Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

School of Information Technology and Engineering (SITE)

B.Tech (Information Technology)

Course Project Report

VitCoAid

Submitted for the Course: ITE 3007: CLOUD COMPUTING AND VIRTUALIZATION

Offered by Dr. R. K. NADESH during FALL 2021-2022

By

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School of Information Technology & Engineering
B.Tech (Information Technology)
FALL 2021-2022
ITE 3007: CLOUD COMPUTING AND VIRTUALIZATION
A Report on the Course Project
VitCoAid

TEAM Name : **VitCoAid**
Team Member(s) with Reg # and Name Somya Khatri; 19BIT0365   Sakshi Agrawal; 19BIT0370 Khushi Agrawal; 19BIT0371
Project Title : **VitCoAid (https://vitcoaid.godaddysites.com/)**

1. Problem Statement

1.1 Background (System Study Details in brief)

With the number of covid cases declining gradually and the various institutions and offices slowly opening, various precautions and norms are to be followed by the students to ensure safety. At the same time the institution also requires a platform to exclusively deal with covid related services like collecting the vaccination certificates, informing students about the latest guidelines and precautions to be followed in the campus and during the classes.
To reduce confusion and hassle we have come up with a one-stop platform **VitCoaid** for covid related information and document upload.
Technologies: Java, Javascript, HTML, CSS, NodeJS, ReactJS, SQl ,Aws Services (RDS, EC2, S3 Lambda, CloudFront, Simple email Service, Simple Queue Service, Route53, Lex), GoDaddy.

1.2 Problem Statement

With the number of covid cases declining gradually and the various institutions and offices slowly opening, various precautions and norms are to be followed by the students to ensure safety. At the same time the institution also requires a platform to

exclusively deal with covid related services like collecting the vaccination certificates, informing students about the latest guidelines and precautions to be followed in the campus and during the classes. To reduce confusion and hassle we have come up with a one-stop platform **VitCoaid** for covid related information and document upload.

1.3 Novelty

This is a website which provides necessary guidelines which are to be followed by Vitians to ensure a safe environment when the college opens.
Innovation component in the project: VitCoAid incorporates various aws cloud services to provide different functionalities that are useful when college reopens after covid.

2. Related Works

2.1 Literature Survey (Should be elaborately discussed with its citation)

[1]. Microsoft Azure v/s Amazon AWS Cloud Services: A Comparative Study

In this research paper a comparison is done between leading cloud service providers i.e Azure and AWS on the basis of its services, features, advantages, disadvantages etc.
In terms of services AWS regards better than Azure. Aws has over 200 fully featured services from data centers globally For window users Azure is not the best cloud service provider. It provides limited support to the Linux Operating System.
The S3 (storage) and EC2 (compute) are the most important services of AWS. The advantage of EC2 is that it provides your own server without owning the hardware. In azure only implementation of the application is needed to be done the rest will be taken by azure.
One of the main advantages of AWS is that it can be easily operated by novice users. It is recommended to choose AWS when you are required to make a robust application, implement various levels of security, and provide a reliable feature set.
Both Azure and AWS are very similar and have their own advantages and disadvantages.

[2]. A File Storage Service on a Cloud Computing Environment for Digital Libraries

In this paper we learn about the benefits and performance evaluation of implementing file storage in a cloud computing environment.
It was found that Amazon S3 bucket is able to store the files in Dropbox.
The response ad service time produced during file uploading by different replication techniques was calculated. The no-replication technique resulted in the best performance. This was because this technique does not require any extra work for duplication files. It also does need to send data through the network.

Aws S3 is another useful solution for storage. AWS S3 has a lot of advantages. It can easily manage data at any scale with robust access control. It protects your data. It can store and retrieve any amount of data at any time and from anywhere.

[3]. Storage Options in the AWS Cloud

This research paper explains several storage options in AWS cloud. The several storage options are AWS S3, Amazon Glacier, Amazon EBS, Amazon EC2 instance Storage, Amazon RDS, AWS CloudFront etc.

AWS S3 is a storage service which is built to scale storage, and users can support virtually unlimited number of web applications. The AWS stores the actual information and it can be paired with databases such as AWS RDS or DynamoDb to store metadata. When you use AWS S3 you only pay for the resources you consume.
AWS S3 can easily be created and managed by the AWS CLI. Through this we can access, upload buckets and browse content into the S3 using a simple web based user interface.

[4]. Exploring Cloud Computing Services and Applications

This research paper explores about various cloud computing services
and its applications.The cloud computing environment offers greater flexibility and accessibility to computing resources at a cheaper cost.
This developing technology ushers in a new era of e-services across
Amazon Web Service is a cloud platform which provides over 200 services. AWS has storage services such as AWS S3, compute services such as AWS Ec2, database AWS RDS, AWS Amplify to launch github applications, AWS Rekognition for image analysis etc.This is an emerging platform that is going to benefit many users.

[5]. Web Application Hosting in the AWS Cloud

In this research we learn about the advantages of hosting web applications using AWS services. AWS services provide secure, scalable and reliable infrastructure.

To deliver the website AWS CloudFront service can be used. This provides dynamic and static streaming using a global network of edge locations. This service can work with other storage and compute services such as AWS S3 and AWS EC2.
When we have to move a web application to the cloud we need to make someDNS changes. These can easily be handled by AWS ROute 53. By using AWS the web application will be safe and secure. AWS EC2 has a feature called security groups.

[6].Comparative Study of Cloud Services Offered by Amazon, Microsoft and Google

Every cloud service provider has its ups and down and there's no universal best Cloud service provider. AWS leads in public cloud market share holding a 33 percent of the cloud infrastructure market but Microsoft Azure and Google Cloud Platform also give easy business solutions with security features.

[7]. Usage visualisation for the AWS services

AWS services provide solution usage visualisation. This system can help in the optimisation of cost and performance. It makes it easier to manage multiple accounts in one place and provides corresponding visualisation and analysis features.

[8]. Performance Analysis of Encryption Algorithm in Cloud Computing

In this paper comparison is done between different symmetric key algorithms.Comparison of mean processing time of the algorithm on local system as well as on cloud network and Comparison of local system mean time algorithm with different input only cloud environment. The results suggest that BLOWFISH,AES,DES are better performing algorithms while for the security of data AES algorithm performs better due to good buffer size.

[9]. Lightweight Cloud Storage Auditing With Deduplication Supporting Strong Privacy Protection

Proposed diagram deals with user privacy leakage and makes a scheme to preserve the privacy against the cloud and other parties. They show more efficiency in the authenticator generation and auditing phase.

[10]. Augment reality chatbot using cloud

The chatbot uses augmented reality to work with voice commands and give replies the way it is trained. It can be trained based on the requirement if the question is out of the training to generate random answers.

[11]. Infrastructure Cost Comparison of Running Web Applications in the Cloud Using AWS Lambda and Monolithic and Microservice Architectures

Use of microservices reduces up to 13.42% of infrastructure costs. However, the use of emerging cloud services such as AWS Lambda reduces their infrastructure costs upto 77.08%. Applications can be developed as a set of small applications that can be implemented and operated separately.

[12] Implementation and Analysis of a Serverless Shared Drive with AWS Lambda

Microservice performance is increased by using higher memory Lambda functions. Therefore to ensure optimal service performance, lambda users without cost constraints may consider using the highest memory reservation size 1536MB. Serverless architecture reduces the burden of administration after development.

