

Project Title: Re-Architecting Web App on AWS Cloud

Project Overview

The project aims to re-architect a web application on the AWS cloud to enhance agility and improve business continuity. This involves migrating services running on physical, virtual, and cloud machines to AWS services for increased operational efficiency and scalability.

Teams Involved

- Cloud Computing Team: Responsible for designing and implementing the cloud infrastructure.
- Virtualization Team: Involved in migrating services from virtual machines to AWS cloud services.
- DC OPS Team: Manages data center operations and assists in the migration process.
- Monitoring Team: Ensures proper monitoring and alerting mechanisms are in place.
- Sys Admins: Responsible for system administration tasks during the migration process.

Operational Overhead

The project addresses several challenges faced by the current infrastructure:

- Struggling with Uptime & Scaling: Implementing AWS services for better scalability and reliability.
- UpFront CapEx & Regular OpEx: Moving to a pay-as-you-go model to reduce upfront costs and optimize operational expenses.
- Manual Process / Difficult to Automate: Implementing Infrastructure as Code (IAC) for automation and ease of management.

AWS Services Utilized

- Elastic Beanstalk: Used for deploying and managing applications without managing the underlying infrastructure. Utilized for Tomcat application server, NGINX load balancer replacement, and automation for VM scaling.
- Amazon S3/EFS: Used for storage purposes.
- Amazon RDS: Utilized for database management.
- Amazon Elastic Cache: Used instead of Memcached for caching.
- Amazon ActiveMQ: Used instead of RabbitMQ for message queuing.
- Amazon Route53: Used for DNS management.
- Amazon CloudFront: Utilized for content delivery network (CDN) to improve content delivery speed and reduce latency.

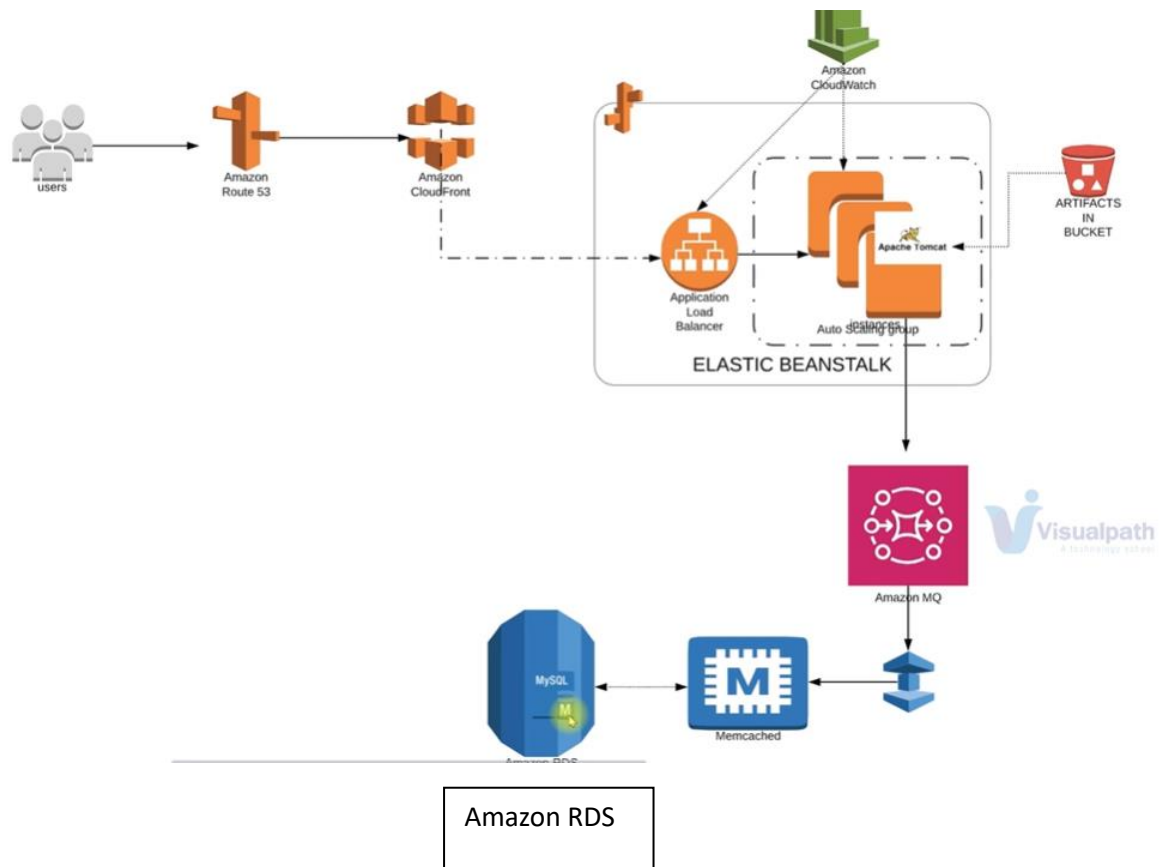
Objectives

- Flexible Infrastructure: Implementing AWS services for flexibility in infrastructure management.
- No Upfront Cost: Moving to a pay-as-you-go model to eliminate upfront capital expenditure.
- Infrastructure as a Service (IAAS): Leveraging AWS for infrastructure provisioning and management.
- Platform as a Service (PAAS): Utilizing AWS services for platform management.
- Software as a Service (SAAS): Improving the web application's availability and scalability.

Comparison:

Beanstalk	Tomcat Ec2/VM
ELB IN BEANSTALK	NGINX LB/ELB
AUTOSCALING	NONE / Autoscaling
EFS/S3	NFS / S3/ EFS
RDS	MYSQL ON VM/Ec2
ELASTIC CACHE	MEMCACHED ON VM/Ec2
ACTIVE MQ	RABBITMQ ON VM/Ec2
ROUTE53	GODADDY, LOCAL DNS
CLOUDFRONT	NONE / MULTI DC ACROSS WORLD

Architecture :






Step of execution :

- 1) Generate a key pair, which is not mandatory but it will be ok if we do generate it.

Key pairs (1/1) Info							Actions	Create key pair
Find Key Pair by attribute or tag							< 1 >	
<input checked="" type="checkbox"/>	Name	Type	Created	Fingerprint	ID			
<input checked="" type="checkbox"/>	elastic-beanstalk	rsa	2024/06/12 11:52 GMT+5:30	31:c9:9a:9f:f6:5f:dd:0f:6c:8e:83:cd:...	key-Ob0			

2) Create a security group for backend service.

