

Assignment 1 – IaaS and FaaS

You will submit screenshots of the core steps in one PDF for all assignments. ACCEPTANCE CRITERIA – Include the followings in the **PDF**:

- Web page that shows your name. The web app in EC2.
- Lambda that returns your friends names.
- S3 bucket URL.

Please include the **entire screenshot of the desktop**. Not just portion of it.

Task 1 – IaaS (EC2) – Launch a simple web app on EC2

- Spin up an EC2 instance.
 - a. Allow HTTP:80 port from the world (0.0.0.0/0) in the Network Setting panel.
 - b. SSH:22 from 0.0.0.0/0 is selected by default. Double check that. It will be used to connect to the instance.
- Connect to the instance. There are 4 ways to connect to your server, SSH, EC2 connect, IAM. Refer: [Connect to your Linux instance](#)
- Configure a web server on EC2.

```
sudo -s => Logging as a root user so you can execute any command
yum install httpd -y => Installing an Apache web server package
service httpd start => Starting the server
cd /var/www/html => Changing the directory to customize the default page.
nano index.html => Create the index.html and write your name here as HTML.
```

If the web app is not responding:

- Make sure you are making <http://<your ip>>, not **https** in your browser.
- Check Security Group if it allows port 80.

Task 2 – FaaS (Lambda) – Simple API with Lambda function URL

Create a lambda function that returns an array of strings. Make it an API by enabling the public URL.

Refer: [Creating and managing Lambda function URLs](#)

- a. Enable URL and enable **CORS**
- b. [If it is AWS Academy account] Go to Change IAM role and select preconfigured **LabRole**. If it is a regular AWS account, skip this step. The IAM role will be created automatically.

Task 3 – Deploying a static website in S3

Call the API in Lambda from the React app and deploy the app in S3. Refer: [Hosting a static website using Amazon S3](#)

- c. Install NodeJS on your laptop
- d. `npx create-react-app appname` – It will create the React app template
- e. `npm install axios`
- f. `npm start` – to start your front-end app
- g. `npm run build` – after testing, build the app
- h. Create a bucket and deselect “Block public access”
- i. Drop all files inside the build folder into the bucket.
- j. Write a policy that makes all objects in the bucket public. Refer to the next section.
- k. Enable “static website hosting” and define the index.html as the index and error page.

If you google, you will find examples of these 3 tasks all over the internet.

Task4: Delete the EC2 instance

Delete the EC2 instance once you are done. EC2 costs a lot whereas Lambda and S3 don't cost much.

Snippets

The bucket policy that makes all objects inside it public:

```
{
  "Id": "Policy1650912821527",
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "Stmt1650912820312",
      "Action": [
        "s3:GetObject"
      ],
      "Effect": "Allow",
      "Resource": "arn:aws:s3:::<yourbucket>/*",
      "Principal": "*"
    }
  ]
}
```

The React web app:

```
import axios from "axios";
import { useEffect, useState } from "react";

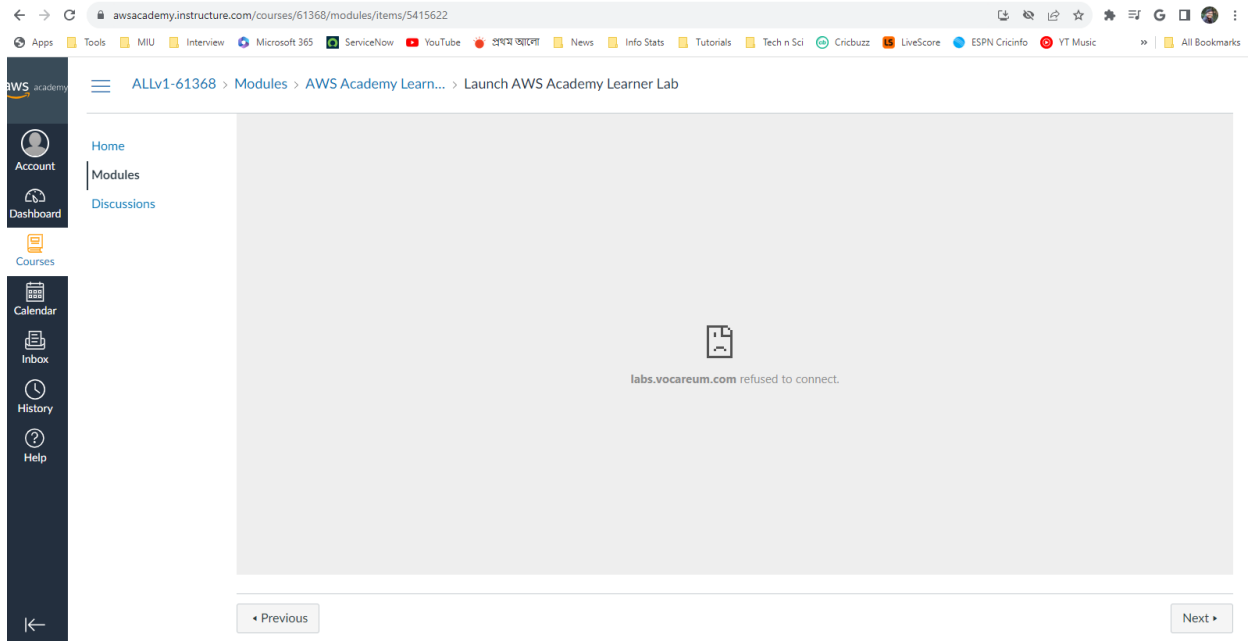
export default function App() {
  const [students, setstudents] = useState([]);

  useEffect(() => {
    async function fetchStudents() {
      const studentsFromLambda = (
        await axios.get(
          "<your lambda URL>"
        )
      ).data;
      setstudents(studentsFromLambda);
      console.log(studentsFromLambda);
    }

    fetchStudents();
  }, []);
  return (
    <div>
      Cloud Computing course
      <ol>
        {students.map((student) => (
          <li>{student}</li>
        ))}
      </ol>
    </div>
  );
}
```

