic for your instance. Add rules to allow specific traffic to reach your instance.

Create security group

Select existing security group



Compare security group rules

Common security groups [Info](#)

Select security groups



WEB-SG sg-0562bd41b1eb6026d

VPC: vpc-028733503722f6eca

Security groups that you add or remove here will be added to or removed from all your network interfaces.

► Advanced network configuration

▼ Summary

Number of instances [Info](#)

1

Software Image (AMI)

Amazon Linux 2 Kernel 5.10 AMI...[read more](#)
ami-0166fe664262f664c

Virtual server type (instance type)

t2.micro

Firewall (security group)

WEB-SG

Storage (volumes)

1 volume(s) - 8 GiB

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 750 hours of public IPv4 address usage per month, 30 GiB of EBS storage, 2 million I/Os, 1 GB of

[Cancel](#)

[Launch instance](#)

[Preview code](#)



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[VPC](#) [EC2](#) [RDS](#) [IAM](#) [CodeCommit](#) [S3](#)[EC2](#) > [Instances](#) > Launch an instance[i](#) [?](#) [Print](#)▼ Advanced details [Info](#)**Domain join directory** [Info](#)

Select

[Create new directory](#)**IAM instance profile** [Info](#)

3-tier-role

arn:aws:iam::515966521120:instance-profile/3-tier-role

[Create new IAM profile](#)**Hostname type** [Info](#)

IP name

DNS Hostname [Info](#) Enable IP name IPv4 (A record) DNS requests Enable resource-based IPv4 (A record) DNS requests Enable resource-based IPv6 (AAAA record) DNS requests**Instance auto-recovery** [Info](#)

Select

Shutdown behavior [Info](#)

Stop

Stop - Hibernate behavior [Info](#)

Select

Termination protection [Info](#)

Select

▼ Summary

Number of instances [Info](#)

1

Software Image (AMI)Amazon Linux 2 Kernel 5.10 AMI...[read more](#)

ami-0166fe664262f664c

Virtual server type (instance type)

t2.micro

Firewall (security group)

WEB-SG

Storage (volumes)

1 volume(s) - 8 GiB

i Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 750 hours of public IPv4 address usage per month, 30 GiB of EBS storage, 2 million I/Os, 1 GB of

[Cancel](#)[Launch instance](#)[Preview code](#)

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VPC EC2 RDS IAM CodeCommit S3

EC2 Instances i-025a4538726c67133 Connect to instance

Connect to instance Info

Connect to your instance i-025a4538726c67133 (APP-TIER-INSTANCE) using any of these options

EC2 Instance Connect Session Manager **SSH client** EC2 serial console

Session Manager usage:

- Connect to your instance without SSH keys, a bastion host, or opening any inbound ports.
- Sessions are secured using an AWS Key Management Service key.
- You can log session commands and details in an Amazon S3 bucket or CloudWatch Logs log group.
- Configure sessions on the Session Manager [Preferences](#) page.

Cancel Connect

```
sh-4.2$ sudo -su ec2-user
[ec2-user@ip-10-0-143-90 bin]$ cd /home/ec2-user/
[ec2-user@ip-10-0-143-90 ~]$ pwd
/home/ec2-user
[ec2-user@ip-10-0-143-90 ~]$ curl -o- https://raw.githubusercontent.com/DHAVANISHAJ/aws-three-tier-web-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  106k      0 --:-- --:-- --:-- 107k
=> Downloading nvm as script to '/home/ec2-user/.nvm'

=> Appending nvm source string to /home/ec2-user/.bashrc
=> Appending bash_completion source string to /home/ec2-user/.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" ] && \. "$NVM_DIR/bash_completion" # This loads nvm bash_completion
[ec2-user@ip-10-0-143-90 ~]$ source ~/.bashrc
[ec2-user@ip-10-0-143-90 ~]$ 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...
#####
Computing checksum with sha256sum
Checksums matched!
Now using node v16.20.2 (npm v8.19.4)
Creating default alias: default -> 16 (-> v16.20.2)
[ec2-user@ip-10-0-143-90 ~]$ nvm use 16
Now using node v16.20.2 (npm v8.19.4)
[ec2-user@ip-10-0-143-90 ~]$ cd ~/
[ec2-user@ip-10-0-143-90 ~]$ aws s3 cp s3://dhavanisha-3-tier-bucket/application-code/web-tier/ web-tier --recursive
download: s3://dhavanisha-3-tier-bucket/application-code/web-tier/public/index.html to web-tier/public/index.html
download: s3://dhavanisha-3-tier-bucket/application-code/web-tier/README.md to web-tier/README.md
download: s3://dhavanisha-3-tier-bucket/application-code/web-tier/src/components/Menu/Menu.styled.js to web-tier/src/components/Menu/Menu.styled.js
download: s3://dhavanisha-3-tier-bucket/application-code/web-tier/src/components/Menu/Menu.js to web-tier/src/components/Menu/Menu.js
download: s3://dhavanisha-3-tier-bucket/application-code/web-tier/src/components/Burger/index.js to web-tier/src/components/Burger/index.js
download: s3://dhavanisha-3-tier-bucket/application-code/web-tier/package.json to web-tier/package.json
download: s3://dhavanisha-3-tier-bucket/application-code/web-tier/src/components/Burger/Burger.js to web-tier/src/components/Burger/Burger.js
download: s3://dhavanisha-3-tier-bucket/application-code/web-tier/src/components/Menu/index.js to web-tier/src/components/Menu/index.js
download: s3://dhavanisha-3-tier-bucket/application-code/web-tier/src/components/index.js to web-tier/src/components/index.js
download: s3://dhavanisha-3-tier-bucket/application-code/web-tier/src/App.js to web-tier/src/App.js
```

```
[ec2-user@ip-10-0-143-90 ~]$ ls
web-tier

[ec2-user@ip-10-0-143-90 ~]$ cd ~/web-tier
[ec2-user@ip-10-0-143-90 web-tier]$ npm install
npm WARN EBADENGINE Unsupported engine {
npm WARN   EBADENGINE   package: '@testing-library/dom@10.4.0',
npm WARN   EBADENGINE   required: { node: '>=18' },
npm WARN   EBADENGINE   current: { node: 'v16.20.2', npm: '8.19.4' }
npm WARN EBADENGINE }
npm WARN deprecated sourcemap-codec@1.4.8: Please use @jridgewell/sourcemap-codec instead
npm WARN deprecated rollup-plugin-terser@7.0.2: This package has been deprecated and is no longer maintained. Please use @rollup/plugin-terser
npm WARN deprecated workbox-cacheable-response@6.6.0: workbox-background-sync@6.6.0
npm WARN deprecated workbox-google-analytics@6.6.0: It is not compatible with newer versions of GA starting with v4, as long as you are using GAv3 it should be ok, but the package is not longer being maintained
npm WARN deprecated stable@0.1.8: Modern JS already guarantees Array#sort() is a stable sort, so this library is deprecated. See the compatibility table on MDN: https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Global_Objects/Array/sort#browser_compatibility
npm WARN deprecated q@1.5.1: You or someone you depend on is using Q, the JavaScript Promise library that gave JavaScript developers strong feelings about promises. They can almost certainly migrate to the native JavaScript promise now. Thank you literally everyone for joining me in this bet against the odds. Be excellent to each other.
npm WARN deprecated
npm WARN deprecated (For a CapTP with native promises, see @endo/eventual-send and @endo/capt)
npm WARN deprecated w3c-hr-time@1.0.2: Use your platform's native performance.now() and performance.timeOrigin.
npm WARN deprecated domexception@2.0.1: Use your platform's native DOMException instead
npm WARN deprecated abab@2.0.6: Use your platform's native atob() and btoa() methods instead
npm WARN deprecated inflight@1.0.6: This module is not supported, and leaks memory. Do not use it. Check out lru-cache if you want a good and tested way to coalesce async requests by a key value, which is much more comprehensive and powerful.
npm WARN deprecated glob@7.2.3: Glob versions prior to v9 are no longer supported
npm WARN deprecated rimraf@3.0.2: Rimraf versions prior to v4 are no longer supported
npm WARN deprecated @humanwhocodes/object-schema@2.0.3: Use @eslint/object-schema instead
npm WARN deprecated @humanwhocodes/config-array@0.13.0: Use @eslint/config-array instead
npm WARN deprecated @babel/plugin-proposal-private-methods@7.18.6: This proposal has been merged to the ECMAScript standard and thus this plugin is no longer maintained. Please use @babel/plugin-transform-private-methods instead.
npm WARN deprecated @babel/plugin-proposal-optional-chaining@7.21.0: This proposal has been merged to the ECMAScript standard and thus this plugin is no longer maintained. Please use @babel/plugin-transform-optional-chaining instead.
npm WARN deprecated @babel/plugin-proposal-numeric-separator@7.18.6: This proposal has been merged to the ECMAScript standard and thus this plugin is no longer maintained. Please use @babel/plugin-transform-numeric-separator instead.
npm WARN deprecated @babel/plugin-proposal-class-properties@7.18.6: This proposal has been merged to the ECMAScript standard and thus this plugin is no longer maintained. Please use @babel/plugin-transform-class-properties instead.
npm WARN deprecated @babel/plugin-proposal-nullish-coalescing-operator@7.18.6: This proposal has been merged to the ECMAScript standard and thus this plugin is no longer maintained. Please use @babel/plugin-transform-nullish-coalescing-operator instead.
```

```
npm notice New major version of npm available! 8.19.4 -> 11.0.0
npm notice Changelog: https://github.com/npm/cli/releases/tag/v11.0.0
npm notice Run npm install -g npm@11.0.0 to update!
npm notice
[ec2-user@ip-10-0-8-212 web-tier]$ npm run build
```

```
> aws-3tier-web-layer@0.1.0 build
> react-scripts build
```

Creating an optimized production build...

One of your dependencies, babel-preset-react-app, is importing the "@babel/plugin-proposal-private-property-in-object" package without declaring it in its dependencies. This is currently working because "@babel/plugin-proposal-private-property-in-object" is already in your node_modules folder for unrelated reasons, but it **may break at any time**.

babel-preset-react-app is part of the create-react-app project, **which is not maintained anymore**. It is thus unlikely that this bug will ever be fixed. Add "@babel/plugin-proposal-private-property-in-object" to your devDependencies to work around this error. This will make this message go away.

Compiled successfully.

File sizes after gzip:

```
75.3 kB  build/static/js/main.eed54180.js
1.79 kB  build/static/js/453.a4ec9c9e.chunk.js
493 B    build/static/css/main.b20b6ac4.css
```

The project was built assuming it is hosted at `./`.
You can control this with the `homepage` field in your `package.json`.

The `build` folder is ready to be deployed.

Find out more about deployment here:

<https://cra.link/deployment>

```
[ec2-user@ip-10-0-8-212 web-tier]$ █
```

I setup a target group for internal load balancer.

The screenshot shows the AWS EC2 Target groups 'Create target group' interface. At the top, there is a search bar and navigation links for VPC, EC2, RDS, IAM, CodeCommit, and S3. The main content area shows a table of EC2 instances:

	Instance ID	Name	State	Security groups	Zone
<input type="checkbox"/>	i-0cbc8a514a09e3dd4	WEB-TIER-INSTANCES	Running	WEB-SG	us-east-1a
<input type="checkbox"/>	i-025a4538726c67133	APP-TIER-INSTANCE	Running	APP-SG	us-east-1a

Below the table, it says "0 selected". Under "Ports for the selected instances", there is a field containing "80" with the placeholder "1-65535 (separate multiple ports with commas)". A button labeled "Include as pending below" is present. A note at the bottom states "1 selection is now pending below. Include more or register targets when ready."

Review targets

Targets (1)

Instance ID	Name	Port	State	Security groups	Zone	Private IPv4 address	Subnet ID
i-0cbc8a514a09e3dd4	WEB-TIER-INSTANCES	80	Running	WEB-SG	us-east-1a	10.0.8.212	subnet-065d0c3

Creating a Load Balancer with Target Group

us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#CreateALBWizard:

aws | Search [Alt+S]

VPC EC2 RDS IAM CodeCommit S3 Route 53

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 is publicly resolvable.
- Requires a public subnet.

