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This project contains two applications:

- 1) car-recognition
- 2) text-recognition

Both projects are written in Java using maven project management tool to manage dependencies for AWS SDK.

To run this project, you will need Java – JDK & JRE and maven installed on the system, links to download both given below:

https://www.java.com/en/download/help/download_options.html

To check JAVA installed, run this command: **java --version**

<https://maven.apache.org/download.cgi>

To check maven installed, run this command: **mvn -version**

To run these both applications for development first go into that project directory, then run following commands:

- 1) **mvn clean package**
- 2) **mvn exec:java -Dexec.mainClass="org.example.App"**

To run this application in production environment in our case in EC2, we will compile it into single jar file and run that jar file on EC2, to create the jar run following command:

- 1) **mvn clean package**

So, it will create the jar file in target folder with name “**text-recognition-1.0-SNAPSHOT-jar-with-dependencies.jar**” for text-recognition and “**car-recognition-1.0-SNAPSHOT-jar-with-dependencies.jar**” for car-recognition”.

Now, we have to host & run car-recognition jar file to EC-A & copy text-recognition jar file to EC-B, process to do this given in following pages.

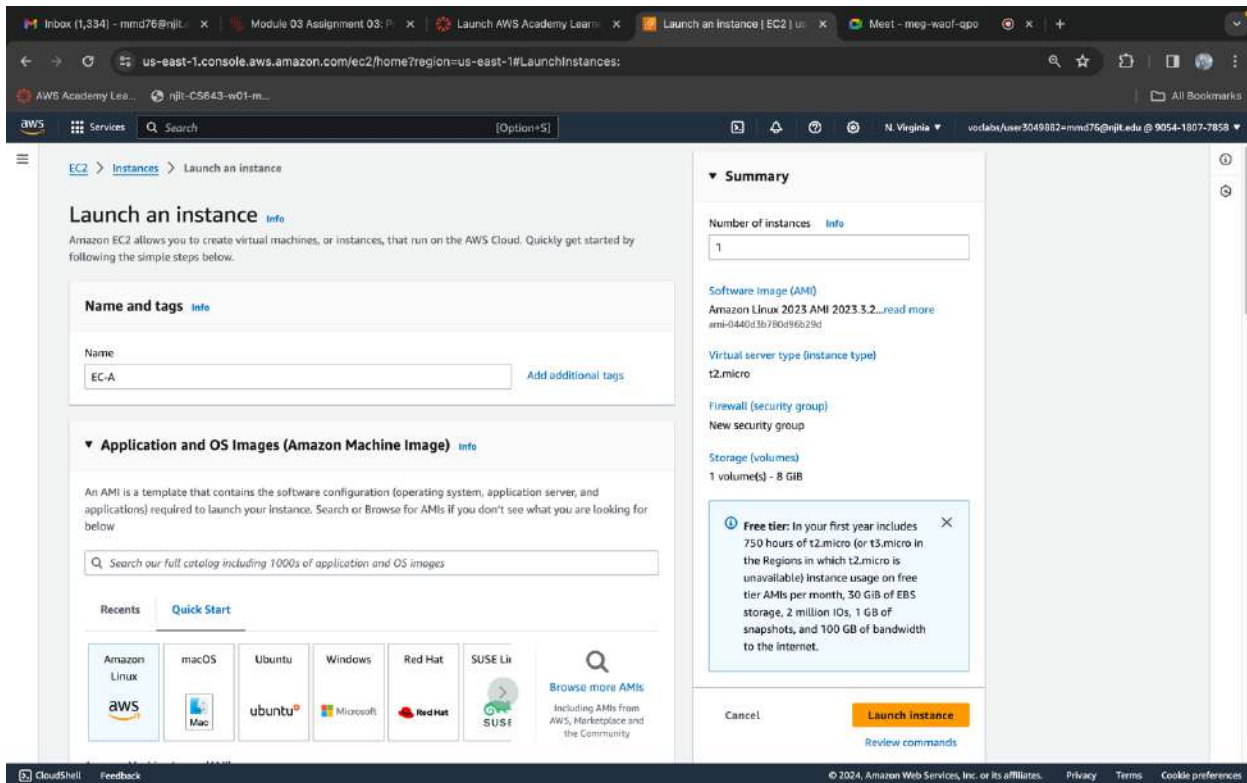
To run this jar file run following command:

```
java -jar text-recognition-1.0-SNAPSHOT-jar-with-dependencies.jar  
java -jar car-recognition-1.0-SNAPSHOT-jar-with-dependencies.jar
```

