



ST0505: Enterprise Systems Development

Assignment Part 2

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## 1.0 Introduction

Previously, our team code-reviewed Global Design Competition's system. We found the flaws and code snippets and suggested on how to improve it. Now the organisation wants us to make the website more secure and host it deploy it to production environment, with resources and services from AWS services. We deployed using EC2 instances and RDS(Relational Database Service).

In this report we have shown how we deploy and host the website. We also indicated the new security features we have included using AWS service. Example of the security service is, centralized logging for web API access and MySQL RDS Database security. Centralized logging for Web API Access enables developers to see sourceip of the request. When the request was made as well as how long was the response length. RDS ensures only EC2 instances running NODEJS code can have access to RDS. It also enables database access logging.

# 2.0 Deploy web application on AWS

## 2.1 EC2 instance

Select EC2 from Services on AWS

The screenshot shows the AWS Management Console search results for 'ec2'. The search bar at the top contains 'ec2'. Below it, the results are categorized under 'Services (7)'. The 'EC2' service is highlighted with a blue border, showing its icon (a server), name, and description: 'Virtual Servers in the Cloud'. There are also links for 'See all 7 results' and 'Documentation (230,178)'.

Click on “Launch instance”

The screenshot shows the EC2 Instances page. At the top, there is a navigation bar with tabs: 'Instances (1)', 'Info', 'Connect', 'Instance state', 'Actions', and 'Launch instances'. The 'Launch instances' button is highlighted with an orange background.

### Step 1 : Choose Ubuntu Server 18.04

The screenshot shows the 'Choose an Amazon Machine Image (AMI)' step. It lists two AMI options: 'Ubuntu Server 20.04 LTS (HVM), SSD Volume Type - ami-0747bdcabd34c712a (64-bit x86)' and 'Ubuntu Server 18.04 LTS (HVM), SSD Volume Type - ami-08353a25e80beea3e (64-bit Arm)'. Both are marked as 'Free tier eligible'. On the right, there are 'Cancel and Exit' and 'Select' buttons, along with checkboxes for '64-bit (x86)' and '64-bit (Arm)'.

### Step 2 : Choose t2 micro for Instance Type

The screenshot shows the 'Choose an Instance Type' step. It displays a table of instance types. The 't2.micro' row is selected and highlighted with a green background. The table columns include Family, Type, vCPUs, Memory (GiB), Instance Storage (GB), EBS-Optimized Available, Network Performance, and IPv6 Support. At the bottom, there are buttons for 'Cancel', 'Previous', 'Review and Launch', and 'Next: Configure Instance Details'.

|                                     | Family | Type                           | vCPUs | Memory (GiB) | Instance Storage (GB) | EBS-Optimized Available | Network Performance | IPv6 Support |
|-------------------------------------|--------|--------------------------------|-------|--------------|-----------------------|-------------------------|---------------------|--------------|
| <input type="checkbox"/>            | t2     | t2.nano                        | 1     | 0.5          | EBS only              | -                       | Low to Moderate     | Yes          |
| <input checked="" type="checkbox"/> | t2     | t2.micro<br>Free tier eligible | 1     | 1            | EBS only              | -                       | Low to Moderate     | Yes          |
| <input type="checkbox"/>            | t2     | t2.small                       | 1     | 2            | EBS only              | -                       | Low to Moderate     | Yes          |

## Step 3 : At Auto-assign Public IP , select Enable

1. Choose AMI   2. Choose Instance Type   3. Configure Instance   4. Add Storage   5. Add Tags   6. Configure Security Group   7. Review

**Step 3: Configure Instance Details**

Configure the instance to suit your requirements. You can launch multiple instances from the same AMI, request Spot instances to take advantage of the lower pricing, assign an access management role to the instance, and more.

Number of instances: 1   Launch into Auto Scaling Group

Purchasing option: Request Spot instances

Network: vpc-c86d06b5 (default)   Create new VPC

Subnet: No preference (default subnet in any Availability Zone)   Create new subnet

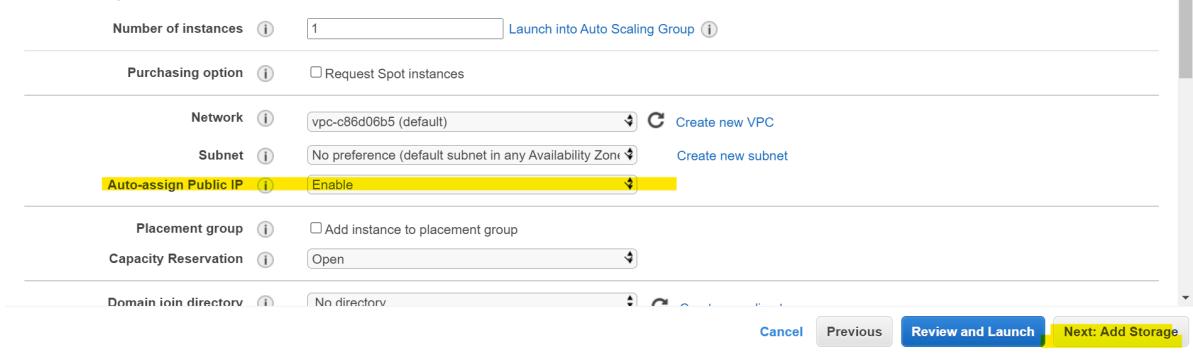
Auto-assign Public IP: **Enable**

Placement group: Add instance to placement group

Capacity Reservation: Open

Domain join directory: No directory

Cancel   Previous   **Review and Launch**   Next: Add Storage



## Step 4 : Keep default

1. Choose AMI   2. Choose Instance Type   3. Configure Instance   4. Add Storage   **5. Add Tags**   6. Configure Security Group   7. Review

**Step 4: Add Storage**

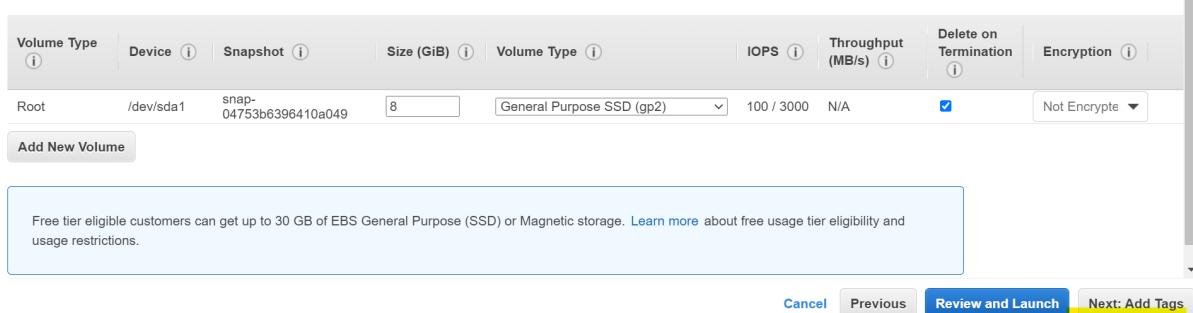
Your instance will be launched with the following storage device settings. You can attach additional EBS volumes and instance store volumes to your instance, or edit the settings of the root volume. You can also attach additional EBS volumes after launching an instance, but not instance store volumes. [Learn more](#) about storage options in Amazon EC2.

| Volume Type | Device    | Snapshot               | Size (GiB) | Volume Type               | IOPS       | Throughput (MB/s) | Delete on Termination               | Encryption    |
|-------------|-----------|------------------------|------------|---------------------------|------------|-------------------|-------------------------------------|---------------|
| Root        | /dev/sda1 | snap-04753b6396410a049 | 8          | General Purpose SSD (gp2) | 100 / 3000 | N/A               | <input checked="" type="checkbox"/> | Not Encrypted |

Add New Volume

Free tier eligible customers can get up to 30 GB of EBS General Purpose (SSD) or Magnetic storage. [Learn more](#) about free usage tier eligibility and usage restrictions.

Cancel   Previous   **Review and Launch**   Next: Add Tags



## Step 5 : \*optional\* to add name for instance

Key : Name , Value : instance name

1. Choose AMI   2. Choose Instance Type   3. Configure Instance   4. Add Storage   5. Add Tags   6. Configure Security Group   7. Review

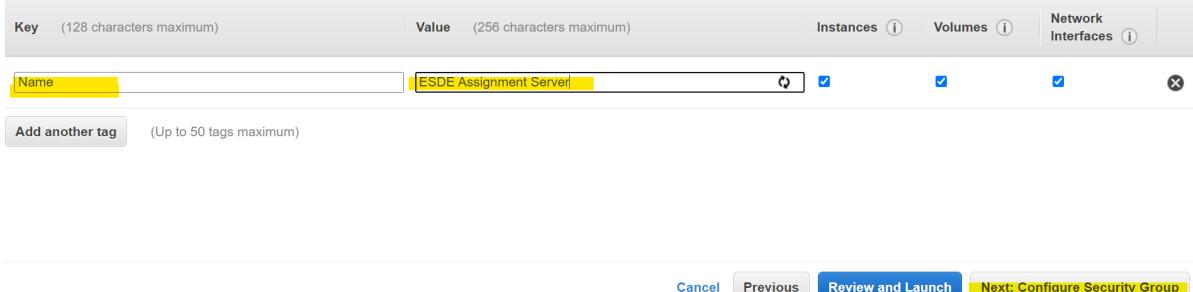
**Step 5: Add Tags**

A tag consists of a case-sensitive key-value pair. For example, you could define a tag with key = Name and value = Webserver. A copy of a tag can be applied to volumes, instances or both. Tags will be applied to all instances and volumes. [Learn more](#) about tagging your Amazon EC2 resources.

| Key (128 characters maximum) | Value (256 characters maximum) | Instances                           | Volumes                             | Network Interfaces                  |
|------------------------------|--------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| Name                         | ESDE Assignment Server         | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

Add another tag (Up to 50 tags maximum)

Cancel   Previous   **Review and Launch**   Next: Configure Security Group



Step 6 : Choose create new security group ,  
 Configure as shown below and click Review and Launch

Step 6: Configure Security Group

Assign a security group:  Create a new security group  Select an existing security group

Security group name: launch-wizard-2

Description: launch-wizard-2 created 2021-08-02T13:06:45.003+08:00

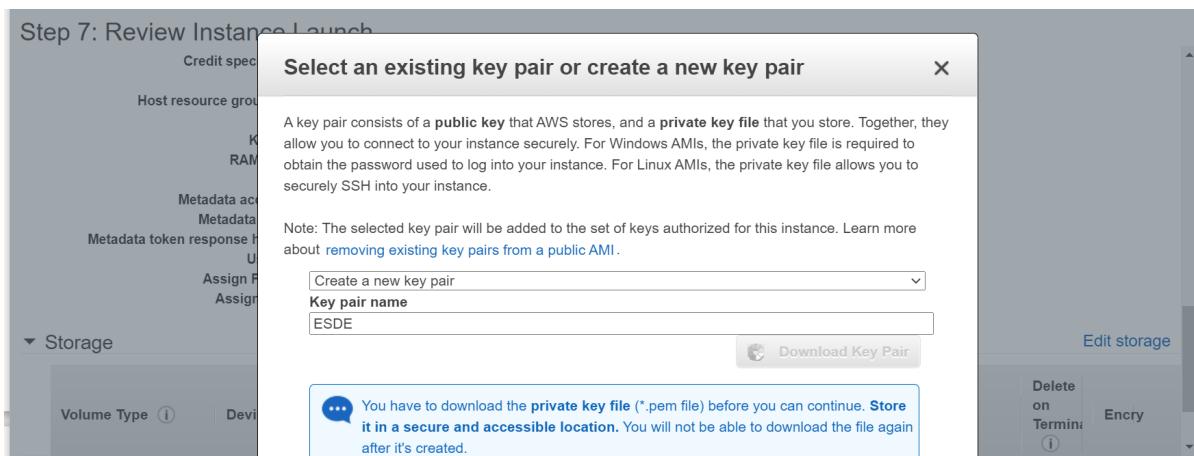
| Type | Protocol | Port Range | Source           | Description                |
|------|----------|------------|------------------|----------------------------|
| SSH  | TCP      | 22         | Custom 0.0.0.0/0 | e.g. SSH for Admin Desktop |

**Add Rule**

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

Cancel Previous **Review and Launch**

Step 7 : click Launch , and add new key pair  
 Choose Create a new key pair , put Key pair name that you want  
 Download the key pair created



Instance created, check the one running

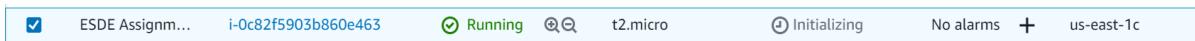
Instances (2) [Info](#)

Connect Instance state Actions Launch instances

Filter instances

| Name                   | Instance ID         | Instance state | Instance type | Status  |
|------------------------|---------------------|----------------|---------------|---------|
| -                      | i-09a3fa935f7d9ae9b | Stopped        | t2.micro      | -       |
| ESDE Assignment Server | i-0cf2ac98a786ab84c | Running        | t2.micro      | Running |

## Select on the running instance



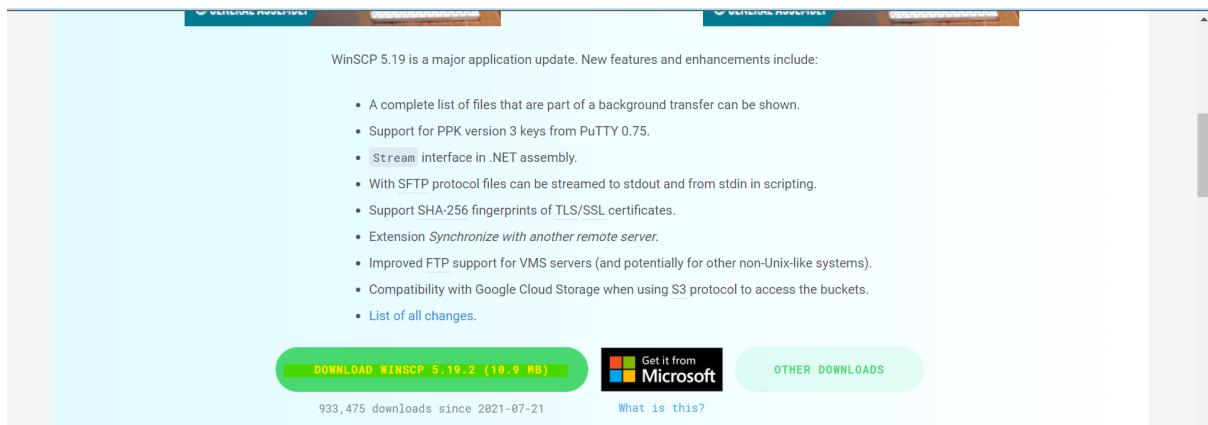
Copy and noted down the IPv4 address , and Public DNS

IP address : 34.207.143.252

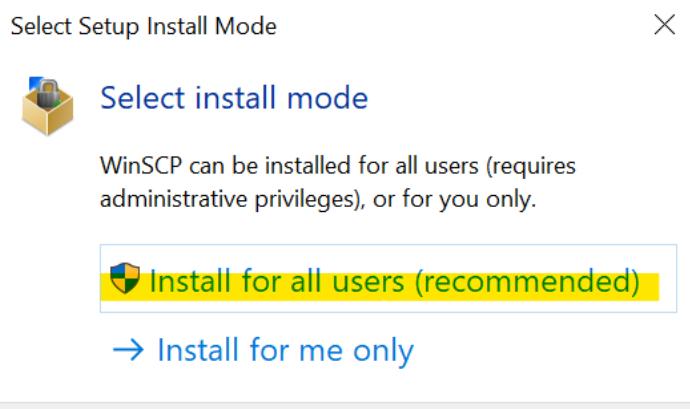
Public DNS IPv4 : ec2-34-207-143-252.compute-1.amazonaws.com

## 2.2 WinSCP and Putty

Download WinSCP online



Choose the recommended option below,  
click Next for all, and download.



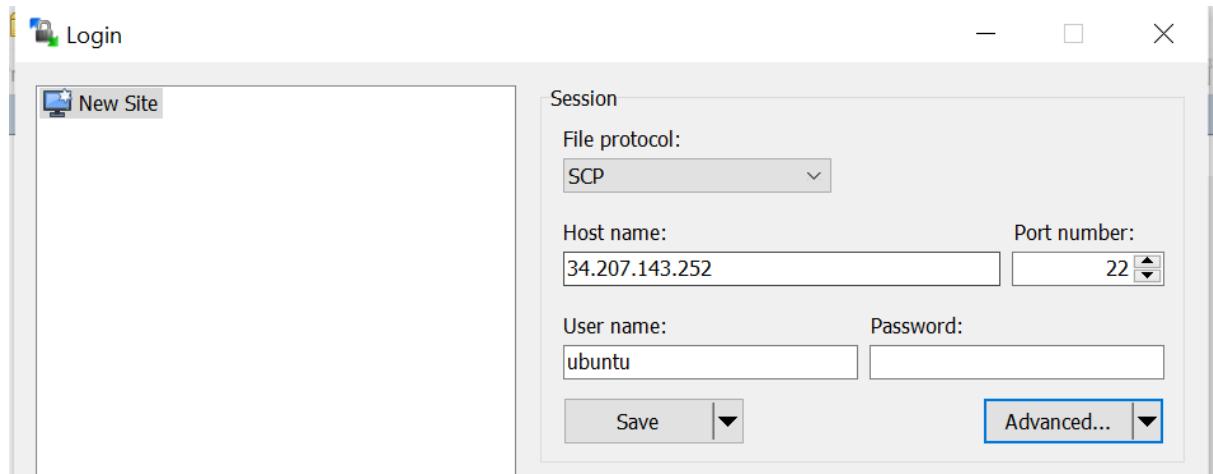
Open WinSCP



At File protocol : choose SCP

At Host name : “your IPv4 address of your instance”

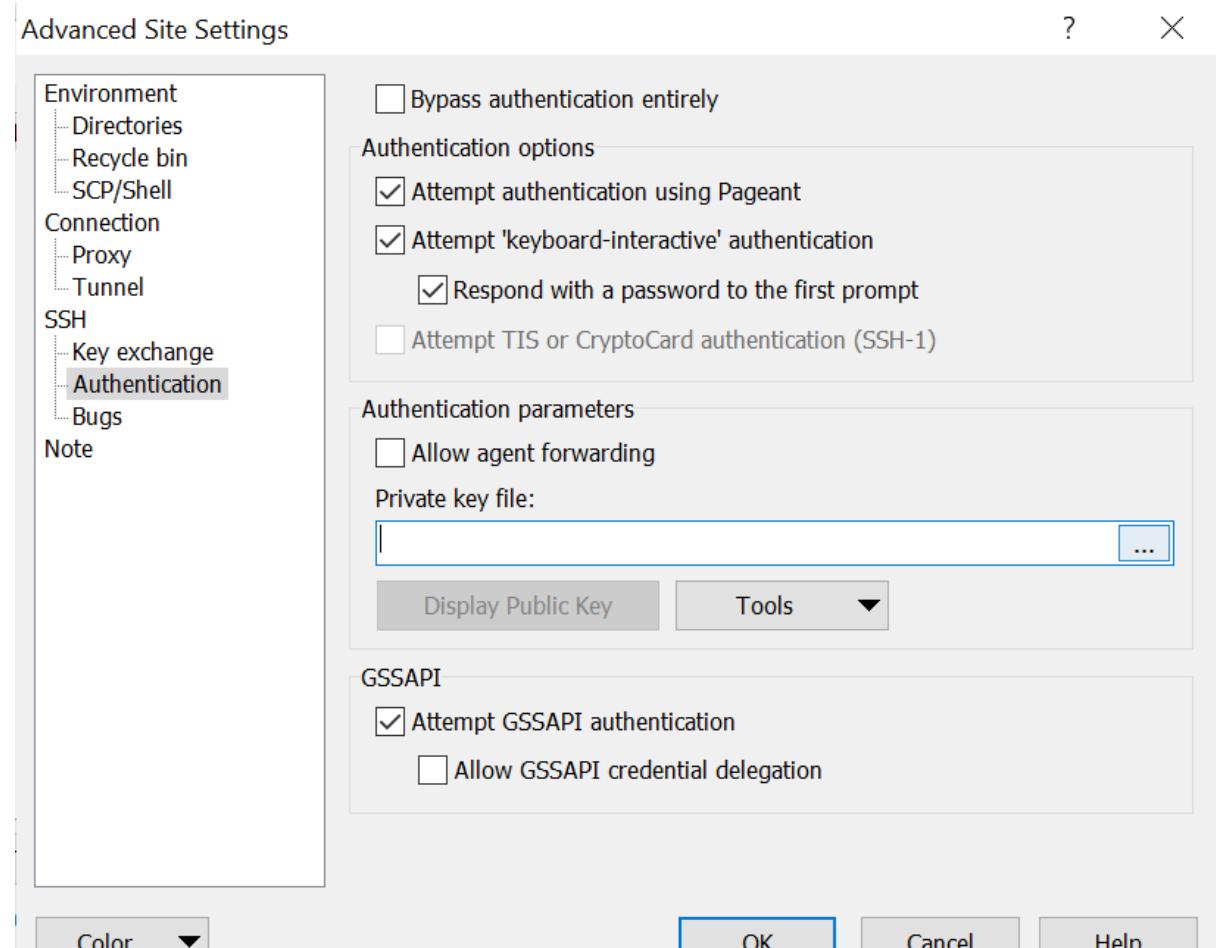
At Username : put “ubuntu”



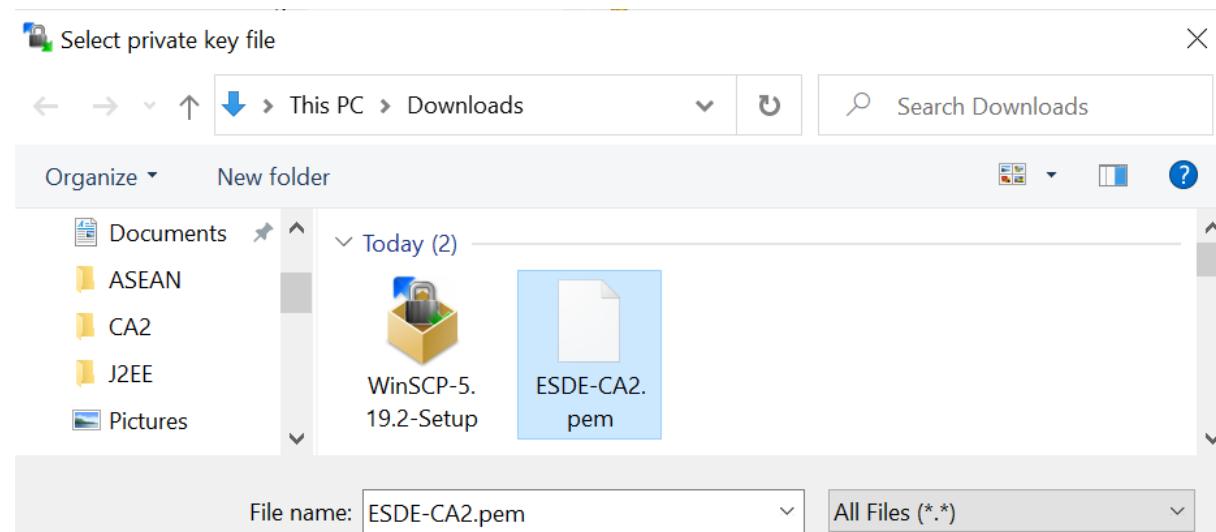
Click on Advanced option

Click on SSH > Authentication.

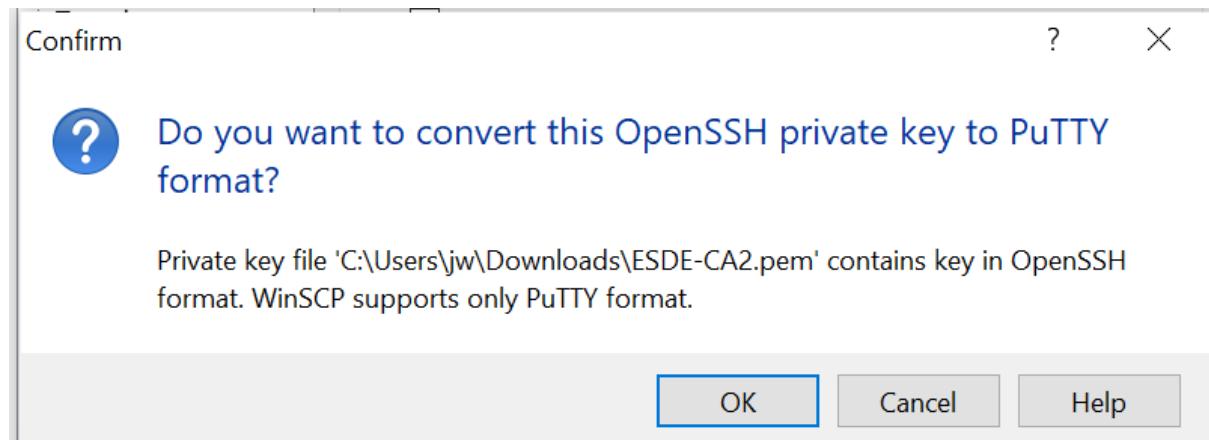
At Private key file : select “...” and choose your KeyPair file that you downloaded just now.



