

# Deploying a Movie Listing Website on AWS Cloud

## **GROUP-6**

### **TEAM MEMBERS:**

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## CONTRIBUTION OF TEAM MEMBERS

S.No	ROLES FOR DEVOPS_CAPSTONE	MEMBERS
1	Connecting the Server with Atlas MongoDB.	Vamshidhar, Sai Pradeep, Sai Poojitha
2	Creating IAM user and S3.	Jyothi, Mahalakshamma
3	Configuring the Application Code with S3-multer.	Raja, Jyothi, Vamshidhar, Sai Pradeep
4	Containerization of the code using Docker file.	Bhanu, Sai Poojitha, Vamshidhar
5	Deploying server on EC2 using Docker.	Sai Pradeep, Raja, Bhargavi
6	Deploying client on EC2 using Docker.	Bhanu, Mahalakshamma, Bhargavi
7	Creation of target group and Load Balancer.	Sai Poojitha, Bhanu
8	Creating AWS Deployment Diagram.	Vamshidhar, Sai Pradeep
9	Preparing Project Documentation.	Jyothi, Mahalakshamma, Bhargavi, Raja

➤ **GitHub URL:**

[https://github.com/pradeep-pulaparthi/Capstone\\_project](https://github.com/pradeep-pulaparthi/Capstone_project)

\*This is the URL of the repository which contains the modified codes of the front end and back end.

➤ **Frontend URL:**

<http://44.204.124.118:6200/>

➤ **Backend URL:**

<http://44.193.213.43:6200/>

➤ **DNS URL:**

<http://myloadbalancer-d6377885a348cd6f.elb.us-east-1.amazonaws.com/>

## PURPOSE OF THE PROJECT:

The aim of the project is to deploy a movie listing web application into the cloud so that it will allow users to connect from anywhere and also allows them to upload movie posters and details.

- The website uses ReactJS at the front end, NodeJS at the back end, and MongoDB as the database.
- The main objective of the project is to provide a platform for users to explore and discover new movies, as well as share their favorite movies with others.
- The website is designed to be user-friendly and interactive, to help users easily find the movies they are interested in.
- By deploying the website on the AWS cloud infrastructure with proper scaling, the project aims to provide a seamless and reliable experience for users, even during periods of high traffic.
- One of the main advantages of this project is that it stores the data in multiple locations. So even when there is a loss of data at one place all the information will be made available at the other locations.
- We can find that the data is being stored in the MongoDB database, S3 buckets, and docker.

## SCOPE OF THE PROJECT:

The scope of the project includes the development of a movie listing website that allows users to upload movie details and images.

- **Objectives:** The project's main objective is to deploy an existing "Movie listing" website on the cloud infrastructure of Amazon Web Services and ensure proper scaling.
- **Deliverables:** The deliverables of the project will be having a fully functional and scalable "Movie listing" website running on AWS infrastructure. The website should be deployed with all its components including the frontend, backend, database, and S3 bucket for images.

The project involves designing and implementing the following features:

- **Backend configuration:** The backend server is configured to use MongoDB as a database and multer for file upload.
- **AWS deployment:** The website is deployed on the AWS cloud infrastructure using S3, and EC2, and proper scaling has been established using the load balancers.
- **Image storage:** The website uses AWS S3 to store the images uploaded by the user.
- **Movie upload:** Users can upload their own movie details and images to the website.
- **Movie listing:** Users can view a list of movies uploaded by other users.

## TECHNOLOGIES USED IN THIS PROJECT:

The following are the technologies that have been used in the project:

### 1)Frontend development:

The user interface is designed by using React JS for enhancing flexibility and performance.

### 2)Backend development:

NodeJS has been used for developing the back end of the movie listing website. NodeJS has the ability to handle multiple requests simultaneously.

### 3)Database management:

MongoDB has been used as the database for storing movie details, user information, and other relevant data. MongoDB is a NoSQL database that is highly flexible.

### 4)File Upload:

The multer-s3 package extends the functionality of multi by providing the ability to store uploaded files directly to Amazon S3 (Simple Storage Service) instead of storing them locally on the server.

### 5)Cloud infrastructure:

We have used Amazon Web Services (AWS) for deploying the movie listing website on the cloud infrastructure with proper scaling. We have used the following services of AWS:

- **EC2:** EC2 stands for Elastic Compute Cloud. It is a web service that helps to launch and manage virtual machines known as instances in the cloud. In this project, we used EC2 to host the “Movie Listing” website.
- **S3:** S3 stands for Simple Storage Service. It is a highly scalable, durable, and secure object storage service. S3 is used to store and retrieve any amount of data from anywhere on the web. The images related to the website will be stored in the S3 bucket whenever the movie details have been uploaded.
- **ELB:** ELB stands for Elastic Load Balancer. ELB automatically distributes the incoming traffic across multiple Amazon EC2 instances, helping to improve the availability and scalability of applications running on AWS. In our project, we have used a Network load balancer for the distribution of traffic to multiple EC2 instances.

## MAJOR TOOLS AND SERVICES UTILIZED IN THIS PROJECT:

- **Visual Code:** Visual Studio Code, commonly referred to as VS Code, is a free, open-source code editor developed by Microsoft. It is a lightweight and powerful tool for coding, debugging, and building applications. We have used it to write the codes of the front end and back end.
- **MongoDB:** A NoSQL database used for storing movie details, user information, and other relevant data.
- **ReactJS:** A JavaScript library used for building user interfaces and developing the front end of the movie listing website.
- **NodeJS:** A JavaScript runtime environment used for developing the backend of the movie listing website.
- **Figma:** Figma is a cloud-based design and prototyping tool that allows designers and teams to collaborate on designing user interfaces, web pages, and mobile applications. It is used to design the architecture that has been followed.
- **GitHub:** GitHub is a web-based platform for version control and collaboration that allows developers to work together on software projects. It provides a range of features for software development, including code hosting, project management, issue tracking, and collaboration tools. In our project, it is used to host the front-end and back-end code of the movie listing website.
- **Docker:** Docker has been used to containerize the application by creating Docker images. We have built Docker images for both the front end and back end and they are made to run in the instances.
- **GIT:** Git is a version control system that is widely used for software development. Git stores the code and its history in a repository and allows developers to make changes to the code by creating new branches and committing changes to those branches.

## IMPLEMENTATION:

### 1) Storing images:

Amazon S3(Simple Storage Service) provides a simple web services interface that can be used to store and retrieve data from anywhere on the web.

In this project, we will be using Multer-s3. Multer-s3 simplifies the process of uploading files to S3 by providing an easy-to-use middleware that integrates with your web application. It handles the process of creating and configuring an S3 bucket, setting up permissions and access control, and uploading files to S3.

\* Open the AWS Management console and go to the IAM service. We need to create a new IAM user by providing the necessary permission to access the S3 service. Also, create an access key that will provide us with the access key and secret access key.

\* We will be using these access key and secret access key in the server's .env file.

\* Go to S3 service and click on Create bucket.

\* Give the bucket name and select a region.

\* In the object ownership enable the ACLs.

- \* Uncheck block all the public access and enable the bucket versioning. Click on create a bucket.
- \* After creation of the bucket select the bucket and click on the “Permissions” tab. Edit the bucket policy that allows your backend server to access the bucket.

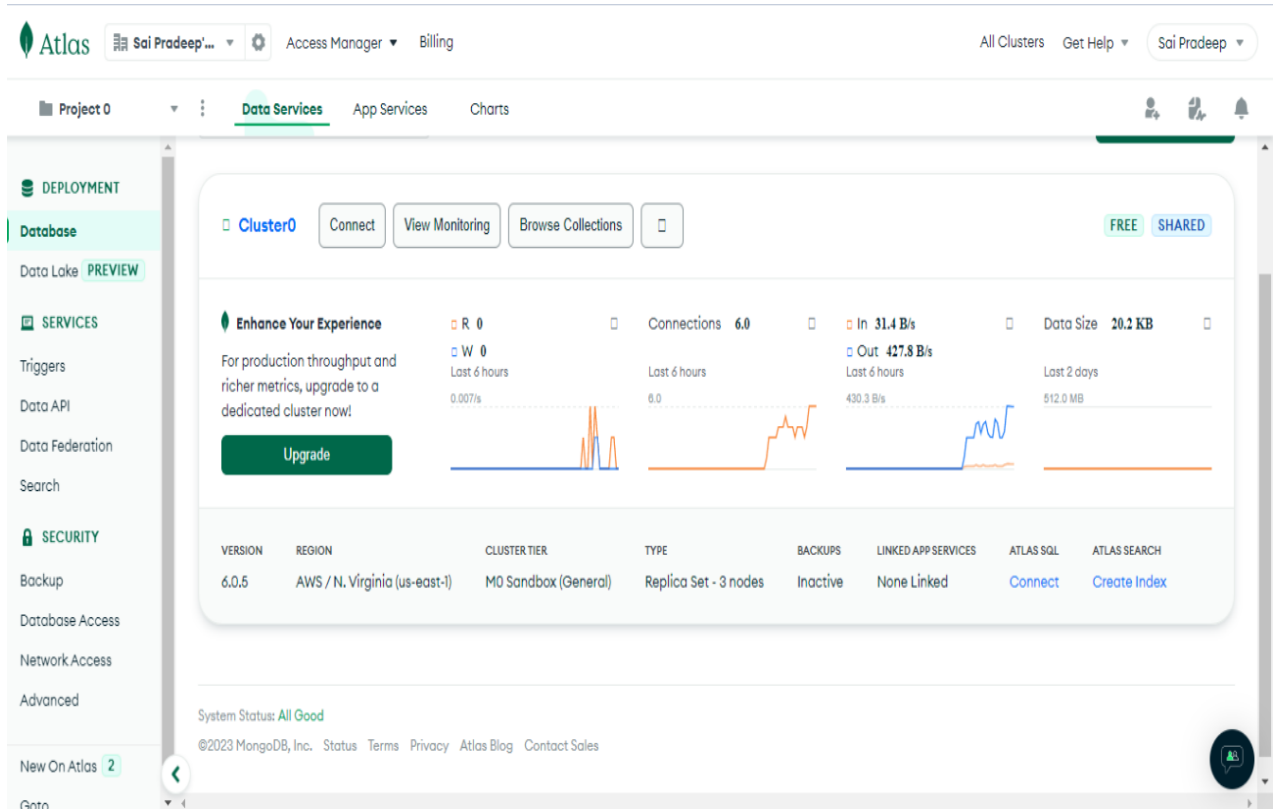
```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "AllowUserToReadWriteObjects",
      "Effect": "Allow",
      "Principal": {
        "AWS": "arn:aws:iam::<ACCOUNTID>:user/<IAM USERNAME>"
      },
      "Action": [
        "s3:GetObject",
        "s3:PutObject"
      ],
      "Resource": "<BUCKETNAME>"
    }
  ]
}
```

