

MedTrack: AWS Cloud-Enabled Healthcare Management System

Project Description:

In today's fast-evolving healthcare landscape, efficient communication and coordination between doctors and patients are crucial. MedTrack is a cloud-based healthcare management system that streamlines patient doctor interactions by providing a centralized platform for booking appointments, managing medical histories, and enabling diagnosis submissions. To address these challenges, the project utilizes Flask for backend development, AWS EC2 for hosting, and DynamoDB for managing data. MedTrack allows patients to register, log in, book appointments, and submit diagnosis reports online. The system ensures real-time notifications, enhancing communication between doctors and patients regarding appointments and medical submissions. Additionally, AWS Identity and Access Management (IAM) is employed to ensure secure access control to AWS resources, allowing only authorized users to access sensitive data. This cloud-based solution improves accessibility and efficiency in healthcare services for all users.

Scenario 1: Efficient Appointment Booking System for Patients

In the MedTrack system, AWS EC2 provides a reliable infrastructure to manage multiple patients accessing the platform simultaneously. For example, a patient can log in, navigate to the appointment booking page, and easily submit a request for an appointment. Flask handles backend operations, efficiently retrieving and processing user data in real-time. The cloud-based architecture allows the platform to handle a high volume of appointment requests during peak periods, ensuring smooth operation without delays.

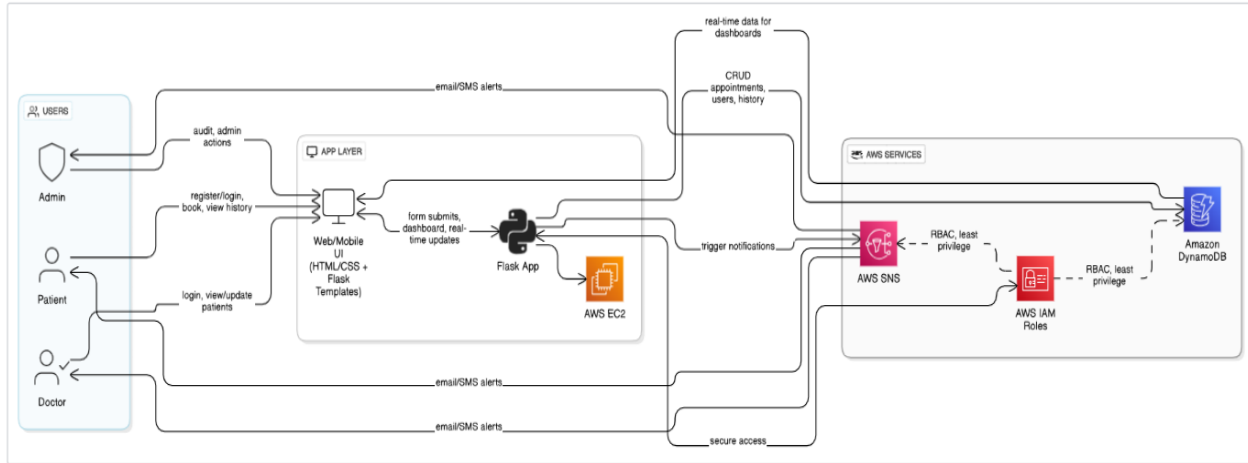
Scenario 2: Secure User Management with IAM

MedTrack utilizes AWS IAM to manage user permissions and ensure secure access to the system. For instance, when a new patient registers, an IAM user is created with specific roles and permissions to access only the features relevant to them. Doctors have their own IAM configurations, allowing them access to patient records and appointment details while maintaining strict security protocols. This setup ensures that sensitive data is accessible only to authorized users.

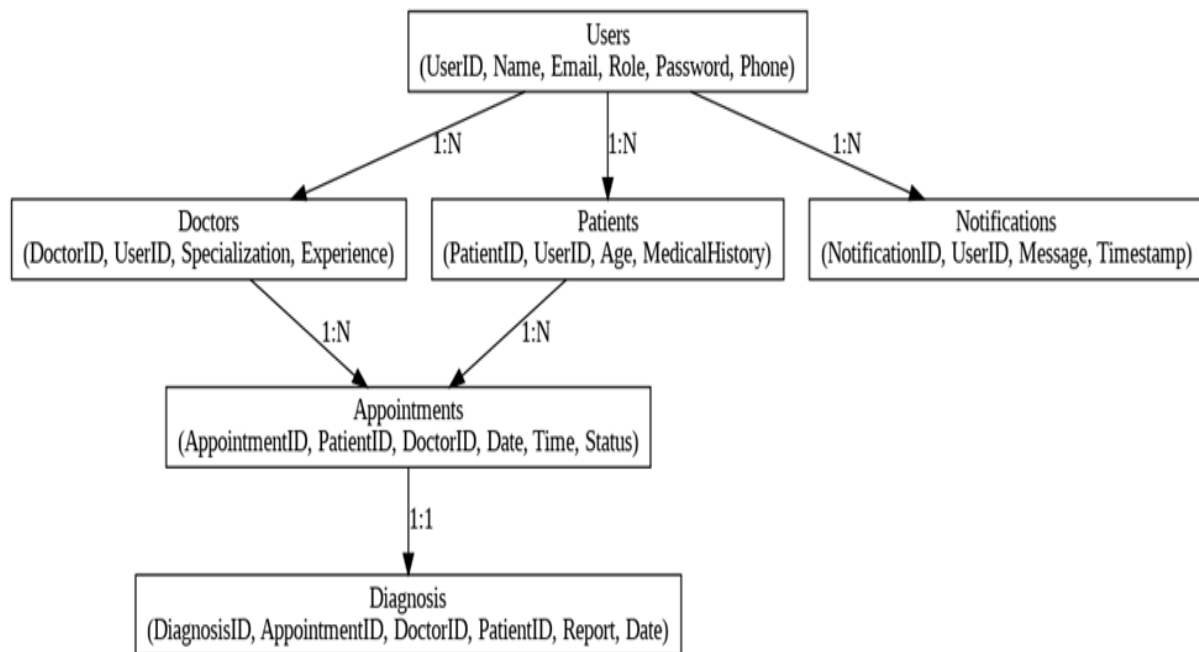
Scenario 3: Easy Access to Medical History and Resources

The MedTrack system provides doctors and patients with easy access to medical histories and relevant resources. For example, a doctor logs in to view a patient's medical history and upcoming appointments. They can quickly access, and update records as needed. Flask manages real-time data fetching from DynamoDB, while EC2 hosting ensures the platform performs seamlessly even when multiple users access it simultaneously, offering a smooth and uninterrupted user experience.

AWS ARCHITECTURE



Entity Relationship (ER)Diagram:



Pre-requisites:

1. **AWS Account Setup:** [AWS Account Setup](#)
2. **Understanding IAM:** [IAM Overview](#)
3. **Amazon EC2 Basics:** [EC2 Tutorial](#)
4. **DynamoDB Basics:** [DynamoDB Introduction](#)
5. **SNS Overview:** [SNS Documentation](#)
6. **Git Version Control:** [Git Documentation](#)

Project WorkFlow:

1. AWS Account Setup and Login

Activity 1.1: Set up an AWS account if not already done.

Activity 1.2: Log in to the AWS Management Console

2. DynamoDB Database Creation and Setup

Activity 2.1: Create a DynamoDB Table.

Activity 2.2: Configure Attributes for User Data and Book Requests.

3. SNS Notification Setup

Activity 3.1: Create SNS topics for book request notifications.

Activity 3.2: Subscribe users and library staff to SNS email notifications.

4. Backend Development and Application Setup

Activity 4.1: Develop the Backend Using Flask.

Activity 4.2: Integrate AWS Services Using boto3.

5. IAM Role Setup

Activity 5.1: Create IAM Role

Activity 5.2: Attach Policies

6. EC2 Instance Setup

Activity 6.1: Launch an EC2 instance to host the Flask application.

Activity 6.2: Configure security groups for HTTP, and SSH access.

7. Deployment on EC2

Activity 7.1: Upload Flask Files

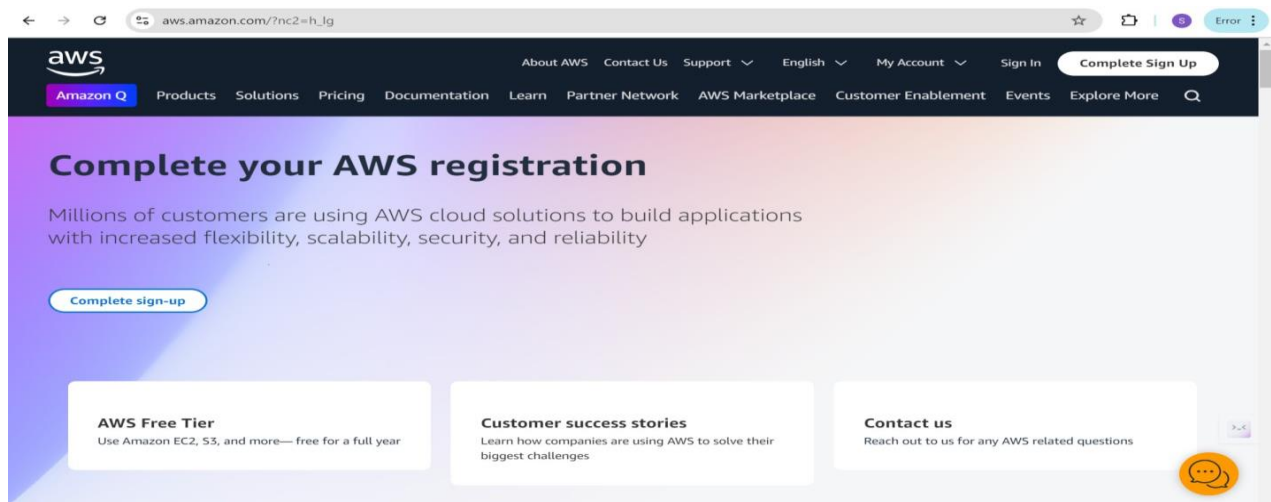
Activity 7.2: Run the Flask App

8. Testing and Deployment

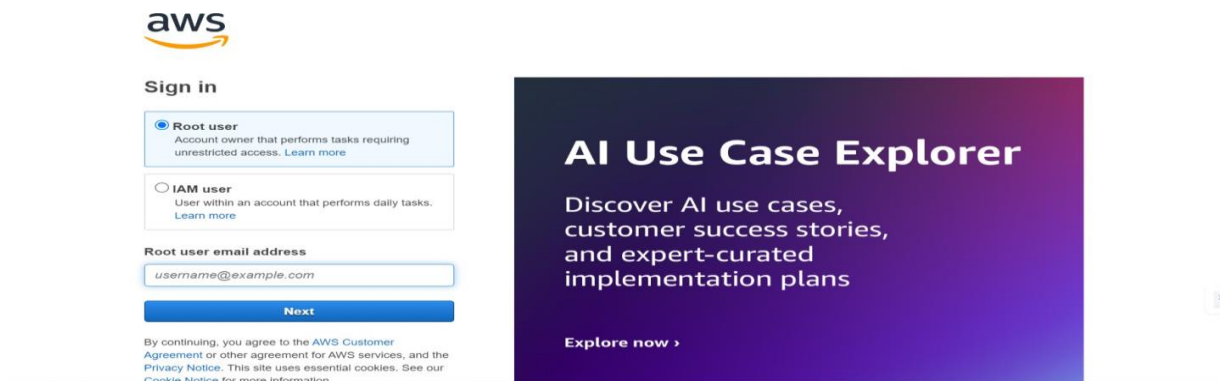
Activity 8.1: Conduct functional testing to verify user registration, login, book requests, and notifications.

Milestone 1: AWS Account Setup and Login

- **Activity 1.1: Set up an AWS account if not already done.**
 - Sign up for an AWS account and configure billing settings.