Cloud Setup

Create two instances: EC-A & EC-B

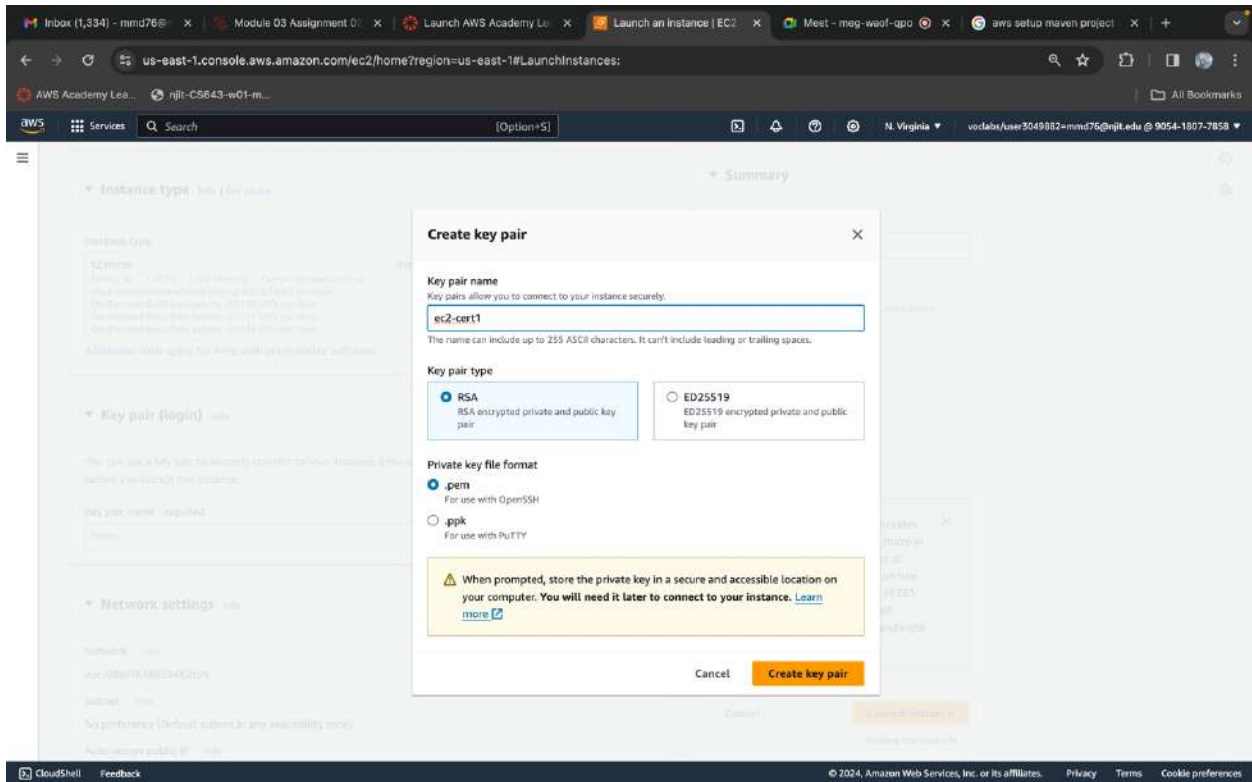
Go to AWS management console in that go to EC2 instances screen and click “Launch Instance” button there