- \* Modify the above code by giving the AWS account Id, IAM user name, and bucket name.

## 2) Cloud Database:

We will be using Atlas MongoDB cloud infrastructure to take the local database into the cloud. Atlas is a fully-managed cloud database service provided by MongoDB, Inc. that offers a global database deployment on AWS, Azure, and Google Cloud Platform.

- \* In the services of AWS search for MongoDB Atlas in the marketplace section.
- \* Click on MongoDB Atlas(pay-as-you-go) which will redirect you to the MongoDB atlas page.
- \* If you don't have an account already click on subscribe and then signup.
- \* Otherwise, log in to the MongoDB Atlas dashboard.
- \* Click on Build cluster and then provide the details required such as region, provider, cluster name, and the other settings required for your cluster and click on Create Cluster.
- \* Once your cluster is created, you can click on the "Connect" button to get the connection string needed for your application to connect to the database.



\* Select the option vs code in the column Access your data through and click on vs code.

\* There will be a connection string copy it and open the vs code.

\* In the index.js file of the server section, paste the above connection string in the Mongoose.connection().

\* This helps us to connect the MongoDB using vs code.

### 3)Back-end deployment:

In this server, we have to install react-scripts, and then give the **npm start** command.

**npm install react-scripts**

**npm start**

\* In the server, we have a .env file that needs to be modified with our access key, secret key, and bucket name.

#### .env file:

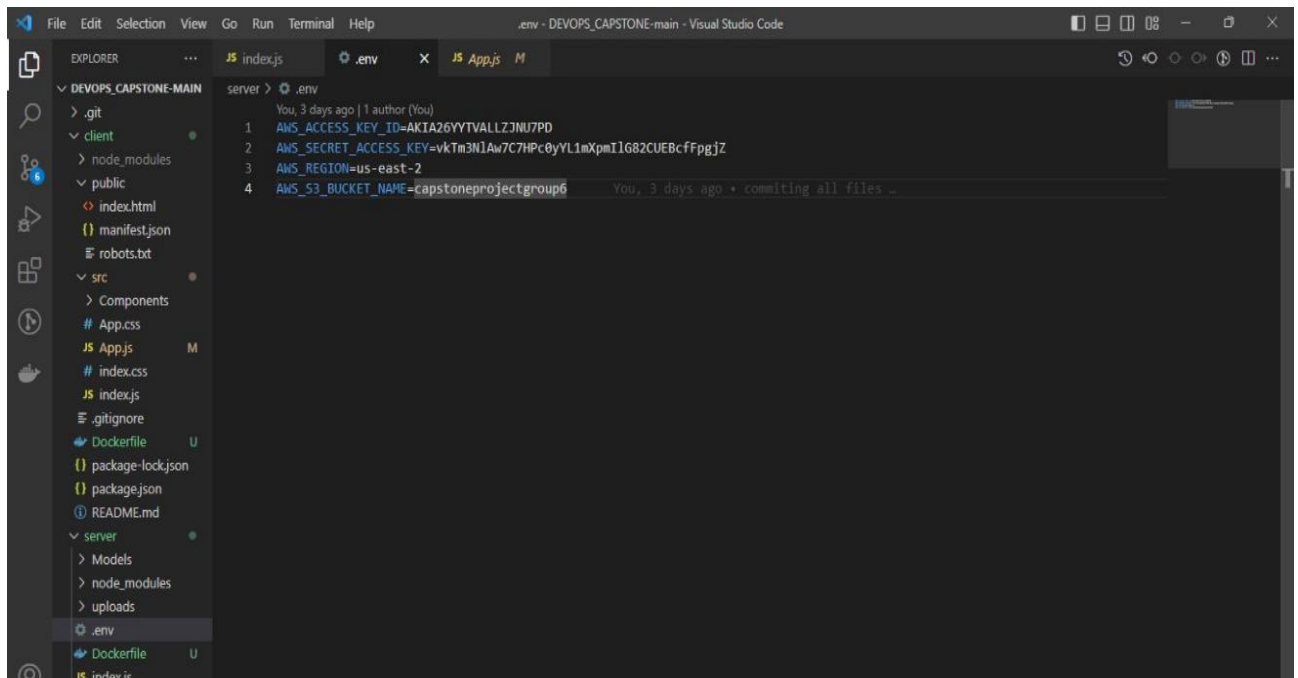
AWS\_ACCESS\_KEY\_ID=AKIA26YYTVALLZJNU7PD

AWS\_SECRET\_ACCESS\_KEY=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

AWS\_REGION=us-east-2

AWS\_S3\_BUCKET\_NAME=capstoneprojectgroup6





\* We are using docker to deploy our backend application. We need to create a Docker file for the backend and build the image. Then, we will create an EC2 instance and install Docker on it. We will then copy the Docker image to the EC2 instance and run it. We will attach an Elastic IP to this instance so that the IP address remains static.

\* Create a Docker File for the front end. Actually, a Docker file is a text document that contains all the commands a user should call on the command line to assemble an image.

\* package.json contains all the modules or packages that are required for running the code without any errors. So, we need the same packages on the cloud after containerizing the application so, we give COPY package\*.json ./ to copy its contents.

\* RUN npm install will install all the packages that are specified on the package.json file.

# Use an official Node.js runtime as a parent image

FROM node:14

# Set the working directory to /app

WORKDIR /ap

# Copy the current directory contents into the container at /app

COPY ./app

# Install any needed packages specified in package.json

RUN npm install

# Make port 5000 available to the world outside this container

EXPOSE 5000

# Start the app when the container launches

CMD ["npm", "start"]

The screenshot shows the Visual Studio Code interface with the Explorer on the left displaying the file structure of 'DEVOPS\_CAPSTONE-MAIN'. The file 'Dockerfile' is selected. The main editor shows the content of the Dockerfile:

```

1 WORKDIR /app
2
3 FROM node:16
4
5 COPY package.json ./
6
7 # Copy the current directory contents into the container at /app
8 COPY . /app

```

The TERMINAL panel at the bottom shows the output of the 'docker login' command:

```

C:\Users\pradeep\Desktop\DEVOPS_CAPSTONE-main\server>docker login
Authenticating with existing credentials...
Login Succeeded

C:\Users\pradeep\Desktop\DEVOPS_CAPSTONE-main\server>docker login
Authenticating with existing credentials...
Login Succeeded

C:\Users\pradeep\Desktop\DEVOPS_CAPSTONE-main\server>docker login
Authenticating with existing credentials...
Login Succeeded

```

The screenshot shows the Visual Studio Code interface with the Explorer on the left displaying the file structure of 'DEVOPS\_CAPSTONE-MAIN'. The file 'Dockerfile' is selected. The main editor shows the content of the Dockerfile:

```

1 WORKDIR /app
2
3 FROM node:16
4
5 COPY package.json ./
6
7 # Copy the current directory contents into the container at /app
8 COPY . /app

```

The TERMINAL panel at the bottom shows the output of the 'docker build' command:

```

C:\Users\pradeep\Desktop\DEVOPS_CAPSTONE-main\server>docker build -t server .
[+] Building 0.1s (1/2)
=> [internal] load build definition from Dockerfile
=> transferring dockerfile: 28
failed to solve with frontend dockerfile.v0: failed to read dockerfile: open /var/lib/docker/tmp/buildkit-mount1729293485/Dockerfile: no such
file or directory

C:\Users\pradeep\Desktop\DEVOPS_CAPSTONE-main\server>docker build -t server-imag .
[+] Building 56.1s (6/9)
=> [internal] load build definition from Dockerfile
=> transferring dockerfile: 462B
=> [internal] load .dockerignore
=> transferring context: 28
=> [internal] load metadata for docker.io/library/node:14
[auth] library/node:pull token for registry-1.docker.io
=> CANCELED [1/4] FROM docker.io/library/node:14@sha256:a158d3b9b4e3fa813fa6c8c590b8f0a860e015ad4e59bbce5744d2f6fd8461aa
=> resolve docker.io/library/node:14@sha256:a158d3b9b4e3fa813fa6c8c590b8f0a860e015ad4e59bbce5744d2f6fd8461aa
=> sha256:b253aefaa7e0671bb60080dfe1d101a38a045ff7bc656e3b0fbfc7c05cca5 1.05MB / 7.86MB
=> sha256:a158d3b9b4e3fa813fa6c8c590b8f0a860e015ad4e59bbce5744d2f6fd8461aa 776B / 776B
=> sha256:2cfa3fbb0b6529ee4726b4f599ec27ee557ea3dea7019182323b3779959927f 2.21kB / 2.21kB
=> sha256:1d12470fa662a2a5cb58378dcd83ea228c1735747db410bbefb8e2d9144b5452 7.51kB / 7.51kB
=> sha256:2ff1d7c41c74a25258bfa6f0b8adb0a727f84518f55f65ca845ebc747976c488 0B / 50.45MB
=> sha256:3d2201bd995cccfc12851a50820de03d34a17011dcb9ac9fd3a50c952cbb131 1.05MB / 10.00MB

```

\* Build a docker image named “server-imag” in the directory containing the Docker file.