 Inbound security group rules successfully modified on security group (sg-01b3b5af4aa8a19f2 | eb-backend-sg) 







 Details

[EC2](#) > [Security Groups](#) > sg-01b3b5af4aa8a19f2 - eb-backend-sg

sg-01b3b5af4aa8a19f2 - eb-backend-sg

Actions ▼




Details

Security group name  eb-backend-sg	Security group ID  sg-01b3b5af4aa8a19f2	Description  allow traffic for backend	VPC ID  vpc-029b513302e489b91 
Owner  891376971929	Inbound rules count 1 Permission entry	Outbound rules count 1 Permission entry	

[Inbound rules](#) | [Outbound rules](#) | [Tags](#)




3) Now Create RDS : Relational Database System

- Create subnet group and paramenet group, well this is not mandatory but if we need own customized VPC than we need this


 Successfully created beanstak-subnet-grp. [View subnet group](#)  


[RDS](#) > [Subnet groups](#)



Subnet groups (1)

   [Create DB subnet group](#)

< 1 >



<input type="checkbox"/>	Name ▲	Description ▼	Status ▼	VPC ▼
<input type="checkbox"/>	beanstak-subnet-grp	creating own subnet group	 Complete	vpc-029b513302e489b91

 Successfully created beanstalk-subnet-grp. [View subnet group](#) 



[RDS](#) > [Parameter groups](#)

Parameter groups Info

Custom


Default

Custom parameter groups (1)

 Actions 

Create parameter group

< 1 >





<input type="checkbox"/>	Name	Family	Type	Description	ARN
<input type="checkbox"/>	my-para-for-beanstalk	mysql8.0	DB instance parameter group	my-para-for-beanstalk	arn:aws:rds:ap-southeast-1:123456789012:parameter-group:my-para-for-beanstalk


- Go to databases and create a database

[RDS](#) > [Databases](#) > [vprofile-rds-eb](#)

vprofile-rds-eb

 [Modify](#) Actions 

Summary

DB identifier vprofile-rds-eb	Status  Creating	Role Instance	Engine MySQL Community	Recommendations
CPU -	Class db.t3.micro	Current activity	Region & AZ ap-southeast-1b	

<

[Connectivity & security](#)

[Monitoring](#)



[Logs & events](#)

[Configuration](#)

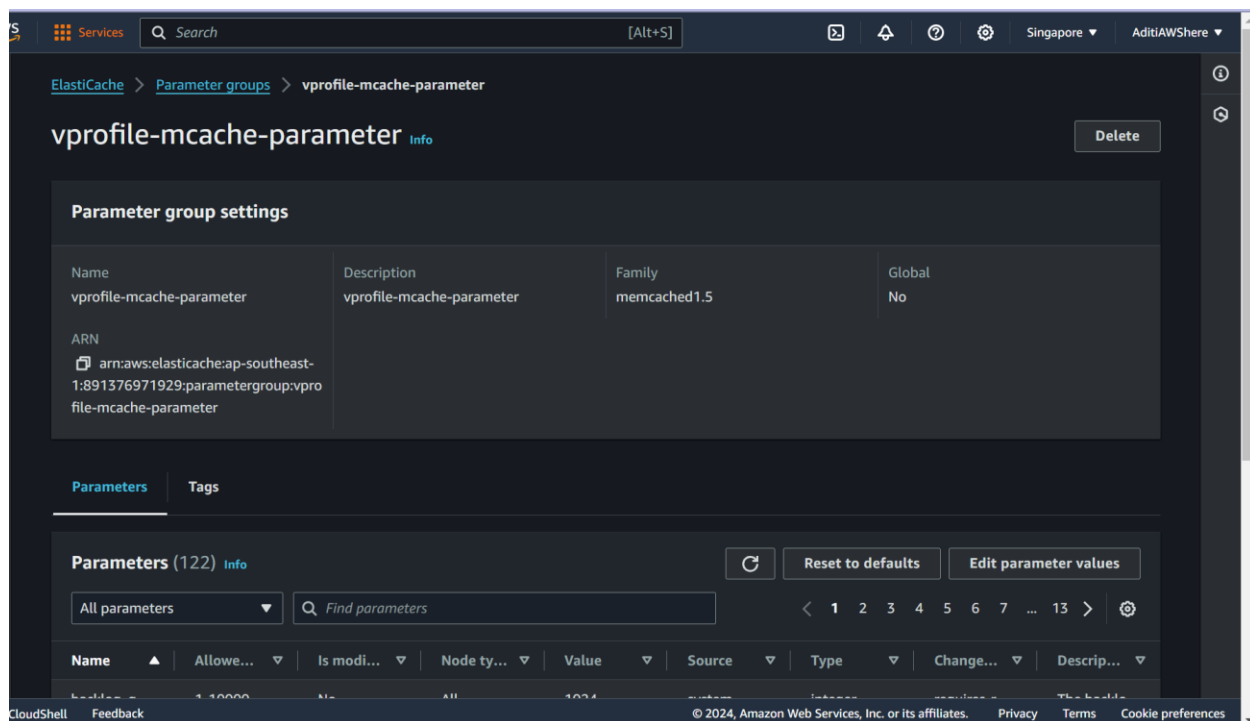
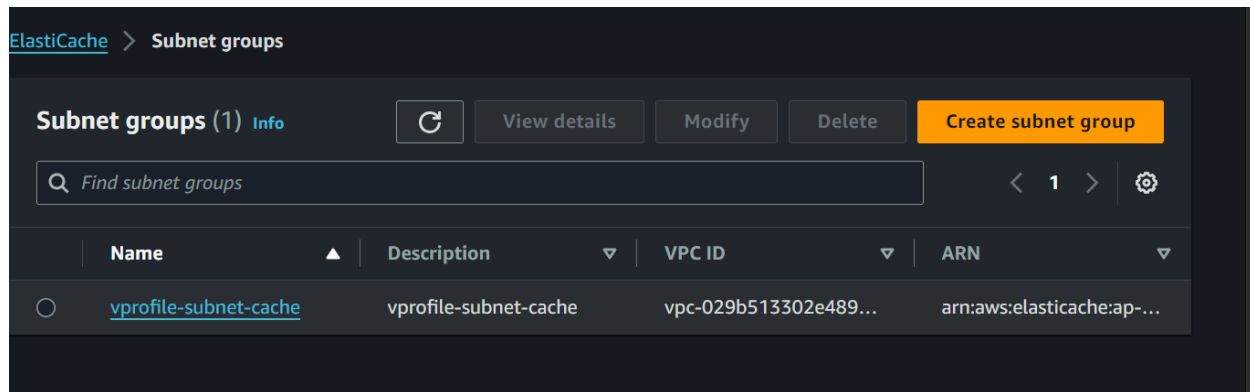
[Maintenance & backups](#)

1 >

Connectivity & security

Endpoint & port	Networking	Security
Endpoint  -	Availability Zone ap-southeast-1b	VPC security groups eb-backend-sg (sg-01b3b5af4aa8a19f2)
Port	VPC	 Active