Internal

- Serves internal traffic.
- Has private IP addresses.
- DNS name is publicly resolvable.
- 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.



Search

[Alt+S]



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[VPC](#) [EC2](#) [RDS](#) [IAM](#) [CodeCommit](#) [S3](#)[EC2](#) > [Load balancers](#) > Create Application Load Balancer **Availability zones** us-east-1a (use1-az2)

Subnet

subnet-065d0c3514fa5791e

3-tier-architecture-subnet-public1-us-east-1a



IPv4 subnet CIDR: 10.0.0.0/20

IPv4 address

Assigned by AWS

 us-east-1b (use1-az4)

Subnet

subnet-0eaaa45b2d319e238

3-tier-architecture-subnet-public2-us-east-1b



IPv4 subnet CIDR: 10.0.16.0/20

IPv4 address

Assigned by AWS

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



WEB-ALB-SG

sg-08e332667167a4e23 VPC: vpc-028733503722f6eca

**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

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VPC EC2 RDS IAM CodeCommit S3 Route 53

EC2 > Load balancers

Images

- AMIs
- AMI Catalog

Elastic Block Store

- Volumes
- Snapshots
- Lifecycle Manager

Network & Security

- Security Groups
- Elastic IPs
- Placement Groups
- Key Pairs
- Network Interfaces

Load Balancing

Load Balancers

- Target Groups
- Trust Stores New

Auto Scaling

- Auto Scaling Groups

ARC zonal shift for Application Load Balancers has changed

- Use of Amazon Application Recovery Controller (ARC) zonal shift now requires the Application Load Balancer attribute **ARC zonal shift integration** to be **enabled**.
- ARC zonal shift now supports cross-zone enabled Application Load Balancers.

Load balancers (2)

Elastic Load Balancing scales your load balancer capacity automatically in response to changes in incoming traffic.

Filter load balancers

<input type="checkbox"/>	Name	DNS name	State	VPC ID	Availability Zones	Type
<input type="checkbox"/>	EXTERNAL-WEB-ALB	EXTERNAL-WEB-ALB-14177...	<input checked="" type="checkbox"/> Active	vpc-06e69e80396cbfc93	2 Availability Zones	application
<input type="checkbox"/>	APP-INT-LB	APP-INT-LB-1349749019.us...	<input checked="" type="checkbox"/> Active	vpc-06e69e80396cbfc93	2 Availability Zones	application

0 load balancers selected

Select a load balancer above.

Navigate to route 53

The screenshot shows the AWS Route 53 console interface. On the left, there is a navigation sidebar with the following sections and links:

- Route 53** (selected)
- Dashboard
- Hosted zones** (selected)
- Health checks
- Profiles [New](#)
- IP-based routing**
 - CIDR collections
- Traffic flow**
 - Traffic policies
 - Policy records
- Domains**
 - Registered domains
 - Requests
- Resolver**
 - VPCs
 - Inbound endpoints
 - Outbound endpoints
 - Rules
 - Query logging
 - Outposts
- DNS Firewall

The main content area is titled "Hosted zones (1)". It displays a table with one row, representing the hosted zone "dhavanisha.site". The table columns are: Hosted zone name, Type, Created by, Record count, Description, and Hosted zone ID.

Hosted zone name	Type	Created by	Record count	Description	Hosted zone ID
dhavanisha.site	Public	Route 53	2	-	Z0584723ZK2M9LAT6...

At the top of the main content area, there are several buttons: "View details", "Edit", "Delete", and "Create hosted zone". There is also a search bar labeled "Filter records by property or value".

Create A record

aws | Search [Alt+S] | Global ▾ Dhavanisha ▾

VPC EC2 RDS IAM CodeCommit S3

Route 53 > Hosted zones > dhavanisha.site

Route 53 dhavanisha.site Delete zone Test record Configure query logging

Hosted zone details

Records (2) DNSSEC signing Hosted zone tags (0)

Records (2) Delete record Import zone file Create record

Automatic mode is the current search behavior optimized for best filter results. [To change modes go to settings.](#)

Filter records by property or value Type Routing p... Alias Value/Route traffic to TTL (s...)

<input type="checkbox"/>	Record ...	Type	Routin...	Differ...	Alias	Value/Route traffic to	TTL (s...)
<input type="checkbox"/>	dhavanish...	NS	Simple	-	No	ns-1093.awsdns-08.org. ns-426.awsdns-53.com. ns-839.awsdns-40.net. ns-1805.awsdns-33.co.uk.	172800
<input type="checkbox"/>	dhavanish...	SOA	Simple	-	No	ns-1093.awsdns-08.org. aws...	900

0 records selected Select a record to see its details

Dashboard Hosted zones Health checks Profiles [New](#) IP-based routing CIDR collections Traffic flow Traffic policies Policy records Domains Registered domains Requests Resolver VPCs Inbound endpoints Outbound endpoints Rules Query logging Outposts

DNS Firewall

aws | Search [Alt+S] | Global ▾ | Dhavanisha ▾

VPC EC2 RDS IAM CodeCommit S3

Route 53 > Hosted zones > dhavanisha.site

Route 53 View status X

Record for dhavanisha.site 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.

Public dhavanisha.site Info Delete zone Test record Configure query logging

Hosted zone details Edit hosted zone

Records (3) DNSSEC signing Hosted zone tags (0)

Records (3) Info Delete record Import zone file Create record

Automatic mode is the current search behavior optimized for best filter results. To change modes go to settings.

Filter records by property or value Type Routing p... Alias

	Record ...	Type	Routin...	Differ...	Alias	Value/Route traffic to	TTL (s...)	Health ...	Evalu...
<input type="checkbox"/>	dhavanish...	A	Simple	-	Yes	dualstack.external-lb-48456...	-	-	Yes
<input type="checkbox"/>	dhavanish...	NS	Simple	-	No	ns-1093.awsdns-08.org. ns-426.awsdns-53.com. ns-839.awsdns-40.net. ns-1805.awsdns-33.co.uk.	172800	-	-
<input type="checkbox"/>	dhavanish...	SOA	Simple	-	No	ns-1093.awsdns-08.org. aws...	900	-	-

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VPC EC2 RDS IAM CodeCommit S3

AWS Certificate Manager > Certificates > Request certificate > Request public certificate

Request public certificate

Domain names

Provide one or more domain names for your certificate.

Fully qualified domain name | Info

dhavanisha.site

Add another name to this certificate

You can add additional names to this certificate. For example, if you're requesting a certificate for "www.example.com", you might want to add the name "example.com" so that customers can reach your site by either name.

Validation method

Info

Select a method for validating domain ownership.

DNS validation - recommended
Choose this option if you are authorized to modify the DNS configuration for the domains in your certificate request.

Email validation
Choose this option if you do not have permission or cannot obtain permission to modify the DNS configuration for the domains in your certificate request.

Key algorithm

Info

Select an encryption algorithm. Some algorithms may not be supported by all AWS services.

RSA 2048
RSA is the most widely used key type.

ECDSA P 256
Equivalent in cryptographic strength to RSA 3072.

ECDSA P 384

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Navigate to Aws certificate manager and request a public certificate



Search

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[VPC](#) [EC2](#) [RDS](#) [IAM](#) [CodeCommit](#) [S3](#)[AWS Certificate Manager](#) > [Certificates](#) > Request certificate[?](#) [Help](#)

Request certificate

Certificate type [Info](#)

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](#)

[Cancel](#)[Next](#)



Search

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[VPC](#) [EC2](#) [RDS](#) [IAM](#) [CodeCommit](#) [S3](#)[AWS Certificate Manager](#) > [Certificates](#) > [fd55785c-1c43-4590-baf5-60453648f1c5](#) > Create DNS records in Amazon Route 53[i](#) [?](#)

Create DNS records in Amazon Route 53 (1/1)

 Search domains

1 match

Validation status = Pending validation [X](#)Validation status = Failed [X](#)Is domain in Route 53? = Yes [X](#)[Clear filters](#)

< 1 >

 Domain

Validation status

Is domain in Route 53?

 dhavanisha.site

Pending validation

Yes

[Cancel](#)[Create records](#)



Search

[Alt+S]



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AWS Certificate Manager



Certificates

fd55785c-1c43-4590-baf5-60453648f1c5



AWS Certificate Manager (ACM)

[List certificates](#)[Request certificate](#)[Import certificate](#)[AWS Private CA](#)

ⓘ Successfully requested certificate with ID **fd55785c-1c43-4590-baf5-60453648f1c5**

A certificate request with a status of pending validation has been created. Further action is needed to complete the validation and approval of the certificate.

[View certificate](#)

fd55785c-1c43-4590-baf5-60453648f1c5

[Delete](#)

Certificate status

Identifier

fd55785c-1c43-4590-baf5-60453648f1c5

Status

ⓘ Pending validation [Info](#)

ARN

arn:aws:acm:us-east-1:515966521120:certificate/fd55785c-1c43-4590-baf5-60453648f1c5

Type

Amazon Issued

Domains (1)

[Create records in Route 53](#)[Export to CSV](#)

< 1 >

Domain	Status	Renewal status	Type	CNAME name
dhavanisha.site	ⓘ Pending validation	-	CNAME	_129276dfb1c5c486e390faaff6e5d1db.dhavanis...

Details

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VPC EC2 RDS IAM CodeCommit S3 Route 53

AWS Certificate Manager Certificates 92afab21-dda5-445a-b963-d06532455fbe

AWS Certificate Manager (ACM)

- List certificates
- Request certificate
- Import certificate
- AWS Private CA

92afab21-dda5-445a-b963-d06532455fbe

Certificate status

Identifier	Status
92afab21-dda5-445a-b963-d06532455fbe	<input checked="" type="checkbox"/> Issued

ARN

arn:aws:acm:us-east-1:515966521120:certificate/92afab21-dda5-445a-b963-d06532455fbe

Type

Amazon Issued

Domains (1)

Create records in Route 53 Export to CSV

Domain	Status	Renewal status	Type	CNAME name
dhavanisha.site	<input checked="" type="checkbox"/> Success	-	CNAME	<input type="checkbox"/> _129276dfb1c5c486e390faaff6e5d1db.dhavanisha

Details

In use	Serial number	Requested at	Renewal eligibility
No	0e:f8:3e:64:6a:51:5b:8f:44:ed:ef:5f:10:4e:6d:69	December 22, 2024, 15:34:27 (UTC+05:30)	Ineligible

▼ Images

AMIs

AMI Catalog

▼ Elastic Block Store

Volumes

Snapshots

Lifecycle Manager

▼ Network & Security

Security Groups

Elastic IPs

Placement Groups

Key Pairs

Network Interfaces

▼ Load Balancing

Load Balancers

Target Groups

Trust Stores [New](#)

▼ Auto Scaling

Auto Scaling Groups

Settings

EXTERNAL-WEB-ALB



Actions ▾

▼ Details

Load balancer type

Application

Status

Active

VPC

[vpc-0b3c5059ed8826ce7](#)

Load balancer IP address type

IPv4

Scheme

Internet-facing

Hosted zone

Z35SXDOTRQ7X7K

Availability Zones

[subnet-0a14f83765bd7a7fd](#)

Date created

December 22, 2024, 15:09 (UTC+05:30)

[subnet-0e122b40015e8c2b0](#)
us-east-1a (use1-az2)

Load balancer ARN

[arn:aws:elasticloadbalancing:us-east-1:515966521120:loadbalancer/app/EXTERNAL-WEB-ALB/a66db6d9fd49be85](#)DNS name [Info](#)[EXTERNAL-WEB-ALB-1989123667.us-east-1.elb.amazonaws.com \(A Record\)](#)[Listeners and rules](#) [Network mapping](#) [Resource map - new](#) [Security](#) [Monitoring](#) [Integrations](#) [Attributes](#) [Capacity - new](#)Listeners and rules (1) [Info](#)

Manage rules ▾

Manage listener ▾

Add listener

Filter listeners	Protocol:Port	Default action	Rules	ARN	Security policy	Default SSL/TLS
Forward to target group						

us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#ElbAddListener:loadBalancerArn=arn:aws:elasticloadbalancing:us-east-1:515966521120:loadbalancer/app/EXTERNAL-WEB... ☆

aws | Search [Alt+S]

VPC EC2 RDS IAM CodeCommit S3 Route 53

EC2 > Load balancers > EXTERNAL-WEB-ALB > Add listener

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: EXTERNAL-WEB-ALB

Listener details: 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.