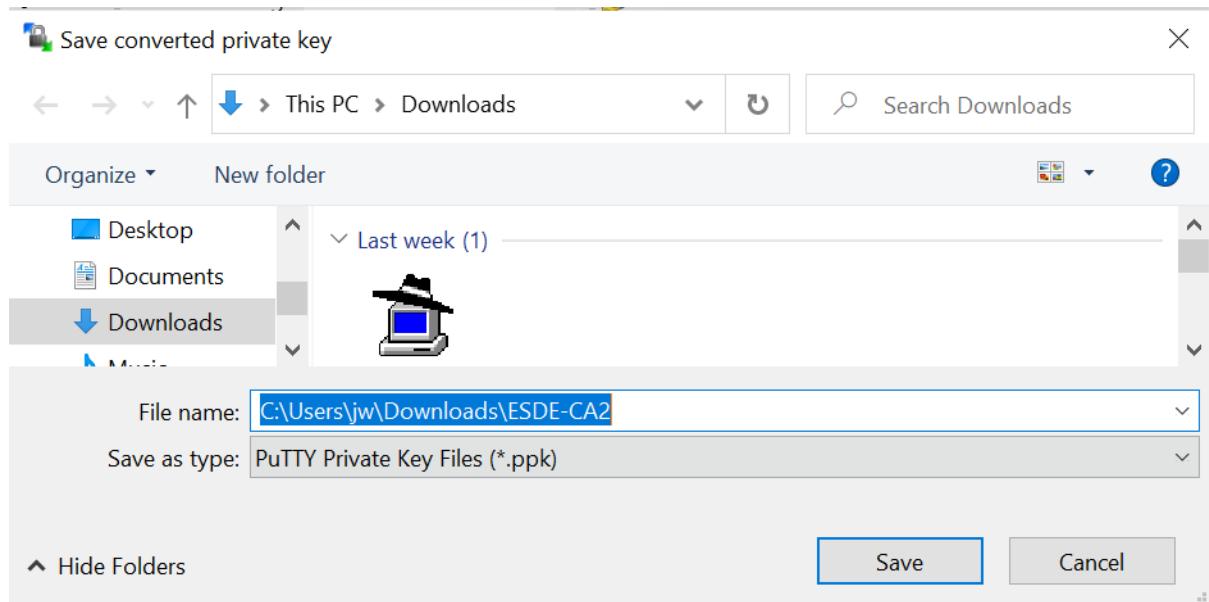
If cannot find, change to “All Files” type



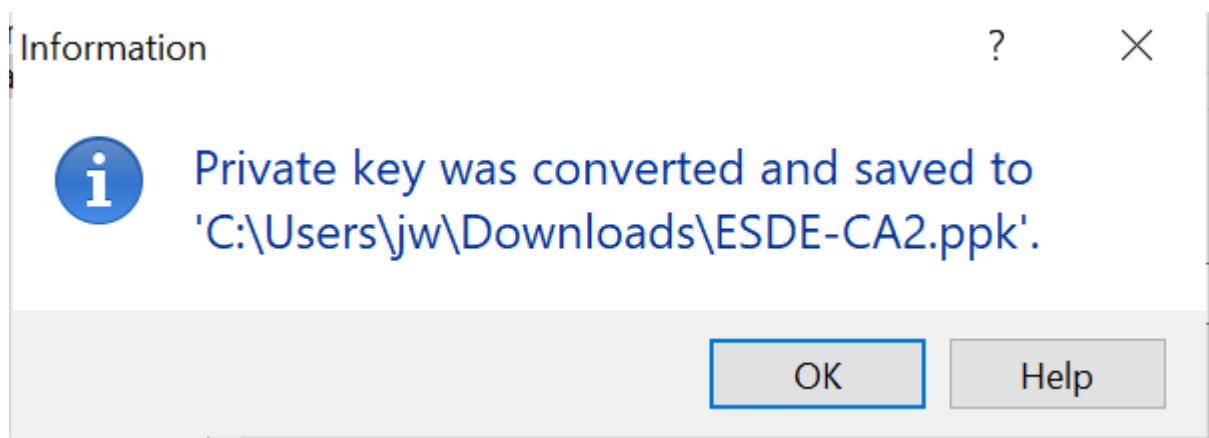
Click OK to convert this pem file to PuTTY format



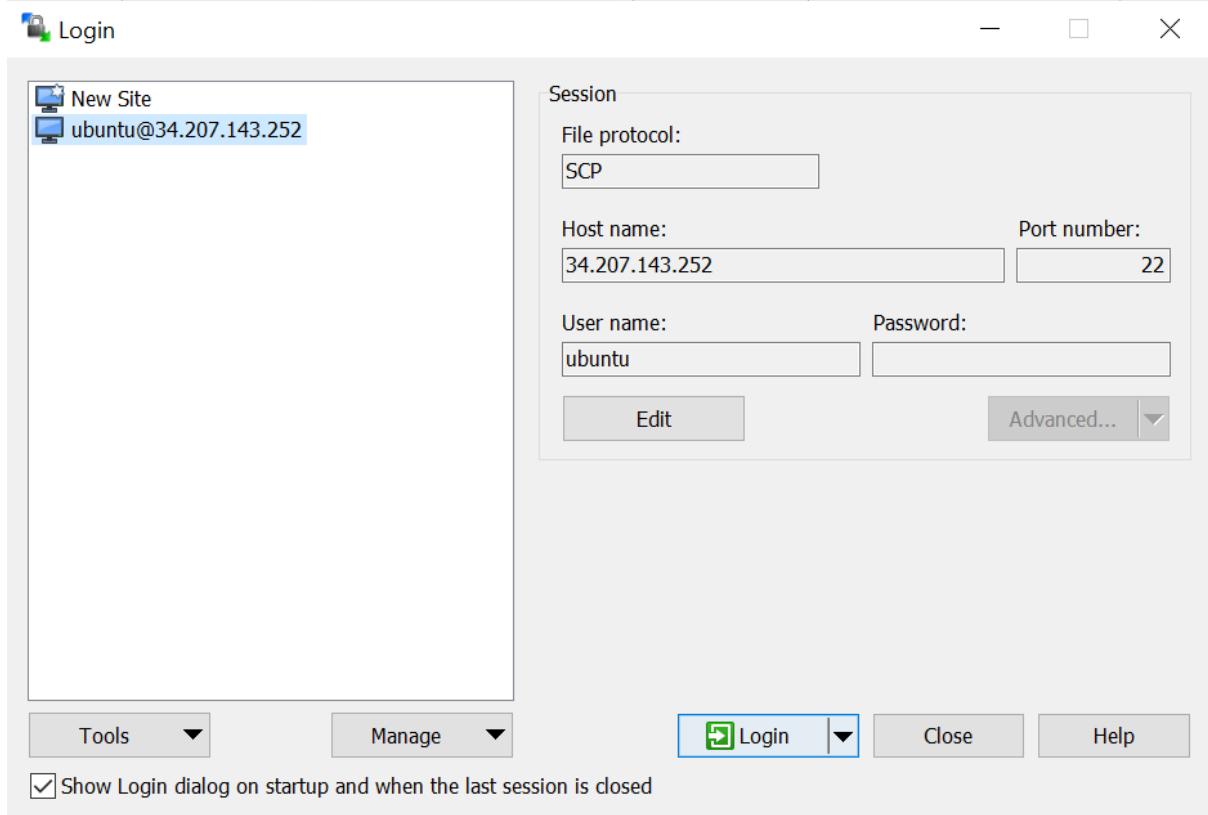
Save this keypair as PuTTY file



Private key was converted and saved.



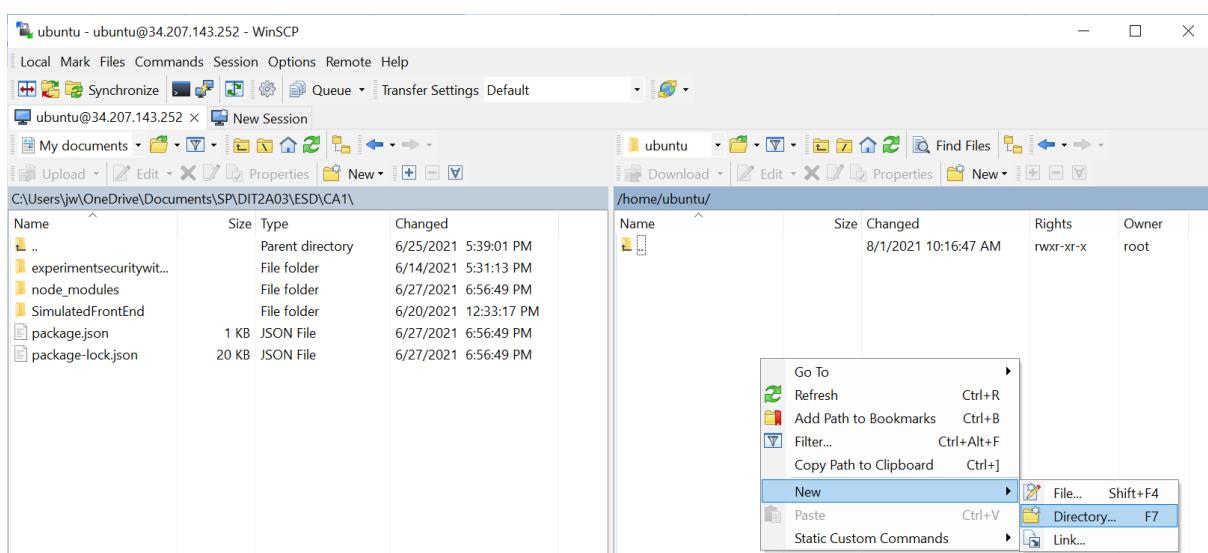
Save this session, and click ok to use the default name given which is your IPv4 address



Click Login

At left side : find your CA1 code folder as shown below

At right side : create new directory named ESDE

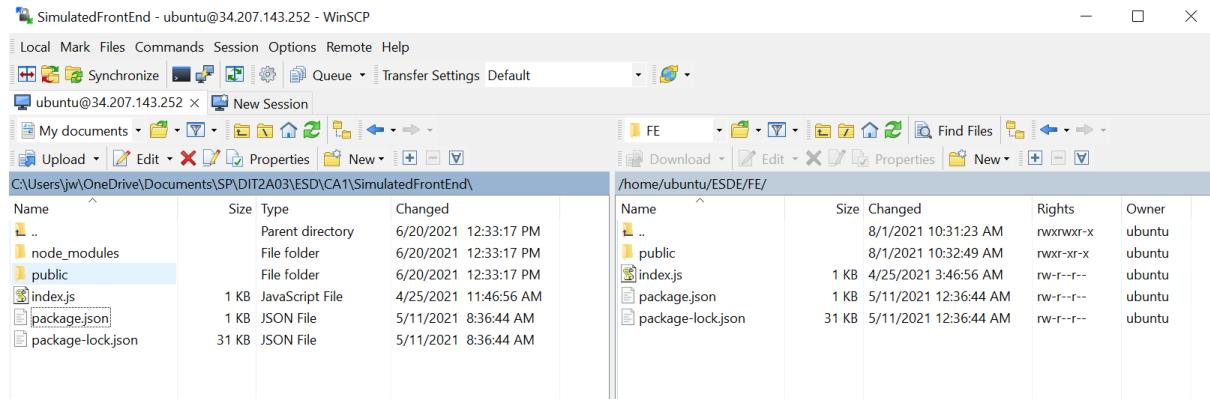


Inside ESDE folder created, create another 2 new directory ,

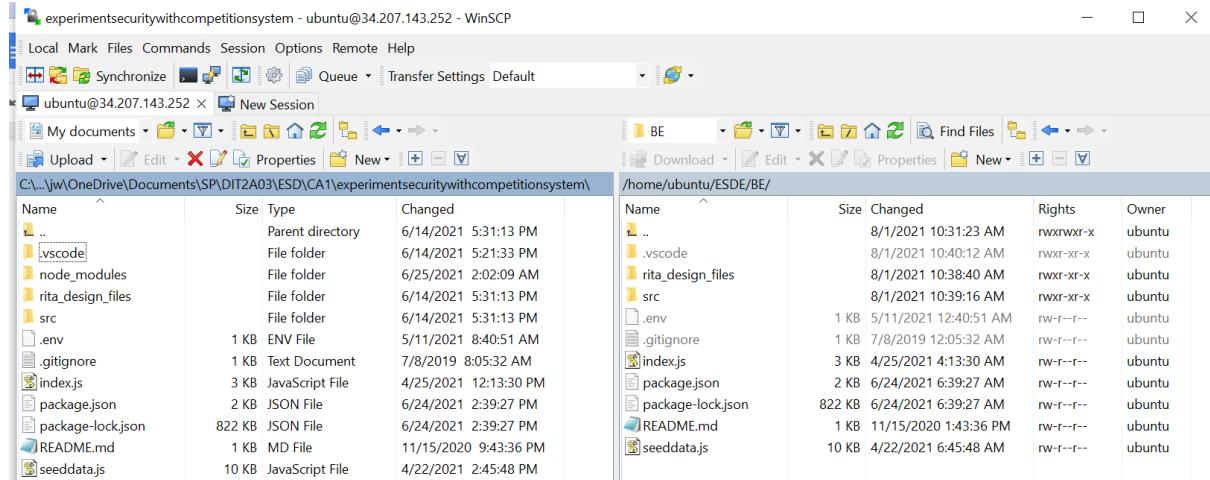
FE ( for frontend ) & BE ( for backend )

Copy all files except node\_modules into both folder respectively

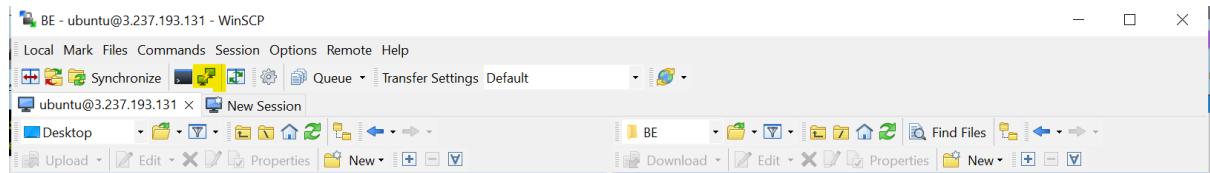
Your FE ( frontend folder ) should look like this :



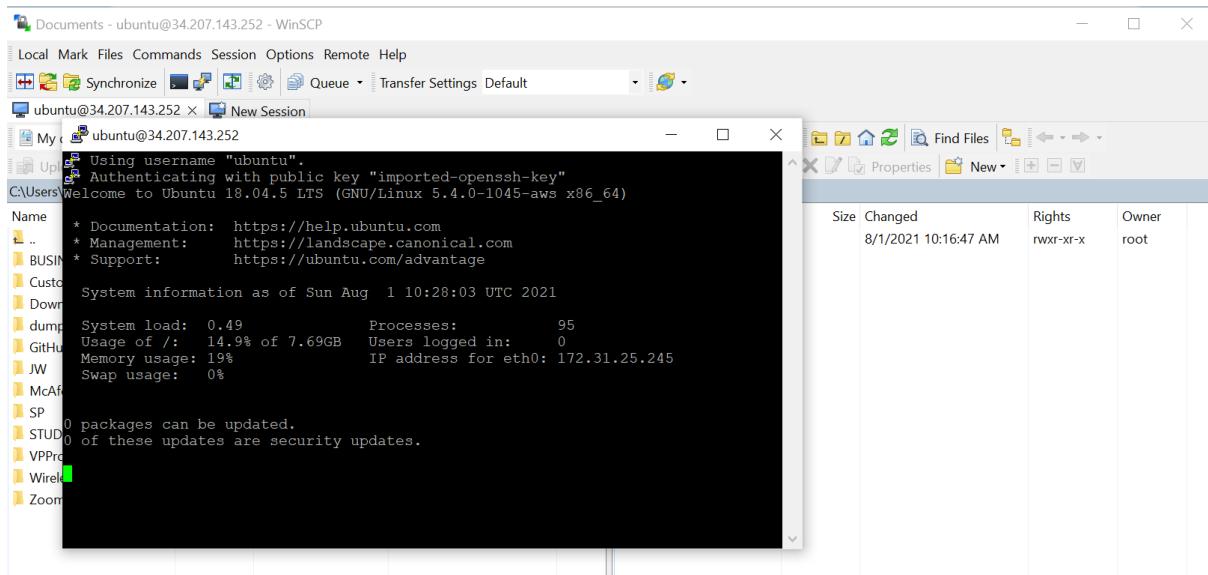
Your BE ( backend folder ) should look like this :



Click on the highlighted button below to open the terminal



Terminal will look like this :



Do the following codes in the terminal  
to download package information from all configured sources

```
ubuntu@ip-172-31-25-245:~$ sudo apt update
Hit:1 http://us-east-1.ec2.archive.ubuntu.com/ubuntu bionic InRelease
Get:2 http://us-east-1.ec2.archive.ubuntu.com/ubuntu bionic-updates InRelease [88.7 kB]
```

to download nodejs

```
ubuntu@ip-172-31-25-245:~$ sudo apt install nodejs
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  libc-ares2 libhttp-parser2.7.1 nodejs-doc
The following NEW packages will be installed:
```

to download npm

```
ubuntu@ip-172-31-25-245:~$ sudo apt install npm
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
```

nodejs -v : to check version of nodejs

ls : to check the files inside this folder

Cd into frontend folder, and do nodejs index.js to run the file

**\*ERROR ENCOUNTERED\***

**Cannot find module express**

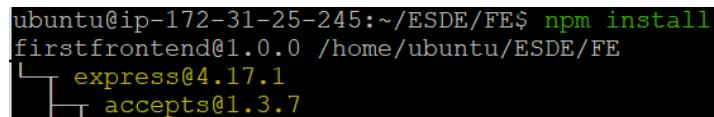


A terminal window showing a command-line session. The user runs 'nodejs -v' to check the Node.js version (v8.10.0). Then, they navigate to the 'ESDE' directory ('cd ESDE') and list its contents ('ls'). Finally, they run 'nodejs index.js'. This results in an error message: 'Error: Cannot find module 'express''. The error stack shows the search path through 'module.js' and 'internal/modules/cjs/loader.js'.

```
ubuntu@ip-172-31-25-245:~/ESDE/FE$ nodejs -v
v8.10.0
ubuntu@ip-172-31-25-245:~/ESDE$ ls
ESDE
ubuntu@ip-172-31-25-245:~/ESDE$ cd FE
ubuntu@ip-172-31-25-245:~/ESDE/FE$ ls
index.js  package-lock.json  package.json  public
ubuntu@ip-172-31-25-245:~/ESDE/FE$ nodejs index.js
module.js:549
    throw err;
^

Error: Cannot find module 'express'
    at Function.Module._resolveFilename (module.js:547:15)
    at Function.Module._load (module.js:474:25)
    at Module.require (module.js:596:17)
    at require (internal/module.js:11:19)
```

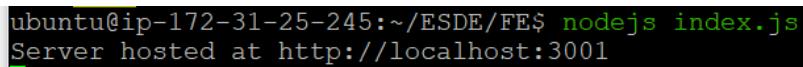
Solved by doing npm install



A terminal window showing the output of 'npm install'. It installs the 'firstfrontend@1.0.0' package from the local directory. The package 'express@4.17.1' is listed as a dependency, along with 'accepts@1.3.7'.

```
ubuntu@ip-172-31-25-245:~/ESDE/FE$ npm install
firstfrontend@1.0.0 /home/ubuntu/ESDE/FE
└── express@4.17.1
    └── accepts@1.3.7
```

Do nodejs index.js again to run the file



A terminal window showing the command 'nodejs index.js' being run. The output indicates that the server is hosted at 'http://localhost:3001'.

```
ubuntu@ip-172-31-25-245:~/ESDE/FE$ nodejs index.js
Server hosted at http://localhost:3001
```

Frontend server has successfully hosted

Cd into backend folder, do npm install to install all node modules

```
ubuntu@ip-172-31-25-245:~/ESDE/BE$ cd ESDE/BE
ubuntu@ip-172-31-25-245:~/ESDE/BE$ npm install
loadDep:validator → cache [██████████] 100%
WARN engine gulp-replace@1.1.3: wanted: {"node":">=10"} (current: {"node":"8.10.0", "npm":"3.5.2"})
WARN engine dotenv@8.6.0: wanted: {"node":">=10"} (current: {"node":"8.10.0", "npm":"3.5.2"})
npm WARN deprecated gulp-minify-css@1.2.4: Please use gulp-clean-css
npm WARN deprecated babel-preset-es2015@6.24.1: 🙏 Thanks for using Babel: we r
```

Do the following codes to setup backend server

```
ubuntu@ip-172-31-25-245:~$ curl -sL https://deb.nodesource.com/setup_14.x -o nodesource_setup.sh
ubuntu@ip-172-31-25-245:~$ sudo bash nodesource_setup.sh
## Installing the NodeSource Node.js 14.x repo...
```

```
1 ubuntu@ip-172-31-25-245:~
ubuntu@ip-172-31-25-245:~$ sudo apt install nodejs
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
```

```
ubuntu@ip-172-31-25-245:~
ubuntu@ip-172-31-25-245:~$ sudo apt install build-essential
Reading package lists... Done
Building dependency tree
Reading state information... Done
```

Try nodejs index.js to run the server

```
ubuntu@ip-172-31-25-245:~/ESDE/BE$ nodejs index.js
internal/modules/cjs/loader.js:892
  throw err;
  ^

Error: Cannot find module 'is-image-url'
Require stack:
- /home/ubuntu/ESDE/BE/src/services/fileService.js
- /home/ubuntu/ESDE/BE/src/controllers/userController.js
- /home/ubuntu/ESDE/BE/src/routes.js
- /home/ubuntu/ESDE/BE/src/bootstrap.js
- /home/ubuntu/ESDE/BE/index.js
  at Function.Module._resolveFilename (internal/modules/cjs/loader.js:889:15)
```

\*ERROR ENCOUNTERED\*

Cannot find module is-image-url

Solved by running npm install is-image-url

```
ubuntu@ip-172-31-25-245: ~/ESDE/BE
}
ubuntu@ip-172-31-25-245:~/ESDE/BE$ npm install is-image-url
> spawn-sync@1.0.15 postinstall /home/ubuntu/ESDE/BE/node_modules/spawn-sync
> node postinstall

npm WARN xyz@1.0.0 No repository field.
npm WARN optional SKIPPING OPTIONAL DEPENDENCY: fsevents@1.2.13 (node_modules/fsevents)

```

Try nodejs index.js to run the server

\*ERROR ENCOUNTERED\*

Cannot find module express rate-limit

```
ubuntu@ip-172-31-25-245: ~/ESDE/BE
ubuntu@ip-172-31-25-245:~/ESDE/BE$ nodejs index.js
internal/modules/cjs/loader.js:892
  throw err;
  ^

Error: Cannot find module 'express-rate-limit'
Require stack:
- /home/ubuntu/ESDE/BE/src/middlewares/rateLimit.js
- /home/ubuntu/ESDE/BE/src/routes.js
- /home/ubuntu/ESDE/BE/src/bootstrap.js
- /home/ubuntu/ESDE/BE/index.js
  at Function.Module._resolveFilename (internal/modules/cjs/loader.js:889:15)
  at Function.Module._load (internal/modules/cjs/loader.js:745:27)
```

Solved by running npm install express-rate-limit

```
ubuntu@ip-172-31-25-245:~/ESDE/BE$ npm install express-rate-limit
npm WARN xyz@1.0.0 No repository field.
npm WARN optional SKIPPING OPTIONAL DEPENDENCY: fsevents@1.2.13 (node_modules/fsevents):
npm WARN notsup SKIPPING OPTIONAL DEPENDENCY: Unsupported platform for fsevents@1.2.13: wanted {"os":"darwin","arch":"any"} (current: {"os":"linux","arch":"x64"})

```

Try nodejs index.js to run the server

```
ubuntu@ip-172-31-25-245:~/ESDE/BE$ nodejs index.js
Server is Listening on: http://localhost:5000/
```

Backend server has successfully hosted

## Configure your instance security group

Click on Edit inbound rules

The screenshot shows the AWS Security Groups interface. At the top, there's a header with 'Security Groups (1/4)' and a 'Create security group' button. Below is a search bar and a table with columns: Name, Security group ID, Security group name, and VPC ID. One row is selected, showing 'sg-0c9f33af95da8e8ee' as the ID, 'ESDE CA2' as the name, and 'vpc-2c731851' as the VPC ID. Below the table are tabs for 'Details', 'Inbound rules' (which is selected), 'Outbound rules', and 'Tags'. A message box says 'You can now check network connectivity with Reachability Analyzer' with a 'Run Reachability Analyzer' button. The 'Inbound rules' section has its own header 'Inbound rules (1/1)' and a table with columns: Name, Security group rule..., IP version, and Type. One rule is listed: 'sgr-0a912b42fd8e60368' with 'IPv4' IP version and 'SSH' type.

Add another 2 rules as shown below

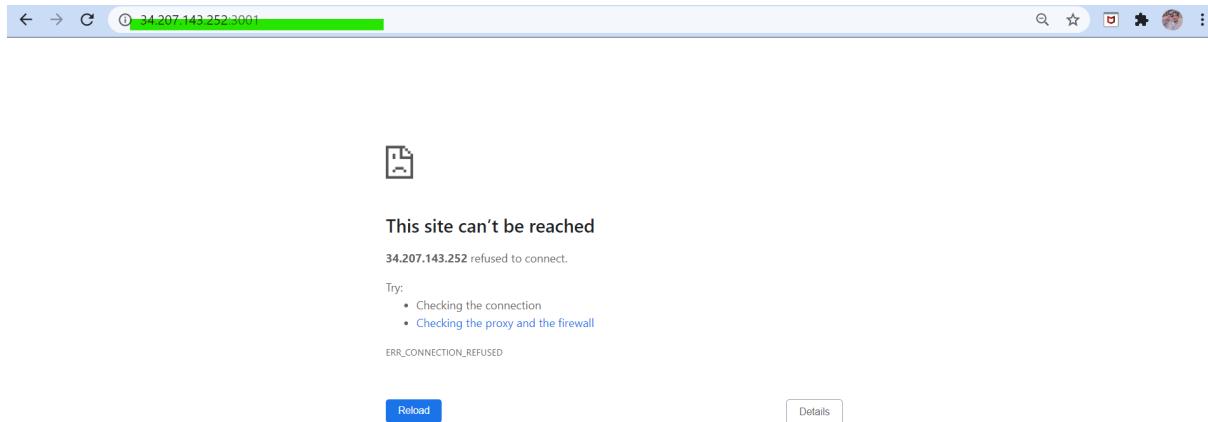
The screenshot shows the 'Edit inbound rules' page for the security group 'sg-0c9f33af95da8e8ee - ESDE CA2'. The header includes 'EC2 > Security Groups > sg-0c9f33af95da8e8ee - ESDE CA2 > Edit inbound rules'. Below is a table titled 'Inbound rules' with columns: Security group rule ID, Type, Protocol, Port range, Source, and Description - optional. Three rules are listed:

| Security group rule ID | Type       | Protocol | Port range | Source | Description - optional |
|------------------------|------------|----------|------------|--------|------------------------|
| sgr-0a912b42fd8e60368  | SSH        | TCP      | 22         | Custom | 0.0.0.0/0              |
| sgr-0d828124f77fdadad  | Custom TCP | TCP      | 3001       | Custom | 0.0.0.0/0              |
| sgr-0e7c452d12b037eb5  | Custom TCP | TCP      | 5000       | Custom | 0.0.0.0/0              |

Try accessing your web page through <http://<yourIPv4address>:3031>

## \*ERROR ENCOUNTERED\*

### Cannot access website



Solved by getting SSL certificate for HTTPS connection

Do the codes below

```
ubuntu@ip-172-31-25-245:~/ESDE/BE$ openssl req -x509 -nodes -new -sha256 -days 1024 -newkey rsa:2048 -keyout RootCA.key -out RootCA.pem
Can't load /home/ubuntu/.rnd into RNG
140677897294272:error:2406F079:random number generator:RAND_load_file:Cannot open file:../crypto/rand/randfile.c:88:Filename=/home/ubuntu/.rnd
Generating a RSA private key
.....+++++
writing new private key to 'RootCA.key'
-----
You are about to be asked to enter information that will be incorporated
into your certificate request.
What you are about to enter is what is called a Distinguished Name or a DN.
There are quite a few fields but you can leave some blank
For some fields there will be a default value,
If you enter '.', the field will be left blank.
-----
Country Name (2 letter code) [AU]:
State or Province Name (full name) [Some-State]:
Locality Name (eg, city) []:
Organization Name (eg, company) [Internet Widgits Pty Ltd]:
Organizational Unit Name (eg, section) []:
Common Name (e.g. server FQDN or YOUR name) []:
Email Address []:
ubuntu@ip-172-31-25-245:~/ESDE/BE$ ls
README.md  RootCA.key  RootCA.pem  index.js  node_modules  npm-debug.log  package-lock.json  package.json  rita_design_files  seeddata.js  src
ubuntu@ip-172-31-25-245:~/ESDE/BE$ openssl x509 -outform pem -in RootCA.pem -out RootCA.crt
ubuntu@ip-172-31-25-245:~/ESDE/BE$ ls
README.md  RootCA.crt  RootCA.key  RootCA.pem  index.js  node_modules  npm-debug.log  package-lock.json  package.json  rita_design_files  seeddata.js  src
```

```
ubuntu@ip-172-31-25-245:~/ESDE/BE$ ls
README.md  RootCA.crt  RootCA.key  RootCA.pem  index.js  node_modules  npm-debug.log  package-lock.json
ubuntu@ip-172-31-25-245:~/ESDE/BE$ nodejs index.js
Server is Listening on: http://localhost:5000/
^C
ubuntu@ip-172-31-25-245:~/ESDE/BE$ ls
README.md  RootCA.pem  npm-debug.log      rita_design_files
RootCA.crt  index.js   package-lock.json  seeddata.js
RootCA.key  node_modules  package.json    src
ubuntu@ip-172-31-25-245:~/ESDE/BE$ openssl req -new -nodes -newkey rsa:2048 -keyout local
host.key -out localhost.csr
Can't load /home/ubuntu/.rnd into RNG
139794255974848:error:2406F079:random number generator:RAND_load_file:Cannot open file:..
../crypto/rand/randfile.c:88:Filename=/home/ubuntu/.rnd
Generating a RSA private key
.....+++++
.....+++++
writing new private key to 'localhost.key'
-----
You are about to be asked to enter information that will be incorporated
into your certificate request.
What you are about to enter is what is called a Distinguished Name or a DN.
There are quite a few fields but you can leave some blank
For some fields there will be a default value,
```

```
ubuntu@ip-172-31-25-245:~/ESDE/BE$ openssl x509 -req -sha256 -days 1024 -in localhost.csr  
-CA RootCA.pem -CAkey RootCA.key -CAcreateserial -out localhost.crt  
Signature ok  
subject=C = AU, ST = Some-State, O = Internet Widgits Pty Ltd  
Getting CA Private Key  
ubuntu@ip-172-31-25-245:~/ESDE/BE$ ls  
README.md  RootCA.pem  localhost.crt  node_modules      package.json      src  
RootCA.crt  RootCA.srl  localhost.csr  npm-debug.log    rita_design_files  
RootCA.key  index.js   localhost.key  package-lock.json seeddata.js  
ubuntu@ip-172-31-25-245:~/ESDE/BE$ nodejs index.js  
Server is Listening on: http://localhost:5000/
```