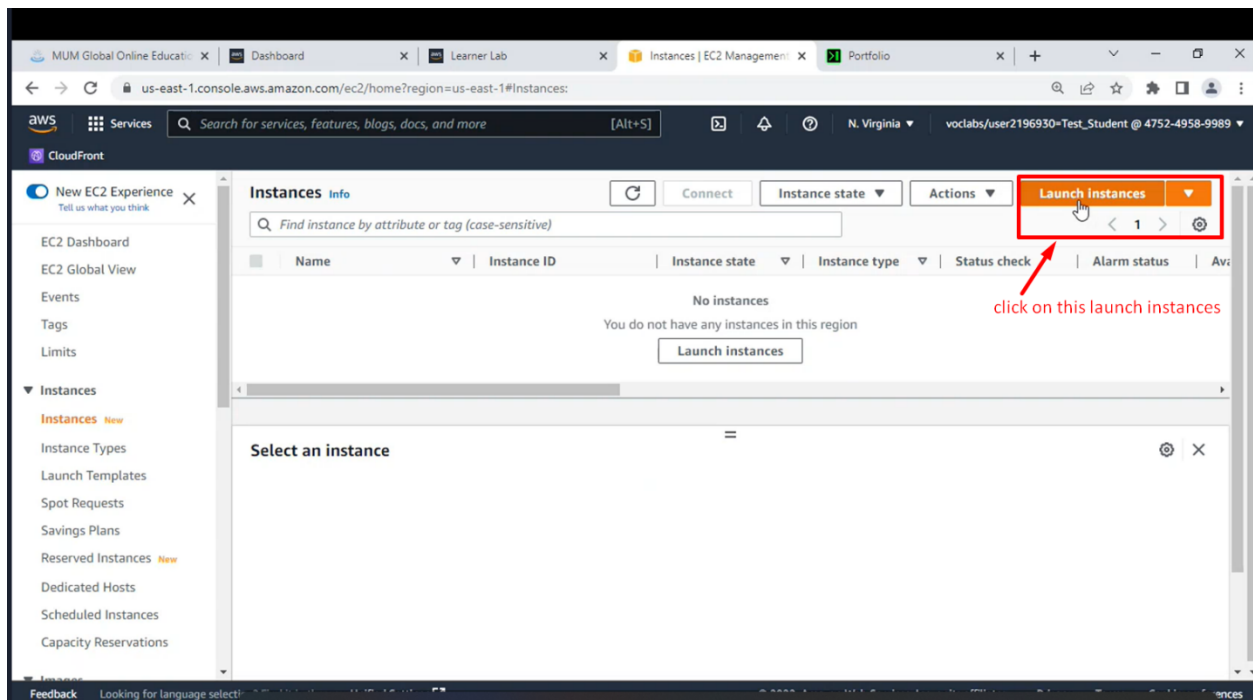
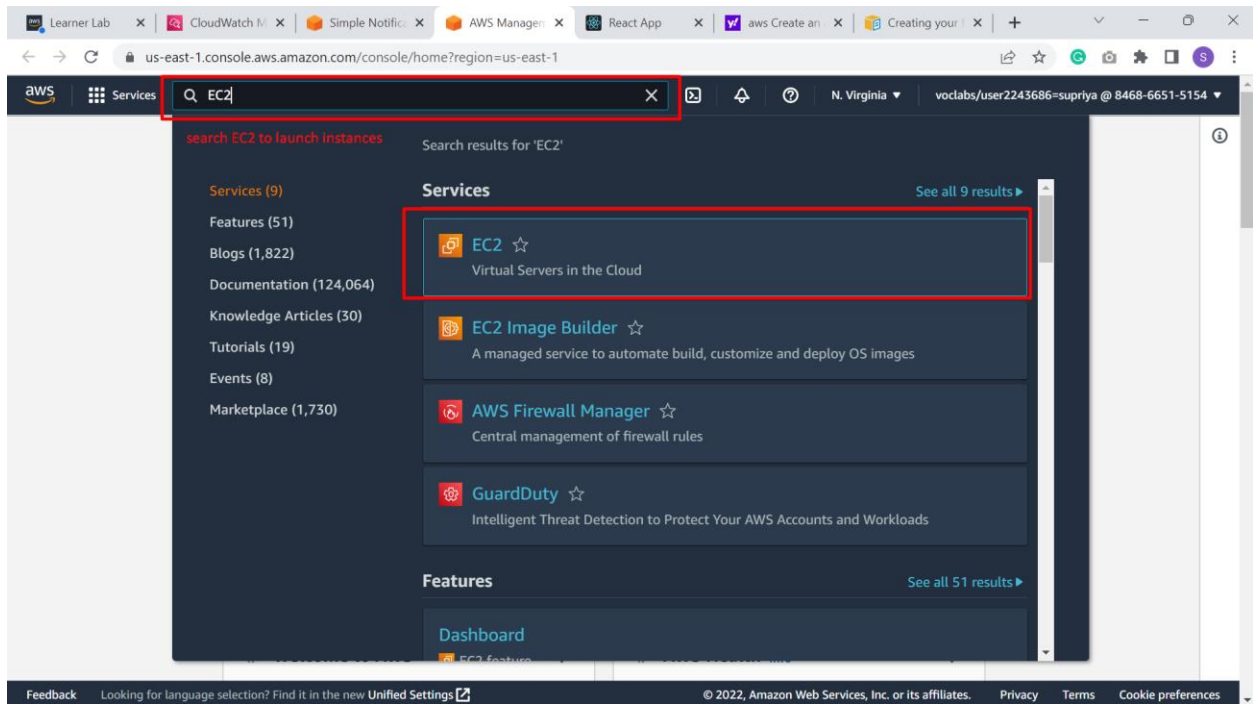
AWS Academy error

If you get this error, it is something wrong with your device or browser configuration that cannot access to the required website labs.vocareum.com. For example, one student resolved it by allowing the third party cookies in google chrome browser.



Setting up a web server on EC2

Step-by-step instructions for you to refer. There are many ways to achieve the same result. You don't have to follow it. It will waste a lot of time. Instead, you can do it on your own without following it step by step since you paid careful attention in class and understood the idea.



MUM Global Online Education | Dashboard | Learner Lab | EC2 Management Console | Portfolio

us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#LaunchInstances:

Search for services, features, blogs, docs, and more [Alt+S]

N. Virginia | voclabs/user2196930-Test_Student @ 4752-4958-9989

CloudFront

Search our full catalog including 1000s of application and OS images

Quick Start for developer select default Amazon Linux

Amazon Linux macOS Ubuntu Windows Red Hat

Amazon Linux 2 Kernel 5.10 AMI (HVM) - Kernel 5.10, SSD Volume Type
ami-09d3b3274b6c5d4aa (64-bit (x86)) / ami-081dc0707789c2daf (64-bit (Arm))
Virtualization: hvm ENA enabled: true Root device type: ebs

Free tier eligible

Description
Amazon Linux 2 Kernel 5.10 AMI 2.0.20221004.0 x86_64 HVM gp2

Architecture AMI ID
64-bit (x86) ami-09d3b3274b6c5d4aa Verified provider

Summary

Number of instances Info
1

Software Image (AMI)
Amazon Linux 2 Kernel 5.10 AMI...read more
ami-09d3b3274b6c5d4aa

Virtual server type (instance type)
t2.micro

Firewall (security group)
New security group

Storage (volumes)
1 volume(s) - 8 GiB

MUM Global Online Education | Dashboard | Learner Lab | EC2 Management Console

us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#LaunchInstances:

Search for services, features, blogs, docs, and more [Alt+S]

CloudFront

Amazon Linux 2 Kernel 5.10 AMI 2.0.20221004.0 x86_64 HVM gp2

Architecture AMI ID
64-bit (x86) ami-09d3b3274b6c5d4aa Verified provider

▼ Instance type Info

Instance type

t2.micro Free tier eligible
Family: t2 1 vCPU 1 GiB Memory
On-Demand Linux pricing: 0.0116 USD per Hour
On-Demand Windows pricing: 0.0162 USD per Hour

