RAJALAKSHMI ENGINEERING COLLEGE

An AUTONOMOUS Institution

Affiliated to ANNA UNIVERSITY, Chennai

DEPARTMENT OF COMPUTER SCIENCE &

ENGINEERING ACADEMIC YEAR 2024-2025

EVEN SEMESTER

CS23432 SOFTWARE ENGINEERING LAB

LAB MANUAL

SECOND YEAR

FOURTH SEMESTER

2024- 2025

EVEN SEMESTER

Ex No	List of Experiments
1	Study of Azure DevOps
2	Designing Project using AGILE-SCRUM Methodology.
3	Agile Planning
4	User stories – Creation
5	Architecture Diagram Using AZURE
6	Designing Usecse and Class Diagram
7	Designing Interaction Diagrams
8	Design Interface
9	Implementation – Design a Web Page based on Scrum Methodology
10	Testing using Azure.
11	Deployment

Requirements	
Hardware	Intel i3, CPU @ 1.20GHz 1.19 GHz, 4 GB RAM, 32 Bit Operating System
Software	StarUML , Azure

LAB PLAN

CS19442-SOFTWARE ENGINEERING LAB

Ex No	Date	Topic	Page No	Sign
1		Study of Azure DevOps		
2		Writing Problem Statement		
3		Designing Project using AGILE-SCRUM Methodology by using Azure.		
4		Agile Planning		
5		User stories – Creation		
6		Architecture Diagram Using AZURE		
7		Designing Usecse Diagram using StarUML		
8		Designing Activity Diagrams using StarUML		
9		Designing Sequence Diagrams using StarUML		
10		Design Class Diagram		
10		Design User Interface		
11		Implementation – Design a Web Page based on Scrum Methodology		
12		Testing		
13		Deployment		

Course Outcomes (COs)

Course Name: Software Engineering
Course Code: CS23432

CO 1	Understand the software development process models.
CO 2	Determine the requirements to develop software
CO 3	Apply modeling and modeling languages to design software products
CO 4	Apply various testing techniques and to build a robust software products
CO 5	Manage Software Projects and to understand advanced engineering concepts

CO - PO – PSO matrices of course

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CS23432.1	2	2	3	2	2	2	2	2	2	2	3	2	1	3	-
CS23432.2	2	3	1	2	2	1	-	1	1	1	2	-	1	2	-
CS23432.3	2	2	1	1	1	1	1	1	1	1	1	1	2	2	1
CS23432.4	2	2	3	2	2	2	1	0	2	2	2	1	1	2	1
CS23432.5	2	2	2	1	1	1	1	0	2	1	1	1	2	1	-
Average	**2.0**	**2.2**	**2.0**	**1.6**	**1.6**	**1.4**	**1.3**	**1.3**	**1.6**	**1.4**	**1.8**	**1.3**	**1.4**	**2.0**	**1.0**

Correlation levels 1, 2 or 3 are as defined below:
1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation: "-"

EX NO : 1 STUDY OF AZURE DEVOPS

AIM:

To study how to create an agile project in Azure DevOps environment.

STUDY:

1. Understanding Azure DevOps

Azure DevOps consists of five key services:

1.1 Azure Repos (Version Control)

- Supports Git repositories and Team Foundation Version Control (TFVC).
- Provides features like branching, pull requests, and code reviews.

1.2 Azure Pipelines (CI/CD)

- Automates build, test, and deployment processes.
- Supports multi-platform builds (Windows, Linux, macOS).
- Works with Docker, Kubernetes, Terraform, and cloud providers (Azure, AWS, GCP).

1.3 Azure Boards (Agile Project Management)

- Manages work using Kanban boards, Scrum boards, and dashboards.
- Tracks user stories, tasks, bugs, sprints, and releases.

1.4 Azure Test Plans (Testing)

- Provides manual, exploratory, and automated testing.
- Supports test case management and tracking.

1.5 Azure Artifacts (Package Management)

- Stores and manages NuGet, npm, Maven, and Python packages.
- Enables versioning and secure access to dependencies.

Getting Started with Azure DevOps

Step 1: Create an Azure DevOps Account

- Visit Azure DevOps.
- Sign in with a Microsoft Account.
- Create an Organization and a Project.

Step 2: Set Up a Repository (Azure Repos)

- Navigate to Repos.
- Choose Git or TFVC for version control.
- Clone the repository and push your code.

Step 3: Configure a CI/CD Pipeline (Azure Pipelines)

- Go to Pipelines → New Pipeline.
- Select a source code repository (Azure Repos, GitHub, etc.).
- Define the pipeline using YAML or the Classic Editor.
- Run the pipeline to build and deploy the application.

Step 4: Manage Work with Azure Boards

- Navigate to Boards.
- Create work items, user stories, and tasks.
- Organize sprints and track progress.

Step 5: Implement Testing (Azure Test Plans)

- Go to Test Plans.
- Create and run test cases.
- View test results and track bugs.

RESULT:

The study was successfully completed.

EX NO: 2 PROBLEM STATEMENT

AIM:
To prepare PROBLEM STATEMENT for your given project.

PROBLEM STATEMENT:

Modern banking systems are increasingly vulnerable to fraud involving unsolicited OTPs and phishing messages via SMS and messaging apps. Users often fall victim to scams due to a lack of real-time fraud detection.
This project aims to **detect and alert users about fraudulent OTPs and scam messages in real-time** across multiple platforms (SMS, WhatsApp, Telegram) by leveraging a secure, Azure-hosted application with real-time analysis and user alerts.

RESULT:
The problem statement was written successfully.

EX NO: 3 **AGILE PLANNING**

AIM:
To prepare an Agile Plan.

THEORY:

Agile planning is a part of the Agile methodology, which is a project management style with an incremental, iterative approach. Instead of using an in-depth plan from the start of the project—which is typically product-related—Agile leaves room for requirement changes throughout and relies on constant feedback from end users.

With Agile planning, a project is broken down into smaller, more manageable tasks with the ultimate goal of having a defined image of a project's vision. Agile planning involves looking at different aspects of a project's tasks and how they'll be achieved, for example:
· Roadmaps to guide a product's release ad schedule
· Sprints to work on one specific group of tasks at a time
· A feedback plan to allow teams to stay flexible and easily adapt to change
User stories, or the tasks in a project, capture user requirements from the end user's perspective Essentially, with Agile planning, a team would decide on a set of user stories to action at any given time, using them as a guide to implement new features or functionalities in a tool. Looking at tasks as user stories is a helpful way to imagine how a customer may use a feature and helps teams prioritize work and focus on delivering value first.
· Steps in Agile planning process
1. Define vision
2. Set clear expectations on goals
3. Define and break down the product roadmap
4. Create tasks based on user stories
5. Populate product backlog
6. Plan iterations and estimate effort
7. Conduct daily stand-ups
8. Monitor and adapt

RESULT:
Thus the Agile plan was completed successfully.

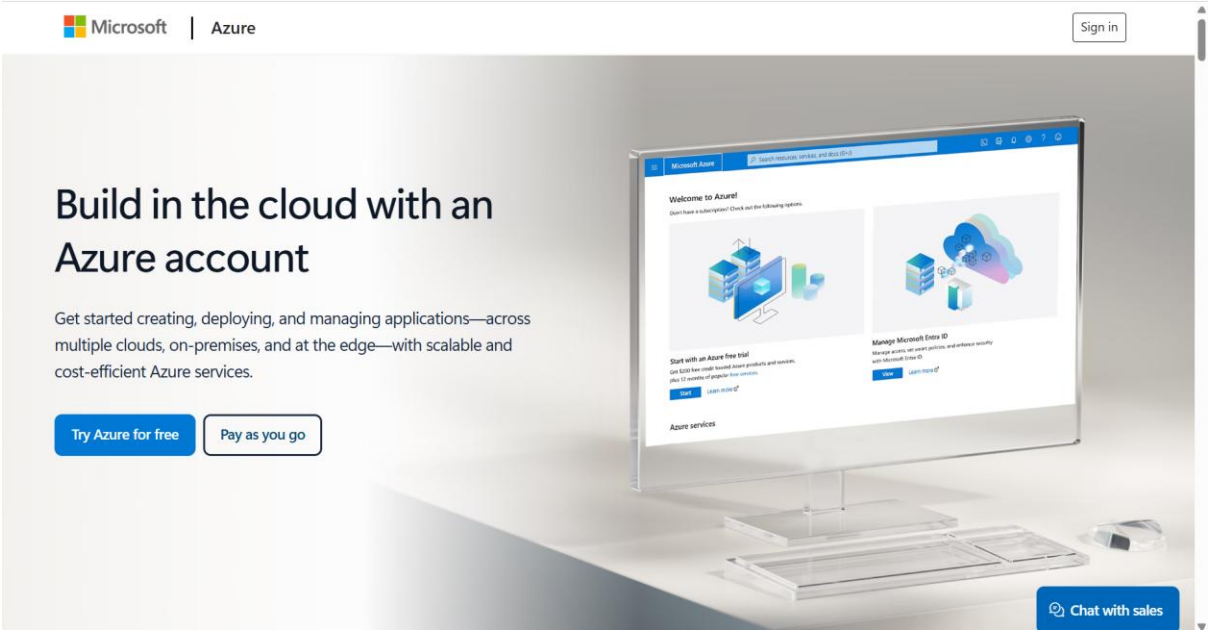
EX NO: 4 **CREATE USER STORIES**

AIM:
To create User Stories

THEORY:
A user story is an informal, general explanation of a software feature written from the perspective of the end user. Its purpose is to articulate how a software feature will provide value to the customer.

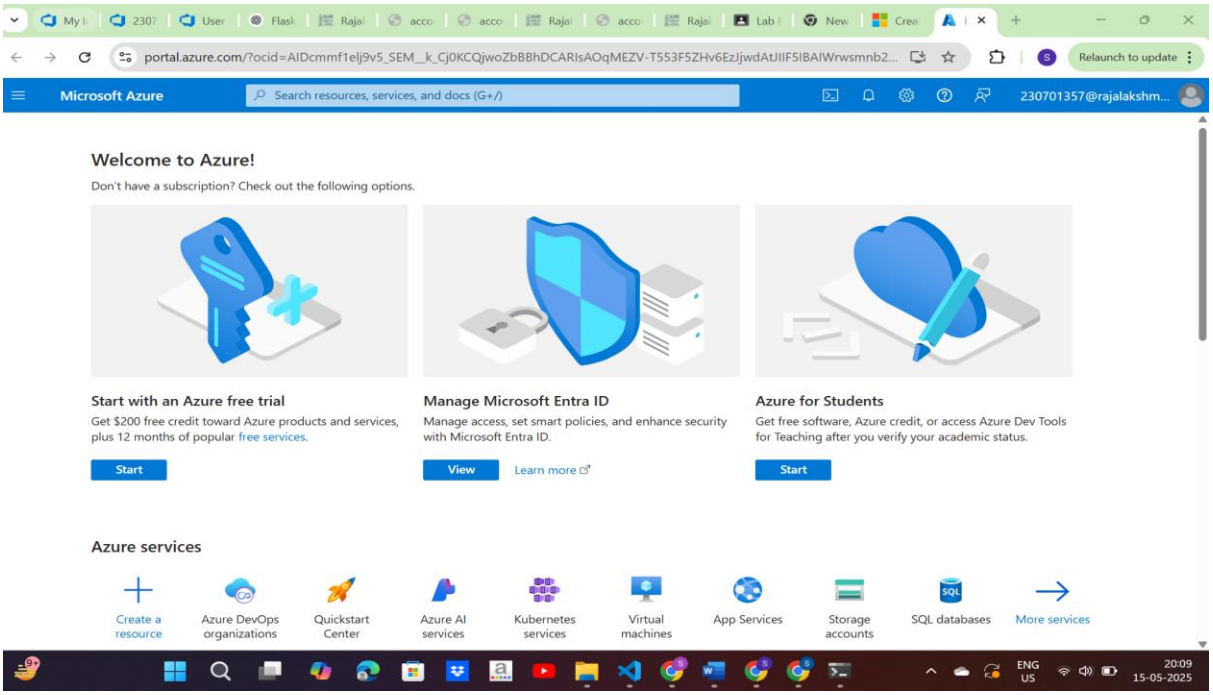
User story template
"As a [role], I [want to], [so that]."

PROCEDURE:
1. Open your web browser and go to the Azure website: https://azure.microsoft.com/en-in Sign in using your Microsoft account credentials. If you don't have an account, you'll need to create one.

