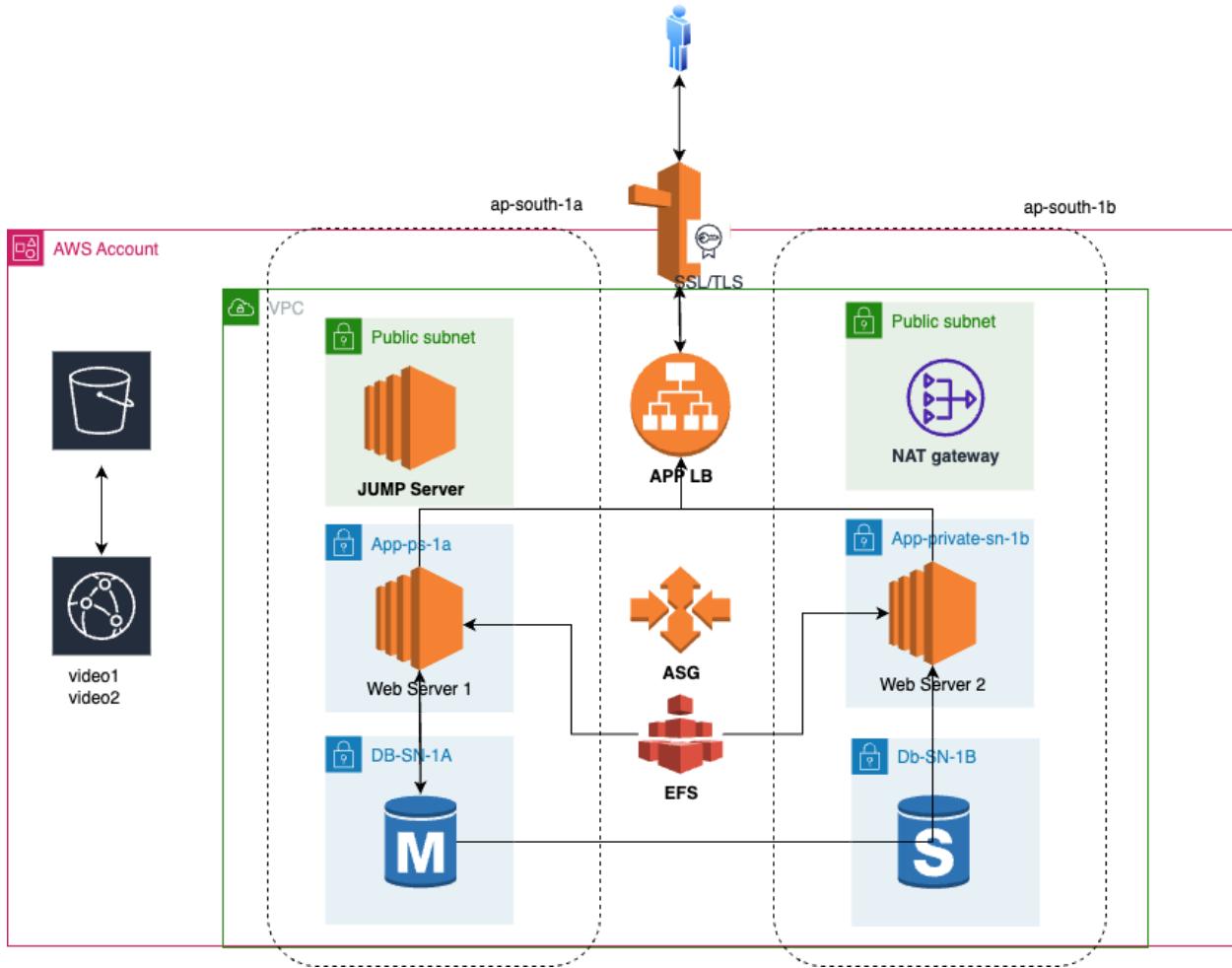


Course Project

Architectural Diagram:



This are the steps to follow to create a 3-tier Architecture Diagram:

Step 1 : Create an S3 bucket, upload a couple of video files. Create cloudfront distribution to deliver these videos via edge location.

Step 2 : create required ec2 instance in custom VPC Public Subnet, connect to it and configure it to access RDS, EFS.

Step 3:

Create 4 Security groups

1. App servers : ssh, http
2. for ELB : http and https

3. RDS : mysql
4. EFS : nfs

Step 4 : Create a mysql RDS DB, use DB subnets only (subnet group), Make sure it has connectivity to web servers.

Step 5 : Connect to your ec2 instance, then connect to RDS DB, Create Required database, table and users.

Step 6 : install required packages, enable http to https redirection, then test php.

Step 7 : Modify web content submit files with your rds cluster, username, pwd and db.

Step 8 : Mount efs to /var/www/html/ path, make it perm mount.

Step 9 : upload all files to s3 bucket, then copy it to /var/www/html/ path.

Step 10 : Pick your ec2 instance public IP, and access the webpage, enter some info, it should store in backend rds db. Connect to DB and verify entries.

Step 11 : Stop ec2 instance, create a GoldenAMI of this instance

step 12 : create a target group and Load balancer

Step 13 : Create a Launch Template, then create an ASG.

Github:

<https://github.com/BhanuGangu/IS698LAB/tree/main/Course-project>

Step1:

The screenshot shows the AWS CloudFormation console with the search bar set to 'cloudformation'. The main page displays the status of a stack named 'capstone-project'. The summary section indicates that the destination 's3://capstone-s3-1bucket1' has succeeded with 2 files (3.5 MB) and failed with 0 files (0%). Below this, the 'Files and folders' tab is selected, showing a table with two mp4 files: 'A001_C064_09224Y_001.mp4' and 'A004_C002_09244Q_001.mp4', both of which have succeeded.

The screenshot shows the AWS CloudFront console with the search bar set to 'Search'. A new distribution is being created. In the 'Distribution options' section, the 'Single website or app' option is selected, with a note that it's chosen for a single app or website. The 'Multi-tenant architecture - New' option is also available for multiple domains. The 'Origin' section is expanded, showing the 'Origin domain' field containing 'capstone-s3-1bucket1.s3.us-east-2.amazonaws.com'. The 'Origin path - optional' field is empty. The 'Name' field contains 'capstone-s3-1bucket1.s3.us-east-2.amazonaws.com'. Under 'Origin access', the 'Origin access control settings (recommended)' option is selected, with a note that it restricts access to CloudFront. The bottom of the screen includes standard AWS navigation links like CloudShell and Feedback.

AWS CloudFront Distribution Details for ECCN3UTFIG36H

General

Details

- Distribution domain name: d2q5q04ey8e4bd.cloudfront.net
- ARN: arn:aws:cloudfront::339712878593:distribution/ECCN3UTFIG36H
- Last modified: Deploying

Settings

- Description: -
- Alternate domain names: -
- Standard logging: Off
- Cookie logging: Off
- Default root object: -

Continuous deployment

Create staging distribution

Step 2 :

AWS VPC Subnets Dashboard

You have successfully created 6 subnets: subnet-05412c77b68dc8516, subnet-01bcdedb18743ddd37, subnet-0c34179ced4cc44cb, subnet-0d003cc32a5e5eb52, subnet-051fa98b4f10a82c4, subnet-06948a867ad95e385

Subnets (6) Info

Name	Subnet ID	State	VPC	Block Public...	IPv4
Cs-prd-web-1A	subnet-05412c77b68dc8516	Available	vpc-0b11693dae694659c cust...	Off	192.1
Cs-prd-web-1B	subnet-01bcdedb18743ddd37	Available	vpc-0b11693dae694659c cust...	Off	192.1
Cs-prd-app-1A	subnet-0c34179ced4cc44cb	Available	vpc-0b11693dae694659c cust...	Off	192.1
Cs-prd-Db-1A	subnet-051fa98b4f10a82c4	Available	vpc-0b11693dae694659c cust...	Off	192.1
Cs-prd-Db-1B	subnet-06948a867ad95e385	Available	vpc-0b11693dae694659c cust...	Off	192.1
Cs-prd-app-1B	subnet-0d003cc32a5e5eb52	Available	vpc-0b11693dae694659c cust...	Off	192.1

Select a subnet

Screenshot of the AWS VPC Details page for VPC ID: vpc-0b11693dae694659c / custom-vpc.

Details

VPC ID vpc-0b11693dae694659c	State Available	Block Public Access Off	DNS hostnames Disabled
DNS resolution Enabled	Tenancy default	DHCP option set dopt-0927464b80158b53f	Main route table rtb-00694eae366e7d480
Main network ACL acl-0715f3448a1e94da	Default VPC No	IPv4 CIDR 192.168.0.0/16	IPv6 pool -
IPv6 CIDR (Network border group) -	Network Address Usage metrics Disabled	Route 53 Resolver DNS Firewall rule groups -	Owner ID 339712878593

Resource map

- VPC Show details Your AWS virtual network custom-vpc
- Subnets (6) Subnets within this VPC us-east-1a
 - Cs-prd-web-1A
 - Cs-prd-app-1A
- Route tables (1) Route network traffic to resources rtb-00694eae366e7d480

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Screenshot of the AWS Internet Gateways Details page for Internet gateway ID: igw-0c5b17c3c238e8803 / CS-IGW.