Listener configuration

The listener will be identified by the protocol and port.

Protocol Used for connections from clients to the load balancer. <input type="button" value="HTTPS"/>	Port The port on which the load balancer is listening for connections. <input type="button" value="443"/> 1-65535
--	---

Default actions Info

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

Authentication Info

Authentication requires IPv4 connectivity to authentication endpoints. [Learn more](#)

Use OpenID or Amazon Cognito
Include authentication using either OpenID Connect (OIDC) or Amazon Cognito.

Routing actions

Forward to target groups Redirect to URL Return fixed response

Forward to target group Info

certificate is linked to the external load balancer.

The screenshot shows the AWS EC2 Load Balancers 'Add listener' configuration page. The URL in the browser is `us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#ElbAddListener:loadBalancerArn=arn:aws:elasticloadbalancing:us-east-1:515966521120:loadbalancer/app/EXTERNAL-WE...`. The top navigation bar includes links for VPC, EC2, RDS, IAM, CodeCommit, S3, and Route 53. The breadcrumb navigation shows: EC2 > Load balancers > EXTERNAL-WEB-ALB > Add listener.

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**

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.

[Request new ACM certificate](#)

Client certificate handling Info
Client certificates are used to make authenticated requests to remote servers. [Learn more](#)

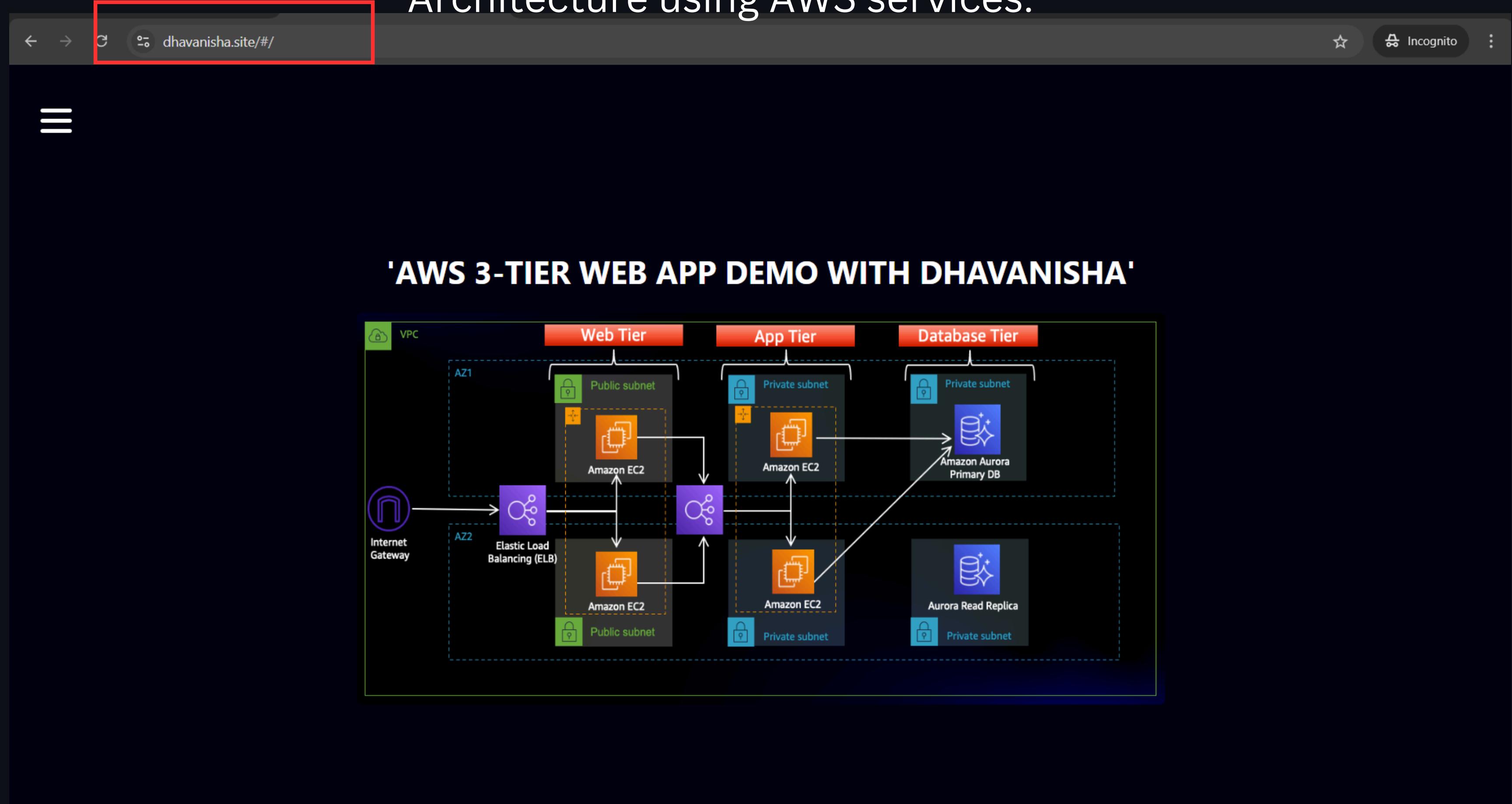
Mutual authentication (mTLS)
Mutual TLS (Transport Layer Security) authentication offers two-way peer authentication. It adds a layer of security over TLS and allows your services to verify the client that's making the connection.

Default attributes Info
Default attributes are applied when adding a listener. You can edit them after adding the listener.

Listener tags - optional

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The project successfully implemented a robust and scalable 3-Tier Architecture using AWS services.





AURORA DATABASE DEMO PAGE

DEL

ID	AMOUNT	DESC
ADD	HI	WELCOME
8	1	DHAVANISHA
9	2	THREE
10	3	TIER
11	4	ARCHITECTURE

HOME

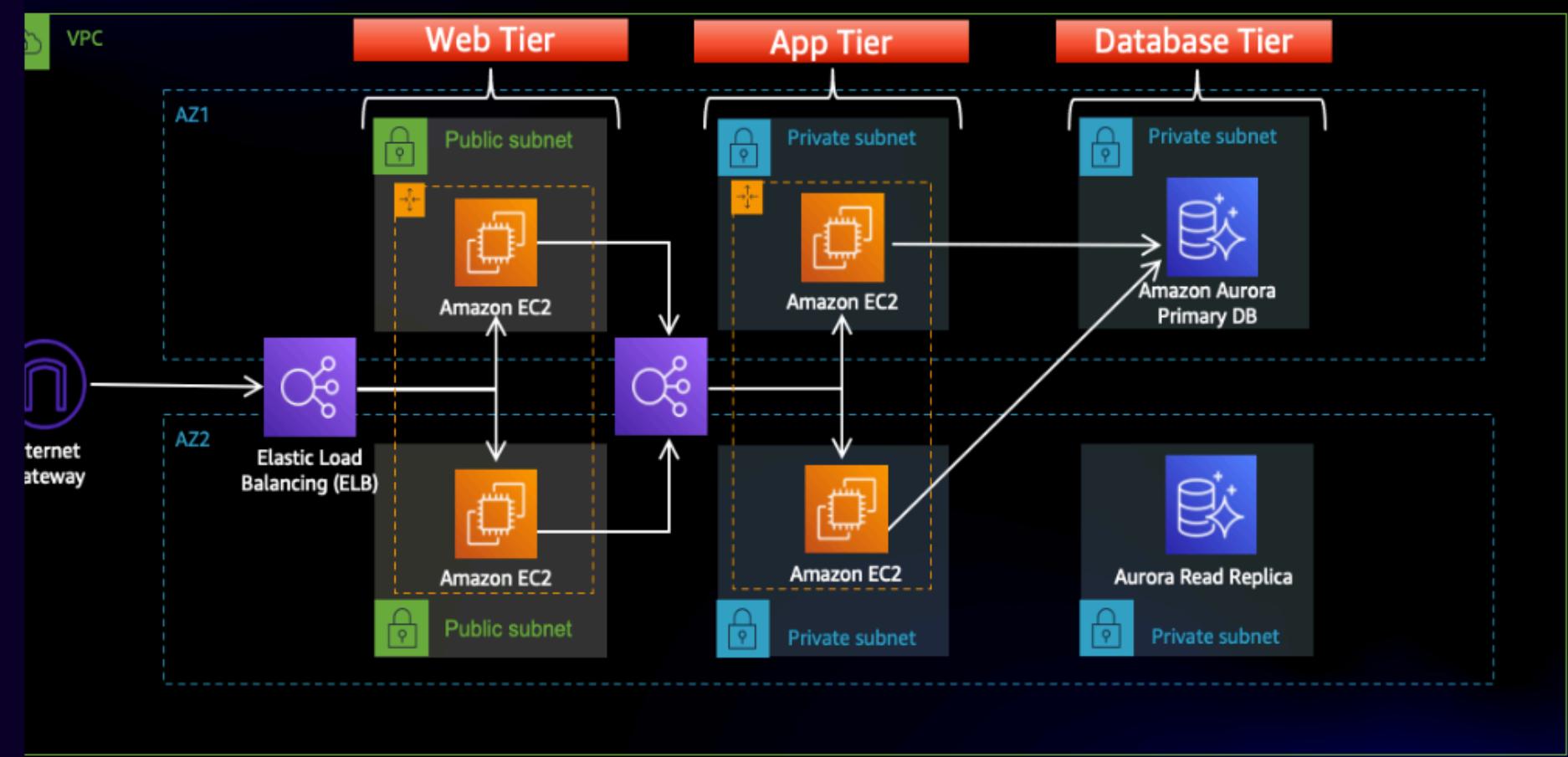
DB DEMO

X

'AWS 3-TIER WEB APP DEMO WITH DHAVANISHA'

 **H O M E**

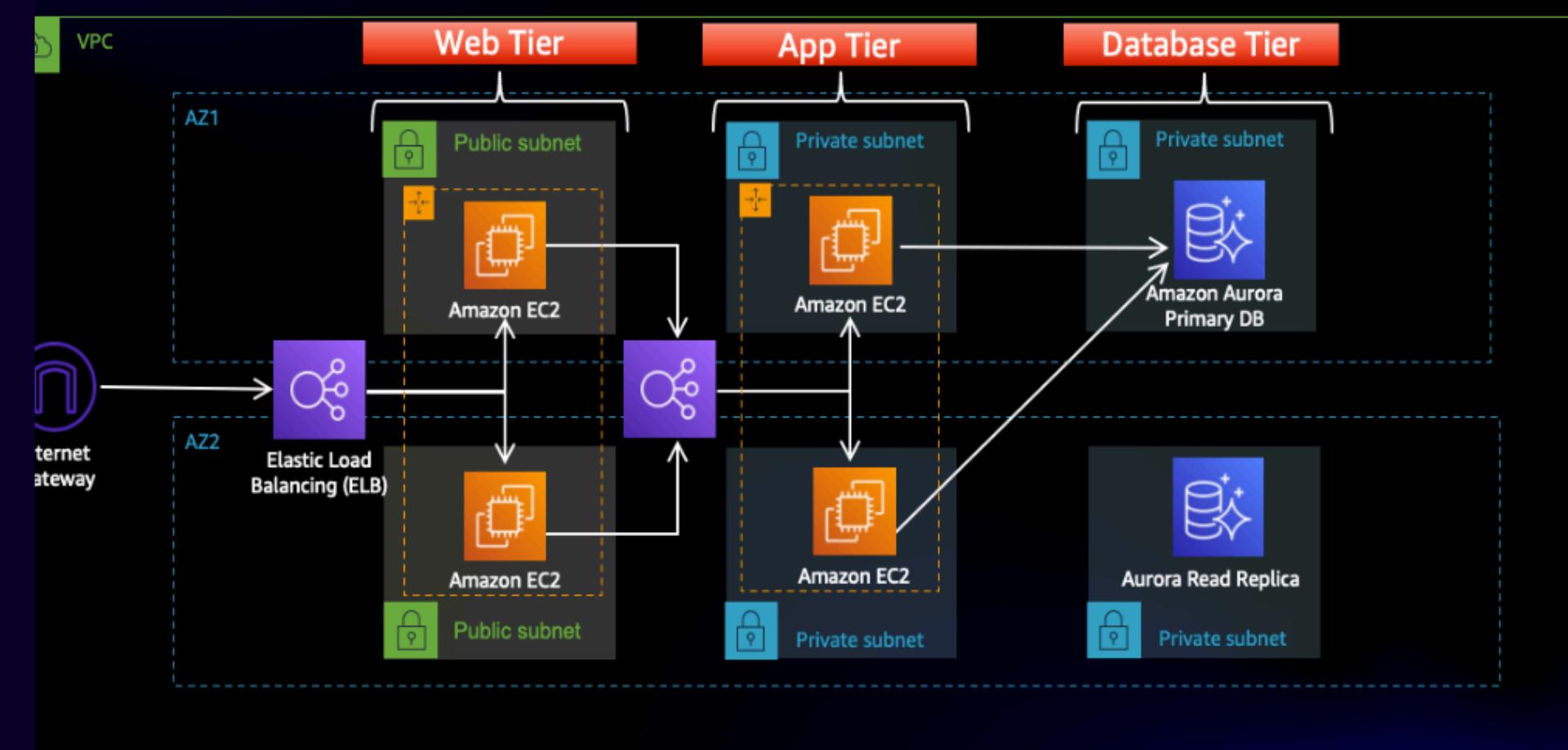
 **D B D E M O**



X

'AWS 3-TIER WEB APP DEMO WITH DHAVANISHA'

 HOME
 DB DEMO



Created a Autoscaling for Automatically adjusts resources to handle traffic surges.