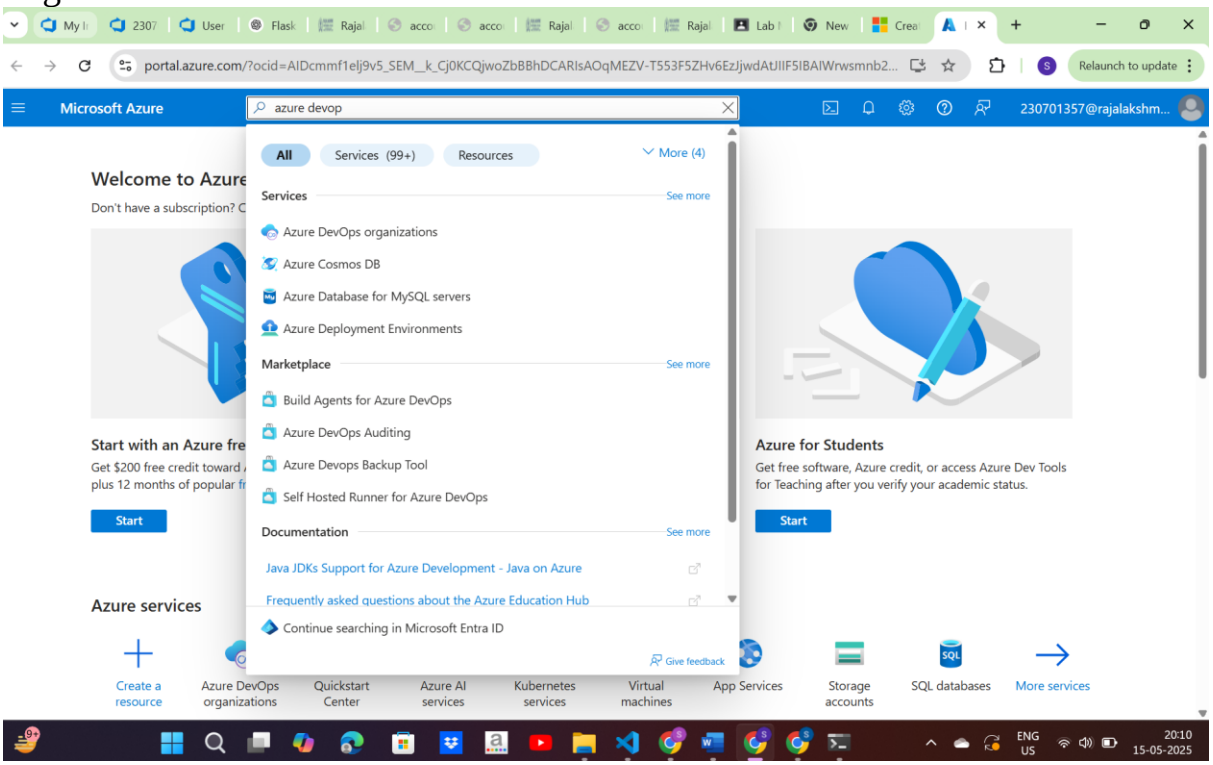


2. If you don’t have a Microsoft account, you can sign up for https://signup.live.com/?lic=1

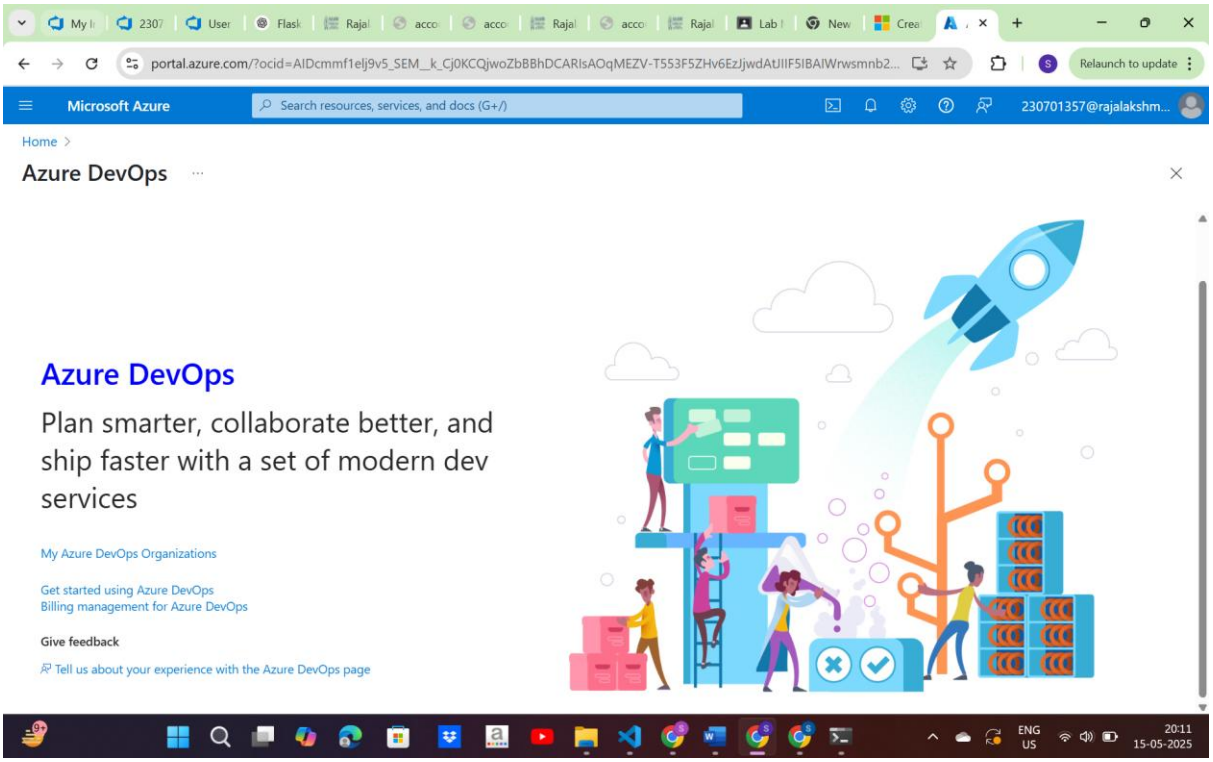
3. Azure home page

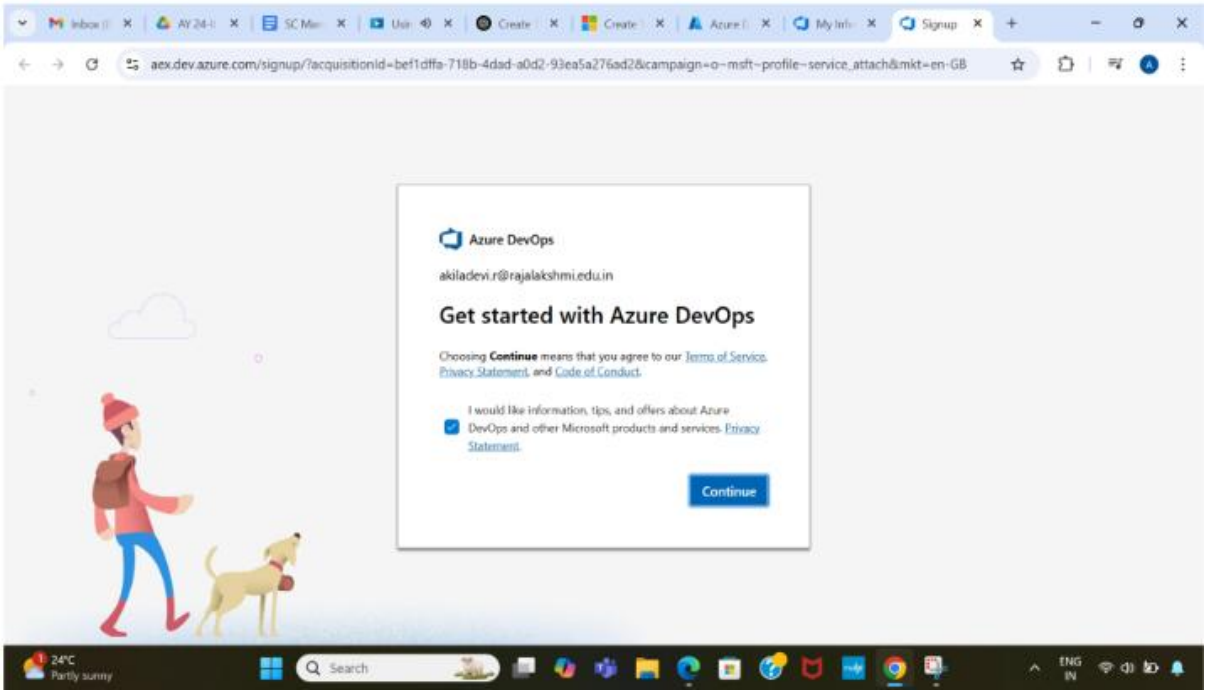


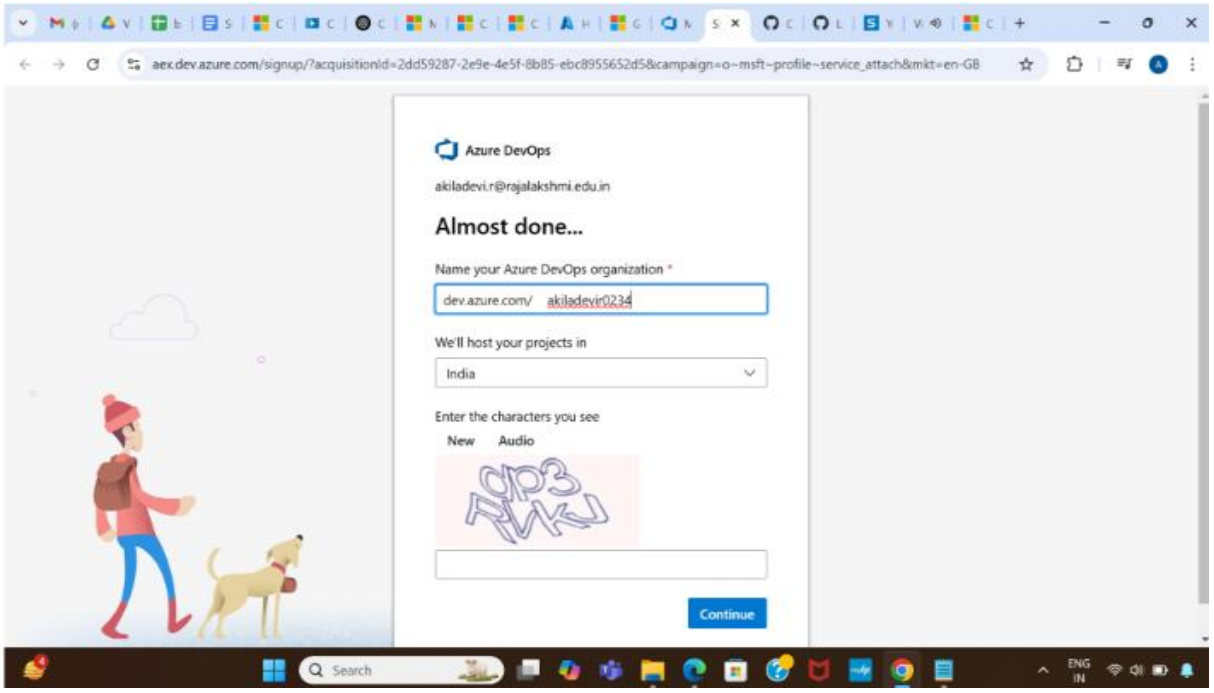
4. Open DevOps environment in the Azure platform by typing Azure DevOps Organizations in the search bar.



5. Click on the My Azure DevOps Organization link and create an organization and you should be taken to the Azure DevOps Organization Home page.


Microsoft Azure
Search resources, services, and docs (G+/)
Home
Azure DevOps
Azure DevOps
Plan smarter, collaborate better, and ship faster with a set of modern dev services
My Azure DevOps Organizations
Get started using Azure DevOps
Billing management for Azure DevOps
Give feedback
Tell us about your experience with the Azure DevOps page


Azure DevOps
akiladevi.r@rajalakshmi.edu.in
Get started with Azure DevOps
Choosing Continue means that you agree to our Terms of Service, Privacy Statement, and Code of Conduct.
I would like information, tips, and offers about Azure DevOps and other Microsoft products and services. Privacy Statement
Continue



6. Create the First Project in Your Organization

After the organization is set up, you'll need to create your first project. This is where you'll begin to manage code, pipelines, work items, and more.

i. On the organization's Home page, click on the New Project button.