**docker build -t server-imag .**

\* This will create a new image with the name "docker-username/image-name" that points to the same image as "image-name". We can then use this new image name to push the image to a remote Docker registry or to run containers based on this image.

**docker tag <image-name> <docker username>/<image-name>**

\* Push the docker image into the docker hub using the following command:

**docker push <docker username>/<image-name>**

\* Go to the AWS Management Console and create an EC2 instance.

\* After the successful creation of the EC2 instance select the instance and connect the instance.

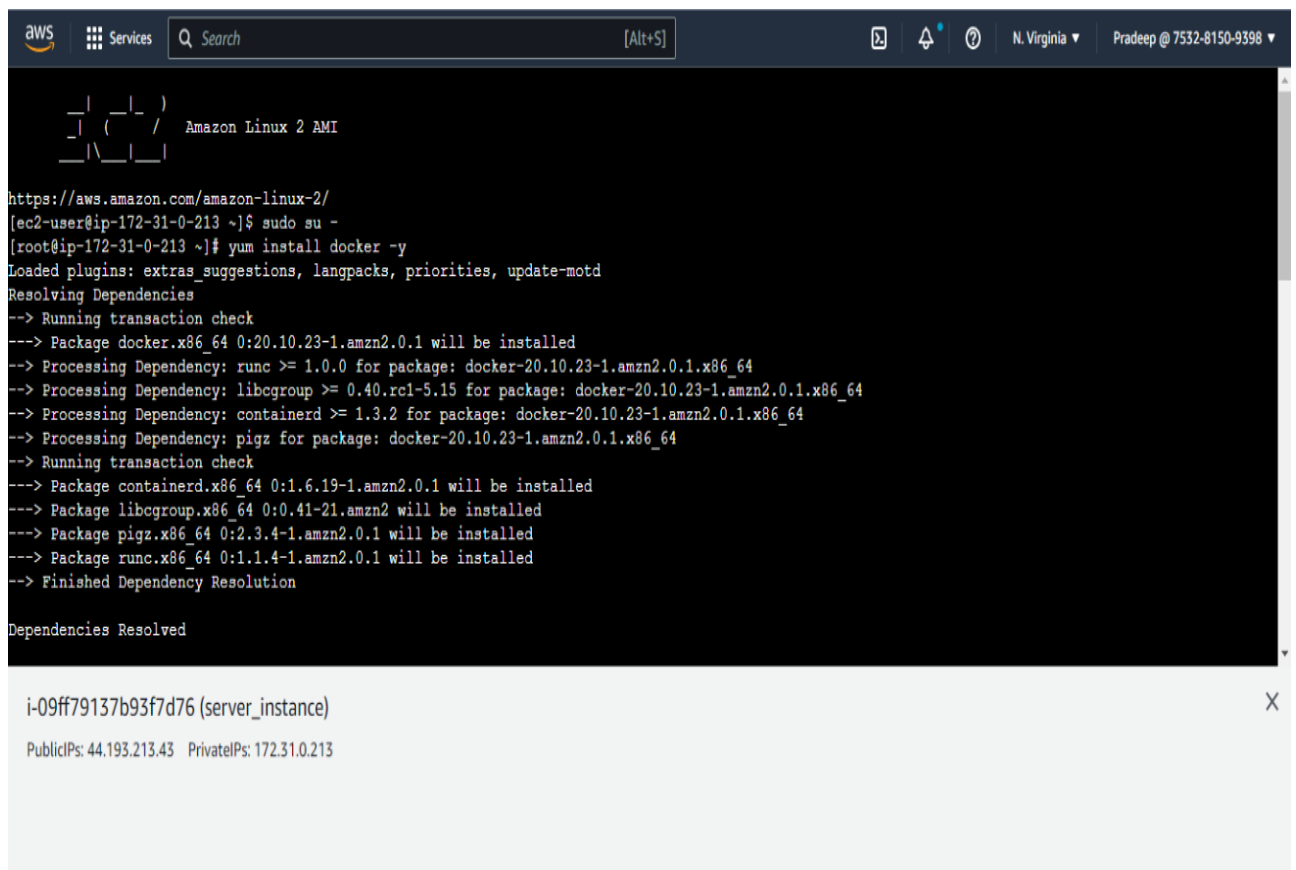
\* After connecting the instance install docker and login to the docker.

\* Then pull the docker image that has been created for the back end and run the image.

\* Use the following commands to do the above steps:

**sudo su -**

**yum install docker -y**



```
aws Services Search [Alt+S] N. Virginia Pradeep @ 7532-8150-9398

_ _ _ _ _
_ | ( _ / Amazon Linux 2 AMI
_ \ _ _ _

https://aws.amazon.com/amazon-linux-2/
[ec2-user@ip-172-31-0-213 ~]$ sudo su -
[root@ip-172-31-0-213 ~]# yum install docker -y
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
Resolving Dependencies
--> Running transaction check
--> Package docker.x86_64 0:20.10.23-1.amzn2.0.1 will be installed
--> Processing Dependency: runc >= 1.0.0 for package: docker-20.10.23-1.amzn2.0.1.x86_64
--> Processing Dependency: libgroup >= 0.40.rc1-5.15 for package: docker-20.10.23-1.amzn2.0.1.x86_64
--> Processing Dependency: containerd >= 1.3.2 for package: docker-20.10.23-1.amzn2.0.1.x86_64
--> Processing Dependency: pigz for package: docker-20.10.23-1.amzn2.0.1.x86_64
--> Running transaction check
--> Package containerd.x86_64 0:1.6.19-1.amzn2.0.1 will be installed
--> Package libgroup.x86_64 0:0.41-21.amzn2 will be installed
--> Package pigz.x86_64 0:2.3.4-1.amzn2.0.1 will be installed
--> Package runc.x86_64 0:1.1.4-1.amzn2.0.1 will be installed
--> Finished Dependency Resolution

Dependencies Resolved

i-09ff79137b93f7d76 (server_instance)
PublicIPs: 44.193.213.43 PrivateIPs: 172.31.0.213
```

\* Use the below commands to start the docker and login to docker.

**systemctl start docker**

**docker login**

```
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Installing : docker-20.10.23-1.amzn2.0.1.x86_64 5/5
Verifying : containerd-1.6.19-1.amzn2.0.1.x86_64 1/5
Verifying : pigz-2.3.4-1.amzn2.0.1.x86_64 2/5
Verifying : libcgrouper-0.41-21.amzn2.x86_64 3/5
Verifying : docker-20.10.23-1.amzn2.0.1.x86_64 4/5
Verifying : runc-1.1.4-1.amzn2.0.1.x86_64 5/5

Installed:
  docker.x86_64 0:20.10.23-1.amzn2.0.1

Dependency Installed:
  containerd.x86_64 0:1.6.19-1.amzn2.0.1  libcgrouper.x86_64 0:0.41-21.amzn2  pigz.x86_64 0:2.3.4-1.amzn2.0.1  runc.x86_64 0:1.1.4-1.amzn2.0.1

Complete!
[root@ip-172-31-0-213 ~]# systemctl start docker
[root@ip-172-31-0-213 ~]# docker login
Login with your Docker ID to push and pull images from Docker Hub. If you don't have a Docker ID, head over to https://hub.docker.com to create one.
Username: 20a91a05h6
Password:
WARNING! Your password will be stored unencrypted in /root/.docker/config.json.
Configure a credential helper to remove this warning. See
https://docs.docker.com/engine/reference/commandline/login/#credentials-store

Login Succeeded
[root@ip-172-31-0-213 ~]# docker
```

i-09ff79137b93f7d76 (server\_instance) X  
PublicIPs: 44.193.213.43 PrivateIPs: 172.31.0.213