4) Now create elastic cache



The screenshot shows the AWS Management Console interface. At the top, a green banner indicates "The cluster was created successfully." Below this, the breadcrumb navigation shows "ElastiCache > Memcached caches". A blue information box announces "Announcing Amazon ElastiCache Serverless." The main content area displays "Memcached caches (1) Info" with buttons for "View details", "Actions", and "Create Memcached cache". A modal window titled "vprofile-cluster" is open, showing the following details:

Cluster name	Node type	Status	Engine
vprofile-cluster	cache.t2.micro	Creating	Memcached
Engine version	Update status	Number of nodes	Encryption in transit
1.6.22	Up to date	1	Disabled
Parameter group	Outpost ARN	Configuration endpoint	ARN
default.memcached1.6	-	-	arn:aws:elasticache:ap-southeast-1:891376971929:cluster:vprofile-cluster

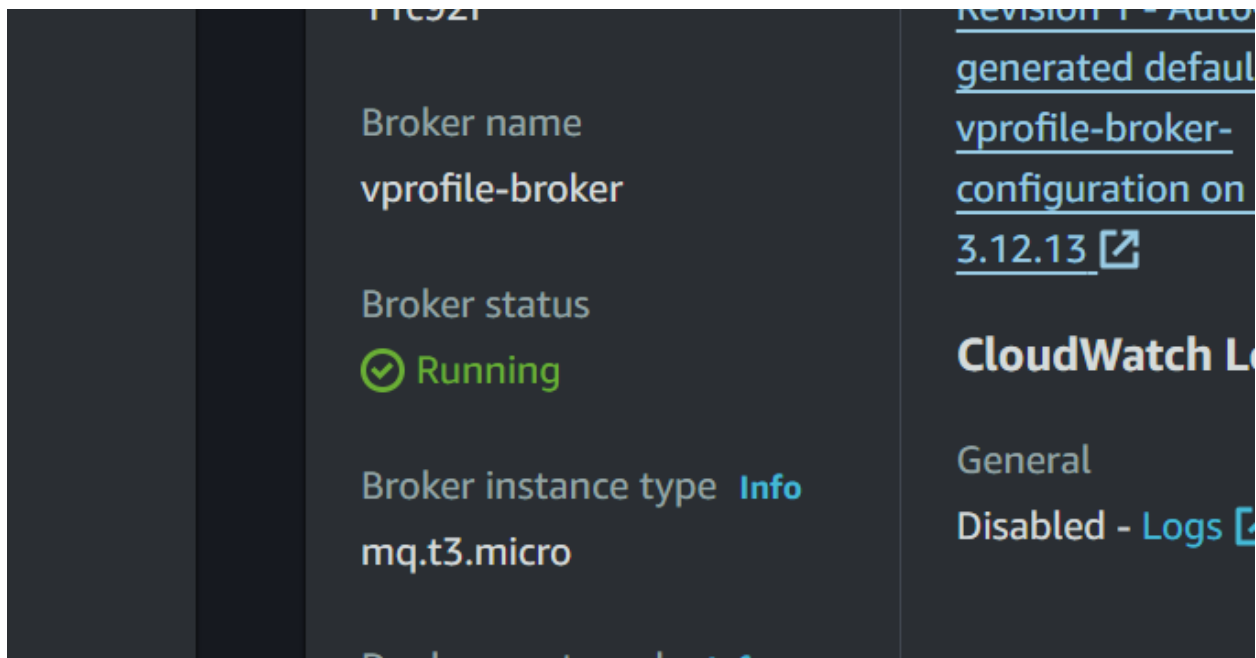
The footer of the console shows "CloudShell", "Feedback", and copyright information for Amazon Web Services, Inc. or its affiliates.

5) Create AmazonMQ

The screenshot shows the AWS Management Console interface for AmazonMQ. A green banner at the top indicates "Broker vprofile-broker is being created." Below this, the breadcrumb navigation shows "Amazon MQ > Brokers > vprofile-broker". The main content area displays "vprofile-broker Info" with a "Pending modifications" status and an "Actions" button. A "Details" section is open, showing the following information:

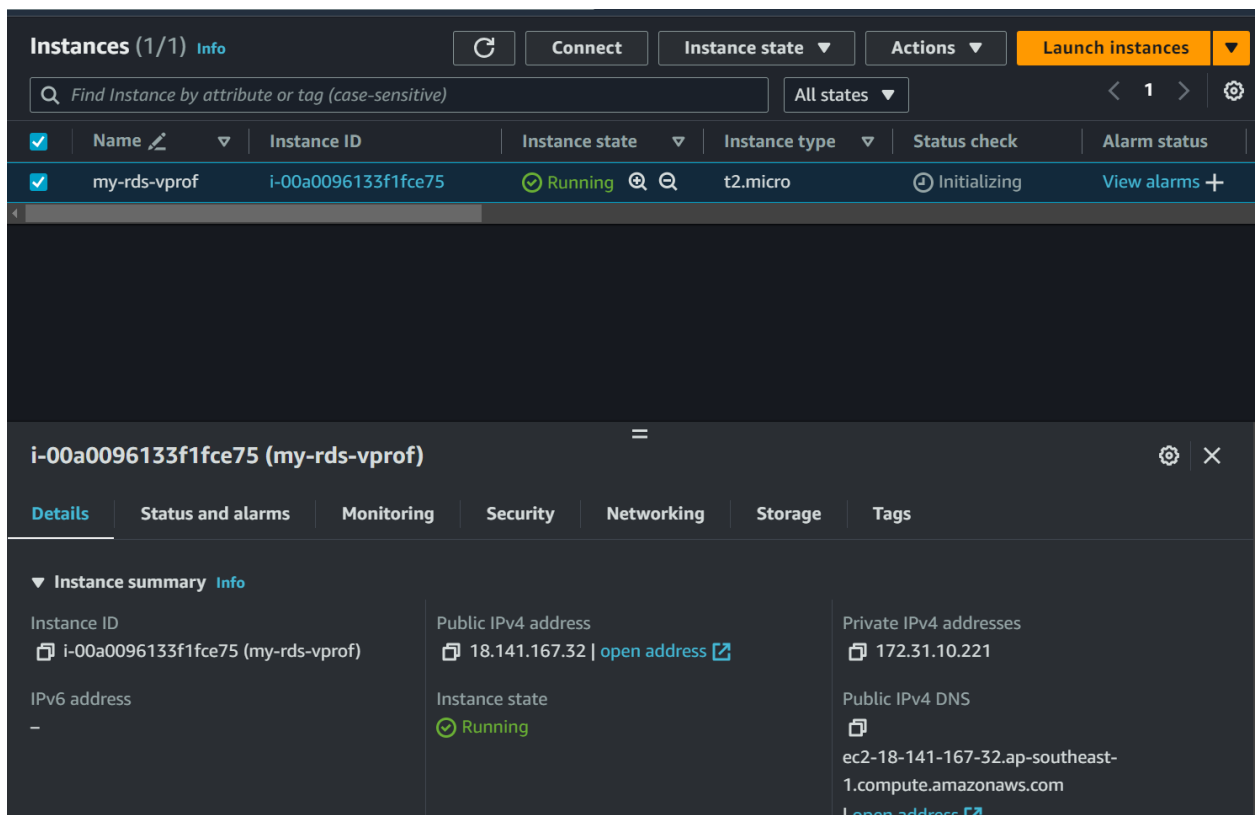
Specifications	CloudWatch Logs	Security and network	Maintenance
ARN Info arn:aws:mq:ap-southeast-1:891376971929:broker:vprofile-broker:b-911712c4-4232-4d70-a05d-0547ef11c92f	General Disabled - Logs	VPC Info vpc-029b513302e489b91 Subnet(s) Info subnet-013800a3658fbbaab Security group(s) Info sg-01b3b5af4aa8a19f2 Public accessibility Info	Automatic minor version upgrade Yes Maintenance window Tuesday 18:00 - 20:00 UTC Pending modifications Broker configuration Pending configuration
Broker name vprofile-broker Broker status Creation in progress			