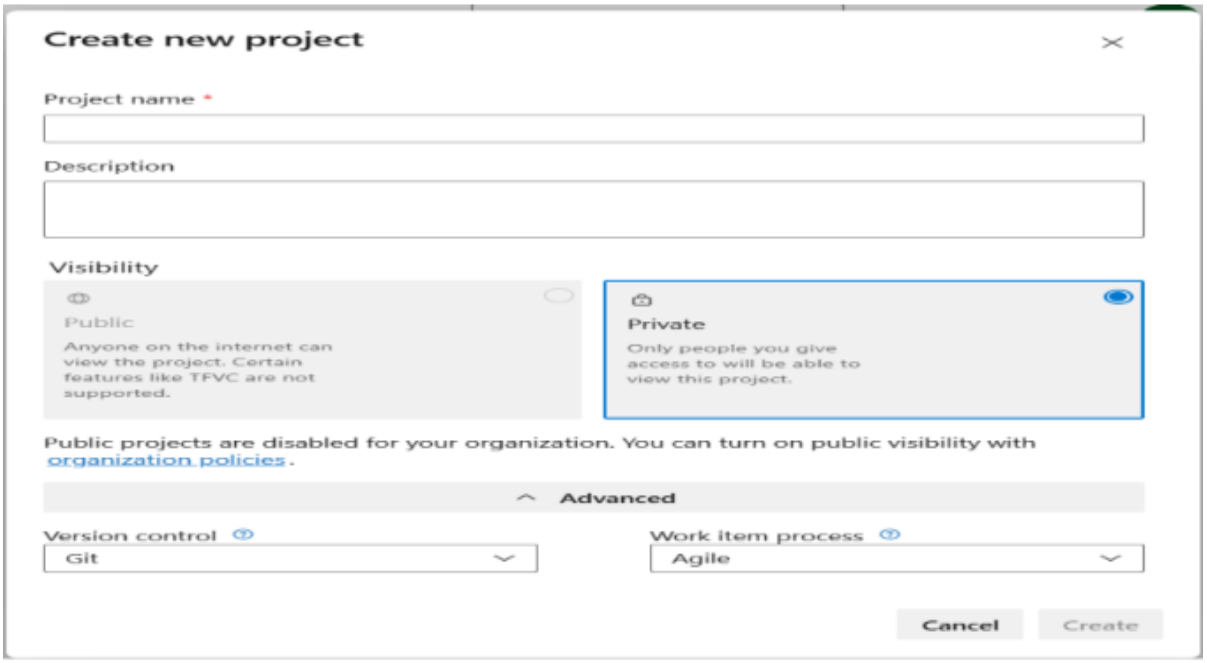
ii. Enter the project name, description, and visibility options:

○ Name: Choose a name for the project (e.g., LMS).

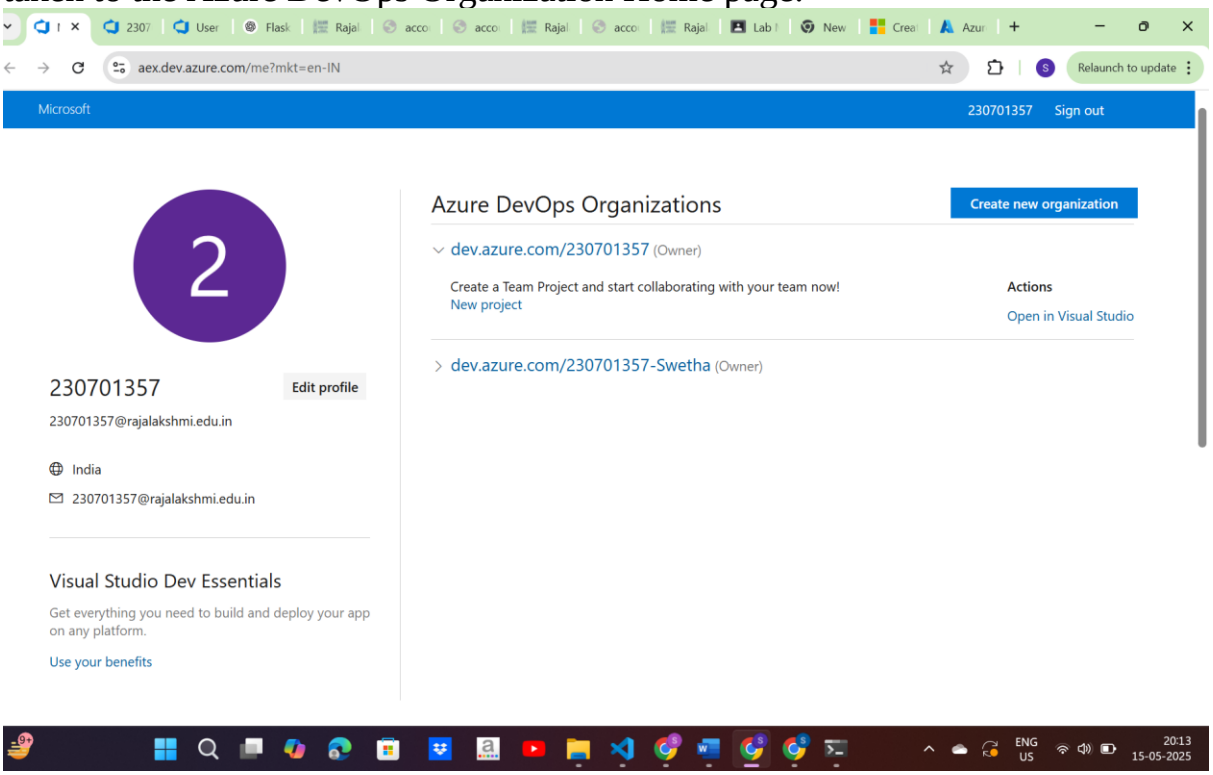
○ Description: Optionally, add a description to provide more context about the project.

○ Visibility: Choose whether you want the project to be Private (accessible only to those invited) or Public (accessible to anyone).

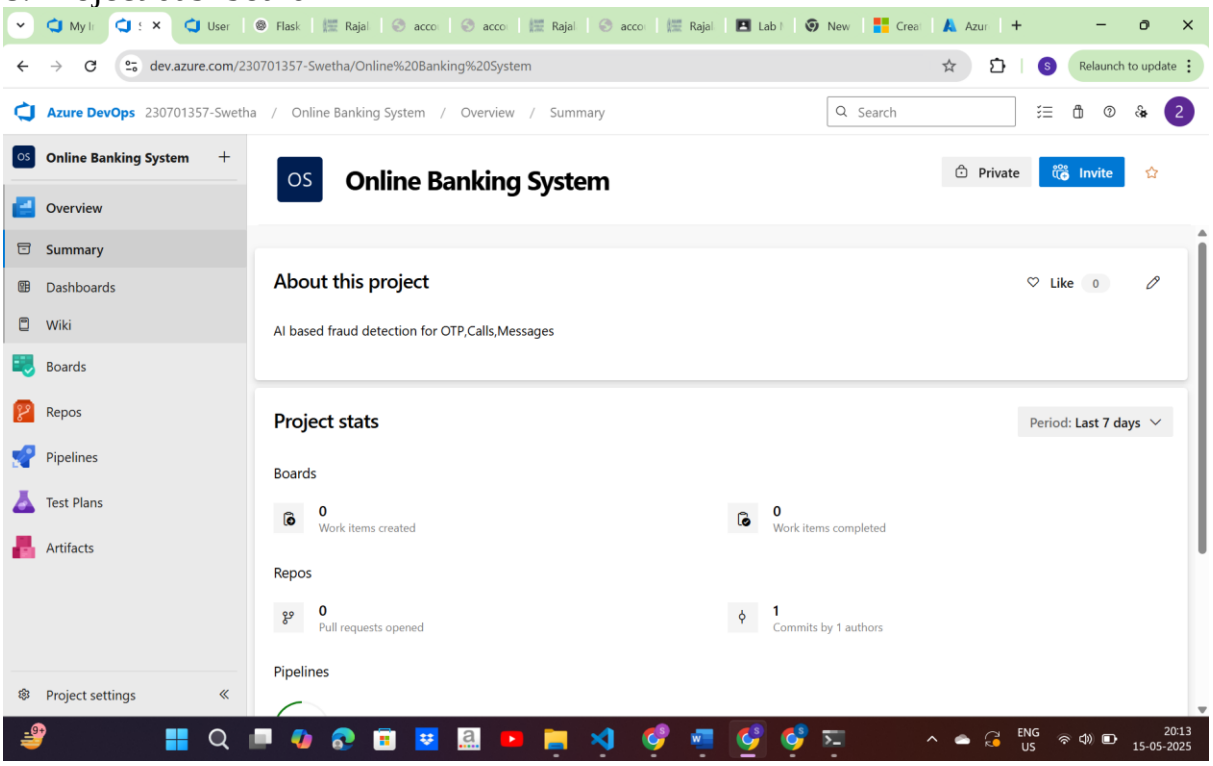
iii. Once you've filled out the details, click Create to set up your first project.



7. Once logged in, ensure you are in the correct organization. If you're part of multiple organizations, you can switch between them from the top left corner (next to your user profile). Click on the Organization name, and you should be taken to the Azure DevOps Organization Home page.