\* To pull the docker image, use the command-

**docker pull <docker username>/<image name>**

```
aws Services Search [Alt+S] N. Virginia Pradeep @ 7532-8150-9398

[root@ip-172-31-0-213 ~]# docker login
Login with your Docker ID to push and pull images from Docker Hub. If you don't have a Docker ID, head over to https://hub.docker.com to create one.
Username: 20a91a05h6
Password:
WARNING! Your password will be stored unencrypted in /root/.docker/config.json.
Configure a credential helper to remove this warning. See
https://docs.docker.com/engine/reference/commandline/login/#credentials-store

Login Succeeded
[root@ip-172-31-0-213 ~]# docker pull 20a91a05h6/server-imag
Using default tag: latest
latest: Pulling from 20a91a05h6/server-imag
2ff1d7c41c74: Pull complete
b253aaefaa7: Pull complete
3d2201bd995c: Pull complete
1de76e268b10: Extracting [=====>] 22.54MB/51.88MB
d9a8df589451: Download complete
6f51ee005dea: Download complete
5f32ed3c3f27: Download complete
0c8cc2f24a4d: Download complete
0d27a8e86132: Download complete
f7f1e399f128: Download complete
babeae603179: Download complete
e9b150ada6b0: Download complete
```

i-09ff79137b93f7d76 (server\_instance) X  
PublicIPs: 44.193.213.43 PrivateIPs: 172.31.0.213

```
aws Services Search [Alt+S] N. Virginia Pradeep @ 7532-8150-9398
Password:
WARNING! Your password will be stored unencrypted in /root/.docker/config.json.
Configure a credential helper to remove this warning. See
https://docs.docker.com/engine/reference/commandline/login/#credentials-store

Login Succeeded
[root@ip-172-31-0-213 ~]# docker pull 20a91a05h6/server-img
Using default tag: latest
latest: Pulling from 20a91a05h6/server-img
2ff1d7c41c74: Pull complete
b253aeafeaa7: Pull complete
3d2201bd995c: Pull complete
1de76e268b10: Pull complete
d9a8df589451: Pull complete
6f51ee005dea: Pull complete
5f32ed3c3f27: Pull complete
0c8cc2f24a4d: Pull complete
0d27a8e86132: Pull complete
f7f1e399f128: Pull complete
babeae603179: Pull complete
e9b150ada6b0: Pull complete
Digest: sha256:a863a1ddfc8b4467bedd9172281048da6820c4dd629101eb84e8affe9693ea6
Status: Downloaded newer image for 20a91a05h6/server-img:latest
docker.io/20a91a05h6/server-img:latest
[root@ip-172-31-0-213 ~]#
```

i-09ff79137b93f7d76 (server\_instance)  
PublicIPs: 44.193.213.43 PrivateIPs: 172.31.0.213

\* To run the docker image

**docker run -d -p Default\_port:Expose\_port <docker username>/<image name>**

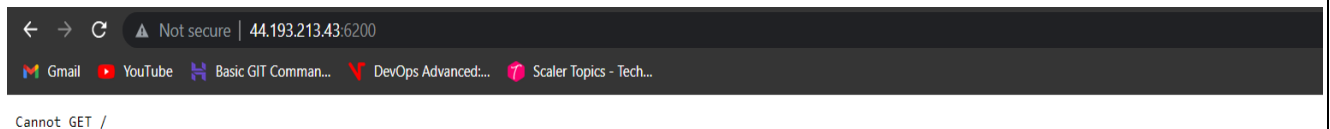
```
aws Services Search [Alt+S] N. Virginia Pradeep @ 7532-8150-9398
Configure a credential helper to remove this warning. See
https://docs.docker.com/engine/reference/commandline/login/#credentials-store

Login Succeeded
[root@ip-172-31-0-213 ~]# docker pull 20a91a05h6/server-img
Using default tag: latest
latest: Pulling from 20a91a05h6/server-img
2ff1d7c41c74: Pull complete
b253aeafeaa7: Pull complete
3d2201bd995c: Pull complete
1de76e268b10: Pull complete
d9a8df589451: Pull complete
6f51ee005dea: Pull complete
5f32ed3c3f27: Pull complete
0c8cc2f24a4d: Pull complete
0d27a8e86132: Pull complete
f7f1e399f128: Pull complete
babeae603179: Pull complete
e9b150ada6b0: Pull complete
Digest: sha256:a863a1ddfc8b4467bedd9172281048da6820c4dd629101eb84e8affe9693ea6
Status: Downloaded newer image for 20a91a05h6/server-img:latest
docker.io/20a91a05h6/server-img:latest
[root@ip-172-31-0-213 ~]# docker run -d -p 6200:5000 20a91a05h6/server-img
22545acf16ac297d4014a364cf734d1fbd6dd718196453752ebceaa2f4c91dda
[root@ip-172-31-0-213 ~]#
```

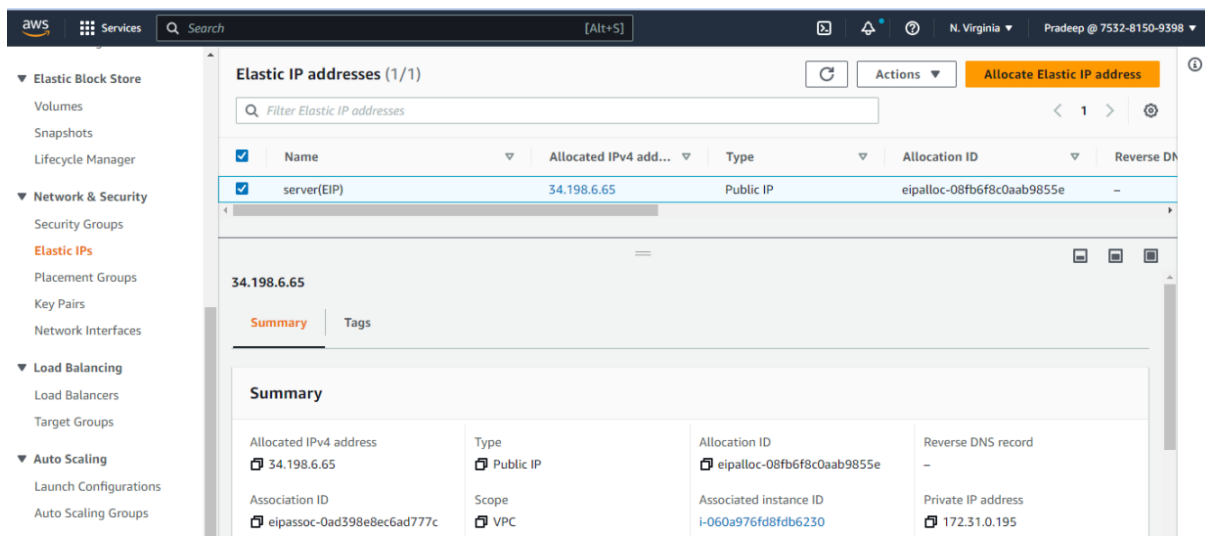
i-09ff79137b93f7d76 (server\_instance)  
PublicIPs: 44.193.213.43 PrivateIPs: 172.31.0.213

\* Copy the public IP of the instance. Open a new tab and then give **PublicIP:Default\_port** as the URL for connecting the backend.

\* We will be then getting an error page which was the output of our backend code.



\* Attach an Elastic IP to the server instance which will give your instance a static IP address that doesn't change when we start or stop the instance.



#### 4)Frontend Deployment:

\* In the client, we need to install the packages like Mongoose, express, cors, and cloudinary which are used in the index.js file using the following command:

**npm i mongoose cloudinary express multer cors aws-sdk**

\* In client, we will have a package.json file that contains the installed packages, when we give the command **npm run build**, all the necessary packages will be installed.

\* We need to make the front-end fetch data from the back end. In order to do this we need to make changes in the **App.js** file of the front-end code.

\* We need to change the URL with the URL of the backend code output.

**const url = "<http://localhost:5000>"**

\* const url needs to be modified to

**const url= <http://serverpublicip:assignedportnumber>**

**const url=<http://34.198.6.65:6200>**

\* Create a Docker File for the front end. Actually, a Docker file is a text document that contains all the commands a user should call on the command line to assemble an image.

\* package.json contains all the modules or packages that are required for running the code without any errors. So, we need the same packages on the cloud after containerizing the application so, we give COPY package\*.json ./ to copy its contents.

\* RUN npm install will install all the packages that are specified on the package.json file.

# Use an official Node.js runtime as a parent image

FROM node:14-alpine

# Set the working directory to /app

WORKDIR /

# Copy package.json and package-lock.json to the container

COPY package\*.json ./

# Install dependencies

RUN npm install

# Copy the rest of the application code to the container

COPY . .