The footer of the console shows copyright information for Amazon Web Services, Inc. or its affiliates, and links for "Privacy", "Terms", and "Cookie preferences".

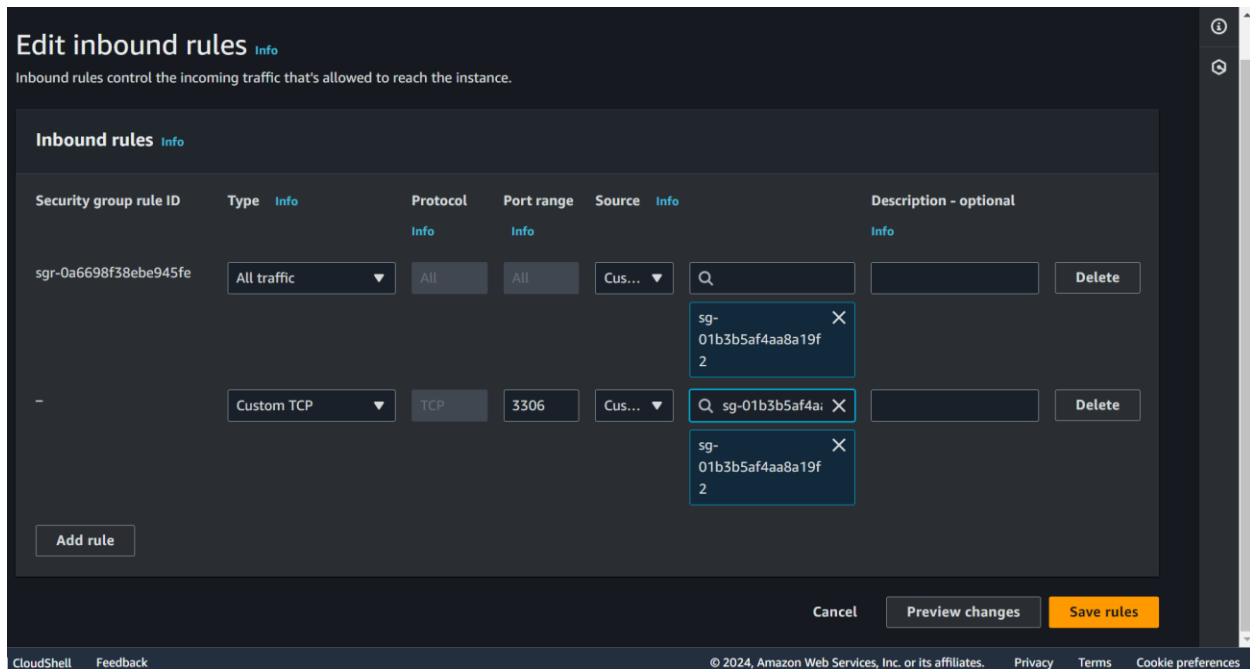


6) DB initialization.

- Go to ec2 and launch instance



- Allow backend security group allow connection from this instance



- Connect to the instance and try connecting mysql

```
connect-expired-password FALSE
network-namespace (No default value)
compression-algorithms (No default value)
zstd-compression-level 3
load-data-local-dir (No default value)
fido-register-factor (No default value)
authentication-oci-client-config-profile (No default value)
oci-config-file (No default value)
ubuntu@ip-172-31-2-85:~$ mysql -h vprofile-rds-eb.cxcyuimqq8b6.ap-southeast-1.rds.amazonaws.com -u admin -pK1sYHS2UMw6CK2vINTVL accounts
mysql: [Warning] Using a password on the command line interface can be insecure.
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 290
Server version: 8.0.35 Source distribution

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affiliates. Other names may be trademarks of their respective
owners.

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

mysql> |
```

```
aditi@ip-172-31-2-33: ~/prometheus-project

Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 295
Server version: 8.0.35 Source distribution

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affiliates. Other names may be trademarks of their respective
owners.

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


mysql> show tables;
+-----+
| Tables_in_accounts |
+-----+
| role                |
| user                |
| user_role           |
+-----+
3 rows in set (0.00 sec)
```

- 7) Go to broker and check if it running and go to the broker's endpoint.

Specifications

ARN [Info](#)
 `arn:aws:mq:ap-southeast-1:891376971929:broker:vprofile-broker:b-911712c4-4232-4d70-a05d-0547ef11c92f`

Broker name
vprofile-broker

Broker status
 **Running**


Broker instance type [Info](#)
mq.t3.micro

Deployment mode [Info](#)
Single-instance broker


Broker engine [Info](#)
RabbitMQ

Configuration

Configuration name
vprofile-broker-configuration

Configuration revision
[Revision 1 - Auto-generated default for vprofile-broker-configuration on RabbitMQ 3.12.13](#) 

CloudWatch Logs

General
Disabled - [Logs](#) 

8) Check Elastic Cache.

The screenshot displays the AWS Management Console interface for an Amazon ElastiCache Memcached cluster. At the top, there's a navigation bar with 'ElastiCache' and 'Memcached caches'. A notification banner at the top left announces 'Announcing Amazon ElastiCache Serverless.' Below this, a summary bar shows 'Memcached caches (1)' with buttons for 'View details', 'Actions', and 'Create Memcached cache'. A search bar is present below the summary. The main content area shows the details for the 'vprofile-cluster'. The details are organized into four columns: Cluster name, Node type, Status, and Engine. The cluster name is 'vprofile-cluster', the node type is 'cache.t2.micro', the status is 'Available', and the engine is 'Memcached'. Other details include 'Engine version: 1.6.22', 'Update status: Up to date', 'Number of nodes: 1', 'Encryption in transit: Disabled', 'Parameter group: default.memcached1.6', and 'Outpost ARN: -'. A tooltip 'Endpoint copied' is visible over the endpoint value. The footer of the console shows the copyright notice '© 2024, Amazon Web Services, Inc. or its affiliates.' and links for 'Privacy', 'Terms', and 'Cookie preferences'.