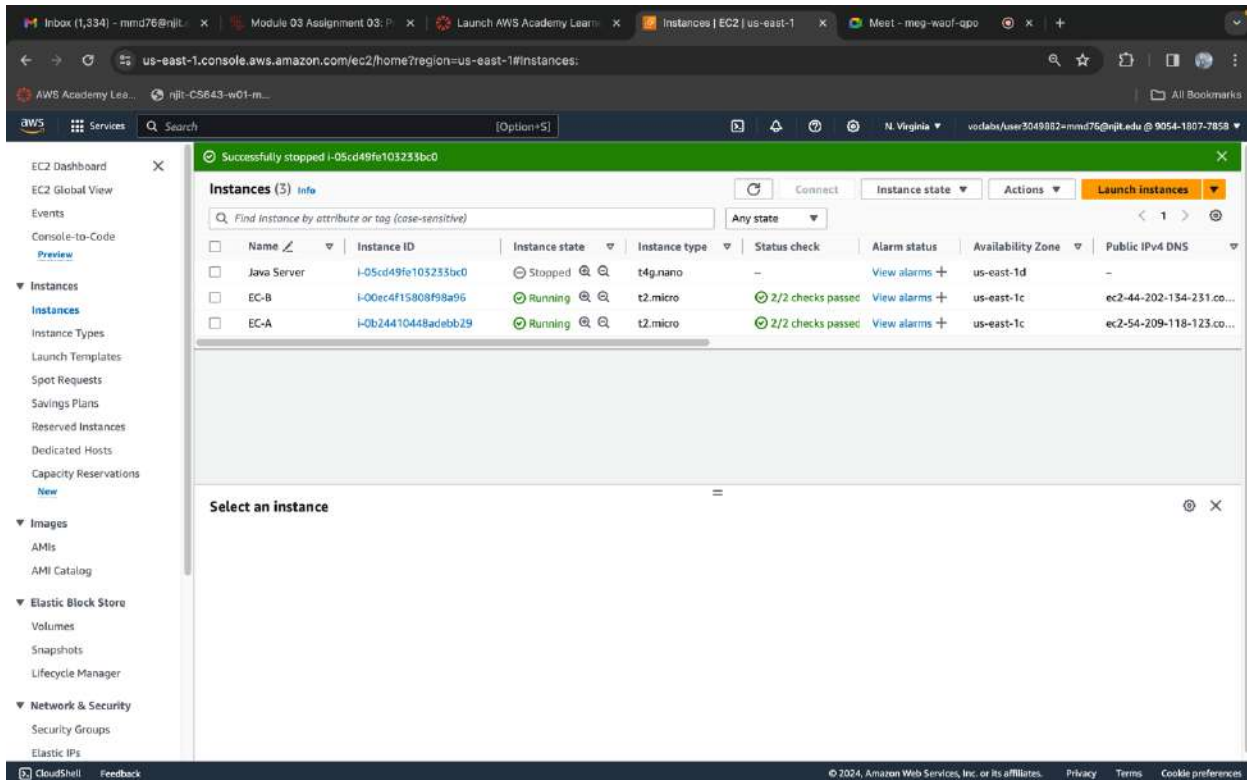
During instance creation it will ask to select Key pair (login), this will be used for connecting with instances securely.

We need create one key pair and same key pair will be used for both the instances.

It will be used whenever we want to connect to this instances from our local machine.



Once both the instances have been created it will show in instances screen, wait until instance state is “Running”.



Java installation on EC2 to run java code

First connect to EC2 from local machine using SSH:

We can connect to EC2 using Public IPv4 DNS that we can find in when we click on particular EC2 from instances screen:

Form there click on “Connect” button, and it will show the command to connect EC2:

ssh -i "ec2-cert.pem" ec2-user@ec2-54-209-118-123.compute-1.amazonaws.com

In this command ec2-cert.pem is the certificate file that we created while creating an instance.

Inbox (1,334) - mmd76@njit.edu

Module 03 Assignment 03 - mmd76@njit.edu

Launch AWS Academy Le... - mmd76@njit.edu

Connect to instance | EC2 - mmd76@njit.edu

Meet - mag-woof-qpo - mmd76@njit.edu

aws setup maven project - mmd76@njit.edu

us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#ConnectToInstance:instanceid=i-0b24410448adebb29

AWS Academy Lea... njit-C5643-w01-m...

AWS Services Search [Option+S]

N. Virginia vodaba/user3049882=mmd76@njit.edu @ 9054-1807-7859

EC2 > Instances > i-0b24410448adebb29 > Connect to instance

Connect to instance Info

Connect to your instance i-0b24410448adebb29 (EC-A) using any of these options

EC2 Instance Connect

Session Manager

SSH client

EC2 serial console

Instance ID

i-0b24410448adebb29 (EC-A)

1. Open an SSH client.
2. Locate your private key file. The key used to launch this instance is ec2-cert.pem
3. Run this command, if necessary, to ensure your key is not publicly viewable.
 `chmod 400 "ec2-cert.pem"`
4. Connect to your instance using its Public DNS:
 `ec2-54-209-118-123.compute-1.amazonaws.com`

Example:

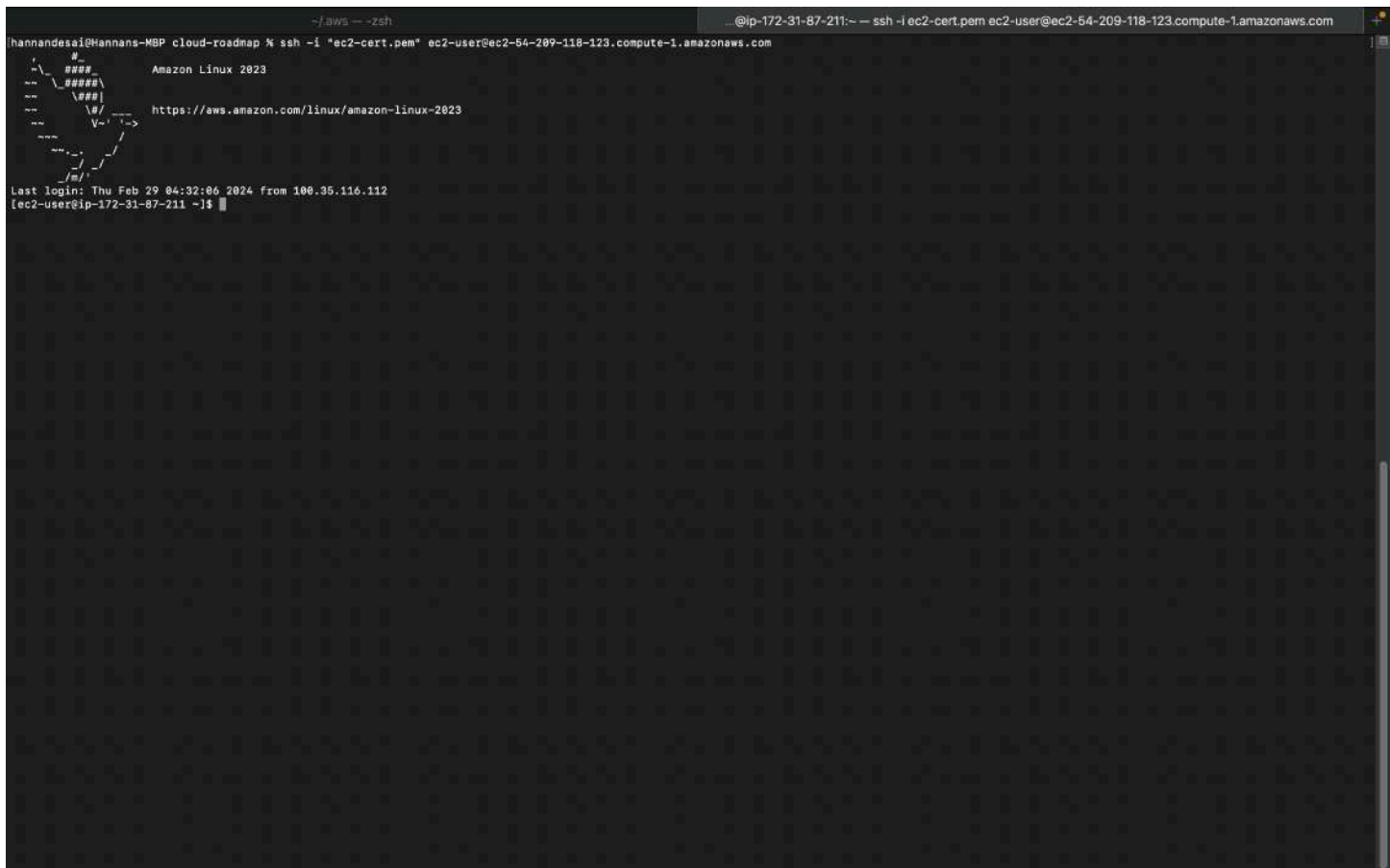
`ssh -i "ec2-cert.pem" ec2-user@ec2-54-209-118-123.compute-1.amazonaws.com`

Note: In most cases, the guessed username is correct. However, read your AMI usage instructions to check if the AMI owner has changed the default AMI username.

Cancel

CloudShell Feedback

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Once connected run below commands to install Java on EC2

```
sudo yum clean metadata
```

```
sudo yum install -y java-1.8.0-amazon-corretto.
```

After successfully running both of these commands it will install Java on EC2 which can be used to run Java applications there, we can check if Java is installed or not using below command:

```
java -version
```

```
hannandesai@Hannans-MBP cloud-roadmap % ssh -i "ec2-cert.pem" ec2-user@ec2-54-209-118-123.compute-1.amazonaws.com
Amazon Linux 2023
https://aws.amazon.com/linux/amazon-linux-2023

Last login: Thu Feb 29 04:32:06 2024 from 100.35.116.112
[ec2-user@ip-172-31-87-211 ~]$ java -version
openjdk version "1.8.0_402"
OpenJDK Runtime Environment Corretto-8.402.08.1 (build 1.8.0_402-b08)
OpenJDK 64-Bit Server VM Corretto-8.402.08.1 (build 25.402-b08, mixed mode)
[ec2-user@ip-172-31-87-211 ~]$
```

So, we can see that Java is installed!