Details

Internet gateway ID igw-0c5b17c3c238e8803	State Detached	VPC ID -	Owner 339712878593
--	-------------------	-------------	-----------------------

Tags

Key	Value
Name	CS-IGW

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AWS CloudShell Feedback

Search [Option+S]

United States (N. Virginia) Cloud_LAB @ gangu6

VPC > Route tables > rtb-07cf1be6296a33a5d > Edit routes

Edit routes

Destination	Target	Status	Propagated
192.168.0.0/16	local	Active	No
0.0.0.0/0	Internet Gateway	-	No
	igw-0c5b17c3c238e8803		Remove

[Add route](#)

Cancel [Preview](#) [Save changes](#)

AWS CloudShell Feedback

Search [Option+S]

United States (N. Virginia) Cloud_LAB @ gangu6

VPC > Route tables > rtb-0c96f72f2c1759bb2

rtb-0c96f72f2c1759bb2 / CS-VPC-Private-RT

[Actions](#)

Details Info

Route table ID rtb-0c96f72f2c1759bb2	Main No	Explicit subnet associations 4 subnets	Edge associations -
VPC vpc-0b11693dae694659c custom-vpc	Owner ID 339712878593		

Routes Subnet associations Edge associations Route propagation Tags

Explicit subnet associations (4)

Name	Subnet ID	IPv4 CIDR	IPv6 CIDR
Cs-prd-app-1A	subnet-0c34179ced4cc44cb	192.168.3.0/24	-
Cs-prd-Db-1A	subnet-051fa98b4f10a82c4	192.168.5.0/24	-
Cs-prd-Db-1B	subnet-06948a867ad95e385	192.168.6.0/24	-
Cs-prd-app-1B	subnet-0d003cc32a5e5eb52	192.168.4.0/24	-

[Edit subnet associations](#)

Subnets without explicit associations (0)

The following subnets have not been explicitly associated with any route tables and are therefore associated with the main route table:

Name	Subnet ID	IPv4 CIDR	IPv6 CIDR
------	-----------	-----------	-----------

[Edit subnet associations](#)

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Create endpoint [Info](#)

Create the type of VPC endpoint that supports the service, service network or resource to which you want to connect.

Endpoint settings

Specify a name and select the type of endpoint.

Name tag - optional
Creates a tag with a key of 'Name' and a value that you specify. Tags help you find and manage your endpoint.

Type [Info](#)
Select a category

AWS services
Connect to services provided by Amazon with an Interface endpoint, or a Gateway endpoint

EC2 Instance Connect Endpoint
An elastic network interface that allows you to connect to resources in a private subnet

Endpoint services that use NLBs and GWLBs
Find services shared with you by service name. Connect to a Network LoadBalancer (NLB) service with an Interface endpoint or to a Gateway LoadBalancer (GWL) service with a Gateway Load Balancer endpoint

PrivateLink Ready partner services
Connect to SaaS services which have AWS Service Ready designation with an Interface endpoint. Uses AWS PrivateLink

AWS Marketplace services
Connect to SaaS services that you have purchased through AWS Marketplace with an Interface endpoint

Resources - New
Connect to resources like Amazon Relational Database Services (RDS) with a Resource endpoint. Uses AWS PrivateLink

Service networks - New
Connect to VPC Lattice service networks with a Service network endpoint. Uses AWS PrivateLink

Services (1/6)

[Search](#)

[Clear filters](#)

[CloudShell](#) [Feedback](#)

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Endpoints (1/1) [Info](#)

[Find endpoints by attribute or tag](#)

[VPC endpoint ID : vpce-03a7192285056cd03](#) [X](#) [Clear filters](#)

<input checked="" type="checkbox"/> Name	<input type="checkbox"/> VPC endpoint ID	<input type="checkbox"/> Endpoint type	<input type="checkbox"/> Status	<input type="checkbox"/> Service name
<input checked="" type="checkbox"/> CS-S3-EP	vpce-03a7192285056cd03	Gateway	<input checked="" type="checkbox"/> Available	com.amazonaws.us-east-1.s3

vpce-03a7192285056cd03 / CS-S3-EP

[Details](#) [Route tables](#) [Policy](#) [Tags](#)

Details

Endpoint ID vpce-03a7192285056cd03	Status Available	Creation time Wednesday 14 May 2025 at 22:52:09 GMT-4	Endpoint type Gateway
VPC ID vpc-0b11693dae694659c (custom-vpc)	Status message -	Service name com.amazonaws.us-east-1.s3	Private DNS names enabled No

[CloudShell](#) [Feedback](#)

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step3:

aws EC2 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](#)
CS-ALB-SG
Name cannot be edited after creation.

Description [Info](#)
alb sg

VPC [Info](#)
vpc-0b11693dae694659c (custom-vpc)

Inbound rules Info

Type Info	Protocol Info	Port range Info	Source Info	Description - optional Info
HTTP	TCP	80	Anywhere... <input type="text" value="0.0.0.0/0"/>	0.0.0.0/0 Delete
HTTPS	TCP	443	Anywhere... <input type="text" value="0.0.0.0/0"/>	0.0.0.0/0 Delete
HTTPS	TCP	443	Anywhere... <input type="text" value="0.0.0.0/0"/>	0.0.0.0/0 Delete
			<input type="text" value="::/0"/>	Delete

[Add rule](#)

⚠ Rules with source of 0.0.0.0/0 or ::/0 allow all IP addresses to access your instance. We recommend setting security group rules to allow access from known IP addresses only.

Outbound rules Info

Type Info	Protocol Info	Port range Info	Destination Info	Description - optional Info
All traffic	All	All	Custom <input type="text" value="0.0.0.0/0"/>	Delete

[Add rule](#)

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aws EC2 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](#)
CS-JUMP-SG
Name cannot be edited after creation.

Description [Info](#)
CS-jump sg

VPC [Info](#)
vpc-0b11693dae694659c (custom-vpc)

Inbound rules Info

Type Info	Protocol Info	Port range Info	Source Info	Description - optional Info
SSH	TCP	22	My IP <input type="text" value="73.129.229.166/32"/>	Delete

[Add rule](#)

Outbound rules Info

Type Info	Protocol Info	Port range Info	Destination Info	Description - optional Info
All traffic	All	All	Custom <input type="text" value="0.0.0.0/0"/>	Delete

[Add rule](#)

⚠ Rules with destination of 0.0.0.0/0 or ::/0 allow your instances to send traffic to any IPv4 or IPv6 address. We recommend setting security group rules to be more restrictive and to only allow traffic to specific known IP addresses.

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

[Add new tag](#)

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aws Search [Option+S] United States (N. Virginia) Cloud_LAB @ gangub

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
CS-APP-SG
Name cannot be edited after creation.

Description Info
app sg

VPC Info
vpc-0b11693dae694659c (custom-vpc)

Inbound rules Info
This security group has no inbound rules.
[Add rule](#)

Outbound rules Info

Type	Info	Protocol	Info	Port range	Info	Destination	Info	Description - optional	Info
SSH	TCP	22	Custom	sg-0dbf78adc4fb8edb3	X	Jump server sg		sg-0dbf78adc4fb8edb3	X

[Add rule](#)

Tags - optional
A tag is a label that you assign to an AWS resource. Each tag consists of a key and an optional value. You can use tags to search and filter your resources or track your AWS costs.
No tags associated with the resource.
[Add new tag](#)
You can add up to 50 more tags

[Cancel](#) [Create security group](#)

aws Search [Option+S] United States (N. Virginia) Cloud_LAB @ gangub

EC2 < [Actions](#)

sg-08e85a42d3aea2015 - CS-APP-SG

Details

Security group name CS-APP-SG	Security group ID sg-08e85a42d3aea2015	Description app sg
Owner 539712878593	Inbound rules count 0 Permission entries	Outbound rules count 3 Permission entries

[VPC ID](#) vpc-0b11693dae694659c

[Inbound rules](#) [Outbound rules](#) [Sharing - new](#) [VPC associations - new](#) [Tags](#)

Outbound rules (3)

Name	Security group rule ID	IP version	Type	Protocol	Port range	Destination	Description
-	sgr-02975727ba87ef890	-	HTTP	TCP	80	sg-0c28b671118352ef...	ALB SG
-	sgr-031641356e05ff4f0	-	SSH	TCP	22	sg-0dbf78adc4fb8edb3...	Jump server sg
-	sgr-0689cb2c402be6bbe	-	HTTPS	TCP	443	sg-0c28b671118352ef...	ALB SG

[Manage tags](#) [Edit outbound rules](#)

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EC2 > 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](#)
 Name cannot be edited after creation.

Description [Info](#)

VPC [Info](#)
 vpc-0b11693dae694659c (custom-vpc)

Inbound rules

Type	Info	Protocol	Info	Port range	Info	Source	Info	Description - optional	Info	
MySQL/Aurora		TCP		3306		Custom		<input type="text" value="sg-08e85a42d3aea2015"/> X	APP SG	Delete
MySQL/Aurora		TCP		3306		Custom		<input type="text" value="sg-08e85a42d3aea2015"/> X	jumb1sg	Delete

[Add rule](#)

Outbound rules

Type	Info	Protocol	Info	Port range	Info	Destination	Info	Description - optional	Info	
All traffic		All		All		Custom		<input type="text" value="0.0.0.0"/> X		Delete

[Add rule](#)

⚠ Rules with destination of 0.0.0.0 or ::/0 allow your instances to send traffic to any IPv4 or IPv6 address. We recommend setting security group rules to be more restrictive and to only allow traffic to specific known IP addresses. [X](#)

Tags - optional

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

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aws Search [Option+S] United States (N. Virginia) Cloud_LAB @ gangul6

EC2 <

Security Groups (8) Info

Find security groups by attribute or tag

Name	Security group ID	Security group name	VPC ID	Description	Owner
-	sg-08e85a42d3aea2015	Linux-SG	vpc-06a10a27f217c1f6a	Linux-SG	339712878593
-	sg-08e85a42d3aea2015	default	vpc-06a10a27f217c1f6a	default VPC security group	339712878593
-	sg-0dbf78ad4fb8edb3	CS-JUMP-SG	vpc-0b11693dae694659c	app sg	339712878593
-	sg-0cc01d040414c426	default	vpc-0b11693dae694659c	CS jumb sg	339712878593
-	sg-004515cc006a30e6b	EFS SG	vpc-0b11693dae694659c	default VPC security group	339712878593
-	sg-08e624dc5d8738dd38	CS-DB-SG	vpc-0b11693dae694659c	efs sg	339712878593
-	sg-0c28b6711183522ef	CS-ALB-SG	vpc-0b11693dae694659c	DB SG	339712878593
-	sg-0c28b6711183522ef	CS-ALB-SG	vpc-0b11693dae694659c	alb sg	339712878593

[Actions](#) [Export security groups to CSV](#) [Create security group](#)

Select a security group

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Step 4:

Aurora and RDS > Subnet groups > Create DB subnet group

Create DB subnet group

To create a new subnet group, give it a name and a description, and choose an existing VPC. You will then be able to add subnets related to that VPC.