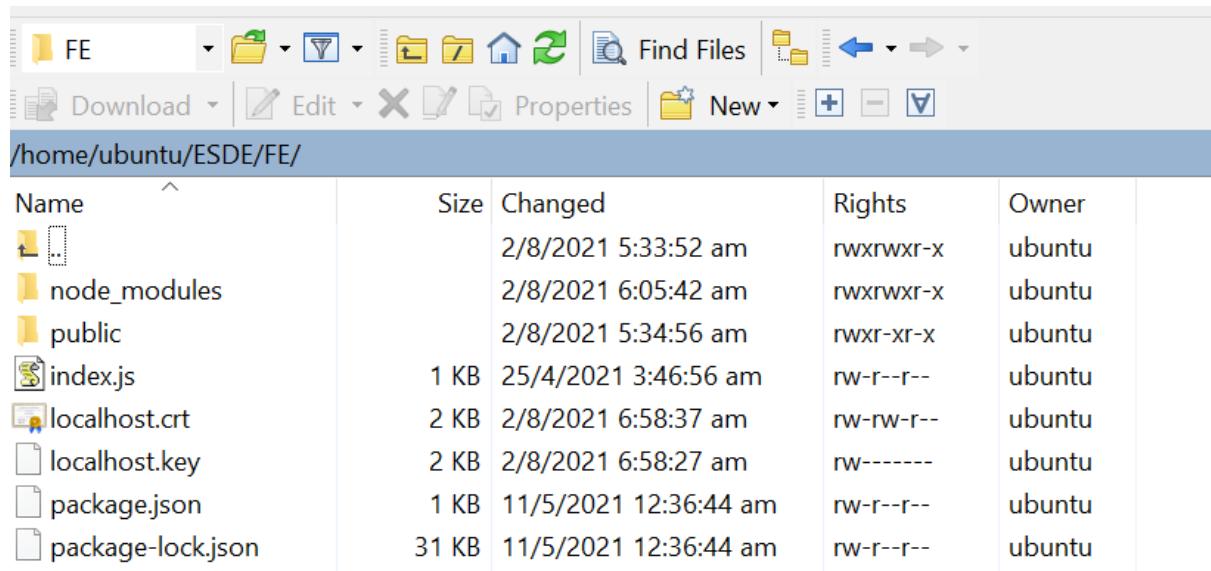
Run backend server again

The website can be accessed through <https://<Ipv4address>:3001>

Before accessing the page, check your backend folder if you have files below in WinSCP

| Name              | Size   | Changed               | Rights    | Owner  |
|-------------------|--------|-----------------------|-----------|--------|
| ..                |        | 2/8/2021 5:33:52 am   | rwxrwxr-x | ubuntu |
| node_modules      |        | 2/8/2021 6:21:08 am   | rwxrwxr-x | ubuntu |
| rita_design_files |        | 2/8/2021 5:38:14 am   | rwxr-xr-x | ubuntu |
| src               |        | 2/8/2021 5:38:59 am   | rwxr-xr-x | ubuntu |
| index.js          | 3 KB   | 25/4/2021 4:13:30 am  | rw-r--r-- | ubuntu |
| localhost.crt     | 2 KB   | 2/8/2021 6:58:37 am   | rw-rw-r-- | ubuntu |
| localhost.csr     | 1 KB   | 2/8/2021 6:58:32 am   | rw-rw-r-- | ubuntu |
| localhost.key     | 2 KB   | 2/8/2021 6:58:27 am   | rw-----   | ubuntu |
| package.json      | 2 KB   | 2/8/2021 6:21:09 am   | rw-r--r-- | ubuntu |
| package-lock.json | 387 KB | 2/8/2021 6:21:09 am   | rw-r--r-- | ubuntu |
| README.md         | 1 KB   | 15/11/2020 1:43:36 pm | rw-r--r-- | ubuntu |
| RootCA.crt        | 2 KB   | 2/8/2021 6:54:08 am   | rw-rw-r-- | ubuntu |
| RootCA.key        | 2 KB   | 2/8/2021 6:53:25 am   | rw-----   | ubuntu |
| RootCA.pem        | 2 KB   | 2/8/2021 6:53:28 am   | rw-rw-r-- | ubuntu |
| RootCA.srl        | 1 KB   | 2/8/2021 6:58:37 am   | rw-rw-r-- | ubuntu |
| seeddata.js       | 10 KB  | 22/4/2021 6:45:48 am  | rw-r--r-- | ubuntu |

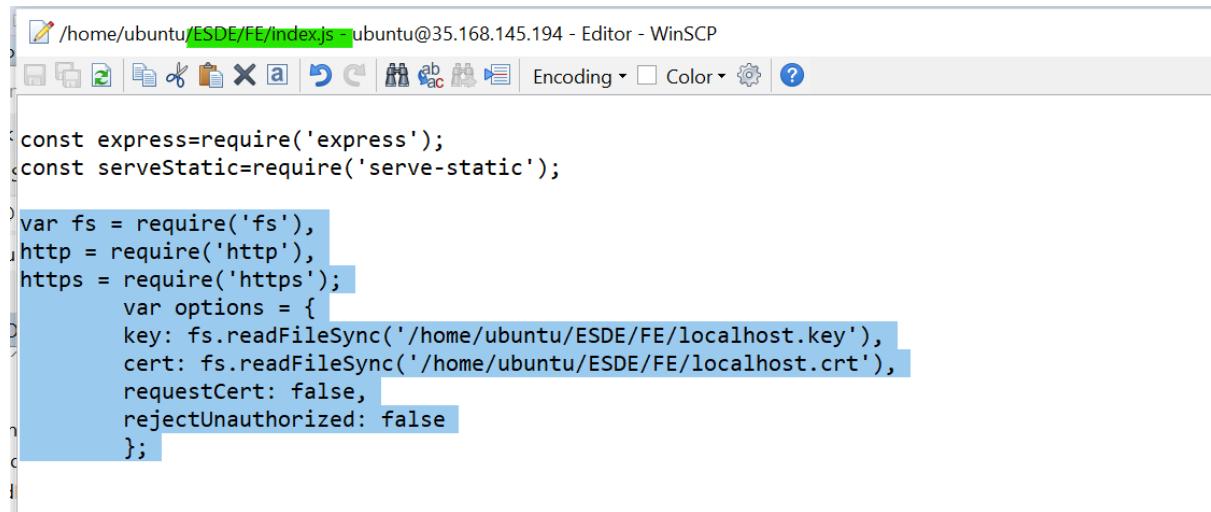
Copy localhost.crt and localhost.key file to frontend folder



A screenshot of a file explorer window titled 'FE'. The address bar shows the path '/home/ubuntu/ESDE/FE/'. The table lists the following files:

| Name              | Size  | Changed               | Rights    | Owner  |
|-------------------|-------|-----------------------|-----------|--------|
| ..                |       | 2/8/2021 5:33:52 am   | rwxrwxr-x | ubuntu |
| node_modules      |       | 2/8/2021 6:05:42 am   | rwxrwxr-x | ubuntu |
| public            |       | 2/8/2021 5:34:56 am   | rwxr-xr-x | ubuntu |
| index.js          | 1 KB  | 25/4/2021 3:46:56 am  | rw-r--r-- | ubuntu |
| localhost.crt     | 2 KB  | 2/8/2021 6:58:37 am   | rw-rw-r-- | ubuntu |
| localhost.key     | 2 KB  | 2/8/2021 6:58:27 am   | rw-----   | ubuntu |
| package.json      | 1 KB  | 11/5/2021 12:36:44 am | rw-r--r-- | ubuntu |
| package-lock.json | 31 KB | 11/5/2021 12:36:44 am | rw-r--r-- | ubuntu |

Open index.js file in frontend folder, add the code below



```
const express=require('express');
const serveStatic=require('serve-static');

var fs = require('fs'),
http = require('http'),
https = require('https');
var options = {
  key: fs.readFileSync('/home/ubuntu/ESDE/FE/localhost.key'),
  cert: fs.readFileSync('/home/ubuntu/ESDE/FE/localhost.crt'),
  requestCert: false,
  rejectUnauthorized: false
};
```



```
/home/ubuntu/ESDE/FE/index.js - ubuntu@35.168.145.194 - Editor - WinSCP
[File Explorer] [File List] [Edit] [Search] [Compare] [Diff] [Preview] [FTP] [SFTP] Encoding ▾ Color ▾ [Settings] [Help]
});;

app.use(serveStatic(__dirname + "/public"));

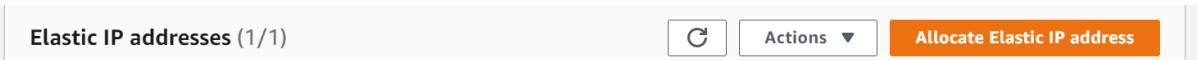
app.get("/", (req, res) => {
  res.sendFile("/public/home.html", { root: __dirname });
});

var server = https.createServer(options, app);

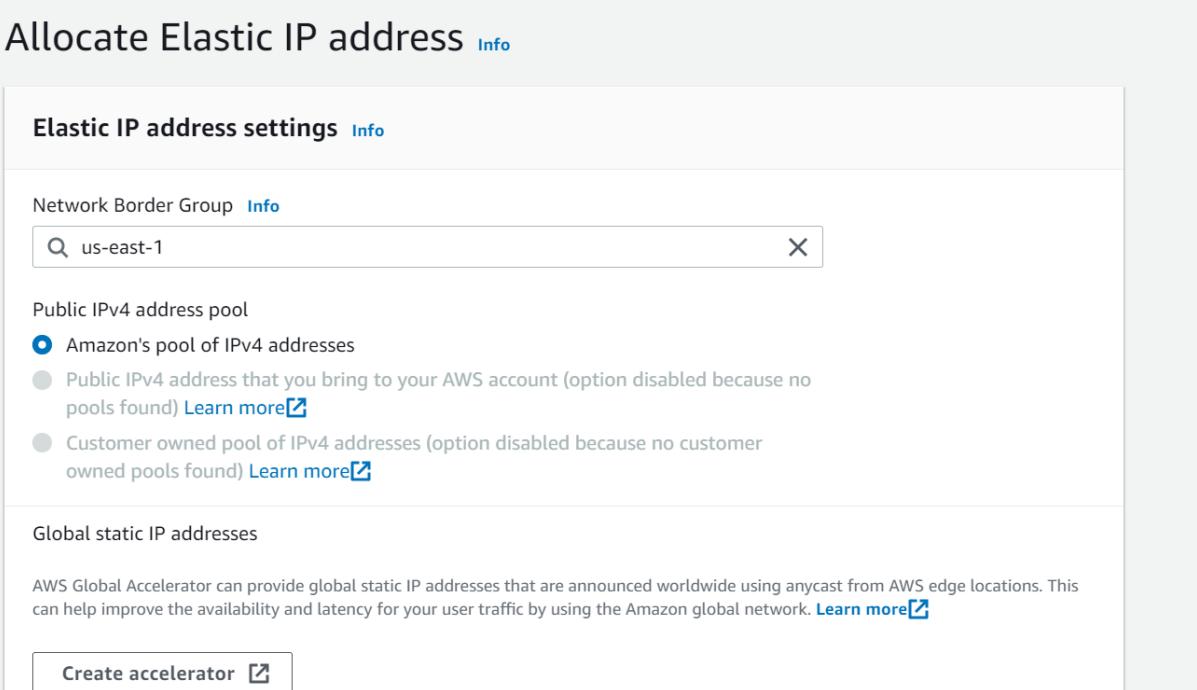
server.listen(port, function(){
  console.log(`Server hosted at http://${hostname}:${port}`);
})
```

## 2.3 Elastic IP

Click Allocate Elastic IP address



Configure settings as shown below



Allocate Elastic IP address [Info](#)

Elastic IP address settings [Info](#)

Network Border Group [Info](#)

Search: us-east-1 X

Public IPv4 address pool

Amazon's pool of IPv4 addresses

Public IPv4 address that you bring to your AWS account (option disabled because no pools found) [Learn more](#)

Customer owned pool of IPv4 addresses (option disabled because no customer owned pools found) [Learn more](#)

Global static IP addresses

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

[Create accelerator](#)

## Select the created elastic IP address

The screenshot shows the AWS Elastic IP addresses page. At the top, a green banner displays a success message: "Elastic IP address allocated successfully." Below the banner, the page title is "Elastic IP addresses (1/1)". There is a search bar with the placeholder "Filter Elastic IP addresses" and a button labeled "Allocate Elastic IP address". A table lists one IP address: "Public IPv4 address: 35.168.145.194" with a delete icon. Below the table are buttons for "Actions" and "Allocate Elastic IP address". The table has columns: Name, Allocated IPv4 add..., Type, and Allocation ID. The data row shows "35.168.145.194" under Allocated IPv4 add..., "Public IP" under Type, and "eipalloc-035eb75687124646" under Allocation ID.

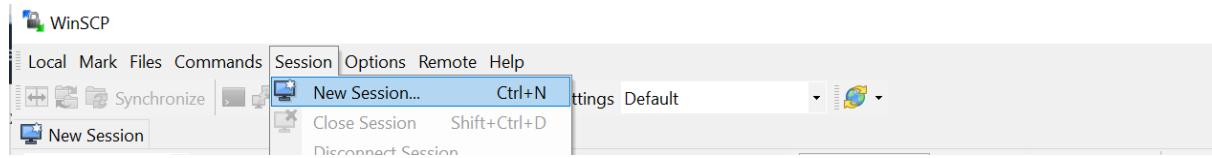
## Click Actions and Associate Elastic IP address

The screenshot shows the AWS Elastic IP addresses page. The green banner still displays the success message. The table now shows two rows: "35.168.145.194" and "-". The "Actions" menu for the first row includes options: "View details", "Release Elastic IP addresses", "Associate Elastic IP address", and "Disassociate Elastic IP address". The "Associate Elastic IP address" option is highlighted. The "Allocation ID" column shows "035eb75687124646" for the first row.

## Choose the instance that is running, and associate

The screenshot shows the "Associate Elastic IP address" wizard. The title is "Elastic IP address: 35.168.145.194". Under "Resource type", it says "Choose the type of resource with which to associate the Elastic IP address." with two options: "Instance" (selected) and "Network interface". A warning message states: "⚠ If you associate an Elastic IP address to an instance that already has an Elastic IP address associated, this previously associated Elastic IP address will be disassociated but still allocated to your account. [Learn more](#)". The "Instance" section shows a dropdown menu with two items: "i-0ce52e8d2e9496a12 (try) - stopped" and "i-0c82f5903b860e463 (ESDE Assignment Server) - running". The "Reassociation" section asks "Specify whether the Elastic IP address can be reassigned with a different resource if it already associated with a resource." with a checkbox "Allow this Elastic IP address to be reassigned".

In WinSCP, click on new session

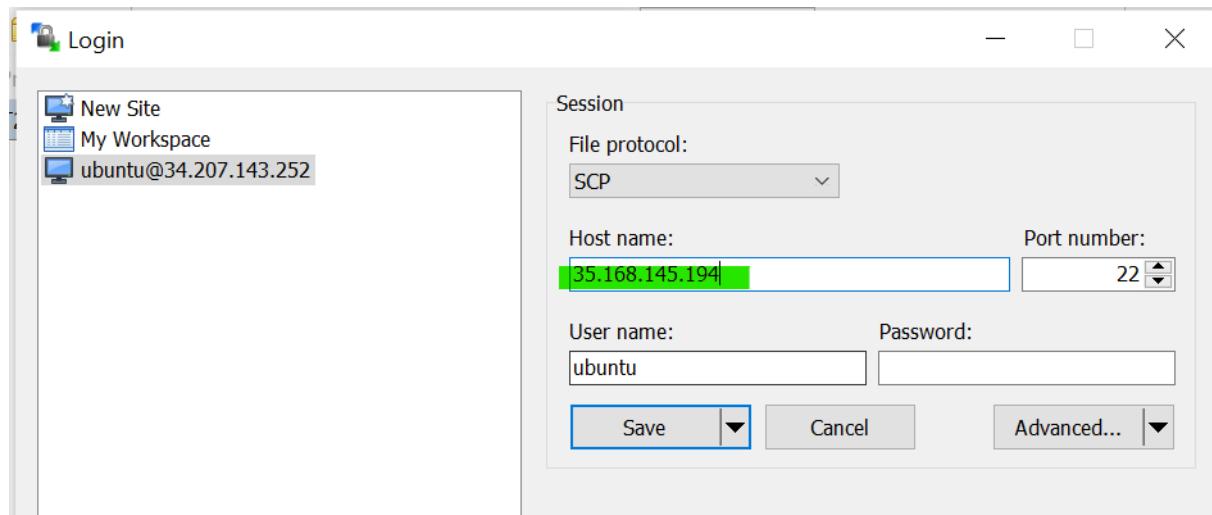


At file protocol : SCP

Host name : put elastic IP address

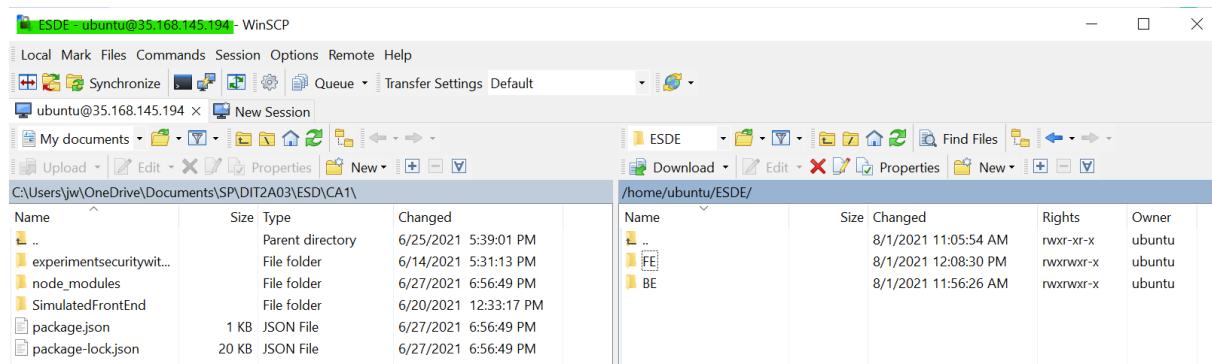
User name : ubuntu

Click Save , and ok to use default name which is the IP address



Click Login

Run both frontend and backend server



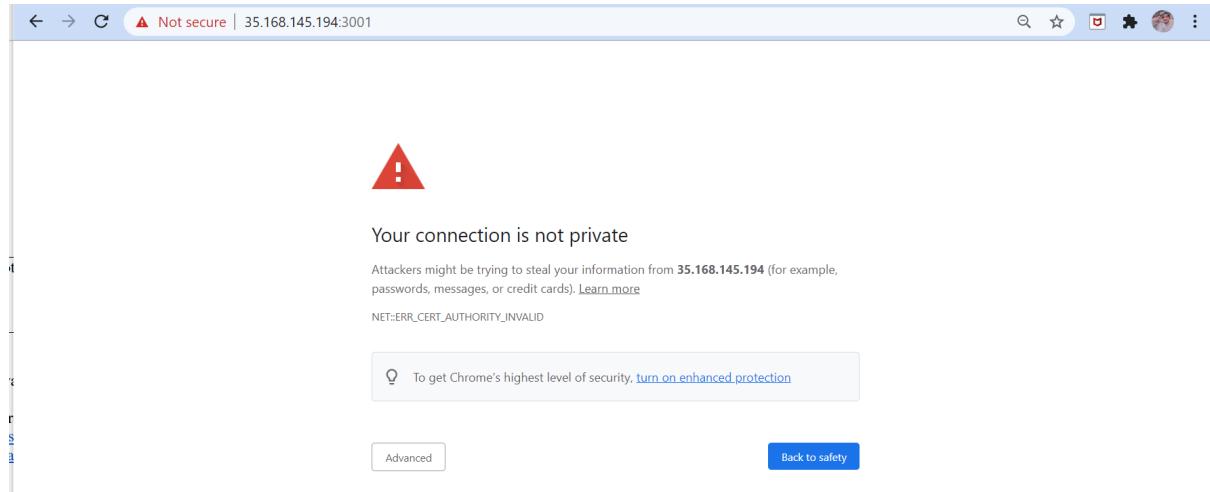
## \*ERROR ENCOUNTERED\*

### Port being used

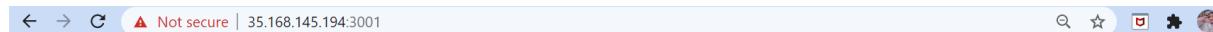
Solved by running codes below to kill the server that is running

```
ubuntu@ip-172-31-25-245:~$ sudo netstat -lpn |grep :'3001'  
tcp6      0      0 :::3001                      ::::*                  LISTEN  
21725/nodejs  
ubuntu@ip-172-31-25-245:~$ kill -9 21725  
ubuntu@ip-172-31-25-245:~$ sudo netstat -lpn |grep :'5000'  
tcp6      0      0 :::5000                      ::::*                  LISTEN  
21706/nodejs  
ubuntu@ip-172-31-25-245:~$ kill -9 21706
```

Access the website using <https://<yourElasticIPaddress>:3031>



Select Advanced > Proceed

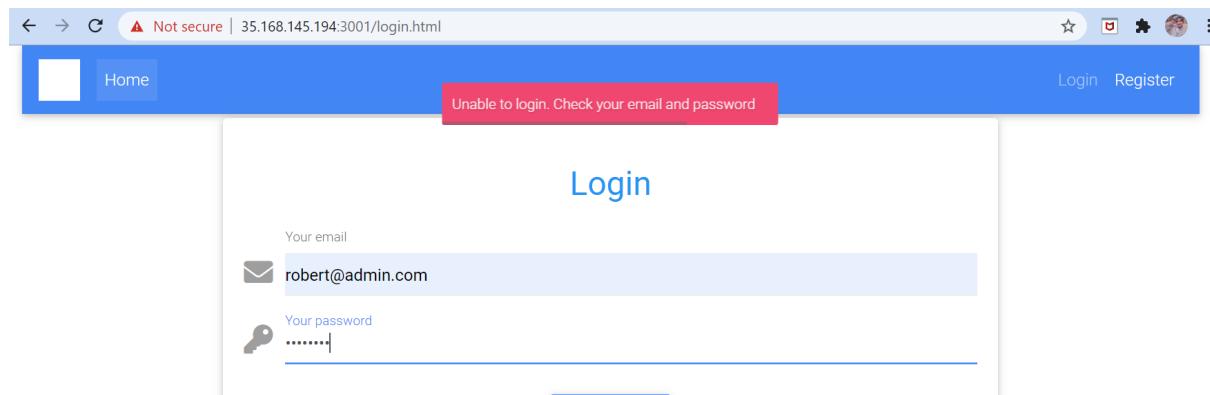


Website successfully hosted !

A screenshot of a web browser window showing a successful website. The address bar shows 'https://35.168.145.194:3001' with a green lock icon indicating a secure connection. The page title is 'Welcome' and the subtext 'DESIGN FREE LOGO ONLINE'. The main feature is a logo design consisting of a stylized orange circle with a colorful geometric pattern inside, surrounded by dark grey wavy lines. Below the logo, the text 'Bee Design Award Competition' is displayed in a large orange font, with the tagline 'Design to inspire dreams' in smaller text underneath. At the bottom of the page, there are links for 'www.designfreelogoonline.com' and 'www.designfreelogoonline.com'. Navigation links 'Home', 'Login', and 'Register' are visible at the top right of the page.

\*ERROR ENCOUNTERED\*

Cannot access any backend api



Solved by creating RDS database

## 2.4 RDS Database

Select RDS from Services on AWS

Search results for 'rds'

Services (3)

Features (22)

Documentation (46,163)

Knowledge Articles (29)

Marketplace (259)

**RDS**  
Managed Relational Database Service

**Top features**

Dashboard Databases Query Editor Performance Insights Snapshots

Click on Create database

Amazon RDS

Dashboard

Databases

Query Editor

Performance Insights

Snapshots

**Amazon Aurora**

Amazon Aurora is a MySQL- and PostgreSQL-compatible enterprise-class database, starting at <\$1/day. Aurora supports up to 64TB of auto-scaling storage capacity, 6-way replication across three availability zones, and 15 low-latency read replicas. [Learn more](#)

**Create database**

Or, [Restore Aurora DB cluster from S3](#)

## Choose standard create, MySQL

Choose a database creation method [Info](#)

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](#)

Amazon Aurora

MySQL

MariaDB

## Choose MySQL 8.0.23 version , Free tier templates

Version

MySQL 8.0.23 ▾

**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](#)

**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.

database-1

The DB instance identifier is case-insensitive, but is stored as all lowercase (as in "mydbinstance"). Constraints: 1 to 60 alphanumeric characters or hyphens. First character must be a letter. Can't contain two consecutive hyphens. Can't end with a hyphen.

## Credentials settings : At Master username, set admin At Master password, put your usual database password

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.

database-1

The DB instance identifier is case-insensitive, but is stored as all lowercase (as in "mydbinstance"). Constraints: 1 to 60 alphanumeric characters or hyphens. First character must be a letter. Can't contain two consecutive hyphens. Can't end with a hyphen.

▼ Credentials Settings

Master username [Info](#)  
Type a login ID for the master user of your DB instance.

admin

1 to 16 alphanumeric characters. First character must be a letter

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

Master password [Info](#)  
\*\*\*\*\*  
Constraints: At least 8 printable ASCII characters. Can't contain any of the following: / (slash), '(single quote), "(double quote) and @ (at sign).

Confirm password [Info](#)  
\*\*\*\*\*

Configure connectivity as shown below, and create

### Connectivity

Virtual private cloud (VPC) [Info](#)  
VPC that defines the virtual networking environment for this DB instance.

Default VPC (vpc-2c731851)

Only VPCs with a corresponding DB subnet group are listed.

i After a database is created, you can't change the VPC selection.

Subnet group [Info](#)  
DB subnet group that defines which subnets and IP ranges the DB instance can use in the VPC you selected.

default

Public access [Info](#)

Yes  
Amazon EC2 instances and devices outside the VPC can connect to your database. Choose one or more VPC security groups that specify which EC2 instances and devices inside the VPC can connect to the database.

No  
RDS will not assign a public IP address to the database. Only Amazon EC2 instances and devices inside the VPC can connect to your database.

At RDS dashboard , click on database created

The screenshot shows a progress message at the top: "Creating database database-1" and "Your database might take a few minutes to launch." Below this, the navigation path is "RDS > Databases > database-1". The main title is "database-1". On the right, there are "Modify" and "Actions" buttons. A summary table provides initial details:

| Summary                     |                  |                           |                      |
|-----------------------------|------------------|---------------------------|----------------------|
| DB identifier<br>database-1 | CPU<br>-         | Status<br>Creating        | Class<br>db.t2.micro |
| Role<br>Instance            | Current activity | Engine<br>MySQL Community | Region & AZ<br>-     |

Copy the endpoint of the database as shown below

The screenshot shows the "database-1" configuration page. The "Connectivity & security" tab is selected. The "Endpoint & port" section shows the copied endpoint: "database-1.cholmzt63wi2.us-east-1.rds.amazonaws.com". Other sections include "Networking" (Availability zone: us-east-1f) and "Security" (VPC security groups: default (sg-ad16bab1) (active)).