The screenshot shows the AWS EC2 Instances page. On the left, there's a navigation sidebar with sections for Dashboard, EC2 Global View, Events, Instances (selected), Instances, Instance Types, Launch Templates, Spot Requests, Savings Plans, Reserved Instances, Dedicated Hosts, Capacity Reservations, Images, AMIs, and AMI Catalog. Below that is the Elastic Block Store section with Volumes and Snapshots, and the Network & Security section with Security Groups, Elastic IPs, and Placement Groups.

The main content area displays "Instances (1/2) Info". It shows two instances: WEB-TIER-INS... (i-0c45b8ee84e5dd4c9) and APP-TIER-INST... (i-0276987f459582701). The APP-TIER-INSTANCE is selected. The table columns include Name, Instance ID, Instance state, Instance type, Status check, and Alarm. The status for both instances is "Running" with 2/2 checks passed.

A context menu is open over the selected instance, showing options: Connect, View details, Manage instance state, Instance settings, Networking, Security, Image and templates, and Monitor and troubleshoot. The "Public IP" field shows "ec2-3-93".

The detailed view for the selected instance (i-0276987f459582701) includes tabs for Details, Status and alarms, Monitoring, Security, Networking, Storage, and Tags. The Details tab is active, showing the following information:

Instance summary	Public IPv4 address	Private IPv4 addresses
Instance ID: i-0276987f459582701	-	Private IP: 10.0.143.56
IPv6 address: -	Instance state: Running	Public IPv4 DNS: -
Hostname type: IP name: ip-10-0-143-56.ec2.internal	Private IP DNS name (IPv4 only): ip-10-0-143-56.ec2.internal	Elastic IP addresses: -
Answer private resource DNS name: -	Instance type: t2.micro	

us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#CreateImage:instanceId=i-0276987f459582701

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VPC EC2 RDS IAM CodeCommit S3 Route 53

EC2 > Instances > i-0276987f459582701 > Create image

Create image Info

An image (also referred to as an AMI) defines the programs and settings that are applied when you launch an EC2 instance. You can create an image from the configuration of an existing instance.

Instance ID
 i-0276987f459582701 (APP-TIER-INSTANCE)

Image name
APP-TIER-GOLDEN-AMI
Maximum 127 characters. Can't be modified after creation.

Image description - optional
APP-TIER-GOLDEN-AMI
Maximum 255 characters

Reboot instance
When selected, Amazon EC2 reboots the instance so that data is at rest when snapshots of the attached volumes are taken. This ensures data consistency.

Instance volumes

Storage type	Device	Snapshot	Size	Volume type	IOPS	Throughput	Delete on termination	Encrypted
EBS	/dev...	Create new snapshot fr...	8	EBS General Purpose SS...	100		<input checked="" type="checkbox"/> Enable	<input type="checkbox"/> Enable

Add volume

ⓘ During the image creation process, Amazon EC2 creates a snapshot of each of the above volumes.

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VPC EC2 RDS IAM CodeCommit S3 Route 53

EC2 Load balancers EXTERNAL-WEB-ALB

Dashboard EC2 Global View Events Instances Instances Instance Types Launch Templates Spot Requests Savings Plans Reserved Instances Dedicated Hosts Capacity Reservations Images AMIs AMI Catalog Elastic Block Store Volumes Snapshots Lifecycle Manager Network & Security Security Groups Elastic IPs Placement Groups

Currently creating AMI ami-046092f8e57c0a943 from instance i-0276987f459582701. Check that the AMI status is 'Available' before deleting the instance or carrying out other actions related to this AMI.

Last updated 2 minutes ago

Instances (1/2) Info Connect Instance state Actions ▲ Launch instances

Find Instance by attribute or tag (case-sensitive) All states ▾

Name	Instance ID	Instance state	Instance type	Status check	Alarm s
APP-TIER-INST...	i-0276987f459582701	Running	t2.micro	2/2 checks passed	View all
WEB-TIER-INS...	i-0c45b8ee84e5dd4c9	Running	t2.micro	2/2 checks passed	View all

Actions menu for WEB-TIER-INSTANCE:

- Connect
- View details
- Manage instance state
- Instance settings
- Networking
- Security
- Image and templates
- Monitor and troubleshoot

Create image
Create template from instance
Launch more like this

i-0c45b8ee84e5dd4c9 (WEB-TIER-INSTANCE)

Details Status and alarms Monitoring Security Networking Storage Tags

Instance summary

Instance ID	Public IPv4 address	Private IPv4 addresses
i-0c45b8ee84e5dd4c9	3.93.146.218 open address ↗	10.0.6.29
IPv6 address	Instance state	Public IPv4 DNS
-	Running	ec2-3-93-146-218.compute-1.amazonaws.com open address ↗

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VPC EC2 RDS IAM CodeCommit S3 Route 53

EC2 > Load balancers > EXTERNAL-WEB-ALB

Amazon Machine Images (AMIs) (2) Info

Owned by me Find AMI by attribute or tag

Actions ▾ Launch instance from AMI

Instances

- Instances
- Instance Types
- Launch Templates
- Spot Requests
- Savings Plans
- Reserved Instances
- Dedicated Hosts
- Capacity Reservations

Images

- AMIs
- AMI Catalog

Elastic Block Store

- Volumes
- Snapshots
- Lifecycle Manager

Network & Security

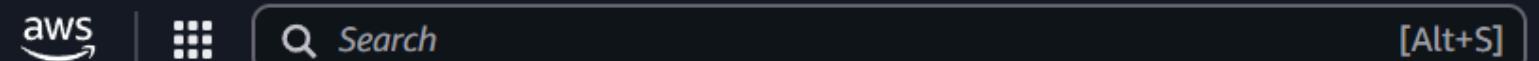
- Security Groups
- Elastic IPs

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88°F ENG 16:01

<input type="checkbox"/>	Name	AMI name	AMI ID	Source	Owner	Visibility
<input type="checkbox"/>	WEB-TIER-GOLDEN-AMI	ami-09923c3caac453f01	515966521120/WEB-TIER-GOLDEN-AMI	515966521120	515966521120	Private
<input type="checkbox"/>	APP-TIER-GOLDEN-AMI	ami-046092f8e57c0a943	515966521120/APP-TIER-GOLDEN-AMI	515966521120	515966521120	Private

Select an AMI



EC2 > Launch templates > Create launch template



Create launch template

Creating a launch template allows you to create a saved instance configuration that can be reused, shared and launched at a later time. Templates can have multiple versions.

Launch template name and description

Launch template name - *required*

APPP-TIER-LAUNCH-TEMPLATE

Must be unique to this account. Max 128 chars. No spaces or special characters like '&', '*', '@'.

Template version description

APPP-TIER-LAUNCH-TEMPLATE

Max 255 chars

Auto Scaling guidance | [Info](#)

Select this if you intend to use this template with EC2 Auto Scaling

Provide guidance to help me set up a template that I can use with EC2 Auto Scaling

► Template tags

► Source template

Launch template contents

Specify the details of your launch template below. Leaving a field blank will result in the field not being included in the launch template.

▼ Application and OS Images (Amazon Machine Image) - *required* [Info](#)

An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. Search or Browse for AMIs if you don't see what you are looking for below

▼ Summary

[Software Image \(AMI\)](#)

[Virtual server type \(instance type\)](#)

[Firewall \(security group\)](#)

[Storage \(volumes\)](#)

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 750 hours of public IPv4 address usage per month, 30 GiB of EBS storage, 2 million I/Os, 1 GB of snapshots, and 100 GB of bandwidth to the internet.



Cancel

Create launch template

us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#CreateTemplate:

aws | Search [Alt+S]

VPC EC2 RDS IAM CodeCommit S3 Route 53

EC2 > Launch templates > Create launch template

AWS, Marketplace and the Community

Amazon Machine Image (AMI)

APP-TIER-GOLDEN-AMI
ami-046092f8e57c0a943
2024-12-22T10:28:06.000Z Virtualization: hvm ENA enabled: true Root device type: ebs

Description
APP-TIER-GOLDEN-AMI

Architecture
x86_64 **AMI ID**
ami-046092f8e57c0a943

Instance type [Info](#) | [Get advice](#)

Instance type

t2.micro
Family: t2 1 vCPU 1 GiB Memory Current generation: true
On-Demand Windows base pricing: 0.0162 USD per Hour
On-Demand Ubuntu Pro base pricing: 0.0134 USD per Hour
On-Demand SUSE base pricing: 0.0116 USD per Hour On-Demand RHEL base pricing: 0.026 USD per Hour
On-Demand Linux base pricing: 0.0116 USD per Hour

Free tier eligible

All generations

[Compare instance types](#)

Key pair (login) [Info](#)

You can use a key pair to securely connect to your instance. Ensure that you have access to the selected key pair before you launch the instance.

Summary

Software Image (AMI)
APP-TIER-GOLDEN-AMI
ami-046092f8e57c0a943

Virtual server type (instance type)
t2.micro

Firewall (security group)
-

Storage (volumes)
1 volume(s) - 8 GiB

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 750 hours of public IPv4 address usage per month, 30 GiB of EBS storage, 2 million IOs, 1 GB of snapshots, and 100 GB of bandwidth to the internet.

[Cancel](#) [Create launch template](#)

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us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#CreateTemplate:

Search [Alt+S]

VPC EC2 RDS IAM CodeCommit S3 Route 53

EC2 > Launch templates > Create launch template

Add new volume

Resource tags Info

No resource tags are currently included in this template. Add a resource tag to include it in the launch template.

Add new tag

You can add up to 50 more tags.

Advanced details Info

IAM instance profile | Info

3-tier-role
arn:aws:iam::515966521120:instance-profile/3-tier-role

Create new IAM profile

Hostname type | Info

Don't include in launch template

DNS Hostname | Info

Enable resource-based IPv4 (A record) DNS requests

Enable resource-based IPv6 (AAAA record) DNS requests

Instance auto-recovery | Info

Don't include in launch template

Shutdown behavior | Info

Summary

Software Image (AMI)
APP-TIER-GOLDEN-AMI
ami-046092f8e57c0a943

Virtual server type (instance type)
t2.micro

Firewall (security group)
APP-SG

Storage (volumes)
1 volume(s) - 8 GiB

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 750 hours of public IPv4 address usage per month, 30 GiB of EBS storage, 2 million IOs, 1 GB of snapshots, and 100 GB of bandwidth to the internet.