Cluster name	Node type	Status	Engine
vprofile-cluster	cache.t2.micro	Available	Memcached
Engine version	Update status	Number of nodes	Encryption in transit
1.6.22	Up to date	1	Disabled
Parameter group	Outpost ARN	Endpoint	ARN
default.memcached1.6	-	vprofile-cluster.oiem4t.cfg.apse1.cache.amazonaws.com:11211	arn:aws:elasticache:ap-south-east-1:891376971929:cluster:vprofile-cluster

broker end point

911712c4-4232-4d70-a05d-0547ef11c92f.mq.ap-southeast-1.amazonaws.com

elastic cache ep

vprofile-cluster.oiem4t.cfg.apse1.cache.amazonaws.com

All our backend is set!

- 9) Elastic Beanstalk setup
- Make IAM Roles for beanstalk

[IAM](#) > [Roles](#) > [beanstalk-vprofile](#)

beanstalk-vprofile [Info](#)

Allows EC2 instances to call AWS services on your behalf. [Delete](#)

Summary [Edit](#)

Creation date	ARN	Instance profile ARN
June 13, 2024, 19:41 (UTC+05:30)	arn:aws:iam::891376971929:role/beanstalk-vprofile	arn:aws:iam::891376971929:instance-profile/beanstalk-vprofile
Last activity	Maximum session duration	
-	1 hour	

[Permissions](#) | [Trust relationships](#) | [Tags](#) | [Access Advisor](#) | [Revoke sessions](#)

Permissions policies (4) [Info](#)

You can attach up to 10 managed policies.

[Filter by Type](#) [All types](#) [1](#) [Settings](#)

[Refresh](#) [Simulate](#) [Remove](#) [Add permissions](#)

You can attach up to 10 managed policies.

[Filter by Type](#) [All types](#) [1](#) [Settings](#)

<input type="checkbox"/>	Policy name ↗	Type	Attached entities
<input type="checkbox"/>	AdministratorAccess-AW...	AWS managed	1
<input type="checkbox"/>	AWSElasticBeanstalkCus...	AWS managed	1
<input type="checkbox"/>	AWSElasticBeanstalkRol...	AWS managed	1
<input type="checkbox"/>	AWSElasticBeanstalkWe...	AWS managed	1

- Important documentation

<https://docs.aws.amazon.com/elasticbeanstalk/latest/dg/using-features.deploy-existing-version.html>

- Beanstalk setup

The screenshot displays the AWS Elastic Beanstalk console interface for an environment named 'Vprofile-project-bs-prod'. At the top, there are buttons for 'Actions' and 'Upload and deploy'. The main section, titled 'Environment overview', is divided into two columns. The left column shows the 'Health' status as 'Ok' with a green checkmark and a link to 'View causes', and the 'Domain' as 'vprof-aditi.ap-southeast-1.elasticbeanstalk.com'. The right column shows the 'Environment ID' as 'e-92gqw2tdmm' and the 'Application name' as 'vprofile-project-bs'. At the bottom, there is a 'Platform' section with a 'Change version' button.

Environment overview	
Health ✔ Ok - View causes	Environment ID e-92gqw2tdmm
Domain vprof-aditi.ap-southeast-1.elasticbeanstalk.com	Application name vprofile-project-bs

Platform [Change version](#)

10) Enable ACL on S3 bucket, Update the health check of target groups, update security group

- While deployment of Artifacts in order not to get ACL S3 error, enable ACL from bucket ownership.

Amazon S3 > Buckets > elasticbeanstalk-ap-southeast-1-891376971929 > Edit Object Ownership

Edit Object Ownership Info

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.

⚠ We recommend disabling ACLs, unless you need to control access for each object individually or to have the object writer own the data they upload. Using a bucket policy instead of ACLs to share data with users outside of your account simplifies permissions management and auditing.

Object Ownership

☐ **Bucket owner preferred**
If new objects written to this bucket specify the bucket-owner-full-control canned ACL, they are owned by the bucket owner. Otherwise, they are owned by the object writer.

☒ **Object writer**
The object writer remains the object owner.

Cancel Save changes

- Go to instance traffic and scaling in Beanstalk environment and go to processes and do changes.

Processes
For each environment process, you can specify the command to run and also specify how the load balancer performs health checks.

Name	Port
default	80

Rules
Your load balancer routes requests to environments. Elastic Beanstalk configures a default rule, listener, and has the last priority among all rules. The default rule routes the request to the listener's default target.

Protocol
HTTP

Health check

HTTP code
HTTP status code of a healthy instance in your environment.
200

Path
Path to which the load balancer sends HTTP health check requests.
/login

Timeout
Amount of time to wait for a health check response.
5 seconds

Interval
Amount of time between health checks of an individual instance. The interval must be greater than the timeout.
15 seconds

Cancel Save

The following settings let you control whether the load balancer routes requests for the same session to the Amazon EC2 instance with the smallest load, or consistently to the same instance.

Session stickiness

☒ Enabled

Cookie duration

Lifetime of the sticky session cookie between an Amazon EC2 instance and the load balancer.

86400

Cancel Save

- Next we will add https listener
- Add port 443 https listener. Select SSL certificate from ACM

Add listener

Listener port

443

Listener protocol

The transport protocol that the load balancer uses for routing incoming traffic from clients.

HTTPS

SSL certificate

hkHING.xyz - 5eed0da9-6218-4d7e-9c4d-35d0727e84f4

SSL policy

Choose a policy

Default process

The process to which the listener routes traffic by default, when the message path doesn't match any custom listener rule