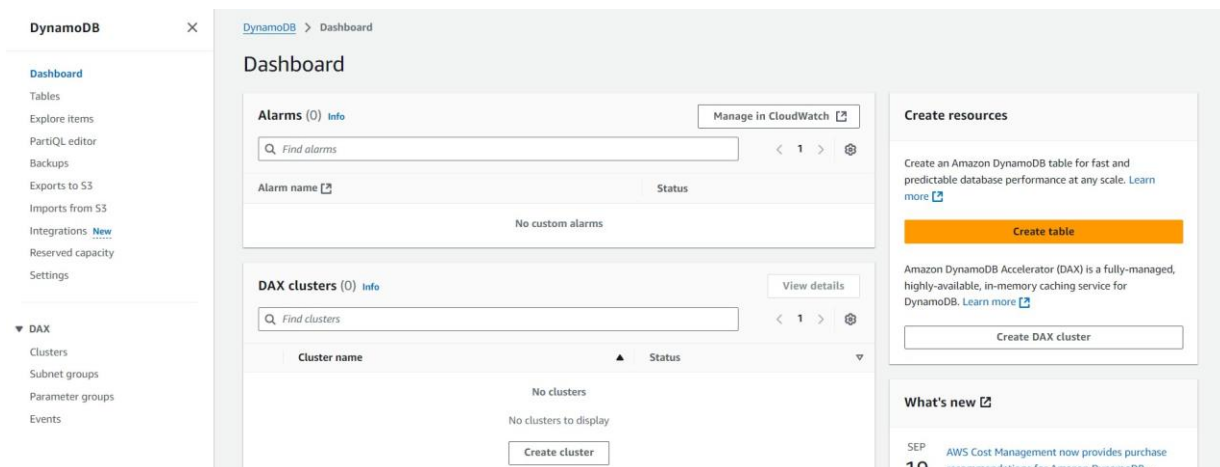
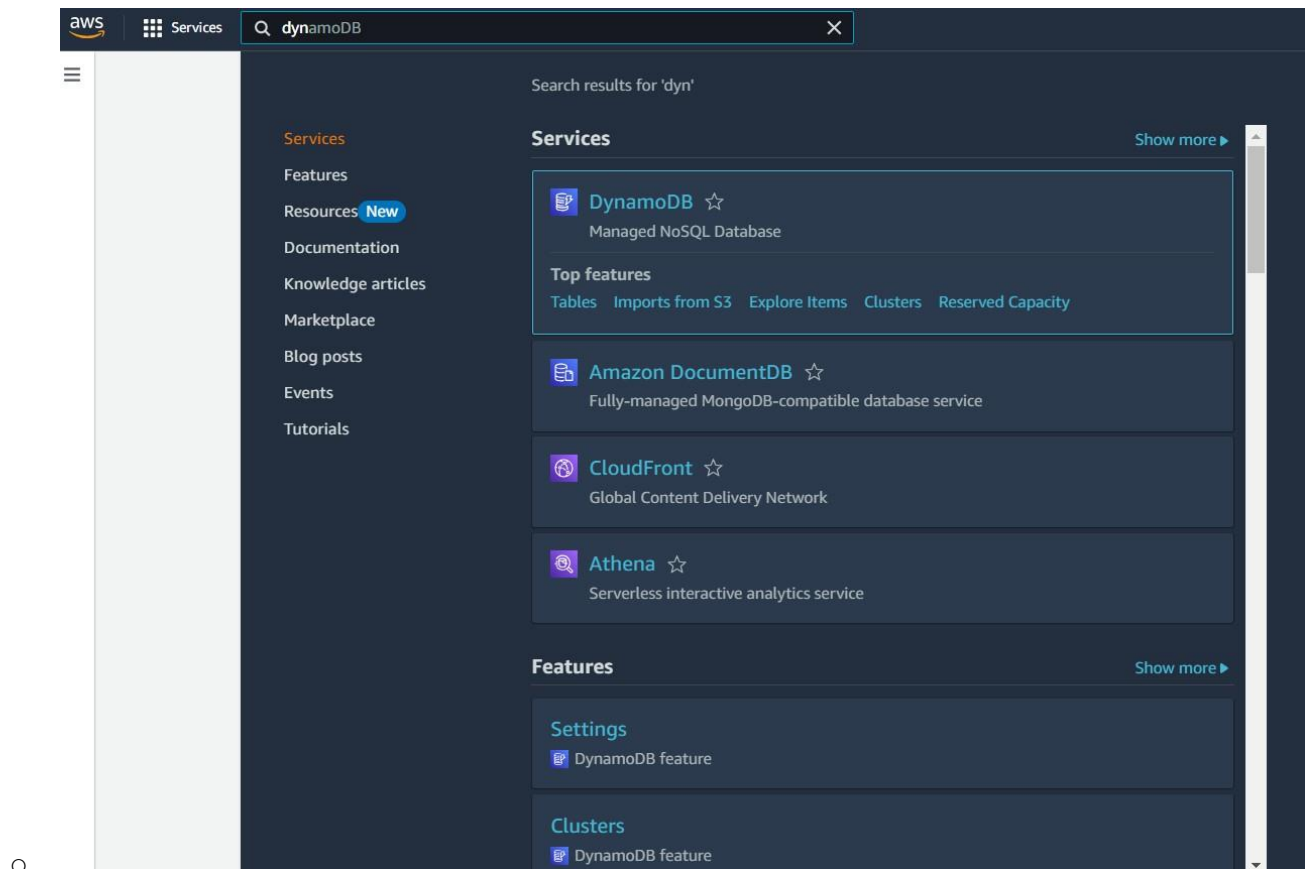
- **Activity 1.2: Log in to the AWS Management Console**
 - After setting up your account, log in to the [AWS Management Console](#).

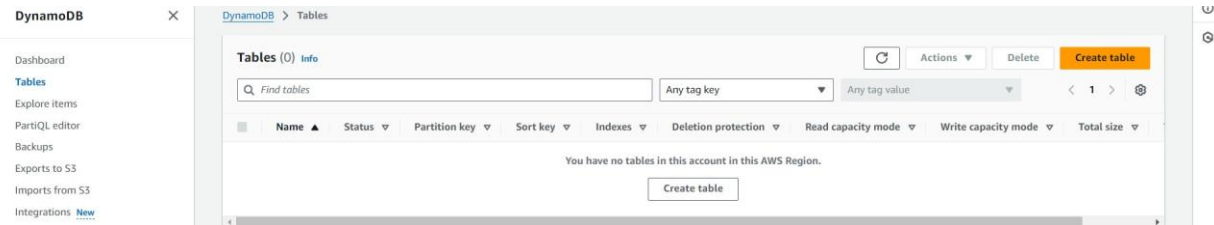


Milestone 2: DynamoDB Database Creation and Setup

- **Activity 2.1: Navigate to the DynamoDB**

- In the AWS Console, navigate to DynamoDB and click on create tables.





- **Activity 2.2: Create a DynamoDB table for storing registration details and book requests.**
 - Create Users table with partition key “Email” with type String and click on create tables.

≡

[DynamoDB](#) > [Tables](#) > Create table

Create table

Table details [Info](#)

DynamoDB is a schemaless database that requires only a table name and a primary key when you create the table.

Table name
This will be used to identify your table.

Users

Between 3 and 255 characters, containing only letters, numbers, underscores (_), hyphens (-), and periods (.).

Partition key
The partition key is part of the table's primary key. It is a hash value that is used to retrieve items from your table and allocate data across hosts for scalability and availability.

email

1 to 255 characters and case sensitive.

String

▼

Sort key - optional
You can use a sort key as the second part of a table's primary key. The sort key allows you to sort or search among all items sharing the same partition key.

Enter the sort key name

1 to 255 characters and case sensitive.

String

▼

Table class	DynamoDB Standard	Yes
Capacity mode	Provisioned	Yes
Provisioned read capacity	5 RCU	Yes
Provisioned write capacity	5 WCU	Yes
Auto scaling	On	Yes
Local secondary indexes	-	No
Global secondary indexes	-	Yes
Encryption key management	Owned by Amazon DynamoDB	Yes
Deletion protection	Off	Yes
Resource-based policy	Not active	Yes

Tags

Tags are pairs of keys and optional values, that you can assign to AWS resources. You can use tags to control access to your resources or track your AWS spending.

No tags are associated with the resource.

Add new tag

You can add 50 more tags.

Cancel

Create table

DynamoDB

Dashboard

Tables

Explore items

PartiQL editor

Backups

Exports to S3

Imports from S3

Integrations New

The Users table was created successfully.

DynamoDB > Tables

Tables (1) Info

Find tables

Any tag key

Any tag value

< 1 >

<input type="checkbox"/>	Name ▲	Status ▼	Partition key ▼	Sort key ▼	Indexes ▼	Deletion protection ▼	Read capacity mode ▼	Write capacity mode ▼	Total size ▼
<input type="checkbox"/>	Users	Active	email (S)	-	0	Off	Provisioned (5)	Provisioned (5)	0 bytes

- Follow the same steps to create a requests table with Email as the primary key for book requests data.

Create table

Table details [Info](#)

DynamoDB is a schemaless database that requires only a table name and a primary key when you create the table.

Table name

This will be used to identify your table.

Between 3 and 255 characters, containing only letters, numbers, underscores (_), hyphens (-), and periods (.).

Partition key

The partition key is part of the table's primary key. It is a hash value that is used to retrieve items from your table and allocate data across hosts for scalability and availability.

String ▼

1 to 255 characters and case sensitive.

Sort key - *optional*

You can use a sort key as the second part of a table's primary key. The sort key allows you to sort or search among all items sharing the same partition key.

String ▼

1 to 255 characters and case sensitive.

Table settings

☒ Default settings

The fastest way to create your table. You can modify

☐ Customize settings

Use these advanced features to make DynamoDB work

Table class	DynamoDB Standard	Yes
Capacity mode	Provisioned	Yes
Provisioned read capacity	5 RCU	Yes
Provisioned write capacity	5 WCU	Yes
Auto scaling	On	Yes
Local secondary indexes	-	No
Global secondary indexes	-	Yes
Encryption key management	Owned by Amazon DynamoDB	Yes
Deletion protection	Off	Yes
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No tags are associated with the resource.

Add new tag

You can add 50 more tags.

Cancel

Create table

DynamoDB

The Requests table was created successfully.