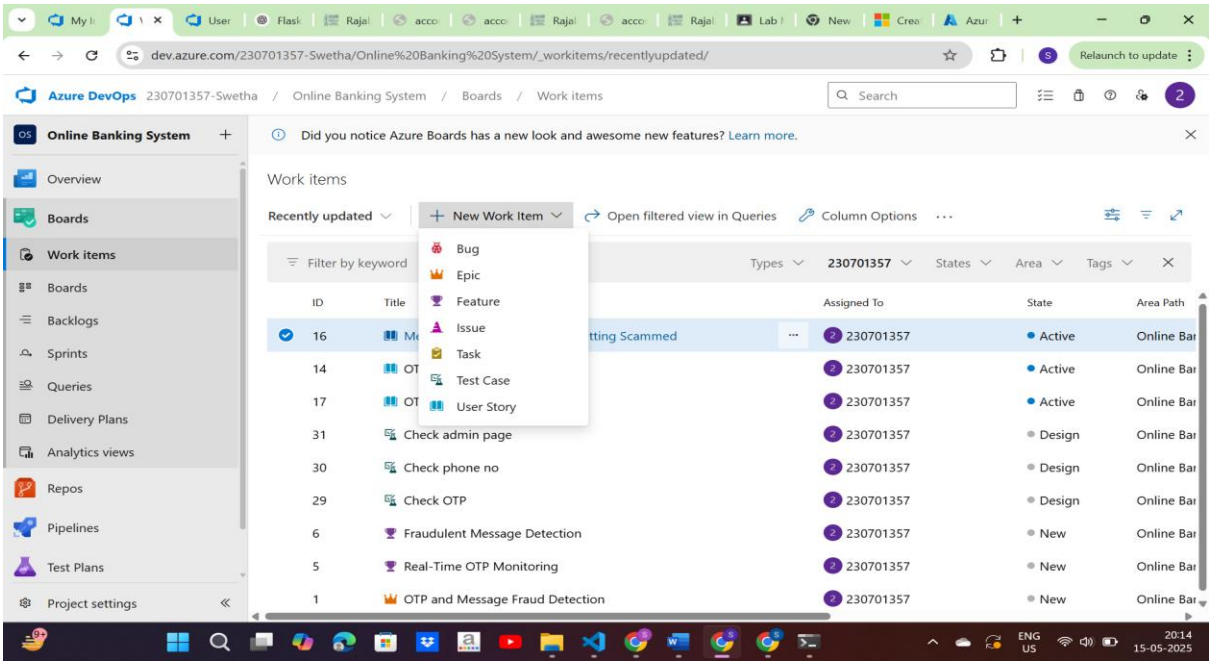


8. Project dashboard

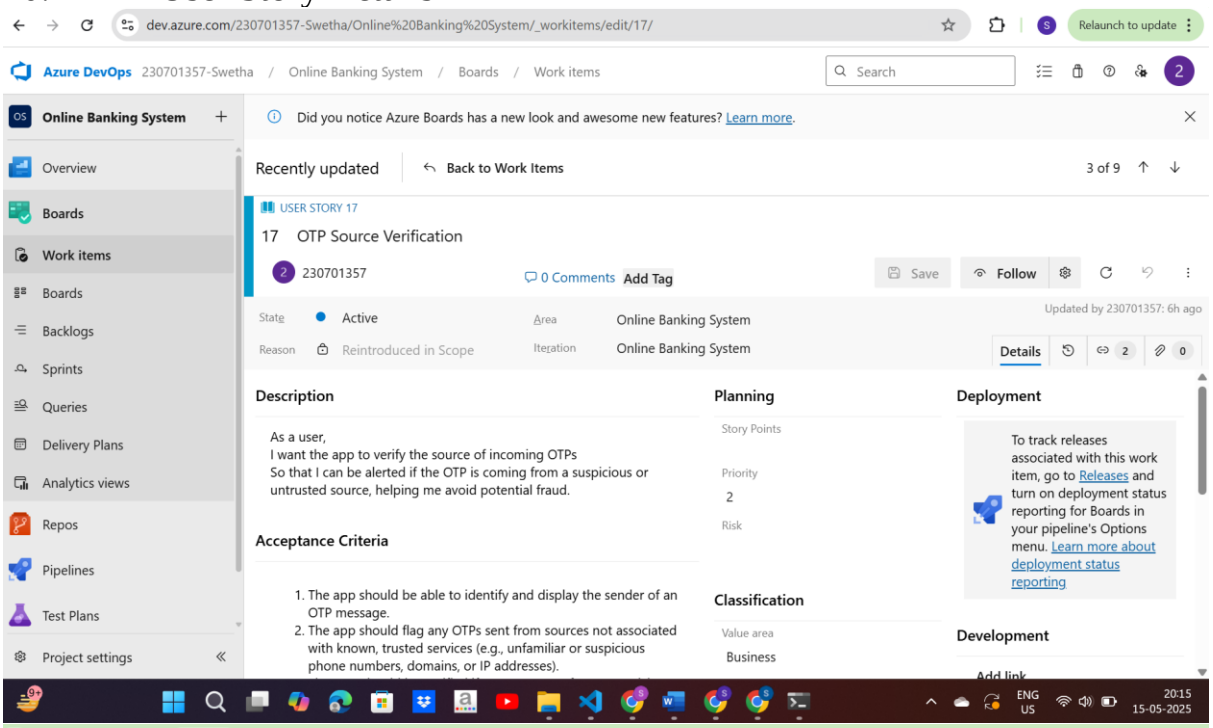


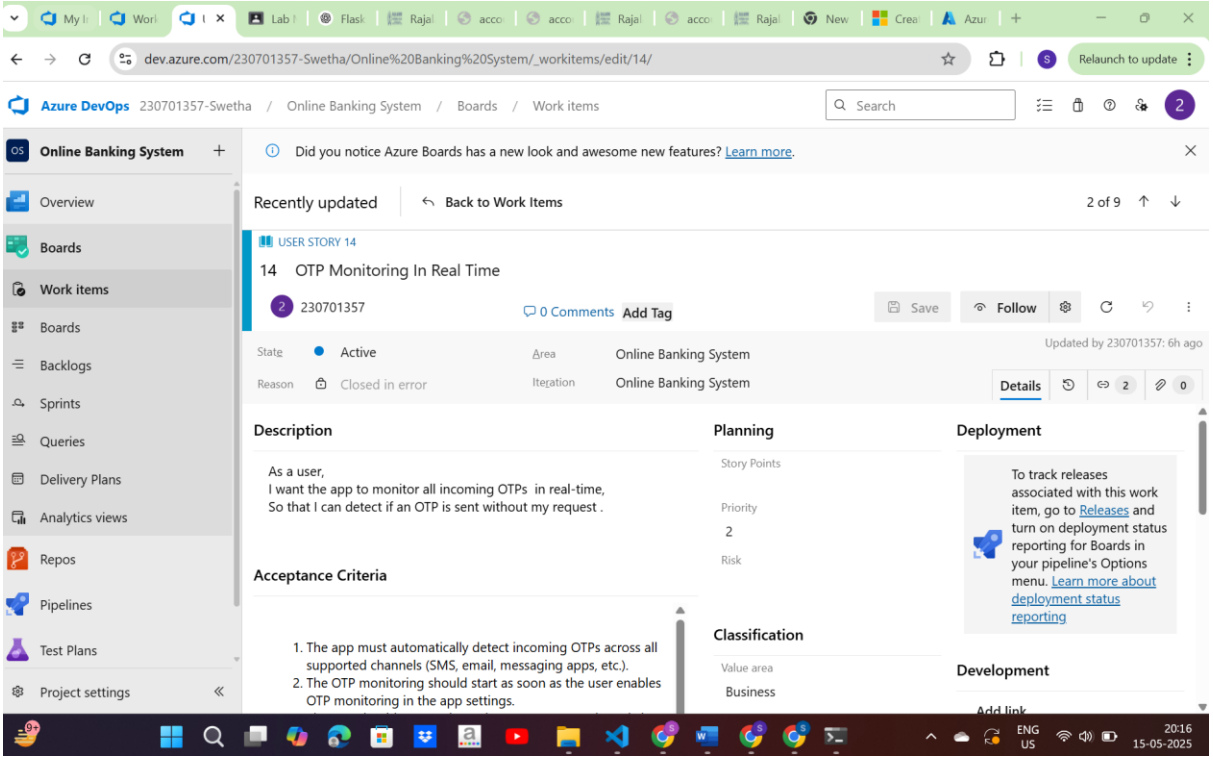
9. To manage user stories

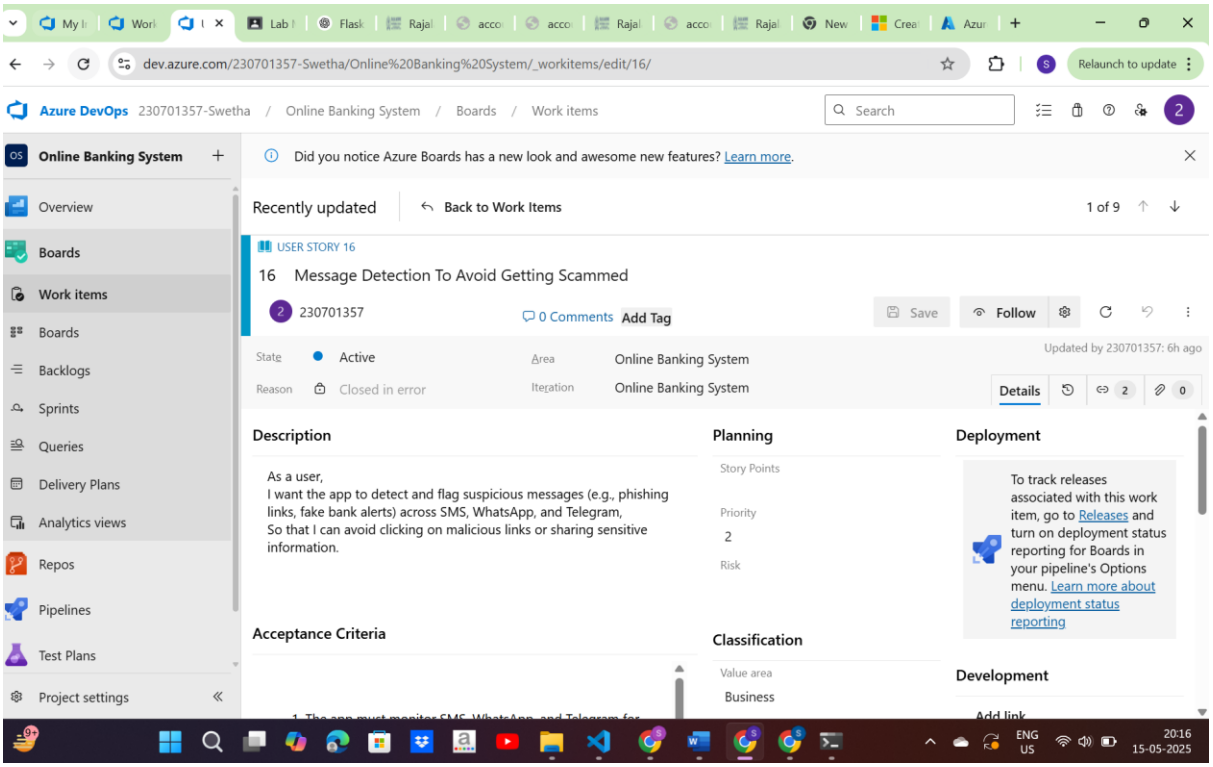
a. From the left-hand navigation menu, click on Boards. This will take you to the main Boards page, where you can manage work items, backlogs, and sprints.
b. On the work items page, you'll see the option to Add a work item at the top. Alternatively, you can find a + button or Add New Work Item depending on the view you're in. From the Add a work item dropdown, select User Story. This will open a form to enter details for the new User Story.



10. Fill in User Story Details







RESULT:

The user story was written successfully.

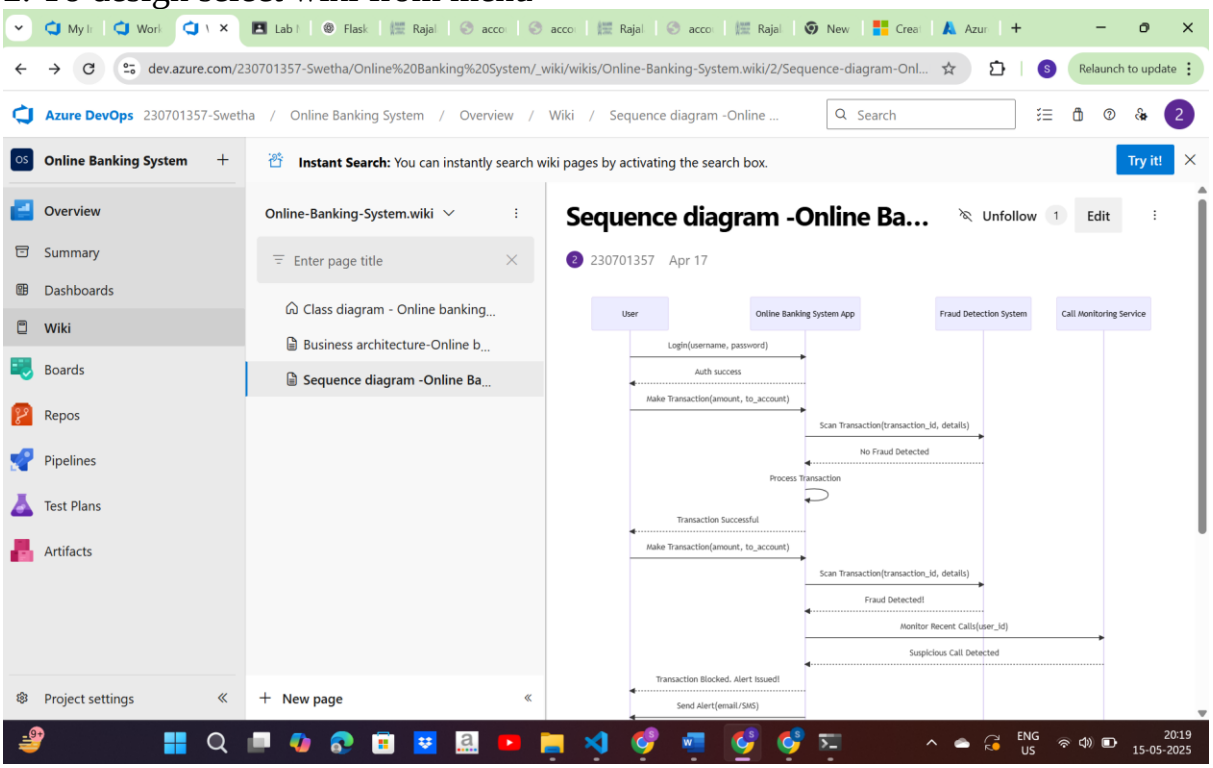
EX NO: 5 **SEQUENCE DIAGRAM**

AIM:
To design a Sequence Diagram by using Mermaid.js

THEORY:
A Sequence Diagram is a key component of Unified Modelling Language (UML) used to visualize the interaction between objects in a sequential order. It focuses on how objects communicate with each other over time, making it an essential tool for modelling dynamic behaviour in a system.

PROCEDURE:

1. Open a project in Azure DevOps Organisations.
2. To design select wiki from menu



3. Write code for drawing sequence diagram and save the code.

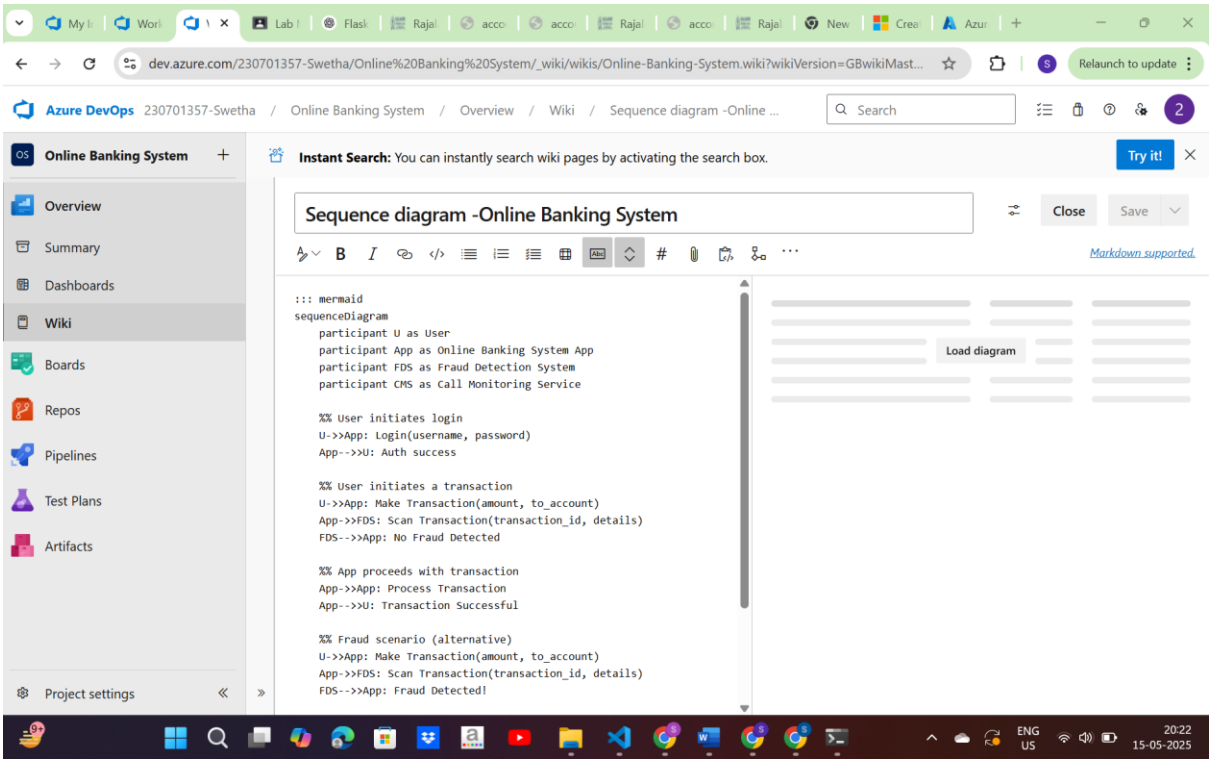
```
::: mermaid
sequenceDiagram
    participant U as User
    participant App as Online Banking System App
    participant FDS as Fraud Detection System
    participant CMS as Call Monitoring Service

    %% User initiates login
```

```
    U->>App: Login(username, password)
    App-->>U: Auth success

    %% User initiates a transaction
    U->>App: Make Transaction(amount, to_account)
    App->>FDS: Scan Transaction(transaction_id, details)
    FDS-->>App: No Fraud Detected

    %% App proceeds with transaction
    App->>App: Process Transaction
    App-->>U: Transaction Successful

    %% Fraud scenario (alternative)
    U->>App: Make Transaction(amount, to_account)
    App->>FDS: Scan Transaction(transaction_id, details)
    FDS-->>App: Fraud Detected!

    App->>CMS: Monitor Recent Calls(user_id)
    CMS-->>App: Suspicious Call Detected

    App-->>U: Transaction Blocked. Alert Issued!
    App->>U: Send Alert(email/SMS)
```