default

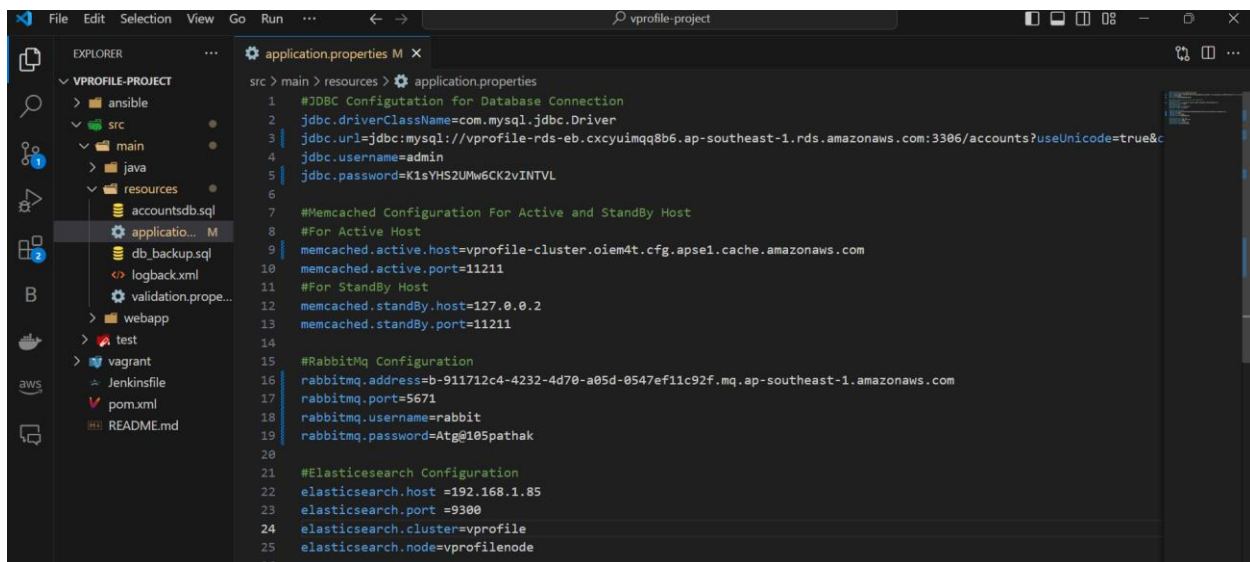
Cancel Save

- Security group changes

<input type="checkbox"/>	-	sg-0c88b7d017080cd74	elastic-bs-sg-client	vpc-029b513302
<input type="checkbox"/>	Vprofile-project-bs...	sg-0bdf2c76820c49486	awseb-e-92gqw2tdmm-stack-AWSEBS...	vpc-029b513302
<input type="checkbox"/>	Vprofile-project-bs...	sg-0bb4617e2b233e5b6	awseb-e-92gqw2tdmm-stack-AWSEBL...	vpc-029b513302

Inbound rules (6)						
<input type="text" value="Search"/>						
<input type="checkbox"/>	Name	Security group rule...	IP version	Type	Protocol	
<input type="checkbox"/>	-	sg-0818b7144ca3e39...	-	All traffic	All	
<input type="checkbox"/>	-	sg-0e7167bc28b6ed8...	-	Custom TCP	TCP	
<input type="checkbox"/>	-	sg-0d6ef090867be6453	-	Custom TCP	TCP	
<input type="checkbox"/>	-	sg-06864014cc7e32c36	IPv4	SSH	TCP	
<input type="checkbox"/>	-	sg-0c608f520-ba045f...	-	All traffic	All	

11) Build and Deploy artifacts.

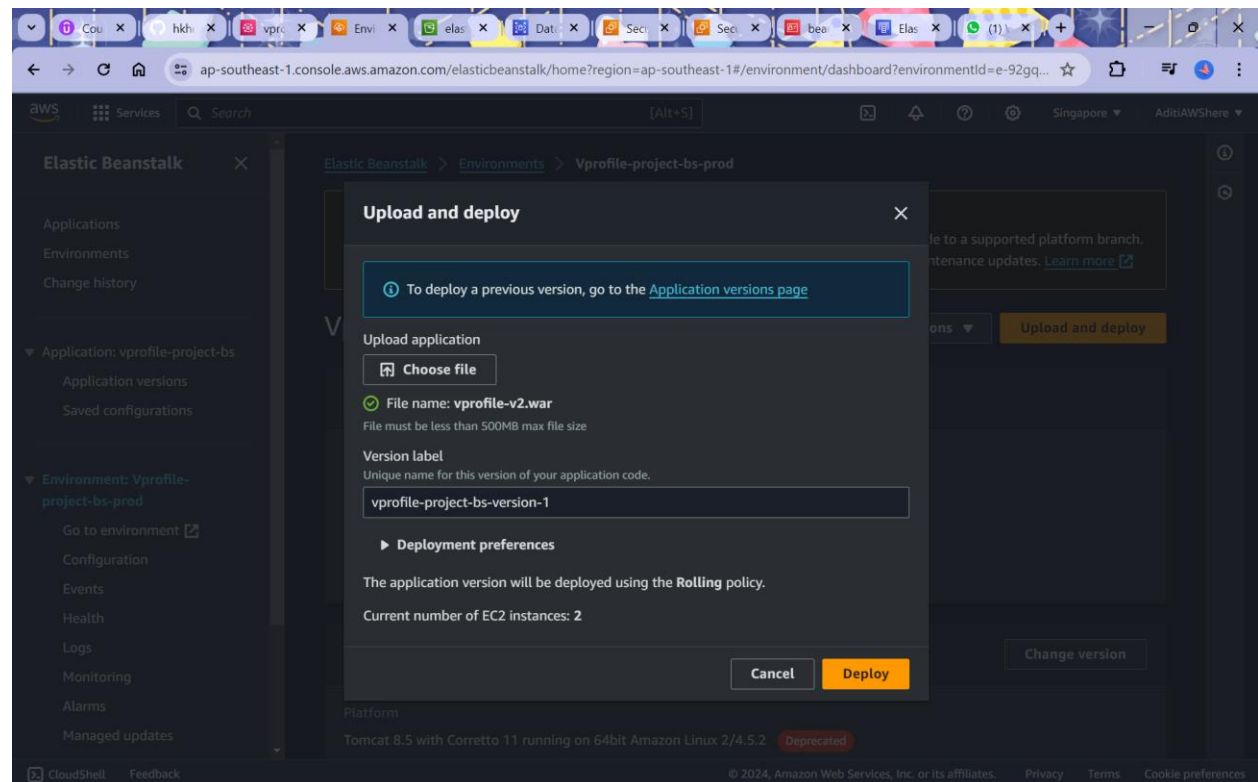


```
src > main > resources > application.properties
1  #JDBC Configuration for Database Connection
2  jdbc.driverClassName=com.mysql.jdbc.Driver
3  jdbc.url=jdbc:mysql://vprofile-rds-eb.cxcyulmq8b6.ap-southeast-1.rds.amazonaws.com:3306/accounts?useUnicode=true&
4  jdbc.username=admin
5  jdbc.password=K1sYHS2UMw6CK2vINTVL
6
7  #Memcached Configuration For Active and StandBy Host
8  #For Active Host
9  memcached.active.host=vprofile-cluster.oiem4t.cfg.apse1.cache.amazonaws.com
10 memcached.active.port=11211
11 #For StandBy Host
12 memcached.standBy.host=127.0.0.2
13 memcached.standBy.port=11211
14
15 #RabbitMq Configuration
16 rabbitmq.address=b-911712c4-4232-4d70-a05d-0547ef11c92f.mq.ap-southeast-1.amazonaws.com
17 rabbitmq.port=5671
18 rabbitmq.username=rabbit
19 rabbitmq.password=Atg@105pathak
20
21 #Elasticsearch Configuration
22 elasticsearch.host=192.168.1.85
23 elasticsearch.port=9300
24 elasticsearch.cluster=vprofile
25 elasticsearch.node=vprofilenode
```


```
aditi@ADITI MINGW64 ~/OneDrive/文档/DevOps/ProjectSetupAWS/vprofile-project (main)
$ mvn -version
Apache Maven 3.9.7 (8b094c9513efc1b9ce2d952b3b9c8eaedaf8cbf0)
Maven home: C:\ProgramData\chocolatey\lib\maven\apache-maven-3.9.7
Java version: 11.0.23, vendor: Amazon.com Inc., runtime: C:\Program Files\Amazon Corretto\jdk11.0.23_9
Default locale: en_US, platform encoding: Cp1252
OS name: "windows 11", version: "10.0", arch: "amd64", family: "windows"

aditi@ADITI MINGW64 ~/OneDrive/文档/DevOps/ProjectSetupAWS/vprofile-project (main)
$
```


```
aditi@ADITI MINGW64 ~/OneDrive/文档/DevOps/ProjectSetupAWS/vprofile-project (main)
$ mvn install
[INFO] Scanning for projects...
[INFO]
[INFO] -----< com.visualpathit:vprofile >-----
[INFO] Building Visualpathit VProfile Webapp v2
[INFO] from pom.xml
[INFO] -----[ war ]-----
[WARNING] The artifact mysql:mysql-connector-java:jar:8.0.32 has been relocated to com.mysql:mysql-connector-j:jar:8.0.32: MySQL Connector/J artifacts moved to reverse-DNS compliant Maven 2+ coordinates.
[INFO]
[INFO] --- resources:3.3.1:resources (default-resources) @ vprofile ---
```