Subnet group details

Name
You won't be able to modify the name after your subnet group has been created.

Must contain from 1 to 255 characters. Alphanumeric characters, spaces, hyphens, underscores, and periods are allowed.

Description

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.

6 Subnets, 2 Availability Zones

Add subnets

Availability Zones
Choose the Availability Zones that include the subnets you want to add.

 us-east-1a us-east-1b

Subnets
Choose the subnets that you want to add. The list includes the subnets in the selected Availability Zones.

 Cs-prd-Db-1A
Subnet ID: subnet-06948a867ad95e385 CIDR: 192.168.6.0/24

For Multi-AZ DB clusters, you must select 3 subnets in 3 different Availability Zones.

Subnets selected (2)

Availability zone	Subnet name	Subnet ID	CIDR block
us-east-1b	Cs-prd-Db-1B	subnet-06948a867ad95e385	192.168.6.0/24

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Aurora and RDS > 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](#)

<input type="radio"/> Aurora (MySQL Compatible) 	<input type="radio"/> Aurora (PostgreSQL Compatible) 
<input checked="" type="radio"/> MySQL 	<input type="radio"/> PostgreSQL 
<input type="radio"/> MariaDB 	<input type="radio"/> Oracle 
<input type="radio"/> Microsoft SQL Server 	<input type="radio"/> IBM Db2 

Edition
 MySQL, Community

Engine version [Info](#)
View the engine versions that support the following database features.

CloudShell Feedback

AWS | EC2 | Aurora and RDS > Create database

Edition: MySQL Community

Engine version: MySQL 8.0.40

Show only versions that support the Multi-AZ DB cluster [Info](#)

Create a Multi-AZ DB cluster with one primary DB instance and two readable standby DB instances. Multi-AZ DB clusters provide up to 2x faster transaction commit latency and automatic failover in typically under 35 seconds.

Show only versions that support the Amazon RDS Optimized Writes [Info](#)

Amazon RDS Optimized Writes improves write throughput by up to 2x at no additional cost.

Enable RDS Extended Support [Info](#)

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

Templates

Choose a sample template to meet your use case.

Production: Use defaults for high availability and fast, consistent performance.

Dev/Test: This instance is intended for development use outside of a production environment.

Free tier: Use RDS Free Tier to develop new applications, test existing applications, or gain hands-on experience with Amazon RDS. [Info](#)

Availability and durability

Deployment options: Info

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

Multi-AZ DB cluster deployment (3 instances): Creates a primary DB instance with two readable standbys in separate Availability Zones. This setup provides:

- 99.95% uptime
- Redundancy across Availability Zones
- Increased read capacity
- Reduced write latency

Multi-AZ DB Instance deployment (2 instances): Creates a primary DB instance with a non-readable standby instance in a separate Availability Zone. This setup provides:

- 99.95% uptime
- Redundancy across Availability Zones

Single-AZ DB instance deployment (1 instance): Creates a single DB instance without standby instances. This setup provides:

- 99.5% uptime
- No data redundancy

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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AWS | EC2 | Aurora and RDS > Create database

Settings

DB instance identifier: [Info](#)

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.

capstone-rds-db

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

Credentials Settings

Master username: [Info](#)

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

dbadmin

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: [Info](#)

Password strength: **Weak**

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

Confirm master password: [Info](#)

Instance configuration

The DB instance configuration options below are limited to those supported by the engine that you selected above.

DB instance class: [Info](#)

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aws | EC2 | Aurora and RDS > Create database

No preference

RDS Proxy

RDS Proxy is a fully managed, highly available database proxy that improves application scalability, resiliency, and security.

Create an RDS Proxy [Info](#)
RDS automatically creates an IAM role and a Secrets Manager secret for the proxy. RDS Proxy has additional costs. For more information, see [Amazon RDS Proxy pricing](#).

Certificate authority - optional [Info](#)

Using a server certificate provides an extra layer of security by validating that the connection is being made to an Amazon database. It does so by checking the server certificate that is automatically installed on all databases that you provision.

rds-ca-rsa2048-g1 (default)
Expiry: May 25, 2061

If you don't select a certificate authority, RDS chooses one for you.

Additional configuration

Tags - optional

A tag consists of a case-sensitive key-value pair.

No tags associated with the resource.

[Add new tag](#)

You can add up to 50 more tags.

Database authentication

Database authentication options [Info](#)

Password authentication
Authenticates using database passwords.

Password and IAM database authentication
Authenticates using the database password and user credentials through AWS IAM users and roles.

Password and Kerberos authentication
Choose a directory in which you want to allow authorized users to authenticate with this DB instance using Kerberos Authentication.

Monitoring [Info](#)

Choose monitoring tools for this database. Database Insights provides a combined view of Performance Insights and Enhanced Monitoring for your fleet of databases. Database Insights pricing is separate from RDS monthly estimates. See [Amazon CloudWatch pricing](#).

Database Insights - Advanced
+ Retains 15 months of performance history

Database Insights - Standard

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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.

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- 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.

aws | EC2 | Aurora and RDS > Create database

No preference

Monitoring [Info](#)

Choose monitoring tools for this database. Database Insights provides a combined view of Performance Insights and Enhanced Monitoring for your fleet of databases. Database Insights pricing is separate from RDS monthly estimates. See [Amazon CloudWatch pricing](#).

Database Insights - Advanced
+ Retains 15 months of performance history

Database Insights - Standard

Additional monitoring settings

Enhanced Monitoring, CloudWatch Logs and DevOps Guru

Enable Enhanced monitoring
Enabling Enhanced Monitoring metrics are useful when you want to see how different processes or threads use the CPU.

OS metrics granularity

60 seconds

Monitoring role for OS metrics

default

Clicking "Create database" will authorize RDS to create the IAM role rds-monitoring-role.

Log exports

Select the log types to publish to Amazon CloudWatch Logs.

Audit log

Error log

General log

iam-db-auth-error log

Slow query log

IAM role

The following service-linked role is used for publishing logs to CloudWatch Logs.

RDS service-linked role

Additional configuration

Database options, encryption turned on, backup turned on, backtrack turned off, maintenance, CloudWatch Logs, delete protection turned off.

Database options

Initial database name [Info](#)

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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.

Step 5 :

Trusted entity type

- AWS service
- AWS account
- Web identity
- SAML 2.0 federation
- Custom trust policy

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

Service or use case
EC2

Choose a use case for the specified service.

Use case

- EC2
- EC2 Role for AWS Systems Manager
- EC2 Spot Fleet Role
- EC2 - Spot Fleet Auto Scaling
- EC2 - Spot Fleet Tagging
- EC2 - Spot Instances
- EC2 - Spot Fleet
- EC2 - Scheduled Instances

Cancel **Next**

Name, review, and create

Role details

Role name
Enter a meaningful name to identify this role.

Description
Add a short explanation for this role.

Step 1: Select trusted entities

Trust policy

```

1: {
2:   "Version": "2012-10-17",
3:   "Statement": [
4:     {
5:       "Effect": "Allow",
6:       "Action": [
7:         "sts:AssumeRole"
8:       ],
9:       "Principal": [
10:         "Service": [
11:           "ec2.amazonaws.com"
12:         ]
13:       }
14:     }
15:   ]
16: }