DynamoDB > Tables

Tables (2) Info

Find tables

Any tag key

Any tag value

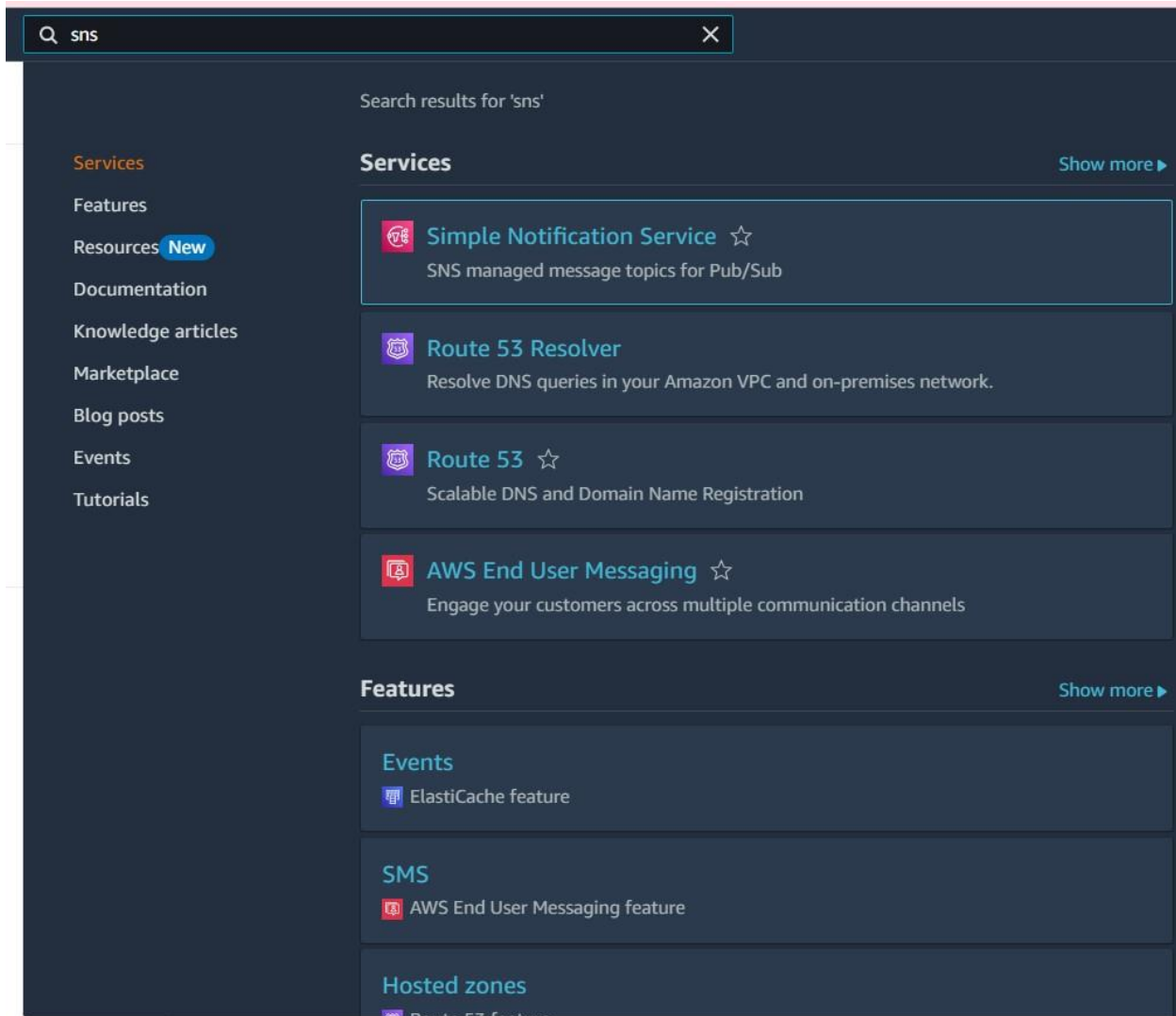
< 1 >

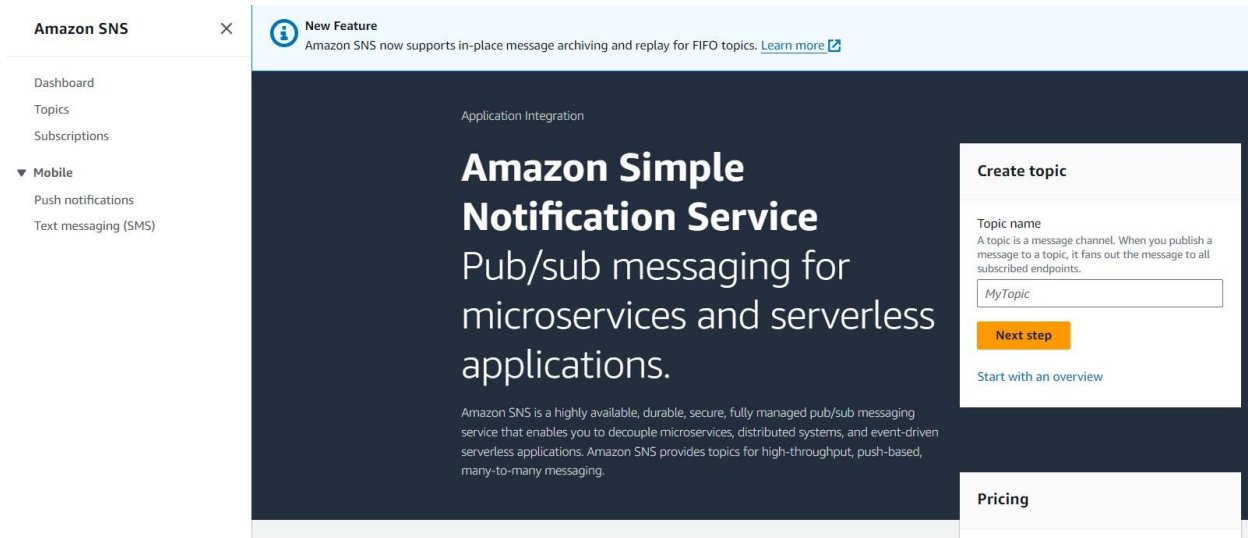
	Name	Status	Partition key	Sort key	Indexes	Deletion protection	Read capacity mode	Write capacity mode	Total size
<input type="checkbox"/>	Requests	Active	email (\$)	-	0	Off	Provisioned (\$)	Provisioned (\$)	0 bytes
<input type="checkbox"/>	Users	Active	email (\$)	-	0	Off	Provisioned (\$)	Provisioned (\$)	0 bytes

Milestone 3: SNS Notification Setup

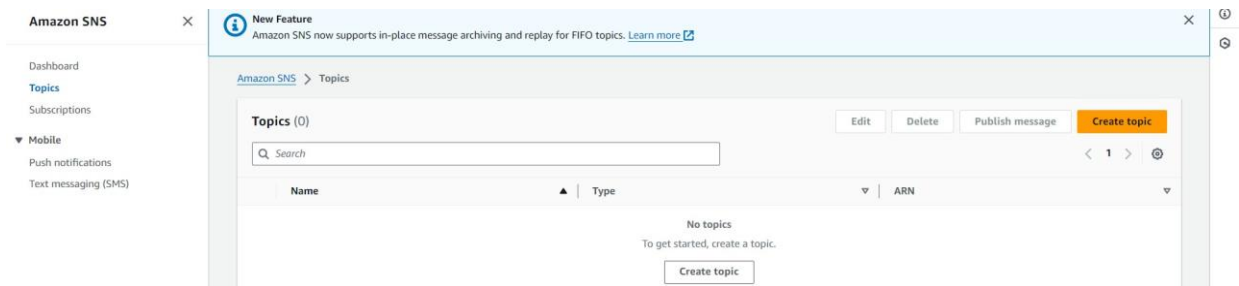
- **Activity 3.1: Create SNS topics for sending email notifications to users and library staff.**

- In the AWS Console, search for SNS and navigate to the SNS Dashboard.





- Click on **Create Topic** and choose a name for the topic.



- Choose Standard type for general notification use cases and Click on Create Topic.

Create topic

Details

Type [Info](#)

Topic type cannot be modified after topic is created

☐ FIFO (first-in, first-out)

- Strictly-preserved message ordering
- Exactly-once message delivery
- High throughput, up to 300 publishes/second
- Subscription protocols: SQS

☒ Standard

- Best-effort message ordering
- At-least once message delivery
- Highest throughput in publishes/second
- Subscription protocols: SQS, Lambda, HTTP, SMS, email, mobile application endpoints

Name

BookRequestNotifications

Maximum 256 characters. Can include alphanumeric characters, hyphens (-) and underscores (_).

Display name - optional [Info](#)

To use this topic with SMS subscriptions, enter a display name. Only the first 10 characters are displayed in an SMS message.

My Topic

Maximum 100 characters.

==

- C

2

- **Activity 3.2: Subscribe users and staff to relevant SNS topics to receive real-time notifications when a book request is made.**
 - Subscribe users (or admin staff) to this topic via Email. When a book request is made, notifications will be sent to the subscribed emails.

Amazon SNS > Subscriptions > Create subscription

Create subscription

Details

Topic ARN

Protocol

The type of endpoint to subscribe

Endpoint

An email address that can receive notifications from Amazon SNS.

ⓘ After your subscription is created, you must confirm it. [Info](#)

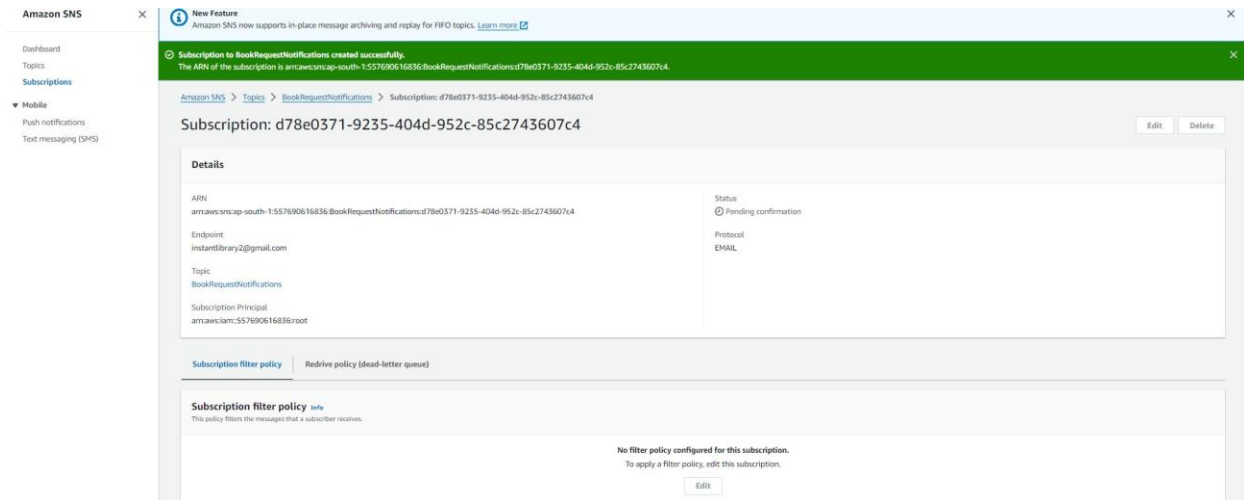
► **Subscription filter policy - optional** [Info](#)

This policy filters the messages that a subscriber receives.

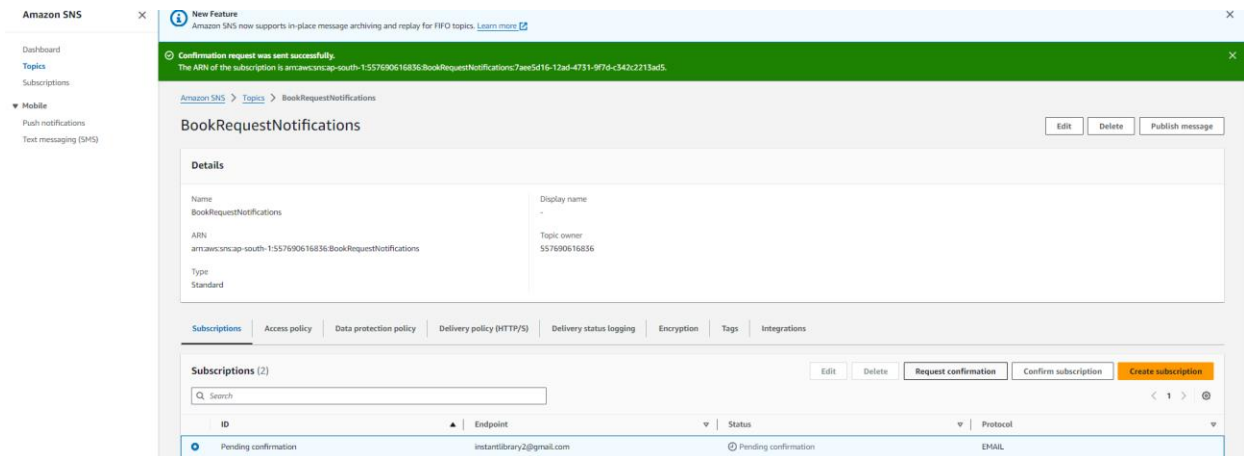
► **Redrive policy (dead-letter queue) - optional** [Info](#)

Send undeliverable messages to a dead-letter queue.

Cancel **Create subscription**



- After subscription request for the mail confirmation



- Navigate to the subscribed Email account and Click on the confirm subscription in the AWS Notification- Subscription Confirmation mail.

AWS Notification - Subscription Confirmation Inbox x

AWS Notifications <no-reply@sns.amazonaws.com>

9

to me ▼

You have chosen to subscribe to the topic:

arn:aws:sns:ap-south-1:557690616836:BookRequestNotifications

To confirm this subscription, click or visit the link below (If this was in error no action is necessary):

[Confirm subscription](#)

Please do not reply directly to this email. If you wish to remove yourself from receiving all future SNS subscription confirmation requests please send an email to [sns-opt-out](#)

AWS Notifications <no-reply@sns.amazonaws.com>

to me ▼

You have chosen to subscribe to the topic:

arn:aws:sns:ap-south-1:557690616836:BookRequestNotifications

To confirm this subscription, click or visit the link below (If this was in error no action is necessary):

[Confirm subscription](#)

Please do not reply directly to this email. If you wish to remove yourself from receiving all future SNS subscription confirmation requests please send an email to [sns-opt-out](#)



Simple Notification Service

Subscription confirmed!