[13] A Traffic Analysis on Serverless Computing Based on the Example of a File Upload Stream on AWS Lambda

Latency and Cold-Start are heavily influenced by other cloud services. In serverless technologies the performance of function instances is determined by their execution time and the overall latency in the Round-Trip-time which is influenced by Cold-Starts, meaning the duration of the auto-scaling process in the event of increasing traffic. The integration of the AWS S3 database contributed the most to latency

[14] Development of a Voice Chatbot for Payment Using Amazon Lex Service with Eyowo as the Payment Platform

Amazon Lex can be used for the development of chatbots for any application using both voice and text. A speech-language understanding system is created using Natural Language Understanding and Automatic Speech recognition which creates a dynamic and flexible chatbot. A single service providing all these services the time and energy spent is optimised.

[15] On the Network Performance of Amazon S3 Cloud-Storage Service

The high-level management interface hides system implementation details and performance figures. The experimental study found that the US and EU cloud regions are able to offer better performance in terms of goodput (+45.5%, on average) even at a lower cost.

2.2 Comparative statement (10 latest Journal papers in the current domain, Tabulation only)

After analysing several research papers, we can conclude that:

SNo	Research Paper	Reason
1	Microsoft Azure v/s Amazon AWS Cloud Services: A Comparative Study	We chose AWS (as the cloud platform) for this project because this can be easily implemented by novice users.
2	Storage Options in the AWS Cloud	AWS S3 is the most recommended service for storage. In a traditional server based application when users upload large media files like images and videos, it creates a heavy load on the application server. This uses a considerable amount of network bandwidth. .By enabling users to upload files to Amazon S3, this serverless pattern moves the network load away from your service. This can make your application much more scalable, and capable of handling Web traffic spikes.
3	Exploring Cloud Computing Services and Applications	We also went through various services that could be used for deployed and we choose amplify because automatic deployment to AWS cloudfront and S3, integrated with builds and deployments activated from pushes to github - not having to manage infrastructure for Cloudfront, S3, CodeBuild, CodeDeploy etc is awesome.
4	Web Application Hosting in the AWS Cloud	Web application hosting through cloud is better than traditional methods as hosting through AWS is safe, secure. AWS S3 provides many features which makes hosting easier
5	Usage visualisation for the AWS services	AWS services provide solution usage visualisation. This system can help in the optimisation of cost and performance. It makes it easier to manage multiple accounts in one place and provides corresponding visualisation and analysis features.

6	Augment reality chatbot using cloud	The chatbot uses augmented reality to work with voice commands and give replies the way it is trained.
7	Comparative Study of Cloud Services Offered by Amazon, Microsoft and Google	Every cloud service provider has its ups and down and there's no universal best Cloud service provider. AWS leads in public cloud market share but Microsoft Azure and Google Cloud Platform also give easy business solutions.
8	Infrastructure Cost Comparison of Running Web Applications in the Cloud Using AWS Lambda and Monolithic and Microservice Architectures	• AWS Lambda reduces their infrastructure costs upto 77.08% • Applications that can be implemented and operated separately.
9	Implementation and Analysis of a Serverless Shared Drive with AWS Lambda	• performance is increased by using higher memory Lambda functions • reduces the burden of administration after development.
10	Development of a Voice Chatbot for Payment Using Amazon Lex Service with Eyowo as the Payment Platform	• Both voice and text. • Natural Language Understanding and Automatic Speech recognition • dynamic and flexible chatbot.

2.3 Hardware Requirements

Laptop, Camera

2.4 Software Requirements

OS: Windows
Python: Version3
Visual StudioCode, Amplify CLI, NodeJS, Git Bash, Putty, Postman, Amplify SAM

3. System Design

3.1 High-Level Design (Black Box design)
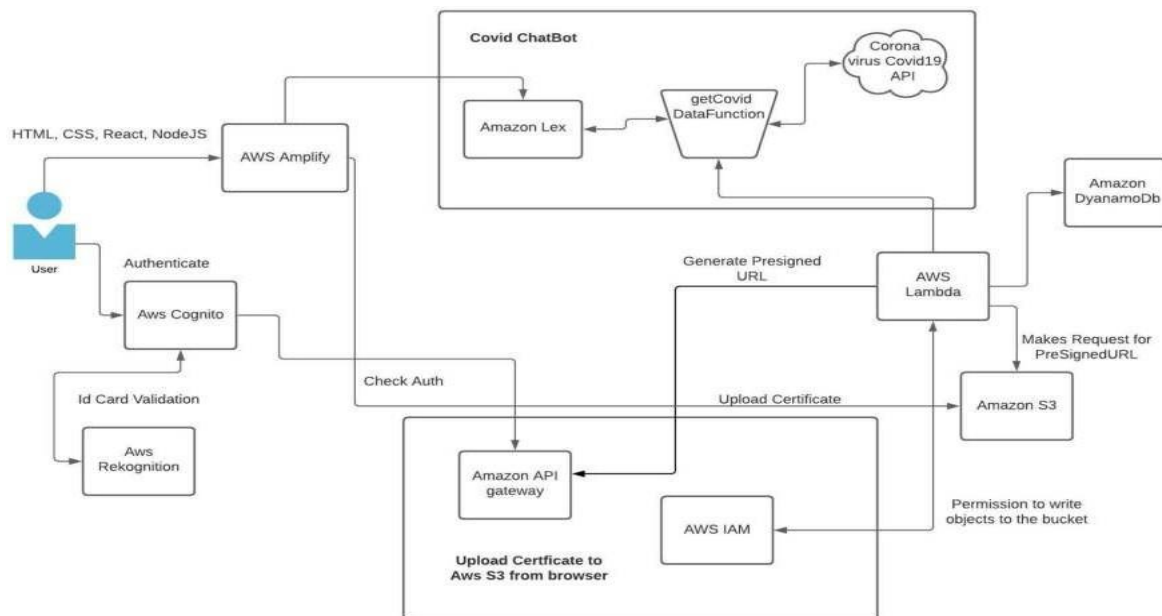
The user first needs to create an account using VIT email ID to login the website. After creating an account the user is directed to the home page where he can upload a certificate, get information about covid etc..

Ther services we used are AWS Amplify to deploy the github code, AWS Cognito for user verification. To upload images to AWS S3 we used AWS Lambda to trigger

3.2 Low-Level Design   (Detailed design)
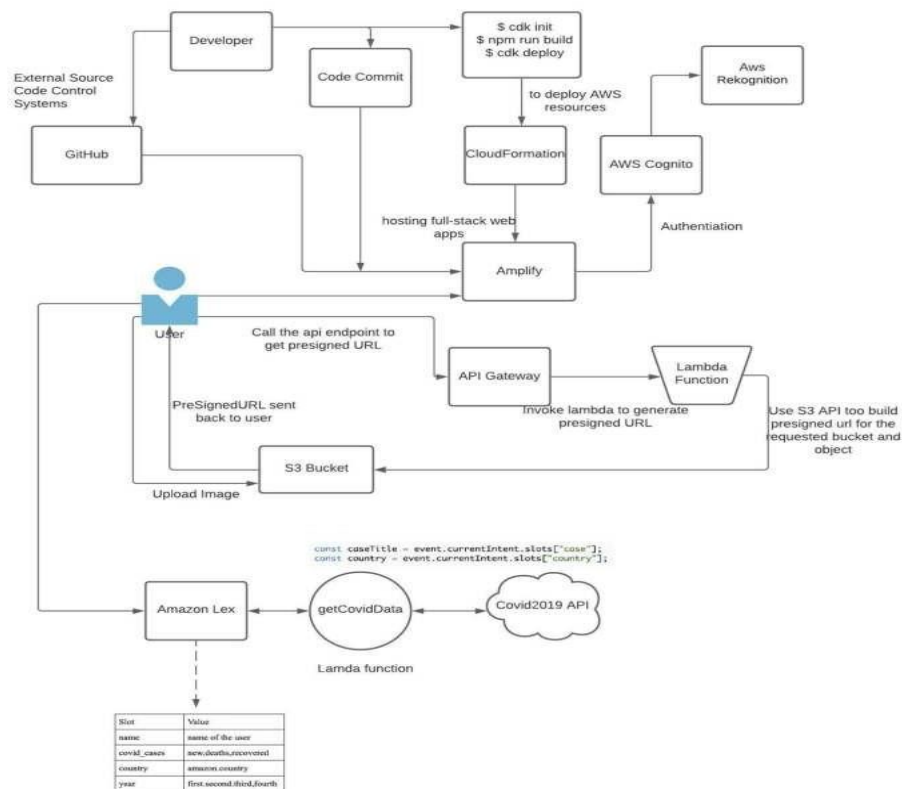
AWS Cognito is an identity provider and users directory. This makes it easier to add signin signup features to the web application. It handles the entire backend authorization. Cognito uses web tokens to manage sessions. THere is no need to manage these sessions as these all are handled by AWS Amplify.
AWS Amplify is a client library which is used to call the various api methods.