# Build the application

RUN npm run build

# Serve the application with a lightweight HTTP server

FROM nginx:alpine

COPY --from=0 /build /usr/share/nginx/html

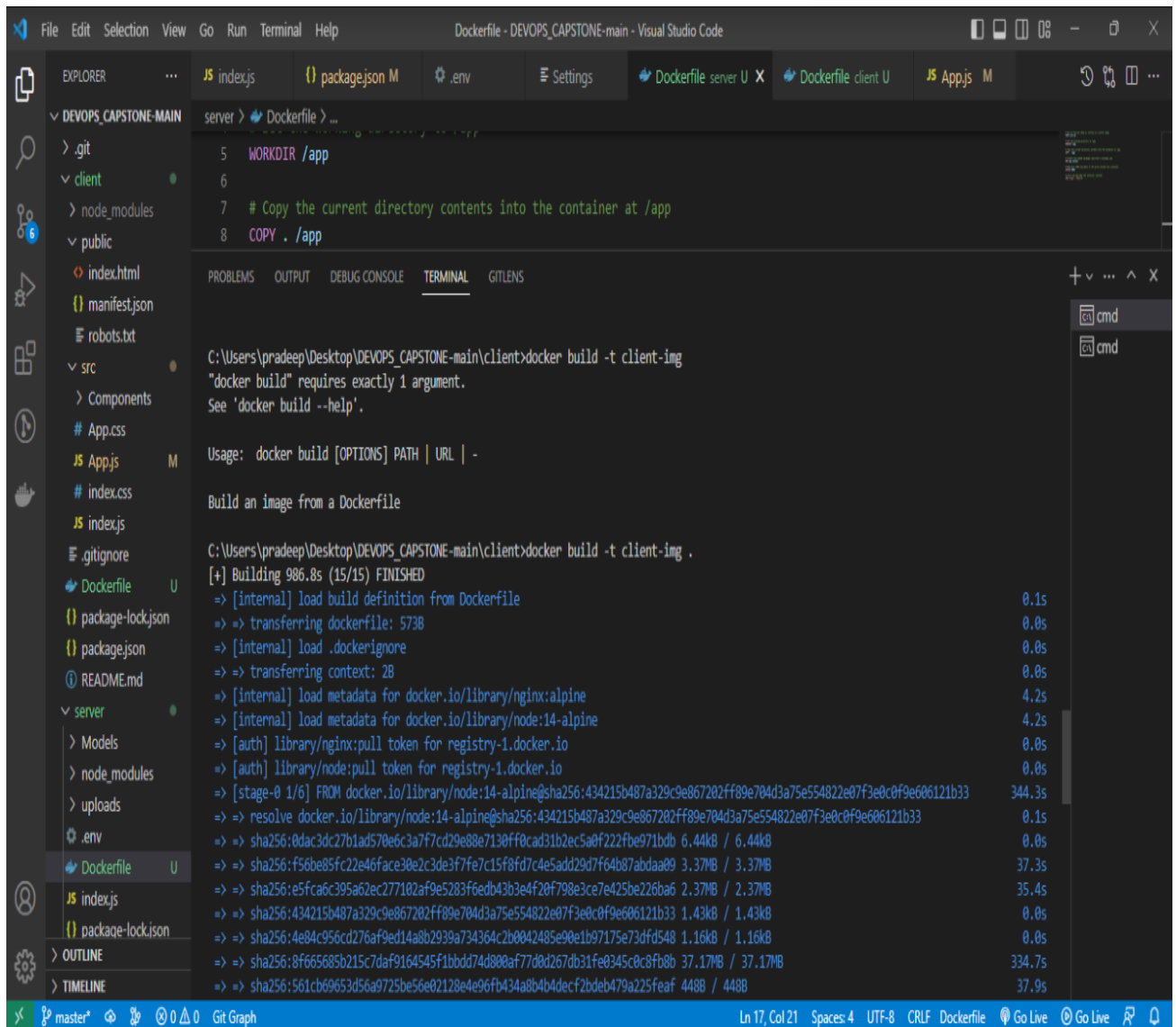
EXPOSE 80

CMD ["nginx", "-g", "daemon off;"]

\* Build a docker image named “client-img” in the directory containing the Docker file.

**docker build -t client-img .**





The screenshot shows the Visual Studio Code interface with a Dockerfile open in the editor. The Dockerfile contains the following content:

```
5 WORKDIR /app
6
7 # Copy the current directory contents into the container at /app
8 COPY . /app
```

The terminal window at the bottom shows the output of the command `C:\Users\pradeep\Desktop\DEVOPS_CAPSTONE-main\client>docker build -t client-imag`. The output indicates that the build was successful, with a total size of 37.9s. The build process includes steps for loading the build definition, transferring the Dockerfile, and resolving the image layers.

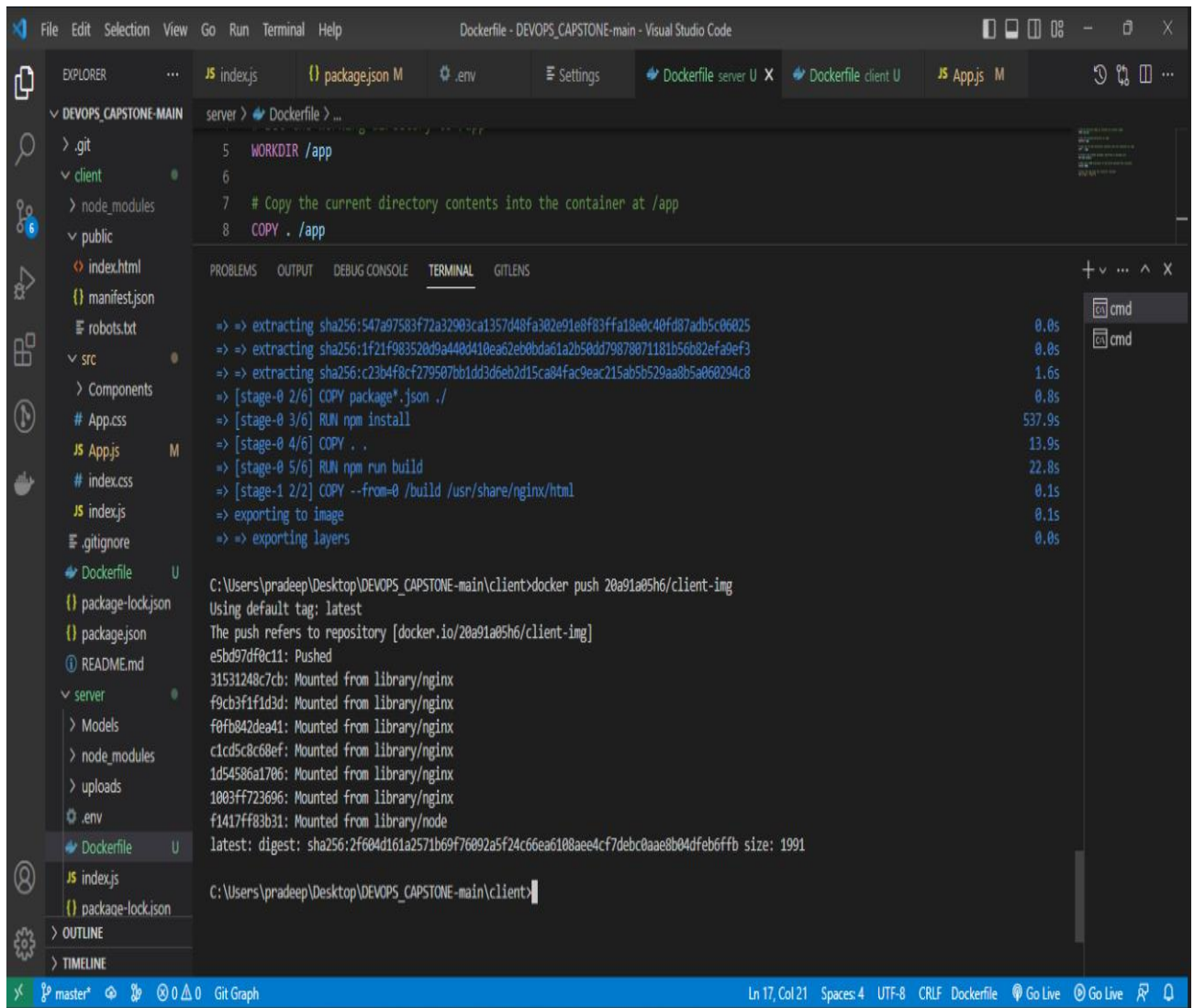
\* This will create a new image with the name "dockerusername/image-name" that points to the same image as "image-name". We can then use this new image name to push the image to a remote Docker registry or to run containers based on this image.

**docker tag <image-name> <docker username>/<image-name>**

\* Push the docker image into the docker hub using the following command:

**docker push <docker username>/<image-name>**





The screenshot shows the Visual Studio Code interface with a project named 'DEVOPS\_CAPSTONE-main'. The Explorer sidebar on the left shows the file structure, including a 'server' directory containing a 'Dockerfile'. The Dockerfile content is as follows:

```
5 WORKDIR /app
6
7 # Copy the current directory contents into the container at /app
8 COPY . /app
```

The TERMINAL panel at the bottom displays the output of the Docker build process. It shows the extraction of layers, copying of files, and the final push to the Docker registry. The output includes the following commands and their durations:

```
=> extracting sha256:547a97583f72a32903ca1357d48fa302e91e8f83ffa18e0c40fd87adb5c06025 0.0s
=> extracting sha256:1f21f983520d9a440d410ea62eb0bda61a2b50dd79878071181b56b82efa9ef3 0.0s
=> extracting sha256:c23b4f8cf279507bb1dd3d6eb2d15ca84fac9eac215ab5b529aa8b5a060294c8 1.6s
=> [stage-0 2/6] COPY package*.json ./ 0.8s
=> [stage-0 3/6] RUN npm install 537.9s
=> [stage-0 4/6] COPY . . 13.9s
=> [stage-0 5/6] RUN npm run build 22.8s
=> [stage-1 2/2] COPY --from=0 /build /usr/share/nginx/html 0.1s
=> exporting to image 0.1s
=> exporting layers 0.0s
```

The terminal also shows the Docker push command and its output:

```
C:\Users\pradeep\Desktop\DEVOPS_CAPSTONE-main\client>docker push 20a91a05h6/client-img
Using default tag: latest
The push refers to repository [docker.io/20a91a05h6/client-img]
e5bd97df0c11: Pushed
31531248c7cb: Mounted from library/nginx
f9cb3f1fd3d: Mounted from library/nginx
f0fb042dea41: Mounted from library/nginx
c1cd5c8c68ef: Mounted from library/nginx
1d54586a1706: Mounted from library/nginx
1003ff723696: Mounted from library/nginx
f1417ff83b31: Mounted from library/node
latest: digest: sha256:2f604d161a2571b69f76092a5f24c66ea6108aee4cf7debc0aae8b04dfeb6ffb size: 1991
```

The status bar at the bottom indicates the current file is 'Dockerfile' and the encoding is 'UTF-8'.