[Elastic Beanstalk](#) > [Environments](#) > **Vprofile-project-bs-prod**

**Deprecated platform**
This environment uses a deprecated platform branch. We recommended that you upgrade to a supported platform branch. A deprecated branch may have a scheduled retirement date. It still receives ongoing maintenance updates. [Learn more](#)

Vprofile-project-bs-prod Info



Actions ▾

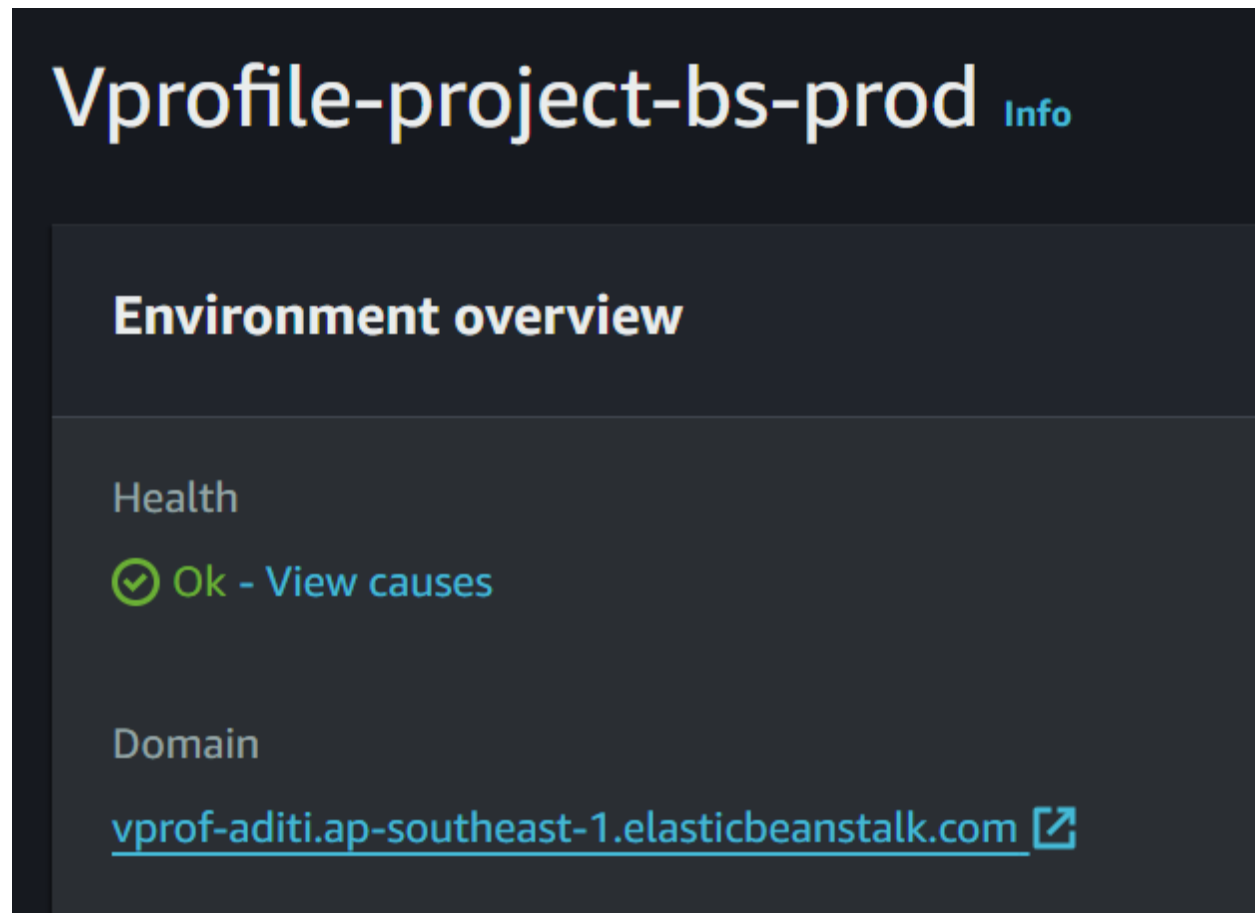
Upload and deploy

Environment overview

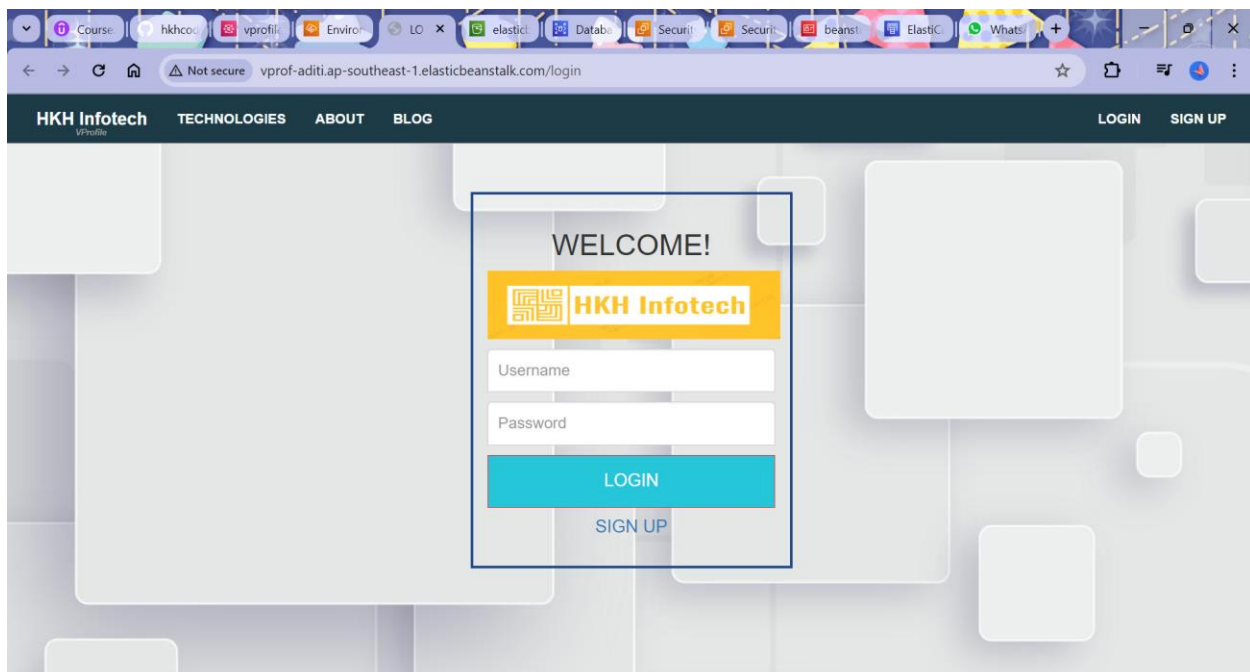
Health ✔ Ok - View causes	Environment ID e-92gqw2tdmm
Domain vprof-aditi.ap-southeast-1.elasticbeanstalk.com	Application name vprofile-project-bs

Platform

Change version



Go to domain :



Let us access via deployment using GoDaddy

The image shows two screenshots. The top screenshot is a GoDaddy DNS settings page for the domain hkhing.xyz. It lists three DNS records:

Type	Host	Value	TTL	Actions
NS	@	ns65.domaincontrol.com.	1 Hour	Can't delete, Can't edit
NS	@	ns66.domaincontrol.com.	1 Hour	Can't delete, Can't edit