The services used to host the web application and implement certificate storage are AWS S3 and AWS Lambda.

First we need to create a bucket and then build a lambda function. AWS Lambda makes the request for presignedURL from AWS S3. The IAM role used by the lambda function - permission to write object to bucket, API gateway front of lambda to call an API endpoint ---this returns the presignedURL for S3 that contains an temp access token allowing the client application to upload directly to the S3 service.

4. System Implementation

4.1 Module Development –Code

AWS Amplify

First we created a React application, Initialized a GitHub repository and deployed the app with AWS Amplify using Github. Then we can just implement code changes and redeploy our app.
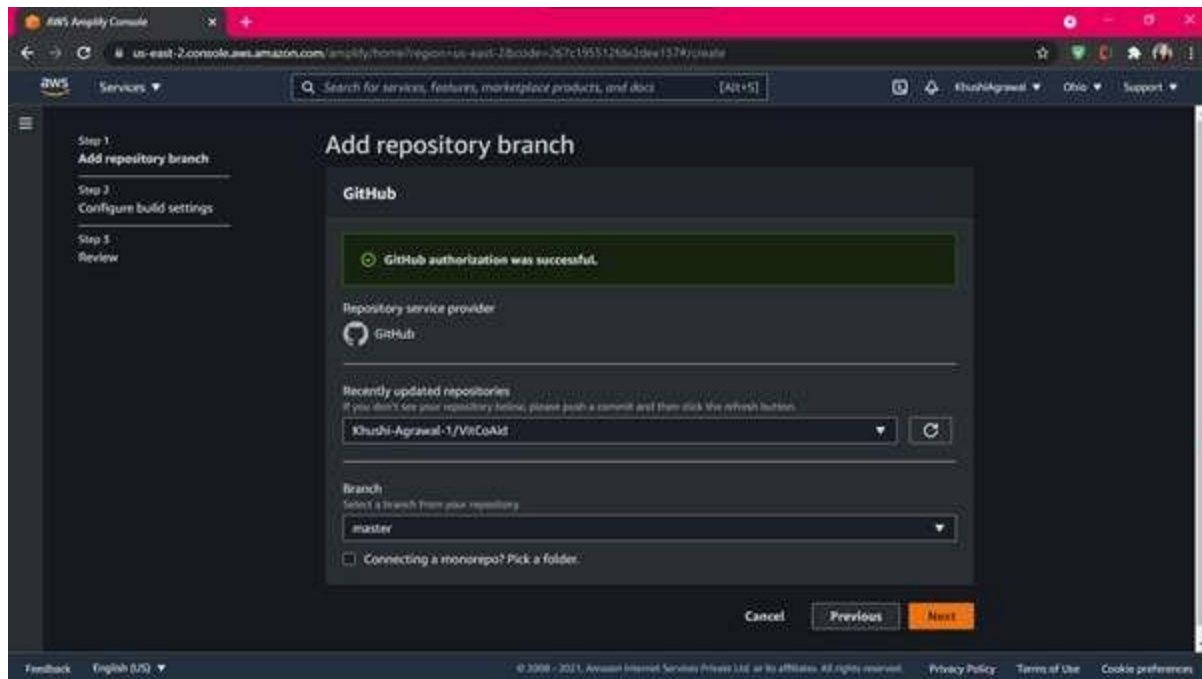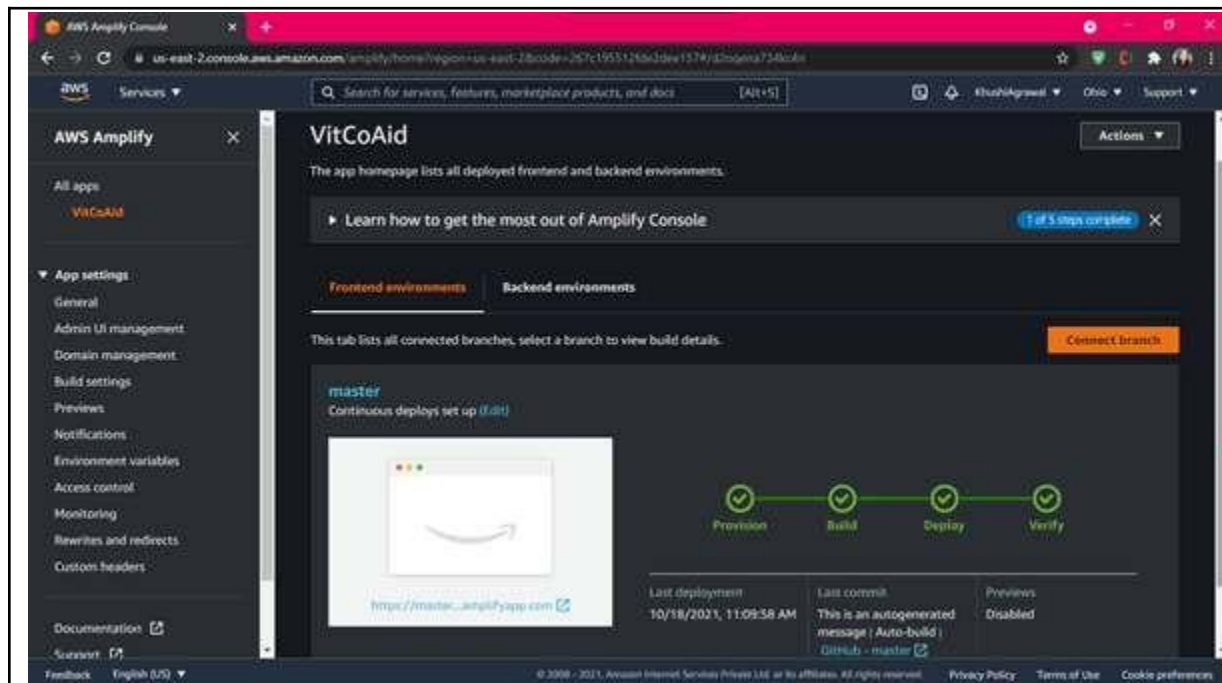
Uploading Images using S3 bucket and AWS lambda