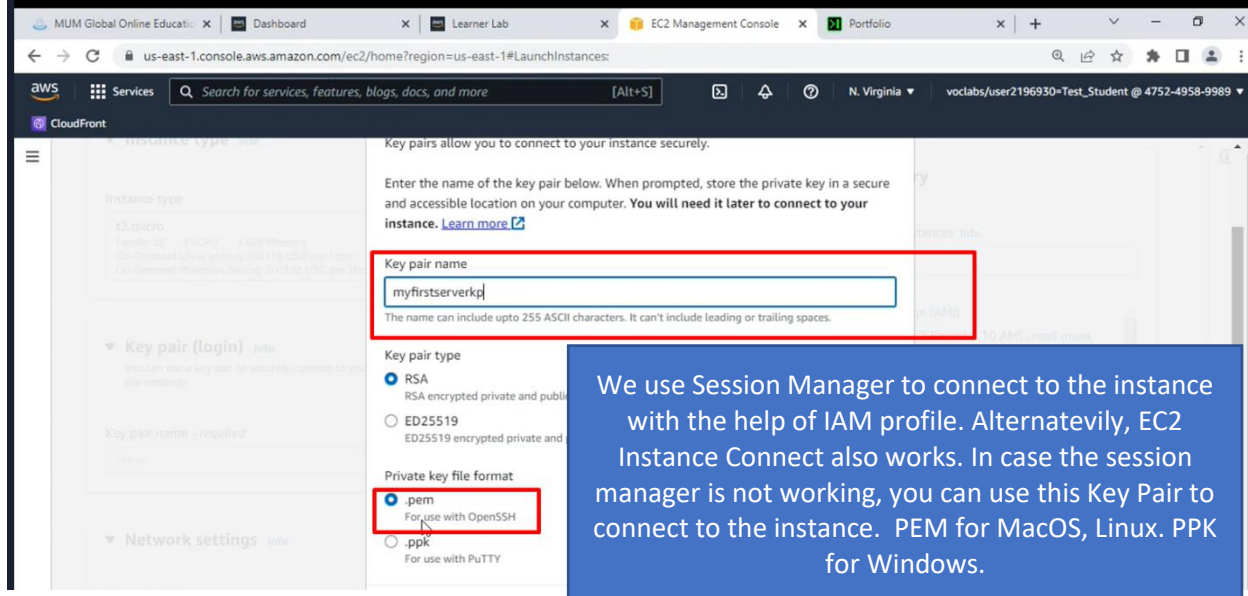
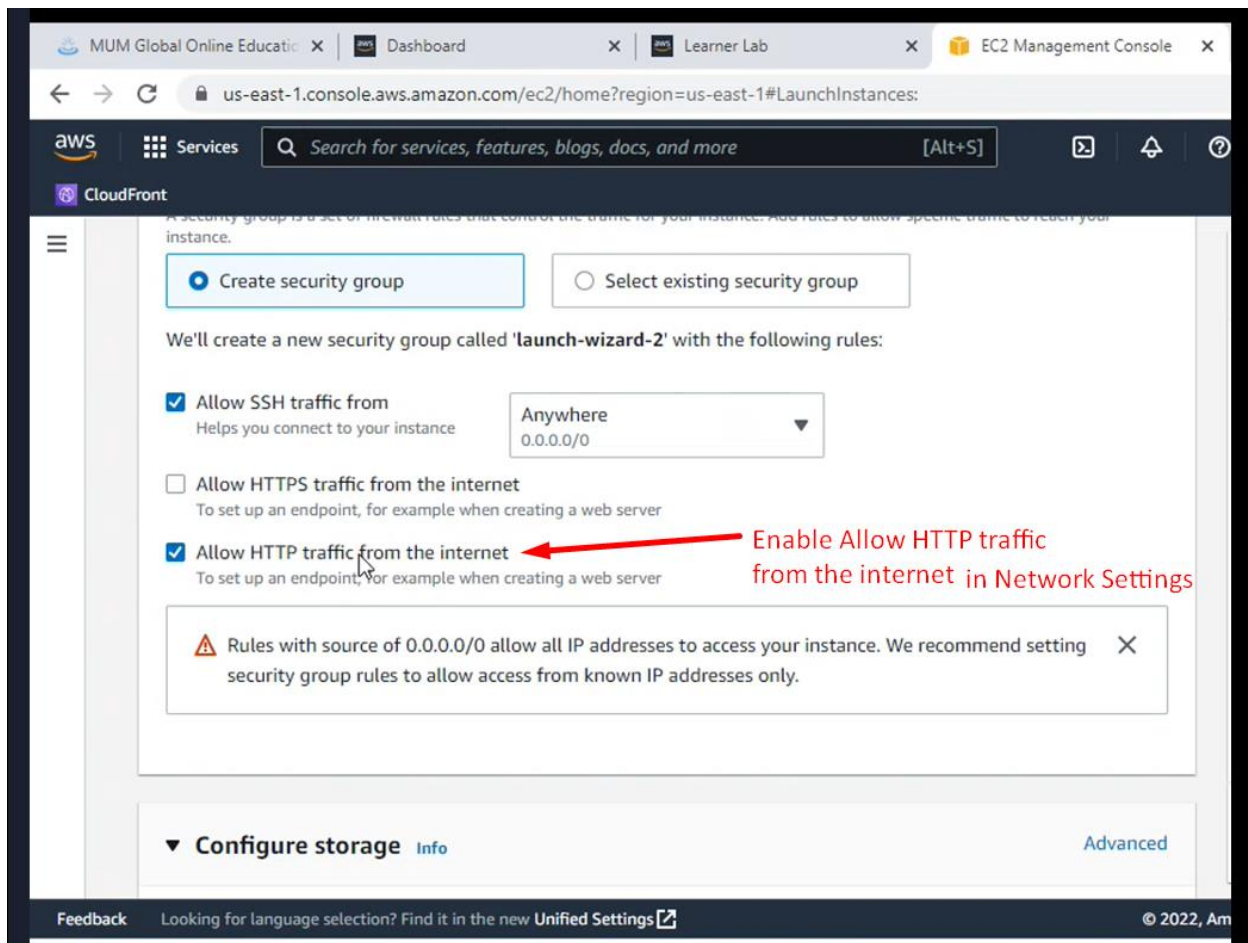
Compare instance types

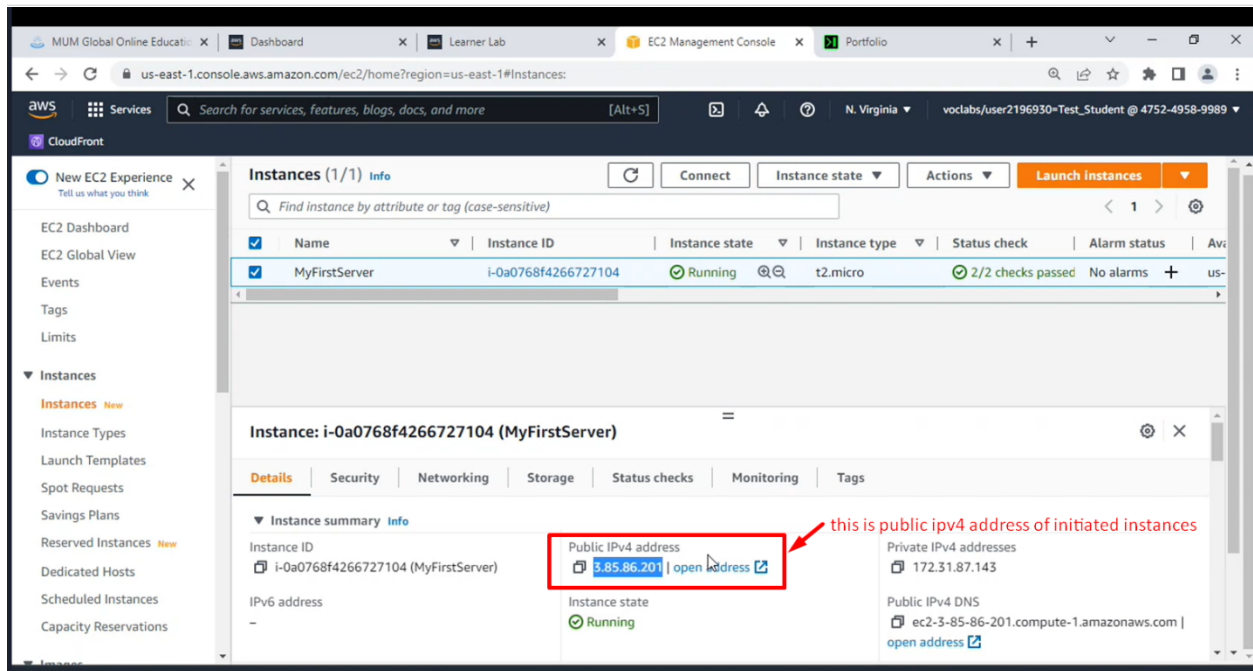
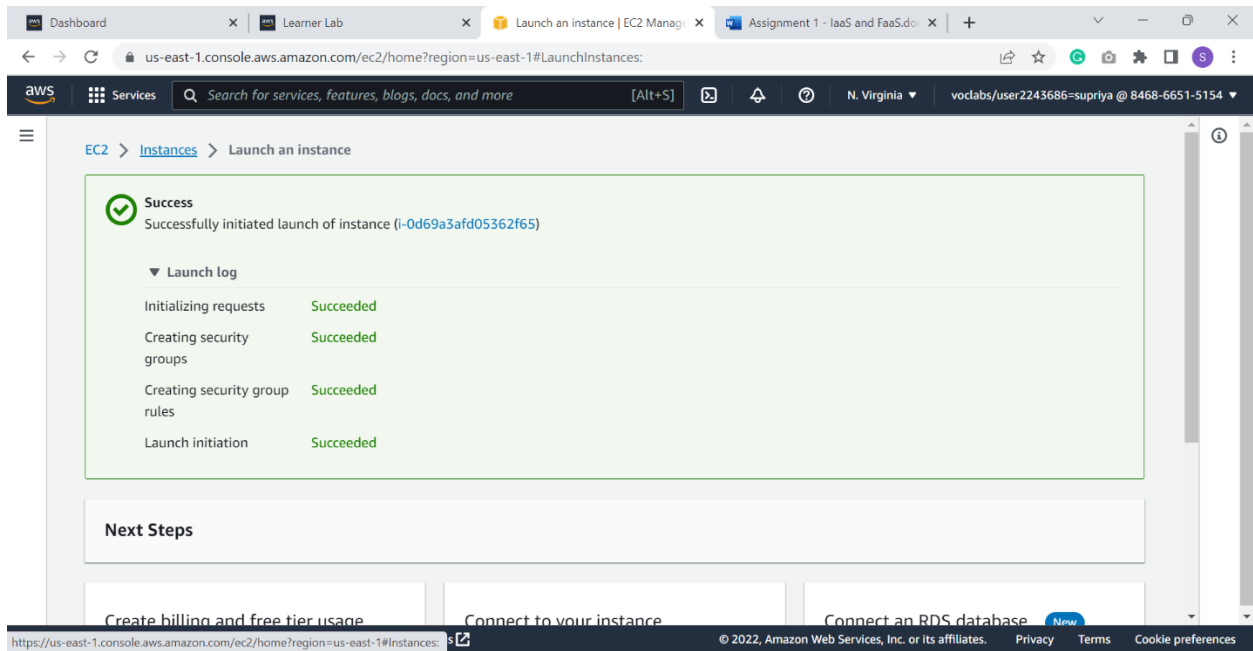
▼ Key pair (login) Info