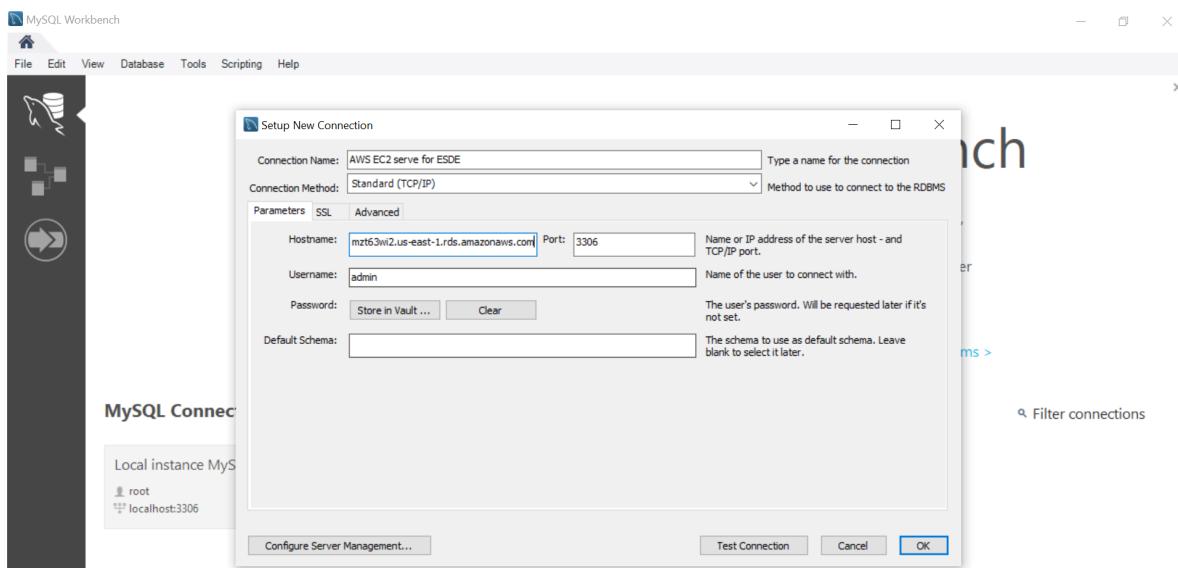
In WinSCP , in the Backend folder, src > config > database.js  
Replace the host : to the endpoint copied

```
/home/ubuntu/ESDE/BE/src/config/database.js - ubuntu@54.204.120.46 - Editor - WinSCP  
File Edit View Database Tools Scripting Help  
const mysql = require('mysql');  
const config = require('./config');  
//To find out more on createPool:  
//https://www.npmjs.com/package/mysql#pooling-connections  
  
const pool = mysql.createPool({  
    connectionLimit: 100,  
    host: 'database-2.cct7ozrykxbb.us-east-1.rds.amazonaws.com',  
    user: config.databaseUserName,  
    password: config.databasePassword
```

Open MYSQL workbench and add new connection

At Hostname : endpoint copied

Set your password same as the Master password and store in Vault



New MYSQL connection created as shown below

## MySQL Connections + ↻

|   |  |
|---|--|
| <b>Local instance MySQL80</b>   | <b>AWS EC2 serve for ESDE</b>  |
|  <b>root</b>           |  <b>admin</b>                                 |
|  <b>localhost:3306</b> |  <b>database-1.cholmzt63wi2.us-east-1....</b> |

Under database's connectivity & security,  
click on the security groups

The screenshot shows the 'Connectivity & security' tab selected in the top navigation bar. Below it, the 'Connectivity & security' section displays endpoint and port details, networking information (availability zone, VPC), and security settings (VPC security groups, public accessibility). The 'default (sg-99963a85) (active)' security group is highlighted.

| Endpoint & port  | Networking                          | Security   |
|--|-------------------------------------|--|
| Endpoint<br>database-2.cct7ozrykxb.us-east-1.rds.amazonaws.com | Availability zone<br>us-east-1b     | VPC security groups<br><b>default (sg-99963a85)<br/>(active)</b> |
| Port<br>3306   | VPC<br><a href="#">vpc-c86d06b5</a> | Public accessibility<br>Yes                                      |

Select the security group , and scroll down to inbound rules  
Select edit inbound rules

The screenshot shows the 'Inbound rules' tab selected under the security group configuration. It lists one rule: 'sgr-0cccd57630fe25f8ae' which allows 'All traffic'.

| Name | Security group rule ID | Type        |
|------|------------------------|-------------|
| -    | sgr-0cccd57630fe25f8ae | All traffic |

Configure the inbound rules as shown below

Inbound rules

| Security group rule ID | Type         | Protocol | Port range | Source             | Description - optional |
|------------------------|--------------|----------|------------|--------------------|------------------------|
| sgr-0cccd57630fe25f8ae | All traffic  | All      | All        | Custom sg-ad16bab1 | sg-ad16bab1            |
| -                      | MySQL/Aurora | TCP      | 3306       | Anywhere           | 0.0.0.0/0              |

Add rule

Inbound rules (2)

| Name | Security group rule... | IP version | Type         | Protocol | Port range |
|------|------------------------|------------|--------------|----------|------------|
| -    | sgr-0f1bf45d4110c93b9  | IPv4       | MySQL/Aurora | TCP      | 3306       |
| -    | sgr-0cccd57630fe25f8ae | -          | All traffic  | All      | All        |

At MySQL workbench , click on the new connection created and import sql script ( the one supplied in CA part 1)  
Scroll down and change line number 33 to the database name shown according to the screenshot below

```
File Edit View Query Database Server Tools Scripting Help
File Edit View Query Database Server Tools Scripting Help
Navigator: SCHEMAS
Query 1: SQLScript_create_database_and_table.sql
20 • insert role (role_name) values ('user');
21
22 • CREATE TABLE file (
23     file_id int NOT NULL AUTO_INCREMENT,
24     clouddinary_file_id varchar(255) NOT NULL,
25     clouddinary_url varchar(255) NOT NULL,
26     design_title varchar(2000) NOT NULL,
27     design_description varchar(2000) NOT NULL,
28     created_by_id int,
29     PRIMARY KEY (file_id)
30 )AUTO_INCREMENT=100;
31
32 • CREATE USER 'adminuser'@'%' IDENTIFIED BY 'password123';
33 • GRANT ALL PRIVILEGES ON competition_system_security_concept_v2_db.* TO 'adminuser'@'%';
34 • ALTER USER 'adminuser'@'%' IDENTIFIED WITH mysql_native_password BY 'password';
35
```

Run the script and you will see the action output as shown below

The screenshot shows the MySQL Workbench interface. In the top navigation bar, it says "AWS EC2 serve for ESDE". Below the bar are tabs for File, Edit, View, Query, Database, Server, Tools, Scripting, and Help. The Navigator panel on the left shows the schema "competition\_system\_security\_" containing Tables (file, role, user), Views, Stored Procedures, Functions, and a sys folder. The main area has tabs for Administration and Schemas, with Schemas selected. The Information pane shows "No object selected". The bottom right pane is titled "Action Output" and displays a table of actions taken:

| Action   | Time     | Message   | Duration / Fetch |
|--|----------|---|------------------|
| CREATE TABLE role  | 21:05:16 | role_id int NOT NULL AUTO_INCREMENT, role_name...   | 0.312 sec        |
| insert role (role_name) values ('admin')   | 21:05:17 | 1 row(s) affected                                   | 0.297 sec        |
| insert role (role_name) values ('user')  | 21:05:17 | 1 row(s) affected                                   | 0.359 sec        |
| CREATE TABLE file  | 21:05:17 | file_id int NOT NULL AUTO_INCREMENT, clouddinary... | 0.344 sec        |
| CREATE USER 'adminuser'@'%' IDENTIFIED BY 'password123'  | 21:05:17 | 0 row(s) affected                                   | 0.312 sec        |
| GRANT ALL PRIVILEGES ON competition_system_security_concept_v2_db.* TO 'adminuser'@'%' IDENTIFIED BY 'password123' | 21:05:17 | 0 row(s) affected                                   | 0.297 sec        |
| ALTER USER 'adminuser'@'%' IDENTIFIED WITH mysql_native_password BY 'password123'                                  | 21:05:18 | 0 row(s) affected                                   | 0.312 sec        |

In WinSCP terminal, cd to backend folder and then run nodejs seedbackup.js

**\*ERROR ENOUNTERED\***

**Access denied as the password is wrong, seedbackup failed**

```
ubuntu@ip-172-31-11-149: ~/ESDE/BE
rotocol.js:144:48)
  at Protocol.handshake (/home/ubuntu/ESDE/BE/node_modules/mysql/lib/protocol/
Protocol.js:51:23)
  at PoolConnection.connect (/home/ubuntu/ESDE/BE/node_modules/mysql/lib/Connec-
tion.js:116:18)
  at Pool.getConnection (/home/ubuntu/ESDE/BE/node_modules/mysql/lib/Pool.js:4
8:16)
  at /home/ubuntu/ESDE/BE/seedbackup.js:91:14
  at new Promise (<anonymous>)
  at createUser (/home/ubuntu/ESDE/BE/seedbackup.js:88:12)
  at prepareDesignerUserData (/home/ubuntu/ESDE/BE/seedbackup.js:160:34)
  at processTicksAndRejections (internal/process/task_queues.js:95:5)
  at async startSeedingData (/home/ubuntu/ESDE/BE/seedbackup.js:177:1) {
code: 'ER_ACCESS_DENIED_ERROR',
errno: 1045,
sqlMessage: "Access denied for user 'adminuser'@'172.31.11.149' (using password: YES)",
sqlState: '28000',
fatal: true
}
```

Solved by checking if the password stored in MYSQL is the same as the master password set in RDS

Run nodejs seedata.js again

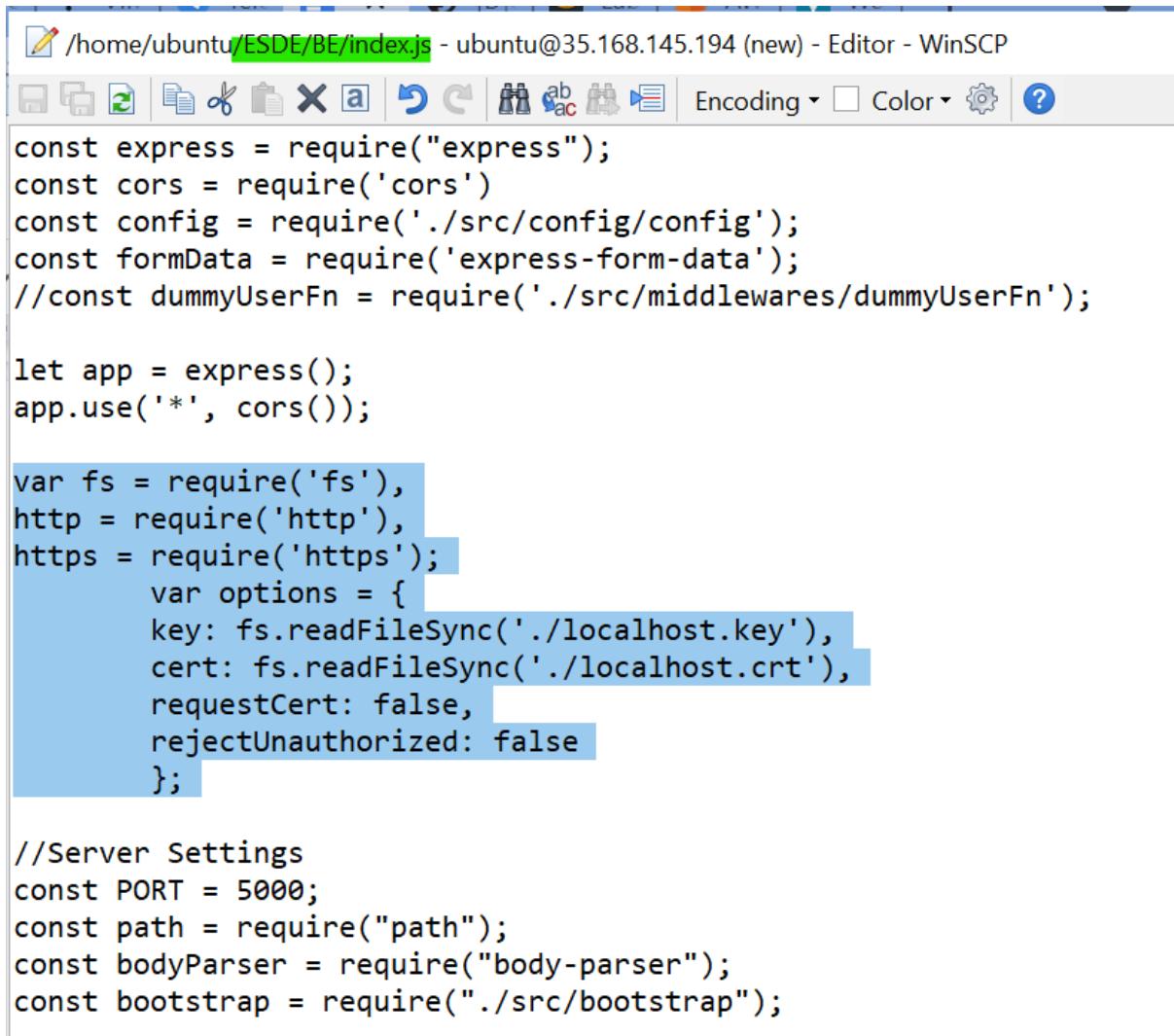
```
ubuntu@ip-172-31-25-245: ~/ESDE/BE$ nodejs seedata.js
Inspecting createUserResult variable
OkPacket {
  fieldCount: 0,
  affectedRows: 1,
  insertId: 100,
  serverStatus: 2,
  warningCount: 0,
  message: '',
  protocol41: true,
  changedRows: 0
}
Checking uploadResult before calling createFileData in try block
{
  imageURL: 'http://res.cloudinary.com/dzrmfnd8i/image/upload/v1627823266/Design/gsim0la5hpanjbcn2ykp.png',
  publicId: 'Design/gsim0la5hpanjbcn2ykp',
  status: 'success'
}
rita_design1.png is uploaded. 1 record created in file table.
Checking uploadResult before calling createFileData in try block
{
  imageURL: 'http://res.cloudinary.com/dzrmfnd8i/image/upload/v1627823266/Design/wgum0c8v78brflobrcdv.png',
```

In WinSCP, go to Frontend folder , public > js

Open all the js files needed and change the const baseURL to “<https://<elasticIPaddress>:5000>” instead of localhost:5000

```
/home/ubuntu/ESDE/FE/public/js/login.js - ubuntu@35.168.145.194 - Editor - WinSCP
let $loginFormContainer = $('#loginFormContainer');
if ($loginFormContainer.length != 0) {
  console.log('Login form detected. Binding event handling logic to form elements.');
  //If the jQuery object which represents the form element exists,
  //the following code will create a method to submit registration details
  //to server-side api when the #submitButton element fires the click event.
  $('#submitButton').on('click', function(event) {
    event.preventDefault();
    const baseUrl = https://35.168.145.194:5000;
    let email = $('#emailInput').val();
    let password = $('#passwordInput').val();
    let webFormData = new FormData();
    webFormData.append('email', email);
    webFormData.append('password', password);
    axios({
      method: 'post',
      url: baseUrl + '/api/user/login',
      data: webFormData,
      headers: { 'Content-Type': 'multipart/form-data' }
```

In Backend folder, open index.js file and add the codes below

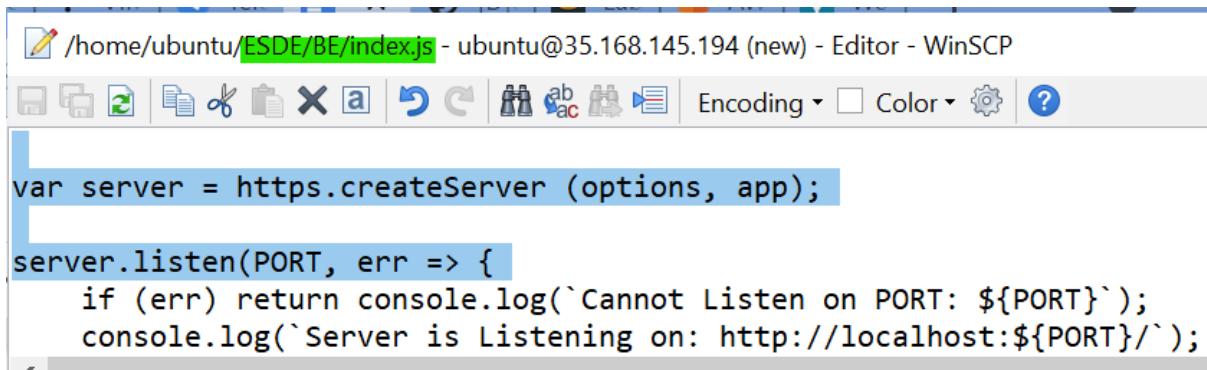


```
const express = require("express");
const cors = require('cors')
const config = require('./src/config/config');
const formData = require('express-form-data');
//const dummyUserFn = require('./src/middlewares/dummyUserFn');

let app = express();
app.use('*', cors());

var fs = require('fs'),
http = require('http'),
https = require('https');
    var options = {
        key: fs.readFileSync('./localhost.key'),
        cert: fs.readFileSync('./localhost.crt'),
        requestCert: false,
        rejectUnauthorized: false
    };

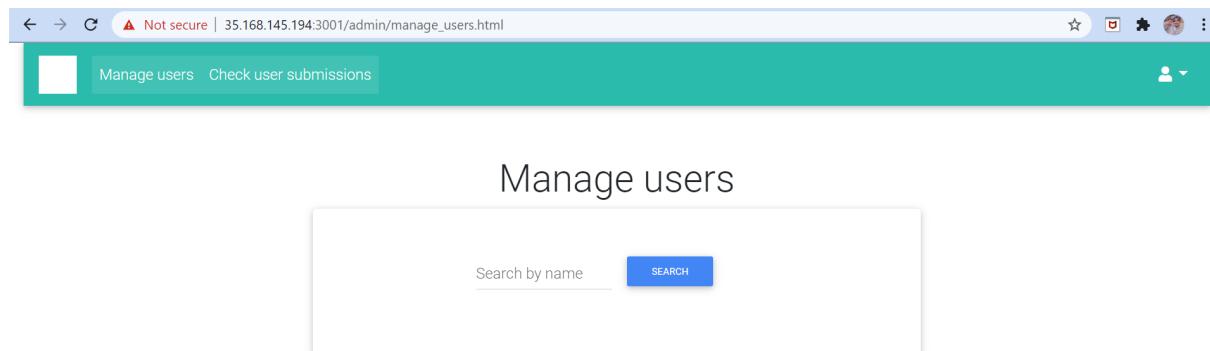
//Server Settings
const PORT = 5000;
const path = require("path");
const bodyParser = require("body-parser");
const bootstrap = require("./src/bootstrap");
```



```
var server = https.createServer (options, app);

server.listen(PORT, err => {
    if (err) return console.log(`Cannot Listen on PORT: ${PORT}`);
    console.log(`Server is Listening on: http://localhost:${PORT}/`);
```

Access the website using `https://<elasticIPaddress>:5000` as shown in the screenshot below and try login

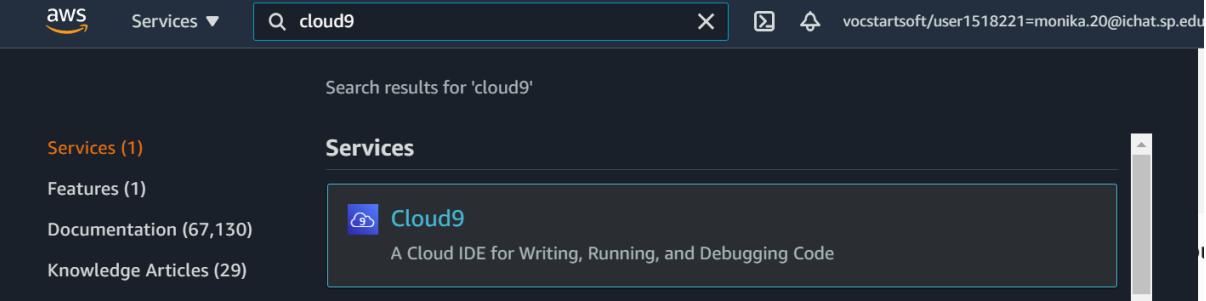


Login successfully !

# 3.0 Refactor API using serverless architecture

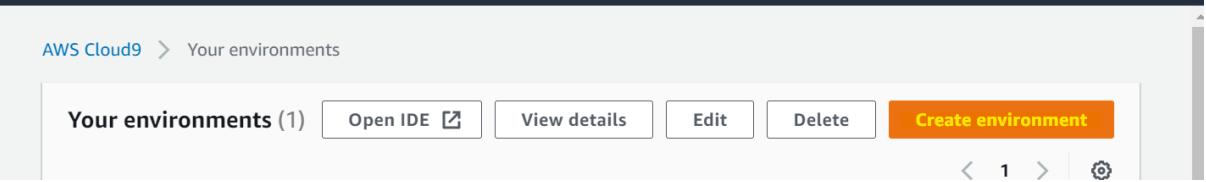
## 3.1 Cloud9

Select Cloud9 from Services on AWS



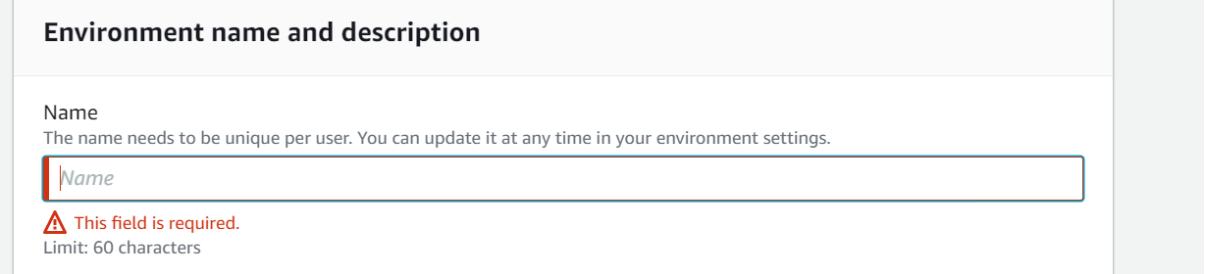
The screenshot shows the AWS Cloud9 search results page. The search bar at the top contains the text "cloud9". Below the search bar, there is a sidebar with links: "Services (1)", "Features (1)", "Documentation (67,130)", and "Knowledge Articles (29)". The main area is titled "Services" and shows a single result: "Cloud9" with the subtext "A Cloud IDE for Writing, Running, and Debugging Code".

Click on “Create environment”



The screenshot shows the "Your environments" list page. It displays one environment entry: "Your environments (1)". Below the entry are four buttons: "Open IDE", "View details", "Edit", and "Create environment". The "Create environment" button is highlighted with a yellow background and black text.

Set a name for the environment



The screenshot shows the "Environment name and description" form. The "Name" field is highlighted with a red border and contains the placeholder text "Name". A red warning message below the field states "This field is required." and "Limit: 60 characters".

## Configure the settings as shown below

### Environment type [Info](#)

Run your environment in a new EC2 instance or an existing server. With EC2 instances, you can connect directly through Secure Shell (SSH) or connect via AWS Systems Manager (without opening inbound ports).

**Create a new EC2 instance for environment (direct access)**

Launch a new instance in this region that your environment can access directly via SSH.

**Create a new no-ingress EC2 instance for environment (access via Systems Manager)**

Launch a new instance in this region that your environment can access through Systems Manager.

**Create and run in remote server (SSH connection)**

Configure the secure connection to the remote server for your environment.

### Instance type

**t2.micro (1 GiB RAM + 1 vCPU)**

Free-tier eligible. Ideal for educational users and exploration.

**t3.small (2 GiB RAM + 2 vCPU)**

Recommended for small-sized web projects.

**m5.large (8 GiB RAM + 2 vCPU)**

Recommended for production and general-purpose development.

**Other instance type**

Select an instance type.

t3.nano



### Platform

**Amazon Linux 2 (recommended)**

Environment successfully created !

Your environments (1) [Open IDE](#) [View details](#) [Edit](#)

ESDE



Type  
EC2

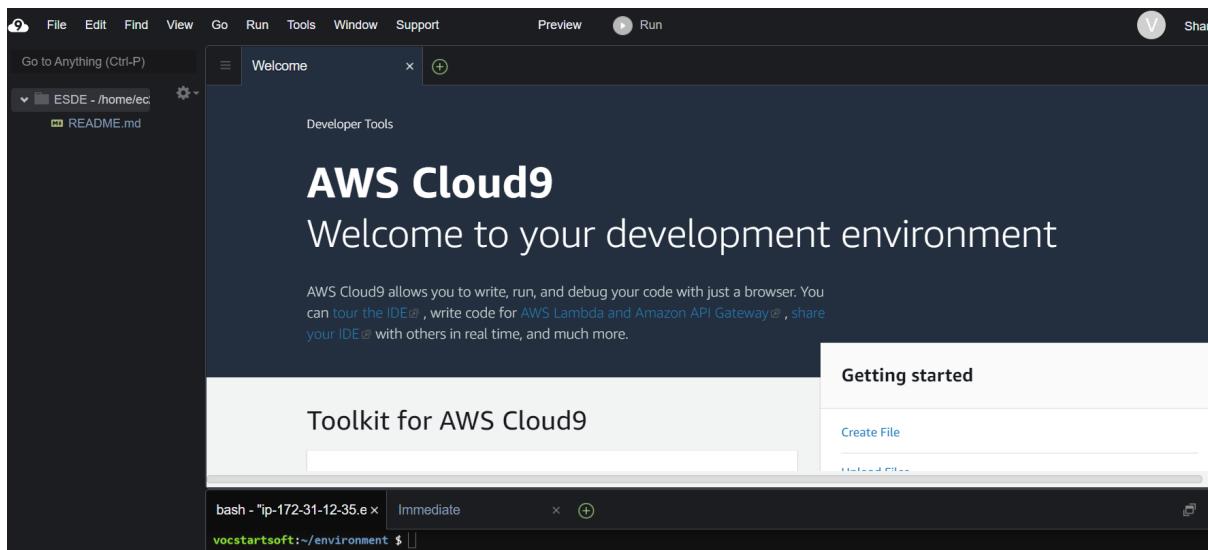
Permissions  
Owner

Description  
No description available

Owner Arn  
arn:aws:sts::665422446546:assumed-role/vocstartsoft/user1518222=tjw21.20@ichat.sp.edu.sg

[Open IDE](#)

Click on Open IDE



## Select DynamoDB from Services on AWS

A screenshot of the AWS Services search results. The search bar at the top contains 'dynamoDB'. The results are categorized under 'Services (1)'. The single result is 'DynamoDB', described as a 'Managed NoSQL Database'. The AWS logo is visible in the top left corner.

## Choose Create table

A screenshot of the Amazon DynamoDB service page. The page features the Amazon logo and the text 'Amazon DynamoDB'. A brief description states: 'Amazon DynamoDB is a fast and flexible NoSQL database service for all applications that need consistent, single-digit millisecond latency at any scale. Its flexible data model and reliable performance make it a great fit for mobile, web, gaming, ad-tech, IoT, and many other applications.' Below this is a prominent blue 'Create table' button. At the bottom of the page, there's a link to 'Getting started guide'.

Set the table name of your choice and give the primary key based on the MYSQL table you are using

## Create DynamoDB table

Tutorial



DynamoDB is a schema-less database that only requires a table name and primary key. The table's primary key is made up of one or two attributes that uniquely identify items, partition the data, and sort data within each partition.

Table name\*

Primary key\* Partition key

Add sort key

### Table settings

Default settings provide the fastest way to get started with your table. You can modify these default settings now or after your table has been created.

Use default settings

- No secondary indexes.
- Provisioned capacity set to 5 reads and 5 writes.
- Basic alarms with 80% upper threshold using SNS topic "dynamodb".
- Encryption at Rest with DEFAULT encryption type.