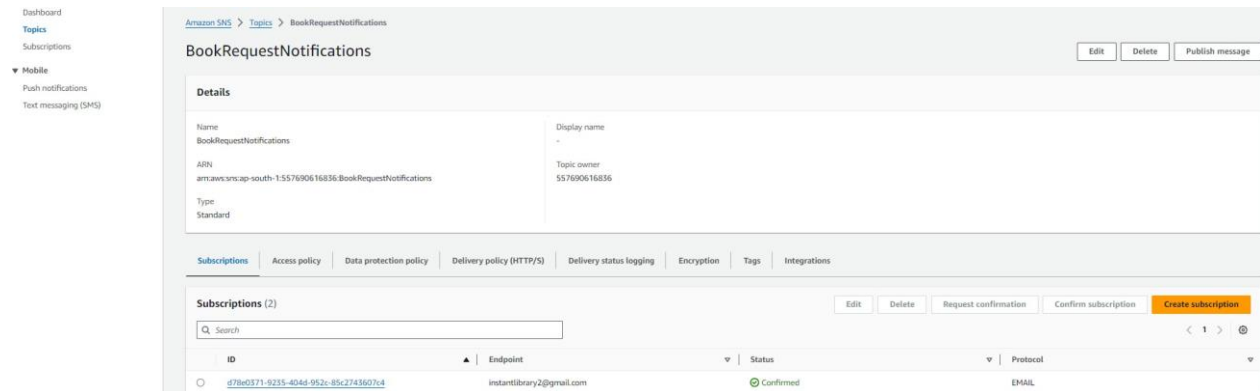
You have successfully subscribed.

Your subscription's id is:

arn:aws:sns:ap-south-1:557690616836:BookRequestNotifications:d78e0371-9235-404d-952c-85c2743607c4

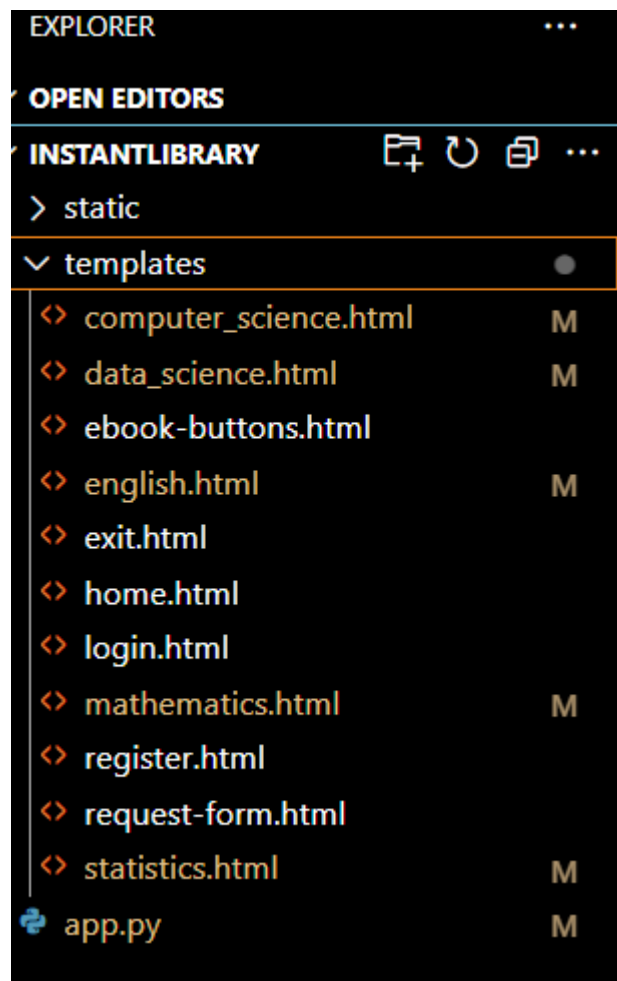
If it was not your intention to subscribe, [click here to unsubscribe](#).

- Successfully done with the SNS mail subscription and setup, now store the ARN link.



Milestone 4: Backend Development and Application Setup

- Activity 4.1: Develop the backend using Flask
 - File Explorer Structure



Description: set up the INSTANT LIBRARY project with an app.py file, a static/ folder for assets, and a templates/ directory containing all required HTML pages like home, login, register, subject-specific pages (e.g., computer_science.html, data_science.html), and utility pages (e.g., request-form.html, statistics.html).

Description of the code :

- **Flask App Initialization**

```
from flask import Flask, render_template, request, redirect, url_for
import boto3
from boto3.dynamodb.conditions import Key
import smtplib
from email.mime.text import MIMEText
from email.mime.multipart import MIMEMultipart
from bcrypt import hashpw, gensalt, checkpw
```

Description: import essential libraries including Flask utilities for routing, Boto3 for DynamoDB operations, SMTP and email modules for sending mails, and Bcrypt for password hashing and verification

```
app = Flask(__name__)
```

Description: initialize the Flask application instance using Flask(__name__) to start building the web app.

- **Dynamodb Setup:**

```
# Initialize DynamoDB resource
dynamodb = boto3.resource('dynamodb', region_name='ap-south-1')

# DynamoDB Tables
users_table = dynamodb.Table('Users') # Ensure the 'Users' table
requests_table = dynamodb.Table('Requests') # Ensure the 'Requests' table
```

Description: initialize the DynamoDB resource for the ap-south-1 region and set up access to the Users and Requests tables for storing user details and book requests.

- **SNS Connection**

```
# SNS Topic ARN (create the SNS topic in AWS and provide the ARN here)
sns = boto3.client('sns', region_name='ap-south-1')
sns_topic_arn = 'arn:aws:sns:ap-south-1:557690616836:BookRequestNotifications'

# Email settings (for sending emails)
SMTP_SERVER = "smtp.gmail.com"
SMTP_PORT = 587
SENDER_EMAIL = "instantlibrary2@gmail.com"
SENDER_PASSWORD = "luut dsih nyvq dgzv" # Your app password

# Function to send email
def send_email(to_email, subject, body):
    msg = MIMEText(body, 'plain')
    msg['From'] = SENDER_EMAIL
    msg['To'] = to_email
    msg['Subject'] = subject
    msg.attach(MIMEText(body, 'plain'))

    try:
        server = smtplib.SMTP(SMTP_SERVER, SMTP_PORT)
        server.starttls()
        server.login(SENDER_EMAIL, SENDER_PASSWORD)
        text = msg.as_string()
        server.sendmail(SENDER_EMAIL, to_email, text)
        server.quit()
        print("Email sent successfully")
    except Exception as e:
        print(f"Failed to send email: {e}")
```

Description: Configure SNS to send notifications when a book request is submitted. Paste your stored ARN link in the sns_topic_arn space, along with the region_name where the SNS topic is created. Also, specify the chosen email service in SMTP_SERVER (e.g., Gmail, Yahoo, etc.) and enter the subscribed email in the SENDER_EMAIL section. Create an 'App password' for the email ID and store it in the SENDER_PASSWORD section.

- **Routes for Web Pages**

- **Home Route:**

```
# Home route redirects to Registration page
@app.route('/')
def home():
    return redirect(url_for('register'))
```

Description: define the home route / to automatically redirect users to the register page when they access the base URL.

- Register Route:

```
# Registration Page
@app.route('/register', methods=['GET', 'POST'])
def register():
    if request.method == 'POST':
        name = request.form['name']
        email = request.form['email']
        password = request.form['password']
        confirm_password = request.form['confirm_password']

        # Basic Validation: Ensure all fields are filled
        if not name or not email or not password or not confirm_password:
            return "All fields are mandatory! Please fill out the entire form."
        if password != confirm_password:
            return "Passwords do not match! Please try again."

        # Check if user already exists
        response = users_table.get_item(Key={'email': email})
        if 'Item' in response:
            return "User already exists! Please log in."

        # Hash the password
        hashed_password = hashpw(password.encode('utf-8'), gensalt()).decode('utf-8')

        # Store user in DynamoDB with login_count initialized to 0
        users_table.put_item(
            Item={
                'email': email,
                'name': name,
                'password': hashed_password,
                'login_count': 0
            }
        )

        # Send SNS notification for new registration
        sns.publish(
            TopicArn=sns_topic_arn,
            Message=f'New user registered: {name} ({email})',
            Subject='New User Registration'
        )

        return redirect(url_for('login'))
    return render_template('register.html')
```

Description: define /register route to validate registration form fields, hash the user password using Bcrypt, store the new user in DynamoDB with a login count, and send an SNS notification on successful registration

- login Route (GET/POST):

```
# Login Page
@app.route('/login', methods=['GET', 'POST'])
def login():
    if request.method == 'POST':
        email = request.form['email']
        password = request.form['password']

        # Basic Validation: Ensure both fields are filled
        if not email or not password:
            return "Please enter both email and password."

        # Fetch user data from DynamoDB
        response = users_table.get_item(Key={'email': email})
        user = response.get('Item')

        if not user or not checkpw(password.encode('utf-8'), user['password'].encode('utf-8')):
            return "Incorrect email or password! Please try again."

        # Update login count
        users_table.update_item(
            Key={'email': email},
            UpdateExpression='SET login_count = login_count + :inc',
            ExpressionAttributeValues={':inc': 1}
        )

        # Successful login
        return redirect(url_for('home_page'))
    return render_template('login.html')
```

Description: define /login route to validate user credentials against DynamoDB, check the password using Bcrypt, update the login count on successful authentication, and redirect users to the home page

- Home, E- book buttons and subject routes:

```
# Home Page with E-Books, Request Books, and Exit
@app.route('/home-page')
def home_page():
    return render_template('home.html')

# E-Books Page (Dropdown Selection for Course and Subject)
@app.route('/ebook-buttons', methods=['GET', 'POST'])
def ebook_buttons():
    if request.method == 'POST':
        subject = request.form['subject']
        return redirect(url_for('subject_page', subject=subject))
    return render_template('ebook-buttons.html')

# Subject Page (Example with Mathematics)
@app.route('/<subject>.html')
def subject_page(subject):
    return render_template(f'{subject}.html')
```

Description: define /home-page to render the main homepage, /ebook-buttons to handle subject selection and redirection, and /<subject>.html dynamic route to render subject-specific pages like Mathematics or English.

- **Request Routes:**

```
# Book Request Form Page
@app.route('/request-form', methods=['GET', 'POST'])
def request_form():
    if request.method == 'POST':
        # Retrieve form data from the POST request
        email = request.form['email'] # Capture email to send thank-you note
        name = request.form['name']
        year = request.form['year']
        semester = request.form['semester']
        roll_no = request.form['roll-no']
        subject = request.form['subject']
        book_name = request.form['book-name']
        description = request.form['description']

        # Store book request in DynamoDB along with the user email
        requests_table.put_item(
            Item={
                'email': email,
                'roll_no': roll_no,
                'name': name,
                'year': year,
                'semester': semester,
                'subject': subject,
                'book_name': book_name,
                'description': description
            }
        )

        # Send a thank-you email to the requesting user
        thank_you_message = f"Dear {name},\n\nThank you for submitting a book request for '{book_name}'. We will\n\nsend_email(email, \"Thank You for Your Book Request\", thank_you_message)

        # Send an email to the Instant Library admin with the book request details
        admin_message = f"User {name} ({email}) has requested the book '{book_name}'.\n\nDetails:\nYear: {year}\n\nsend_email(\"instantlibrary2@gmail.com\", \"New Book Request\", admin_message)

        return "<h3>Book request submitted successfully! We will get back to you soon.</h3>"

    # Render the request form for GET requests
    return render_template('request-form.html')
```

Description: define /request-form route to capture book request details from users, store the request in DynamoDB, send a thank-you email to the user, notify the admin, and confirm submission with a success message.

Exit Route:

```
# Exit Page
@app.route('/exit')
def exit_page():
    return render_template('exit.html')
```

Description: define /exit route to render the exit.html page when the user chooses to leave or close the application.