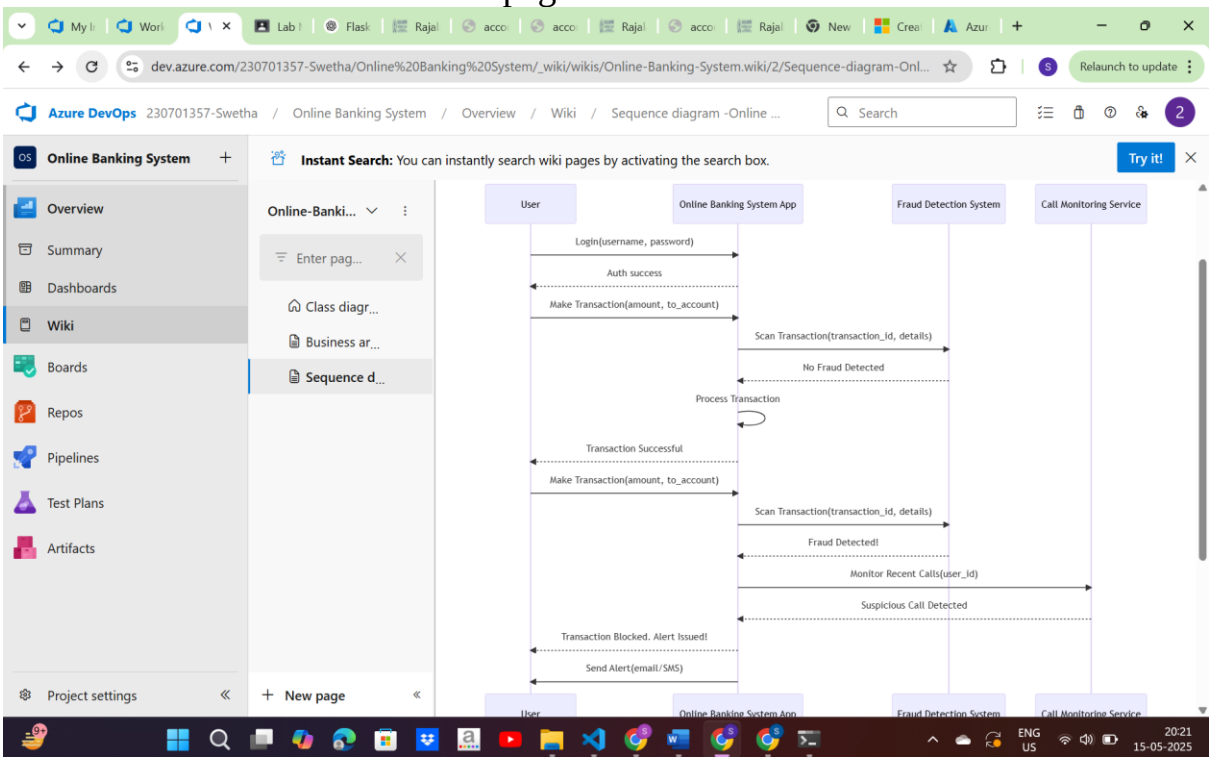
Explanation:

participant defines the entities involved.
->> represents a direct message.
-->> represents a response message.
+ after ->> activates a participant.

- after -->> deactivates a participant.
alt / else for conditional flows.
loop can be used for repeated actions.
-> Solid line without arrow
--> Dotted line without arrow
->> Solid line with arrowhead
-->> Dotted line with arrowhead
<<->> Solid line with bidirectional arrowheads (v11.0.0+)
<<-->> Dotted line with bidirectional arrowheads (v11.0.0+)
-x Solid line with a cross at the end
--x Dotted line with a cross at the end
-) Solid line with an open arrow at the end (async)
--) Dotted line with a open arrow at the end (async)



4. click wiki menu and select the page



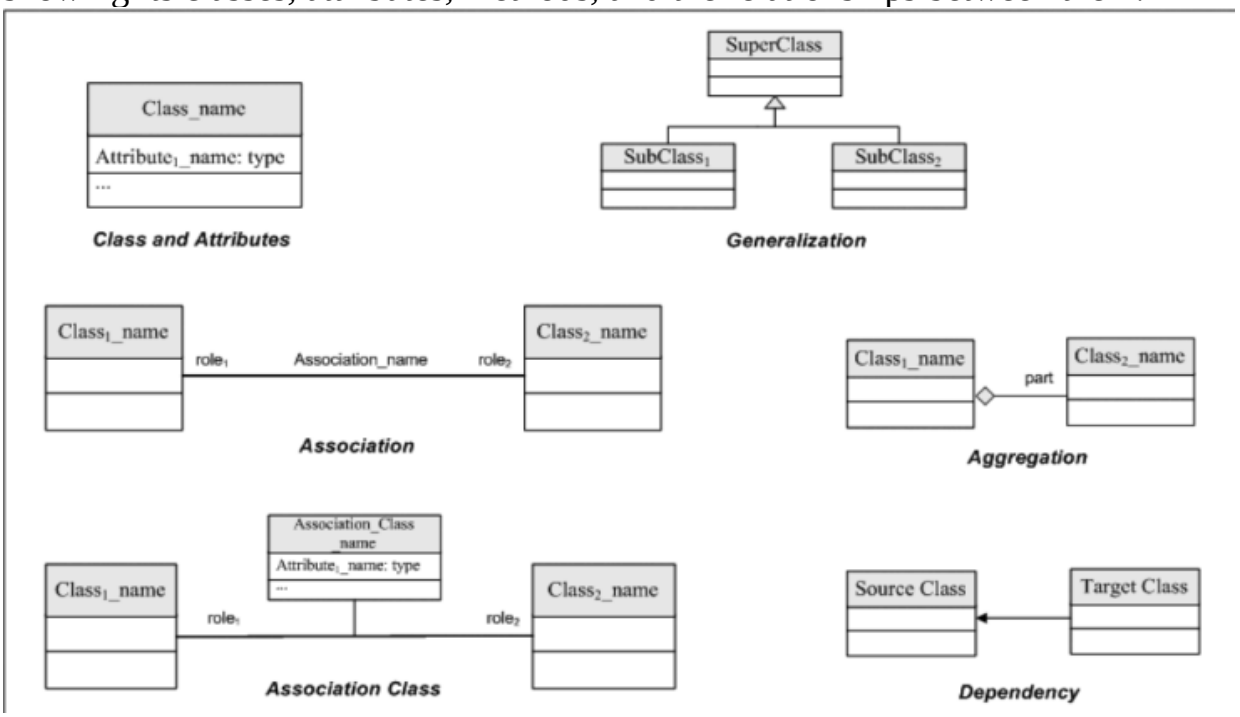
RESULT:

The sequence diagram was drawn successfully.

EX NO. 6 **CLASS DIAGRAM**

AIM :-
To draw a sample class diagram for your project or system.

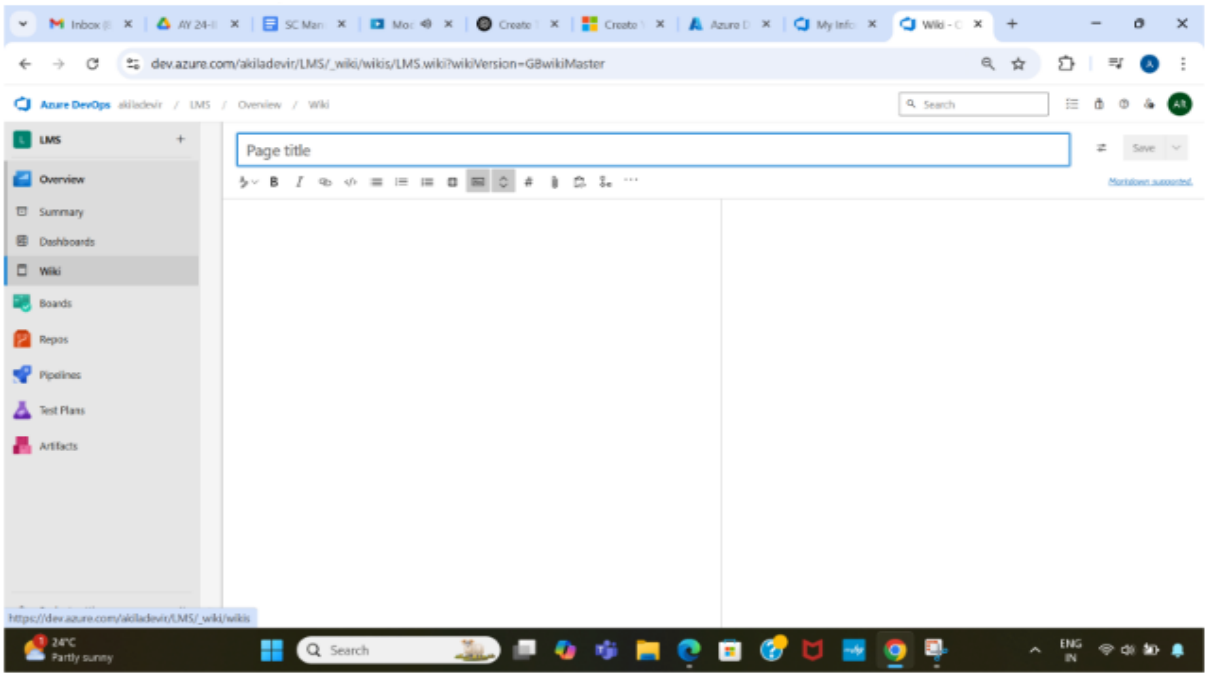
THEORY:
A UML class diagram is a visual tool that represents the structure of a system by showing its classes, attributes, methods, and the relationships between them.