You can use a key pair to securely connect to your instance. Ensure that you have access to the selected key pair before you launch the instance.

Key pair name - required
Select

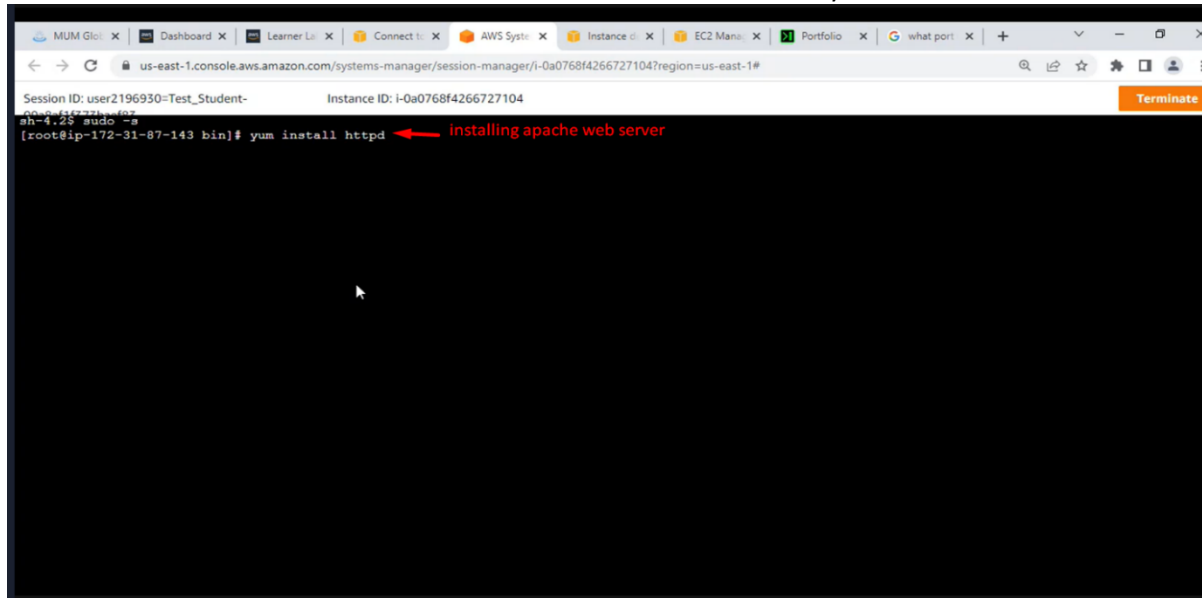
Create new key pair





1. Configure a web server on EC2.
 - a. Select the instance
 - b. Hit Connect
 - c. Select the “**EC2 Instance Connect**” tab and hit Connect. For more information: <https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/connect.html>
 - d. To install and customize a web server:
 - sudo -s** => Logging as a root user so you can start the HTTPD service
 - yum install httpd -y** => Installing a web server
 - service httpd start** => Starting the server

`cd /var/www/html` => Changing the directory to customize the default Apache page.
`nano index.html` => Create the index.html and write your name here as HTML.