## Table successfully created

[Create table](#) [Delete table](#)

files Close

Overview Items Metrics Alarms Capacity Indexes Global Ta

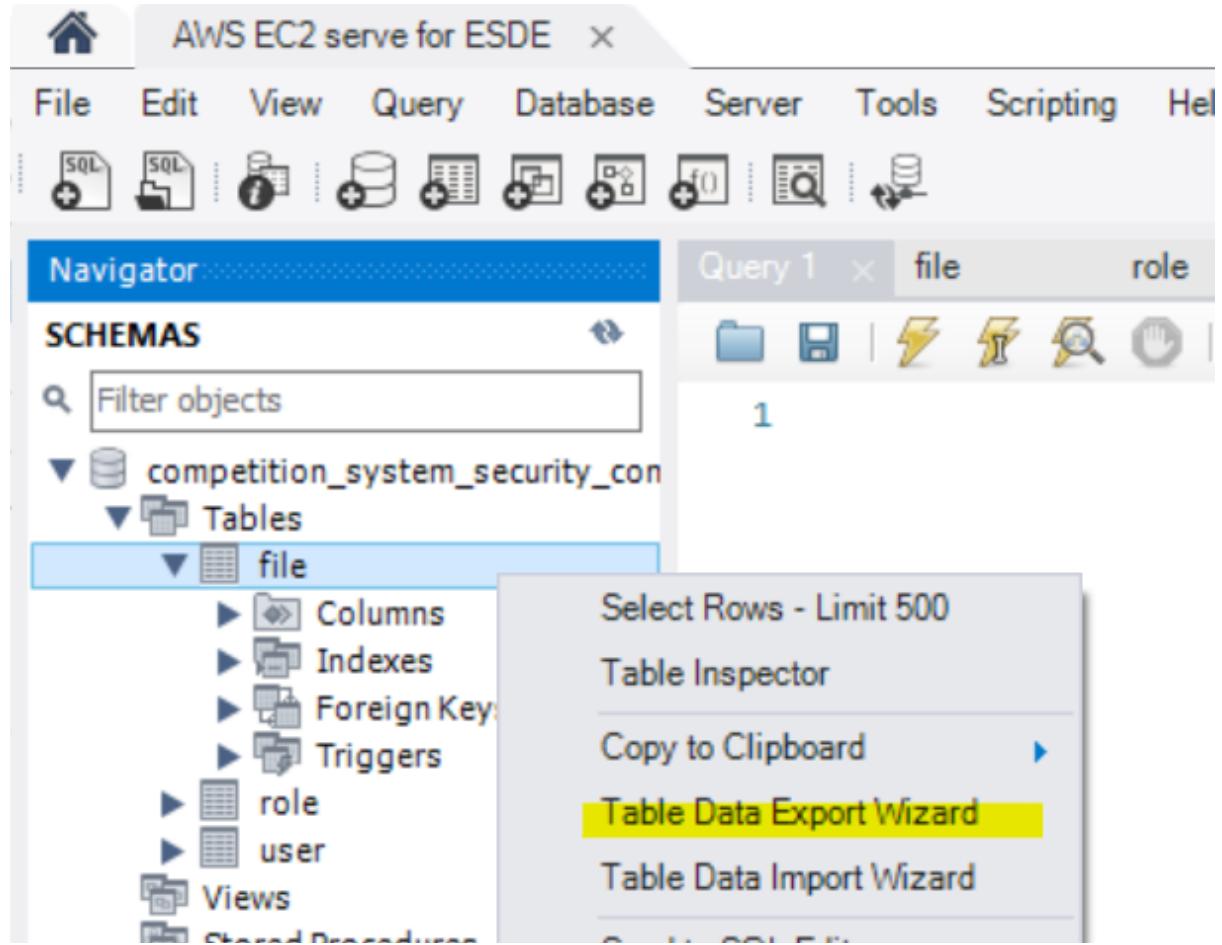
Contributor Insights **NEW** DISABLED [Manage TTL](#)

| Time to live attribute           | DISABLED                            |
|----------------------------------|-------------------------------------|
| Table status                     | Active                              |
| Creation date                    | August 7, 2021 at 12:44:59 AM UTC+8 |
| Read/write capacity mode         | Provisioned                         |
| Last change to on-demand mode    | -                                   |
| Provisioned read capacity units  | 5 (Auto Scaling Error)              |
| Provisioned write capacity units | 5 (Auto Scaling Error)              |
| Last decrease time               | -                                   |
| Last increase time               | -                                   |
| Storage size (in bytes)          | 0 bytes                             |
| Item count                       | 0 <a href="#">Manage live count</a> |
| Region                           | US East (N. Virginia)               |

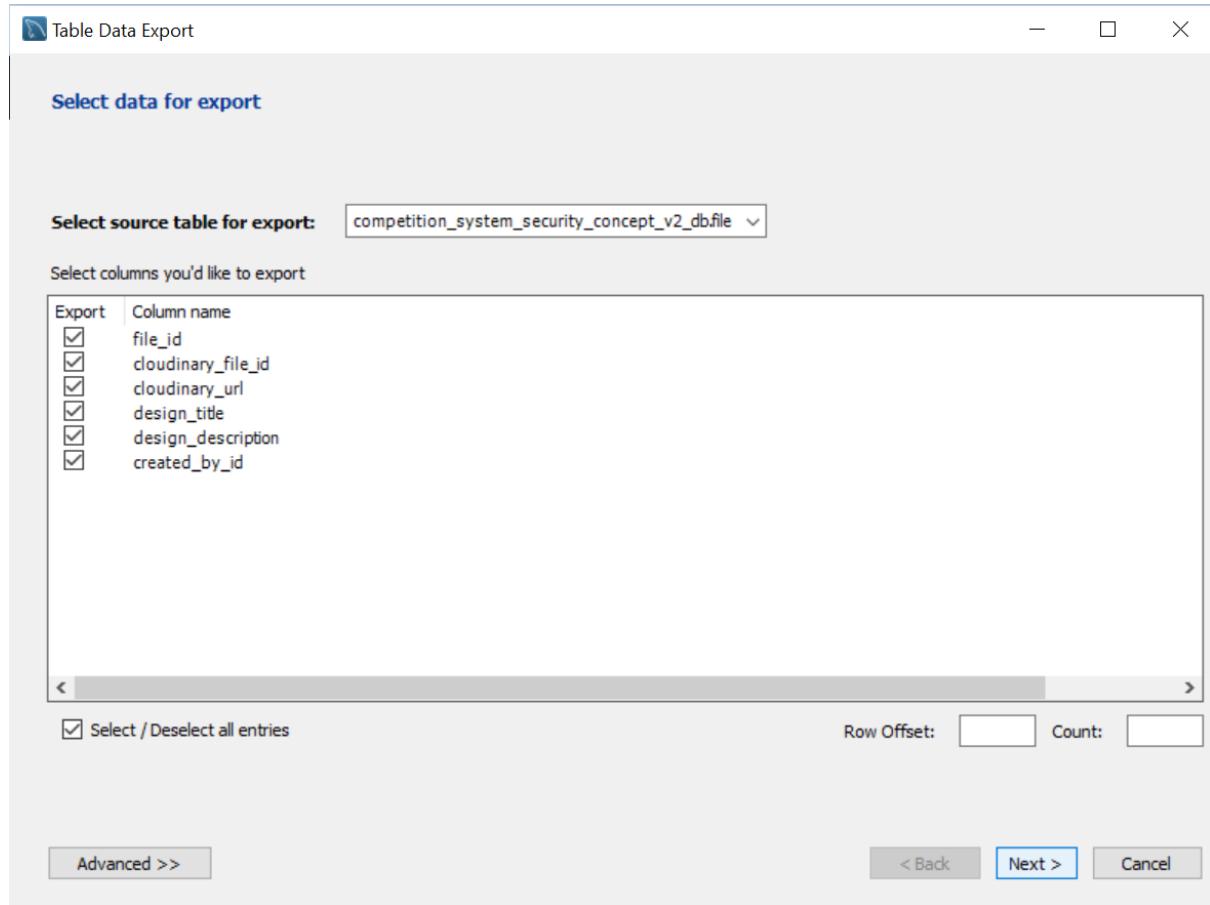
Filter by table name  Choose a table ... Actions

| Name  |
|-------|
| files |

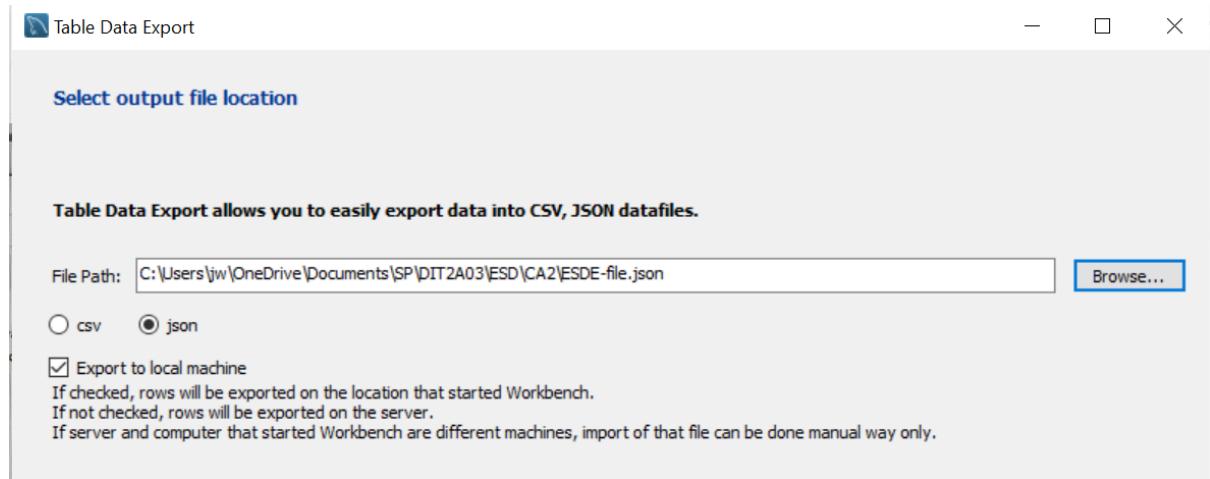
In MYSQL workbench, click on the new connection created  
click on the table of you are using  
and export it by “Table Data Export Wizard”.



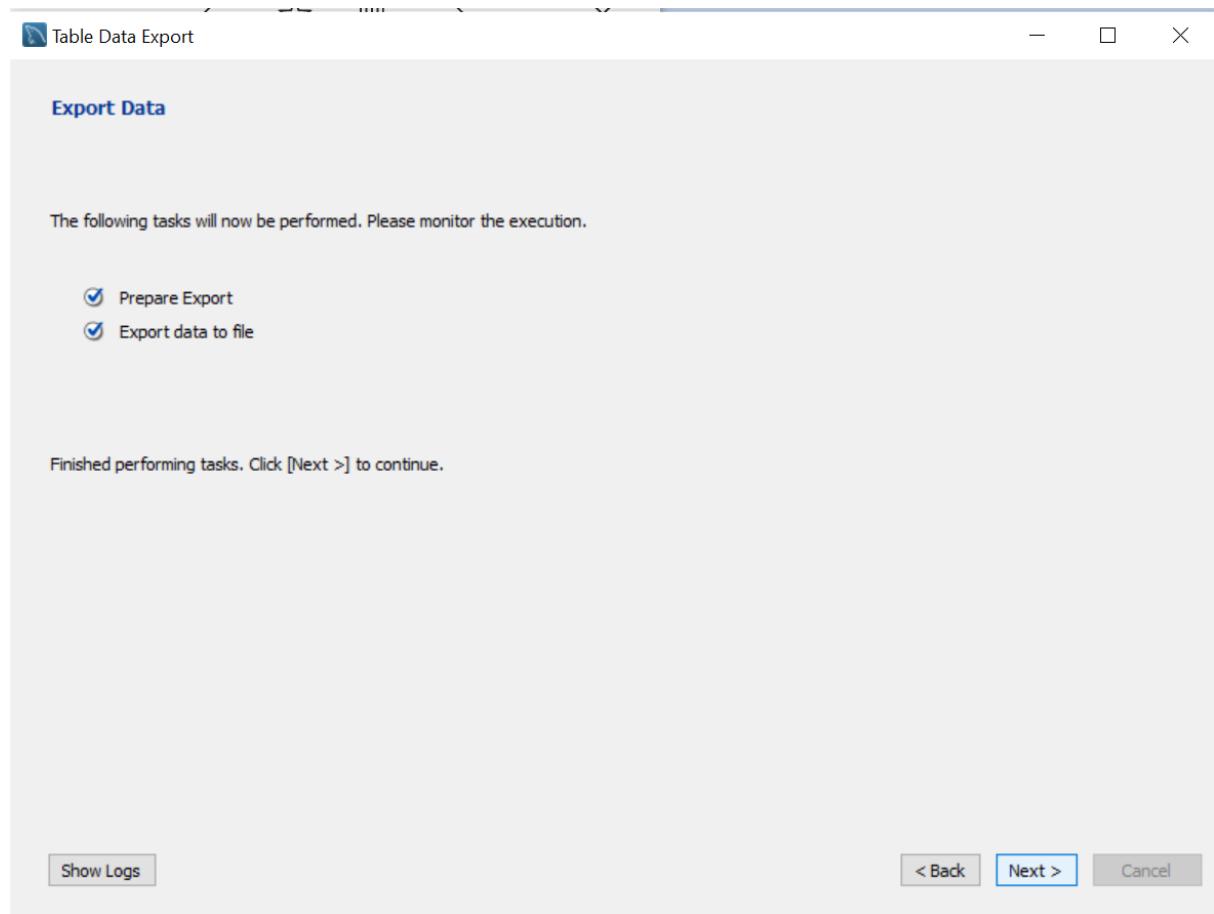
## Select all columns to be export



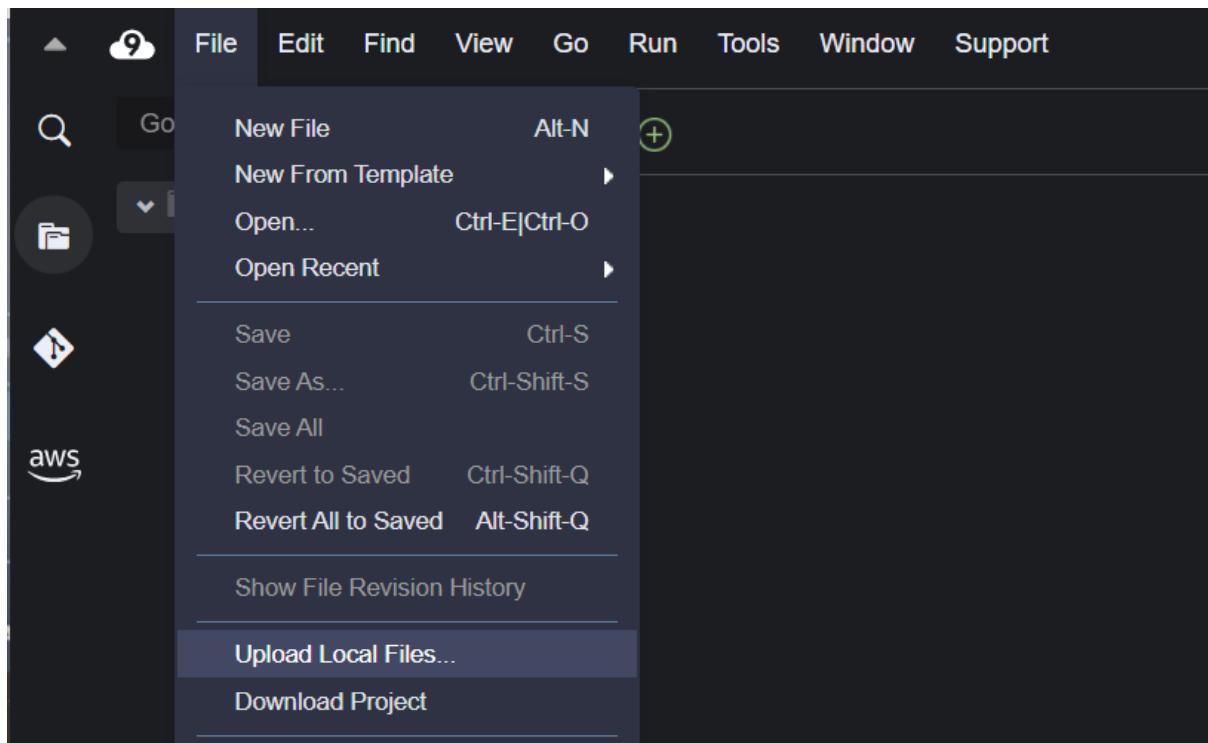
## Select json file and click Next



## Click Next to export



In Cloud9, select File tab and Upload Local files

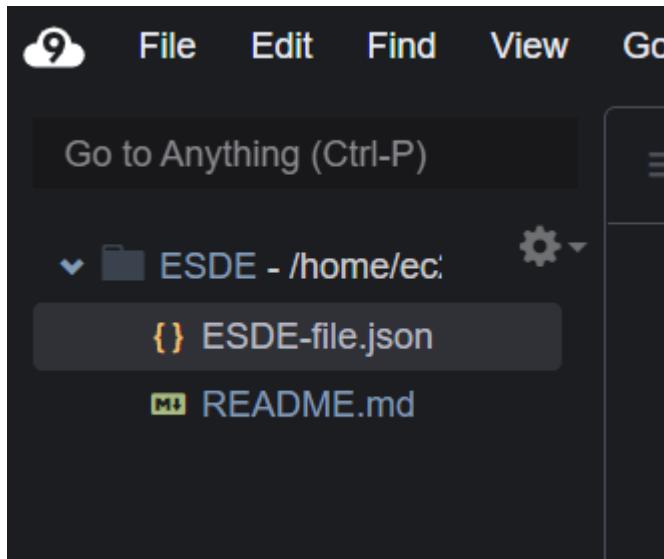


Choose the json file you exported just now from MYSQL

A screenshot of the AWS Cloud9 file browser. The path shown is 'DIT2A03 > ESD > CA2'. A search bar at the top right contains the text 'Search CA2'. Below the search bar, there is a 'New folder' button. The main area shows a table with one item:

| Name      | Status | Date mod |
|-----------|--------|----------|
| ESDE-file | ✓      | 8/7/2021 |

Json file successfully uploaded



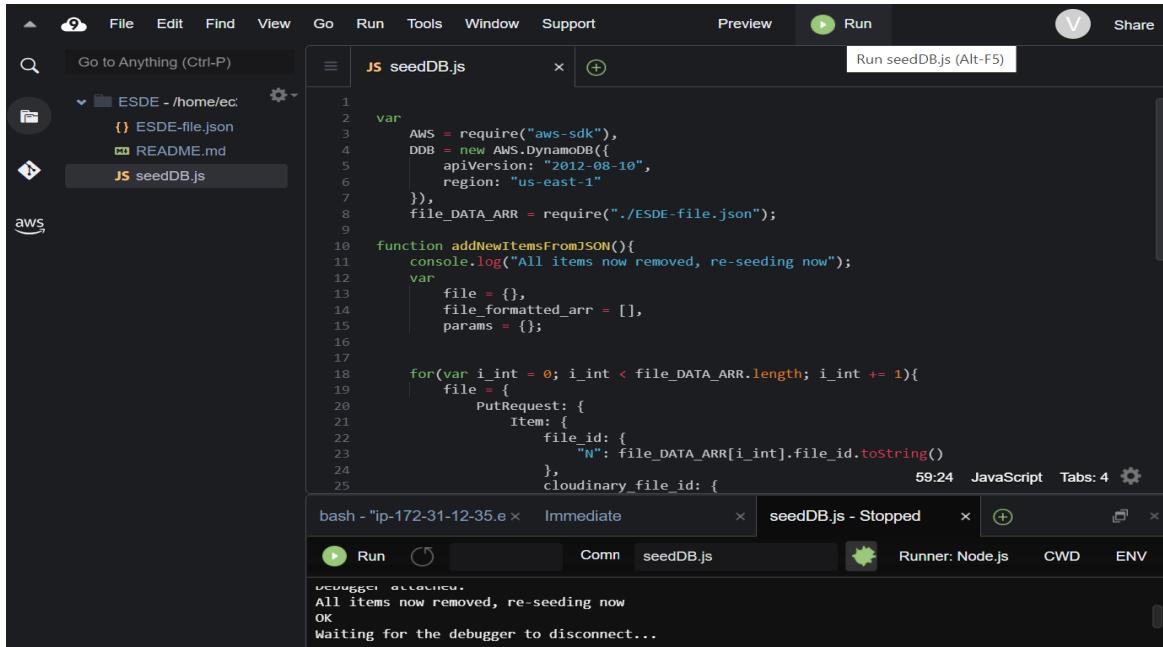
Create a new file called seedDB.js for DynamoDB

A screenshot of a terminal window titled "Go to Anything (Ctrl-P)". The window shows a file tree with a folder named "ESDE - /home/ec2-user". Inside the folder are three files: "ESDE-file.json", "README.md", and "seedDB.js". The "seedDB.js" file is highlighted with a dark gray background and orange brackets {}, indicating it is selected. The code editor pane displays the contents of the "seedDB.js" file, which is a JavaScript script for seeding a DynamoDB database. The code includes imports for AWS SDK and a local JSON file, and a function to add items from the JSON file to the database.

At Cloud9 terminal, npm install aws sdk

A screenshot of a terminal window titled "Cloud9 Terminal". The terminal shows a command line interface with several tabs: "Cloud9 Terminal", "Immediate", "seedDB.js - Stopped", and a new tab. The current tab contains the command "vocostartsoft:~/environment \$ npm install aws-sdk". The command is being typed and has not yet been executed.

## Click Run for seedDB.js



```
var AWS = require("aws-sdk"),
    DDB = new AWS.DynamoDB({
        apiVersion: "2012-08-10",
        region: "us-east-1"
    }),
    file_DATA_ARR = require("./ESDE-file.json");

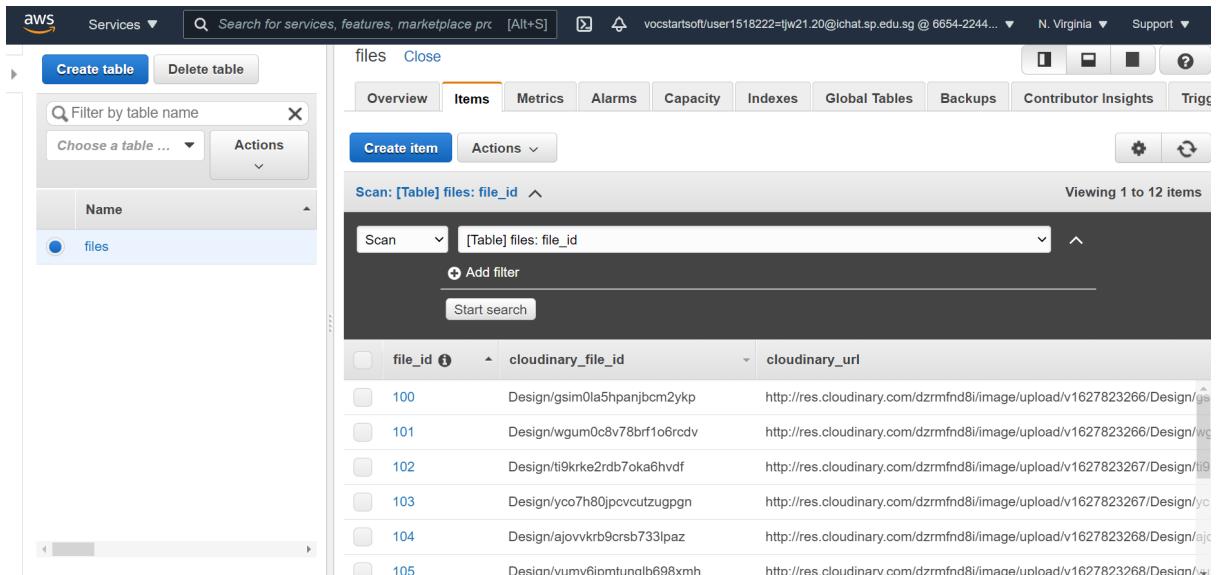
function addNewItemFromJSON(){
    console.log("All items now removed, re-seeding now");
    var file = {},
        file_formatted_arr = [],
        params = {};

    for(var i_int = 0; i_int < file_DATA_ARR.length; i_int += 1){
        file = {
            PutRequest: {
                Item: {
                    file_id: {
                        "N": file_DATA_ARR[i_int].file_id.toString()
                    },
                    clouddinary_file_id: {
                        "S": file_DATA_ARR[i_int].clouddinary_file_id
                    }
                }
            }
        };
        file_formatted_arr.push(file);
    }
    params = {
        Item: file_formatted_arr
    };
    DDB.putItem(params, function(err, data) {
        if (err) {
            console.log("Error", err);
        } else {
            console.log("Success", data);
        }
    });
}
```

bash - "ip-172-31-12-35.e" x Immediate x seedDB.js - Stopped x + Run Comm seedDB.js Runner: Node.js CWD ENV

Debugger attached.  
All items now removed, re-seeding now  
OK  
Waiting for the debugger to disconnect...

In DynamoDB, select the items tab



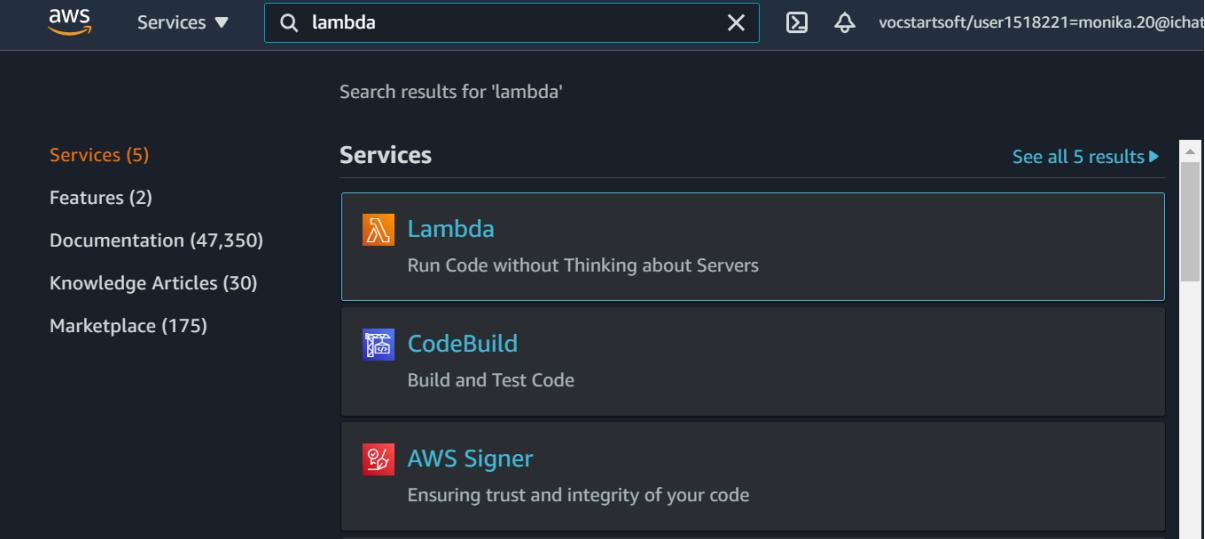
Overview Items Metrics Alarms Capacity Indexes Global Tables Backups Contributor Insights Triggers

| file_id | clouddinary_file_id         | clouddinary_url  |
|---------|-----------------------------|--|
| 100     | Design/gsim0la5hpanjbcm2ykp | http://res.cloudinary.com/dzrmrnd8i/image/upload/v1627823266/Design/gsim0la5hpanjbcm2ykp.jpg |
| 101     | Design/wgum0c8v78brf1o6rcdv | http://res.cloudinary.com/dzrmrnd8i/image/upload/v1627823266/Design/wgum0c8v78brf1o6rcdv.jpg |
| 102     | Design/ti9krke2rdb7oka6hvdf | http://res.cloudinary.com/dzrmrnd8i/image/upload/v1627823267/Design/ti9krke2rdb7oka6hvdf.jpg |
| 103     | Design/yc07h80jpvcutzugpgn  | http://res.cloudinary.com/dzrmrnd8i/image/upload/v1627823267/Design/yc07h80jpvcutzugpgn.jpg  |
| 104     | Design/ajovvkrb9crsb733lpaz | http://res.cloudinary.com/dzrmrnd8i/image/upload/v1627823268/Design/ajovvkrb9crsb733lpaz.jpg |
| 105     | Design/yumy6jpmtunqlb698xmh | http://res.cloudinary.com/dzrmrnd8i/image/upload/v1627823268/Design/yumy6jpmtunqlb698xmh.jpg |

Data has been seeded successfully !

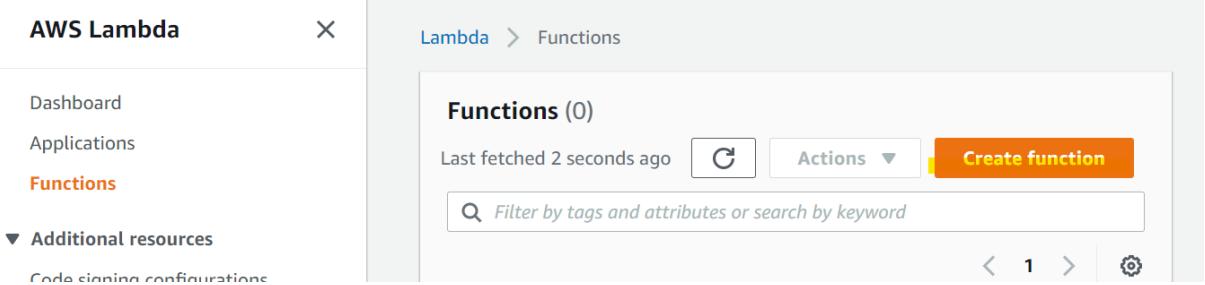
## 3.2 Lambda

Select Lambda from Services on AWS



The screenshot shows the AWS search interface with the search term 'lambda' entered. The results page displays several items under the 'Services' category, including Lambda, CodeBuild, and AWS Signer. The Lambda service card is highlighted, showing its icon (a server icon), name, and description: 'Run Code without Thinking about Servers'.

Click “Create function” button



The screenshot shows the AWS Lambda Functions page. The sidebar on the left has 'Functions' selected. The main area displays a summary: 'Functions (0)', 'Last fetched 2 seconds ago', and a prominent orange 'Create function' button. Below the button is a search bar with the placeholder 'Filter by tags and attributes or search by keyword'.

## Configure settings as below

Choose one of the following options to create your function...

- Author from scratch  
Start with a simple Hello World example.
- Use a blueprint  
Build a Lambda application from sample code and configuration presets for common use cases.
- Container image  
Select a container image to deploy for your function.
- Browse serverless app repository  
Deploy a sample Lambda application from the AWS Serverless Application Repository.

### Basic information

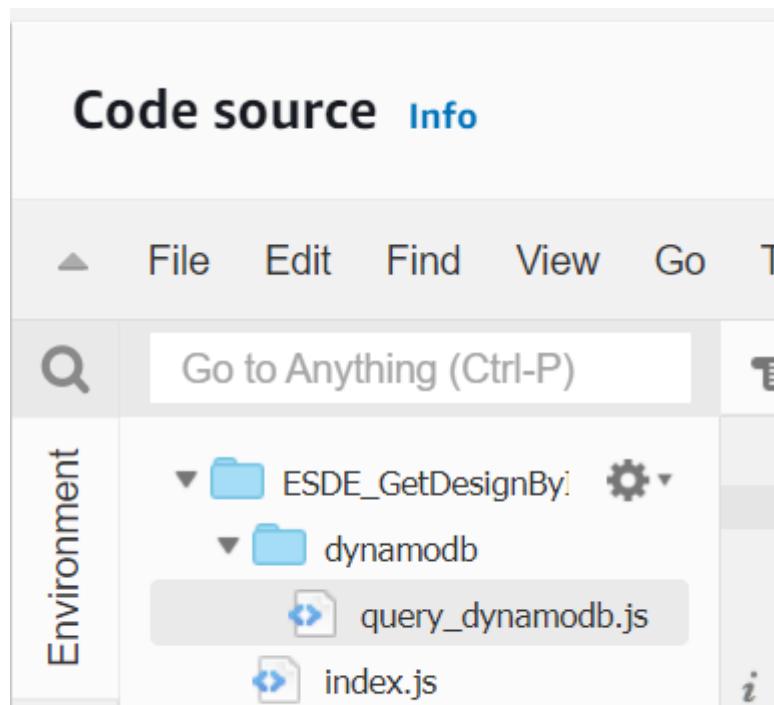
Function name  
Enter a name that describes the purpose of your function.