Notations in class diagram

PROCEDURE:

1. Open a project in Azure DevOps Organisations.
2. To design select wiki from menu



3. Write code for drawing class diagram and save the code
::: mermaid
classDiagram

class User {
  +int user_id
  +string name
  +string email
  +string phone
  +string address
  +string login_status
  +date registration_date

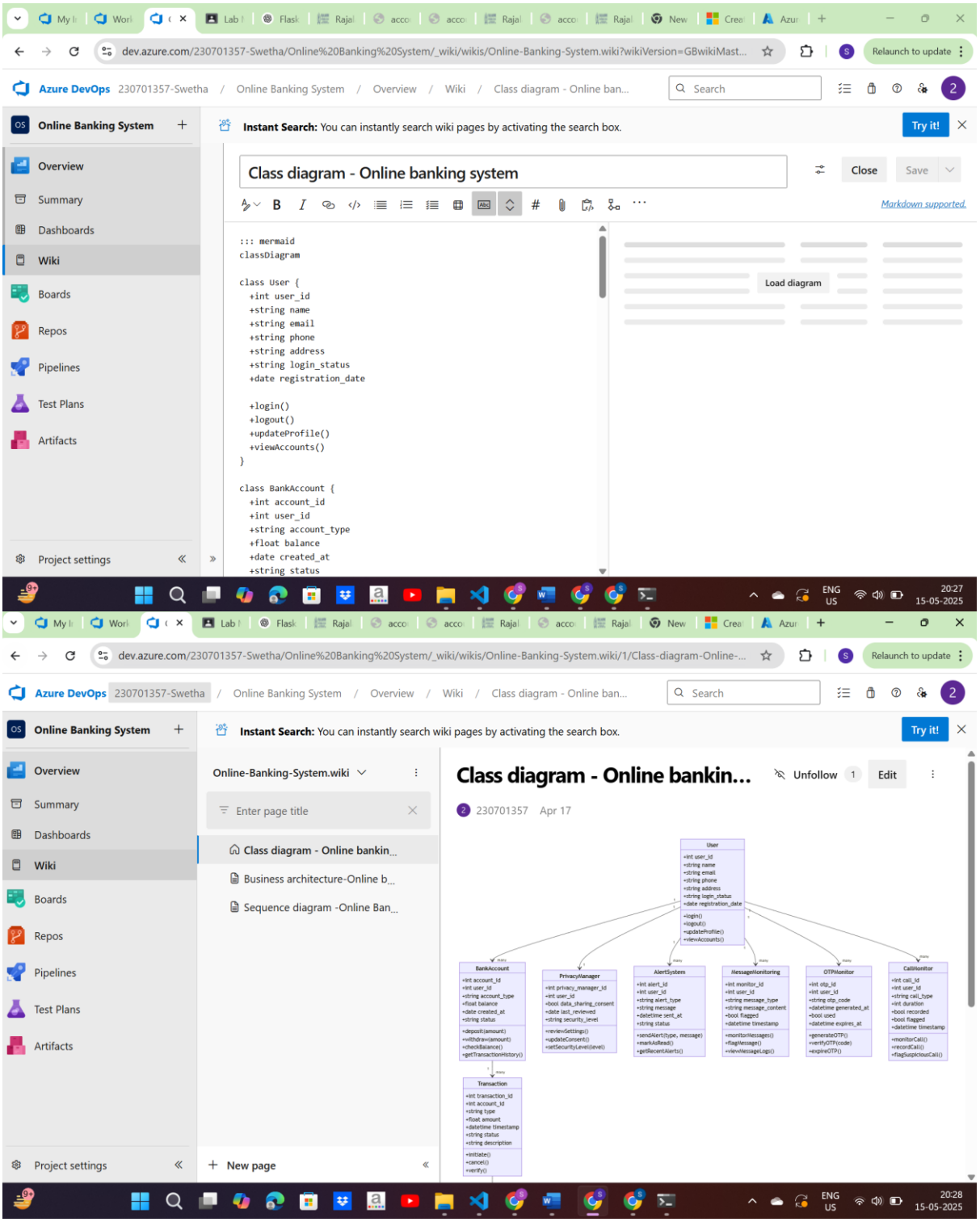
  +login()
  +logout()
  +updateProfile()
  +viewAccounts()
}

class BankAccount {
  +int account_id
  +int user_id
  +string account_type
  +float balance
  +date created_at
  +string status

```
  +deposit(amount)
  +withdraw(amount)
  +checkBalance()
  +getTransactionHistory()
}

class Transaction {
  +int transaction_id
  +int account_id
  +string type
  +float amount
  +datetime timestamp
  +string status
  +string description

  +initiate()
  +cancel()
  +verify()
}

class PrivacyManager {
  +int privacy_manager_id
  +int user_id
  +bool data_sharing_consent
  +date last_reviewed
  +string security_level

  +reviewSettings()
  +updateConsent()
  +setSecurityLevel(level)
}

class FraudDetectionSystem {
  +int fraud_case_id
  +int transaction_id
  +bool is_flagged
  +string flag_reason
  +string review_status
  +datetime detected_at

  +scanTransaction()
  +flagTransaction()
```

```
  +reviewCase()
}

class AlertSystem {
  +int alert_id
  +int user_id
  +string alert_type
  +string message
  +datetime sent_at
  +string status

  +sendAlert(type, message)
  +markAsRead()
  +getRecentAlerts()
}

class MessageMonitoring {
  +int monitor_id
  +int user_id
  +string message_type
  +string message_content
  +bool flagged
  +datetime timestamp

  +monitorMessages()
  +flagMessage()
  +viewMessageLogs()
}

class OTPMonitor {
  +int otp_id
  +int user_id
  +string otp_code
  +datetime generated_at
  +bool used
  +datetime expires_at

  +generateOTP()
  +verifyOTP(code)
  +expireOTP()
}

class CallMonitor {
```

```
  +int call_id
  +int user_id
  +string call_type
  +int duration
  +bool recorded
  +bool flagged
  +datetime timestamp

  +monitorCall()
  +recordCall()
  +flagSuspiciousCall()
}

%% Relationships
User "1" --> "many" BankAccount
BankAccount "1" --> "many" Transaction
Transaction "0..1" --> "1" FraudDetectionSystem
User "1" --> "1" PrivacyManager
User "1" --> "many" AlertSystem
User "1" --> "many" MessageMonitoring
User "1" --> "many" OTPMonitor
User "1" --> "many" CallMonitor
Relationship Types
Type Description
<| Inheritance
\* Composition
o Aggregation
> Association
< Association
|> Realization
```



RESULT:

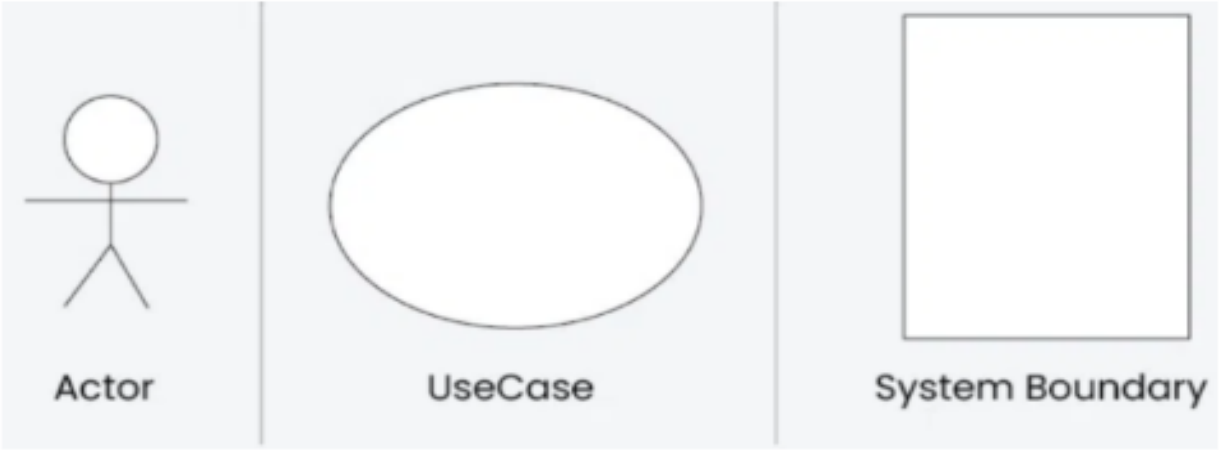
The use case diagram was designed successfully.

EX NO: 7 **USECASE DIAGRAM**

AIM:
Steps to draw the Use Case Diagram using draw.io

THEORY:

● UCD shows the relationships among actors and use cases within a system which Provide an overview of all or part of the usage requirements for a system or organization in the form of an essential model or a business model and communicate the scope of a development project
● Use Cases
● Actors
● Relationships
● System Boundary Boxes



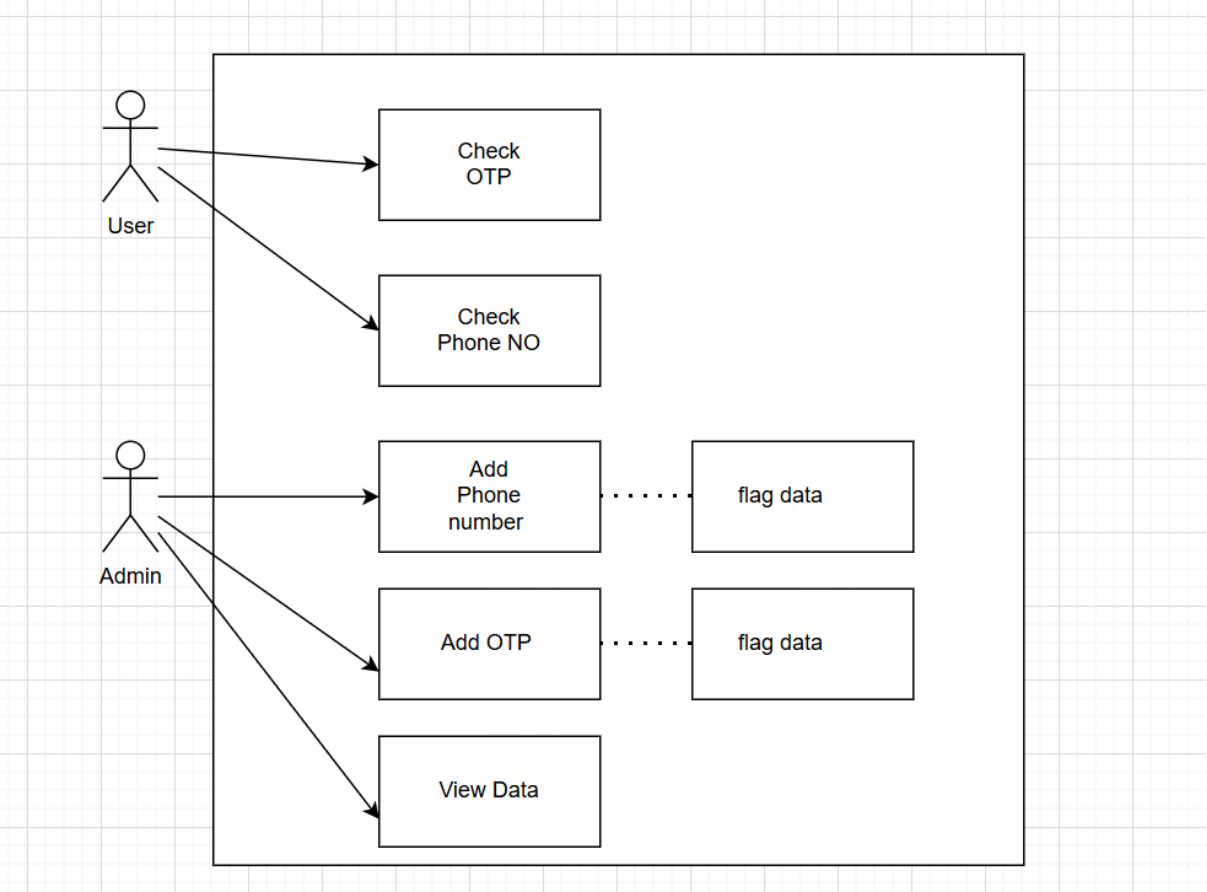
PROCEDURE:
Step 1: Create the Use Case Diagram in Draw.io
● Open Draw.io (diagrams.net).
● Click "Create New Diagram" and select "Blank" or "UML Use Case" template.
● Add Actors (Users, Admins, External Systems) from the UML section.
● Add Use Cases (Functionalities) using ellipses.
● Connect Actors to Use Cases with lines (solid for direct interaction, dashed for <<include>> and <<extend>>).
● Save the diagram as .drawio or export as PNG/JPG/SVG.

Step 2: Upload the Diagram to Azure DevOps
Option 1: Add to Azure DevOps Wiki

● Open Azure DevOps and go to your project.
● Navigate to Wiki (Project > Wiki).

● Click "Edit Page" or create a new page.
● Drag & Drop the exported PNG/JPG image.
● Use Markdown to embed the diagram:
● ![Use Case Diagram](attachments/use_case_diagram.png)

Option 2: Attach to Work Items in Azure Boards
● Open Azure DevOps → Navigate to Boards (Project > Boards).
● Select a User Story, Task, or Feature.
● Click "Attachments" → Upload your Use Case Diagram.
● Add comments or descriptions to explain the use case.



RESULT:
The use case diagram was designed successfully

EX NO. 8 **ACTIVITY DIAGRAM**

AIM :-

To draw a sample activity diagram for your project or system.