- \* Go to the AWS Management Console and create 3 EC2 instances.
- \* After the successful creation of the EC2 instances select the instance and connect the instance.
- \* After connecting the instance install docker and login to the docker.
- \* Then pull the docker image that has been created for the front end and run the image.
- \* Use the following commands to do the above steps:

**sudo su –**

**yum install docker -y**

**systemctl start docker**

**docker login**

**docker pull <docker username>/<image name>**

**docker run -d -p Default\_port:Expose\_port <docker username>/<image name>**

```
aws Services Search [Alt+S] N. Virginia Pradeep @ 7532-8150-9398

Amazon Linux 2 AMI

https://aws.amazon.com/amazon-linux-2/
[ec2-user@ip-172-31-0-35 ~]$ sudo su -
[root@ip-172-31-0-35 ~]# yum install docker -y
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
Resolving Dependencies
--> Running transaction check
--> Package docker.x86_64 0:20.10.23-1.amzn2.0.1 will be installed
--> Processing Dependency: runc >= 1.0.0 for package: docker-20.10.23-1.amzn2.0.1.x86_64
--> Processing Dependency: libcgrouper >= 0.40.rc1-5.15 for package: docker-20.10.23-1.amzn2.0.1.x86_64
--> Processing Dependency: containerd >= 1.3.2 for package: docker-20.10.23-1.amzn2.0.1.x86_64
--> Processing Dependency: pigz for package: docker-20.10.23-1.amzn2.0.1.x86_64
--> Running transaction check
--> Package containerd.x86_64 0:1.6.19-1.amzn2.0.1 will be installed
--> Package libcgrouper.x86_64 0:0.41-21.amzn2 will be installed
--> Package pigz.x86_64 0:2.3.4-1.amzn2.0.1 will be installed
--> Package runc.x86_64 0:1.1.4-1.amzn2.0.1 will be installed
--> Finished Dependency Resolution

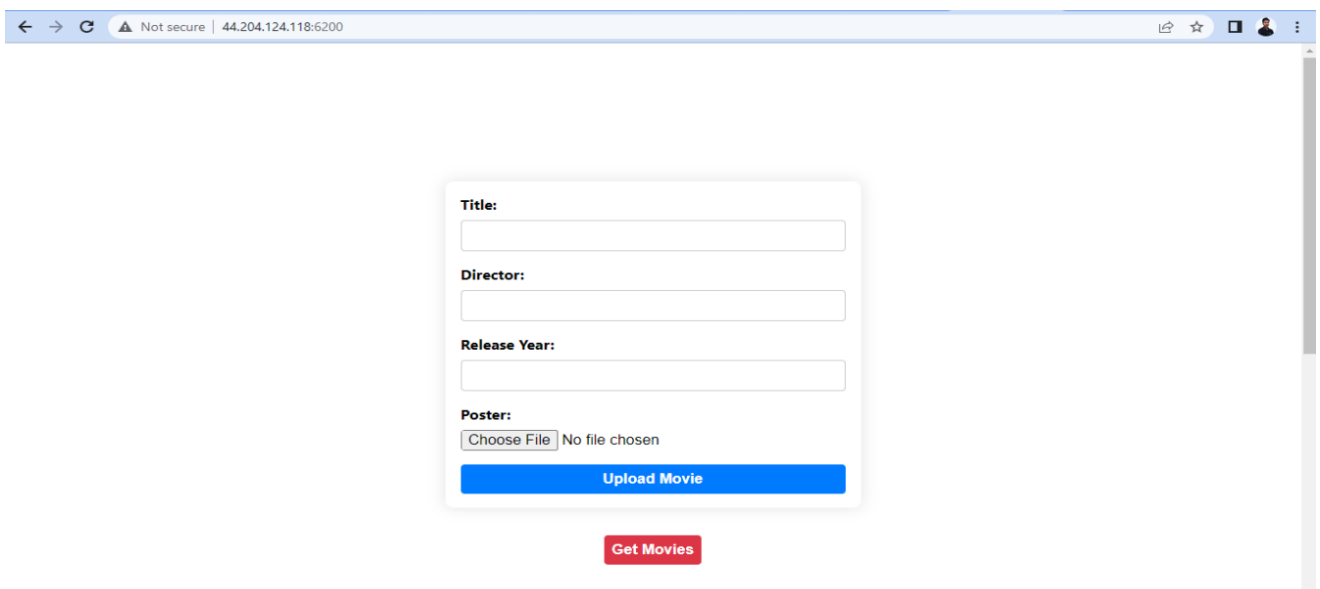
Dependencies Resolved

i-0504a741a04afe421 (client_instance)
PublicIPs: 44.204.124.118 PrivateIPs: 172.31.0.35
```

```
[root@ip-172-31-0-35 ~]# docker run 20a91a05h6/client-img
/docker-entrypoint.sh: /docker-entrypoint.d/ is not empty, will attempt to perform configuration
/docker-entrypoint.sh: Looking for shell scripts in /docker-entrypoint.d/
/docker-entrypoint.sh: Launching /docker-entrypoint.d/10-listen-on-ipv6-by-default.sh
10-listen-on-ipv6-by-default.sh: info: Getting the checksum of /etc/nginx/conf.d/default.conf
10-listen-on-ipv6-by-default.sh: info: Enabled listen on IPv6 in /etc/nginx/conf.d/default.conf
/docker-entrypoint.sh: Launching /docker-entrypoint.d/20-envsubst-on-templates.sh
/docker-entrypoint.sh: Launching /docker-entrypoint.d/30-tune-worker-processes.sh
/docker-entrypoint.sh: Configuration complete; ready for start up
2023/04/29 18:03:43 [notice] 1#1: using the "epoll" event method
2023/04/29 18:03:43 [notice] 1#1: nginx/1.23.4
2023/04/29 18:03:43 [notice] 1#1: built by gcc 12.2.1 20220924 (Alpine 12.2.1_git20220924-r4)
2023/04/29 18:03:43 [notice] 1#1: OS: Linux 5.10.177-158.645.amzn2.x86_64
2023/04/29 18:03:43 [notice] 1#1: getrlimit(RLIMIT_NOFILE): 32768:65536
2023/04/29 18:03:43 [notice] 1#1: start worker processes
2023/04/29 18:03:43 [notice] 1#1: start worker process 30
```

\* Copy the public IP of the instance. Open a new tab and then give **PublicIP:Default\_port** as the URL.

\* We will be then getting the “Movie listing” website page.

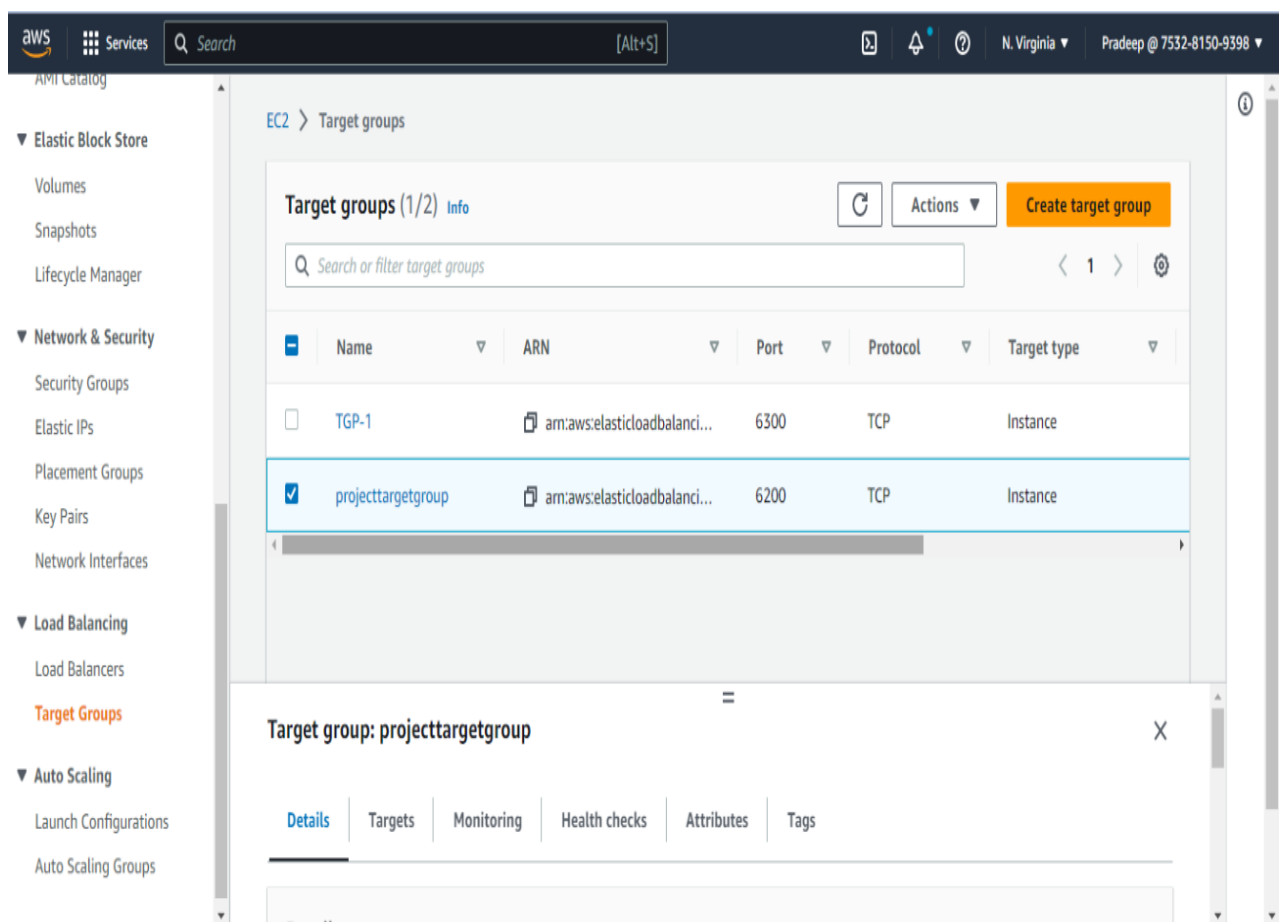


\* The .jpg .png .jpeg ,etc formats files are accepted. These files are stored with a unique object id in the monoddb, It helps us to easily retrieve data from the database.