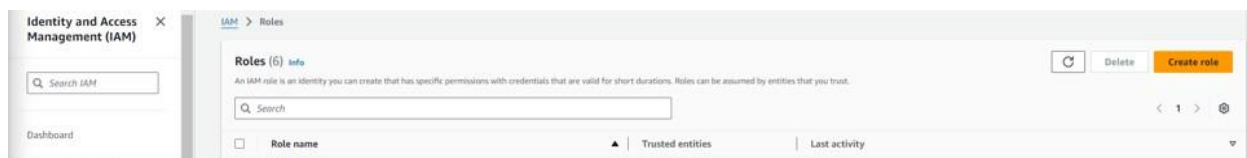
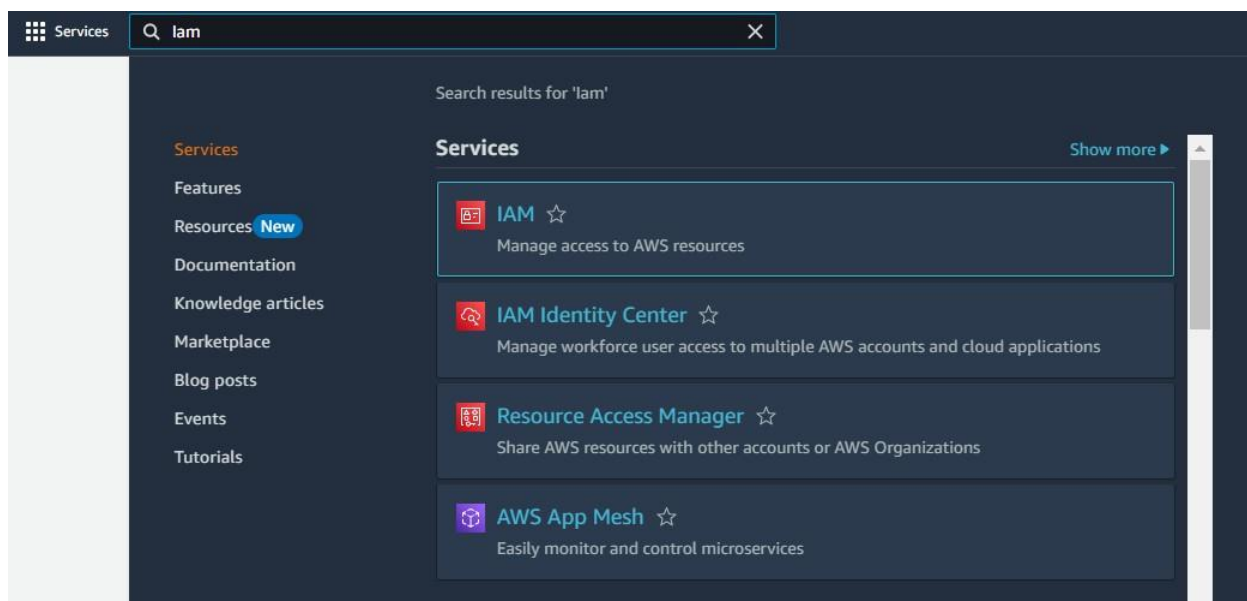
Deployment Code:

```
if __name__ == "__main__":  
    app.run(host='0.0.0.0', port=80, debug=True)
```

Description: start the Flask server to listen on all network interfaces (0.0.0.0) at port 80 with debug mode enabled for development and testing.

Milestone 5: IAM Role Setup

- **Activity 5.1: Create IAM Role.**
 - In the AWS Console, go to IAM and create a new IAM Role for EC2 to interact with DynamoDB and SNS.



Select trusted entity

Trusted entity type

- ☒ **AWS service**
Allow AWS services like EC2, Lambda, or others to perform actions in this account.
- ☐ **AWS account**
Attach policies to allow AWS accounts belonging to you or a third party to perform actions in this account.
- ☐ **Web identity**
Attach your application to the specified external web identity provider to assume this role to perform actions in this account.
- ☐ **OAuth 2.0 Integration**
Attach your application to OAuth 2.0 from a compatible identity provider to perform actions in this account.
- ☐ **Custom trust policy**
Create a custom trust policy to enable others to perform actions in this account.

Use case

Allow an AWS service like EC2, Lambda, or others to perform actions in this account.

Services or user code

EC2

Choose a use case for the specified service.

Use case

- ☒ **EC2**
Amazon EC2 instances to run AWS services on your behalf.
- ☐ **EC2 Run for AWS Systems Manager**
Allow EC2 instances to run AWS services like CloudWatch and Systems Manager on your behalf.
- ☐ **EC2 Spot Fleet**
Allow EC2 Spot Fleet to request and terminate Spot instances on your behalf.
- ☐ **EC2 - Spot Fleet Auto Scaling**
Allow Auto Scaling to create and update EC2 Spot Fleets on your behalf.
- ☐ **EC2 - Spot Fleet Tagging**
Allow EC2 to control user resources and attach tags to the specified instances on your behalf.
- ☐ **EC2 - Spot Instance**
Allow EC2 Spot Instance to request and manage spot instances on your behalf.
- ☐ **EC2 - Spot Fleet**
Allow EC2 Spot Fleet to request and manage spot fleet instances on your behalf.
- ☐ **EC2 - Scheduled instances**
Allow EC2 Scheduled instances to manage instances on your behalf.

Cancel **Next**

Add permissions

Permissions policies (1/955)

Choose one or more policies to attach to your new role.

Filter by Type: All types 2 matches

Policy name	Type
<input checked="" type="checkbox"/> AmazonDynamoDBFullAccess	AWS managed
<input type="checkbox"/> AmazonDynamoDBReadOnlyAccess	AWS managed

Set permissions boundary - optional

Cancel Previous **Next**

● Activity 5.2: Attach Policies.

Attach the following policies to the role:

- **AmazonDynamoDBFullAccess:** Allows EC2 to perform read/write operations on DynamoDB.
- **AmazonSNSFullAccess:** Grants EC2 the ability to send notifications via SNS.

IAM > Roles > Create role

Step 1
Select trusted entity

Step 2
Add permissions

Step 3
Name, review, and create

Add permissions info

Permissions policies (2/955) info

Choose one or more policies to attach to your new role.

Filter by type

X

All types

5 matches

(1)

Policy name	Type
AmazonS3FullAccess	AWS managed
AmazonS3OutpostsFullAccess	AWS managed
AmazonS3OutpostsReadOnlyAccess	AWS managed
AmazonS3OutpostsReadOnlyAccess	AWS managed
AmazonS3OutpostsReadOnlyAccess	AWS managed
AmazonS3OutpostsReadOnlyAccess	AWS managed
AmazonS3OutpostsReadOnlyAccess	AWS managed

Set permissions boundary - optional

Cancel Previous Next

IAM > Roles > Create role

Step 1
Select trusted entity

Step 2
Add permissions

Step 3
Name, review, and create

Name, review, and create

Role details

Role name

Description

Step 1: Select trusted entities

Trust policy

```

1 {
2   "Version": "2012-10-17",
3   "Statement": [
4     {
5       "Effect": "Allow",
6       "Action": "ec2:Describe*",
7       "Resource": "*"
8     },
9     {
10      "Effect": "Allow",
11      "Action": "ec2:Describe*",
12      "Resource": "*"
13    }
14  ]
15 }
```

Step 2: Add permissions

Permissions policy summary

Policy name	Type	Attached to
AmazonS3FullAccess	AWS managed	Permissions policy
AmazonS3OutpostsFullAccess	AWS managed	Permissions policy

Step 3: Add tags

Add tags - optional info

Tags are key-value pairs that you can add to AWS resources to help identify, organize, or search for resources.

Cancel Previous Create role

25

IAM > Roles > sns_Dynamodb_role

sns_Dynamodb_role
Info

Delete

Allows EC2 instances to call AWS services on your behalf.

Summary

Edit

Creation date
October 13, 2024, 23:06 (UTC+05:30)

Last activity
6 days ago

ARN
arn:aws:iam::557690616836:role/sns_Dynamodb_role

Maximum session duration
1 hour

Instance profile ARN
arn:aws:iam::557690616836:instance-profile/sns_Dynamodb_role

Permissions
Trust relationships
Tags
Last Accessed
Revoke sessions

Permissions policies (2)
Info

You can attach up to 10 managed policies.

Search

Filter by Type
All types

☐
Policy name

☐
Type

☐
Attached entities

☐
AmazonDynamoDBFullAccess

☐
AmazonSNSFullAccess

AWS managed

AWS managed

4

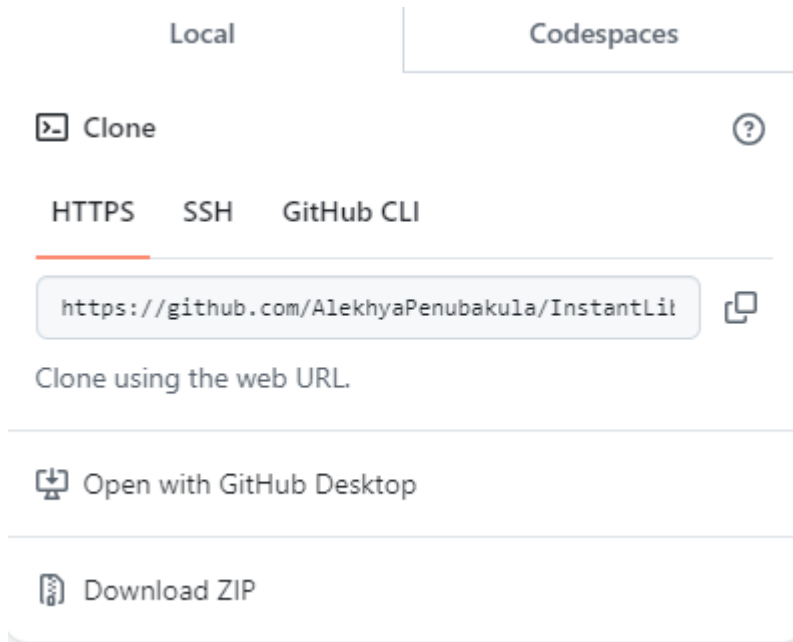
2

Milestone 6: EC2 Instance Setup

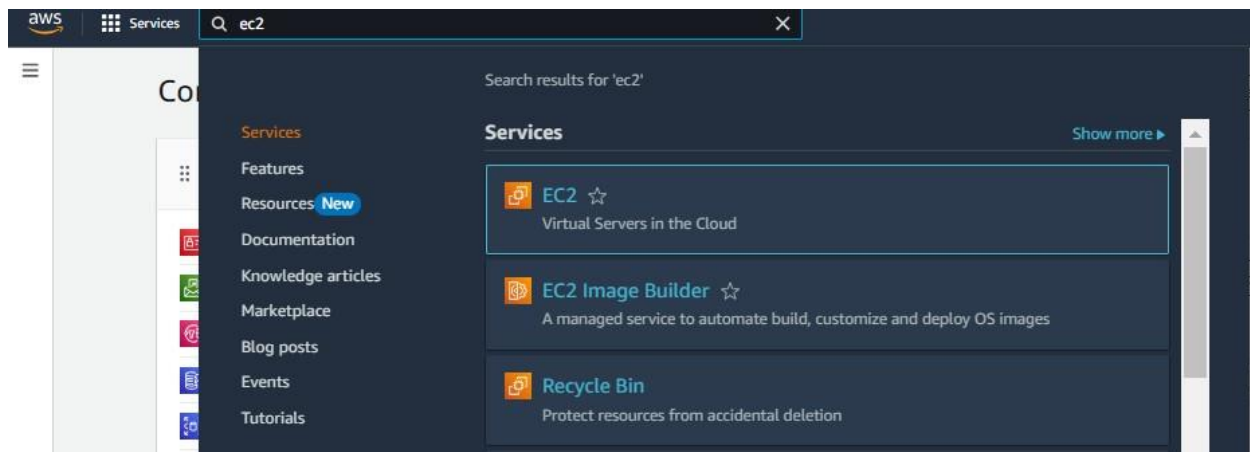
- Note: Load your Flask app and Html files into GitHub repository.