We first created a S3 bucket 'vitcoaidupload'. This bucket is used to store all the images when uploaded from the user. We added permissions such as Cross-origin resource sharing (CORS) and bucket policy.
We then created a lambda function 'vit getdoc'. This lambda function is used to input images from users. We have to change the execution role as it needs permissions to access the S3 bucket.
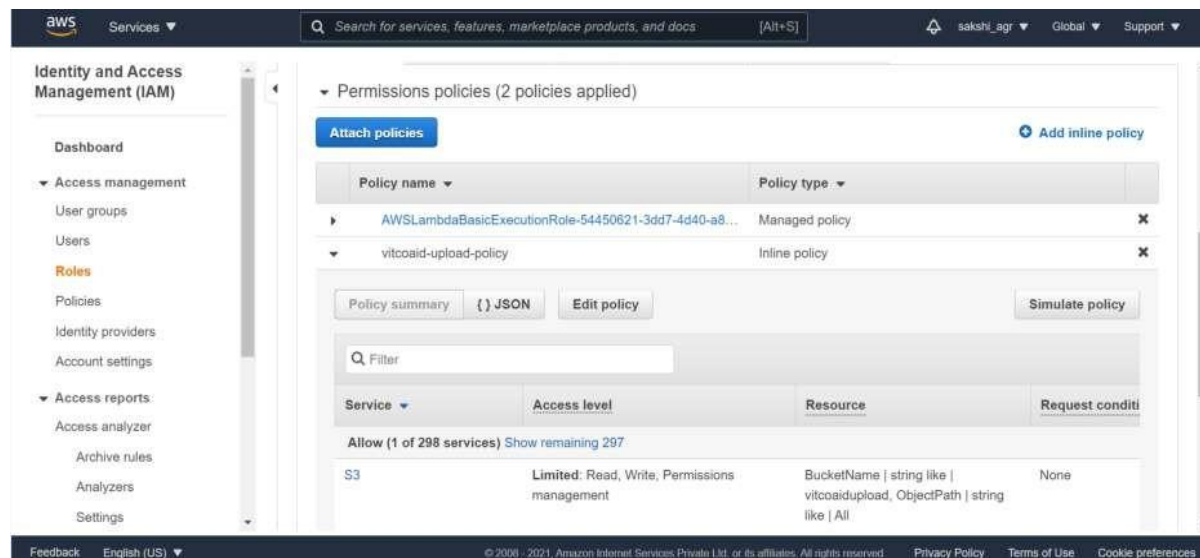
Configuring test event.

The response contains the presigned UploadURL which is the token needed to upload images.

We then added a trigger to make it publicly accessible. We used HTTP API. After this we can an API endpoint

In the postman API endpoint request was sent and the UploadURL was received as response.

To upload images directly from browser

We hosted a static website using HTML, CSS, JS using S3 bucket 'vitco aid-upload-site'.

All the images uploaded by the user are stored in this bucket.
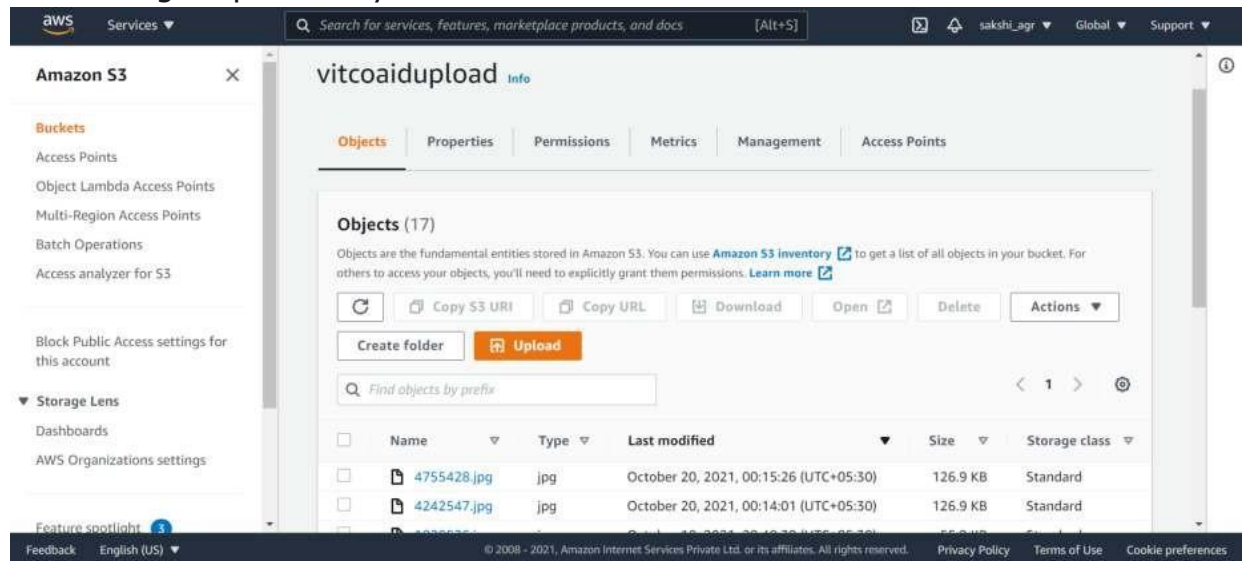
Chatbot