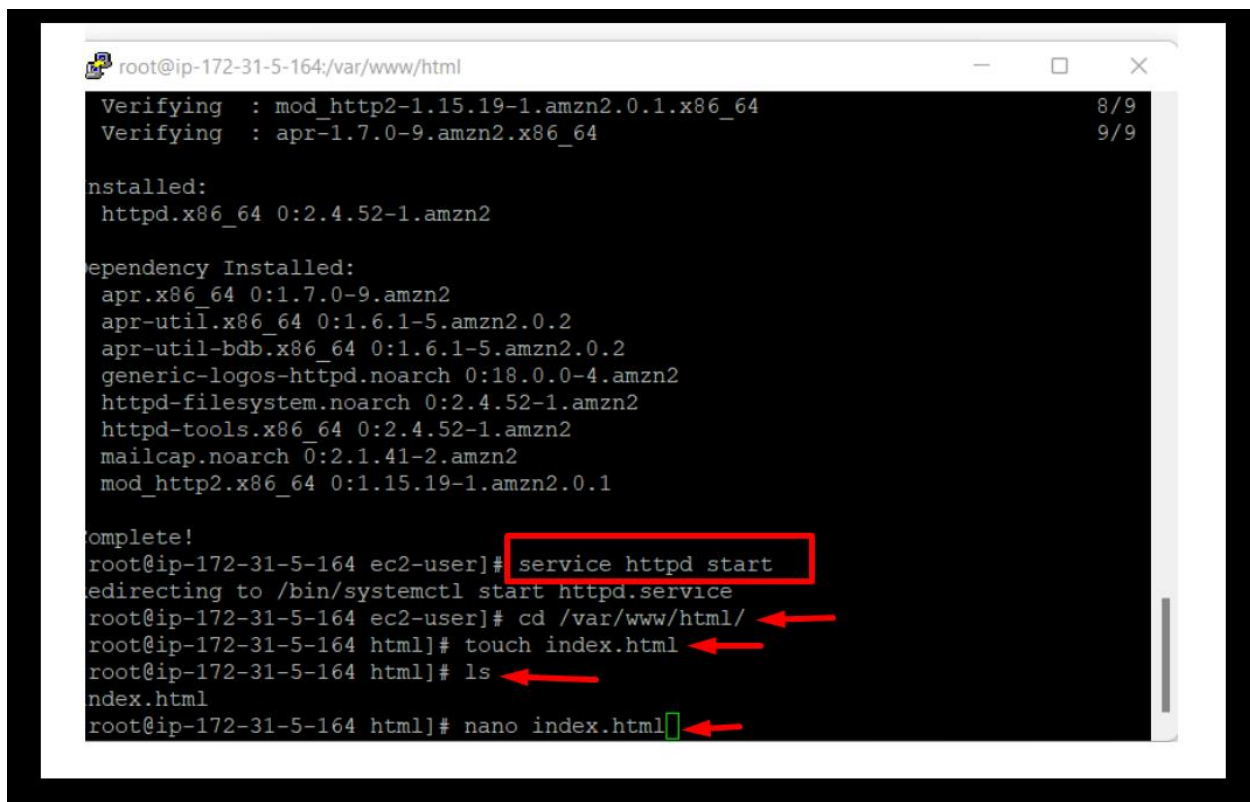
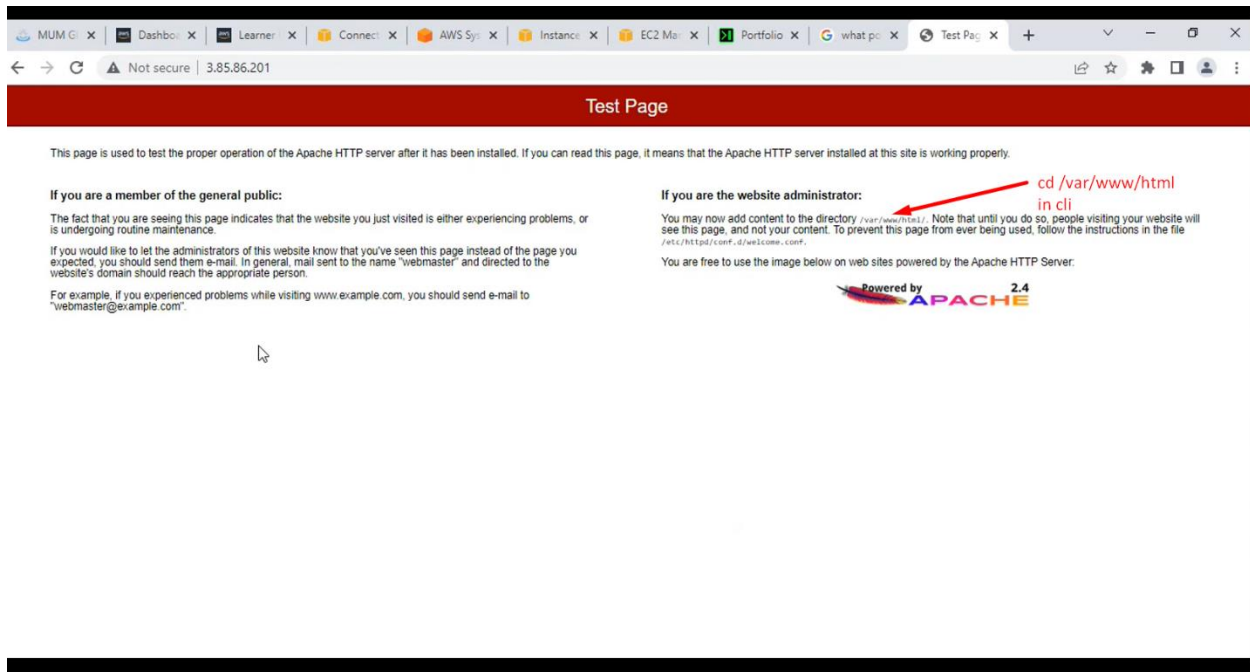


```
root@ip-172-31-5-164:/home/ec2-user
Verifying : httpd-filesystem-2.4.52-1.amzn2.noarch 4/9
Verifying : httpd-2.4.52-1.amzn2.x86_64 5/9
Verifying : mailcap-2.1.41-2.amzn2.noarch 6/9
Verifying : generic-logos-httpd-18.0.0-4.amzn2.noarch 7/9
Verifying : mod_http2-1.15.19-1.amzn2.0.1.x86_64 8/9
Verifying : apr-1.7.0-9.amzn2.x86_64 9/9

Installed:
  httpd.x86_64 0:2.4.52-1.amzn2

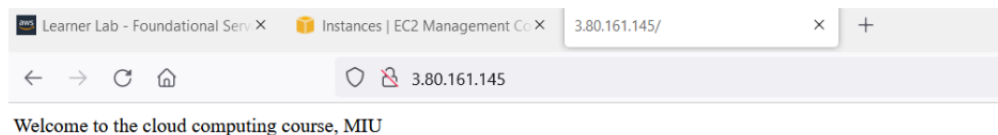
Dependency Installed:
  apr.x86_64 0:1.7.0-9.amzn2
  apr-util.x86_64 0:1.6.1-5.amzn2.0.2
  apr-util-bdb.x86_64 0:1.6.1-5.amzn2.0.2
  generic-logos-httpd.noarch 0:18.0.0-4.amzn2
  httpd-filesystem.noarch 0:2.4.52-1.amzn2
  httpd-tools.x86_64 0:2.4.52-1.amzn2
  mailcap.noarch 0:2.1.41-2.amzn2
  mod_http2.x86_64 0:1.15.19-1.amzn2.0.1

Complete!
[root@ip-172-31-5-164 ec2-user]# service httpd start
Redirecting to /bin/systemctl start httpd.service
[root@ip-172-31-5-164 ec2-user]#
```

```
root@ip-172-31-5-164:/var/www/html
GNU nano 2.9.8 index.html Modified
<p>Welcome to the cloud computing course, MIU <p>
File Name to Write: index.html
^G Get Help      M-D DOS Format  M-A Append      M-B Backup File
^C Cancel        M-M Mac Format  M-P Prepend     ^T To Files
```

Go to the website and reload



Creating a public Lambda endpoint

Change the IAM role to LabRole if it is AWS Academy Account. If it is your regular account, go with the default. You can create a new role with basic permissions.

Create function [Info](#)

AWS Serverless Application Repository applications have moved to [Create application](#).

- ☒ Author from scratch
Start with a simple Hello World example.

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.

Architecture [Info](#)

Choose the instruction set architecture you want for your function code.

- ☒ x86_64
- ☐ arm64

Permissions [Info](#)

By default, Lambda will create an execution role with permissions to upload logs to Amazon CloudWatch Logs. You can customize this default role later when adding triggers.