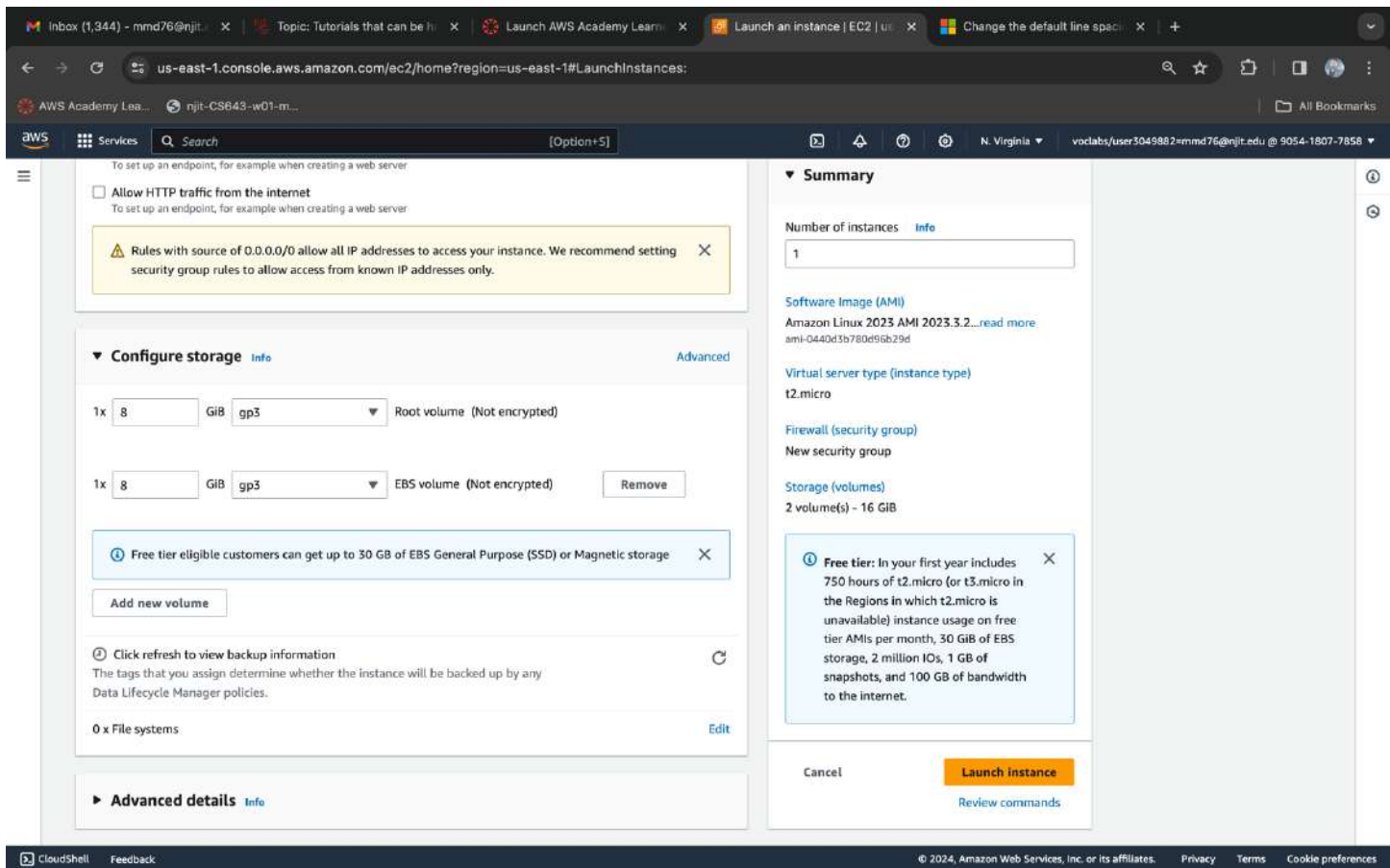
We have to repeat this Java installation process for both the instances we have created:

Setup EBS (Elastic Block Storage) on EC-B for storing process output:

So, first when creating an EC-B instance, there will be an option to mount EBS to this instance, as given in following screenshot.

In this click on Add Volume option, modify the size to desired size, so in this instance AWS will allocate EBS storage as well.

So this is an extra step we have to follow while creating EC-B.