```

Step 2: Add permissions

Permissions policy summary

Policy name	Type	Attached as

Edit

```
(base) gangubhandGangus-Laptop-2: ~% ssh -i First_KP.pem ec2-user@3.88.203.238
The authenticity of host '3.88.203.238 (3.88.203.238)' can't be established.
ED25519 key fingerprint is SHA256:mfp0zjGDnZklxW+vhGqAkyQmaXTI7lQCDhQuK9MuE.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '3.88.203.238' (ED25519) to the list of known hosts.

#_
~\_ _###_ Amazon Linux 2
~~ \###\ AL2 End of Life is 2026-06-30.
~~ \#/ V-' -->
~~ / A newer version of Amazon Linux is available!
~~ / / Amazon Linux 2023, GA and supported until 2028-03-15.
~/m/ https://aws.amazon.com/linux/amazon-linux-2023/
[ec2-user@ip-192-168-1-157 ~]$ 
```



```
#_
~\_ _###_ Amazon Linux 2
~~ \###\ AL2 End of Life is 2026-06-30.
~~ \#/ V-' -->
~~ / A newer version of Amazon Linux is available!
~~ / / Amazon Linux 2023, GA and supported until 2028-03-15.
~/m/ https://aws.amazon.com/linux/amazon-linux-2023/
[ec2-user@ip-192-168-1-157 ~]$ yum install mysql -y
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
You need to be root to perform this command.
[ec2-user@ip-192-168-1-157 ~]$ sudo yum install mysql -y
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
amzn2-core
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
  Verifying  : 1:mariadb-5.5.68-1.amzn2.0.1.x86_64
Installed:
  mariadb.x86_64 1:5.5.68-1.amzn2.0.1

Complete!
[ec2-user@ip-192-168-1-157 ~]$ 
```

```

-- ## AL2 End of Life is 2026-06-30.
-- ## # --- V-->
-- ## / A newer version of Amazon Linux is available!
-- ## / / Amazon Linux 2023, GA and supported until 2028-03-15.
-- ## /m/
[ec2-user@ip-192-168-1-157 ~]$ yum install mysql -y
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
You need to be root to perform this command.
[ec2-user@ip-192-168-1-157 ~]$ sudo yum install mysql -y
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
amzn2-core
Resolving Dependencies
--> Running transaction check
--> Package mariadb.x86_64 1:5.6.68-1.amzn2.0.1 will be installed
--> Finished Dependency Resolution

Dependencies Resolved

=====
Package           Arch      Version          Repository      Size
=====
Installing:
mariadb          x86_64   1:5.6.68-1.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-5.6.68-1.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-5.6.68-1.amzn2.0.1.x86_64                               1/1
  Verifying  : 1:mariadb-5.6.68-1.amzn2.0.1.x86_64                               1/1

Installed:
mariadb.x86_64 1:5.6.68-1.amzn2.0.1

Complete!
[ec2-user@ip-192-168-1-157 ~]$ export MYSQL_HOST=capstone-rds-db.cdsssm8ckpq.us-east-1.rds.amazonaws.com
[ec2-user@ip-192-168-1-157 ~]$ 
[ec2-user@ip-192-168-1-157 ~]$ 
[ec2-user@ip-192-168-1-157 ~]$ 
[ec2-user@ip-192-168-1-157 ~]$ mysql -h capstone-rds-db.cdsssm8ckpq.us-east-1.rds.amazonaws.com -P 3306 -u dbadmin -p
Enter password:
Welcome to the MariaDB monitor. Commands end with ; or \g.
Your MySQL connection id is 28
Server version: 8.0.48 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)]>
MySQL [(none)]>
MySQL [(none)]>
MySQL [(none)]>
MySQL [(none)]>

=====
Installing:
mariadb          x86_64   1:5.6.68-1.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-5.6.68-1.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-5.6.68-1.amzn2.0.1.x86_64                               1/1
  Verifying  : 1:mariadb-5.6.68-1.amzn2.0.1.x86_64                               1/1

Installed:
mariadb.x86_64 1:5.6.68-1.amzn2.0.1

Complete!
[ec2-user@ip-192-168-1-157 ~]$ export MYSQL_HOST=capstone-rds-db.cdsssm8ckpq.us-east-1.rds.amazonaws.com
[ec2-user@ip-192-168-1-157 ~]$ 
[ec2-user@ip-192-168-1-157 ~]$ 
[ec2-user@ip-192-168-1-157 ~]$ 
[ec2-user@ip-192-168-1-157 ~]$ mysql -h capstone-rds-db.cdsssm8ckpq.us-east-1.rds.amazonaws.com -P 3306 -u dbadmin -p
Enter password:
Welcome to the MariaDB monitor. Commands end with ; or \g.
Your MySQL connection id is 28
Server version: 8.0.48 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)]>
MySQL [(none)]>
MySQL [(none)]>
MySQL [(none)]>
MySQL [(none)]> CREATE DATABASE capstone;
Query OK, 1 row affected (0.01 sec)

MySQL [(none)]> CREATE TABLE capstone.customers (
-->     id INT(11) NOT NULL AUTO_INCREMENT,
-->     name VARCHAR(50) NOT NULL,
-->     gender VARCHAR(50) NOT NULL,
-->     email VARCHAR(50) NOT NULL,
-->     phone VARCHAR(20) NOT NULL,
-->     PRIMARY KEY (id)
--> );
Query OK, 0 rows affected, 1 warning (0.05 sec)

MySQL [(none)]> CREATE USER 'capstoneuser' IDENTIFIED BY 'Bhanu123';
Query OK, 0 rows affected (0.02 sec)

MySQL [(none)]> GRANT ALL PRIVILEGES ON capstone.* TO capstoneuser;
Query OK, 0 rows affected (0.00 sec)

MySQL [(none)]> FLUSH PRIVILEGES;
Query OK, 0 rows affected (0.01 sec)

MySQL [(none)]> Exit
Bye
[ec2-user@ip-192-168-1-157 ~]$ 

```

aws IAM EC2 Instances

EC2

- 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
- Key Pairs
- Network Interfaces
- Load Balancing
- Load Balancers
- Target Groups
- Trust Stores
- Auto Scaling
- Auto Scaling Groups

CloudShell Feedback

Instances (1/3) Info

Last updated less than a minute ago

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS	Public IPv4 ...	Elast...
<input checked="" type="checkbox"/> App-server-private-SB	i-0c5cb3778bca04d27	Running	t2.micro	Initializing	View alarms +	us-east-1a	-	-	-
<input type="checkbox"/> JUMP Server	i-089733d1844096452	Running	t2.micro	2/2 checks passed	View alarms +	us-east-1a	ec2-3-80-203-238.com...	3.80.203.238	-
<input type="checkbox"/> linux1	i-0b7d779e888594890	Terminated	t2.micro	-	View alarms +	us-east-1c	-	-	-

i-0c5cb3778bca04d27 (App-server-private-SB)

Details Status and alarms Monitoring Security Networking Storage Tags

Instance summary

Instance ID	i-0c5cb3778bca04d27	Public IPv4 address	Private IPv4 addresses
IPv6 address	-	Instance state	Private IP 192.168.3.208
Hostname type	IP name: ip-192-168-3-208.ec2.internal	Private IP DNS name (IPv4 only)	Public IPv4 DNS
Answer private resource DNS name	-	ip-192-168-3-208.ec2.internal	-
Auto-assigned IP address	-	Instance type	Elastic IP addresses
IAM Role	S3fullaccessoEC2	VPC ID	AWS Compute Optimizer finding
Subnet ID	subnet-0c34179ced4cc44cb (Cs-prd-app-1A)	Allocated Elastic IP	Opt-in to AWS Compute Optimizer for recommendations. Learn more

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aws cloudfront EC2 VPC NAT_gateways Create NAT gateway

Create NAT gateway

A highly available, managed Network Address Translation (NAT) service that instances in private subnets can use to connect to services in other VPCs, on-premises networks, or the internet.

NAT gateway settings

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

The name can be up to 256 characters long.

Subnet
Select a subnet in which to create the NAT gateway.

Connectivity type
Select a connectivity type for the NAT gateway.
 Public
 Private

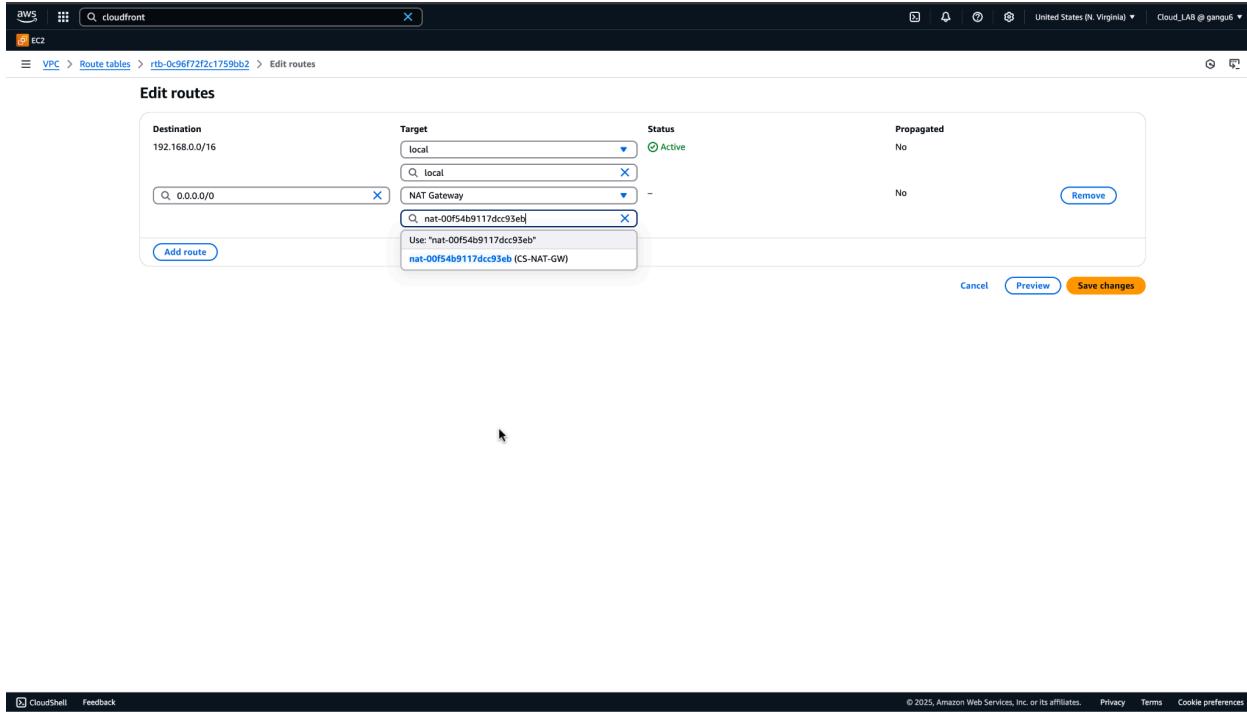
Elastic IP allocation ID
Assign an Elastic IP address to the NAT gateway.

Additional settings

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

Key	Value - optional
<input type="text" value="Name"/>	<input type="text" value="CS-NAT-GW"/> <input type="button" value="Remove"/>

You can add 49 more tags.