AWS Lex console
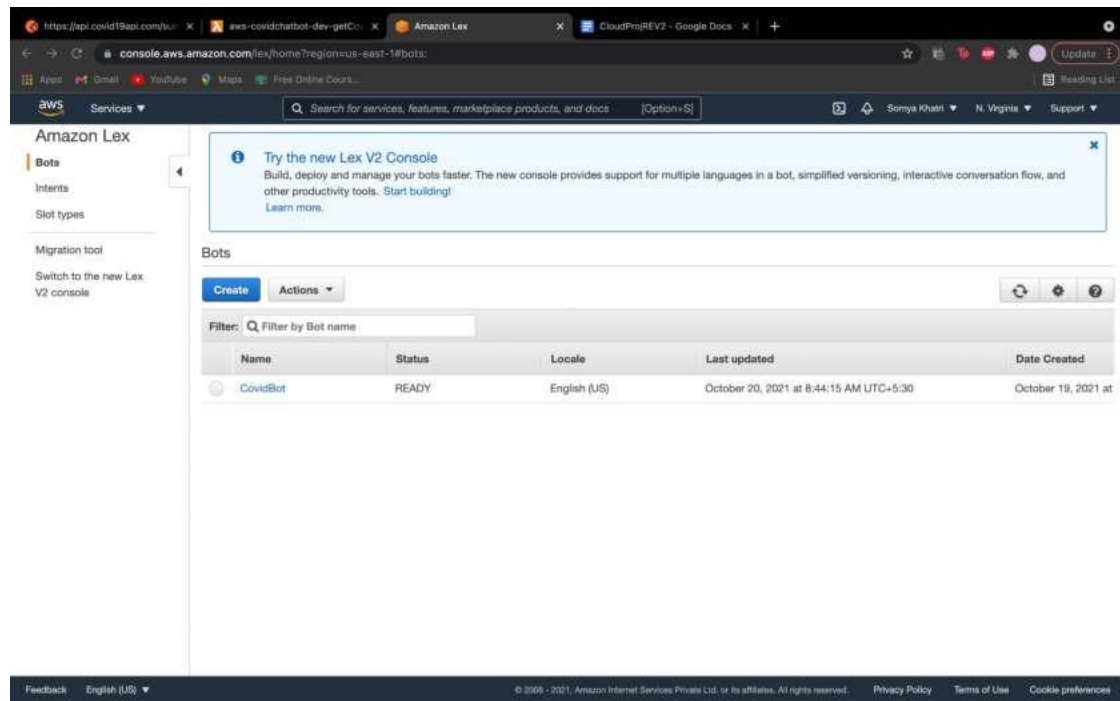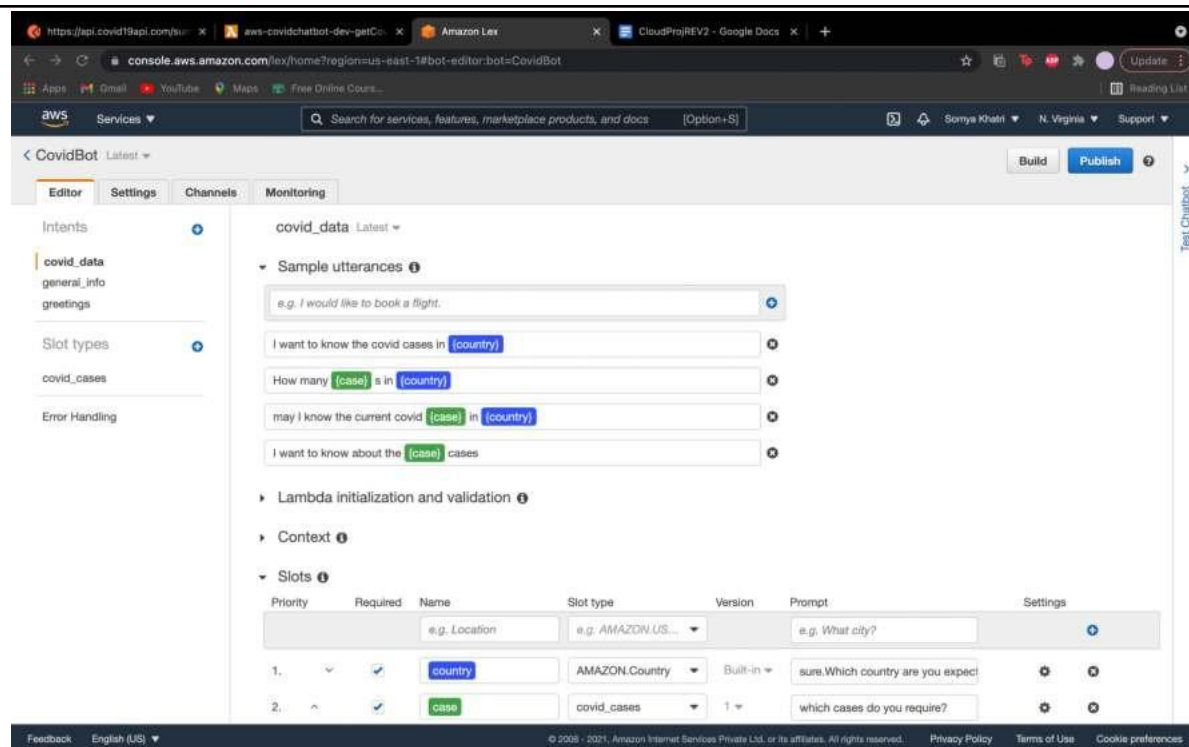
Serverless framework to create lambda function
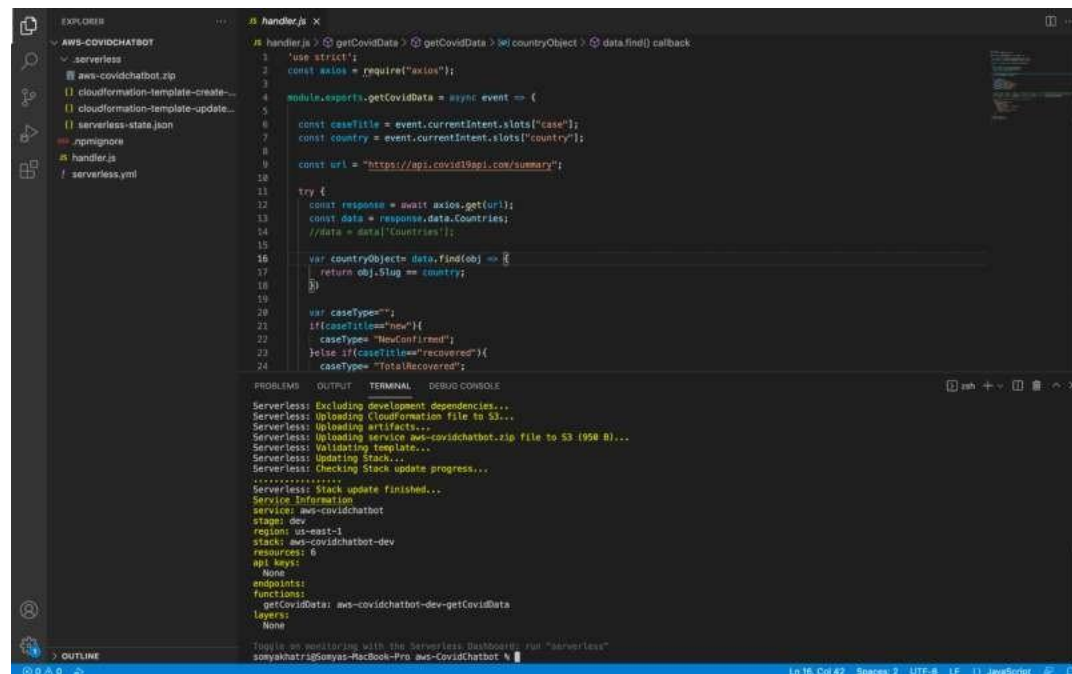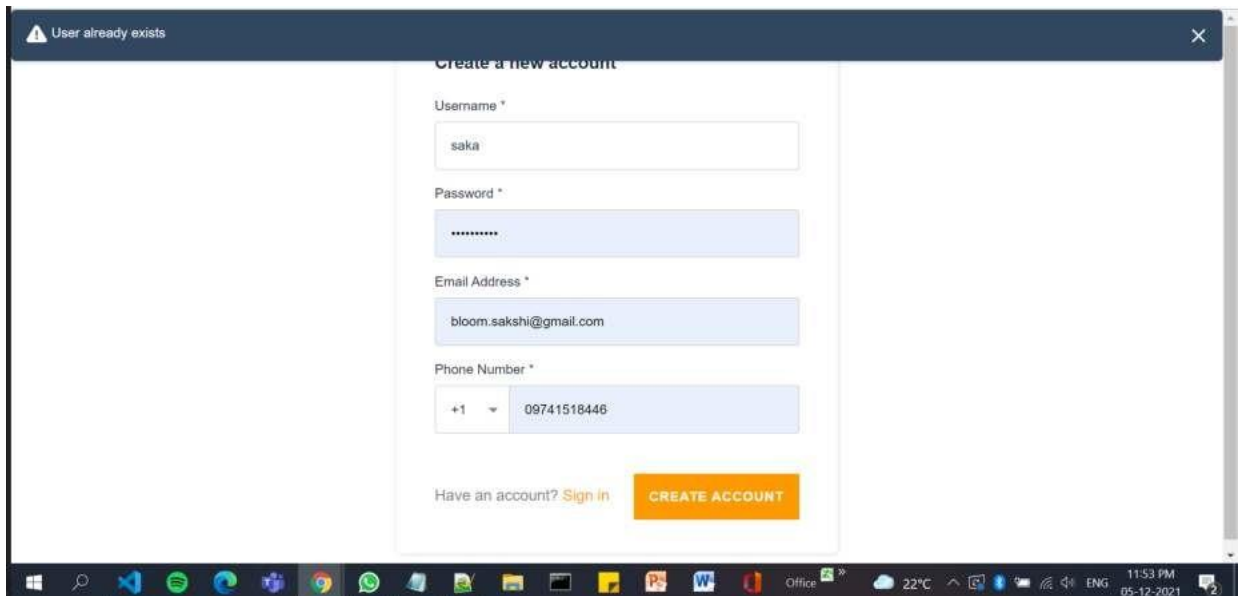
COVID19 API in postman
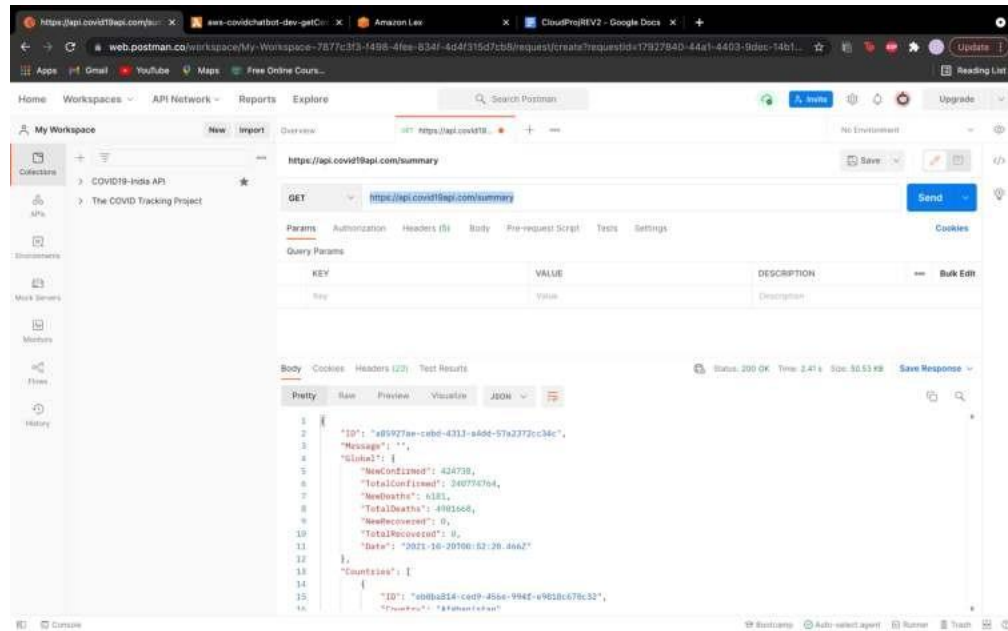
Lambda function deployed in aws
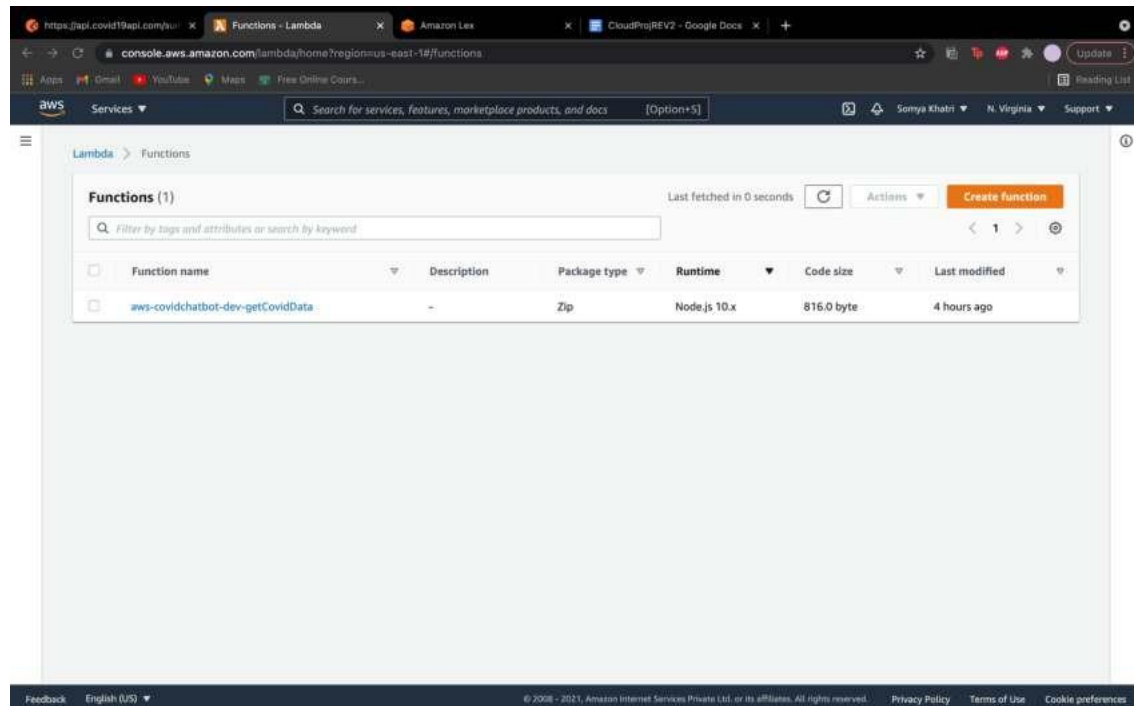
Selecting Lambda function in the Fulfillment section
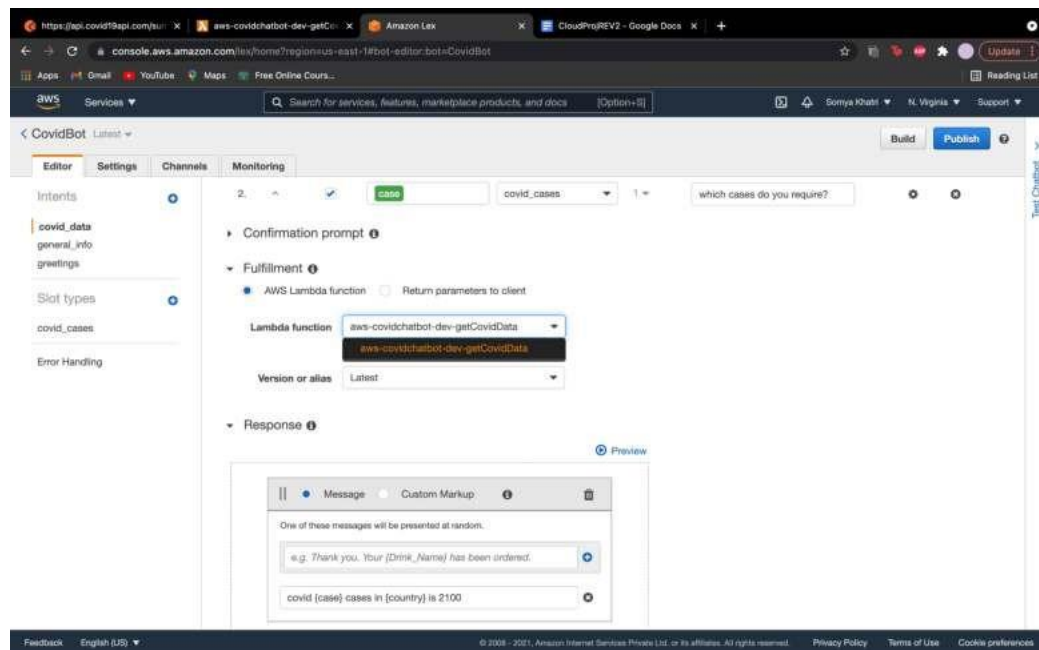
Bot testing
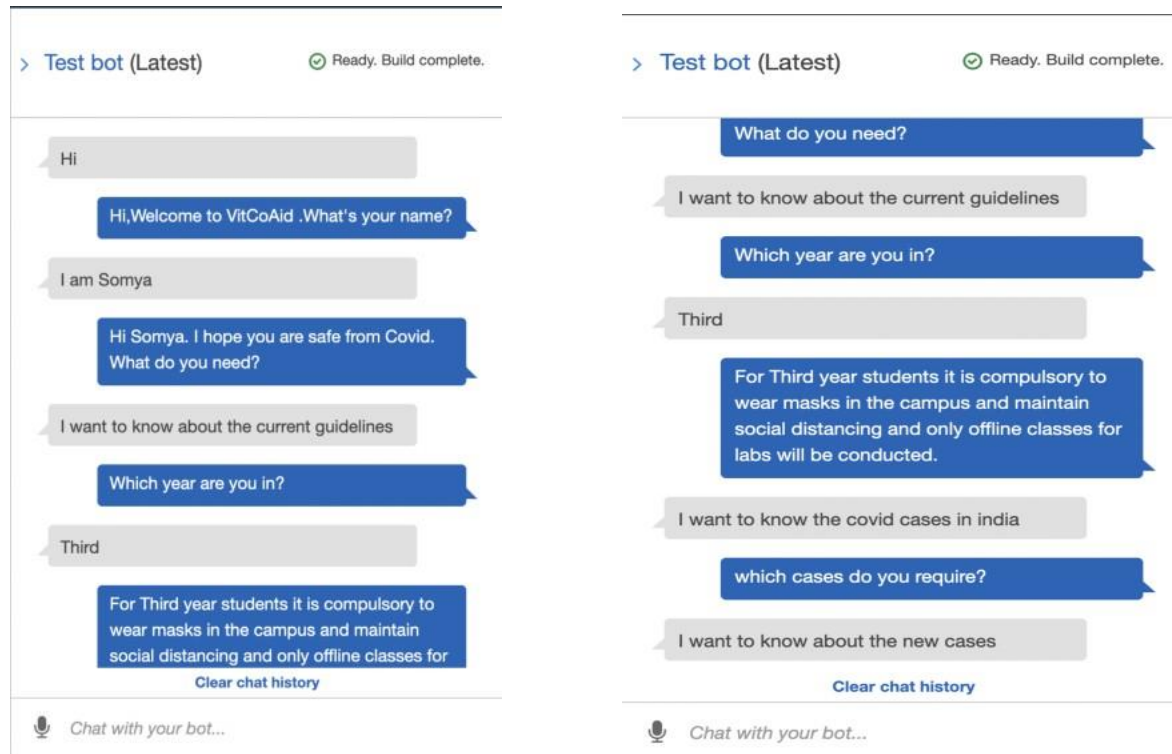
4.4 Test Cases