Cancel Create launch template

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us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#CreateAutoScalingGroup:

aws | Search [Alt+S] | [] | [] | [] | [] | N. Virginia | Dhavanisha

VPC EC2 RDS IAM CodeCommit S3 Route 53

EC2 > Auto Scaling groups > Create Auto Scaling group

Step 1
Choose launch template
Step 2
Choose instance launch options
Step 3 - optional
Integrate with other services
Step 4 - optional
Configure group size and scaling
Step 5 - optional
Add notifications
Step 6 - optional
Add tags
Step 7
Review

Choose launch template Info

Specify a launch template that contains settings common to all EC2 instances that are launched by this Auto Scaling group.

Name

Auto Scaling group name
Enter a name to identify the group.
 Must be unique to this account in the current Region and no more than 255 characters.

Launch template Info

i For accounts created after May 31, 2023, the EC2 console only supports creating Auto Scaling groups with launch templates. Creating Auto Scaling groups with launch configurations is not recommended but still available via the CLI and API until December 31, 2023.

Launch template
Choose a launch template that contains the instance-level settings, such as the Amazon Machine Image (AMI), instance type, key pair, and security groups.
 C

[Create a launch template](#)

Version
 C

[Create a launch template version](#)

Description APPP-TIER-LAUNCH-TEMPLATE **Launch template** APPP-TIER-LAUNCH-TEMPLATE **Instance type** t2.micro

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us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#CreateAutoScalingGroup:

aws | Search [Alt+S]

VPC EC2 RDS IAM CodeCommit S3 Route 53

EC2 > Auto Scaling groups > Create Auto Scaling group

Step 6 - optional
Add tags

Step 7
Review

Instance type: t2.micro

Network Info

For most applications, you can use multiple Availability Zones and let EC2 Auto Scaling balance your instances across the zones. The default VPC and default subnets are suitable for getting started quickly.

VPC

Choose the VPC that defines the virtual network for your Auto Scaling group.

vpc-0b3c5059ed8826ce7 (3-tier-project-vpc)
10.0.0.0/16

Create a VPC

Availability Zones and subnets

Define which Availability Zones and subnets your Auto Scaling group can use in the chosen VPC.

Select Availability Zones and subnets

us-east-1b | subnet-0398b575e3d6a5f2d (3-tier-project-subnet-APP-2-us-east-1b)
10.0.144.0/20

us-east-1a | subnet-063705093f9bbf690 (3-tier-project-subnet-APP-1-us-east-1a)
10.0.128.0/20

Create a subnet

Availability Zone distribution - new

Auto Scaling automatically balances instances across Availability Zones. If launch failures occur in a zone, select a strategy.

Balanced best effort
If launches fail in one Availability Zone, Auto Scaling will attempt to launch in another healthy Availability Zone.

Balanced only
If launches fail in one Availability Zone, Auto Scaling will continue to attempt to launch in the unhealthy Availability Zone to preserve.

Linked my existing load balancer to autoscaling

The screenshot shows the AWS EC2 console with the URL `us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#CreateAutoScalingGroup:`. The navigation bar includes the AWS logo, search bar, and tabs for VPC, EC2, RDS, IAM, CodeCommit, S3, and Route 53. The main content area shows the 'Create Auto Scaling group' wizard, currently on Step 3 - optional: **Integrate with other services**.

Integrate with other services - optional Info

Use a load balancer to distribute network traffic across multiple servers. Enable service-to-service communications with VPC Lattice. Shift resources away from impaired Availability Zones with zonal shift. You can also customize health check replacements and monitoring.

Load balancing Info

Use the options below to attach your Auto Scaling group to an existing load balancer, or to a new load balancer that you define.

No load balancer
Traffic to your Auto Scaling group will not be fronted by a load balancer.

Attach to an existing load balancer
Choose from your existing load balancers.

Attach to a new load balancer
Quickly create a basic load balancer to attach to your Auto Scaling group.

Attach to an existing load balancer

Select the load balancers that you want to attach to your Auto Scaling group.

Choose from your load balancer target groups
This option allows you to attach Application, Network, or Gateway Load Balancers.

Choose from Classic Load Balancers

Existing load balancer target groups

Only instance target groups that belong to the same VPC as your Auto Scaling group are available for selection.

Select target groups

APP-INT-ALB | HTTP
Application Load Balancer: APP-INT-LB

us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#CreateAutoScalingGroup:

aws | Search [Alt+S]

VPC EC2 RDS IAM CodeCommit S3 Route 53

EC2 > Auto Scaling groups > Create Auto Scaling group

Step 1
Choose launch template

Step 2
Choose instance launch options

Step 3 - optional
Integrate with other services

Step 4 - optional
Configure group size and scaling

Step 5 - optional
Add notifications

Step 6 - optional
Add tags

Step 7
Review

Configure group size and scaling - *optional* Info

Define your group's desired capacity and scaling limits. You can optionally add automatic scaling to adjust the size of your group.

Group size Info

Set the initial size of the Auto Scaling group. After creating the group, you can change its size to meet demand, either manually or by using automatic scaling.

Desired capacity type

Choose the unit of measurement for the desired capacity value. vCPUs and Memory(GiB) are only supported for mixed instances groups configured with a set of instance attributes.

Units (number of instances)

Desired capacity

Specify your group size.

2

Scaling Info

You can resize your Auto Scaling group manually or automatically to meet changes in demand.

Scaling limits

Set limits on how much your desired capacity can be increased or decreased.

Min desired capacity 2	Max desired capacity 2
----------------------------------	----------------------------------

Equal or less than desired capacity Equal or greater than desired capacity

Automatic scaling - optional

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VPC EC2 RDS IAM CodeCommit S3 Route 53

EC2 > Auto Scaling groups > Create Auto Scaling group

Step 1
Choose launch template

Step 2
Choose instance launch options

Step 3 - optional
Integrate with other services

Step 4 - optional
Configure group size and scaling

Step 5 - optional
Add notifications

Step 6 - optional
Add tags

Step 7
Review

Add tags - optional Info

Add tags to help you search, filter, and track your Auto Scaling group across AWS. You can also choose to automatically add these tags to instances when they are launched.

i You can optionally choose to add tags to instances (and their attached EBS volumes) by specifying tags in your launch template. We recommend caution, however, because the tag values for instances from your launch template will be overridden if there are any duplicate keys specified for the Auto Scaling group. X

Tags (1)

Key	Value - optional	Tag new instances
Name	APP-TIER-INSTANCE	<input checked="" type="checkbox"/>

Add tag 49 remaining

Cancel **Previous** **Next**



Search

[Alt+S]



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[VPC](#) [EC2](#) [RDS](#) [IAM](#) [CodeCommit](#) [S3](#) [Route 53](#)[EC2](#) > [Auto Scaling groups](#) > Create Auto Scaling group[i](#) [S](#) [E](#)**Instance state-in protection**

Disabled

Monitoring

Disabled

Default instance warmup

Disabled

Capacity Reservation preference**Preference**

Default

Capacity Reservation IDs

-

Resource Groups

-

Step 5: Add notifications[Edit](#)**Notifications****Notification 1****SNS Topic**

3TIER-SNS-NOTIFICATION (dhavanisha.jp@gmail.com)

Event types

- Launch
- Terminate
- Fail to launch
- Fail to terminate

Step 6: Add tags[Edit](#)**Tags (1)****Key****Value****Tag new instances**

Name

APP-TIER-INSTANCE

Yes

[Preview code](#)[Cancel](#)[Previous](#)[Create Auto Scaling group](#)

us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#AutoScalingGroups:

aws | Search [Alt+S]

VPC EC2 RDS IAM CodeCommit S3 Route 53

EC2 > Auto Scaling groups

Auto Scaling groups (1) [Info](#)

Search your Auto Scaling groups

Launch configurations Launch templates Actions Create Auto Scaling group

< 1 > [⚙️](#)

<input type="checkbox"/>	Name	Launch template/configuration	Instances	Status	Desired capacity	Min	Max	Availability Zones
<input type="checkbox"/>	APP-TIER-ASG	APPP-TIER-LAUNCH-TEMPLATE Version 2	2	-	2	2	2	us-east-1a, us-east-1b

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Autoscaling created for App-tier-instance

The screenshot shows the AWS EC2 Instances page. On the left, there's a navigation sidebar with sections like Dashboard, EC2 Global View, Events, Instances (with sub-options like Instances, Instance Types, Launch Templates, Spot Requests, Savings Plans, Reserved Instances, Dedicated Hosts, Capacity Reservations), Images (AMIs, AMI Catalog), Elastic Block Store (Volumes, Snapshots, Lifecycle Manager), and Network & Security (Security Groups, Elastic IPs, Placement Groups). The main content area has a title "Instances (1/4) Info" and a message "Last updated less than a minute ago". It includes buttons for Connect, Instance state, Actions, and Launch instances. A search bar says "Find Instance by attribute or tag (case-sensitive)" and a dropdown says "All states". Below is a table with columns: Name, Instance ID, Instance state, Instance type, Status check, Alarm status, Availability Zone, and Public IP. The table lists four instances:

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IP
WEB-TIER-INS...	i-0c45b8ee84e5dd4c9	Running	t2.micro	2/2 checks passed	View alarms	us-east-1a	ec2-3-93
APP-TIER-INST...	i-0276987f459582701	Running	t2.micro	2/2 checks passed	View alarms	us-east-1a	-
APP-TIER-INST...	i-0b89545f9e0a9617f	Running	t2.micro	Initializing	View alarms	us-east-1a	-
APP-TIER-INST...	i-0f41cdf488450144d	Running	t2.micro	Initializing	View alarms	us-east-1b	-

Below the table, a specific instance is selected: i-0c45b8ee84e5dd4c9 (WEB-TIER-INSTANCE). The Details tab is active. The Instance summary section shows the Instance ID (i-0c45b8ee84e5dd4c9), IPv6 address (-), and Instance state (Running). The Public IPv4 address is 3.93.146.218, and the Private IPv4 address is 10.0.6.29. The Public IPv4 DNS is ec2-3-93-146-218.compute-1.amazonaws.com.

navigate to the target group. Check the status, all instances are in healthy condition.

The screenshot shows the AWS Elastic Load Balancing (ELB) Target Groups interface for a target group named "APP-INT-ALB".

Details:

- Target type: Instance
- Protocol : Port: HTTP: 4000
- Protocol version: HTTP1
- VPC: vpc-0b3c5059ed8826ce7
- IP address type: IPv4
- Load balancer: APP-INT-LB

Target Status Summary:

Total targets	Healthy	Unhealthy	Unused	Initial	Draining
3	3	0	0	0	0

Distribution of targets by Availability Zone (AZ):

Select values in this table to see corresponding filters applied to the Registered targets table below.

Registered targets (3)

Anomaly mitigation: Not applicable

Instance ID	Name	Port	Zone	Health status	Health status details	Admini...	Overri...
i-0b89545f9e0a9617f	APP-TIER-INST...	4000	us-east-1a (us...)	Healthy	-	No override.	No overri...
i-0f41cdf488450144d	APP-TIER-INST...	4000	us-east-1b (us...)	Healthy	-	No override.	No overri...
i-0276987f459582701	APP-TIER-INST...	4000	us-east-1a (us...)	Healthy	-	No override.	No overri...

The web tier follows similar techniques to the app tier.

The screenshot shows the AWS EC2 'Create launch template' wizard. The top navigation bar includes the AWS logo, search bar, and various service links like VPC, EC2, RDS, IAM, CodeCommit, S3, and Route 53. The current page is 'EC2 > Launch templates > Create launch template'. The main content area is titled 'Create launch template' and explains that it allows saving instance configurations for reuse. It features a 'Launch template name and description' section where 'WEB-TIER-GOLDEN-AMI' is entered. Below this is a 'Template version description' field containing 'WEB-TIER-GOLDEN-AMI'. Under 'Auto Scaling guidance', there's a checked checkbox for 'Provide guidance to help me set up a template that I can use with EC2 Auto Scaling'. A sidebar on the right lists configuration sections: 'Summary', 'Software Image (AMI)', 'Virtual server type (instance type)', 'Firewall (security group)', and 'Storage (volumes)'. A callout box highlights the 'Free tier' information: 'In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 750 hours of public IPv4 address usage per month, 30 GiB of EBS storage, 2 million IOs, 1 GB of snapshots, and 100 GB of bandwidth to the internet.' At the bottom are 'Cancel' and 'Create launch template' buttons.

aws | Search [Alt+S] | N. Virginia | Dhavanisha

VPC EC2 RDS IAM CodeCommit S3 Route 53

EC2 > Launch templates > Create launch template

Create launch template

Creating a launch template allows you to create a saved instance configuration that can be reused, shared and launched at a later time. Templates can have multiple versions.