Step 6 :

```
Total download size: 2.3 M
Installed size: 6.9 M
Downloading Packages:
(1/12): apr-util-openssl-1.6.3-1.amzn2023.0.1.x86_64.rpm 477 kB/s | 17 kB 00:00
(2/12): apr-util-1.6.3-1.amzn2023.0.1.x86_64.rpm 2.4 MB/s | 98 kB 00:00
(3/12): apr-util-1.7.6-1.amzn2023.0.4.x86_64.rpm 2.6 MB/s | 129 kB 00:00
(4/12): apr-util-util-hmac-1.0.1-12.amzn2023.0.3.noarch.rpm 1.9 kB/s | 15 kB 00:00
(5/12): httpd-2.4.62-1.amzn2023.x86_64.rpm 2.1 MB/s | 48 kB 00:00
(6/12): httpd-filesystem-2.4.62-1.amzn2023.noarch.rpm 748 kB/s | 14 kB 00:00
(7/12): httpd-core-2.4.62-1.amzn2023.x86_64.rpm 30 kB/s | 1.4 MB 00:00
(8/12): httpd-tools-2.4.62-1.amzn2023.x86_64.rpm 2.3 MB/s | 8 kB 00:00
(9/12): libbrotli-1.0.9-4.amzn2023.0.2.x86_64.rpm 9.2 MB/s | 315 kB 00:00
(10/12): mailcap-2.1.49-3.amzn2023.0.3.noarch.rpm 1.4 MB/s | 3 kB 00:00
(11/12): mod_http2-2.0.27-1.amzn2023.0.3.x86_64.rpm 1.66 kB/s | 166 kB 00:00
(12/12): mod_lua-2.4.62-1.amzn2023.x86_64.rpm 2.8 MB/s | 61 kB 00:00

Total 15 MB/s | 2.3 MB 00:00

Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
Preparing : 1/1
Installing : apr-1.7.5-1.amzn2023.0.4.x86_64 1/12
Installing : apr-util-openssl-1.6.3-1.amzn2023.0.1.x86_64 2/12
Installing : apr-util-1.6.3-1.amzn2023.0.1.x86_64 3/12
Installing : apr-util-1.7.6-1.amzn2023.0.4.x86_64 4/12
Installing : apr-util-util-hmac-1.0.1-12.amzn2023.0.3.noarch 5/12
Installing : httpd-2.4.62-1.amzn2023.x86_64 6/12
Installing : libbrotli-1.0.9-4.amzn2023.0.2.x86_64 7/12
Running scriptlet: httpd-filesystem-2.4.62-1.amzn2023.noarch 7/12
Installing : httpd-filesystem-2.4.62-1.amzn2023.noarch 8/12
Installing : httpd-filesystem-2.4.62-1.amzn2023.x86_64 9/12
Installing : mod_http2-2.0.27-1.amzn2023.0.3.x86_64 10/12
Installing : mod_lua-2.4.62-1.amzn2023.x86_64 11/12
Installing : generic-logos-httpd-18.0.0-12.amzn2023.0.3.noarch 12/12
Installing : httpd-2.4.62-1.amzn2023.x86_64 12/12
Running scriptlet: httpd-2.4.62-1.amzn2023.x86_64 1/12
Installing : apr-1.7.5-1.amzn2023.0.4.x86_64 2/12
Verifying : apr-1.7.5-1.amzn2023.0.4.x86_64 3/12
Verifying : apr-util-openssl-1.6.3-1.amzn2023.0.1.x86_64 4/12
Verifying : generic-logos-httpd-18.0.0-12.amzn2023.0.3.noarch 5/12
Verifying : httpd-2.4.62-1.amzn2023.x86_64 6/12
Verifying : httpd-filesystem-2.4.62-1.amzn2023.noarch 7/12
Verifying : httpd-filesystem-2.4.62-1.amzn2023.x86_64 8/12
Verifying : libbrotli-1.0.9-4.amzn2023.0.2.x86_64 9/12
Verifying : mailcap-2.1.49-3.amzn2023.0.3.noarch 10/12
Verifying : mod_http2-2.0.27-1.amzn2023.0.3.x86_64 11/12
Verifying : mod_lua-2.4.62-1.amzn2023.x86_64 12/12

Installed:
apr-1.7.5-1.amzn2023.0.4.x86_64           apr-util-1.6.3-1.amzn2023.0.1.x86_64           generic-logos-httpd-18.0.0-12.amzn2023.0.3.noarch
httpd-2.4.62-1.amzn2023.x86_64            httpd-core-2.4.62-1.amzn2023.x86_64           httpd-tools-2.4.62-1.amzn2023.x86_64
libbrotli-1.0.9-4.amzn2023.0.2.x86_64      mailcap-2.1.49-3.amzn2023.0.3.noarch         mod_http2-2.0.27-1.amzn2023.0.3.x86_64
                                           1                                     generic-logos-httpd-18.0.0-12.amzn2023.0.3.noarch
                                           generic-logos-httpd-18.0.0-12.amzn2023.0.3.noarch
                                           httpd-filesystem-2.4.62-1.amzn2023.noarch
                                           httpd-filesystem-2.4.62-1.amzn2023.x86_64
                                           libbrotli-1.0.9-4.amzn2023.0.2.x86_64
                                           mailcap-2.1.49-3.amzn2023.0.3.noarch
                                           mod_http2-2.0.27-1.amzn2023.0.3.x86_64
                                           mod_lua-2.4.62-1.amzn2023.x86_64

Complete!
[root@ip-172-31-13-114 ~]# service start httpd
The service command supports only basic LSB actions (start, stop, restart, try-restart, reload, reload-or-restart, try-reload-or-restart, force-reload, status, condrestart). For other actions, please try to use systemctl.
[root@ip-172-31-13-114 ~]# service httpd start
Redirecting to /bin/systemctl start httpd.service
[root@ip-172-31-13-114 ~]# chkconfig httpd on
Note: Forwarding request to 'systemctl enable httpd.service'.
Created symlink /etc/systemd/system/multi-user.target.wants/httpd.service → /usr/lib/systemd/system/httpd.service.
[root@ip-172-31-13-114 ~]#
```

```
[ec2-user@ip-172-31-27-181 ~]$ ls
index.html
[ec2-user@ip-172-31-27-181 ~]$ sudo su -
Last login: Thu May 15 19:00:15 UTC 2025 on pts/0
[root@ip-172-31-27-181 ~]# ls
MyKeyPair.pem
[root@ip-172-31-27-181 ~]# ssh -i "MyKeyPair.pem" ec2-user@ec2-3-144-182-245.us-east-2.compute.amazonaws.com
The authenticity of host 'ec2-3-144-182-245.us-east-2.compute.amazonaws.com (172.31.27.72)' can't be established.
ED25519 key fingerprint is SHA256:qjwvJyLzXWZG+85AKhSe/KuEs68.
ECDSA key fingerprint is MD5:f4:8ae9:97:9a:c5:a1:88:20:52:fi:15:d4:e1:d6:rd6.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'ec2-3-144-182-245.us-east-2.compute.amazonaws.com,172.31.27.72' (ECDSA) to the list of known hosts.

#_
~\###_ Amazon Linux 2
~~\###_ AL2 End of Life is 2026-06-30.
~~\###_ V_,->
~~\###_ / A newer version of Amazon Linux is available!
~~\###_ / Amazon Linux 2023, GA and supported until 2028-03-15.
~/m/ https://aws.amazon.com/linux/amazon-linux-2023/
[ec2-user@ip-172-31-27-72 ~]$ yum install httpd -y
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
You need to be root to perform this command.
[ec2-user@ip-172-31-27-72 ~]$ sudo su -
[root@ip-172-31-27-72 ~]# yum install httpd -y
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
Resolving Dependencies
--> Running transaction check
--> Package httpd.x86_64 0:2.4.62-1.amzn2.0.2 will be installed
--> Processing Dependency: httpd-filesystem = 2.4.62-1.amzn2.0.2 for package: httpd-2.4.62-1.amzn2.0.2.x86_64
--> Processing Dependency: httpd = 2.4.62-1.amzn2.0.2 for package: httpd-2.4.62-1.amzn2.0.2.x86_64
--> Processing Dependency: httpd-filesystem for package: httpd-2.4.62-1.amzn2.0.2.x86_64
--> Processing Dependency: mod_http2 for package: httpd-2.4.62-1.amzn2.0.2.x86_64
--> Processing Dependency: mod_http2 for package: httpd-2.4.62-1.amzn2.0.2.x86_64
--> Processing Dependency: libapr-1.so.(6abit) for package: httpd-2.4.62-1.amzn2.0.2.x86_64
--> Processing Dependency: libaprutil-1.so.(6abit) for package: httpd-2.4.62-1.amzn2.0.2.x86_64
--> Processing Dependency: libxml2 for package: httpd-2.4.62-1.amzn2.0.2.x86_64
--> Processing Dependency: apr-util.x86_64 0:1.6.3-1.amzn2.0.1 will be installed
--> Processing Dependency: apr-util-bdb(x86-64) = 1.6.3-1.amzn2.0.1 for package: apr-util-1.6.3-1.amzn2.0.1.x86_64
--> Package generic-logos-httpd.noarch 0:18.0.0-4.amzn2 will be installed
--> Package httpd-filesystem.noarch 0:2.4.62-1.amzn2.0.2 will be installed
--> Package mailcap.noarch 0:2.1.41-2.amzn2 will be installed
--> Package mod_http2.x86_64 0:1.15.19-1.amzn2.0.2 will be installed
--> Running transaction check
--> Package apr-util-bdb.x86_64 0:1.6.3-1.amzn2.0.1 will be installed
--> Finished Dependency Resolution

Dependencies Resolved
=====

```

Package	Arch	Version	Repository	Size
httpd	x86_64	2.4.62-1.amzn2.0.2	amzn2-core	1.4 M
Installing:				
apr	x86_64	1.7.2-1.amzn2.0.1	amzn2-core	59 k
apr-util	x86_64	1.6.3-1.amzn2.0.1	amzn2-core	67 k
apr-util-bdb	x86_64	1.6.3-1.amzn2.0.1	amzn2-core	22 k
Verifying :				
mod_http2-1.15.19-1.amzn2.0.2.x86_64				4/9
Verifying : apr-util-1.6.3-1.amzn2.0.1.x86_64				5/9
Verifying : mailcap-2.1.41-2.amzn2.noarch				6/9
Verifying : generic-logos-httpd-18.0.0-4.amzn2.noarch				7/9
Verifying : httpd-tools-2.4.62-1.amzn2.0.2.x86_64				8/9
Verifying : httpd-filesystem-2.4.62-1.amzn2.0.2.noarch				9/9

```
=====
Installed:
  httpd.x86_64 0:2.4.62-1.amzn2.0.2

Dependency Installed:
  apr.x86_64 0:1.7.2-1.amzn2.0.1           apr-util.x86_64 0:1.6.3-1.amzn2.0.1   apr-util-bdb.x86_64 0:1.6.3-1.amzn2.0.1   generic-logos-httpd.noarch 0:18.0.0-4.amzn2 httpd-filesystem.noarch 0:2.4.62-1.amzn2.0.2
  httpd-tools.x86_64 0:2.4.62-1.amzn2.0.2   mailcap.noarch 0:2.1.41-2.amzn2             mod_http2.x86_64 0:1.15.19-1.amzn2.0.2

Complete!
[root@ip-172-31-27-72 ~]# service httpd start
Redirecting to /bin/systemctl start httpd.service
[root@ip-172-31-27-72 ~]# Note: Forwarding request to 'systemctl enable httpd.service'.
Created symlink from /etc/systemd/system/multi-user.target.wants/httpd.service to /usr/lib/systemd/system/httpd.service.
[root@ip-172-31-27-72 ~]# yum install -y mysql
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
Resolving Dependencies
--> Running transaction check
--> Package mariadb.x86_64 1:5.6.68-1.amzn2.0.1 will be installed
--> Finished Dependency Resolution

Dependencies Resolved
=====