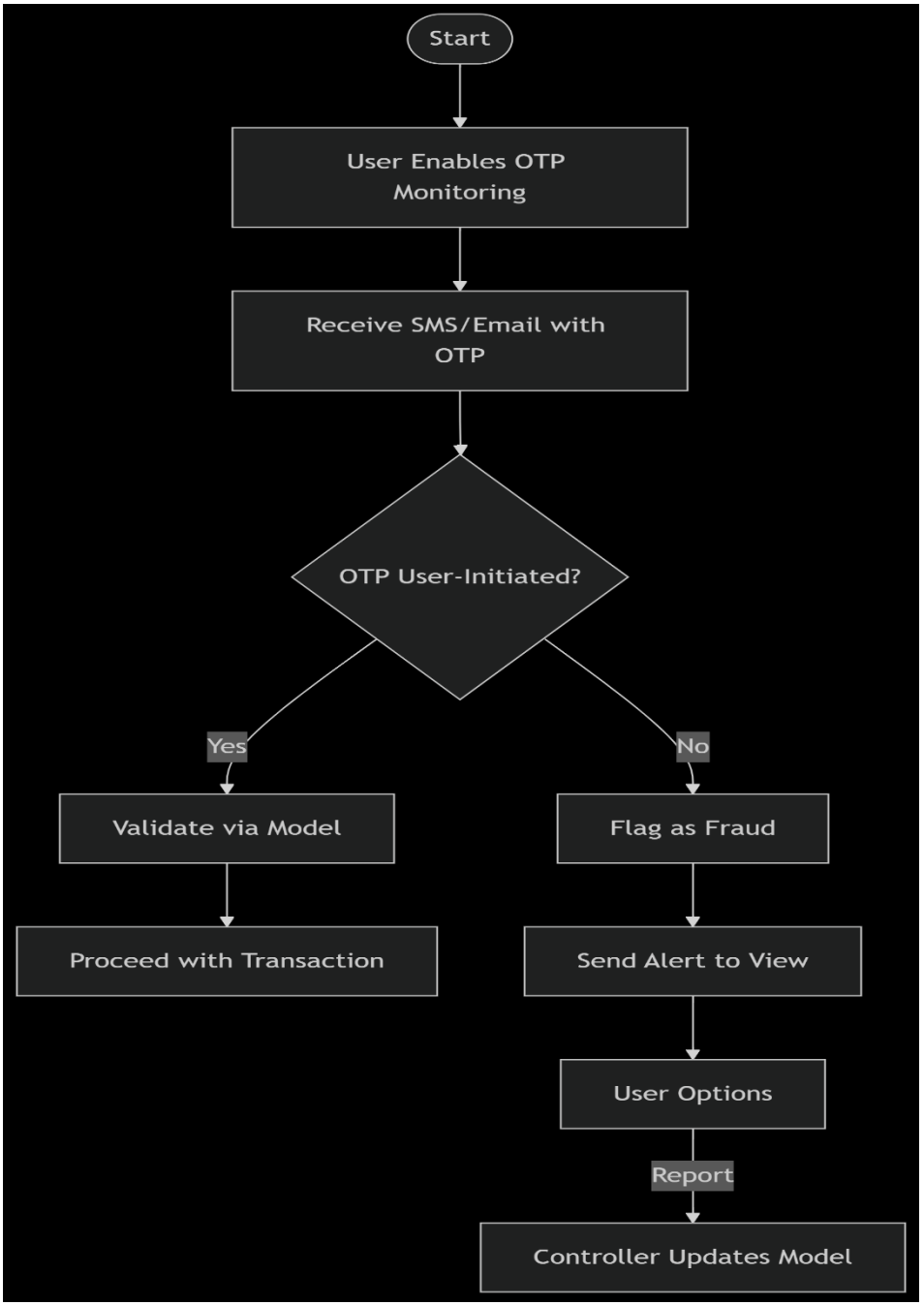
THEORY:

Activity diagrams are an essential part of the Unified Modelling Language (UML) that help visualize workflows, processes, or activities within a system. They depict how different actions are connected and how a system moves from one state to another.

Notations	Symbol	Meaning
Start		Shows the beginning of a process
Connector		Shows the directional flow, or control flow, of the activity
Joint symbol		Combines two concurrent activities and re-introduces them to a flow where one activity occurs at a time
Decision		Represents a decision
Note		Allows the diagram creators o communicate additional messages
Send signal		Show that a signal is being sent to a receiving activity
Receive signal		Demonstrates the acceptance of an event
Flow final symbol		Represents the end of a specific process flow
Option loop		Allows the creator to model a repetitive sequence within the option loop symbol
Shallow history pseudostate		Represents a transition that invokes the last active state.

PROCEDURE:

1. Draw diagram in draw.io
2. Upload the diagram in Azure DevOps wiki



RESULT:
The activity diagram was designed successfully

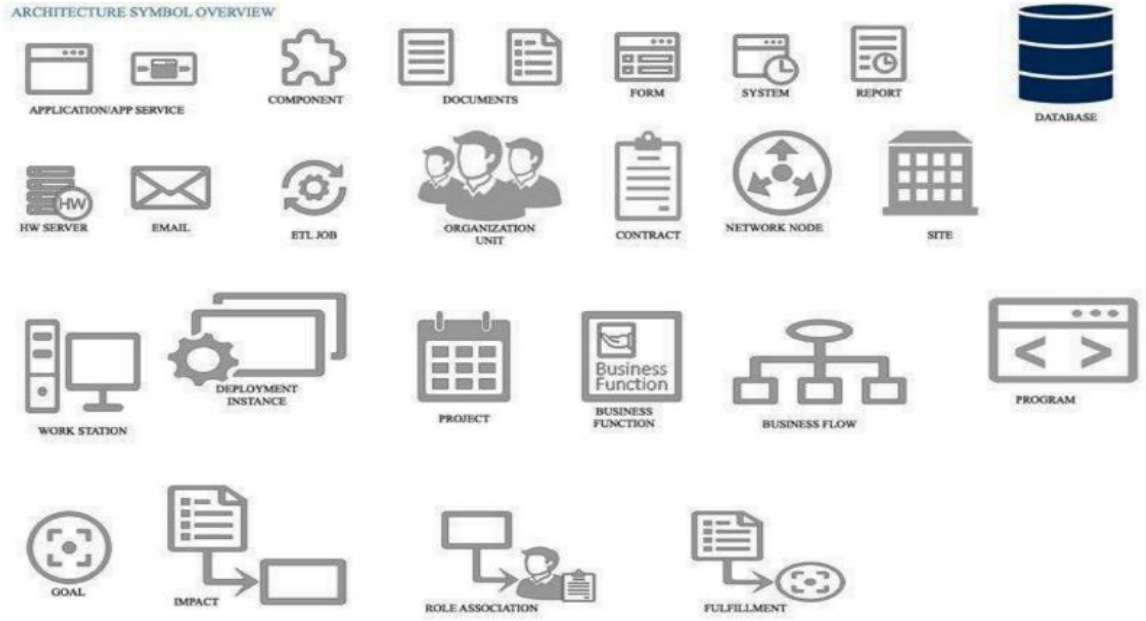
EX NO. 9 **ARCHITECTURE DIAGRAM**

AIM:

Steps to draw the Architecture Diagram using draw.io.

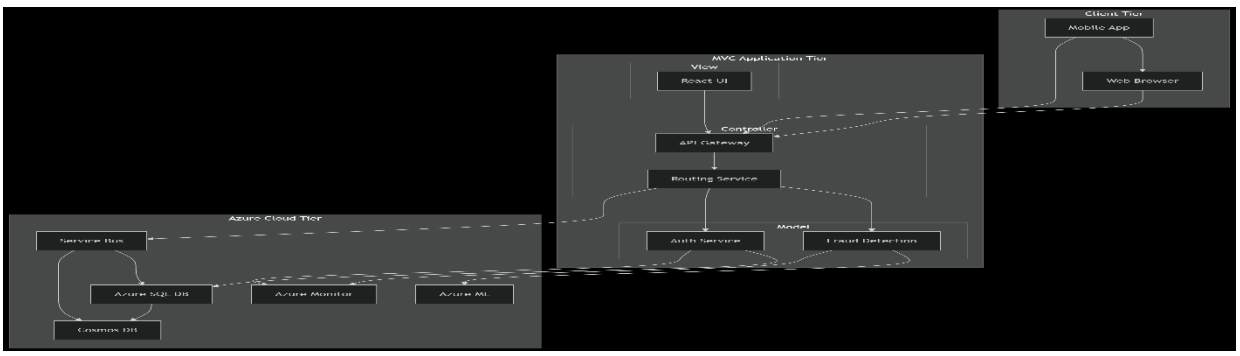
THEORY:

An architectural diagram is a visual representation that maps out the physical implementation for components of a software system. It shows the general structure of the software system and the associations, limitations, and boundaries between each element.



PROCEDURE:

1. Draw diagram in draw.io
2. Upload the diagram in Azure DevOps wiki



RESULT:

The architecture diagram was designed successfully

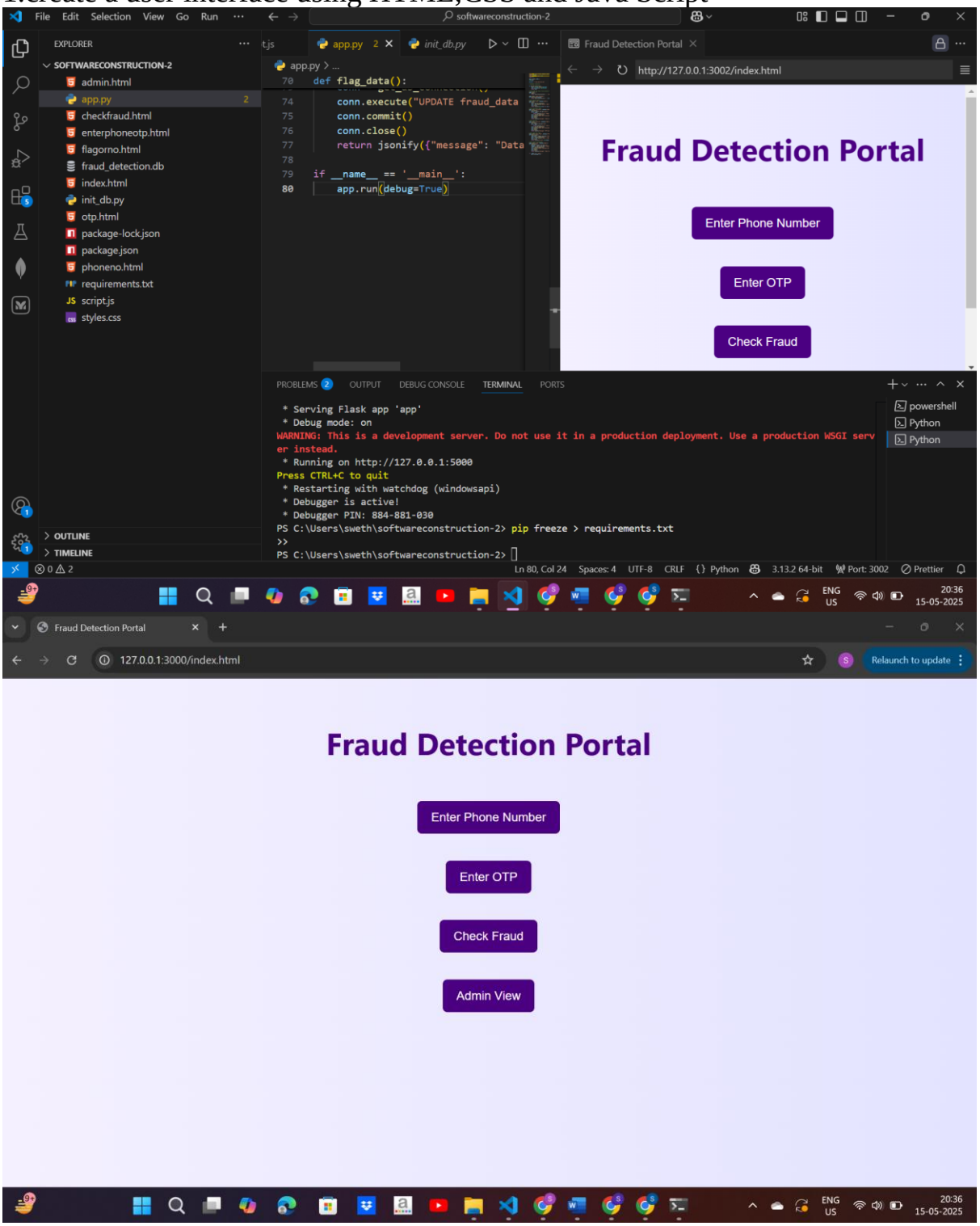
EX NO. 10 **USER INTERFACE**

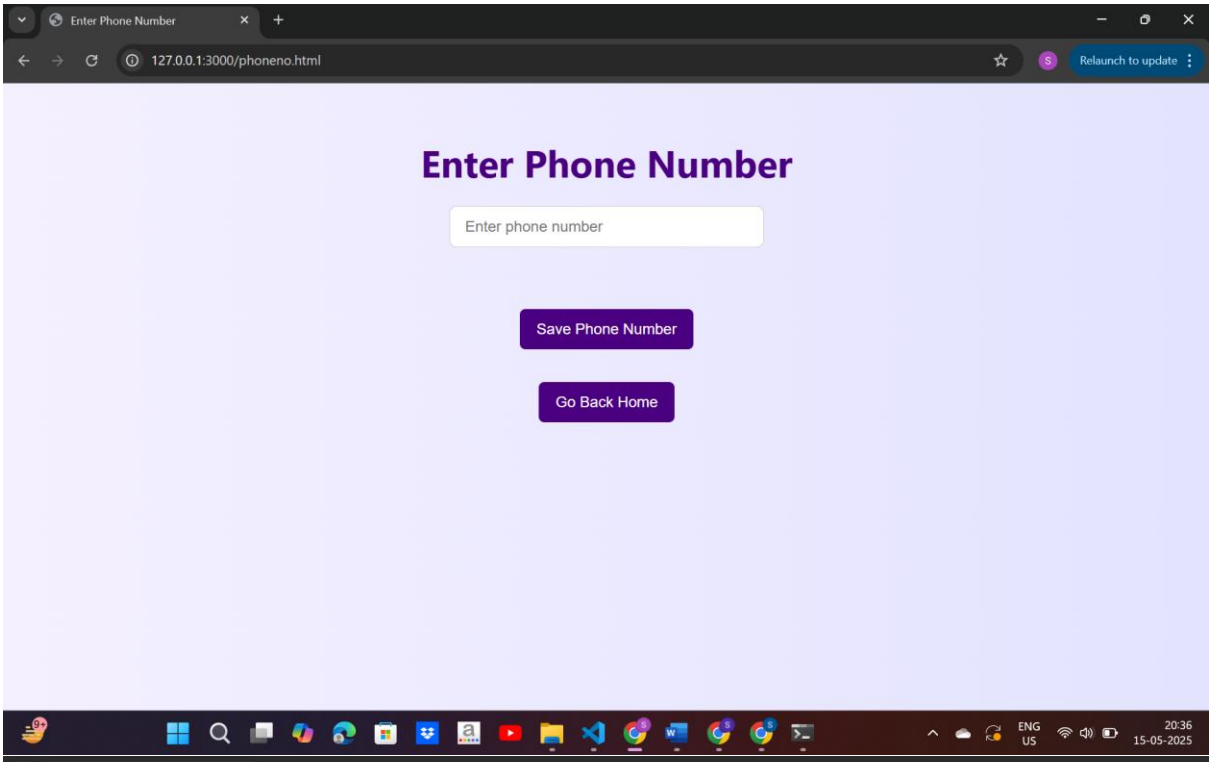
AIM:

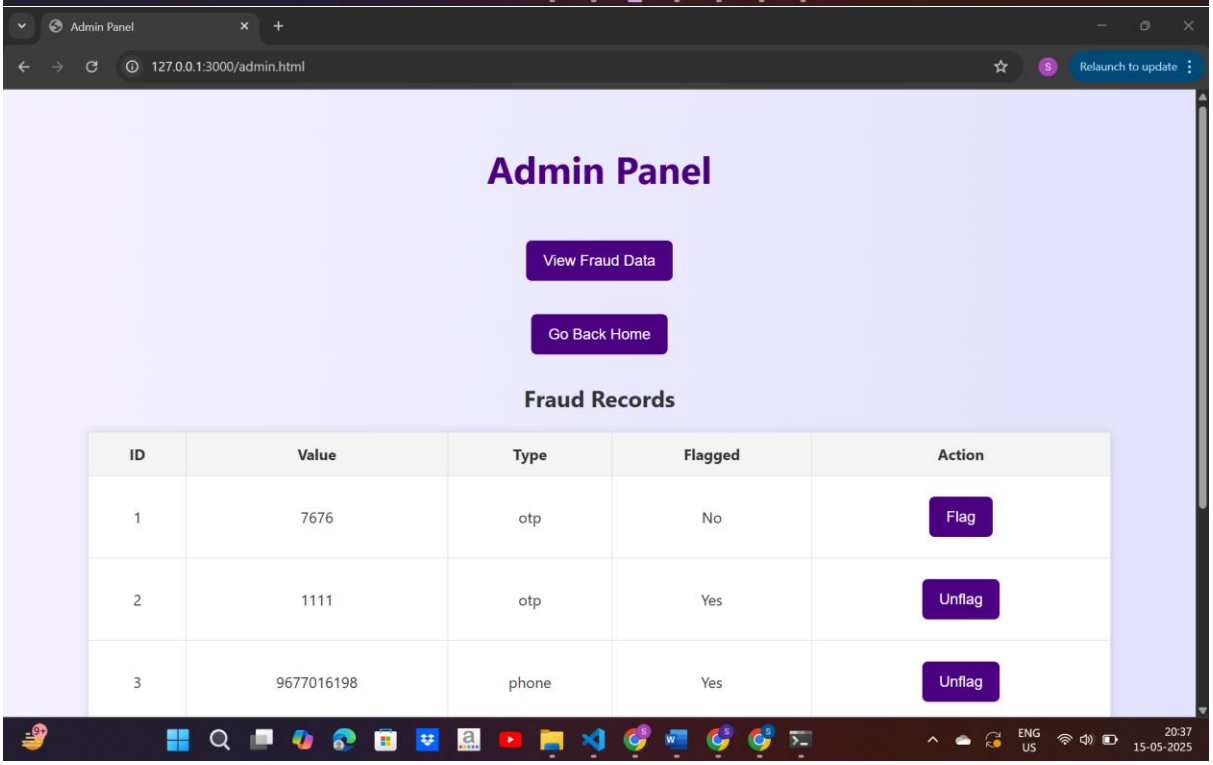
Design User Interface for the given project

PROCEDURE:

1.create a user interface using HTML,CSS and Java Script







RESULT:
The UI was designed successfully.

EX NO. 11 IMPLEMENTATION

AIM:
To implement the given project based on Agile Methodology.

PROCEDURE:

Step 1: Set Up an Azure DevOps Project
● Log in to Azure DevOps.
● Click "New Project" → Enter project name → Click "Create".
● Inside the project, navigate to "Repos" to store the code.
Step 2: Add Your Web Application Code
● Navigate to Repos → Click "Clone" to get the Git URL.
● Open Visual Studio Code / Terminal and run:

git clone <repo_url>
cd <repo_folder>

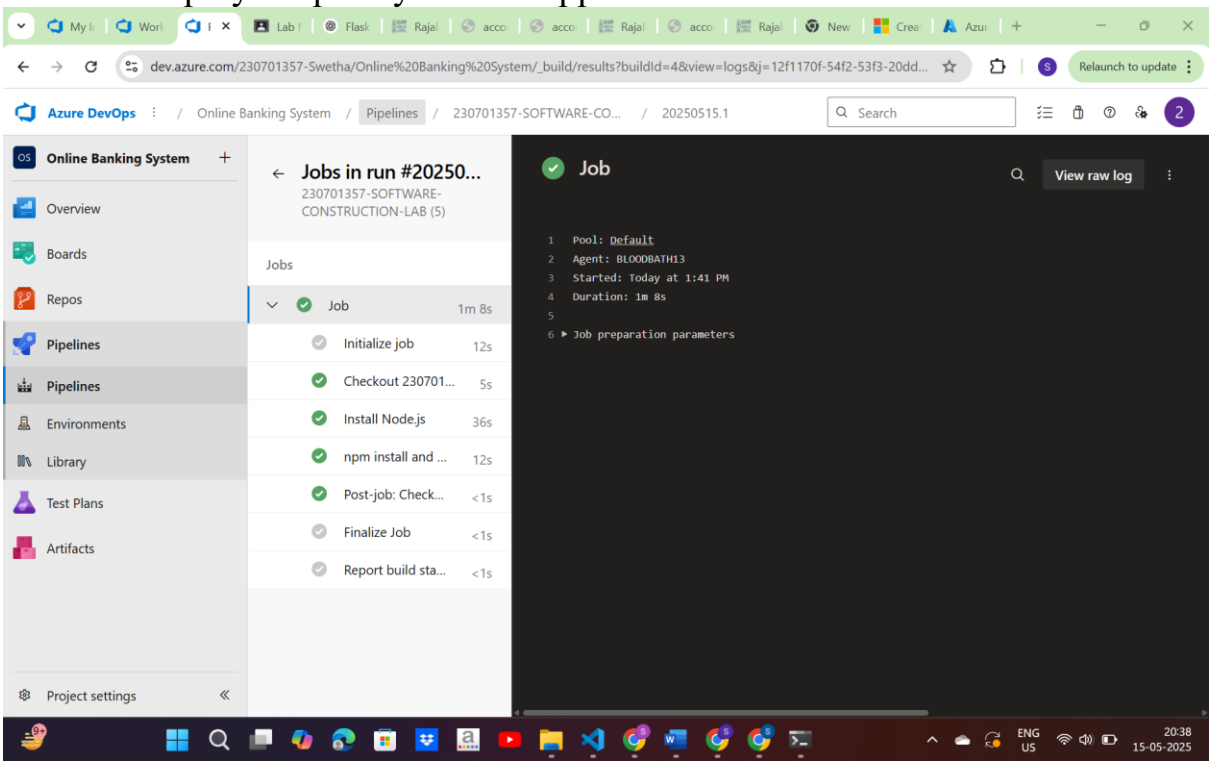
● Add web application code (HTML, CSS, JavaScript, React, Angular, or backend like
Node.js, .NET, Python, etc.).
● Commit & push:
git add .
git commit -m "Initial commit"
git push origin main

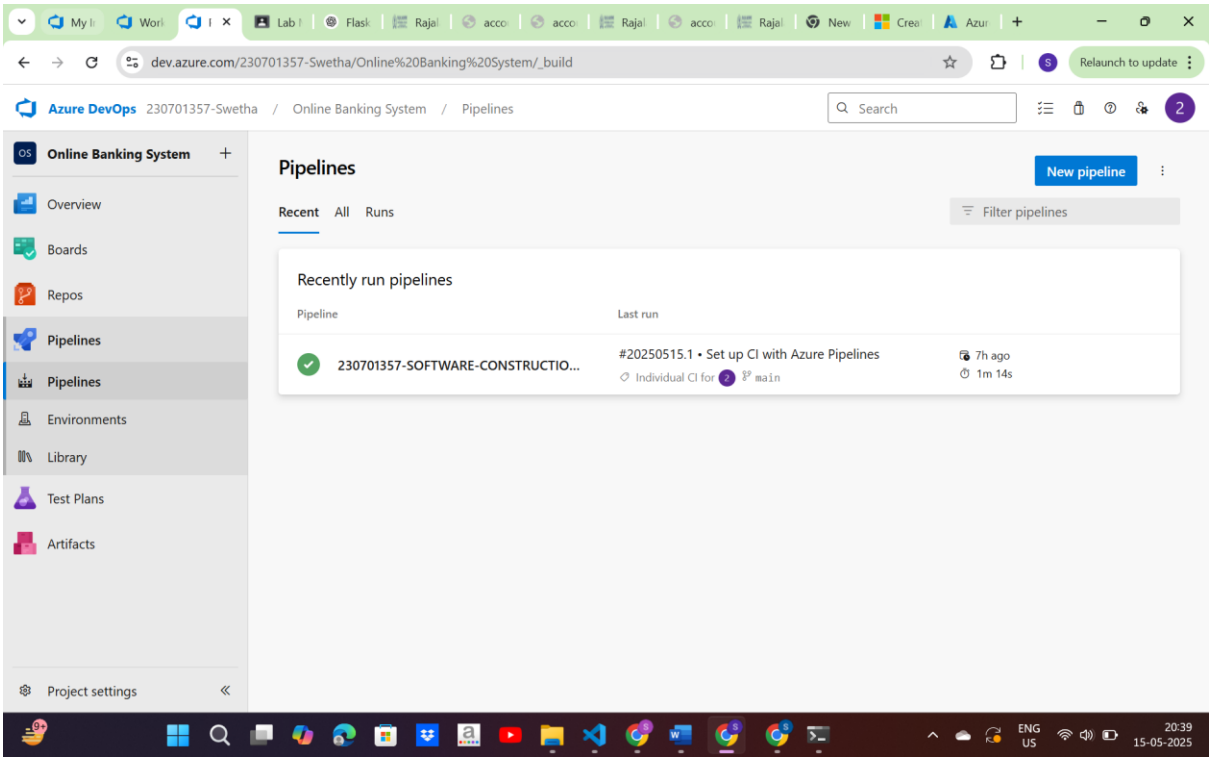
Step 3: Set Up Build Pipeline (CI/CD - Continuous Integration)
● Navigate to Pipelines → Click "New Pipeline".
● Select Git Repository (Azure Repos, GitHub, or Bitbucket).
● Choose Starter Pipeline or a pre-configured template for your framework.
● Modify the azure-pipelines.yml file (Example for a Node.js app):

trigger:
- main
pool:
vmImage: 'ubuntu-latest'
steps:
- task: UseNode@1
inputs:
version: '16.x'
- script: npm install
displayName: 'Install dependencies'
- script: npm run build

displayName: 'Build application'
- task: PublishBuildArtifacts@1
inputs:
pathToPublish: 'dist'
artifactName: 'drop'
Click "Save and Run" → The pipeline will start building app.

Step 4: Set Up Release Pipeline (CD - Continuous Deployment)
- Go to Releases → Click "New Release Pipeline".
- Select Azure App Service or Virtual Machines (VMs) for deployment.
- Add an artifact (from the build pipeline).
- Configure deployment stages (Dev, QA, Production).
- Click "Deploy" to push your web app to Azure.





RESULT:

Thus the application was successfully implemented.