Launch template name and description

Launch template name - *required*

WEB-TIER-GOLDEN-AMI

Must be unique to this account. Max 128 chars. No spaces or special characters like '&', '*', '@'.

Template version description

WEB-TIER-GOLDEN-AMI

Max 255 chars

Auto Scaling guidance | [Info](#)

Select this if you intend to use this template with EC2 Auto Scaling

Provide guidance to help me set up a template that I can use with EC2 Auto Scaling

► **Template tags**

► **Source template**

Launch template contents

Specify the details of your launch template below. Leaving a field blank will result in the field not being included in the launch template.

▼ **Application and OS Images (Amazon Machine Image) - required** | [Info](#)

An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. Search or Browse for AMIs if you don't see what you are looking for below

Summary

Software Image (AMI)

Virtual server type (instance type)

Firewall (security group)

Storage (volumes)

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 750 hours of public IPv4 address usage per month, 30 GiB of EBS storage, 2 million IOs, 1 GB of snapshots, and 100 GB of bandwidth to the internet.

Cancel Create launch template

us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#LaunchTemplates:

aws | Search [Alt+S]

VPC EC2 RDS IAM CodeCommit S3 Route 53

EC2 > Auto Scaling groups

Dashboard <

EC2 Global View

Events

Instances

- Instances
- Instance Types
- Launch Templates**
- Spot Requests
- Savings Plans
- Reserved Instances
- Dedicated Hosts
- Capacity Reservations

Images

- AMIs
- AMI Catalog

Elastic Block Store

- Volumes
- Snapshots
- Lifecycle Manager

Network & Security

- Security Groups
- Elastic IPs
- Placement Groups

Launch Templates (3) Info

Search

C Actions Create launch template

<input type="checkbox"/>	Launch Template ID	Launch Template Name	Default Version	Latest Version	Create Time	Created By
<input type="checkbox"/>	lt-0621b40bd7184391b	APP-TIER-LAUNCH-TEMPLATE	1	1	2024-12-22T10:38:42.000Z	arn:aws:iam::5159
<input type="checkbox"/>	lt-00802aca8ad46bb6f	created-and-used-by-applicatio...	1	1	2024-12-18T10:44:53.000Z	arn:aws:iam::5159
<input type="checkbox"/>	lt-0bd6fe252894fbbe2	WEB-TIER-LAUNCH-TEMPLATE	1	1	2024-12-22T10:59:01.000Z	arn:aws:iam::5159

Select a launch template

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us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#CreateAutoScalingGroup:

aws | Search [Alt+S]

VPC EC2 RDS IAM CodeCommit S3 Route 53

N. Virginia Dhavanisha

EC2 > Auto Scaling groups > Create Auto Scaling group

Step 1
Choose launch template
Step 2
Choose instance launch options
Step 3 - optional
Integrate with other services
Step 4 - optional
Configure group size and scaling
Step 5 - optional
Add notifications
Step 6 - optional
Add tags
Step 7
Review

Choose launch template Info

Specify a launch template that contains settings common to all EC2 instances that are launched by this Auto Scaling group.

Name

Auto Scaling group name
Enter a name to identify the group.
WEB-TIER-ASG

Must be unique to this account in the current Region and no more than 255 characters.

Launch template Info

i For accounts created after May 31, 2023, the EC2 console only supports creating Auto Scaling groups with launch templates. Creating Auto Scaling groups with launch configurations is not recommended but still available via the CLI and API until December 31, 2023.

Launch template
Choose a launch template that contains the instance-level settings, such as the Amazon Machine Image (AMI), instance type, key pair, and security groups.

WEB-TIER-LAUNCH-TEMPLATE C

[Create a launch template](#) ?

Version

Default (1) C

[Create a launch template version](#) ?

Description	Launch template	Instance type
WEB-TIER-LAUNCH-TEMPALTE	WEB-TIER-LAUNCH-TEMPLATE	t2.micro

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us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#CreateAutoScalingGroup:

aws | Search [Alt+S]

VPC EC2 RDS IAM CodeCommit S3 Route 53

EC2 > Auto Scaling groups > Create Auto Scaling group

Step 1 Choose launch template
Step 2 Choose instance launch options
Step 3 - optional Integrate with other services
Step 4 - optional Configure group size and scaling
Step 5 - optional Add notifications
Step 6 - optional Add tags
Step 7 Review

Configure group size and scaling - *optional* Info

Define your group's desired capacity and scaling limits. You can optionally add automatic scaling to adjust the size of your group.

Group size Info

Set the initial size of the Auto Scaling group. After creating the group, you can change its size to meet demand, either manually or by using automatic scaling.

Desired capacity type

Choose the unit of measurement for the desired capacity value. vCPUs and Memory(GiB) are only supported for mixed instances groups configured with a set of instance attributes.

Units (number of instances)

Desired capacity

Specify your group size.

2

Scaling Info

You can resize your Auto Scaling group manually or automatically to meet changes in demand.

Scaling limits

Set limits on how much your desired capacity can be increased or decreased.

Min desired capacity 2	Max desired capacity 2
----------------------------------	----------------------------------

Equal or less than desired capacity Equal or greater than desired capacity

Automatic scaling - *optional*

Choose whether to use a target tracking policy | Info

aws | Search [Alt+S] | N. Virginia | Dhavanisha

VPC EC2 RDS IAM CodeCommit S3 Route 53

EC2 > Auto Scaling groups

WEB-TIER-ASG created successfully

Auto Scaling groups (2) [Info](#)

Launch configurations Launch templates Actions Create Auto Scaling group

Search your Auto Scaling groups

<input type="checkbox"/>	Name	Launch template/configuration	Instances	Status	Desired capacity	Min	Max	Availability Zones
<input type="checkbox"/>	WEB-TIER-ASG	WEB-TIER-LAUNCH-TEMPLATE Version 1	2	-	2	2	2	us-east-1a, us-east-1b
<input type="checkbox"/>	APP-TIER-ASG	APP-TIER-LAUNCH-TEMPLATE Version 1	2	-	2	2	2	us-east-1a, us-east-1b

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Dashboard	<	Instances (3/6) Info	Last updated less than a minute ago		Connect	Instance state ▾	Actions ▾	Launch instances	▼																																																
				<input type="text"/> Find Instance by attribute or tag (case-sensitive)					All states ▾																																																
<table border="1"><thead><tr><th>Name</th><th>Instance ID</th><th>Instance state</th><th>Instance type</th><th>Status check</th><th>Alarm status</th><th>Availability Zone</th><th>Public IP</th></tr></thead><tbody><tr><td><input type="checkbox"/> APP-TIER-INST...</td><td>i-0276987f459582701</td><td> Running </td><td>t2.micro</td><td> 2/2 checks passed</td><td>View alarms +</td><td>us-east-1a</td><td>-</td></tr><tr><td><input checked="" type="checkbox"/> WEB-TIER-INS...</td><td>i-0c45b8ee84e5dd4c9</td><td> Running </td><td>t2.micro</td><td> 2/2 checks passed</td><td>View alarms +</td><td>us-east-1a</td><td>ec2-3-93</td></tr><tr><td><input checked="" type="checkbox"/> WEB-TIER-INS...</td><td>i-0b23b8ed85aee6bc1</td><td> Running </td><td>t2.micro</td><td> Initializing</td><td>View alarms +</td><td>us-east-1a</td><td>-</td></tr><tr><td><input type="checkbox"/> APP-TIER-INST...</td><td>i-0b89545f9e0a9617f</td><td> Running </td><td>t2.micro</td><td> 2/2 checks passed</td><td>View alarms +</td><td>us-east-1a</td><td>-</td></tr><tr><td><input type="checkbox"/> APP-TIER-INST...</td><td>i-0f41cdf488450144d</td><td> Running </td><td>t2.micro</td><td> 2/2 checks passed</td><td>View alarms +</td><td>us-east-1b</td><td>-</td></tr><tr><td><input checked="" type="checkbox"/> WEB-TIER-INS...</td><td>i-02574053f14b78385</td><td> Running </td><td>t2.micro</td><td> Initializing</td><td>View alarms +</td><td>us-east-1b</td><td>-</td></tr></tbody></table>	Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IP	<input type="checkbox"/> APP-TIER-INST...	i-0276987f459582701	Running	t2.micro	2/2 checks passed	View alarms +	us-east-1a	-	<input checked="" type="checkbox"/> WEB-TIER-INS...	i-0c45b8ee84e5dd4c9	Running	t2.micro	2/2 checks passed	View alarms +	us-east-1a	ec2-3-93	<input checked="" type="checkbox"/> WEB-TIER-INS...	i-0b23b8ed85aee6bc1	Running	t2.micro	Initializing	View alarms +	us-east-1a	-	<input type="checkbox"/> APP-TIER-INST...	i-0b89545f9e0a9617f	Running	t2.micro	2/2 checks passed	View alarms +	us-east-1a	-	<input type="checkbox"/> APP-TIER-INST...	i-0f41cdf488450144d	Running	t2.micro	2/2 checks passed	View alarms +	us-east-1b	-	<input checked="" type="checkbox"/> WEB-TIER-INS...	i-02574053f14b78385	Running	t2.micro	Initializing	View alarms +	us-east-1b	-	▼
Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IP																																																		
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<input checked="" type="checkbox"/> WEB-TIER-INS...	i-0b23b8ed85aee6bc1	Running	t2.micro	Initializing	View alarms +	us-east-1a	-																																																		
<input type="checkbox"/> APP-TIER-INST...	i-0b89545f9e0a9617f	Running	t2.micro	2/2 checks passed	View alarms +	us-east-1a	-																																																		
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<input checked="" type="checkbox"/> WEB-TIER-INS...	i-02574053f14b78385	Running	t2.micro	Initializing	View alarms +	us-east-1b	-																																																		
Instances	Instances	Instance Types	Launch Templates	Spot Requests	Savings Plans	Reserved Instances	Dedicated Hosts																																																		

3 instances selected

Monitoring

8 Alarm recommendations 9

3h 1d 1w 1h  UTC

timezone ▾

 Add to dashboard

CPU utilization (%)

Network in (bytes)

Network out (bytes) ⓘ ⋮

network packets in (co... ⓘ ⋮

This is also in healthy condition.

The screenshot shows the AWS Elastic Load Balancing (ELB) Target Groups page for a target group named "WEB-TG".

Details:

- ARN: arn:aws:elasticloadbalancing:us-east-1:515966521120:targetgroup/WEB-TG/c2c6e9d97675cdf2
- Target type: Instance
- Protocol: Port: HTTP: 80
- Protocol version: HTTP1
- VPC: vpc-0b3c5059ed8826ce7
- IP address type: IPv4
- Load balancer: None associated

Target Status:

Total targets	Healthy	Unhealthy	Unused	Initial	Draining
3	3	0	0	0	0
	Healthy	Unhealthy	Unused	Initial	Draining
	0 Anomalous				

Distribution of targets by Availability Zone (AZ):

Select values in this table to see corresponding filters applied to the Registered targets table below.

Registered targets (3)

Anomaly mitigation: Not applicable

Instance ID	Name	Port	Zone	Health status	Health status details	Admini...	Overri...
i-02574053f14b78385	WEB-TIER-INS...	80	us-east-1b (us...)	Healthy	-	No override.	No overri...
i-0b23b8ed85aee6bc1	WEB-TIER-INS...	80	us-east-1a (us...)	Healthy	-	No override.	No overri...
i-0c45b8ee84e5dd4c9	WEB-TIER-INS...	80	us-east-1a (us...)	Healthy	-	No override.	No overri...

Actions:

- Filter targets
- Deregister
- Register targets

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got a sns notification from aws

Screenshot of a Gmail inbox showing an AWS SNS subscription confirmation email.