```

Package	Arch	Version	Repository	Size
mariadb	x86_64	1:5.6.68-1.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 1:5.6.68-1.amzn2.0.1				
Complete!				

```
[root@ip-172-31-27-72 ~]# mysql -h database-1.czsgk6emz49.us-east-2.rds.amazonaws.com -P 3306 -u dbadmin -p
Enter password:
Welcome to the MariaDB monitor. Commands end with ; or \g.
Your MySQL connection id is 31
Server version: 8.0.41 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)]#
```

```
[root@ip-172-31-27-72 ~]# mysql -h database-1.cz2sgk6emz49.us-east-2.rds.amazonaws.com -P 3306 -u dbadmin -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MySQL connection id is 31
Server version: 8.0.41 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 capstone;
ERROR 1007 (HY000): Can't create database 'capstone'; database exists
MySQL [(none)]> exit
Bye
[root@ip-172-31-27-72 ~]# amazon-linux-extras install -y lamp-mariadb10.2-php7.2 php7.2
Total 2 packages installed, 0 updated, 0 removed
Last updated: Sun Nov 28 18:28:00 UTC 2026-11-30
Total 2 packages, 0B of which are up-to-date
Installing php-pdo, php-mysqli, php-fpm, php-cli, php-json, mariadb
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
Cleaning repos: amzn2-core amzn2extra-docker amzn2extra-kernel-5.10 amzn2extra-lamp-mariadb10.2-php7.2 amzn2extra-php7.2
17 metadata files removed
6 sqlite files removed
0 memcache files removed
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
amzn2-core
amzn2extra-docker
amzn2extra-kernel-5.10
amzn2extra-lamp-mariadb10.2-php7.2
amzn2extra-php7.2
[1/11]: amzn2-core/2/x86_64/group.gz
[2/11]: amzn2extra-docker/2/x86_64/updateinfo
[3/11]: amzn2extra-lamp-mariadb10.2-php7.2/2/x86_64/updateinfo
[4/11]: amzn2extra-docker/2/x86_64/primary_db
[5/11]: amzn2extra-kernel-5.10/2/x86_64/updateinfo
[6/11]: amzn2extra-kernel-5.10/2/x86_64/primary_db
[7/11]: amzn2extra-lamp-mariadb10.2-php7.2/2/x86_64
[8/11]: amzn2extra-lamp-mariadb10.2-php7.2/2/x86_64/primary_db
[9/11]: amzn2extra-php7.2/2/x86_64/primary_db
[10/11]: amzn2extra-kernel-5.10/2/x86_64/primary_db
[11/11]: amzn2-core/2/x86_64/primary_db
Resolving Dependencies
--> Checking for transaction check
--> Package mariadb-common.x86_64 1:5.5.68-1.amzn2.0.1 will be updated
--> Package mariadb-libs.x86_64 3:10.2.38-1.amzn2.0.1 will be installed
--> Processing Dependency: mariadb-libs(x86-64) = 3:10.2.38-1.amzn2.0.1 for package: 3:mariadb-10.2.38-1.amzn2.0.1.x86_64
--> Processing Dependency: mariadb-common(x86-64) = 3:10.2.38-1.amzn2.0.1 for package: 3:mariadb-10.2.38-1.amzn2.0.1.x86_64
--> Package php-cli.x86_64 0:7.2.34-1.amzn2 will be installed
--> Processing Dependency: php-common(x86-64) = 7.2.34-1.amzn2 for package: php-cli-7.2.34-1.amzn2.x86_64
--> Package php-fpm.x86_64 0:7.2.34-1.amzn2 will be installed
--> Package php-json.x86_64 0:7.2.34-1.amzn2 will be installed
--> Package php-mysqli.x86_64 0:7.2.34-1.amzn2 will be installed
--> Package php-pdo.x86_64 0:7.2.34-1.amzn2 will be installed
--> Package mariadb-common.x86_64 3:10.2.38-1.amzn2.0.1 will be installed
--> Processing Dependency: /etc/my.cnf for package: 3:mariadb-common-10.2.38-1.amzn2.0.1.x86_64
--> Package mariadb-libs(x86-64) = 3:10.2.38-1.amzn2.0.1 will be updated
--> Package mariadb-libs(x86-64) = 3:10.2.38-1.amzn2.0.1 will be updated
--> Package php-common.x86_64 0:7.2.34-1.amzn2 will be installed
--> Processing Dependency: libzip.so.5()(64bit) for package: php-common-7.2.34-1.amzn2.x86_64
--> Running transaction check
--> Package libzip.x86_64 0:1.3.2-1.amzn2.0.1 will be installed
--> Package mariadb-config.x86_64 3:10.2.38-1.amzn2.0.1 will be installed
--> Package mariadb-libs.x86_64 1:5.5.68-1.amzn2.0.1 will be updated
--> Finished Dependency Resolution

(base) gangubhanu@Gangus-Laptop-2:~$ ls -l "First_KP.pem" ec2-user@ec2-3-80-203-238.compute-1.amazonaws.com
The authenticity of host 'ec2-3-80-203-238.compute-1.amazonaws.com (3.80.203.238)' can't be established.
ED25519 key fingerprint is SHA256:mfPbzj0DzKlxW+VehQgAkyQmXTiTJ1QCDhQuK9MuE.
This host is known by the following other names/addresses:
  - .ssh/known_hosts:1 3.80.203.238
Are you sure you want to continue connecting (yes/no/fingerprint)? yes
Warning: Permanently added 'ec2-3-80-203-238.compute-1.amazonaws.com' (ED25519) to the list of known hosts.
Last login: Thu May 15 09:31:17 2025 from c-73-129-229-166.hsd1.md.comcast.net
  #_
  _\ #####_ Amazon Linux 2
  _\ #####\ AL2 End of Life is 2026-06-30.
  _\ #####\ V-'---->
  _\ #####\ A newer version of Amazon Linux is available!
  _\ #####\ Amazon Linux 2023, GA and supported until 2028-03-15.
  _\ #####\ https://aws.amazon.com/linux/amazon-linux-2023/
[ec2-user@ip-192-168-1-157 ~]$ sudo su -
[root@ip-192-168-1-157 ~]# ls
[root@ip-192-168-1-157 ~]# vim First_KP.pem
[root@ip-192-168-1-157 ~]# chmod 400 First_KP.pem
[root@ip-192-168-1-157 ~]# ssh -i "First_KP.pem" ec2-user@92.168.4.129
[root@ip-192-168-1-157 ~]# ssh -i "First_KP.pem" ec2-user@92.168.4.129
The authenticity of host '92.168.4.129 (92.168.4.129)' can't be established.
ED25519 key fingerprint is SHA256:PrIkd2L4cNivsUeIKQ6+avtxSxfszCSFp79+ICiW.
ED25519 key fingerprint is MD5:bfb:1:cd:fb:7:f3d:7b:18:72:82:f7:01:8f:8e:38:0e.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '92.168.4.129' (ED25519) to the list of known hosts.
  #_
  _\ #####_ Amazon Linux 2
  _\ #####\ AL2 End of Life is 2026-06-30.
  _\ #####\ V-'---->
  _\ #####\ A newer version of Amazon Linux is available!
  _\ #####\ Amazon Linux 2023, GA and supported until 2028-03-15.
  _\ #####\ https://aws.amazon.com/linux/amazon-linux-2023/
[ec2-user@ip-192-168-4-129 ~]$
```

Step 7:

We will update our video1.html and video2.html files with the rds endpoint and username and password that files are present in the github repository.

Step 8:

The screenshot shows two sequential steps in the AWS EFS console for creating a new file system.

File system settings (Step 1)

- General**
 - Name - optional**: capstone-efs
 - File system type**: Regional (selected)
 - Automatic backups**: Enable automatic backups (unchecked)
 - Lifecycle management**: Transition files to Infrequent Access (IA) based on time since last accessed in Standard storage. Transition files to Archive based on time since last accessed in IA or Archive storage.
- Network access (Step 2)**
 - Virtual Private Cloud (VPC)**: vpc-0b7b3fc1a821d710
 - Mount targets**: Three availability zones (us-east-2a, us-east-2b, us-east-2c) each mapped to a specific subnet and security group (sg-048ff98ede742b4f).

AWS Services Search [Option+S] United States (Ohio) capstone-project @ gangu6

Elastic File System

File systems Access points AWS Backup AWS DataSync AWS Transfer Documentation

File system (fs-Ofaaa33047649e90a) is creating.