## 5)Load balancing

**Elastic Load Balancer (ELB)** automatically distributes the incoming traffic across multiple Amazon EC2 instances, helping to improve the availability and scalability of applications running on AWS. In our project, we have used a Network load balancer for the distribution of traffic to multiple EC2 instances.

- \* Go to AWS Management Console.
- \* Select the EC2 and go to the EC2 dashboard.
- \* In the load balancing section, click on target groups.
- \* Click on create target group. Choose instances as the type of target group.
- \* Give a target group name and select protocol as TCP and port as Default port used in the Docker file of front end and back end.
- \* Register all the client servers as the target groups and click on Create target group.



Target groups (1/2) Info

Search or filter target groups

	Name	ARN	Port	Protocol	Target type
<input type="checkbox"/>	TGP-1	arn:aws:elasticloadbalancing:us-east-1:753281509398:targetgroup/projecttargetgroup/ae4a62d35fc5fc44	6300	TCP	Instance
<input checked="" type="checkbox"/>	projecttargetgroup	arn:aws:elasticloadbalancing:us-east-1:753281509398:targetgroup/projecttargetgroup/ae4a62d35fc5fc44	6200	TCP	Instance

Target group: projecttargetgroup

Filter resources by property or value

	Instance ID	Name	Port	Zone	Health status	Health status details
<input type="checkbox"/>	i-01f5e9b80cb79a17f	client-2	6200	us-east-1a	healthy	
<input type="checkbox"/>	i-0a3a998254a4df3d9	client-1	6200	us-east-1a	healthy	
<input type="checkbox"/>	i-0b24c0d4937acd39c	client-main	6200	us-east-1a	healthy	

EC2 > Target groups > projecttargetgroup

projecttargetgroup

Actions

Details

arn:aws:elasticloadbalancing:us-east-1:753281509398:targetgroup/projecttargetgroup/ae4a62d35fc5fc44

Target type Instance	Protocol : Port TCP: 6200	VPC vpc-044950d87417385e3	IP address type IPv4
Load balancer MyLoadBalancer			

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

Distribution of targets by Availability Zone (AZ)

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

Target groups (1/1) Info

Search or filter target groups

	Name	ARN	Port	Protocol	Target type
<input checked="" type="checkbox"/>	projecttargetgroup	arn:aws:elasticloadbalancing:us-east-1:753281509398:targetgroup/projecttargetgroup/ae4a62d35fc5fc44	6200	TCP	Instance

Target group: projecttargetgroup

Details Targets Monitoring Health checks Attributes Tags

Details

arn:aws:elasticloadbalancing:us-east-1:753281509398:targetgroup/projecttargetgroup/ae4a62d35fc5fc44

Target type Instance	Protocol : Port TCP: 6200	VPC vpc-044950d87417385e3	IP address type IPv4
-------------------------	------------------------------	------------------------------	-------------------------

The screenshot shows the AWS Management Console interface. On the left, the navigation menu is visible with categories like Elastic Block Store, Network & Security, Load Balancing, and Auto Scaling. The 'Load Balancing' section is expanded, and 'Target Groups' is selected. The main panel displays 'Target groups (1/1) Info'. A table lists the target group 'projecttargetgroup' with details: ARN (arn:aws:elasticloadbalancing...), Port (6200), Protocol (TCP), and Target type (Instance). Below this, a modal window titled 'Target group: projecttargetgroup' is open, showing a table of instances. The table has columns for Instance ID, Name, Port, Zone, Health status, and Health status details. Three instances are listed, all with a 'healthy' status.

Instance ID	Name	Port	Zone	Health status	Health status details
i-01f5e9b80cb79a17f	client-2	6200	us-east-1a	healthy	
i-0a3a998254a4df3d9	client-1	6200	us-east-1a	healthy	
i-0b24c0d4937acd39c	client-main	6200	us-east-1a	healthy	

- \* Go to the Load balancer section and select the Network load balancer as the load balancer type.
- \* Click on Create. Give a load balancer name and select all the availability zones as mappings.
- \* In the Listener's and routing section, select the target group that was created earlier. Click on Create the load balancer.

The screenshot shows the AWS Management Console interface. On the left, the navigation menu is visible with categories like Elastic Block Store, Network & Security, Load Balancing, and Auto Scaling. The 'Load Balancing' section is expanded, and 'Load Balancers' is selected. The main panel displays 'Load balancers (1/1)'. A table lists the load balancer 'MyLoadBalancer' with details: DNS name (MyLoadBalancer-d637788...), State (Active), VPC ID (vpc-044950d87417385e3), and Availability Zones (2 Availability Zones). Below this, a modal window titled 'Load balancer: MyLoadBalancer' is open, showing the 'Details' tab. The details section shows the ARN (arn:aws:elasticloadbalancing:us-east-1:753281509398:loadbalancer/net/MyLoadBalancer/d6377885a348cd6f) and a table with attributes: Load balancer type (Network), DNS name (MyLoadBalancer-d6377885a348cd6f.elb.us-east-1.amazonaws.com), Status (Active), and VPC (vpc-044950d87417385e3).

Name	DNS name	State	VPC ID	Availability Zones
MyLoadBalancer	MyLoadBalancer-d637788...	Active	vpc-044950d87417385e3	2 Availability Zones

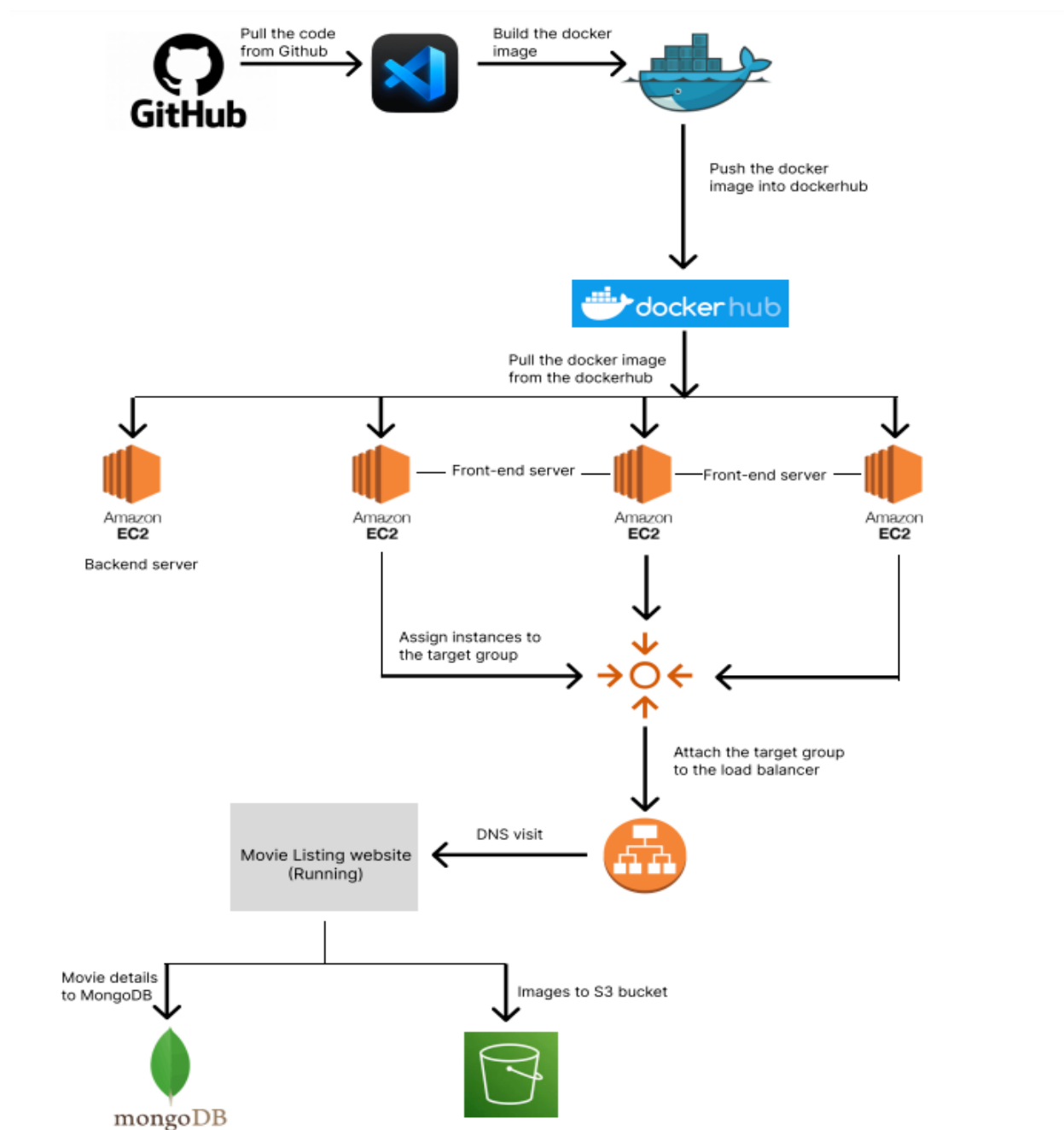
Load balancer type	DNS name	Status	VPC
Network	MyLoadBalancer-d6377885a348cd6f.elb.us-east-1.amazonaws.com	Active	vpc-044950d87417385e3

## AWS DEPLOYMENT DIAGRAM:

### Figma:

Figma is a cloud-based design and prototyping tool that allows designers and teams to collaborate on designing user interfaces, web pages, and mobile applications.