static	Initial commit
templates	Update statistics.html
app.py	Update app.py

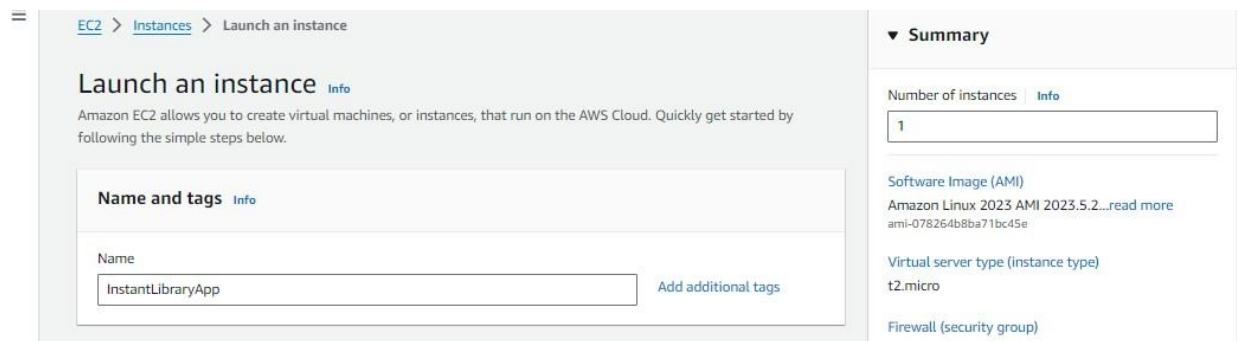
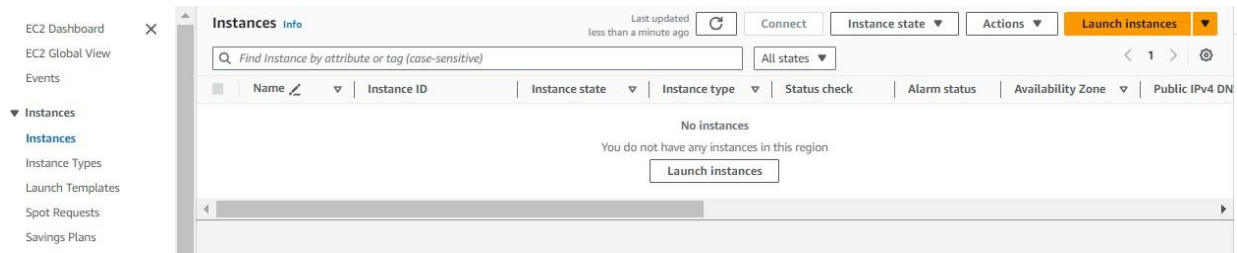
26



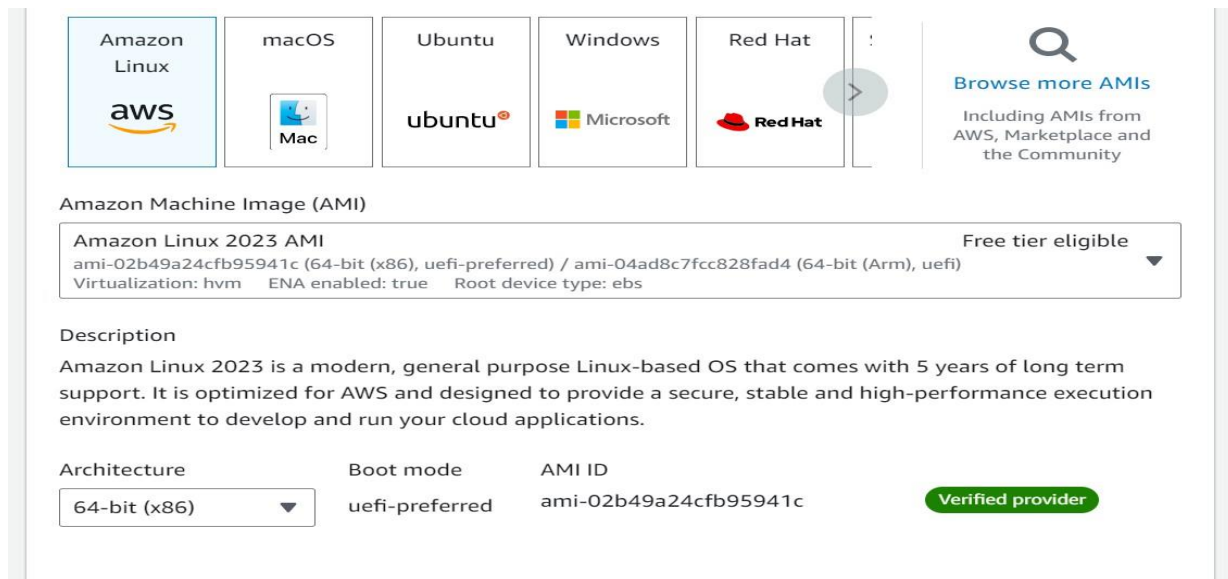
- **Activity 6.1: Launch an EC2 instance to host the Flask application.**
 - **Launch EC2 Instance**
 - In the AWS Console, navigate to EC2 and launch a new instance.



- Click on Launch instance to launch EC2 instance



- Choose Amazon Linux 2 or Ubuntu as the AMI and t2.micro as the instance type (free-tier eligible).



- Create and download the key pair for Server access.

▼ **Instance type** [Info](#) | [Get advice](#)

Instance type

t2.micro
Family: t2 1 vCPU 1 GiB Memory Current generation: true
On-Demand Linux base pricing: 0.0124 USD per Hour
On-Demand Windows base pricing: 0.017 USD per Hour
On-Demand RHEL base pricing: 0.0268 USD per Hour
On-Demand SUSE base pricing: 0.0124 USD per Hour

Free tier eligible

☐ All generations
[Compare instance types](#)

[Additional costs apply for AMIs with pre-installed software](#)

▼ **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](#)

Create key pair

×

Key pair name
Key pairs allow you to connect to your instance securely.

InstantLibrary

The name can include up to 255 ASCII characters. It can't include leading or trailing spaces.

Key pair type

☒ **RSA**
RSA encrypted private and public key pair

☐ **ED25519**
ED25519 encrypted private and public key pair

Private key file format

☒ **.pem**
For use with OpenSSH

☐ **.ppk**
For use with PuTTY

⚠ When prompted, store the private key in a secure and accessible location on your computer. You will need it later to connect to your instance. [Learn more](#)

Cancel

Create key pair



InstantLibrary.pem

Description

Amazon Linux 2023 is a modern, general purpose Linux-based OS that comes with 5 years of long term support. It is optimized for AWS and designed to provide a secure, stable and high-performance execution environment to develop and run your cloud applications.

Architecture

64-bit (x86)

Boot mode

uefi-preferred

AMI ID

ami-078264b8ba71bc45e

Username

ec2-user

Verified provider

▼ Instance type

Info | Get advice

Instance type

t2.micro

Family: t2 1 vCPU 1 GiB Memory Current generation: true

On-Demand Linux base pricing: 0.0124 USD per Hour

On-Demand Windows base pricing: 0.017 USD per Hour

On-Demand RHEL base pricing: 0.0268 USD per Hour

On-Demand SUSE base pricing: 0.0124 USD per Hour

Free tier eligible

▼

Additional costs apply for AMIs with pre-installed software

All generations

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

InstantLibrary

▼

Create new key pair

▼ Summary

Number of instances

Info

1

Software Image (AMI)

Amazon Linux 2023 AMI 2023.5.2...read more

ami-078264b8ba71bc45e

Virtual server type (instance type)

t2.micro

Firewall (security group)

New security group

Storage (volumes)

1 volume(s) - 8 GiB

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 750 hours of public IPv4 address usage per month, 30 GiB of EBS storage, 2 million I/Os, 1 GB of snapshots, and 100 GB of bandwidth to the internet.

Can cel

Preview code

Launch instance

30

- **Activity 6.2: Configure security groups for HTTP, and SSH access.**

▼ Network settings

Info

VPC - required

Info

vpc-03cdc7b6f19dd7211

(default) ▼

172.31.0.0/16

↻

Subnet

Info

No preference ▼

↻ Create new subnet

Auto-assign public IP

Info

Enable ▼

Additional charges apply when outside of free tier allowance

Firewall (security groups)

Info

A security group is a set of firewall rules that control the traffic for your instance. Add rules to allow specific traffic to reach your instance.

Create security group

Select existing security group

Security group name - required

launch-wizard

This security group will be added to all network interfaces. The name can't be edited after the security group is created. Max length is 255 characters. Valid characters: a-z, A-Z, 0-9, spaces, and ., -, /, (), #, @, [], +, =, &, !, \$, *

Description - required

Info

launch-wizard created 2024-10-13T17:49:56.622Z

Inbound Security Group Rules

▼ Security group rule 1 (TCP, 22, 0.0.0.0/0)

Remove

Type

Info

ssh ▼

Protocol

Info

TCP

Port range

Info

22

Source type

Info

Anywhere ▼

Source

Info

Q Add CIDR, prefix list or security

0.0.0.0/0 X

Description - optional

Info

e.g. SSH for admin desktop

▼ Security group rule 2 (TCP, 80, 0.0.0.0/0)

Remove

Type

Info

HTTP ▼

Protocol

Info

TCP

Port range

Info

80

Source type

Info

Custom ▼

Source

Info

Q Add CIDR, prefix list or security

0.0.0.0/0 X

Description - optional

Info

e.g. SSH for admin desktop

▼ Security group rule 3 (TCP, 5000, 0.0.0.0/0)