Use only letters, numbers, hyphens, or underscores with no spaces.

Runtime [Info](#)  
Choose the language to use to write your function. Note that the console code editor supports only Node.js, Python, and Ruby.

Create a new folder for dynamoDb

Create a new file inside the folder name it query\_dynamodb.js



After putting necessary codes, click on Deploy button

The screenshot shows the AWS Lambda Code source interface. At the top, there are tabs for Code, Test, Monitor, Configuration, Aliases, and Versions. The Code tab is selected. Below the tabs, there's a toolbar with File, Edit, Find, View, Go, Tools, Window, a Test dropdown set to 'Test', a Deploy button (which is orange), and a status message 'Changes not deployed'. On the left, there's a sidebar for 'Environment' with a search bar 'Go to Anything (Ctrl-P)' and a tree view showing 'ESDE\_GetDesignBy:' and 'dynamodb' with files 'query\_dynamodb.js' and 'index.js'. The main area shows the code for 'index.js':

```
1 var dynamodbQuery = require('dynamodb/query_dynamodb');
2
3 exports.handler = async function(event, context, callback){
4     if (event.fid) {
5         var fileId = parseInt(event.fid);
6     } else {
7         var fileId = parseInt(event.queryStringParameters.fid);
8     }
9     var region = "us-east-1";
10    var table_name = "files";
11    var expr_attr_values = { ":fileId": fileId };
12    var key_cond_expr = "file_id=:fileId";
13    var proj_expr = "file_id,cloudinary_url,design_title,design_description";
14    await dynamodbQuery(region, table_name,expr_attr_values,key_cond_expr,proj_expr)
15    .then(data => {
16        console.log("Successfully got items from dynamodb.query")
17        var responseCode = 200;
18        var jsonResult = {'filedata': data.Items[0]};
19        let response = {
20            statusCode: responseCode,
21            body: JSON.stringify(jsonResult),
22            headers: {
23                "Access-Control-Allow-Headers" : "Content-Type,User"
24            }
25        }
26        callback(null, response);
27    })
28}
29
30
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```

Under permission tab click on “Attach policies”

Identity and Access Management (IAM)

Roles > ESDE\_GetDesignByld-role-fo6bfdkx

**Summary**

Role ARN: arn:aws:iam::665422446546:role/service-role/ESDE\_GetDesignByld-role-fo6bfdkx

Role description: [Edit](#)

Instance Profile ARNs: [Edit](#)

Path: /service-role/

Creation time: 2021-08-07 00:59 UTC+0800

Last activity: Not accessed in the tracking period

Maximum session duration: 1 hour [Edit](#)

**Permissions** **Trust relationships** **Tags** **Access Advisor** **Revoke sessions**

▼ Permissions policies (1 policy applied)

**Attach policies** [+ Add inline policy](#)

| Policy name  | Policy type    | X |
|--|----------------|---|
| AWSLambdaBasicExecutionRole-272ec549-27b1-401e-a4... | Managed policy | X |

Configure policies as shown below and select Attach policies

**Permissions** **Trust relationships** **Tags** **Access Advisor** **Revoke sessions**

▼ Permissions policies (4 policies applied)

**Attach policies** [+ Add inline policy](#)

| Policy name  | Policy type        | X |
|--|--------------------|---|
| AmazonAPIGatewayInvokeFullAccess                     | AWS managed policy | X |
| AmazonDynamoDBFullAccess                             | AWS managed policy | X |
| AWSLambda_FullAccess                                 | AWS managed policy | X |
| AWSLambdaBasicExecutionRole-272ec549-27b1-401e-a4... | Managed policy     | X |

At “Trust relationships” tab, click on “Edit trust relationship”

Policies  
Identity providers  
Account settings

▼ Access reports  
Access analyzer  
Archive rules  
Analyzers  
Settings  
Credential report

Maximum session duration: 1 hour [Edit](#)

**Permissions** **Trust relationships** **Tags** **Access Advisor** **Revoke sessions**

You can view the trusted entities that can assume the role and the access conditions for the role. [Show policy document](#)

**Edit trust relationship**

**Trusted entities**  
The following trusted entities can assume this role.  
lambda.amazonaws.com

**Conditions**  
The following conditions define how and when trusted entities assume the role.  
There are no conditions associated with this role.

Configure as shown below and update trust policy

## Edit Trust Relationship

You can customize trust relationships by editing the following access control policy document.

### Policy Document

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

**Cancel** **Update Trust Policy**

Now go back to the code source and under the test dropdown click on “Configure test event”

Code source [Info](#)

Upload from

File Edit Find View Go Tools Window Test Deploy Changes deployed

Go to Anything (Ctrl-P) index.js Configure test event Ctrl-Shift-C

Environment ESDE\_GetDesignBy dynamodb query\_dynamodb.js Index.js

```
1 var dynamodbQuery = require('dynamodb/query_dynamodb');  
2  
3 exports.handler = async function(event, context, callback){  
4     if (event.fid || (event.queryStringParameters && event.queryStringParameters.fid)) {  
5         if (event.fid)  
6             var fileId = parseInt(event.fid);  
7         else  
8             var fileId= parseInt(event.queryStringParameters.fid);  
9     }  
10    var params = {  
11        TableName: "dynamodb",  
12        KeyConditionExpression: "fid = :fid",  
13        ExpressionAttributeValues: {  
14            ":fid": fileId  
15        }  
16    };  
17    dynamodbQuery(params, function(err, data){  
18        if (err) {  
19            callback(err);  
20        } else {  
21            var response = {  
22                fid: fileId,  
23                file: data.Items[0].file  
24            };  
25            callback(null, response);  
26        }  
27    });  
28}
```

Click on “create new test event” and put in the query param

**Configure test event** X

A function can have up to 10 test events. The events are persisted so you can switch to another computer or web browser and test your function with the same events.

Create new test event  
 Edit saved test events

Event template

hello-world ▼

Event name

test

```
1 ▾ {  
2   "fid": "100"  
3 }
```

Save and run the test

The test event **test** was successfully saved.

**Code source** [Info](#) Upload from ▾

File Edit Find View Go Tools Window Test | Deploy Changes deployed

Go to Anything (Ctrl-P) Run the selected Lambda test (Ctrl-Shift-I)

Environment ⚙️

ESDE\_GetDesignBy... dynamodb query\_dynamodb.js index.js

```
index.js
1 var AWS = require('aws-sdk');
2
3 async function queryitems_dynamodb(region, table_name,expr_attr_values,key_cond_expr,proj_expr) {
4   console.log("In the queryitems_dynamodb method...")
5   var dynamodb = new AWS.DynamoDB.DocumentClient({region: region});
6
7   try{
8     var params = { TableName: table_name,
9                   ExpressionAttributeValues: expr_attr_values,
10                  KeyConditionExpression: key_cond_expr ,
11                  ProjectionExpression: proj_expr};
12
13   var items = []
14
15   const results = await dynamodb.query(params).promise()
16   console.log("Printing results from queryitems_dynamodb " + results)
17   return results;
18
19
20
21 }
```

Result is shown as below

The screenshot shows the AWS Lambda Test interface. The top navigation bar includes File, Edit, Find, View, Go, Tools, Window, Test, Deploy, and a status message "Changes deployed". The "Test" tab is selected. Below the tabs, there's a search bar "Go to Anything (Ctrl-P)" and a sidebar titled "Environment" listing "ESDE\_GetDesignBy", "dynamodb", and "query\_dynamodb.js". The main area displays "Execution results" for a test event named "test". The "Response" section shows a JSON object with a statusCode of 200 and a body containing file data. The "Function Logs" section shows log entries from the "queryitems\_dynamodb" method, indicating successful retrieval of items. A "Request ID" is also provided.

### 3.3 API Gateway

Select API Gateway from Services on AWS

The screenshot shows the AWS Services search results for "api gateway". The search bar at the top contains "api gateway". The results list "Services (8)", "Features (35)", "Documentation (680,510)", and "Knowledge Articles (30)". The "Services" section highlights "API Gateway" with a description "Build, Deploy and Manage APIs". A link "See all 8 results" is visible at the top right of the services list.

Select build for REST API

The screenshot shows the API Gateway build interface. The left sidebar lists "APIs", "Custom domain names", and "VPC links". The main content area is titled "REST API" with the sub-instruction "Develop a REST API where you gain complete control over the request and response along with API management capabilities." It also states "Works with the following: Lambda, HTTP, AWS Services". At the bottom are two buttons: "Import" and a prominent yellow "Build" button.

Configure as shown below and key in an API name of your choice

The screenshot shows the 'Create API' wizard in the Amazon API Gateway console. The top navigation bar says 'Amazon API Gateway' and 'APIs > Create'. The main section title is 'Choose the protocol'. Below it, a sub-instruction says 'Select whether you would like to create a REST API or a WebSocket API.' There are two radio buttons: one selected for 'REST' and one for 'WebSocket'. The next section is 'Create new API', with a note explaining what a REST API is. It includes three radio button options: 'New API' (selected), 'Import from Swagger or Open API 3', and 'Example API'. The final section is 'Settings', where users can enter an 'API name\*' (set to 'ESDE-API'), a 'Description' (empty), and choose an 'Endpoint Type' (set to 'Regional').

Click on the API created

The screenshot shows the 'APIs' list page in the Amazon API Gateway console. The header has 'APIs (1)' and a 'Create API' button. Below is a search bar and a table with one row. The table columns are Name, Description, ID, Protocol, Endpoint type, and Created. The single row shows 'Name' as 'ESDE-API', 'ID' as 'w3j79gwzo9', 'Protocol' as 'REST', 'Endpoint type' as 'Regional', and 'Created' as '2021-08-07'.

| Name     | Description | ID         | Protocol | Endpoint type | Created    |
|----------|-------------|------------|----------|---------------|------------|
| ESDE-API |             | w3j79gwzo9 | REST     | Regional      | 2021-08-07 |

On the actions dropdown click on “Create Method”

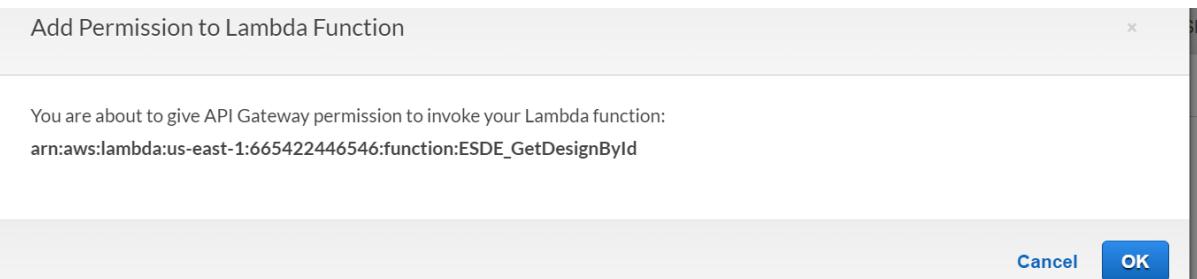
The screenshot shows the AWS Lambda console interface. At the top, the path is: APIs > ESDE-API (w3j79gwzo9) > Resources > / (56tqkdxr38). Below this, the 'Actions' dropdown is open, showing 'Actions ▾' and '/ Methods'. A sub-menu titled 'RESOURCE ACTIONS' contains 'Create Method' (which is highlighted in yellow), 'Delete Resource', and 'Create Resource'.

Choose the method you want to use in this case is GET

The screenshot shows the 'Actions' dropdown again, but this time the 'METHODS' section is visible. It shows a 'GET' method selected (indicated by a dropdown menu with 'GET' and a checkmark icon). There are also other options like 'PUT' and 'DELETE' with their respective icons.

Set up the following configuration

The screenshot shows the 'GET - Setup' configuration screen. On the left, the path is: Resources > / > GET. The main area has a heading 'Choose the integration point for your new method.' Below it, the 'Integration type' section shows 'Lambda Function' selected (radio button is checked). Other options include 'HTTP', 'Mock', 'AWS Service', and 'VPC Link'. Further down, there's a 'Use Lambda Proxy integration' checkbox which is checked. The 'Lambda Region' is set to 'us-east-1'. The 'Lambda Function' field contains 'ESDE\_GetDesignById'. At the bottom, there's a 'Use Default Timeout' checkbox which is also checked.



In IAM , select the role for API created and copy the Role ARN below

| Attribute                | Value  |
|--------------------------|--|
| Role ARN                 | arn:aws:iam::665422446546:role/service-role/ESDE_GetDesignById-role-fo6bfdkx |
| Role description         | Edit   |
| Instance Profile ARNs    |  |
| Path                     | /service-role/   |
| Creation time            | 2021-08-07 00:59 UTC+0800  |
| Last activity            | Not accessed in the tracking period  |
| Maximum session duration | 1 hour Edit  |

In API Gateway ,  
Go to GET - Integration Request and paste copied Role ARN

[Method Execution](#) / - GET - Integration Request

Provide information about the target backend that this method will call and whether the incoming request data should be modified.

Integration type  Lambda Function [i](#)

- HTTP [i](#)
- Mock [i](#)
- AWS Service [i](#)
- VPC Link [i](#)

Use Lambda Proxy integration  [i](#)

Lambda Region us-east-1 [i](#)

Lambda Function ESDE\_GetDesignById [i](#)

Execution role arn:aws:iam::665422446546:role/service-role/ESDE\_GetDesignById-role-fo6bfdkx [i](#)

In the actions dropdown click on Enable CORS button

The screenshot shows the 'Actions' dropdown menu for a 'GET' method under a resource path. The menu items are: Create Method, Create Resource, Enable CORS (which is highlighted with a yellow background), and Edit Resource Documentation. To the right of the menu, there are two status indicators: 'None' (orange) and 'Not required' (grey).

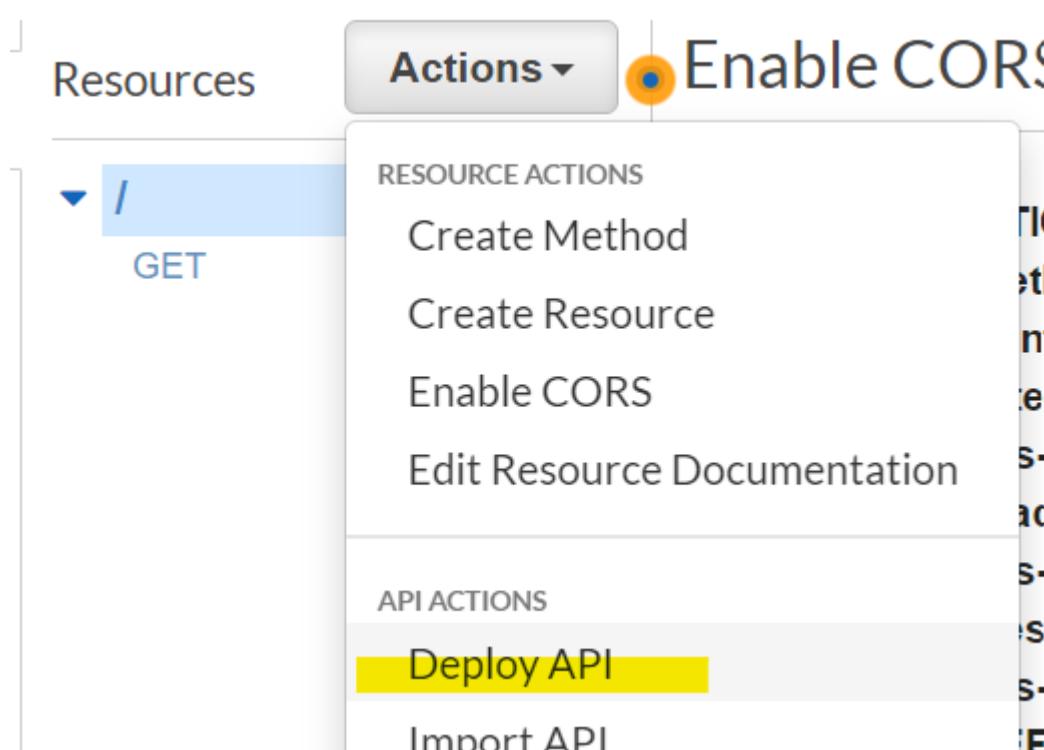
Configure as shown below

The screenshot shows the 'Enable CORS' configuration page for the 'ESDE-API' API. It includes settings for 'Gateway Responses' (checkboxes for DEFAULT 4XX and DEFAULT 5XX), 'Methods' (checkboxes for GET and OPTIONS), and CORS headers: 'Access-Control-Allow-Methods' (GET, OPTIONS), 'Access-Control-Allow-Headers' ('Content-Type,X-Amz-Date,Authorization'), and 'Access-Control-Allow-Origin\*' ('\*'). A large blue button at the bottom right says 'Enable CORS and replace existing CORS'.

CORS successfully enabled

The screenshot shows the confirmation message after enabling CORS. It lists the steps taken: Create OPTIONS method, Add 200 Method Response with Empty Response Model to OPTIONS method, Add Mock Integration to OPTIONS method, Add 200 Integration Response to OPTIONS method, Add Access-Control-Allow-Headers, Access-Control-Allow-Methods, Access-Control-Allow-Origin Method Response Headers to OPTIONS method, Add Access-Control-Allow-Headers, Access-Control-Allow-Methods, Access-Control-Allow-Origin Integration Response Header Mappings to OPTIONS method, Add Access-Control-Allow-Headers, Access-Control-Allow-Methods, Access-Control-Allow-Origin Response Headers to DEFAULT 4XX Gateway Response, Add Access-Control-Allow-Headers, Access-Control-Allow-Methods, Access-Control-Allow-Origin Response Headers to DEFAULT 5XX Gateway Response, Add Access-Control-Allow-Origin Method Response Header to GET method, and Add Access-Control-Allow-Origin Integration Response Header Mapping to GET method. Below this, a note states: 'Your resource has been configured for CORS. If you see any errors in the resulting output above please check the error message and if necessary attempt to execute the failed step manually via the Method Editor.'

Click on Deploy API



At deployment stage choose new stage and set the stage name  
Click on “Deploy” button

The screenshot shows a modal dialog box titled 'Deploy API' with a blue circular icon. Inside the dialog, there's a message: 'Choose a stage where your API will be deployed. For example, a test version of your API could be deployed to a stage named beta.' Below this, there are four input fields:

|                        |  |
|------------------------|--|
| Deployment stage       | [New Stage] <input type="button" value="▼"/> |
| Stage name*            | <input type="text" value="test"/>            |
| Stage description      | <input type="text"/>                         |
| Deployment description | <input type="text"/>                         |

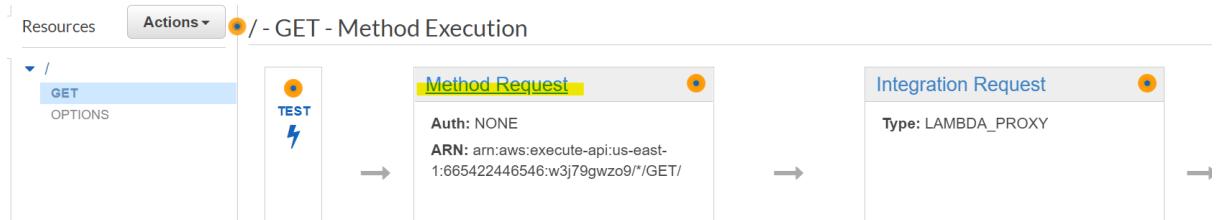
At the bottom right of the dialog are two buttons: 'Cancel' and a blue 'Deploy' button.

## Stage created successfully

The screenshot shows the 'test Stage Editor' for the 'test' stage of the 'ESDE-API'. At the top, there's a navigation bar with 'Amazon API Gateway', 'APIs > ESDE-API (w3j79gwzo9) > Stages > test', and buttons for 'Show all hints' and a question mark icon. Below the navigation is a 'Create' button and a 'Delete Stage' button. The main area is titled 'test Stage Editor' and contains tabs for 'Settings', 'Logs/Tracing', 'Stage Variables', 'SDK Generation', 'Export', 'Deployment History', 'Documentation History', and 'Canary'. The 'Settings' tab is selected. Under 'Cache Settings', there's an 'Enable API cache' checkbox which is unchecked. Under 'Default Method Throttling', it says 'Choose the default throttling level for the methods in this stage. Each method in this stage will respect these rate and burst settings. Your current account level throttling rate is 10000 requests per second with a burst of 5000 requests. [Read more about API Gateway throttling](#)'. There's an 'Enable throttling' checkbox which is checked, and input fields for 'Rate' (10000) and 'Burst' (5000). At the bottom, there's a link to 'Web Application Firewall (WAF) [Learn more](#)'.

To test the api :

click on method request



Add query string

## [Method Execution](#) / - GET - Method Request

Provide information about this method's authorization settings and the parameters it can receive.

### Settings

Authorization NONE  

Request Validator NONE  

API Key Required false 

### ▼ URL Query String Parameters

| Name | Required | Caching |
|------|----------|---------|
|------|----------|---------|

No query strings

 [Add query string](#)

Named it fid to represent file id

## [Method Execution](#) / - GET - Method Request

Provide information about this method's authorization settings and the parameters it can receive.

### Settings

Authorization NONE  

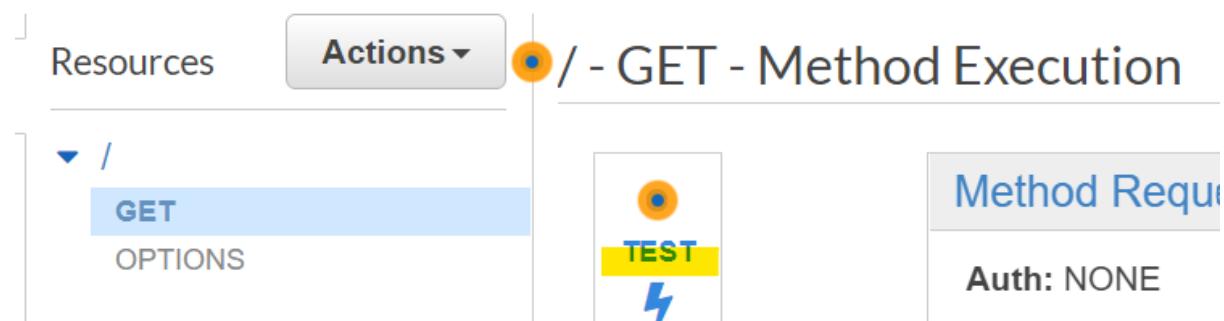
Request Validator NONE  

API Key Required false 

### ▼ URL Query String Parameters

| Name | Required                 | Caching                  |   |
|------|--------------------------|--------------------------|---|
| fid  | <input type="checkbox"/> | <input type="checkbox"/> |   |
| -    |                          |                          |   |

Click on method execution and click on test button



The screenshot shows the API management interface with the following details:

- Resources:** The current screen is for a resource at the path `/`.
- Actions:** The `Actions` dropdown is open, and the `TEST` button is highlighted with a yellow background and blue border.
- Method:** The method is listed as `GET`.
- Auth:** The authentication requirement is listed as `NONE`.

Fill in the query string created just now with value and run the test

## Method Execution / - GET - Method Test

Make a test call to your method. When you make a test call, API Gateway skips your method

### Path

No path parameters exist for this resource. You can define path parameters by [clicking here](#) in a resource path.

### Query Strings

fid=100

\*ERROR ENCOUNTERED\*

Configuration error, API Gateway have no permission

 Test

Request: /?fid=100

Status: 500

Latency: 42 ms

Response Body

```
{  
  "message": "Internal server error"  
}
```

Response Headers

```
{"x-amzn-ErrorType":"InternalServerErrorException","Access-Control-Allow-Origin":"*","Access-Control-Allow-Methods":"GET,OPTIONS","Access-Control-Allow-Headers":"Content-Type,X-Amz-Date,Authorization,X-Api-Key,X-Amz-Security-Token"}
```

Logs

```
Execution log for request b827b512-3e54-4260-bc34-edbc4d5a8d30  
Sat Aug 07 13:24:09 UTC 2021 : Starting execution for request: b827b512-3e54-4260-bc34-edbc4d5a8d30
```

## Logs

```
Execution log for request b827b512-3e54-4260-bc34-edbc4d5a8d30
Sat Aug 07 13:24:09 UTC 2021 : Starting execution for request: b827b512-3e54-4260-bc34-e
dbc4d5a8d30
Sat Aug 07 13:24:09 UTC 2021 : HTTP Method: GET, Resource Path: /
Sat Aug 07 13:24:09 UTC 2021 : Method request path: {}
Sat Aug 07 13:24:09 UTC 2021 : Method request query string: {fid=100}
Sat Aug 07 13:24:09 UTC 2021 : Method request headers: {}
Sat Aug 07 13:24:09 UTC 2021 : Method request body before transformations:
Sat Aug 07 13:24:09 UTC 2021 : Execution failed due to configuration error: API Gateway
does not have permission to assume the provided role arn:aws:iam::665422446546:role/serv
ice-role/ESDE_GetDesignById-role-fo6bfdkx
Sat Aug 07 13:24:09 UTC 2021 : Gateway response type: DEFAULT_5XX with status code: 500
Sat Aug 07 13:24:09 UTC 2021 : Gateway response body: {"message": "Internal server erro
r"}
Sat Aug 07 13:24:09 UTC 2021 : Gateway response headers: {Access-Control-Allow-Headers=C
ontent-Type,X-Amz-Date,Authorization,X-Api-Key,X-Amz-Security-Token, Access-Control-Allo
w-Origin=*, Access-Control-Allow-Methods=GET,OPTIONS, x-amzn-ErrorType=InternalServerErr
orException}
Sat Aug 07 13:24:09 UTC 2021 : Method completed with status: 500
```

Solved by editing the trust relationship in IAM for Lambda

Add the line below

## Edit Trust Relationship

You can customize trust relationships by editing the following access control policy document.

### Policy Document

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

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

Run the test again



Request: /?fid=100

Status: 200

Latency: 1469 ms

Response Body

```
{
  "filedata": {
    "design_title": "rita",
    "cloudinary_url": "http://res.cloudinary.com/dzrmfnd8i/image/upload/v1627823266/Desi
gn/gsim0la5hpanjbcn2ykp.png",
    "design_description": "rita",
    "file_id": 100
  }
}
```

Response Headers

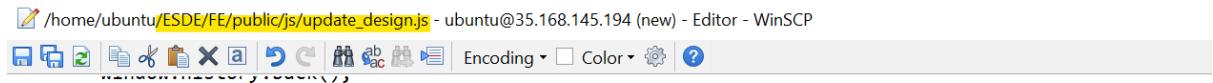
```
{"Access-Control-Allow-Origin":"*", "Access-Control-Allow-Methods":"OPTIONS,POST,GET", "Ac
cess-Control-Allow-Headers":"Content-Type,user", "X-Amzn-Trace-Id":"Root=1-610e8cf0-79e66
a28510d1d167145355c;Sampled=0"}
```

Test successfully !

Copy the URL link in test stage

The screenshot shows the AWS Lambda function configuration page. At the top, there's a 'Function' dropdown set to 'ESDE-Function'. Below it, the 'Handler' is set to 'index.handler'. Under the 'Runtime' section, 'Node.js 14.x' is selected. The 'Memory' is set to '128 MB'. The 'Timeout' is set to '300' seconds. The 'Environment Variables' section contains a single variable: 'AWS\_LAMBDA\_FUNCTION\_NAME' with the value 'ESDE-Function'. The 'Logs' tab is selected at the bottom.

In WinSCP, in Frontend folder, update\_design.js  
paste the url as shown below at url :