Duplicate users aren't allowed
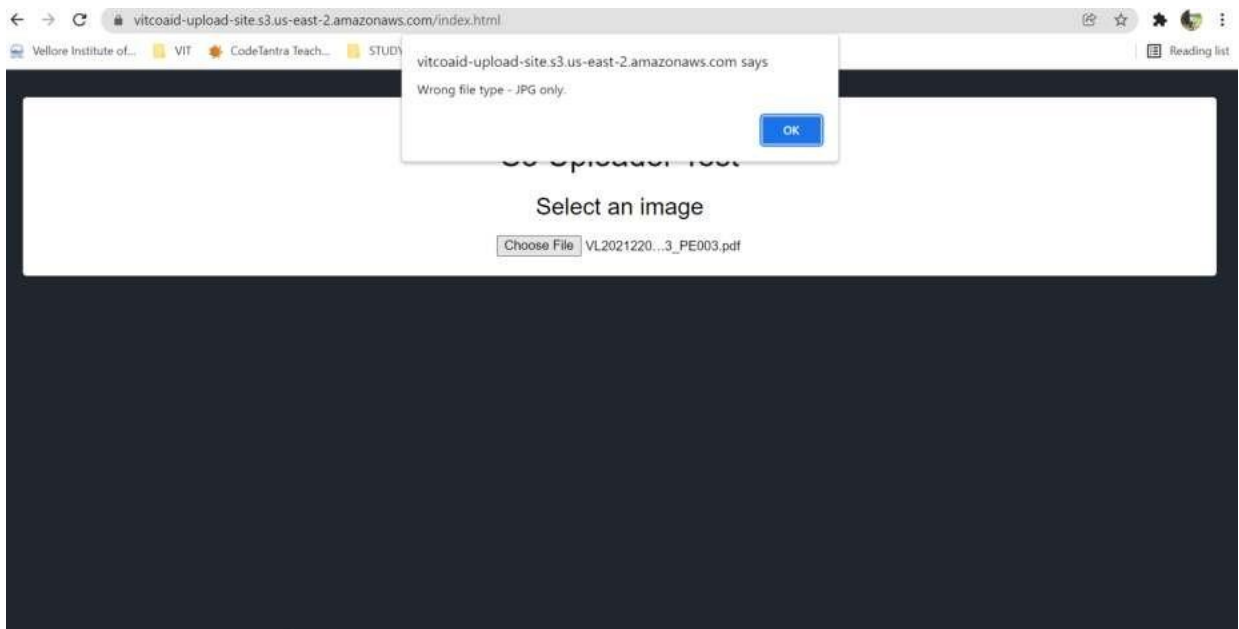
Only JPEG files are allowed