Remove

Type

Info

Custom TCP ▼

Protocol

Info

TCP

Port range

Info

5000

Source type

Info

Custom ▼

Source

Info

Q Add CIDR, prefix list or security

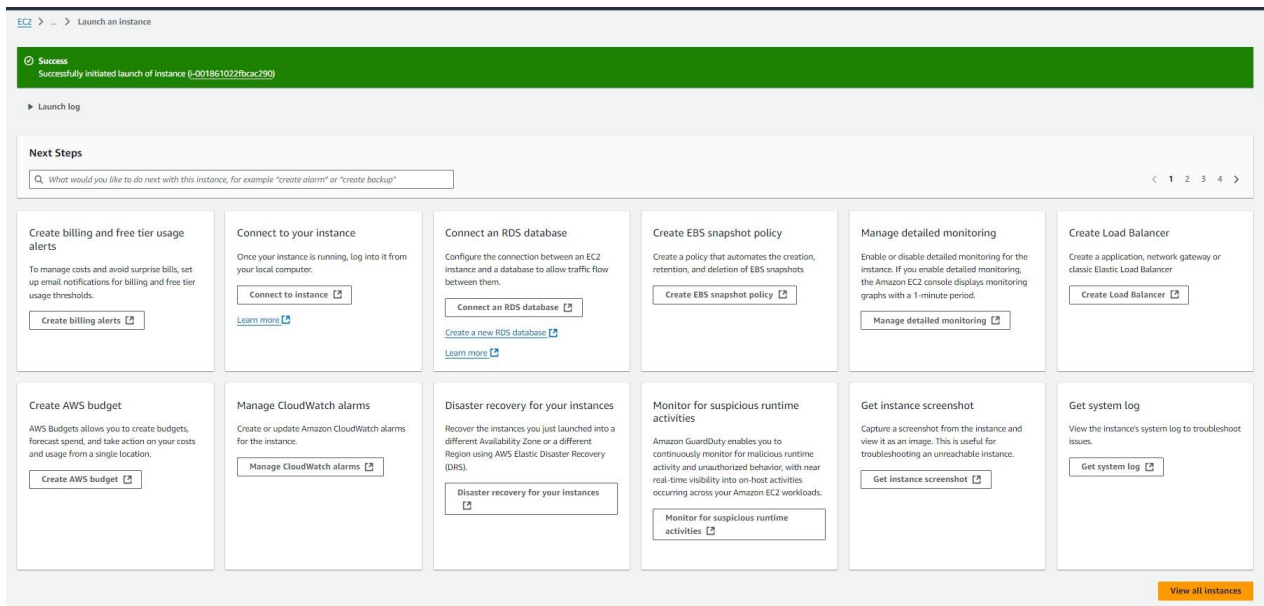
0.0.0.0/0 X

Description - optional

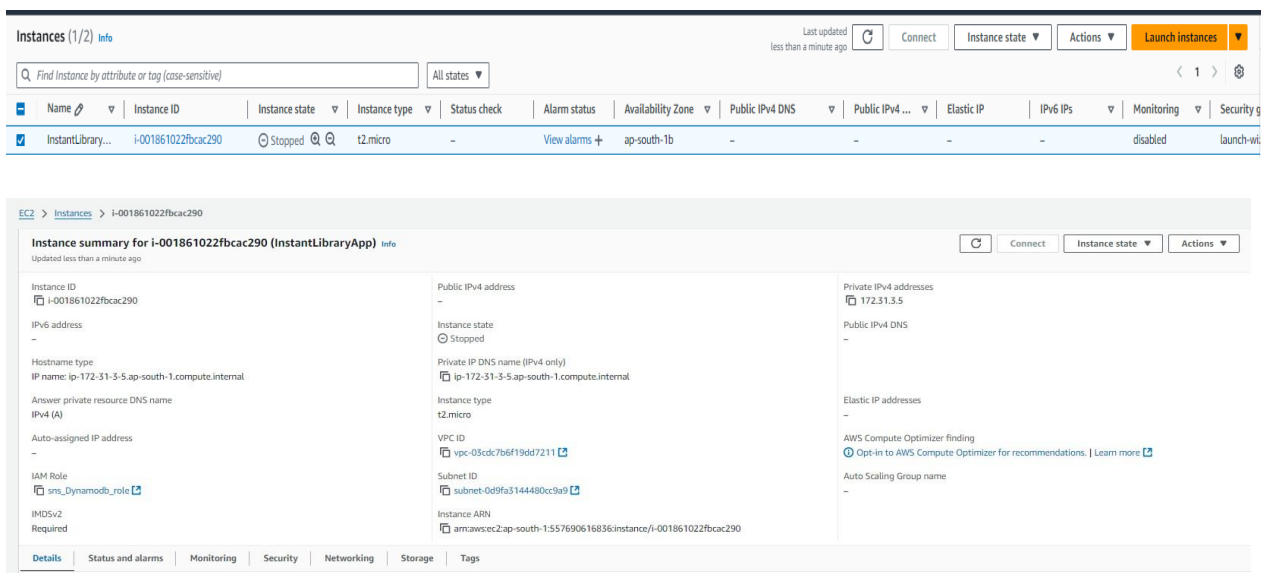
Info

e.g. SSH for admin desktop

Add security group rule



- To connect to EC2 using **EC2 Instance Connect**, start by ensuring that an **IAM role** is attached to your EC2 instance. You can do this by selecting your instance, clicking on **Actions**, then navigating to **Security** and selecting **Modify IAM Role** to attach the appropriate role. After the IAM role is connected, navigate to the **EC2** section in the **AWS Management Console**. Select the **EC2 instance** you wish to connect to. At the top of the **EC2 Dashboard**, click the **Connect** button. From the connection methods presented, choose **EC2 Instance Connect**. Finally, click **Connect** again, and a new browser-based terminal will open, allowing you to access your EC2 instance directly from your browser.



EC2 > Instances > i-001861022fbcac290

Instance summary for i-001861022fbcac290 (InstantLibraryApp) [Info](#)

Updated less than a minute ago

Instance ID i-001861022fbcac290 IPv6 address -- Hostname type IP name: ip-172-31-3-5-ap-south-1.compute.internal Answer private resource DNS name IPv4 (A) -- Auto-assigned IP address -- IAM Role sns_Dynamodb_role IMDSv2 Required	Public IPv4 address -- Instance state Stopped Private IP DNS name (IPv4 only) ip-172-31-3-5-ap-south-1.compute.internal Instance type t2.micro VPC ID vpc-03cdc7b6f19dd7211 Subnet ID subnet-0d9fa3144489cc9a9 Instance ARN arn:aws:ec2:ap-south-1:557690616836:instance/i-001861022fbcac290	Private IPv4 addresses 172.31.3.5 Public IPv4 DNS -- Elastic IP addresses -- AWS Compute Optimizer finding Opt-in to AWS Compute Optimizer for recommendations. Learn more Auto Scaling Group name --	Actions Connect Instance state Instance settings Networking Security Image and templates Monitor and troubleshoot Change security groups Get Windows password Modify IAM role
---	--	---	--

EC2 > Instances > i-001861022fbcac290 > **Modify IAM role**

Modify IAM role [Info](#)

Attach an IAM role to your instance.

Instance ID
i-001861022fbcac290 (InstantLibraryApp)

IAM role
Select an IAM role to attach to your instance or create a new role if you haven't created any. The role you select replaces any roles that are currently attached to your instance.

sns_Dynamodb_role

[Create new IAM role](#)

Cancel [Update IAM role](#)

- Now connect the EC2 with the files

Info


Connect to your instance i-001861022fbcac290 (InstantLibraryApp) using any of these options

EC2 Instance Connect

Session Manager


SSH client

EC2 serial console



Port 22 (SSH) is open to all IPv4 addresses
Port 22 (SSH) is currently open to all IPv4 addresses, indicated by **0.0.0.0/0** in the inbound rule in [your security group](#). For increased security, consider restricting access to only the EC2 Instance Connect service IP addresses for your Region: 13.233.177.0/29. [Learn more.](#)

Instance ID


 i-001861022fbcac290 (InstantLibraryApp)

Connection Type

☒ **Connect using EC2 Instance Connect**
Connect using the EC2 Instance Connect browser-based client, with a public IPv4 or IPv6 address.

☐ **Connect using EC2 Instance Connect Endpoint**
Connect using the EC2 Instance Connect browser-based client, with a private IPv4 address and a VPC endpoint.


☒ **Public IPv4 address**


 13.200.229.59


☐ IPv6 address

Username

Enter the username defined in the AMI used to launch the instance. If you didn't define a custom username, use the default username, ec2-user.

 ec2-user






Note: In most cases, the default username, ec2-user, is correct. However, read your AMI usage instructions to check if the AMI owner has changed the default AMI username.

Cancel

Connect

```
A newer release of "Amazon Linux" is available.  
Version 2023.6.20241010:  
Run "/usr/bin/dnf check-release-update" for full release and version update info
```



```
Amazon Linux 2023  
  
https://aws.amazon.com/linux/amazon-linux-2023  
  
Last login: Tue Oct 15 04:17:59 2024 from 13.233.177.3  
[ec2-user@ip-172-31-3-5 ~]$ █
```

Milestone 7: Deployment on EC2

Activity 7.1: Install Software on the EC2 Instance

Install Python3, Flask, and Git:

On Amazon Linux 2:

```
sudo yum update -y  
sudo yum install python3 git  
sudo pip3 install flask boto3
```

Verify Installations:

```
flask --version  
git --version
```

Activity 7.2: Clone Your Flask Project from GitHub

Clone your project repository from GitHub into the EC2 instance using Git.

Run: `git clone https://github.com/your-github-username/your-repository-name.git`

Note: change your-github-username and your-repository-name with your credentials

here: `git clone https://github.com/divya072805/medtrack.git`

This will download your project to the EC2 instance.

To navigate to the project directory, run the following command:

```
cd InstantLibrary
```

Once inside the project directory, configure and run the Flask application by executing the following command with elevated privileges:

Run the Flask Application

```
sudo flask run --host=0.0.0.0 --port=80
```

```
A newer release of "Amazon Linux" is available.
Version 2023.6.20241010:
Run "/usr/bin/dnf check-release-update" for full release and version update info

#####
#####\
#####|
\###|
 \#|
  V-|
   |
  /m/

Amazon Linux 2023
https://aws.amazon.com/linux/amazon-linux-2023

Last login: Tue Oct 15 04:17:59 2024 from 13.233.177.3
[ec2-user@ip-172-31-3-5 ~]$ git clone https://github.com/AlekhyPenubakula/InstantLibrary.git
fatal: destination path 'InstantLibrary' already exists and is not an empty directory.
[ec2-user@ip-172-31-3-5 ~]$ cd InstantLibrary
[ec2-user@ip-172-31-3-5 InstantLibrary]$ cd InstantLibrary
[ec2-user@ip-172-31-3-5 InstantLibrary]$ flask run --host=0.0.0.0 --port=80
 * Debug mode: off
Permission denied
[ec2-user@ip-172-31-3-5 InstantLibrary]$ ^C
[ec2-user@ip-172-31-3-5 InstantLibrary]$ ^C
[ec2-user@ip-172-31-3-5 InstantLibrary]$ sudo flask run --host=0.0.0.0 --port=80
 * Debug mode: off
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
 * Running on all addresses (0.0.0.0)
 * Running on http://127.0.0.1:80
 * Running on http://172.31.3.5:80
Press CTRL+C to quit
^C[ec2-user@ip-172-31-3-5 InstantLibrary]$
[ec2-user@ip-172-31-3-5 InstantLibrary]$ sudo flask run --host=0.0.0.0 --port=80
 * Debug mode: off
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
 * Running on all addresses (0.0.0.0)
 * Running on http://127.0.0.1:80
 * Running on http://172.31.3.5:80
Press CTRL+C to quit
183.82.125.56 - - [22/Oct/2024 07:42:00] "GET / HTTP/1.1" 302 -
183.82.125.56 - - [22/Oct/2024 07:42:01] "GET /register HTTP/1.1" 200 -
183.82.125.56 - - [22/Oct/2024 07:42:01] "GET /static/images/library3.jpg HTTP/1.1" 200 -
183.82.125.56 - - [22/Oct/2024 07:42:01] "GET /favicon.ico HTTP/1.1" 404 -
183.82.125.56 - - [22/Oct/2024 07:42:16] "GET /login HTTP/1.1" 200 -
183.82.125.56 - - [22/Oct/2024 07:42:16] "GET /static/images/library3.jpg HTTP/1.1" 304 -
183.82.125.56 - - [22/Oct/2024 07:42:21] "POST /login HTTP/1.1" 200 -
183.82.125.56 - - [22/Oct/2024 07:42:24] "GET /login HTTP/1.1" 200 -
183.82.125.56 - - [22/Oct/2024 07:42:27] "POST /login HTTP/1.1" 302 -
183.82.125.56 - - [22/Oct/2024 07:42:28] "GET /home-page HTTP/1.1" 200 -

i-001861022fbcac290 (InstantLibraryApp)
PublicIPs: 13.201.74.42 PrivateIPs: 172.31.3.5
```

Verify the Flask app is running:

<http://your-ec2-public-ip>

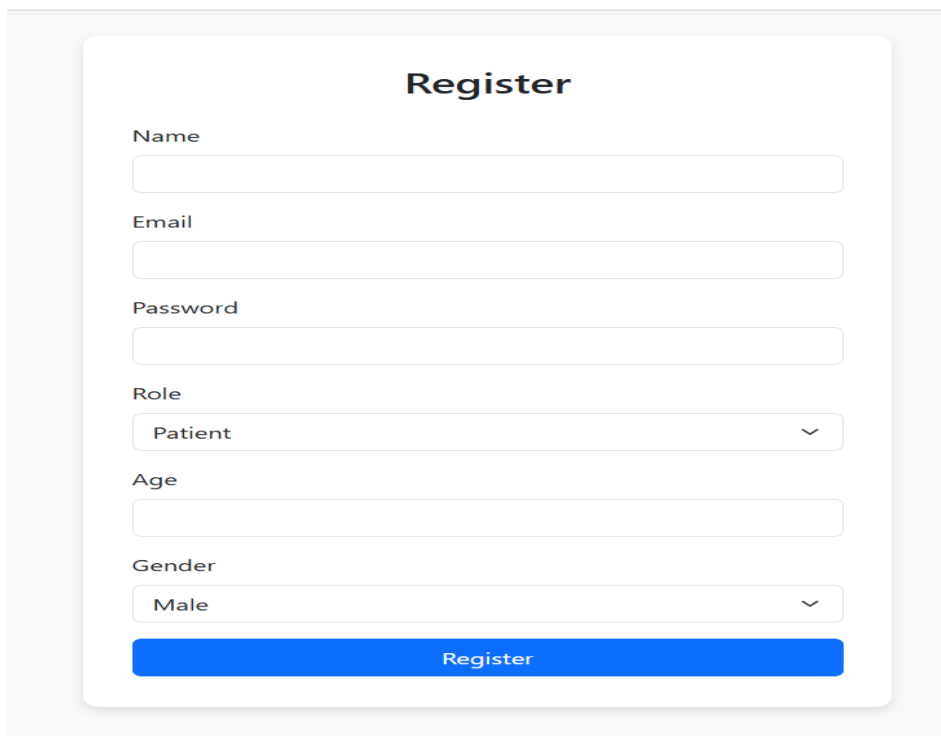
- Run the Flask app on the EC2 instance

```
[ec2-user@ip-172-31-3-5 InstantLibrary]$ sudo flask run --host=0.0.0.0 --port=80
 * Debug mode: off
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
 * Running on all addresses (0.0.0.0)
 * Running on http://127.0.0.1:80
 * Running on http://172.31.3.5:80
Press CTRL+C to quit
183.82.125.56 - - [22/Oct/2024 07:42:00] "GET / HTTP/1.1" 302 -
183.82.125.56 - - [22/Oct/2024 07:42:01] "GET /register HTTP/1.1" 200 -
183.82.125.56 - - [22/Oct/2024 07:42:01] "GET /static/images/library3.jpg HTTP/1.1" 200 -
183.82.125.56 - - [22/Oct/2024 07:42:01] "GET /favicon.ico HTTP/1.1" 404 -
183.82.125.56 - - [22/Oct/2024 07:42:16] "GET /login HTTP/1.1" 200 -
183.82.125.56 - - [22/Oct/2024 07:42:16] "GET /static/images/library3.jpg HTTP/1.1" 304 -
183.82.125.56 - - [22/Oct/2024 07:42:21] "POST /login HTTP/1.1" 200 -
183.82.125.56 - - [22/Oct/2024 07:42:24] "GET /login HTTP/1.1" 200 -
183.82.125.56 - - [22/Oct/2024 07:42:27] "POST /login HTTP/1.1" 302 -
183.82.125.56 - - [22/Oct/2024 07:42:28] "GET /home-page HTTP/1.1" 200 -
```

Milestone 8: Testing and Deployment

- **Activity 8.1: Conduct functional testing to verify user registration, login, book requests, and notifications.**

Register Page:

A screenshot of a web registration form titled "Register". The form is contained within a white rounded rectangle with a subtle shadow, set against a light gray background. It features several input fields: "Name", "Email", and "Password" are text inputs; "Role" and "Gender" are dropdown menus with "Patient" and "Male" selected respectively; "Age" is a text input. A prominent blue "Register" button is at the bottom.