```
;/home/ubuntu/ESDE/FE/public/js/update_design.js - ubuntu@35.168.145.194 (new) - Editor - WinSCP
File Edit View Insert Tools Options Help
Encoding: Color: ??
});  
  
function getOneData() {  
    const baseUrl = 'https://35.168.145.194:5000';  
    //Get the fileId information from the web browser URL textbox  
    let query = window.location.search.substring(1);  
    let arrayData = query.split('=');  
    let fileId = arrayData[1];  
    //console.dir('Obtained file id from URL : ', fileId);  
    let userId = localStorage.getItem('user_id');  
    axios({  
        headers: {  
            'user': userId  
        },  
        method: 'get',  
        url: 'https://w3j79gwzo9.execute-api.us-east-1.amazonaws.com/test?id=' + fileId,  
        //url: baseUrl + '/api/user/design/' + fileId,  
    })  
.then(function(response) {
```

Paste the url in the browser tab with the query string fid behind  
And the result should be similar to the one below

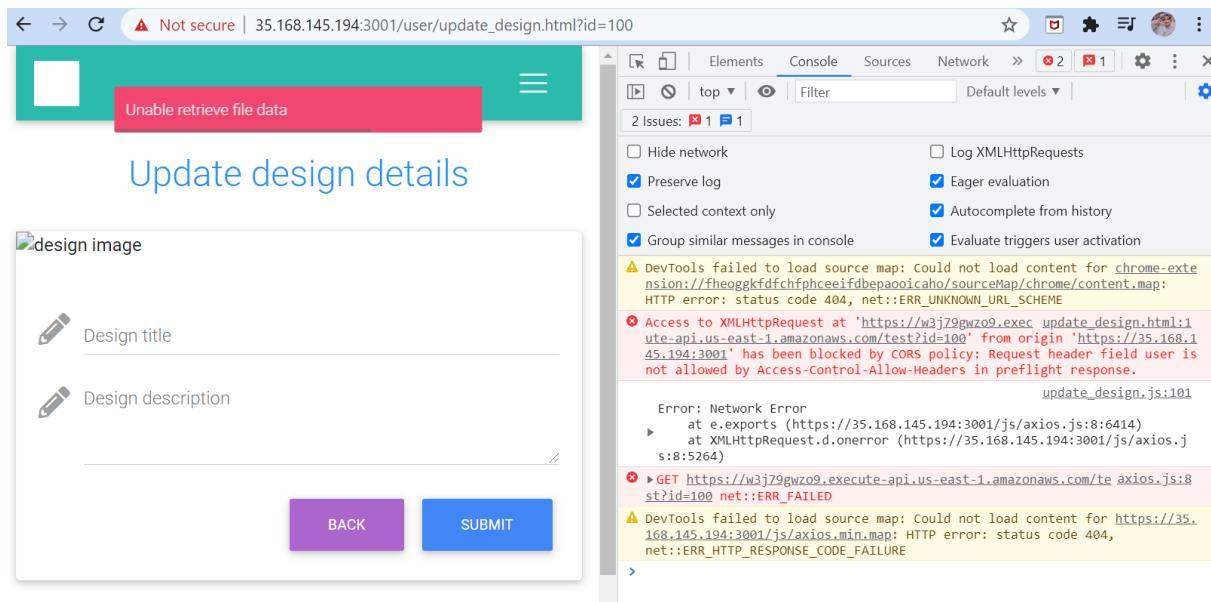


Run the website and try updating a file

\*ERROR ENCOUNTERED\*

Request header field user is not allowed in

Access-Control-Allow-Header



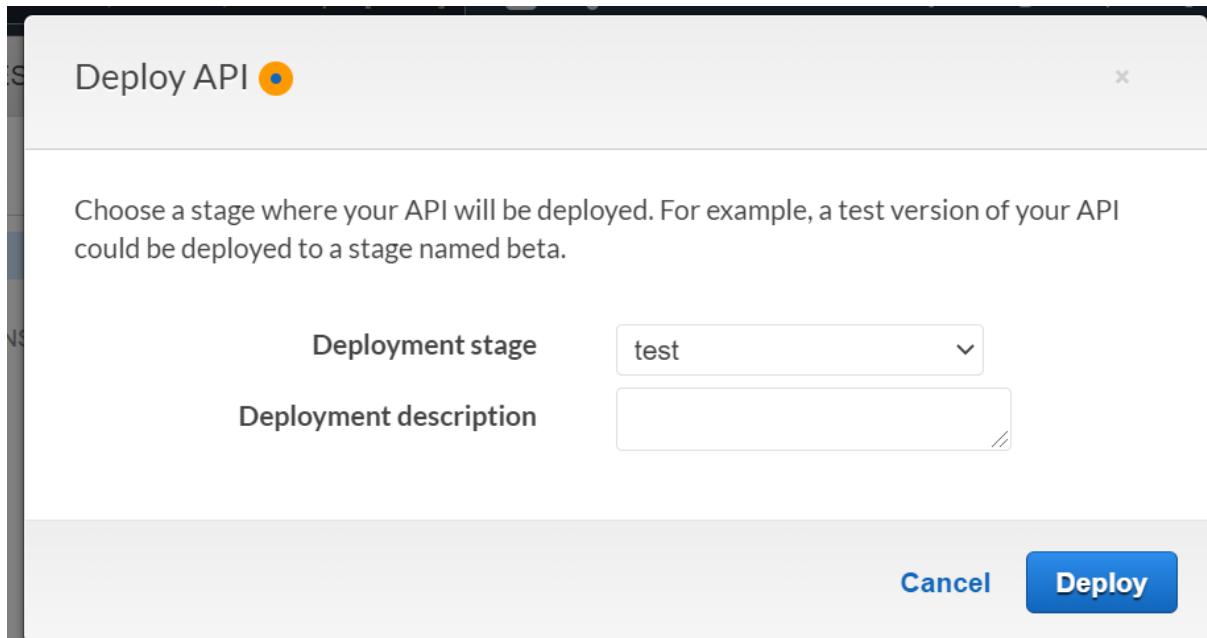
## Solved by

In API Gateway, click on Enable CORS in the input box ,

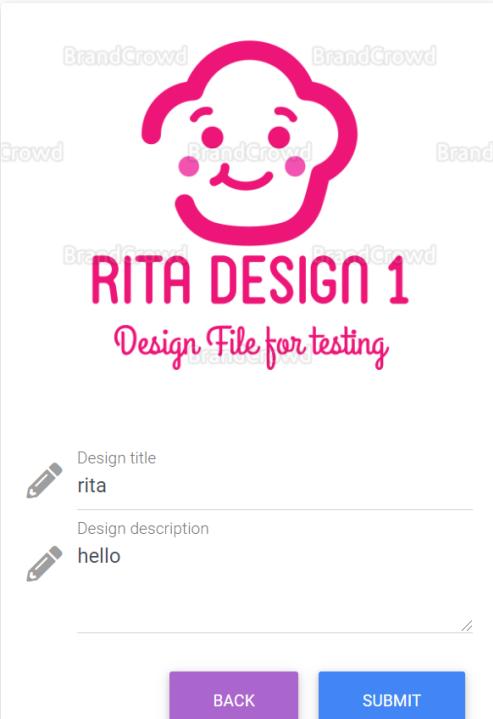
Access-Control-Allow-Headers add “,user” at the end.

A screenshot of the AWS API Gateway 'Enable CORS' configuration screen. The navigation path is APIs &gt; ESDE-API (w3j79gwzo9) &gt; Resources &gt; / (56tqkdxr38) &gt; Enable CORS. The main section is titled 'Enable CORS'. It shows 'Gateway Responses for ESDE-API API' with checkboxes for 'DEFAULT 4XX' and 'DEFAULT 5XX'. Below that, under 'Methods', 'GET' and 'OPTIONS' are selected. Under 'Access-Control-Allow-Methods', 'GET, OPTIONS' is listed. Under 'Access-Control-Allow-Headers', the value ',X-Api-Key,X-Amz-Security-Token,user' is entered into a text input field. Under 'Access-Control-Allow-Origin\*', the value '\*' is listed. At the bottom right is a large blue button labeled 'Enable CORS and ...'.

Next deploy API again, the deployment stage should be the same as the one created before and then click deploy



Access the update design page again, the picture is loaded



A screenshot of the 'Update design details' page. At the top, it says 'Update design details'. Below that is a large preview image of a logo featuring a pink smiley face with the text 'RITA DESIGN 1' and 'Design File for testing'. Underneath the preview, there are two input fields: 'Design title' containing 'rita' and 'Design description' containing 'hello'. At the bottom are 'BACK' and 'SUBMIT' buttons.

▲ Not secure | 35.168.145.194:3001/user/update\_design.html?id=100

To make sure it is properly connected ,  
 go to dynamoDB table and click on the table then on the items tab,  
 next click on any of the designs and click a column to be edited.  
 In this case, we decided to edit design\_description of rita design 1  
 which is hello to “rita”

|              | created_by_id | design_description   | design_t    |
|--------------|---------------|--|-------------|
| rita         | rita          | hello  | rita        |
| esign/100    | 100           | rita design 2 description text 1 text 2 text 3 text 4 .... | rita design |
| esign/yc...  | 100           | rita design 3 description text 1 text 2 text 3 text 4 .... | rita design |
| esign/ajo... | 100           | rita design 4 description text 1 text 2 text 3 text 4 .... | rita design |
|              |               | rita design 5 description text 1 text 2 text 3 text 4 .... | rita design |

Go to browser view the design changed,it should be changed to the new value



## 4.0 Centralized Logging for Web API Access

Go to API gateway

The screenshot shows the 'APIs' list page in the Amazon API Gateway console. There is one API entry:

| Name     | Description | ID         | Protocol | Endpoint type | Created    |
|----------|-------------|------------|----------|---------------|------------|
| ESDE-API |             | w3j79gwzo9 | REST     | Regional      | 2021-08-07 |

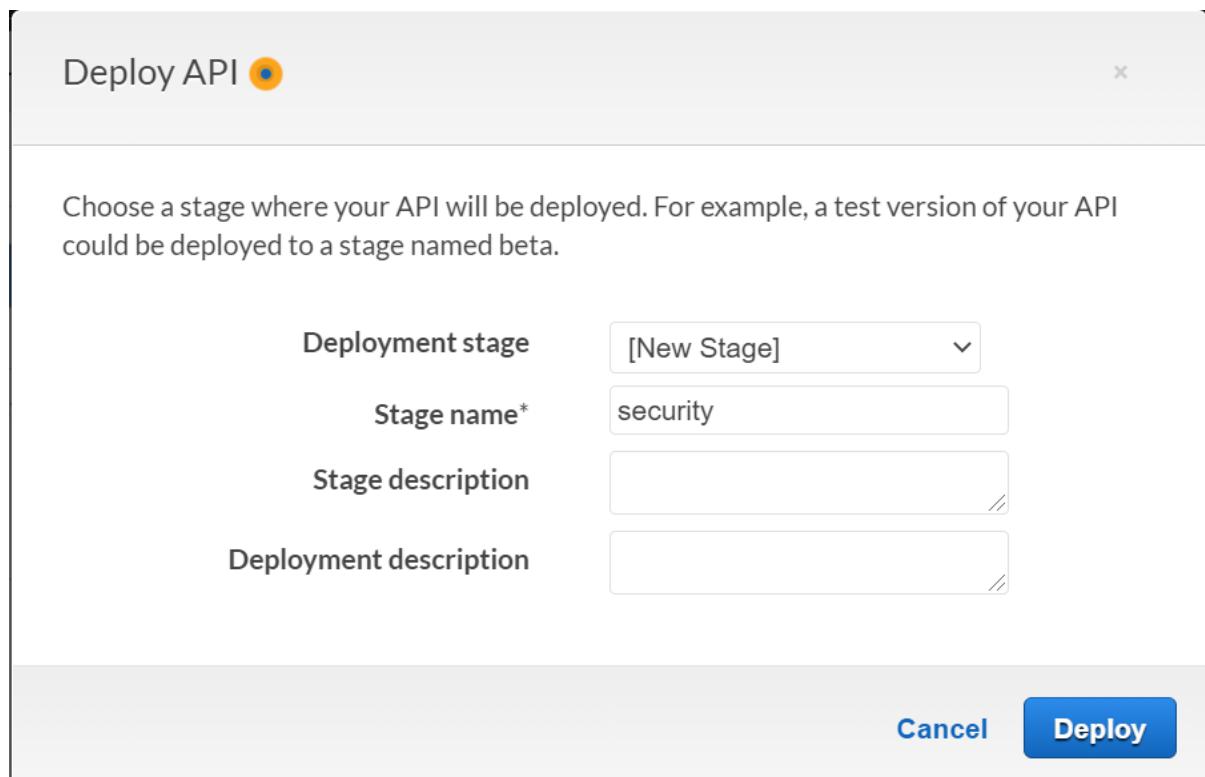
Click on the api under the Actions dropdown, click on deploy API

The screenshot shows the 'Resources' page for the 'ESDE-API' resource. The 'Actions' dropdown menu is open, showing the following options:

- RESOURCE ACTIONS
  - Create Method
  - Create Resource
  - Enable CORS
  - Edit Resource Documentation
- API ACTIONS
  - Deploy API
  - Import API

The 'Deploy API' option is highlighted with a yellow background.

Click New Stage for Deploy stage then give a stage name



This screenshot shows the "security Stage Editor" page in the Amazon API Gateway console. The URL is https://w3j79gwzo9.execute-api.us-east-1.amazonaws.com/security. The top navigation bar includes "Create", "Delete Stage", and "Configure" buttons. The main area displays the Invoke URL. Below it is a tab navigation bar with "Settings" (selected), "Logs/Tracing", "Stage Variables", "SDK Generation", "Export", "Deployment History", "Documentation History", and "Canary".

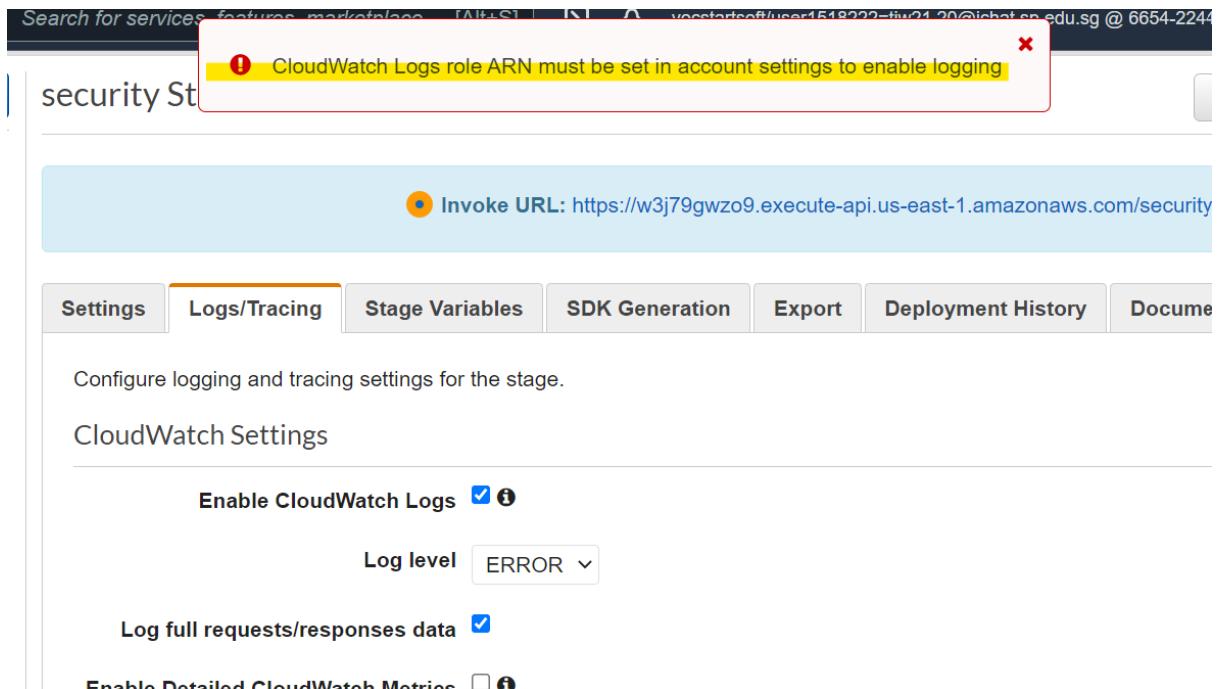
Click on the logs/tracing tab

This screenshot shows the "Logs/Tracing" tab of the stage editor. It contains several configuration sections:

- CloudWatch Settings**: Includes "Enable CloudWatch Logs" (checked), "Log level" (set to "ERROR"), and "Log full requests/responses data" (checked).
- Enable Detailed CloudWatch Metrics**: A checkbox that is unchecked.
- Custom Access Logging**: Includes "Enable Access Logging" (unchecked).
- X-Ray Tracing**: Includes "Enable X-Ray Tracing" (unchecked) and a link to "Set X-Ray Sampling Rules".

At the bottom right is a blue "Save Changes" button.

## \*ERROR ENOUNTERED\*



As shown in the diagram below go click on settings button at the bottom left-hand corner. Notice that arn is empty

Now navigate to IAM dashboard and click on roles at left side and then click on create role

**Identity and Access Management (IAM)**

- Dashboard
- Access management
  - User groups
  - Users
  - Roles**
  - Policies
  - Identity providers
  - Account settings
- Access reports
  - Access analyzer
  - Archive rules
  - Analyzers
  - Settings
  - Credential report
  - Organization activity

**Introducing the new Roles list experience**  
We've redesigned the Roles list experience to make it easier to use. [Let us know what you think.](#)

IAM > Roles

**Roles (19) Info**

An IAM role is an identity you can create that has specific permissions with credentials that are valid for short durations. Roles can be assumed by entities that you trust.

| <input type="checkbox"/> | Role name  | Trusted entities                                  | Last ac...   |
|--------------------------|--|---|--------------|
| <input type="checkbox"/> | AWS-QuickSetup-StackSet-Local-AdministrationRole | AWS Service: cloudformation                       | -            |
| <input type="checkbox"/> | AWS-QuickSetup-StackSet-Local-ExecutionRole      | Account: 665422446546                             | -            |
| <input type="checkbox"/> | AWSServiceRoleForAmazonGuardDuty                 | AWS Service: guardduty (Service-Linked Role)      | 10 days ago  |
| <input type="checkbox"/> | AWSServiceRoleForAPIGateway                      | AWS Service: ops.apigateway (Service-Linked Role) | -            |
| <input type="checkbox"/> | AWSServiceRoleForAWSCloud9                       | AWS Service: cloud9 (Service-Linked Role)         | 16 hours ago |
| <input type="checkbox"/> | AWSServiceRoleForCloudWatchEvents                | AWS Service: events (Service-Linked Role)         | -            |

[Create role](#)

## Select AWS service

### Create role

1 2 3 4

#### Select type of trusted entity

|  |   |   |  |
|--|---|---|--|
|  <b>AWS service</b><br>EC2, Lambda and others |  <b>Another AWS account</b><br>Belonging to you or 3rd party |  <b>Web identity</b><br>Cognito or any OpenID provider |  <b>SAML 2.0 federation</b><br>Your corporate directory |
|--|---|---|--|

Allows AWS services to perform actions on your behalf. [Learn more](#)

#### Choose a use case

##### Common use cases

###### **EC2**

Allows EC2 instances to call AWS services on your behalf.

###### **Lambda**

Allows Lambda functions to call AWS services on your behalf.

##### Or select a service to view its use cases

**API Gateway**

**CodeBuild**

**EMR Containers**

**IoT SiteWise**

**RDS**

## Attach AmazonAPIGatewayPushToCloudWatchLogs

### Create role

1 2 3 4

#### Attached permissions policies

The type of role that you selected requires the following policy.

| Filter policies ▾  |         | Search   | Showing 1 result |
|--|---------|--|------------------|
| Policy name ▾  | Used as | Description                                      |                  |
| ▶  <a href="#">AmazonAPIGatewayPushToCloudWatchLogs</a> | None    | Allows API Gateway to push logs to user's acc... |                  |

Enter Role name of your choice and description for the role name

## Create role

1 2 3 4

### Review

Provide the required information below and review this role before you create it.

**Role name\*** APIGatewayLogsRule

Use alphanumeric and '+=.,@-\_ ' characters. Maximum 64 characters.

**Role description**

Allows API Gateway to push logs to CloudWatch Logs.

Maximum 1000 characters. Use alphanumeric and '+=.,@-\_ ' characters.

**Trusted entities** AWS service: apigateway.amazonaws.com

**Policies**  AmazonAPIGatewayPushToCloudWatchLogs 

**Permissions boundary** Permissions boundary is not set

No tags were added

\* Required

Cancel

Previous

Create role

## You will see the ordered role name below

 The role [APIGatewayLogsRule](#) has been created.

IAM > Roles

**Roles (20) [Info](#)**

An IAM role is an identity you can create that has specific permissions with credentials that are valid for short durations. Roles can be assumed by entities that you trust.

[Create role](#)

| <input type="checkbox"/> | Role name  | Trusted entities            | Last |
|--------------------------|--|-----------------------------|------|
| <input type="checkbox"/> | <a href="#">APIGatewayLogsRule</a>                               | AWS Service: apigateway     | -    |
| <input type="checkbox"/> | <a href="#">AWS-QuickSetup-StackSet-Local-AdministrationRole</a> | AWS Service: cloudformation | -    |

## Take note and copy the role ARN

Roles > APIGatewayLogsRule

## Summary

|                          |  |
|--------------------------|--|
| Role ARN                 | arn:aws:iam::665422446546:role/APIGatewayLogsRule <a href="#">Copy</a>     |
| Role description         | Allows API Gateway to push logs to CloudWatch Logs.   <a href="#">Edit</a> |
| Instance Profile ARNs    | <a href="#">Copy</a>   |
| Path                     | /  |
| Creation time            | 2021-08-08 13:07 UTC+0800  |
| Last activity            | Not accessed in the tracking period  |
| Maximum session duration | 1 hour <a href="#">Edit</a>  |

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

Paste the copied role ARN as shown below

### Settings

Provide an Identity and Access Management (IAM) role ARN that has write access to CloudWatch logs in your account.

CloudWatch log role ARN\*  [Copy](#)  
Account level throttling Your current account level throttling rate is 10000 requests per second with a burst of 5000 requests. [?](#)

Go to the api go under stages and click on logs/tracing tab then configure as shown below

The screenshot shows the 'Amazon API Gateway' interface. In the top navigation bar, 'APIs' is selected. Below it, the path 'APIs > ESDE-API (w3j79gwzo9) > Stages > security' is shown. On the left sidebar, 'API: ESDE-API' is selected, and under 'Stages', 'security' is highlighted. The main content area is titled 'security Stage Editor'. It displays an 'Invoke URL' field with the value 'https://w3j79gwzo9.execute-api.us-east-1.amazonaws.com/security'. Below this, there are tabs for 'Settings', 'Logs/Tracing' (which is currently selected), 'Stage Variables', 'SDK Generation', 'Export', and 'Deployment History'. Under the 'Logs/Tracing' tab, there are sections for 'CloudWatch Settings' and 'Custom Access Logging'. In the 'CloudWatch Settings' section, 'Enable CloudWatch Logs' is checked, and 'Log level' is set to 'ERROR'. There is also an option 'Log full requests/responses data' which is checked. At the bottom of this section, 'Enable Detailed CloudWatch Metrics' is unchecked. The overall interface is clean and modern, typical of AWS management tools.

Navigate to cloudwatch go to log groups

The screenshot shows the AWS CloudWatch Log groups interface. On the left, there's a sidebar with options like Favorites, Dashboards, Alarms, Logs (selected), Log groups (selected), Logs Insights, Metrics, and Events. The main area displays 'Log groups (3)' with a search bar and filter options. The table lists the following log groups:

| Log group                                      | Retention    | Metric filters | Contributor Insights |
|--|--------------|----------------|----------------------|
| /aws/apigateway/welcome                        | Never expire | -              | -                    |
| /aws/lambda/ESDE_GetDesignById                 | Never expire | -              | -                    |
| API-Gateway-Execution-Logs_w3j79gwzo9/security | Never expire | -              | -                    |

Click on the API Gateway log groups

The screenshot shows the same AWS CloudWatch Log groups interface, but now the 'API-Gateway-Execution-Logs\_w3j79gwzo9/security' log group is selected, indicated by a blue border around its row.

The screenshot shows the 'Log group details' section for the selected log group. It includes fields for Retention (Never expire), Creation time (2 minutes ago), Stored bytes (-), KMS key ID (-), Metric filters (0), Subscription filters (0), ARN (arn:aws:logs:us-east-1:665422446546:log-group:API-Gateway-Execution-Logs\_w3j79gwzo9/security:\*), and Contributor Insights rules (-). Below this, the 'Log streams' tab is selected, showing a table with one entry: 'Log streams (0)'. A message at the bottom states 'There are no log streams.'

Navigate to api gateway

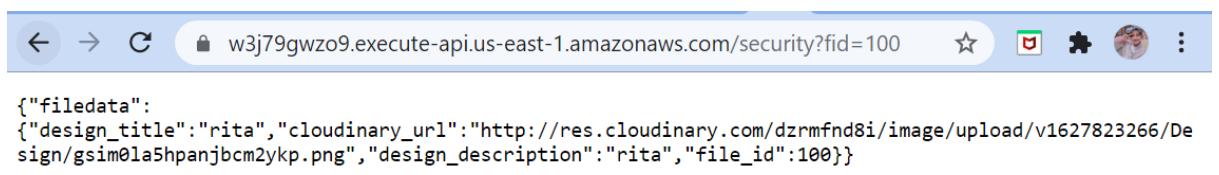
Go to the folder as shown below take note of the url