Gmail Search mail Active

Compose Mail Chat Meet Labels +

Inbox (1,510) Starred Snoozed Sent Drafts More

AWS Notification - Subscription Confirmation

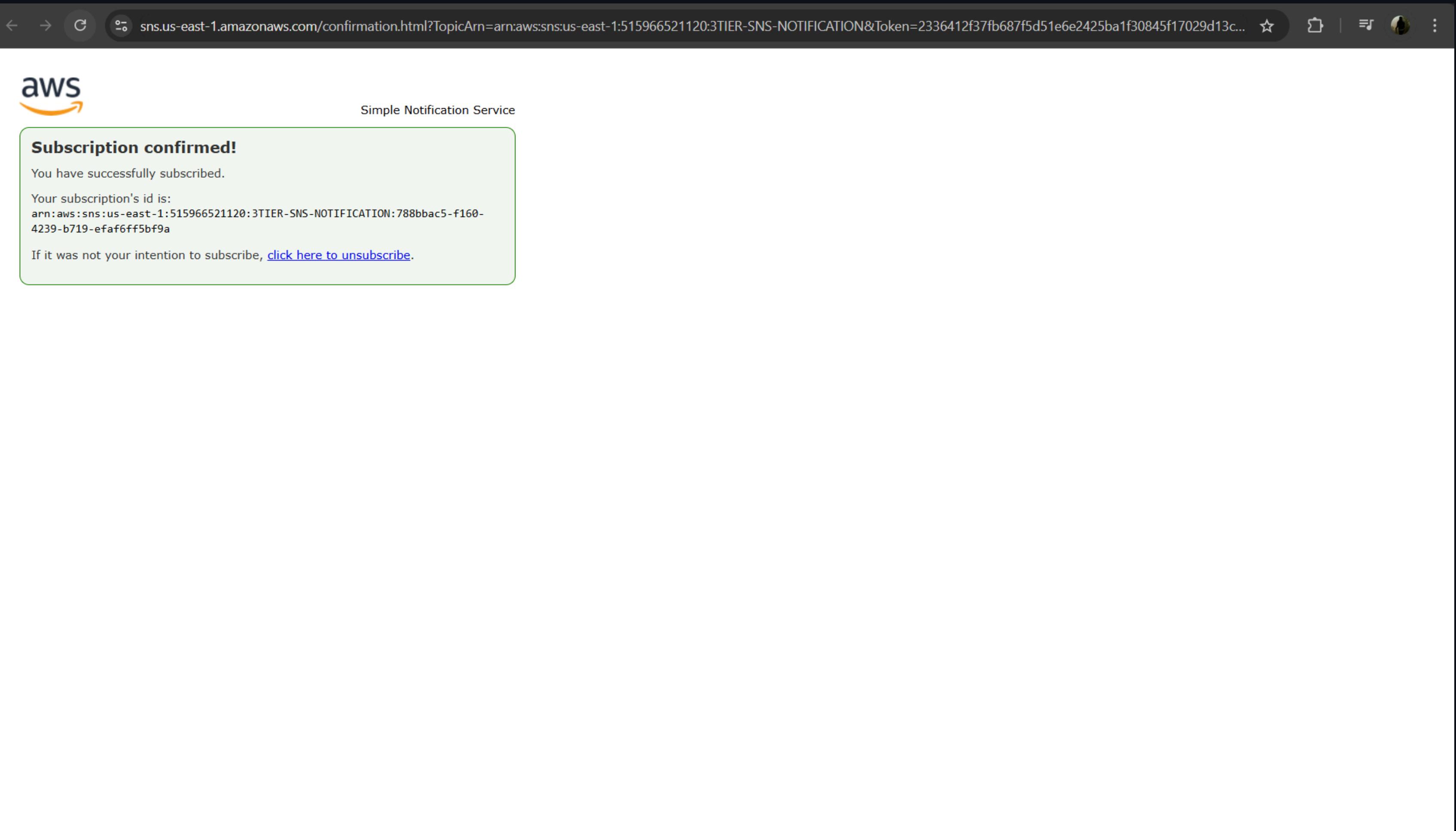
AWS Notifications <no-reply@sns.amazonaws.com> to me 4:20 PM (29 minutes ago)

You have chosen to subscribe to the topic:
arn:aws:sns:us-east-1:515966521120:3TIER-SNS-NOTIFICATION

To confirm this subscription, click or visit the link below (If this was in error no action is necessary):
[Confirm subscription](#)

Please do not reply directly to this email. If you wish to remove yourself from receiving all future SNS subscription confirmation requests please send an email to [sns-opt-out](#)

Reply Forward



Created a cloud watch for Monitoring a application performance

The screenshot shows the AWS EC2 console with the URL us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#AutoScalingGroupDetails:id=APP-TIER-ASG;view=monitoring. The left sidebar is collapsed. The main content area displays the 'APP-TIER-ASG Capacity overview' and the 'Monitoring' tab is selected. A red box highlights the 'All times shown are in UTC.' message and the 'View all CloudWatch metrics' link.

APP-TIER-ASG Capacity overview

arn:aws:autoscaling:us-east-1:515966521120:autoScalingGroup:d3026696-15da-484f-8e9f-65eae8e4a978:autoScalingGroupName/APP-TIER-ASG

Desired capacity	Scaling limits (Min - Max)	Desired capacity type	Status
2	2 - 2	Units (number of instances)	-

Date created
Sun Dec 22 2024 16:20:15 GMT+0530 (India Standard Time)

CloudWatch monitoring details

Auto Scaling (selected) | **EC2**

Auto Scaling group metrics collection:
 Enable

All times shown are in UTC.
[View all CloudWatch metrics](#)

3h 1d 1w UTC timezone Add to dashboard

Minimum Group Size (Count): 1 No data available. Try adjusting the dashboard time range.

Maximum Group Size (Count): 1 No data available. Try adjusting the dashboard time range.

Desired Capacity (Count): 1 No data available. Try adjusting the dashboard time range.

In Service Instances (Count): 1 No data available. Try adjusting the dashboard time range.

CloudShell | **Feedback** | © 2024, Amazon Web Services, Inc. or its affiliates. | **Privacy** | **Terms** | **Cookie preferences**

us-east-1.console.aws.amazon.com/cloudwatch/home?region=us-east-1#alarmsV2:~(alarmStateFilter~'ALARM')

aws | Search [Alt+S]

VPC EC2 RDS IAM CodeCommit S3 Route 53

CloudWatch > Alarms

CloudWatch

Favorites and recents

Dashboards [New](#)

▶ AI Operations [Preview](#)

▼ Alarms ⚠ 0 ✓ 0 ... 0

- In alarm
- All alarms
- Billing

▶ Logs [New](#)

▶ Metrics

▶ X-Ray traces [New](#)

▶ Events

▶ Application Signals

▶ Network Monitoring [New](#)

▶ Insights [New](#)

Settings

Telemetry config

Getting Started

What's new

Alarms (0)

Hide Auto Scaling alarms

[Clear selection](#) [Create composite alarm](#) [Actions](#)

[Create alarm](#)

Search

Alarm state: In alarm

Alarm type: Any

Actions status: Any

Name State Last state update (UTC) Conditions Actions

No alarms

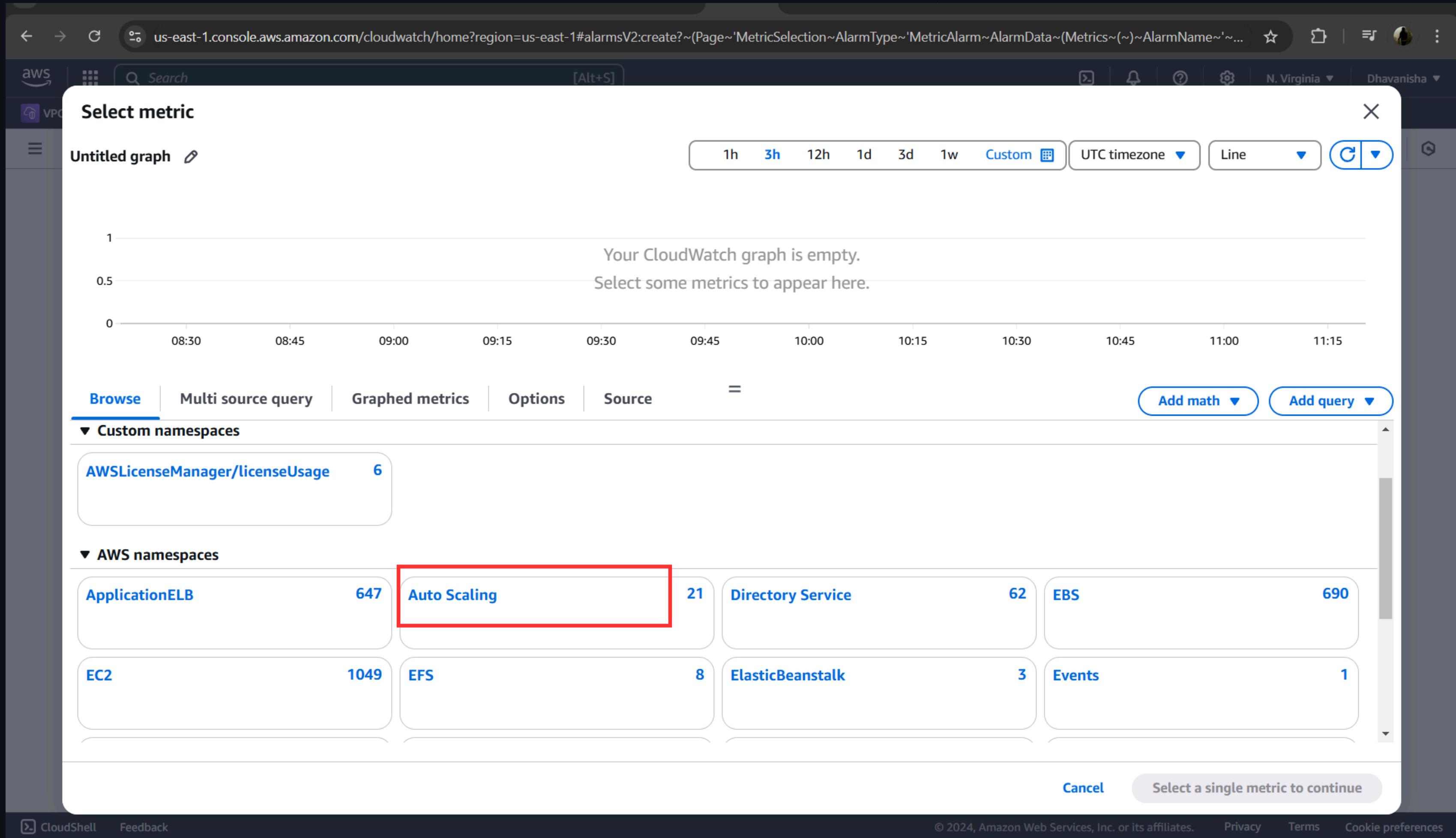
No alarms to display

[Read more about Alarms](#)

[Create alarm](#)

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us-east-1.console.aws.amazon.com/cloudwatch/home?region=us-east-1#alarmsV2:create?~(Page~'MetricSelection~AlarmType~MetricAlarm~AlarmData~(Metrics~(~)~AlarmName~'~...)

aws | Search [Alt+S]

VPC N. Virginia Dhavanisha

Select metric

Untitled graph

1h 3h 12h 1d 3d 1w Custom UTC timezone Line

Your CloudWatch graph is empty.
Select some metrics to appear here.