▼ Change default execution role

← Expand

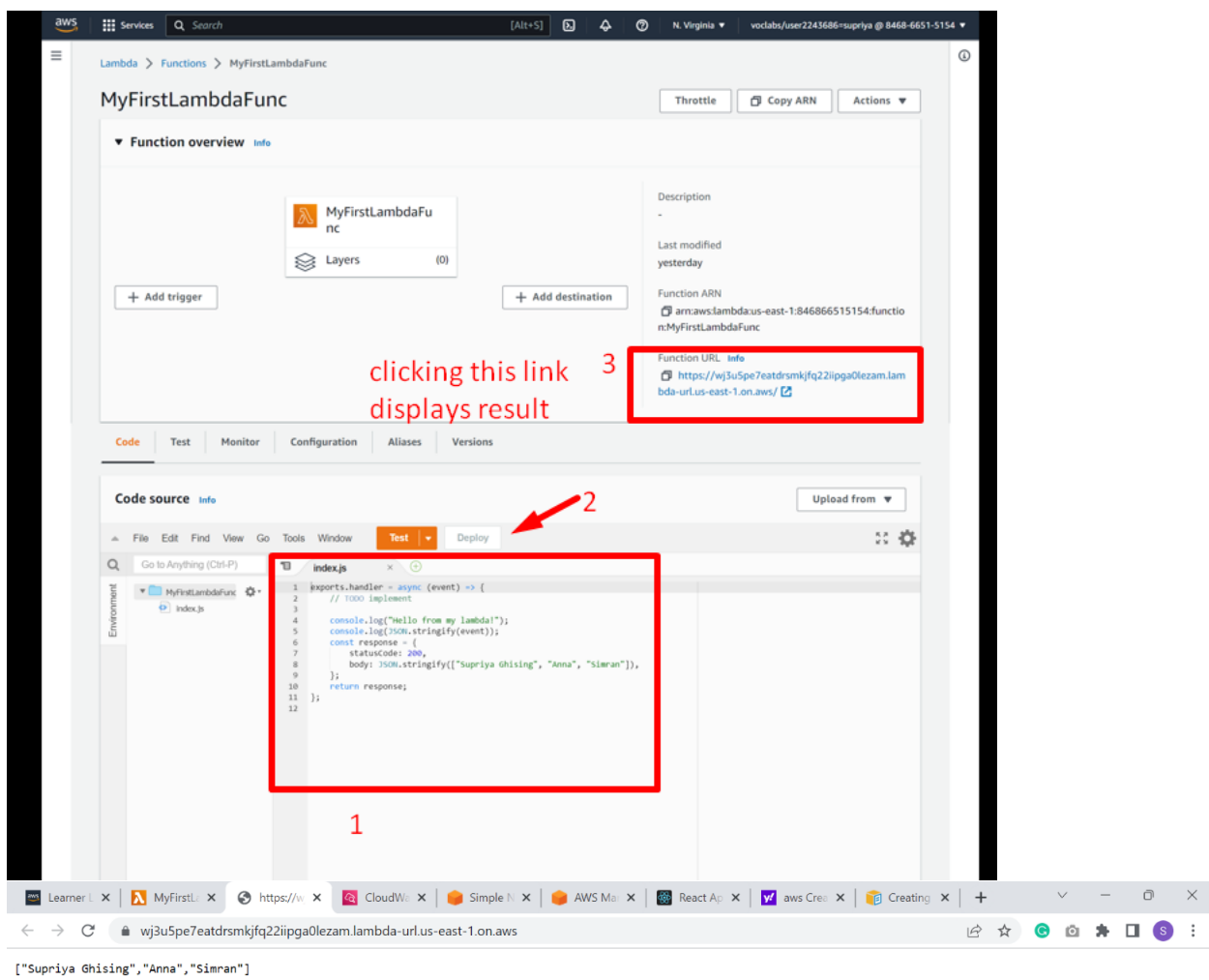
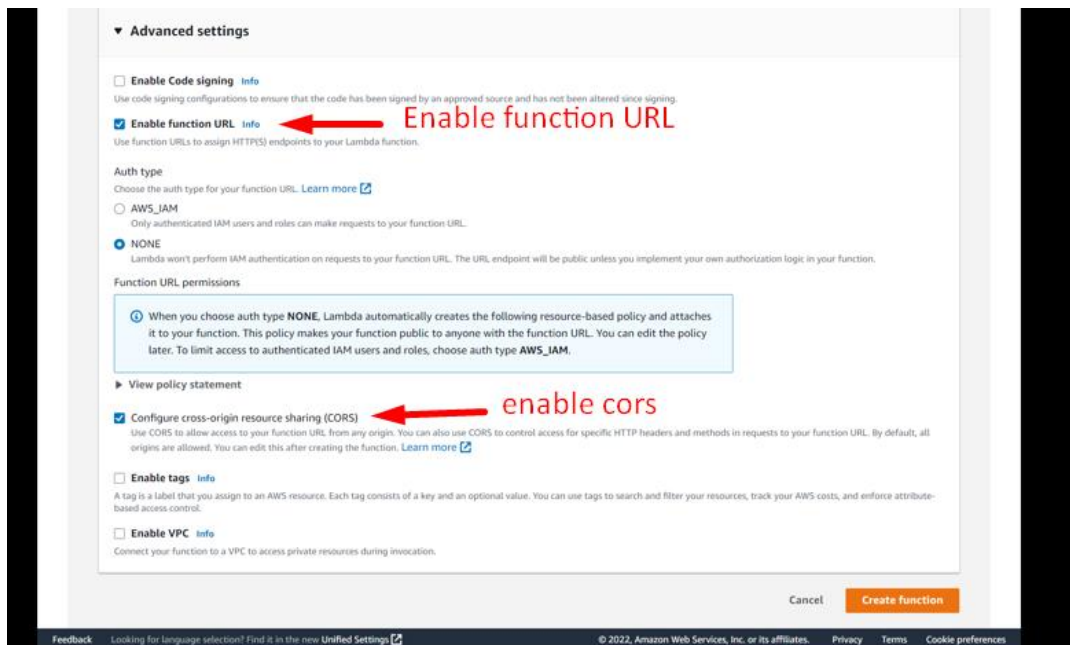
Execution role

Choose a role that defines the permissions of your function. To create a custom role, go to the [IAM console](#).

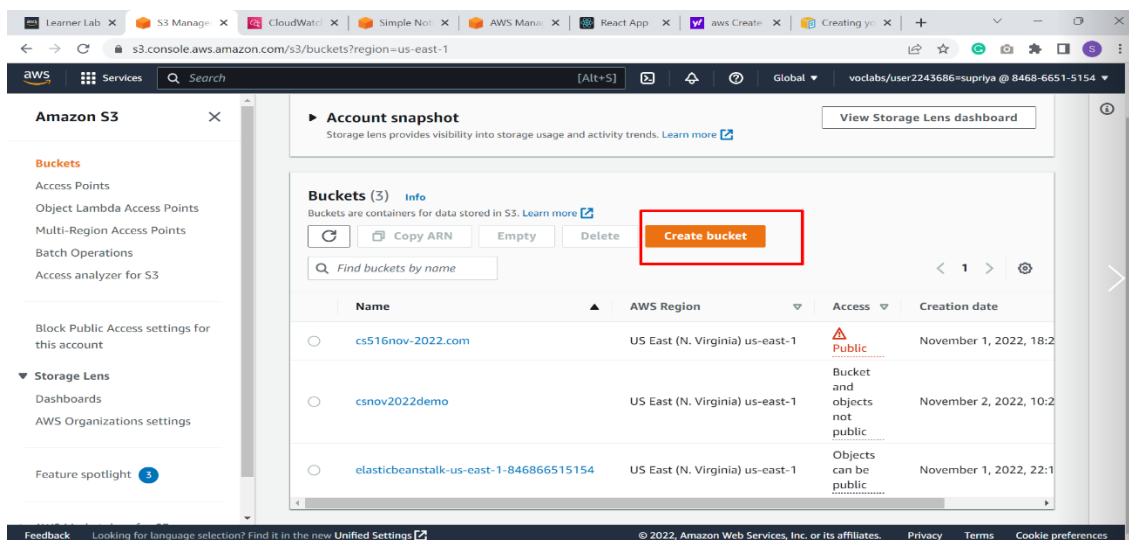
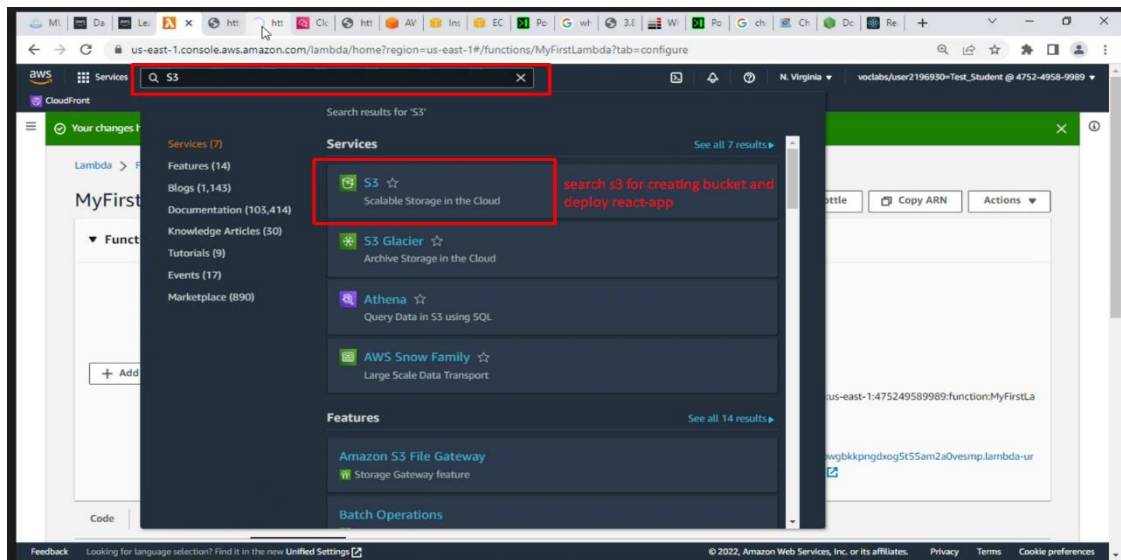
- ☐ Create a new role with basic Lambda permissions
- ☒ Use an existing role ← select
- ☐ Create a new role from AWS policy templates