```

function getOneData() {
    const baseUrl = 'https://35.168.145.194:5000';
    //Get the fileId information from the web browser URL textbox
    let query = window.location.search.substring(1);
    let arrayData = query.split("=");
    let fileId = arrayData[1];
    //console.dir('Obtained file id from URL : ', fileId);
    let userId = localStorage.getItem('user_id');
    axios({
        headers: {
            'user': userId
        },
        method: 'get',
        url: 'https://w3j79gwzo9.execute-api.us-east-1.amazonaws.com/security?fid=' + fileId,
        //url: baseUrl + '/api/user/design/' + fileId,
    })
    .then(function(response) {
}

```

Open a browser and paste the url and add an valid id behind



| Log stream                       | Last event time                 |
|----------------------------------|---------------------------------|
| 25dd7b0c5ba13e5497abd400dbc6b053 | 2021-08-08 13:18:22 (UTC+08:00) |

Go to the log events to check them out

| Log events  |  |     |    |     |        |  |  |
|---|--|-----|----|-----|--------|--|--|
| You can use the filter bar below to search for and match terms, phrases, or values in your log events. <a href="#">Learn more about filter patterns</a>   |  |     |    |     |        |  |  |
| <input type="checkbox"/> View as text <span style="border: 1px solid #ccc; padding: 2px 10px;">C</span> Actions ▾ <span style="border: 1px solid #ccc; padding: 2px 10px;">Create Metric Filter</span>  |  |     |    |     |        |  |  |
| <span style="border: 1px solid #ccc; padding: 2px 10px;">Filter events</span>   |  |     |    |     |        |  |  |
| <span style="border: 1px solid #ccc; padding: 2px 10px;">Clear</span>   | 1m   | 30m | 1h | 12h | Custom | <span style="border: 1px solid #ccc; padding: 2px 10px;"></span> | <span style="border: 1px solid #ccc; padding: 2px 10px;"></span> |
| <p>▶ <b>Timestamp</b></p> <ul style="list-style-type: none"> <li>▶ 2021-08-08T13:18:21.229+08:00</li> <li>▶ 2021-08-08T13:18:21.231+08:00</li> <li>▶ 2021-08-08T13:18:21.231+08:00</li> <li>▶ 2021-08-08T13:18:21.231+08:00</li> <li>▶ 2021-08-08T13:18:21.231+08:00</li> <li>▶ 2021-08-08T13:18:21.231+08:00</li> <li>▶ 2021-08-08T13:18:21.267+08:00</li> <li>▶ 2021-08-08T13:18:21.267+08:00</li> <li>▶ 2021-08-08T13:18:21.267+08:00</li> <li>▶ 2021-08-08T13:18:22.717+08:00</li> <li>▶ 2021-08-08T13:18:22.717+08:00</li> <li>▶ 2021-08-08T13:18:22.717+08:00</li> <li>▶ 2021-08-08T13:18:22.717+08:00</li> </ul> | <p>▶ <b>Message</b></p> <p>No older events at this moment. <a href="#">Retry</a></p> <p>(cbe1c941-6a42-4ac6-a489-4eba0f092645b) Extended Request Id: Du1cmEbQIAMF_Ww=</p> <p>(cbe1c941-6a42-4ac6-a489-4eba0f092645b) Method request path: {}</p> <p>(cbe1c941-6a42-4ac6-a489-4eba0f092645b) Method request query string: {fid=100}</p> <p>(cbe1c941-6a42-4ac6-a489-4eba0f092645b) Method request headers: {sec-fetch-mode=navigate, sec-fetch-site=None, accept=...</p> <p>(cbe1c941-6a42-4ac6-a489-4eba0f092645b) Method request body before transformations:</p> <p>(cbe1c941-6a42-4ac6-a489-4eba0f092645b) Endpoint request URI: https://lambda.us-east-1.amazonaws.com/2015-03-31/func...tions/test/execute</p> <p>(cbe1c941-6a42-4ac6-a489-4eba0f092645b) Endpoint request headers: {x-amzn-lambda-integration-tag=cbe1c941-6a42-4ac6-a489-4eba0f092645b}</p> <p>(cbe1c941-6a42-4ac6-a489-4eba0f092645b) Endpoint request body after transformations: {"resource": "/", "path": "/", "httpMethod": "GET", "headers": {}, "queryStringParameters": {}, "pathParameters": {}, "stageVariables": {}, "requestContext": {"accountId": "123456789012", "resourceId": "12345678901234567890", "stage": "test"}, "body": null, "isBase64Encoded": false}</p> <p>(cbe1c941-6a42-4ac6-a489-4eba0f092645b) Endpoint response headers: {Date=Sun, 08 Aug 2021 05:18:22 GMT, Content-Type=application/json, Content-Length=11, Connection=keep-alive}</p> <p>(cbe1c941-6a42-4ac6-a489-4eba0f092645b) Endpoint response body before transformations: {"statusCode":200,"body":"\\\"filedata\\\":\\\"{\\\"design_title\\\":\\\"rita\\\",\\\"file_type\\\":\\\"image\\\",\\\"file_size\\\":1234567890\\}\\\"\\\"}</p> <p>(cbe1c941-6a42-4ac6-a489-4eba0f092645b) Method response body after transformations: {"filedata": {"design_title": "rita", "file_type": "image", "file_size": 1234567890}}</p> <p>(cbe1c941-6a42-4ac6-a489-4eba0f092645b) Method response headers: {Access-Control-Allow-Headers=Content-Type,user, Access-Control-Allow-Methods=POST, Access-Control-Allow-Origin=*, Access-Control-Expose-Headers=Content-Type, Content-Type=application/json}</p> |     |    |     |        |  |  |

## Access update design page

 Not secure | 35.168.145.194:3001/user/update\_design.html?id=100

## Update design details



The log should be shown

| Log streams  | Metric filters                   | Subscription filters | Contributor Insights            | Tags |                          |            |   |                 |  |                          |                                 |  |                                 |  |                          |                                  |  |                                 |  |
|--|----------------------------------|----------------------|---------------------------------|------|--------------------------|------------|---|-----------------|--|--------------------------|---------------------------------|--|---------------------------------|--|--------------------------|----------------------------------|--|---------------------------------|--|
| <h2>Log streams (2)</h2>   |                                  |                      |                                 |      |                          |            |   |                 |  |                          |                                 |  |                                 |  |                          |                                  |  |                                 |  |
| <input type="text"/> Filter log streams or try prefix search   |                                  |                      |                                 |      |                          |            |   |                 |  |                          |                                 |  |                                 |  |                          |                                  |  |                                 |  |
| <table><thead><tr><th><input type="checkbox"/></th><th>Log stream</th><th>▼</th><th>Last event time</th><th></th></tr></thead><tbody><tr><td><input type="checkbox"/></td><td>57903dedd8fb5c1c5e250eaaeaaef54</td><td></td><td>2021-08-08 13:20:28 (UTC+08:00)</td><td></td></tr><tr><td><input type="checkbox"/></td><td>25dd7b0c5ba13e5497abd400dbc6b053</td><td></td><td>2021-08-08 13:18:22 (UTC+08:00)</td><td></td></tr></tbody></table> |                                  |                      |                                 |      | <input type="checkbox"/> | Log stream | ▼ | Last event time |  | <input type="checkbox"/> | 57903dedd8fb5c1c5e250eaaeaaef54 |  | 2021-08-08 13:20:28 (UTC+08:00) |  | <input type="checkbox"/> | 25dd7b0c5ba13e5497abd400dbc6b053 |  | 2021-08-08 13:18:22 (UTC+08:00) |  |
| <input type="checkbox"/>   | Log stream                       | ▼                    | Last event time                 |      |                          |            |   |                 |  |                          |                                 |  |                                 |  |                          |                                  |  |                                 |  |
| <input type="checkbox"/>   | 57903dedd8fb5c1c5e250eaaeaaef54  |                      | 2021-08-08 13:20:28 (UTC+08:00) |      |                          |            |   |                 |  |                          |                                 |  |                                 |  |                          |                                  |  |                                 |  |
| <input type="checkbox"/>   | 25dd7b0c5ba13e5497abd400dbc6b053 |                      | 2021-08-08 13:18:22 (UTC+08:00) |      |                          |            |   |                 |  |                          |                                 |  |                                 |  |                          |                                  |  |                                 |  |

## Go check log events again

**Log events**  
You can use the filter bar below to search for and match terms, phrases, or values in your log events. [Learn more about filter patterns](#)

View as text  Actions ▾ [Create Metric Filter](#)

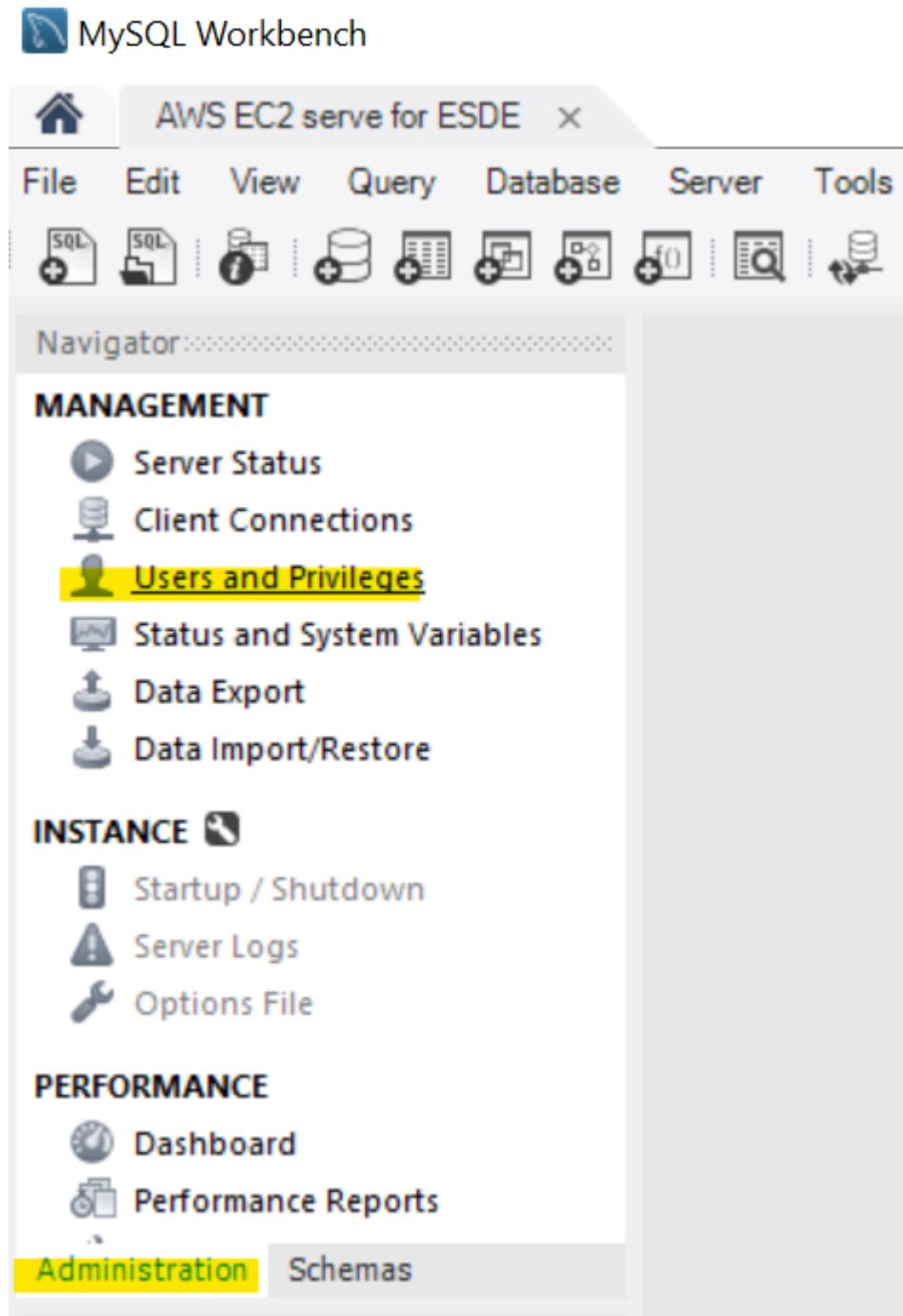
Filter events Clear 1m 30m 1h 12h Custom 

| ▶  | Timestamp                     | Message   |
|--|-------------------------------|---|
| No older events at this moment. <a href="#">Retry</a>                                      |                               |   |
| ▶  | 2021-08-08T13:20:27.734+08:00 | (ef583028-1c30-4404-b1e4-de2fe155c96a) Extended Request Id: DuIwXF2JIAFMfsug=   |
| ▶  | 2021-08-08T13:20:27.736+08:00 | (ef583028-1c30-4404-b1e4-de2fe155c96a) Method request path: {}  |
| ▶  | 2021-08-08T13:20:27.736+08:00 | (ef583028-1c30-4404-b1e4-de2fe155c96a) Method request query string: {fid=100}   |
| ▶  | 2021-08-08T13:20:27.736+08:00 | (ef583028-1c30-4404-b1e4-de2fe155c96a) Method request headers: {sec-fetch-mode=cors, referer=https://35.168.145.194:30...}  |
| ▶  | 2021-08-08T13:20:27.736+08:00 | (ef583028-1c30-4404-b1e4-de2fe155c96a) Method request body before transformations:  |
| ▶  | 2021-08-08T13:20:27.769+08:00 | (ef583028-1c30-4404-b1e4-de2fe155c96a) Endpoint request URI: https://lambda.us-east-1.amazonaws.com/2015-03-31/func...<br>(ef583028-1c30-4404-b1e4-de2fe155c96a) Endpoint request headers: {x-amzn-lambda-integration-tag=ef583028-1c30-4404-b1e... |
| ▶  | 2021-08-08T13:20:27.769+08:00 | (ef583028-1c30-4404-b1e4-de2fe155c96a) Endpoint request body after transformations: {"resource":"/","path":"/","httpMe...   |
| ▶  | 2021-08-08T13:20:28.236+08:00 | (ef583028-1c30-4404-b1e4-de2fe155c96a) Endpoint response headers: {Date=Sun, 08 Aug 2021 05:20:28 GMT, Content-Type=ap...   |
| ▶  | 2021-08-08T13:20:28.236+08:00 | (ef583028-1c30-4404-b1e4-de2fe155c96a) Endpoint response body before transformations: {"statusCode":200,"body":{}}  |
| ▶  | 2021-08-08T13:20:28.236+08:00 | (ef583028-1c30-4404-b1e4-de2fe155c96a) Method response body after transformations: {"filedata":{"design_title":"rita",...}}   |
| ▶  | 2021-08-08T13:20:28.236+08:00 | (ef583028-1c30-4404-b1e4-de2fe155c96a) Method response headers: {Access-Control-Allow-Headers=Content-Type,user, Acces...   |
| No newer events at this moment. <a href="#">Auto retrv paused</a> . <a href="#">Resume</a> |                               |   |

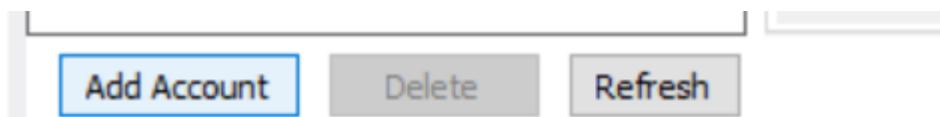
## 5.0 MYSQL RDS Database security

### 5.1 Ensure least privilege for database connection credentials

Go to MySQL workbench and under administrator tab click on Users and Privileges



Click on Add Account



Configure for your user as shown below

The screenshot shows the 'User Accounts' configuration window in MySQL Workbench. On the left, a table lists existing accounts:

| User             | From Host |
|------------------|-----------|
| admin            | %         |
| admin            | localhost |
| adminuser        | %         |
| mysql.infoschema | localhost |
| mysql.session    | localhost |
| mysql.sys        | localhost |
| rdsadmin         | localhost |

The main panel displays the 'Details for account admin@localhost' configuration. It includes tabs for Login, Account Limits, Administrative Roles, and Schema Privileges. The Login tab is selected, showing fields for:

- Login Name: admin (with a note: You may create multiple accounts with the same name to connect from different hosts.)
- Authentication Type: Standard (with a note: For the standard password and/or host based authentication, select 'Standard').
- Limit to Hosts Matching: localhost (with a note: % and \_ wildcards may be used).
- Password: (redacted) (with a note: Consider using a password with 8 or more characters with mixed case letters, numbers and punctuation marks.)
- Confirm Password: (redacted) (with a note: Enter password again to confirm.)
- Buttons: Expire Password, Revert, Apply.

Click on “Add Entry.”

The screenshot shows the 'Schema Privileges' configuration window for the 'admin' account. It has tabs for Login, Account Limits, Administrative Roles, and Schema Privileges. The Schema Privileges tab is selected, showing a table with columns 'Schema' and 'Privileges'. A note at the bottom states: 'Schema and Host fields may use % and \_ wildcards. The server will match specific entries before wildcarded ones.' Buttons at the bottom include: Revoke All Privileges, Delete Entry, and Add Entry... (which is highlighted with a blue border).

Select schema

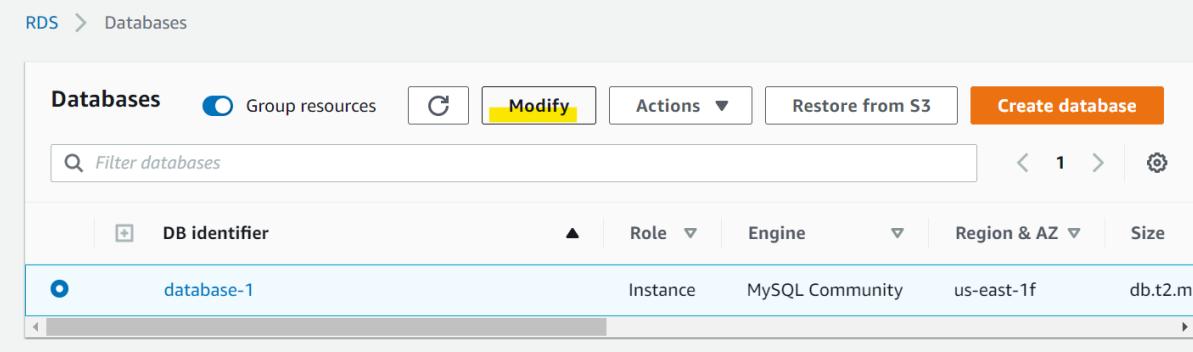
The screenshot shows the 'New Schema Privilege Definition' dialog. It asks: 'Select the Schema for which the user 'admin' will have the privileges you want to define.' It has three options:

- All Schema (%): This rule will apply to any schema name.
- Schemas matching pattern: (input field: competition\_system\_security\_concept\_v2\_db) This rule will apply to schemas that match the given name or pattern. You may use \_ and % as wildcards in a pattern. Escape these characters with \ in case you want their literal value.
- Selected schema: competition\_system\_security\_concept\_v2\_db (dropdown menu) Select a specific schema name for the rule to apply to.

Select INSERT, DELETE, UPDATE, SELECT  
And Click apply button

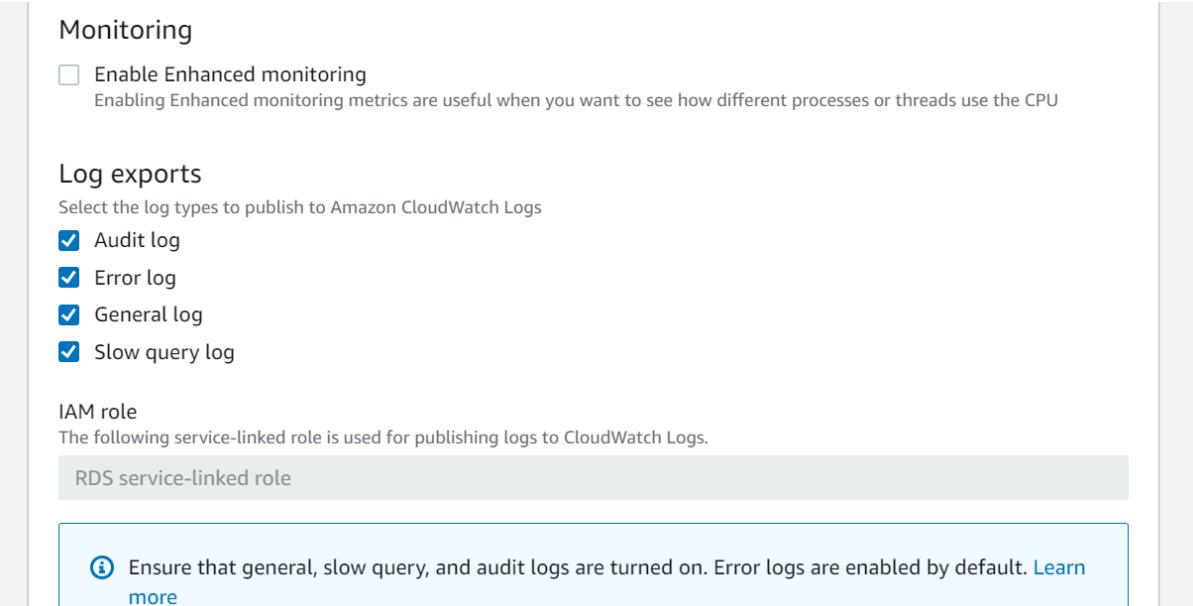
## 5.2 Database access logging

At RDS, select database then click on the Modify button



The screenshot shows the AWS RDS 'Databases' page. At the top, there are navigation links: 'RDS' and 'Databases'. Below them are several buttons: 'Databases' (selected), 'Group resources' (with a toggle switch), 'Create database' (orange button), 'Modify' (highlighted in yellow), 'Actions' (dropdown menu), and 'Restore from S3'. There is also a search bar labeled 'Filter databases' and a page navigation area with a magnifying glass icon and numbers 1 and 2. The main table lists databases with columns: DB identifier, Role, Engine, Region & AZ, and Size. A single row is selected, showing 'database-1' as the DB identifier, 'Instance' as the role, 'MySQL Community' as the engine, 'us-east-1f' as the region, and 'db.t2.mi' as the size.

Under log exports make sure the following are checked



The screenshot shows the 'Log exports' configuration section. It includes a heading 'Monitoring' with a checkbox for 'Enable Enhanced monitoring' (unchecked) and a note about enabling metrics for CPU usage. Below this is a section for 'Log exports' with a heading 'Select the log types to publish to Amazon CloudWatch Logs'. Four checkboxes are present: 'Audit log' (checked), 'Error log' (checked), 'General log' (checked), and 'Slow query log' (checked). Further down, there is an 'IAM role' section with a note about using a service-linked role for publishing logs to CloudWatch Logs. A button labeled 'RDS service-linked role' is shown. At the bottom, a callout box contains a note: 'Ensure that general, slow query, and audit logs are turned on. Error logs are enabled by default.' followed by a 'Learn more' link.

Click on apply immediately

## Modify DB instance: database-1

### Summary of modifications

You are about to submit the following modifications. Only values that will change are displayed. Carefully verify your changes and click Modify DB Instance.

| Attribute                         | Current value | New value                                      |
|-----------------------------------|---------------|--|
| Enable publish to cloudWatch logs |               | Audit log,Error log,General log,Slow query log |

### Scheduling of modifications

#### When to apply modifications

- Apply during the next scheduled maintenance window  
Current maintenance window: August 09, 2021 11:14 - 11:44 UTC+8

- Apply immediately  
The modifications in this request and any pending modifications will be asynchronously applied as soon as possible, regardless of the maintenance window setting for this database instance.

Cancel

Back

Modify DB instance

Now you should be able to see your new log group

CloudWatch > Log groups

Log groups (4) By default, we only load up to 10000 log groups.

Filter log groups or try prefix search  Exact match < 1 >

| Log group                                      | Retenti...   | Metric filters | Contributor Insights | Sub |
|--|--------------|----------------|----------------------|-----|
| /aws/apigateway/welcome                        | Never expire | -              | -                    | -   |
| /aws/lambda/ESDE_GetDesignByld                 | Never expire | -              | -                    | -   |
| /aws/rds/instance/database-1/error             | Never expire | -              | -                    | -   |
| API-Gateway-Execution-Logs_w3j79gwzo9/security | Never expire | -              | -                    | -   |

| Log streams   | Metric filters                   | Subscription filters                  | Contributor Insights                             | Tags                                      |
|---|----------------------------------|---------------------------------------|--|---|
| <b>Log streams (1)</b>                              |                                  |                                       |  |   |
|   | <input type="button" value="C"/> | <input type="button" value="Delete"/> | <input type="button" value="Create log stream"/> | <input type="button" value="Search all"/> |
| <input type="checkbox"/> Log stream                 | ▼                                | Last event time                       | ▼  |   |
| <input type="checkbox"/> <a href="#">database-1</a> |                                  | 2021-08-03 11:01:22 (UTC+08:00)       |  |   |

| CloudWatch   | >  | Log groups  | >   | /aws/rds/instance/database-1/error | > | database-1 |           |         |   |  |  |  |  |  |  |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |
|--|--|---|---|------------------------------------|---|------------|-----------|---------|---|--|--|--|--|--|--|---|-------------------------------|---|---|-------------------------------|---|---|-------------------------------|---|---|-------------------------------|---|---|-------------------------------|---|---|-------------------------------|---|---|-------------------------------|---|---|-------------------------------|---|---|-------------------------------|---|---|-------------------------------|---|---|-------------------------------|---|
| <b>Log events</b>  |  |   |   |                                    |   |            |           |         |   |  |  |  |  |  |  |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |
| You can use the filter bar below to search for and match terms, phrases, or values in your log events.   | <a href="#">Learn more about filter patterns</a> |   |   |                                    |   |            |           |         |   |  |  |  |  |  |  |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |
| <input type="checkbox"/> View as text  | <input type="button" value="C"/>                 | <input type="button" value="Actions"/>  | <input type="button" value="Create Metric Filter"/> |                                    |   |            |           |         |   |  |  |  |  |  |  |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |
| <input type="button" value="Filter events"/> Clear 1m 30m 1h 12h Custom <input type="button" value=""/>  |  |   |   |                                    |   |            |           |         |   |  |  |  |  |  |  |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |
| <table border="1"> <thead> <tr> <th>▶</th> <th>Timestamp</th> <th>Message</th> </tr> </thead> <tbody> <tr> <td colspan="7">There are older events to load. <a href="#">Load more</a>.</td></tr> <tr> <td>▶</td><td>2021-08-08T16:08:38.674+08:00</td><td>2021-08-08T08:08:38.674199Z 2137 [Warning] [MY-010055] [Server] IP address '185.220.10...</td></tr> <tr> <td>▶</td><td>2021-08-08T17:07:25.882+08:00</td><td>2021-08-08T09:07:25.882696Z 2158 [Warning] [MY-010057] [Server] IP address '129.126.10...</td></tr> <tr> <td>▶</td><td>2021-08-08T17:07:29.665+08:00</td><td>2021-08-08T09:07:29.665210Z 2159 [Warning] [MY-010057] [Server] IP address '129.126.10...</td></tr> <tr> <td>▶</td><td>2021-08-08T17:07:58.620+08:00</td><td>2021-08-08T09:07:58.620569Z 2160 [Warning] [MY-010057] [Server] IP address '129.126.10...</td></tr> <tr> <td>▶</td><td>2021-08-08T17:08:02.056+08:00</td><td>2021-08-08T09:08:02.056026Z 2161 [Warning] [MY-010057] [Server] IP address '129.126.10...</td></tr> <tr> <td>▶</td><td>2021-08-08T17:09:09.348+08:00</td><td>2021-08-08T09:09:09.348054Z 2163 [Warning] [MY-010057] [Server] IP address '129.126.10...</td></tr> <tr> <td>▶</td><td>2021-08-08T17:09:12.875+08:00</td><td>2021-08-08T09:09:12.875116Z 2164 [Warning] [MY-010057] [Server] IP address '129.126.10...</td></tr> <tr> <td>▶</td><td>2021-08-08T17:09:56.398+08:00</td><td>2021-08-08T09:09:56.398424Z 2165 [Warning] [MY-010057] [Server] IP address '129.126.10...</td></tr> <tr> <td>▶</td><td>2021-08-08T17:10:00.188+08:00</td><td>2021-08-08T09:10:00.188823Z 2166 [Warning] [MY-010057] [Server] IP address '129.126.10...</td></tr> <tr> <td>▶</td><td>2021-08-08T17:11:03.710+08:00</td><td>2021-08-08T09:11:03.710196Z 2167 [Warning] [MY-010057] [Server] IP address '129.126.10...</td></tr> <tr> <td>▶</td><td>2021-08-08T17:11:07.039+08:00</td><td>2021-08-08T09:11:07.039619Z 2168 [Warning] [MY-010057] [Server] IP address '129.126.10...</td></tr> </tbody> </table> |  |   |   |                                    |   | ▶          | Timestamp | Message | There are older events to load. <a href="#">Load more</a> . |  |  |  |  |  |  | ▶ | 2021-08-08T16:08:38.674+08:00 | 2021-08-08T08:08:38.674199Z 2137 [Warning] [MY-010055] [Server] IP address '185.220.10... | ▶ | 2021-08-08T17:07:25.882+08:00 | 2021-08-08T09:07:25.882696Z 2158 [Warning] [MY-010057] [Server] IP address '129.126.10... | ▶ | 2021-08-08T17:07:29.665+08:00 | 2021-08-08T09:07:29.665210Z 2159 [Warning] [MY-010057] [Server] IP address '129.126.10... | ▶ | 2021-08-08T17:07:58.620+08:00 | 2021-08-08T09:07:58.620569Z 2160 [Warning] [MY-010057] [Server] IP address '129.126.10... | ▶ | 2021-08-08T17:08:02.056+08:00 | 2021-08-08T09:08:02.056026Z 2161 [Warning] [MY-010057] [Server] IP address '129.126.10... | ▶ | 2021-08-08T17:09:09.348+08:00 | 2021-08-08T09:09:09.348054Z 2163 [Warning] [MY-010057] [Server] IP address '129.126.10... | ▶ | 2021-08-08T17:09:12.875+08:00 | 2021-08-08T09:09:12.875116Z 2164 [Warning] [MY-010057] [Server] IP address '129.126.10... | ▶ | 2021-08-08T17:09:56.398+08:00 | 2021-08-08T09:09:56.398424Z 2165 [Warning] [MY-010057] [Server] IP address '129.126.10... | ▶ | 2021-08-08T17:10:00.188+08:00 | 2021-08-08T09:10:00.188823Z 2166 [Warning] [MY-010057] [Server] IP address '129.126.10... | ▶ | 2021-08-08T17:11:03.710+08:00 | 2021-08-08T09:11:03.710196Z 2167 [Warning] [MY-010057] [Server] IP address '129.126.10... | ▶ | 2021-08-08T17:11:07.039+08:00 | 2021-08-08T09:11:07.039619Z 2168 [Warning] [MY-010057] [Server] IP address '129.126.10... |
| ▶  | Timestamp  | Message   |   |                                    |   |            |           |         |   |  |  |  |  |  |  |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |
| There are older events to load. <a href="#">Load more</a> .  |  |   |   |                                    |   |            |           |         |   |  |  |  |  |  |  |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |
| ▶  | 2021-08-08T16:08:38.674+08:00                    | 2021-08-08T08:08:38.674199Z 2137 [Warning] [MY-010055] [Server] IP address '185.220.10... |   |                                    |   |            |           |         |   |  |  |  |  |  |  |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |
| ▶  | 2021-08-08T17:07:25.882+08:00                    | 2021-08-08T09:07:25.882696Z 2158 [Warning] [MY-010057] [Server] IP address '129.126.10... |   |                                    |   |            |           |         |   |  |  |  |  |  |  |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |
| ▶  | 2021-08-08T17:07:29.665+08:00                    | 2021-08-08T09:07:29.665210Z 2159 [Warning] [MY-010057] [Server] IP address '129.126.10... |   |                                    |   |            |           |         |   |  |  |  |  |  |  |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |
| ▶  | 2021-08-08T17:07:58.620+08:00                    | 2021-08-08T09:07:58.620569Z 2160 [Warning] [MY-010057] [Server] IP address '129.126.10... |   |                                    |   |            |           |         |   |  |  |  |  |  |  |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |
| ▶  | 2021-08-08T17:08:02.056+08:00                    | 2021-08-08T09:08:02.056026Z 2161 [Warning] [MY-010057] [Server] IP address '129.126.10... |   |                                    |   |            |           |         |   |  |  |  |  |  |  |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |
| ▶  | 2021-08-08T17:09:09.348+08:00                    | 2021-08-08T09:09:09.348054Z 2163 [Warning] [MY-010057] [Server] IP address '129.126.10... |   |                                    |   |            |           |         |   |  |  |  |  |  |  |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |
| ▶  | 2021-08-08T17:09:12.875+08:00                    | 2021-08-08T09:09:12.875116Z 2164 [Warning] [MY-010057] [Server] IP address '129.126.10... |   |                                    |   |            |           |         |   |  |  |  |  |  |  |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |
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| ▶  | 2021-08-08T17:11:07.039+08:00                    | 2021-08-08T09:11:07.039619Z 2168 [Warning] [MY-010057] [Server] IP address '129.126.10... |   |                                    |   |            |           |         |   |  |  |  |  |  |  |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |   |                               |   |