Amazon EFS > File systems

File systems (1)

Create file system

Name	File system ID	Encrypted	Total size	Size in Standard	Size in IA	Size in Archive	Provisioned Throughput (MiB/s)
customer-efs	fs-Ofaaa33047649e90a	Encrypted	0 Bytes	0 Bytes	0 Bytes	0 Bytes	-

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```
Redirection to /bin/systemctl restart httpd.service
[root@ip-172-31-27-72 ~]# cd /home/ec2-user/
[root@ip-172-31-27-72 ec2-user]# sudo mount -t nfs4 -o nfsvers=4.1,rsize=1048576,wsize=1048576,hard,timeo=600,retrans=2,noresvport fs-Ofaaa33047649e90a.efs.us-east-2.amazonaws.com:/var/www/html
[root@ip-172-31-27-72 ec2-user]# df -h
df: no file systems processed
[root@ip-172-31-27-72 ec2-user]# df -Th
Filesystem      Type    Size  Used Avail Use% Mounted on
devtmpfs        devtmpfs 477M   0  477M  0% /dev/shm
tmpfs          tmpfs    477M  420K 476M  1% /run
tmpfs          tmpfs    477M   0  477M  0% /sys/fs/cgroup
/dev/xvda1      xfs     8.0G  2.0G  6.1G  25% /
tmpfs          tmpfs    96M   0   96M  0% /run/user/1000
fs-Ofaaa33047649e90a.efs.us-east-2.amazonaws.com:/ nfs4  8.0E   0  8.0E  0% /var/www/html
[root@ip-172-31-27-72 ec2-user]#
```

Step 9:

The screenshot shows the AWS CloudFormation console with the path: Amazon S3 > Buckets > mycode-repo-1. The main view displays the contents of the 'Objects (12)' section. A search bar at the top allows filtering by prefix. The objects listed include various files and folders such as 'css/', 'images/', 'index.html', 'js/', 'newuser.html', 'project Description Doc.txt', 'submit.php', 'submit2.php', 'thankyou.html', 'validation.html', 'video1.html', and 'video2.html'. Each object is shown with its name, type, last modified date, size, and storage class (Standard). Action buttons like Copy S3 URI, Copy URL, Download, Open, Delete, Actions, Create folder, and Upload are available for each item.

Name	Type	Last modified	Size	Storage class
css/	Folder	-	-	-
images/	Folder	-	-	-
index.html	html	May 15, 2025, 15:52:09 (UTC-04:00)	4.3 KB	Standard
js/	Folder	-	-	-
newuser.html	html	May 15, 2025, 15:52:16 (UTC-04:00)	2.3 KB	Standard
project Description Doc.txt	txt	May 15, 2025, 15:52:16 (UTC-04:00)	8.0 KB	Standard
submit.php	php	May 15, 2025, 15:52:17 (UTC-04:00)	604.0 B	Standard
submit2.php	php	May 15, 2025, 15:52:17 (UTC-04:00)	873.0 B	Standard
thankyou.html	html	May 15, 2025, 15:52:17 (UTC-04:00)	1.4 KB	Standard
validation.html	html	May 15, 2025, 15:52:17 (UTC-04:00)	1.5 KB	Standard
video1.html	html	May 15, 2025, 15:52:17 (UTC-04:00)	355.0 B	Standard
video2.html	html	May 15, 2025, 15:52:17 (UTC-04:00)	355.0 B	Standard

```
usage: aws [options] <command> <subcommand> [<subcommand> ...] [parameters]
To see help text, you can run:

    aws help
    aws <command> help
    aws <command> <subcommand> help
    aws: error: too few arguments
[root@ip-172-31-27-72 ~]# aws s3 sync s3://mycode-repo-1 .
download: s3://mycode-repo-1/images/.DS_Store to images/.DS_Store
download: s3://mycode-repo-1/css/style.css to css/style.css
download: s3://mycode-repo-1/css/bootstrap.css to css/bootstrap.css
download: s3://mycode-repo-1/images/arrow-left.gif to images/arrow-left.gif
download: s3://mycode-repo-1/images/arrow-right.gif to images/arrow-right.gif
download: s3://mycode-repo-1/images/3page-img1.jpg to images/3page-img1.jpg
download: s3://mycode-repo-1/images/3page-img2.jpg to images/3page-img2.jpg
download: s3://mycode-repo-1/images/2page-img3.jpg to images/2page-img3.jpg
download: s3://mycode-repo-1/images/2page-img1.jpg to images/2page-img1.jpg
download: s3://mycode-repo-1/images/3page-img1_1.jpg to images/3page-img1_1.jpg
download: s3://mycode-repo-1/images/4page-img1.jpg to images/4page-img1.jpg
download: s3://mycode-repo-1/images/3page-img1.jpg to images/3page-img1.jpg
download: s3://mycode-repo-1/images/border-left.gif to images/border-left.gif
download: s3://mycode-repo-1/images/border-right.gif to images/border-right.gif
download: s3://mycode-repo-1/images/footer-left.gif to images/footer-left.gif
download: s3://mycode-repo-1/images/footer-right.gif to images/footer-right.gif
download: s3://mycode-repo-1/images/icon1-acct.gif to images/icon1-acct.gif
download: s3://mycode-repo-1/images/icon1.gif to images/icon1.gif
download: s3://mycode-repo-1/images/footer-right.gif to images/footer-right.gif
download: s3://mycode-repo-1/images/banner-img.jpg to images/banner-img.jpg
download: s3://mycode-repo-1/images/icon2-acct.gif to images/icon2-acct.gif
download: s3://mycode-repo-1/images/footer-tail.gif to images/footer-tail.gif
download: s3://mycode-repo-1/images/icon3.gif to images/icon3.gif
download: s3://mycode-repo-1/images/icon3.gif to images/icon3.gif
download: s3://mycode-repo-1/images/line-hor.gif to images/line-hor.gif
download: s3://mycode-repo-1/images/link1-tail.gif to images/link1-tail.gif
download: s3://mycode-repo-1/images/icon3-acct.gif to images/icon3-acct.gif
download: s3://mycode-repo-1/images/link2-right.gif to images/link2-right.gif
download: s3://mycode-repo-1/images/icon1-right.gif to images/icon1-right.gif
download: s3://mycode-repo-1/images/icon1-right_1.png to images/icon1-right_1.png
download: s3://mycode-repo-1/images/icon2-left.gif to images/icon2-left.gif
download: s3://mycode-repo-1/images/icon2-tail.gif to images/icon2-tail.gif
download: s3://mycode-repo-1/images/icon3-left.gif to images/icon3-left.gif
download: s3://mycode-repo-1/images/icon3-right.gif to images/icon3-right.gif
download: s3://mycode-repo-1/images/nav-bg.gif to images/nav-bg.gif
download: s3://mycode-repo-1/index.html to ./index.html
download: s3://mycode-repo-1/images/nav-acct.gif to images/nav-acct.gif
download: s3://mycode-repo-1/images/icon1-tail.gif to images/icon1-tail.gif
download: s3://mycode-repo-1/images/movie2.jpg to images/movie2.jpg
download: s3://mycode-repo-1/js/cufon-replace.js to js/cufon-replace.js
download: s3://mycode-repo-1/images/tail-bottom.gif to images/tail-bottom.gif
download: s3://mycode-repo-1/fonts/j Gill_Sans_400.js to js/Gill_Sans_400.js
download: s3://mycode-repo-1/jisie_pn.js to js/jisie.png
download: s3://mycode-repo-1/jis/cufon-yui.js to js/cufon-yui.js
download: s3://mycode-repo-1/submit.php to ./submit.php
download: s3://mycode-repo-1/submit2.php to ./submit2.php
download: s3://mycode-repo-1/newuser.html to ./newuser.html
download: s3://mycode-repo-1/valkyryon.html to ./valkyryon.html
download: s3://mycode-repo-1/project>Description.Doc.txt to ./project>Description.Doc.txt
download: s3://mycode-repo-1/video1.html to ./video1.html
download: s3://mycode-repo-1/video2.html to ./video2.html
download: s3://mycode-repo-1/js/jquery-1.4.2.min.js to js/jquery-1.4.2.min.js
[root@ip-172-31-27-72 ~]#
```

Step 10:

```
MySQL [capstone]> select * from customers;
+----+-----+-----+-----+-----+
| id | name | gender | email    | phone
+----+-----+-----+-----+-----+
| 1  | bhanu | male   | bhanu@gmail.com | 123456790
| 2  | dinakar | male   | dinakar@gmail.com | 987654321
+----+-----+-----+-----+-----+
2 rows in set (0.00 sec)