Existing role

Choose an existing role that you've created to be used with this Lambda function. The role must have permission to upload logs to Amazon CloudWatch Logs.



Deploying a React app to S3



Amazon S3 > Buckets > Create bucket

Create bucket

Buckets are containers for data stored in S3. [Learn more](#)

General configuration

Bucket name

unique-bucketName.com

Bucket name must be globally unique and must not contain spaces or uppercase letters. See rules for bucket naming.

AWS Region

US East (N. Virginia) us-east-1

Copy settings from existing bucket - optional

Only the bucket settings in the following configuration are copied.

Choose bucket

Object Ownership

Control ownership of objects written to this bucket from other AWS accounts and the use of access control lists (ACLs). Object ownership determines who can specify access to objects.

☒ ACLs disabled (recommended)

All objects in this bucket are owned by this account. Access to this bucket and its objects is specified using only policies.

☐ ACLs enabled

Objects in this bucket can be owned by other AWS accounts. Access to this bucket and its objects can be specified using ACLs.

Object Ownership

Bucket owner enforced

Block Public Access settings for this bucket

Public access is granted to buckets and objects through access control lists (ACLs), bucket policies, access point policies, or all. In order to ensure that public access to this bucket and its objects is blocked, turn on Block all public access. These settings apply only to this bucket and its access points. AWS recommends that you turn on Block all public access, but before applying any of these settings, ensure that your applications will work correctly without public access. If you require some level of public access to this bucket or objects within, you can customize the individual settings below to suit your specific storage use cases. [Learn more](#)

☐ Block all public access

Turning this setting on is the same as turning on all four settings below. Each of the following settings are independent of one another.

☐ Block public access to buckets and objects granted through new access control lists (ACLs)

S3 will block public access permissions applied to newly added buckets or objects, and prevent the creation of new public access ACLs for existing buckets and objects. This setting doesn't change any existing permissions that allow public access to S3 resources using ACLs.

☐ Block public access to buckets and objects granted through any access control lists (ACLs)

S3 will ignore all ACLs that grant public access to buckets and objects.

☐ Block public access to buckets and objects granted through new public bucket or access point policies

S3 will block new bucket and access point policies that grant public access to buckets and objects. This setting doesn't change any existing policies that allow public access to S3 resources.

☐ Block public and cross-account access to buckets and objects through any public bucket or access point policies

S3 will ignore public and cross-account access for buckets or access points with policies that grant public access to buckets and objects.

Turning off block all public access might result in this bucket and the objects within becoming public

AWS recommends that you turn on Block all public access, unless public access is required for specific and verified use cases such as static website hosting.

☒ I acknowledge that the current settings might result in this bucket and the objects within becoming public.

Bucket Versioning

Versioning is a means of keeping multiple variants of an object in the same bucket. You can use versioning to preserve, retrieve, and restore every version of every object stored in your Amazon S3 bucket. With versioning, you can easily recover from both unintended user actions and application failures. [Learn more](#)

Bucket Versioning

☒ Disable

☐ Enable

Tags (0) - optional

Track storage cost or other criteria by tagging your bucket. [Learn more](#)

No tags associated with this bucket.

Add tag

Default encryption

Automatically encrypts new objects stored in this bucket. [Learn more](#)

Server-side encryption

☒ Disable

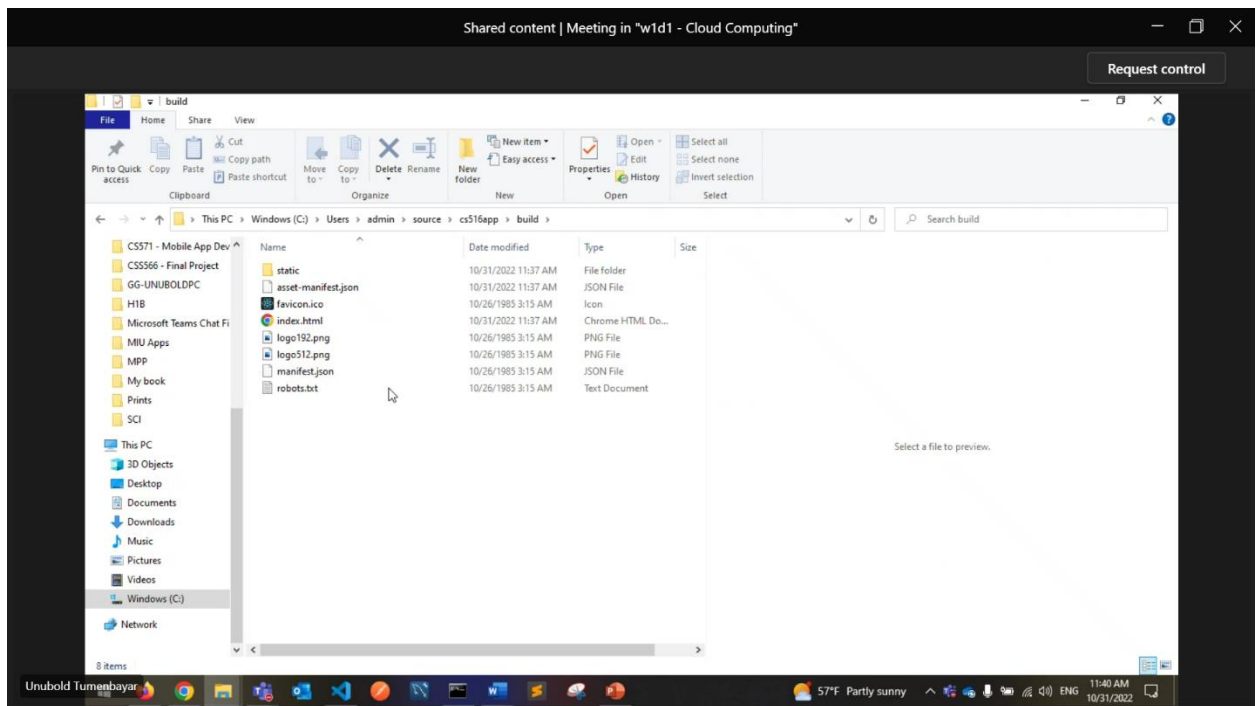
☐ Enable

Advanced settings

After creating the bucket you can upload files and folders to the bucket, and configure additional bucket settings.