As a part of this project we have used Figma tool to design the architecture of the entire deployment process which makes everyone to easily understand the process and helps in every phase to understand the tasks needs to be done.



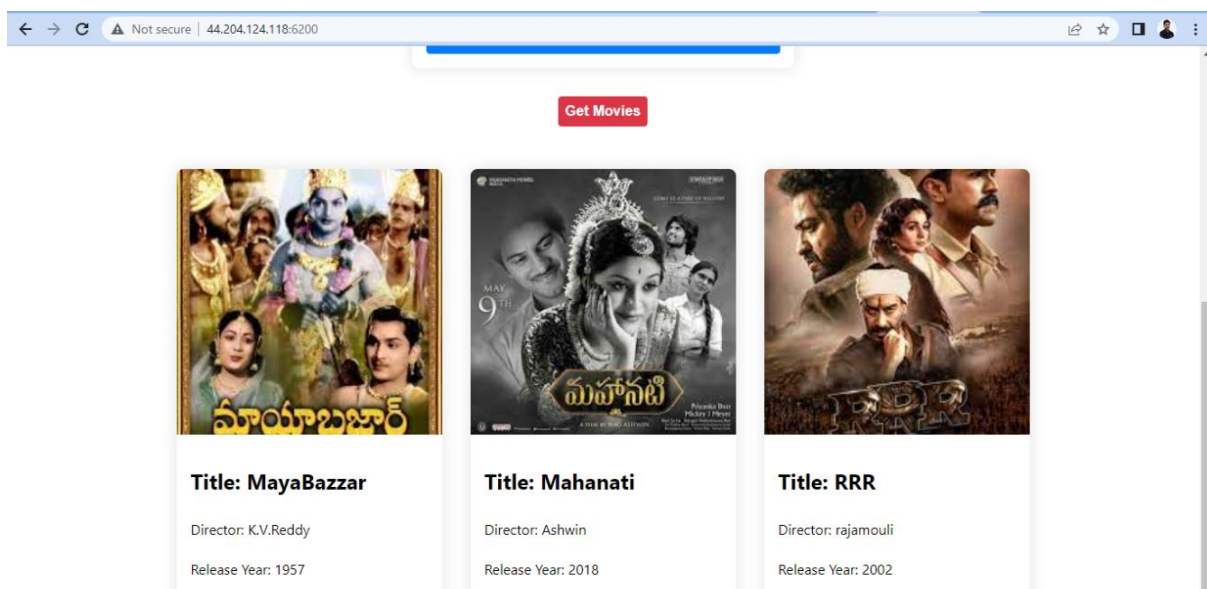


## OBSERVATIONS:

From the project " Movie Listing " we have observed,

- **Technology Stack:** The project " Movie Listing " uses popular and robust technologies such as ReactJS, NodeJS, and MongoDB. These technologies are well-suited for developing modern and scalable web applications.
- **Storage for Images:** The project uses local storage to store images, which can be a limitation as local storage has limited storage capacity. Using a cloud-based storage solution such as Amazon S3 would be a better option.
- We have used Multer S3 which provides a simple and easy-to-use interface to upload files to S3. It integrates well with Express.js, a popular Node.js web application framework, and can be used with any other Node.js framework as well.
- **Cloud Infrastructure:** The movie listing project requires a cloud infrastructure that is reliable, scalable, and secure. AWS provides a wide range of services that can be used to build and deploy the project. Deploying the website to AWS is a good choice as AWS provides a wide range of services to build, deploy, and scale web applications.
- **Containerization using Docker:** Docker containers provide a consistent runtime environment, which helps to eliminate issues related to differences in dependencies and configurations across various development, testing, and production environments.
- This ensures that the application runs consistently across different environments. We have used the docker hub to push and pull the images that we have built.
- **Proper Auto Scaling:** Scaling is an essential aspect of any web application, and it is crucial to design the architecture in such a way that it can scale horizontally or vertically. Using AWS Auto Scaling can help in scaling the application efficiently.
- **Security:** It is essential to ensure that the application is secure, and user data is protected. Using AWS Identity and Access Management (IAM), VPC can help in securing the application.

Overall, using AWS to build and deploy the movie listing project can provide a reliable, scalable, and secure cloud infrastructure. It simplifies the deployment process, reduces infrastructure management overhead, and enables efficient use of cloud resources.



Amazon S3 > Buckets > capstoneprojectgroup6

capstoneprojectgroup6 Info

Objects | Properties | Permissions | Metrics | Management | Access Points

Objects (3)

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

Copy S3 URI

Copy URL

Download

Open

Delete

Actions

Create folder

Upload

Find objects by prefix

< 1 >

<input type="checkbox"/>	Name	Type	Last modified	Size	Storage class
<input type="checkbox"/>	<a href="#">1682505954759-mayabazzar.jpg</a>	jpg	April 26, 2023, 16:16:01 (UTC+05:30)	14.7 KB	Standard
<input type="checkbox"/>	<a href="#">1682661123665-Mahanati.jpg</a>	jpg	April 28, 2023, 11:22:04 (UTC+05:30)	11.0 KB	Standard
<input type="checkbox"/>	<a href="#">1682661433648-RRR.jpg</a>	jpg	April 28, 2023, 11:27:14 (UTC+05:30)	9.4 KB	Standard

Atlas Sai Pradeep'... Access Manager Billing All Clusters Get Help Sai Pradeep

Project 0 Data Services App Services Charts

DEPLOYMENT Database Data Lake PREVIEW SERVICES Triggers Data API Data Federation Search SECURITY Backup Database Access Network Access Advanced Goto

capstone movies

Find

Indexes

Schema Anti-Patterns

Aggregation

Search Indexes

Filter

Type a query: { field: 'value' }

Reset

Apply

More Options

INSERT DOCUMENT

QUERY RESULTS: 1-3 OF 3

\_id: ObjectId('644900e7b46bc328d5ab5f22')

title: "Mayabazzar"

director: "K.V.Reddy"

releaseYear: 1957

poster: "https://capstoneprojectgroup6.s3.amazonaws.com/1682505954759-mayabazza..."

\_\_v: 0

\_id: ObjectId('644b5f0340c654831efff8f9')

title: "Mahanati"

director: "Ashwin"

System Status: All Good ©2023 MongoDB, Inc. Status Terms Privacy Atlas Blog Contact Sales

Atlas Sai Pradeep'... Access Manager Billing All Clusters Get Help Sai Pradeep

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DEPLOYMENT Database Data Lake PREVIEW SERVICES Triggers Data API Data Federation Search SECURITY Backup Database Access Network Access Advanced Goto

capstone movies

Find

Indexes

Schema Anti-Patterns

Aggregation

Search Indexes

Filter

Type a query: { field: 'value' }

Reset

Apply

More Options

INSERT DOCUMENT

QUERY RESULTS: 1-3 OF 3

\_id: ObjectId('644b5f0340c654831efff8f9')

title: "Mahanati"

director: "Ashwin"

releaseYear: 2018

poster: "https://capstoneprojectgroup6.s3.amazonaws.com/1682661123665-Mahanati..."

\_\_v: 0

\_id: ObjectId('644b603940c654831efff8fc')

title: "RRR"

director: "rajamouli"

releaseYear: 2002

poster: "https://capstoneprojectgroup6.s3.amazonaws.com/1682661433648-RRR.jpg"

\_\_v: 0

System Status: All Good ©2023 MongoDB, Inc. Status Terms Privacy Atlas Blog Contact Sales

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## CONCLUSION:

In conclusion, deploying the "Movie listing" website onto the AWS cloud infrastructure provides several benefits, including improved scalability, reliability, security, and resource utilization. By deploying the NodeJS application, Amazon S3 for storing images, and MongoDB Atlas for database management, we can ensure that the application runs smoothly and efficiently. Additionally, by using Docker containers, we can further simplify the deployment process, improve portability, and ensure consistency across environments. This enables us to easily deploy and scale the application without compromising performance or security. Overall, deploying the "Movie listing" website onto the AWS cloud infrastructure using Docker containers provides a robust and efficient solution for managing and scaling the application. It helps to reduce infrastructure management overhead, improve application performance and scalability, and ensure that the application runs consistently across different environments.

➤ **GitHub URL:**

[https://github.com/pradeep-pulaparthi/Capstone\\_project](https://github.com/pradeep-pulaparthi/Capstone_project)

\*This is the URL of the repository which contains the modified codes of the front end and back end.

➤ **Frontend URL:**

<http://44.204.124.118:6200/>

➤ **Backend URL:**

<http://44.193.213.43:6200/>

➤ **DNS URL:**

<http://myloadbalancer-d6377885a348cd6f.elb.us-east-1.amazonaws.com/>

**THANK YOU**