5. Results and Discussion

5.1 Implementation Results

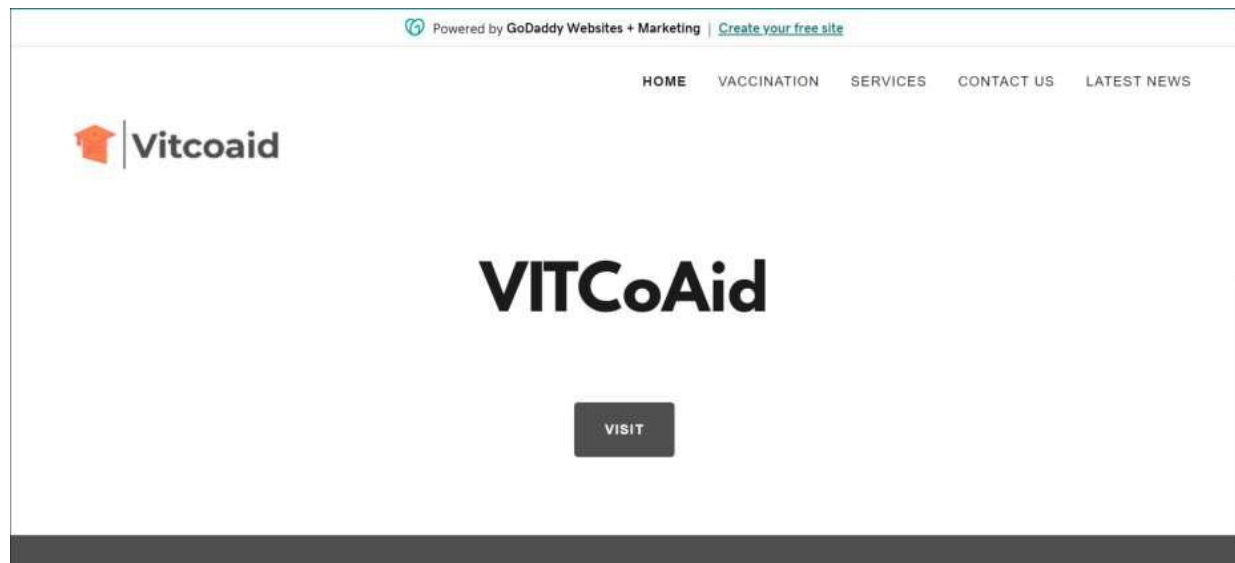# Instructions to upload your vaccination certificate

Please Upload your certifcate in the format RegisterationNumber.jpeg

DOWNLOAD YOUR CERTIFICATE

Choose File | No file chosen

Find COVID-19
Vaccines Near You

Visit Vaccines.gov

Or Call 1-800-232-0233

CoAid
Online

Hi

Dec 5 8:52 PM

CoAid

Hi,Welcome to VitCoAid .What's your name?