Cancel

Create bucket



Buckets (2) Info Refresh Copy ARN Empty Delete Create bucket

Buckets are containers for data stored in S3. [Learn more](#)

Find buckets by name

	Name	AWS Region	Access	Creation date
<input type="radio"/>	cloudbucketlesson	US East (N. Virginia) us-east-1	Objects can be public	April 26, 2022, 23:01:12 (UTC-05:00)
<input type="radio"/>	elasticbeanstalk-us-east-1-068007615521	US East (N. Virginia) us-east-1	Objects can be public	April 25, 2022, 23:04:58 (UTC-05:00)

Go to the **cloudbucketlesson** bucket to upload build folders files of project.

click to the created bucket and upload files or folders of project, you can upload images, videos

Amazon S3 > Buckets > cloudbucketlesson > Upload

Upload [Info](#)

Add the files and folders you want to upload to S3. To upload a file larger than 160GB, use the AWS CLI, AWS SDK or Amazon S3 REST API. [Learn more](#)

Drag and drop files and folders you want to upload here, or choose **Add files**, or **Add folders**.

Files and folders (14 Total, 760.8 KB) [Remove](#) [Add files](#) [Add folder](#)

All files and folders in this table will be uploaded.

<input type="checkbox"/>	Name ▲	Folder ▼	Type ▼	Size ▼
<input type="checkbox"/>	787.4637bb57.chunk.js	static/js/	-	4.5 KB
<input type="checkbox"/>	787.4637bb57.chunk.js.map	static/js/	-	10.0 KB
<input type="checkbox"/>	asset-manifest.json	-	application/json	517.0 B
<input type="checkbox"/>	favicon.ico	-	image/x-icon	3.8 KB
<input type="checkbox"/>	index.html	-	text/html	644.0 B
<input type="checkbox"/>	logo192.png	-	image/png	5.2 KB
<input type="checkbox"/>	logo512.png	-	image/png	9.4 KB

After uploading complete go to the properties tab of bucket.

Amazon S3 > Buckets > cloudbucketlesson

cloudbucketlesson [Info](#)

[Objects](#) [Properties](#) [Permissions](#) [Metrics](#) [Management](#) [Access Points](#)

Static website hosting

☐ Disable
☒ Enable

Index document

Specify the home or default page of the website.

Error document - optional

This is returned when an error occurs.

Then save changes.

Sid may not be required. Make sure there is no type. You can use policy generator to generate it. Don't forget "/" in the resource. Again, in this step take your time and find it out yourself if face issue. Because the issue is only type.

Amazon S3

Buckets

Access Points

Object Lambda Access Points

Multi-Region Access Points

Batch Operations

Access analyzer for S3

Block Public Access settings for this account

Storage Lens

Dashboards

AWS Organizations settings

Feature spotlight

AWS Marketplace for S3

Amazon S3 > Buckets > cs516nov-2022-frontend.com > Edit bucket policy

Edit bucket policy

Bucket policy
The bucket policy, written in JSON, provides access to the objects stored in the bucket. Bucket policies don't apply to objects owned by other accounts.
[Learn more](#)

[Policy examples](#) [Policy generator](#) → you can use it

Bucket ARN
arn:aws:s3::cs516nov-2022-frontend.com

Policy

```
1 {  
2   "Version": "2012-10-17",  
3   "Id": "Policy1650912821527",  
4   "Statement": [  
5     {  
6       "Sid": "Stmnt1650912820312",  
7       "Effect": "Allow",  
8       "Principal": "*",  
9       "Action": "s3:GetObject",  
10      "Resource": "arn:aws:s3::cs516nov-2022-frontend.com/*"  
11    }  
12  ]  
13 }
```

Edit statement

Select a statement
Select an existing statement in the policy or add a new statement.

[+ Add new statement](#)

[+ Add new statement](#)

Edit bucket policy to getObject

JSON Ln 13, Col 1

Security: 0 Errors: 0 Warnings: 0 Suggestions: 0

[Preview external access](#)

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

Feedback Looking for language selection? Find it in the new Unified Settings

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aws

Services

Search

[Alt+S]

Global

voclabs/user2243686=supriya @ 8468-6651-5154

Uploading

26%

Total remaining: 11 files: 538.0 KB(73.94%)
Estimated time remaining: a few seconds
Transfer rate: 13.9 KB/s

Cancel

Upload: status

Close

The information below will no longer be available after you navigate away from this page.

Summary

Destination
s3://cs516nov-2022-frontend.com

Succeeded
3 files, 189.6 KB (26.06%)

Failed
0 files, 0 B (0%)

Files and folders

Configuration

Files and folders (14 Total, 727.7 KB)

Find by name

< 1 2 >

Name	Folder	Type	Size	Status	Error
787.36db6797.chunk.js	static/js/	text/javascript	4.5 KB	Succeeded	-
787.36db6797.chunk.js.map	static/js/	-	10.3 KB	Succeeded	-
asset-manifest.json	-	application/json	517.0 B	Pending	-
favicon.ico	-	image/x-icon	3.8 KB	Pending	-
index.html	-	text/html	644.0 B	Pending	-
logo192.png	-	image/png	5.2 KB	Pending	-
logo512.png	-	image/png	9.4 KB	Pending	-
main.2dbd410b.js	static/js/	text/javascript	174.8 KB	Succeeded	-
main.2dbd410b.js.LICENSE.txt	static/js/	text/plain	1.1 KB	In Progress (100%)	-
main.2dbd410b.js.map	static/js/	-	515.9 KB	Pending	-

Amazon S3

Buckets

Access Points

Object Lambda Access Points

Multi-Region Access Points

Batch Operations

Access analyzer for S3

Block Public Access settings for this account

Storage Lens

Dashboards

AWS Organizations settings

Feature spotlight

Feature spotlight

AWS Marketplace for S3

Amazon S3 > Buckets > cs516nov-2022-frontend.com > Edit static website hosting

Edit static website hosting [Info](#)

Static website hosting
Use this bucket to host a website or redirect requests. [Learn more](#)

Static website hosting

☐ Disable

☒ Enable

Hosting type

☒ Host a static website
Use the bucket endpoint as the web address. [Learn more](#)

☐ Redirect requests for an object
Redirect requests to another bucket or domain. [Learn more](#)

For your customers to access content at the website endpoint, you must make all your content publicly readable. To do so, you can edit the S3 Block Public Access settings for the bucket. For more information, see [Using Amazon S3 Block Public Access](#)

Index document
Specify the home or default page of the website.

index.html

Error document - optional
This is returned when an error occurs.

index.html

Redirection rules - optional
Redirection rules, written in JSON, automatically redirect webpage requests for specific content. [Learn more](#)

for static website hosting

Static website hosting [Edit](#)

Use this bucket to host a website or redirect requests. [Learn more](#)

Static website hosting

Enabled

Hosting type

Bucket hosting

Bucket website endpoint

When you configure your bucket as a static website, the website is available at the AWS Region-specific website endpoint of the bucket. [Learn more](#)

<http://cs516nov-2022-frontend.com.s3-website-us-east-1.amazonaws.com>

static website hosting url

Learn x cs516 x React x Screen x Cloud x Simple x AWS x React x aws C x Creati x +

Not secure | cs516nov-2022-frontend.com.s3-website-us-east-1.amazonaws.com

Cloud Computing course

1. Supriya Ghising
2. Anna
3. Simran