Register

Name

Email

Password

Role

Patient

Age

Gender

Male

Register

Login Page:

Login

Email

Password

Role

Doctor

▼

Login

Home page:

MedTrack

Welcome to MedTrack

Your cloud-based solution for medical record management and diagnosis.

Register

Login

About Us

Secure Data

Store and access patient records safely using AWS DynamoDB.

AI Diagnosis

Leverage AI tools for accurate, fast medical diagnosis.

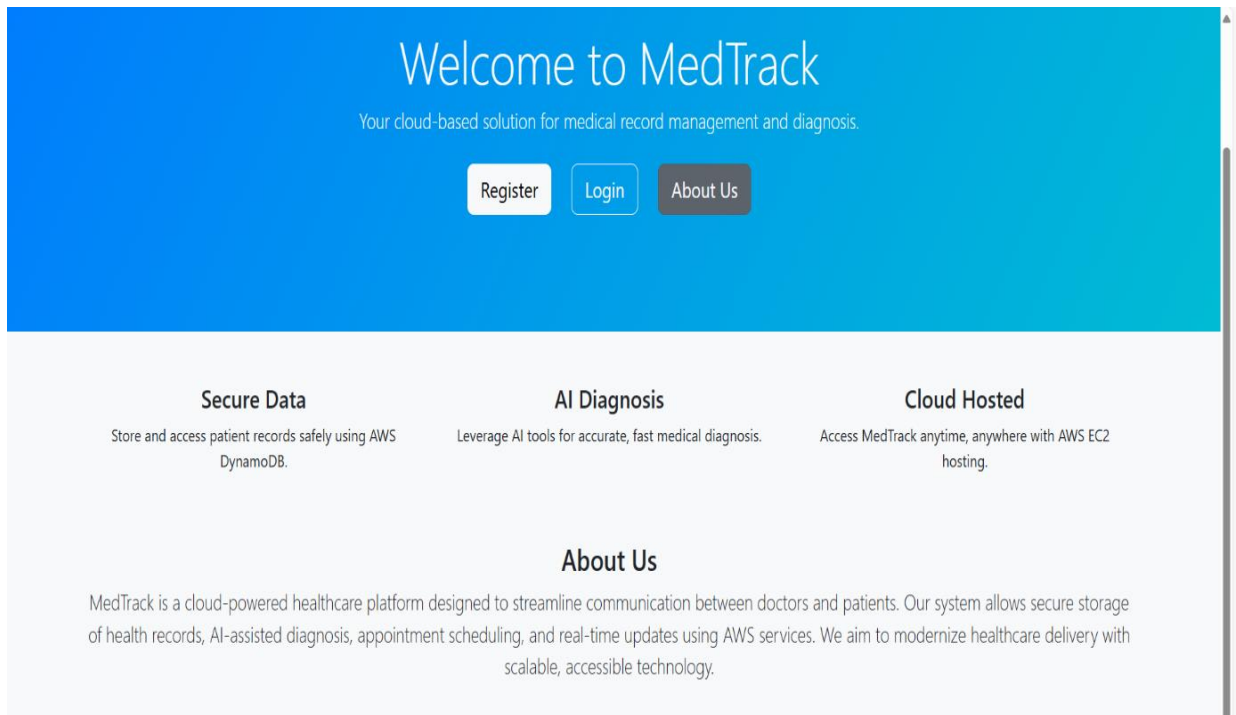
Cloud Hosted

Access MedTrack anytime, anywhere with AWS EC2 hosting.

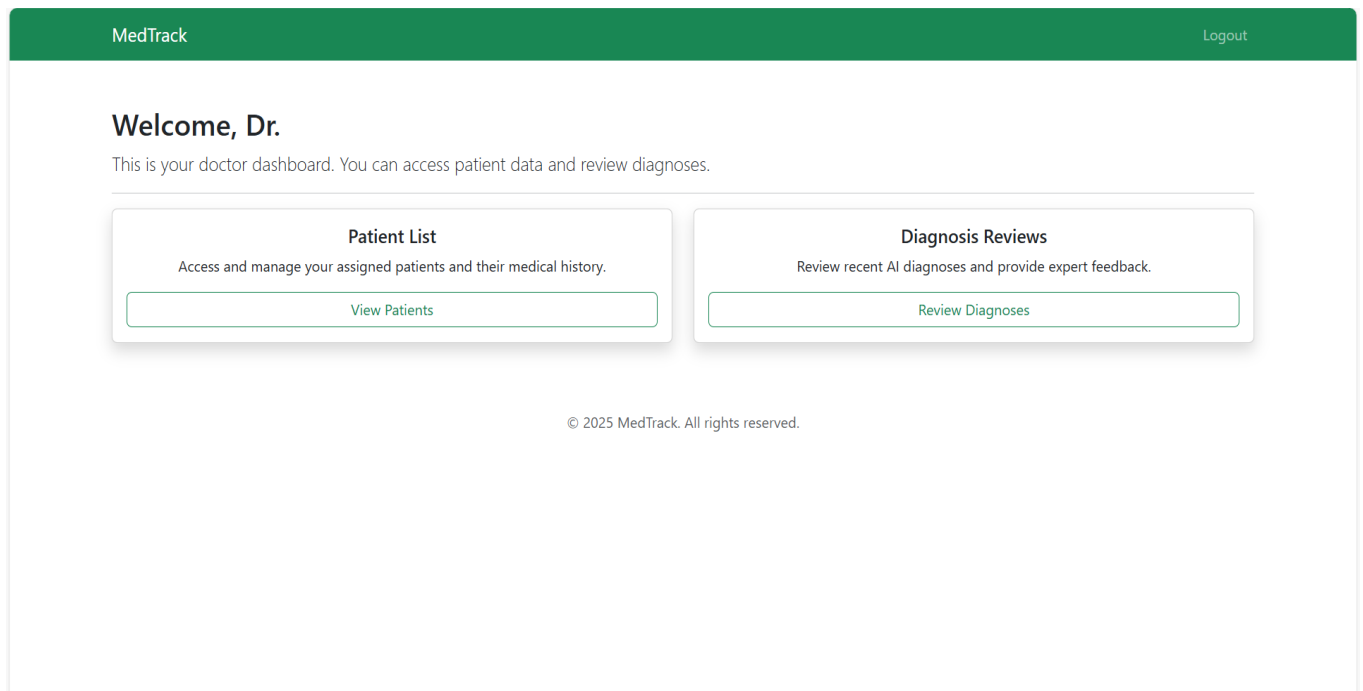
About Us

MedTrack is a cloud-powered healthcare platform designed to streamline communication between doctors and patients. Our system allows secure storage of health records, AI-assisted diagnosis, appointment scheduling, and real-time updates using AWS services. We aim to modernize healthcare delivery with

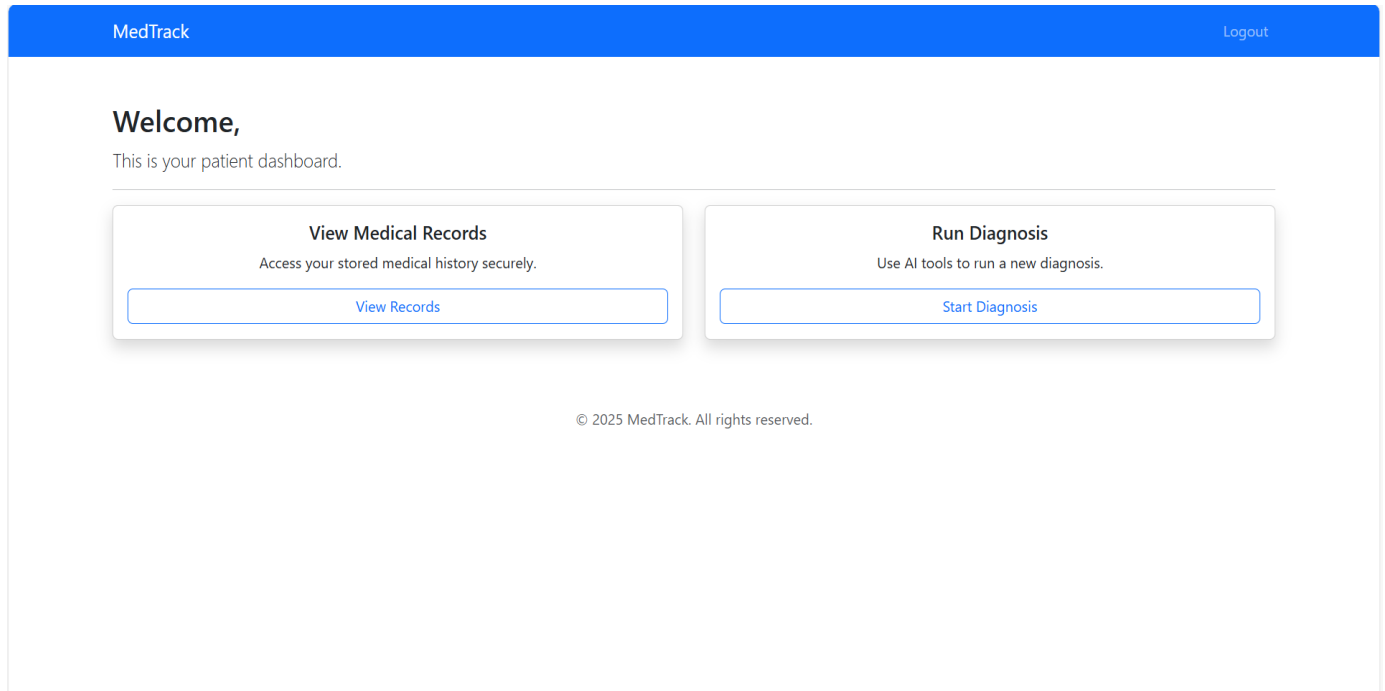
About Us page:



Doctor Dashboard:



Patient Dashboard:



Exit:

Session Ended

Please close this tab.

Conclusion:

MedTrack is a web-based healthcare management system built using Flask that facilitates interaction between doctors and patients. It allows users to register and log in as either a doctor or a patient. Patients can view available doctors, book appointments, and view their scheduled or past visits. Doctors can access their assigned appointments, update them with a diagnosis, treatment plan, and prescription, and mark them as completed. The system uses in-memory storage for users and appointments, making it suitable for demonstration or development purposes without requiring a database. Although email and AWS SNS notification features are present in the code, they are disabled by default. MedTrack is designed with a clear role-based workflow and is easily extendable for real-world deployment with additional features like persistent databases, email alerts, password encryption, and a modern UI.