Dec 5 8:52 PM

Frequently Asked Questions

Please contact us if you cannot find an answer to your question.

When is VIT opening?   ▾

Where to upload the certificata?   ▾

Is VitCoAid lsgit?   ▾

In case of Emergency

Fruther if you have any doubts please contatc the HOD

Message us on WhatsApp

VitCoAid

Hours

Open today 09:00 am – 05:00 pm ▾

Coronavirus Disease 2019 (COVID-19)
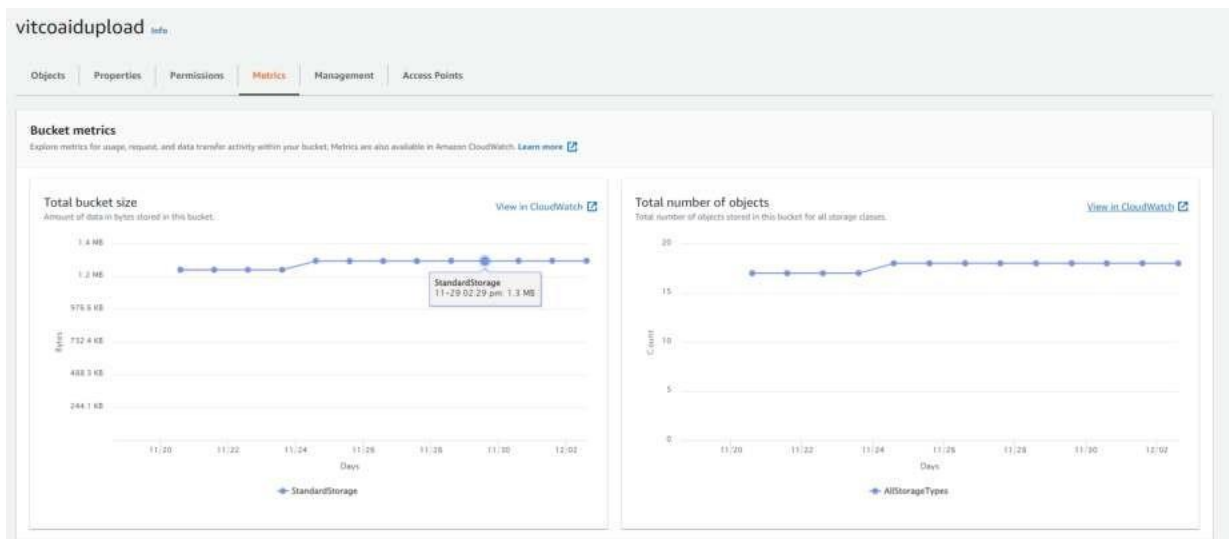Centers for Disease Control and Prevention

COVID-19 patients, clinicians should consider deferring influenza vaccination until the patients have completed their COVID-19 isolation period and are no longer moderately or severely ill. People with SARS-CoV-2 infection who are not moderately or severely ill (including those who are asymptomatic) should seek influenza vaccination when they no longer require isolation. They can be vaccinated sooner if they are in a health care setting for other reasons.

5.2 Metrics


```
Uploading to: https://vitcoaidupload.s3.us-east-2.amazonaws.com/6627040.jpg?Content-Type=_f400b308954f219&X-Amz-SignedHeaders=host%3Bx-amz-acl&x-amz-acl=public-read    sample.html:110
Result:                                                                                                                                                                         sample.html:115
▼Response ⓘ
    body: (...)
    bodyUsed: false
    ▶headers: Headers {}
    ok: true
    redirected: false
    status: 200
    statusText: "OK"
    type: "cors"
    url: "https://vitcoaidupload.s3.us-east-2.amazonaws.com/6627040.jpg?Content-Type=image%2Fjpeg&X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=ASIA5NW5IPUWG3BJMGA5%2F20211205%2Fus_
    ▶[[Prototype]]: Response
>
```

    appLife: 1502.609130859375 ms
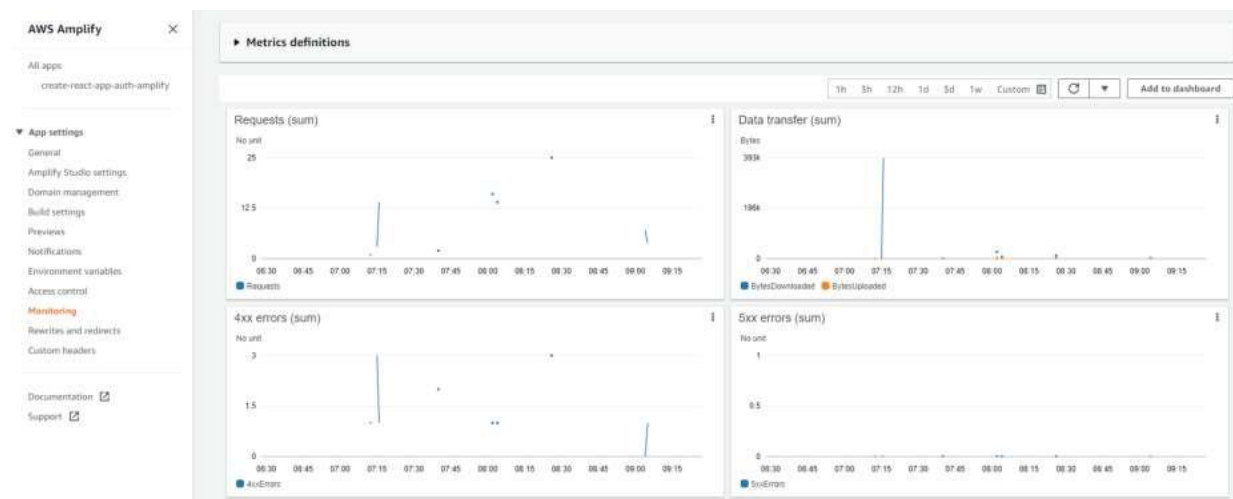
The image was successfully uploaded.

In this we can see the total number of buckets in a form of graph.

This bar chart shows the usage of each chatbot service.

In this we were able to see the various performance graphs of AWS Cognito.

5.4 Mapping the results with problem statement and existing systems

The aim of the project was to build a platform to exclusively deal with covid related services like collecting the vaccination certificates, informing students about the latest guidelines and precautions to be followed in the campus and during the classes.

The resultant website has an option to upload vaccination certificates and has a chatbot to assist students with basic queries.

5.5 Conclusion and Discussions

We were able to successfully deploy a website using AWS Cognito and AWS Amplify, it had the user authentication part. We faced a lot of difficulties combining different aws services from different accounts to our website. After a lot of effort and time we decided to switch over to In the end we hosted our website on godaddy.com.

6. Future Developments
- Include the feature of letting students login through id card verification.
- Include AWS services such as broadcast which would help in broadcasting live feed and current covid cases.
- Include the option to upload documents through QR code Scanner

7. References

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FALL 2021-2022
ITE 3007: CLOUD COMPUTING AND VIRTUALIZATION
(Review III) -Evaluation Sheet
01.12.2021

VIT®
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

Title:

Team Name

Project Team				
S.No	**Register Number**	**Student Name**	**Signature**	**Guided By**
				Dr. Nadesh R.K

Team Member(s) Contribution and Performance Assessment

Components	Student 1	Student 2	Student 3
Implementation & Results -(20)			
Contributed fair share to the team project -(05)			
Documentation without Plagiarism - (20)			
Q & A - (05)			

Student Feedback (Student Experience in this Course Project)	Evaluator Comments

Name & Signature of the Evaluator
(Dr.Nadesh R.K)