08:30 08:45 09:00 09:15 09:30 09:45 10:00 10:15 10:30 10:45 11:00 11:15

Browse Multi source query Graphed metrics Options Source = Add math Add query

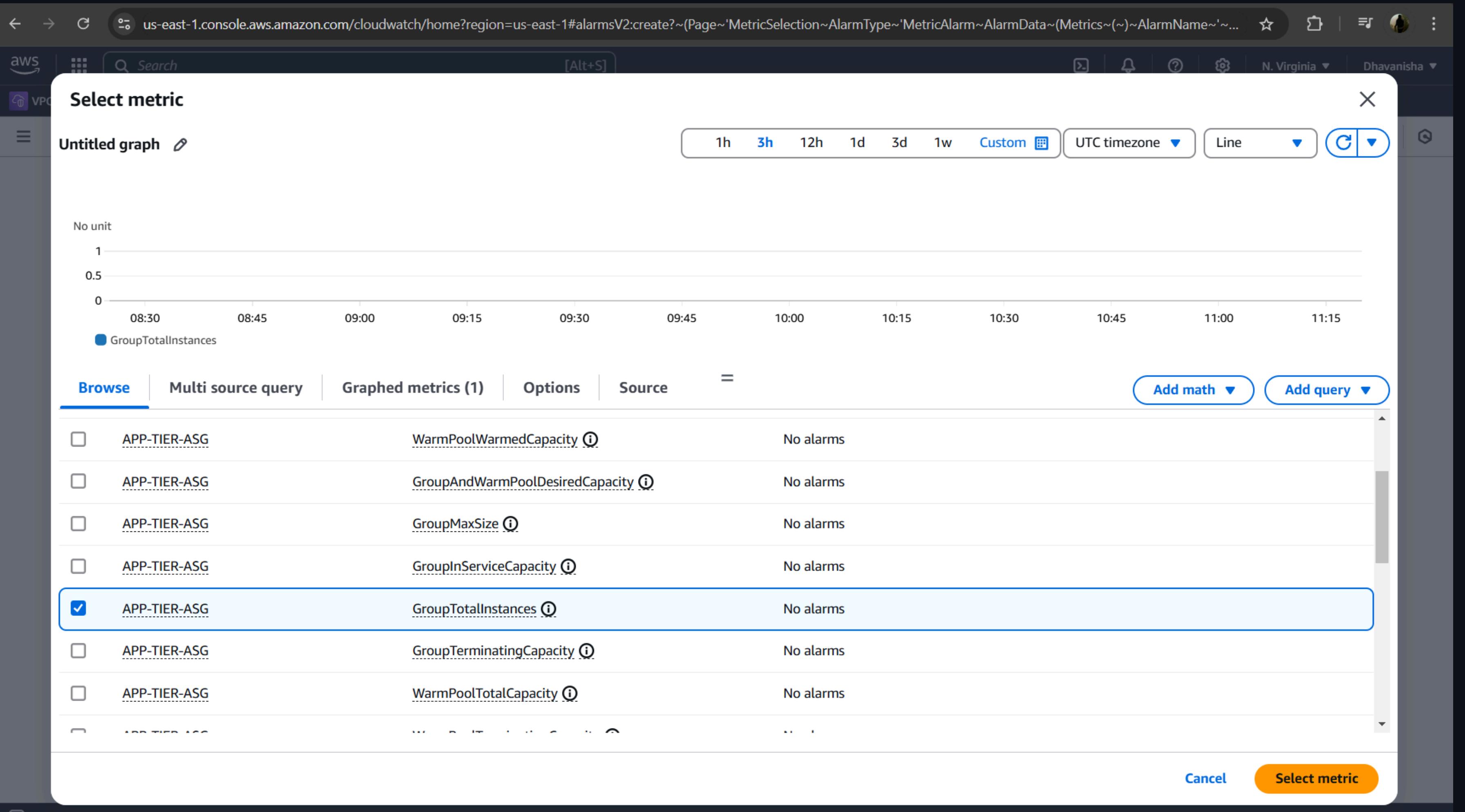
Metrics (21) Alarm recommendations Graph with SQL Graph search

N. Virginia All > Auto Scaling Search for any metric, dimension, resource id or account id

Group Metrics 21

Cancel Select a single metric to continue

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us-east-1.console.aws.amazon.com/cloudwatch/home?region=us-east-1#alarmsV2:create/?~(Page~'MetricSelection~AlarmType~'MetricAlarm~AlarmData~(Namespace~'AWSAutoScaling~MetricName~GroupTotalInstances~Dimensions~(Name~'AutoScalingGroup~Value~'arn:aws:autoscaling:us-east-1:123456789012:autoScalingGroup:12345678901234567890123456789012:group:12345678901234567890123456789012)~Period~300~Statistic~Average~ComparisonOperator~LessThan~Threshold~2~Unit~Count)

aws | Search [Alt+S]

VPC EC2 RDS IAM CodeCommit S3 Route 53

CloudWatch > Alarms > Create alarm

1
08:30 09:30 10:30
GroupTotalInstances

Statistic: Average
Period: 5 minutes

Conditions

Threshold type: Static (selected)
Anomaly detection

Whenever GroupTotalInstances is...
Define the alarm condition.
Greater than threshold
Greater/Equal >= threshold
Lower/Equal <= threshold (selected)
Lower < threshold

than...
Define the threshold value.
2
Must be a number

► Additional configuration

us-east-1.console.aws.amazon.com/cloudwatch/home?region=us-east-1#alarms

aws | Search [Alt+S]

VPC EC2 RDS IAM CodeCommit S3 Route 53

CloudWatch > Alarms

CloudWatch <

Favorites and recents ▶

Dashboards New

▶ AI Operations Preview

▼ Alarms ⚠ 0 ⓘ 0 📈 1

In alarm

All alarms

Billing

▶ Logs New

▶ Metrics

▶ X-Ray traces New

▶ Events

▶ Application Signals

▶ Network Monitoring New

▶ Insights New

Settings

Telemetry config

Alarms (1)

Hide Auto Scaling alarms

<input type="checkbox"/>	Name	State	Last state update (UTC)	Conditions	Actions
<input type="checkbox"/>	ALERT	OK	2024-12-22 11:30:54	GroupTotalInstances < 2 for 1 datapoints within 5 minutes	<input checked="" type="checkbox"/> Actions enabled

To check outcomes, I am terminating one instance.

The screenshot shows the AWS EC2 Instances page for the 'APP-TIER-ASG' group. There are 6 instances listed:

Name	Instance ID	Instance state	Instance type	Status	Availability Zone	Public IP
APP-TIER-INST...	i-0276987f459582701	Running	t2.micro	2/2 checks passed	us-east-1a	-
WEB-TIER-INS...	i-0c45b8ee84e5dd4c9	Running	t2.micro	2/2 checks passed	us-east-1a	ec2-3-93
WEB-TIER-INS...	i-0b23b8ed85aeee6bc1	Running	t2.micro	2/2 checks passed	us-east-1a	-
APP-TIER-INST...	i-0b89545f9e0a9617f	Running	t2.micro	2/2 checks passed	us-east-1a	-
APP-TIER-INST...	i-0f41cdf488450144d	Running	t2.micro	2/2 checks passed	us-east-1b	-
WEB-TIER-INS...	i-02574053f14b78385	Running	t2.micro	2/2 checks passed	us-east-1b	-

A context menu is open over the selected instance (i-0f41cdf488450144d), showing options: Stop instance, Start instance, Reboot instance, Hibernate instance, and Terminate (delete) instance. The 'Terminate (delete) instance' option is highlighted.

Instances (1/6)

Last updated 1 minute ago

Actions ▾

Launch instances

Stop instance

Start instance

Reboot instance

Hibernate instance

Terminate (delete) instance

Availability Zone ▾

Public IP

us-east-1a

us-east-1a

us-east-1a

us-east-1a

us-east-1b

us-east-1b

i-0f41cdf488450144d (APP-TIER-INSTANCE)

Details Status and alarms Monitoring Security Networking Storage Tags

Instance summary

Instance ID	Public IPv4 address	Private IPv4 addresses
i-0f41cdf488450144d	-	10.0.151.0
IPv6 address	Instance state	Public IPv4 DNS
-	Running	-

I received a sns notification after quitting the instance.

mail.google.com/mail/u/0/#inbox/

Gmail Search mail Active

Compose Mail 99+ Inbox 1,510 Chat Starred Snoozed Sent Drafts 43 Meet More Labels +

Auto Scaling: launch for group "APP-TIER-ASG" Inbox

AWS Notifications to me 5:04 PM (0 minutes ago)

Service: AWS Auto Scaling
Time: 2024-12-22T11:34:26.607Z
RequestId: b7b64fb8-9650-9ae9-6636-a67e78b4e667
Event: autoscaling:EC2_INSTANCE_LAUNCH
AccountId: 515966521120
AutoScalingGroupName: APP-TIER-ASG
AutoScalingGroupARN: arn:aws:autoscaling:us-east-1:515966521120:autoScalingGroup:d3026696-15da-484f-8e9f-65eae8e4a978:autoScalingGroupName/APP-TIER-ASG
ActivityId: b7b64fb8-9650-9ae9-6636-a67e78b4e667
Description: Launching a new EC2 instance: i-0c724305ede859017
Cause: At 2024-12-22T11:34:18Z an instance was launched in response to an unhealthy instance needing to be replaced.
StartTime: 2024-12-22T11:34:20.454Z
EndTime: 2024-12-22T11:34:26.607Z
StatusCode: InProgress
StatusMessage:
Progress: 50
EC2InstanceId: i-0c724305ede859017
Details: {"Subnet ID": "subnet-0398b575e3d6a5f2d", "Availability Zone": "us-east-1b"}
Origin: EC2
Destination: AutoScalingGroup

--
If you wish to stop receiving notifications from this topic, please click or visit the link below to unsubscribe:
<https://sns.us-east-1.amazonaws.com/unsubscribe.html?SubscriptionArn=arn:aws:sns:us-east-1:515966521120:3TIER-SNS-NOTIFICATION:788bbac5-f160-4239-b719-efaf6ff5bf9a&Endpoint=dhavanisha.jp@gmail.com>

Please do not reply directly to this email. If you have any questions or comments regarding this email, please contact us at <https://aws.amazon.com/support>

Instances are also created automatically because of the implemented autoscaling.

The screenshot shows the AWS EC2 Instances page with the following details:

- Success Message:** A green banner at the top indicates "Successfully initiated termination (deletion) of i-0f41cdf488450144d".
- Instance Count:** Instances (1/7)
- Last Updated:** Less than a minute ago
- Actions:** Connect, Instance state, Actions, Launch instances
- Search:** Find Instance by attribute or tag (case-sensitive)
- Filter:** All states
- Table Headers:** Name, Instance ID, Instance state, Instance type, Status check, Alarm status, Availability Zone, Public IP
- Instances:** A list of 7 instances, including one terminated instance and one currently initializing.

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IP
APP-TIER-INST...	i-0276987f459582701	Running	t2.micro	2/2 checks passed	View alarms +	us-east-1a	-
WEB-TIER-INS...	i-0c45b8ee84e5dd4c9	Running	t2.micro	2/2 checks passed	View alarms +	us-east-1a	ec2-3-93
WEB-TIER-INS...	i-0b23b8ed85aee6bc1	Running	t2.micro	2/2 checks passed	View alarms +	us-east-1a	-
APP-TIER-INST...	i-0b89545f9e0a9617f	Running	t2.micro	2/2 checks passed	View alarms +	us-east-1a	-
APP-TIER-INST...	i-0f41cdf488450144d	Terminated	t2.micro	-	View alarms +	us-east-1b	-
WEB-TIER-INS...	i-02574053f14b78385	Running	t2.micro	2/2 checks passed	View alarms +	us-east-1b	-
APP-TIER-INST...	i-0c724305ede859017	Running	t2.micro	Initializing	View alarms +	us-east-1b	-

CONCLUSION

In conclusion, this project successfully implemented a robust and scalable 3-Tier Architecture using AWS services, showcasing the potential of cloud technologies in building modern, efficient, and reliable applications. By utilizing key AWS tools such as VPC, EC2, S3, RDS, IAM, Route 53, Load Balancer, Auto Scaling, Certificate Manager, and CloudWatch, the architecture achieved the following:

- High Scalability: Auto Scaling dynamically adjusted resources to handle varying traffic loads.
- Enhanced Security: IAM and SSL certificates from Certificate Manager ensured secure access and communication.
- Reliability and Fault Tolerance: Load Balancer and Route 53 distributed traffic efficiently and provided redundancy.
- Performance Optimization: CloudWatch enabled real-time monitoring and insights for system improvements.

This architecture demonstrates the power of AWS in providing a flexible and modular framework for deploying multi-tier applications. The project not only addressed key challenges such as integration and scaling but also delivered measurable results, including improved uptime, reduced latency, and cost efficiency.



THANK YOU



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