CNAME	vprofile	vprof-aditi.ap-southeast-1.elasticbeanstalk.com.	1 Hour	Delete, Edit

The bottom screenshot is a LinkedIn profile for admin_vp (admin_vp@visualpath.co.in). The profile includes a bio, location (Earth), and a recent post titled "The Key to DevOps Success." The post content is:

"The Key to DevOps Success." Collaboration is essential to DevOps, yet how to do it is often unclear with many teams falling back on ineffective conference calls, instant messaging, documents, and SharePoint sites. In this keynote, we will share a vision for a next generation DevOps where collaboration, continuous documentation, and knowledge capture are combined with automation toolchains to enable rapid innovation and deployment.



Rabbitmq initiated

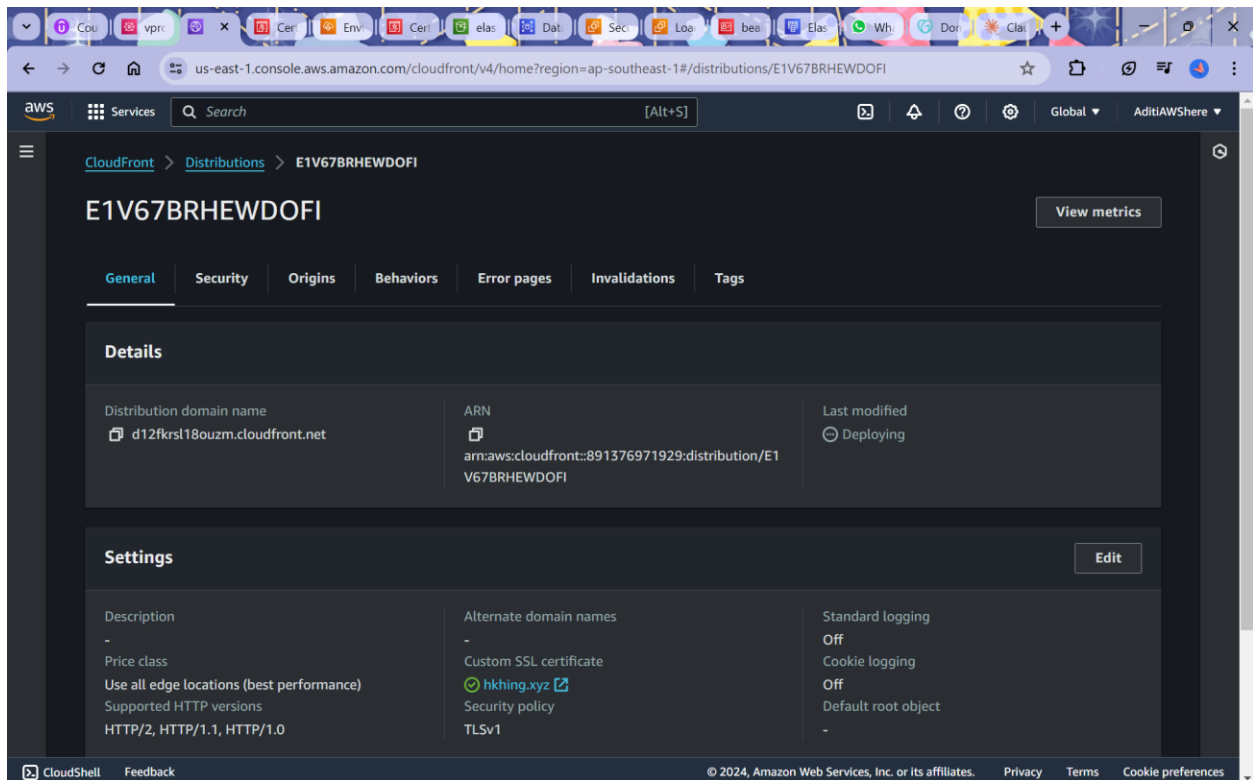
Generated 2 Connections

6 Channels 1 Exchange and 2 Que

Deployment is successful!!!!!!!!!!!!!!

Let us explore CLOUD FRONT.

Cloud Front is Content Delivery network of AWS



CNAME

vprofileaditi

d12fkrsl18ouzm.cloudfront.net.

1 Hour