Now, we have to mount this EBS value in EC-B to make it available for use, to do this we have to run following commands on EC-B:

1. lsblk
2. sudo file -s /dev/xvdb
3. sudo mkfs -t xfs /dev/xvdb
4. sudo mkdir /ebs-data
5. sudo mount /dev/xvdb /ebs-data
6. file -s /dev/xvdb

Followed this link for more detailed explanation:

<https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/ebs-using-volumes.html>

The screenshot displays the AWS Academy Learner Lab interface. The browser's address bar shows the URL `awsacademy.instructure.com/courses/69417/modules/items/6179781`. The interface features a sidebar on the left with navigation options: Home, Modules, Discussions, and Grades. The main content area is divided into two sections. The top section shows a terminal window with the command `aws configure` entered. The bottom section, titled 'Cloud Access', contains a box with AWS CLI credentials to be copied into `~/.aws/credentials`. Below this, it shows session information for the 'Cloud Labs' environment, including the remaining session time (03:49:15), session start and end times, and accumulated lab time (2 days 01:35:00). It also indicates that there is no running instance and provides links to download the SSH key and AWS SSO. At the bottom, a table shows the AWS Account ID (905418077858) and the Region (us-east-1).

Now run following command in EC2 terminal to store these credentials:
aws configure

```
hannandesai@Hannans-MBP cloud-roadmap % ssh -i "ec2-cert.pem" ec2-user@ec2-54-209-118-123.compute-1.amazonaws.com
Amazon Linux 2023
https://aws.amazon.com/linux/amazon-linux-2023

Last login: Thu Feb 29 04:32:06 2024 from 100.35.116.112
[ec2-user@ip-172-31-87-211 ~]$ java -version
openjdk version "1.8.0_402"
OpenJDK Runtime Environment Corretto-8.402.08.1 (build 1.8.0_402-b08)
OpenJDK 64-Bit Server VM Corretto-8.402.08.1 (build 25.402-b08, mixed mode)
[ec2-user@ip-172-31-87-211 ~]$ aws configure
AWS Access Key ID [*****LDADJ]: ASIASF7Y702RFGIBC64V
AWS Secret Access Key [*****0K0J]: aS0PPj38ohHJr/ZXNj7kQ7w00mSxoAgZSqAo3Wsu
Default region name [us-east-1]:
Default output format [None]:
[ec2-user@ip-172-31-87-211 ~]$
```

After running above command, it will create “.aws” directory in EC2 instance, in that directory we have to put our credentials in “credentials” file using vi command:

sudo vi ./aws/credentials

and copy paste the entire credentials into this file

To save this file: **esc → : → wq! → enter**


```
hannandesai@Hannans-MBP text-recognition % cd target
hannandesai@Hannans-MBP target % scp -i ~/Documents/Workspace/cloud-roadmap/ec2-cert.pem text-recognition-1.0-SNAPSHOT-jar-with-dependencies.jar ec2-user@ec2-52-91-86-65.compute-1.amazonaws.com:
The authenticity of host 'ec2-52-91-86-65.compute-1.amazonaws.com (52.91.86.65)' can't be established.
ED25519 key fingerprint is SHA256:4Y9pKMv9Lq01X98bHolet720=ekhyRVAJs3eJRqA46i.
This host key is known by the following other names/addresses:
~/ssh/known_hosts:7: ec2-54-165-170-163.compute-1.amazonaws.com
~/ssh/known_hosts:11: ec2-3-95-163-171.compute-1.amazonaws.com
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'ec2-52-91-86-65.compute-1.amazonaws.com' (ED25519) to the list of known hosts.
text-recognition-1.0-SNAPSHOT-jar-with-dependencies.jar
hannandesai@Hannans-MBP target %
```

100% 15MB 20.8MB/s 00:00

```
hannandesai@Hannans-MBP target % scp -i ~/Documents/Workspace/cloud-roadmap/ec2-cert.pem car-recognition-1.0-SNAPSHOT-jar-with-dependencies.jar ec2-user@ec2-54-174-187-62.compute-1.amazonaws.com:
The authenticity of host 'ec2-54-174-187-62.compute-1.amazonaws.com (54.174.187.62)' can't be established.
ED25519 key fingerprint is SHA256:g463Uu1ietKUCblzyQI+gNOTzK09g6B0VbX10wn9ve.
This host key is known by the following other names/addresses:
~/.ssh/known_hosts:9: ec2-3-82-242-224.compute-1.amazonaws.com
~/.ssh/known_hosts:12: ec2-34-226-142-141.compute-1.amazonaws.com
~/.ssh/known_hosts:14: ec2-54-269-118-123.compute-1.amazonaws.com
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'ec2-54-174-187-62.compute-1.amazonaws.com' (ED25519) to the list of known hosts.
car-recognition-1.0-SNAPSHOT-jar-with-dependencies.jar
hannandesai@Hannans-MBP target %
```