MySQL [capstone]>
```

Step 11:

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, etc.), Images (AMIs, AMI Catalog), Elastic Block Store (Volumes, Snapshots, Lifecycle Manager), Network & Security (Security Groups, Elastic IPs), and CloudShell/Feedback.

The main content area displays the 'Instances (1/2) Info' table. It lists two instances:

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public
App-server	i-0f8397e5426b8a2c2	Stopping	t2.micro	2/2 checks passed	View alarms	us-east-2b	ec2-3-
linux1	i-01bfa0b0c9b1f2fd1	Running	t2.micro	2/2 checks passed	View alarms	us-east-2b	ec2-18

Below the table, a specific instance is selected: **i-0f8397e5426b8a2c2 (App-server)**. The 'Details' tab is active, showing the following details:

- Instance ID:** i-0f8397e5426b8a2c2
- IPv6 address:** -
- Hostname type:** IP name: ip-172-31-27-72.us-east-2.compute.internal
- Public IPv4 address:** 3.144.182.245 | [open address](#)
- Instance state:** Stopping
- Private IP DNS name (IPv4 only):** ip-172-31-27-72.us-east-2.compute.internal
- Private IPv4 addresses:** 172.31.27.72
- Public IPv4 DNS:** ec2-3-144-182-245.us-east-2.compute.amazonaws.com | [open address](#)

The screenshot shows the AWS EC2 AMIs page. The left sidebar is identical to the previous screenshot, showing the same navigation options.

The main content area displays the 'Amazon Machine Images (AMIs) (1) Info' table. It lists one AMI:

Name	AMI ID	Source	Owner	Visibility
capstone-image	ami-014b1c842f7c9328f	339712878593/capstone-image	339712878593	Private

Below the table, a section titled 'Select an AMI' is visible.

Step 12:

AWS EFS EC2 Target groups capstone-tg

capstone-tg

Details

arn:aws:elasticloadbalancing:us-east-2:339712878593:targetgroup/capstone-tg/45e40013bdd0bc44

Target type Instance	Protocol : Port HTTP: 80	Protocol version HTTP1	VPC vpc-0b7b3fc1a821d710
IP address type IPv4	Load balancer None associated		
0 Total targets	0 Healthy	0 Unhealthy	0 Unused
0 Anomalous		0 Initial	0 Draining

Targets **Monitoring** **Health checks** **Attributes** **Tags**

Registered targets (0) [Info](#)

Target groups route requests to individual registered targets using the protocol and port number specified. Health checks are performed on all registered targets according to the target group's health check settings. Anomaly detection is automatically applied to HTTP/HTTPS target groups with at least 3 healthy targets.

No registered targets

You have not registered targets to this group yet.

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AWS EFS EC2 Load balancers capstone-alb

capstone-alb

Application Load Balancers now support public IPv4 IP Address Management (IPAM)

You can get started with this feature by configuring IP pools in the Network mapping section.

Details

Load balancer type Application	Status Provisioning	VPC vpc-0b7b3fc1a821d710	Load balancer IP address type IPv4
Scheme Internet-facing	Hosted zone Z3AADJGX6KTTL2	Availability Zones	Date created May 15, 2025, 16:08 (UTC-04:00)
		subnet-022a99a754fd9abbe us-east-2c (use2-a2z)	
		subnet-054465545152dae0e3 us-east-2a (use2-a2z)	
		subnet-03d69777923b701c3 us-east-2b (use2-a2z)	

Listeners and rules (1) [Info](#)

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

Listeners and rules (1) [Info](#)

Manage rules [Manage listener](#) [Add listener](#)

Filter listeners

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Step 13:

Screenshot of the AWS EC2 'Create Auto Scaling group' wizard Step 1: Choose launch template.

The left sidebar shows the steps: Step 1 (Choose launch template) is selected, while others like Step 2 through Step 7 are optional.

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)

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.

[Create a launch template](#) [Edit](#)

Version
 [Create a launch template version](#) [Edit](#)

Description
-

Launch template
[capstone-template](#)
lt-080c2ce1227819f28

Instance type
t2.micro

Request Spot Instances

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Screenshot of the AWS EC2 'Create Auto Scaling group' wizard Step 2: Choose instance launch options.

The left sidebar shows the steps: Step 2 (Choose instance launch options) is selected, while others like Step 3 through Step 7 are optional.

Instance type requirements (Info)

You can keep the same instance attributes or instance type from your launch template, or you can choose to override the launch template by specifying different instance attributes or manually adding instance types.

Launch template
[capstone-template](#)
lt-080c2ce1227819f28

Version
Default

Description
-

Instance type
t2.micro

Override launch template

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.

172.31.0.0/16 Default [Create a VPC](#) [Edit](#)

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

172.31.0.0/20 Default [Select Availability Zones and subnets](#) [Edit](#)

172.31.0.0/20 Default [Edit](#)

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Screenshot of the AWS EC2 Auto Scaling Groups page for the 'capstone-asg' group.

capstone-asg Capacity overview

Desired capacity 4	Scaling limits (Min - Max) 1 - 6	Desired capacity type Units (number of instances)	Status Updating capacity
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Date created
Thu May 15 2025 16:27:53 GMT-0400 (Eastern Daylight Time)

Details Integrations - new Automatic scaling Instance management Instance refresh Activity Monitoring

Launch template

Launch template lt-080c2ce1227819f28 capstone-template	AMI ID ami-014b1c842f7c9328f	Instance type t2.micro	Owner arn:aws:iam::339712878593:user/capstone-project
Version Default	Security groups -	Security group IDs sg-0f3caf6f713d6d1d	Create time Thu May 15 2025 16:11:21 GMT-0400 (Eastern Daylight Time)
Description -	Storage (volumes) -	Key pair name MyKeyPair	Request Spot Instances No

[View details in the launch template console](#)

Screenshot of the AWS EC2 Auto Scaling Groups page for the 'capstone-asg' group, showing the 'Automatic scaling' tab.

Scaling policies (1) [Info](#)

Scaling policies resize your Auto Scaling group to meet changes in demand. With reactive dynamic scaling policies, you can track specific CloudWatch metrics and take action when the CloudWatch alarm threshold is met. Use predictive scaling policies along with dynamic scaling policies in the following situations: when your application demand changes quickly, but with a recurring pattern, or when your EC2 instances require more time to initialize.

Actions [Create dynamic scaling policy](#)

Target Tracking Policy

Policy type Target tracking scaling	<input type="checkbox"/>
Enabled or disabled Enabled	
Execute policy when As required to maintain Average CPU utilization at 70	
Take the action Add or remove capacity units as required	
Instances need 300 seconds to warm up before including in metric	
Scale in Enabled	

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Screenshot of the AWS EC2 Instances page showing a list of running t2.micro instances. The selected instance is 'App-server' (i-0f8397e5426b8a2c2).

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public
<input checked="" type="checkbox"/> App-server	i-0f8397e5426b8a2c2	Running	t2.micro	2/2 checks passed	View alarms +	us-east-2b	ec2-1E
<input type="checkbox"/> linux1	i-01bfa0b0c9b1f2fd1	Running	t2.micro	2/2 checks passed	View alarms +	us-east-2b	ec2-1E
<input type="checkbox"/>	i-0fefd21fc3face412	Running	t2.micro	Initializing	View alarms +	us-east-2b	ec2-1E
<input type="checkbox"/>	i-0ddb27b46a6e84cf1	Running	t2.micro	Initializing	View alarms +	us-east-2c	ec2-1I
<input type="checkbox"/>	i-0d6eb37c4ecc4d28d	Running	t2.micro	Initializing	View alarms +	us-east-2a	ec2-1I
<input type="checkbox"/>	i-0037a15f4d6bd2db	Running	t2.micro	Initializing	View alarms +	us-east-2a	ec2-1E

i-0f8397e5426b8a2c2 (App-server)

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

Instance summary

Instance ID i-0f8397e5426b8a2c2	Public IPv4 address 18.220.33.147 open address	Private IPv4 addresses 172.31.27.72
IPv6 address -	Instance state Running	Public IPv4 DNS ec2-18-220-33-147.us-east-2.compute.amazonaws.com open address
Hostname type IP name: ip-172-31-27-72.us-east-2.compute.internal	Private IP DNS name (IPv4 only) ip-172-31-27-72.us-east-2.compute.internal	

This is the output of the website which I deployed into AWS.

Screenshot of the website 'learnaws.today' titled 'Cinema World'.

WE ARE BREAKING ALL LIMITATIONS

The Indian Film Institute proudly curates lists to celebrate excellence in the art form. We believe their greatest impact is to inspire personal, passionate discussions about what makes a great film and why and, also, to chart the evolution of the art form.

Welcome to Cinema World

Since its inception, American film has marginalized the diversity of voices that make our nation and its stories strong and these lists reflect that intolerable truth.

Since its inception, American film has marginalized the diversity of voices that make our nation and its stories strong and these lists reflect that intolerable truth.

Architecture Explanation:

This AWS architecture showcases a well-designed three-tier architecture to host a scalable and secure application. The underlying infrastructure is designed within a Virtual Private Cloud (VPC), which was created in two different Availability Zones (AZs) with the VPC divided into public and private subnets, to reasonably ensure a level of high availability and fault tolerance. The Jump Server (Bastion Host) is deployed on a public subnet. This server has been configured to allow SSH access from a specific IP (typically the developer's computer) and combined, provides a secure jump to access resources residing in the private subnets.

The application tier (app/Tier-3) is deployed in both private subnets, with an application server EC2 instance in each AZ. While this provides basic redundancy, this also allows for load balancing and auto-scaling in the future. The NAT Gateway is in the public subnet (Tier-1 and secure) that allows the private application server instances to have access to the internet while securing their direct access, mainly to keep the application updated.

The data tier (dat/Tier-2) is composed of one of the RDS MySQL instances created in a private subnet to secure the instance from public potential access. The security groups are configured tight and have allowed MySQL traffic from the application servers only, effectively creating a small attack surface.

We also provide additional services with an S3 bucket for static assets (e.g. images, user uploads) and a CloudFront distribution to globally cache and serve this content with low latency and HTTPS support. CloudFront also provides an additional layer of protection using AWS Shield that allows for the cached assets to be served faster while having more protection in place.

Challenges Faced and Solutions Implemented:

Secure Remote Access:

Exposing EC2 instances directly to the internet is a potential security risk. We implemented a Jump Server in our architecture that is only accessible from a trusted IP, enabling secure SSH access to the private network.

Software Updates in Private Subnets:

The instances in the private subnets could not normally reach the internet for patches and updates. The solution was to add a NAT Gateway on the public subnet, extending outbound internet access to the private subnet for patches and updates while remaining secure.

Database Protection:

It was critical to make sure that we could protect our RDS instance so that it could not be (easily) accessed from the internet. We logically achieved this by deploying our RDS instance in a private subnet, with a DB Security Group ensuring inbound traffic was permitted only from our Web Server security groups.

Performance Bottlenecks for Static Content:

If we decide to host static assets on the same EC2 servers as our application, the load times for the application and performance of the server would be negatively impacted (quickly). To avoid this, we leveraged the S3 object storage technology, while using the CloudFront CDN to make our application assets available and globally accessible via HTTPS.

Manual Provisioning:

Initially, we provisioned our environment and configured the infrastructure components manually, which was inefficient and sometimes resulted in misconfigured deployments. This was solved by utilizing Infrastructure as Code (IaC) tools to deploy the components and manage their configuration (without the mistakes). We leveraged Terraform and AWS CloudFormation to deploy components many times consistently, repeatedly and in a version controlled manner.

Future Improvements:

Auto Scaling and Load Balancing:

Currently there are only two EC2 instances in the web tier and no auto-scaling is enabled. By creating an Auto Scaling Group behind an Application Load Balancer (ALB) it could dynamically handle load while maintaining high availability.

Multi-AZ RDS Deployment:

The RDS database is in a single AZ which is one point of failure. If Multi-AZ deployment was enabled, an automatic failover would occur, to provide a level of redundancy.

More Efficient CI/CD Integration:

To improve the deployment process, taking advantage of CodePipeline and CodeDeploy with GitHub is a way to automate application delivery with minimal downtime and allow for blue-green deployments.

Monitoring and Alerts:

There may be some basic monitoring currently in place but enabling Amazon CloudWatch Alarms, Logs, and AWS X-Ray, will provide detailed details of performance metrics and allow issues to be identified proactively.

Cost Optimisation:

Using Spot Instances or Savings Plans, reducing idle resources, and creating S3 lifecycle rules are ways to reduce costs, without impacting performance.

Fully Automated Using Terraform/CloudFormation:

Taking the IaC approach further would mean using tools that would allow for unrestricted state management, module reuse, and remote backends (such S3 + DynamoDB as Terraform state storage); it will allow teams to collaborate better so different application environments (dev, test, prod) can easily! be provisioned.