Now connect to EC-A & EC-B using SSH command as mentioned previously:

ssh -i "ec2-cert.pem" <Public IPv4 DNS>

Run following command in both instances to see that file has been uploaded:

ls -ltr

```

...n/target -- ec2-user@ip-172-31-87-211:~ -- zsh      ...cloud-roadmap/text-recognition/target -- zsh      ...c2-54-174-187-62.compute-1.amazonaws.com      ...ec2-52-91-86-65.compute-1.amazonaws.com      +
Last login: Sun Mar 3 16:02:24 on ttys001
hannandesai@Hannans-MBP target % cd ..
hannandesai@Hannans-MBP text-recognition % cd ..
hannandesai@Hannans-MBP cloud-roadmap % ssh -i "ec2-cert.pem" ec2-user@ec2-54-174-187-62.compute-1.amazonaws.com
_ _ _ _ _
|_|   Amazon Linux 2023
|_|   _____
|_|  / ____ \
|_| | |  | | | | https://aws.amazon.com/linux/amazon-linux-2023
|_| | |_| | | | |
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Last login: Sat Mar 2 22:20:27 2024 from 100.35.116.112
[ec2-user@ip-172-31-87-211 ~]$ ls -ltr
total 16276
-rw-r--r--. 1 ec2-user ec2-user 15640308 Mar 3 20:57 car-recognition-1.0-SNAPSHOT-jar-with-dependencies.jar
[ec2-user@ip-172-31-87-211 ~]$
```

Run the jar file:

- 1) Run the car-recognition first on EC-A, using command:
java -jar car-recognition-1.0-SNAPSHOT-jar-with-dependencies.jar

```
...nfarget -- ec2-user@ip-172-31-87-211:~ -- ssh | .../cloud-roadmap/text-recognition/target -- ssh | ... c2-54-174-187-62.compute-1.amazonaws.com | ... ec2-52-91-86-65.compute-1.amazonaws.com | +
[ec2-user@ip-172-31-87-211 ~]$ java -jar car-recognition-1.0-SNAPSHOT-jar-with-dependencies.jar
INFO org.example.App - Application starts
INFO org.example.AWSS RekognitionService - Detected Labels for image: 1.jpg
INFO org.example.App - Image pushed in queue: 1.jpg
INFO org.example.AWSS RekognitionService - Detected Labels for image: 10.jpg
INFO org.example.AWSS RekognitionService - Detected Labels for image: 2.jpg
INFO org.example.App - Image pushed in queue: 2.jpg
INFO org.example.AWSS RekognitionService - Detected Labels for image: 3.jpg
INFO org.example.AWSS RekognitionService - Detected Labels for image: 4.jpg
INFO org.example.App - Image pushed in queue: 4.jpg
INFO org.example.AWSS RekognitionService - Detected Labels for image: 5.jpg
INFO org.example.App - Image pushed in queue: 5.jpg
INFO org.example.AWSS RekognitionService - Detected Labels for image: 6.jpg
INFO org.example.AWSS RekognitionService - Detected Labels for image: 7.jpg
INFO org.example.App - Image pushed in queue: 7.jpg
INFO org.example.AWSS RekognitionService - Detected Labels for image: 8.jpg
INFO org.example.AWSS RekognitionService - Detected Labels for image: 9.jpg
INFO org.example.App - Application ends
[ec2-user@ip-172-31-87-211 ~]$ java -jar car-recognition-1.0-SNAPSHOT-jar-with-dependencies.jar
INFO org.example.App - Application starts
INFO org.example.AWSS RekognitionService - Detected Labels for image: 1.jpg
INFO org.example.App - Image pushed in queue: 1.jpg
INFO org.example.AWSS RekognitionService - Detected Labels for image: 10.jpg
INFO org.example.AWSS RekognitionService - Detected Labels for image: 2.jpg
INFO org.example.App - Image pushed in queue: 2.jpg
INFO org.example.AWSS RekognitionService - Detected Labels for image: 3.jpg
INFO org.example.AWSS RekognitionService - Detected Labels for image: 4.jpg
INFO org.example.App - Image pushed in queue: 4.jpg
INFO org.example.AWSS RekognitionService - Detected Labels for image: 5.jpg
INFO org.example.App - Image pushed in queue: 5.jpg
INFO org.example.AWSS RekognitionService - Detected Labels for image: 6.jpg
INFO org.example.AWSS RekognitionService - Detected Labels for image: 7.jpg
INFO org.example.App - Image pushed in queue: 7.jpg
INFO org.example.AWSS RekognitionService - Detected Labels for image: 8.jpg
INFO org.example.AWSS RekognitionService - Detected Labels for image: 9.jpg
INFO org.example.App - Application ends
[ec2-user@ip-172-31-87-211 ~]$ ls -ltr
total 15276
-rw-r--r-- 1 ec2-user ec2-user 16648394 Mar 3 21:18 car-recognition-1.0-SNAPSHOT-jar-with-dependencies.jar
[ec2-user@ip-172-31-87-211 ~]$ java -jar car-recognition-1.0-SNAPSHOT-jar-with-dependencies.jar
INFO org.example.App - Application starts
INFO org.example.AWSS RekognitionService - Detected Labels for image: 1.jpg
INFO org.example.App - Image pushed in queue: 1.jpg
INFO org.example.AWSS RekognitionService - Detected Labels for image: 10.jpg
INFO org.example.AWSS RekognitionService - Detected Labels for image: 2.jpg
INFO org.example.App - Image pushed in queue: 2.jpg
INFO org.example.AWSS RekognitionService - Detected Labels for image: 3.jpg
INFO org.example.AWSS RekognitionService - Detected Labels for image: 4.jpg
INFO org.example.App - Image pushed in queue: 4.jpg
INFO org.example.AWSS RekognitionService - Detected Labels for image: 5.jpg
INFO org.example.App - Image pushed in queue: 5.jpg
INFO org.example.AWSS RekognitionService - Detected Labels for image: 6.jpg
INFO org.example.AWSS RekognitionService - Detected Labels for image: 7.jpg
INFO org.example.App - Image pushed in queue: 7.jpg
INFO org.example.AWSS RekognitionService - Detected Labels for image: 8.jpg
INFO org.example.AWSS RekognitionService - Detected Labels for image: 9.jpg
INFO org.example.App - Application ends
[ec2-user@ip-172-31-87-211 ~]$
```

- 2) Then run text-recognition on EC-B, using command:
java -jar text-recognition-1.0-SNAPSHOT-jar-with-dependencies.jar


```
..n/target -- ec2-user@ip-172-31-87-211:~ -- zsh | ..cloud-roadmap/text-recognition/target -- zsh | ..c2-54-174-187-62.compute-1.amazonaws.com | ..ec2-52-91-86-65.compute-1.amazonaws.com | +
[ec2-user@ip-172-31-94-136 ~]$ java -jar text-recognition-1.0-SNAPSHOT-jar-with-dependencies.jar
INFO org.example.App - Text Recognition starts
INFO org.example.SQSService - No of messages received from queue: 6
INFO org.example.AWSService - No of text detected in Image: 1.jpg are: 3
INFO org.example.SQSService - Message deleted from queue: 1.jpg
INFO org.example.AWSService - No of text detected in Image: 2.jpg are: 0
INFO org.example.SQSService - Message deleted from queue: 2.jpg
INFO org.example.AWSService - No of text detected in Image: 4.jpg are: 3
INFO org.example.SQSService - Message deleted from queue: 4.jpg
INFO org.example.AWSService - No of text detected in Image: 5.jpg are: 0
INFO org.example.SQSService - Message deleted from queue: 5.jpg
INFO org.example.AWSService - No of text detected in Image: 7.jpg are: 9
INFO org.example.SQSService - Message deleted from queue: 7.jpg
INFO org.example.SQSService - Message deleted from queue: -1
INFO org.example.App - =====All Images Processed=====
Image: 1.jpg, Text: 3 BRB1675BRB167
Image: 4.jpg, Text: YH19 OTZYH19GTZ
Image: 7.jpg, Text: LamborghiniLP 618 LB80BWLamborghiniLP618 LB80BWL
INFO org.example.App - ===== Process Finished output saved to /ebs-data/image-recognition/output.txt =====
INFO org.example.App - Text Recognition ends
[ec2-user@ip-172-31-94-136 ~]$
```

So, now both the process finished and from the output image 1,4 & 7 have both car and text in it, output has been written in file format (.txt) on associated EBS directory “ebs-data/image-recognition.output.txt”, this directory we have created previously.

.../target -- ec2-user@ip-172-31-87-211:~ -- zsh

...cloud-roadmap/text-recognition/target -- zsh

...c2-54-174-167-62.compute-1.amazonaws.com

...ec2-52-91-86-85.compute-1.amazonaws.com

+

Image: 1.jpg, Text: \$ 888167888167

Image: 4.jpg, Text: YH19 072YH19072

Image: 7.jpg, Text: LamborghiniLP 610 L880BW

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