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

FOURTH SEMESTER 2024-2025

TEAM   DETAILS:

- **PROJECT NAME** : EXPENSE TRACKER APP

- **MEMBER 1** : ANIKETH J

- **MEMBER 2** : DHIVAKAR S

- **MEMBER 3** : HARISH KUMAR V

INDEX

S. No.	Date	TITLE	Page No.	Teacher's Signature / Remarks
1.	6/2/25	Azure DevOps Environment Setup		
2.	20/2/25	Azure DevOps Project Setup and User Story Management		
3.	27/2/25	Setting Up Epics, Features, and User Stories for Project Planning		
4.	6/3/25	Sprint Planning		
5.	20/3/25	Poker Estimation		
6.	27/3/25	Designing Class and Sequence Diagrams for Project Architecture		
7.	3/4/25	Designing Architectural and ER Diagrams for Project Structure		
8.	17/4/25	Testing – Test Plans and Test Cases		
9.	24/4/25	Load Testing and Performance Testing		
10.	1/5/25	Github: Project Structure & Naming Conventions		

EXP NO: 1 **DATE:**	**AZURE DEVOPS ENVIRONMENT SETUP**

Aim:

   To set up and access the Azure DevOps environment by creating an organization through the Azure portal.

INSTALLATION

1.Open your web browser and go to the Azure website: https://azure.microsoft.com/en-us/get- started/azure-portal.
Sign in using your Microsoft account credentials.
If you don't have a Microsoft account, you can create one here: https://signup.live.com/?lic=1
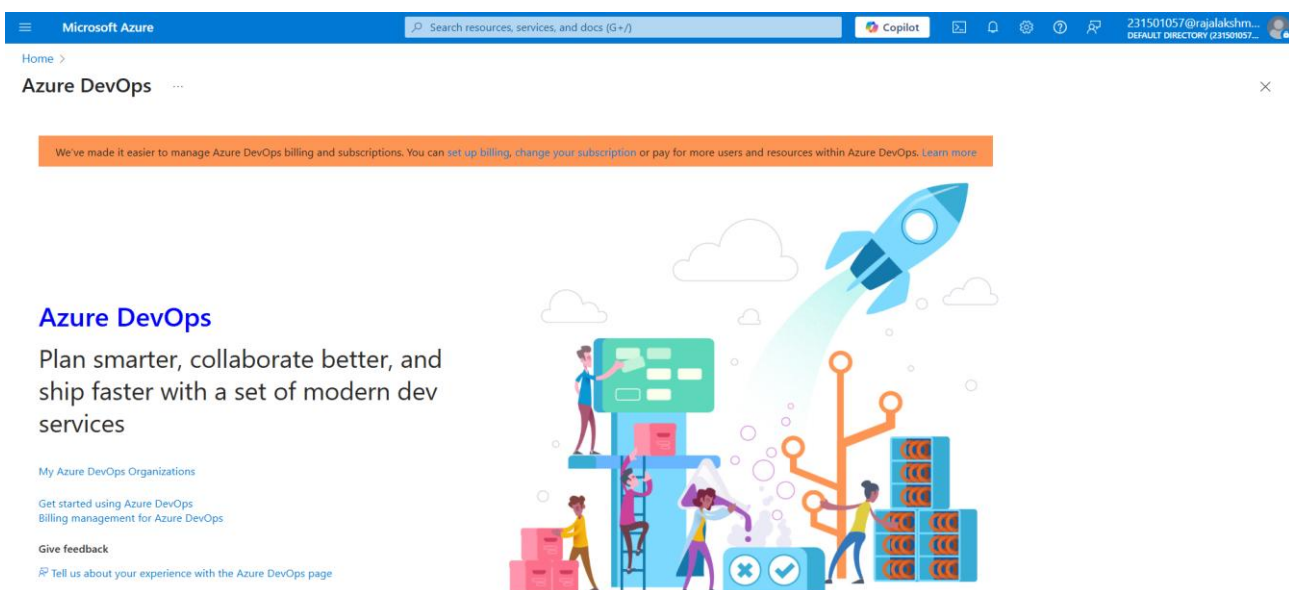
2. Azure home page
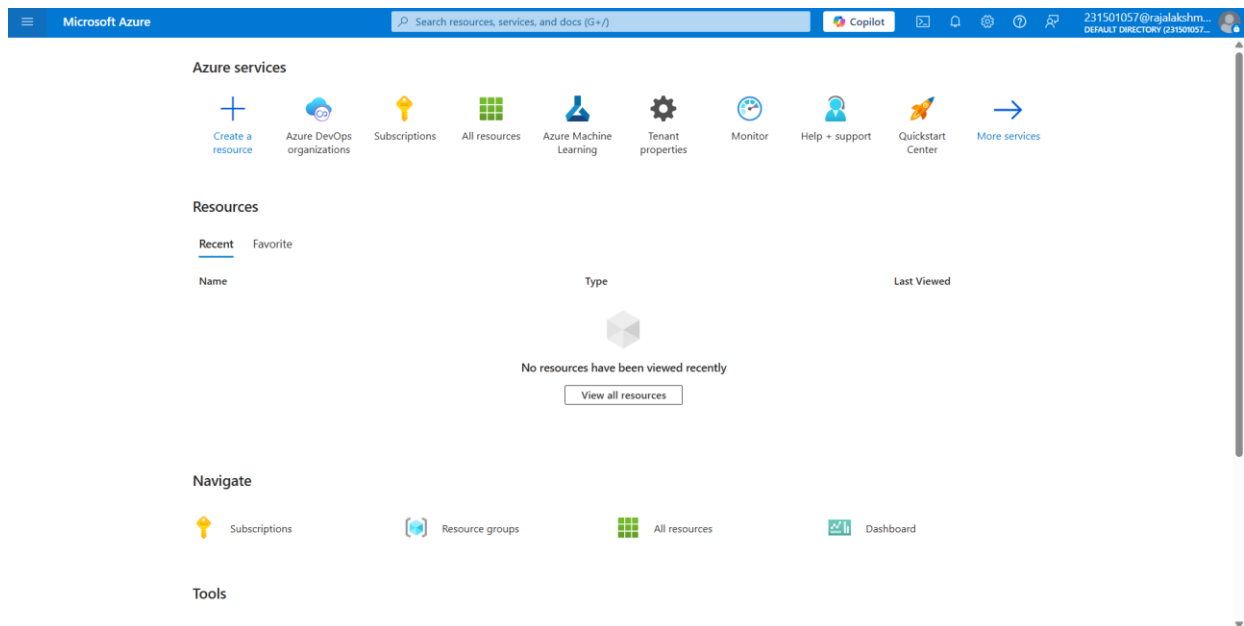
3. Open DevOps environment in the Azure platform by typing **_Azure DevOps Organizations_** in the search bar.
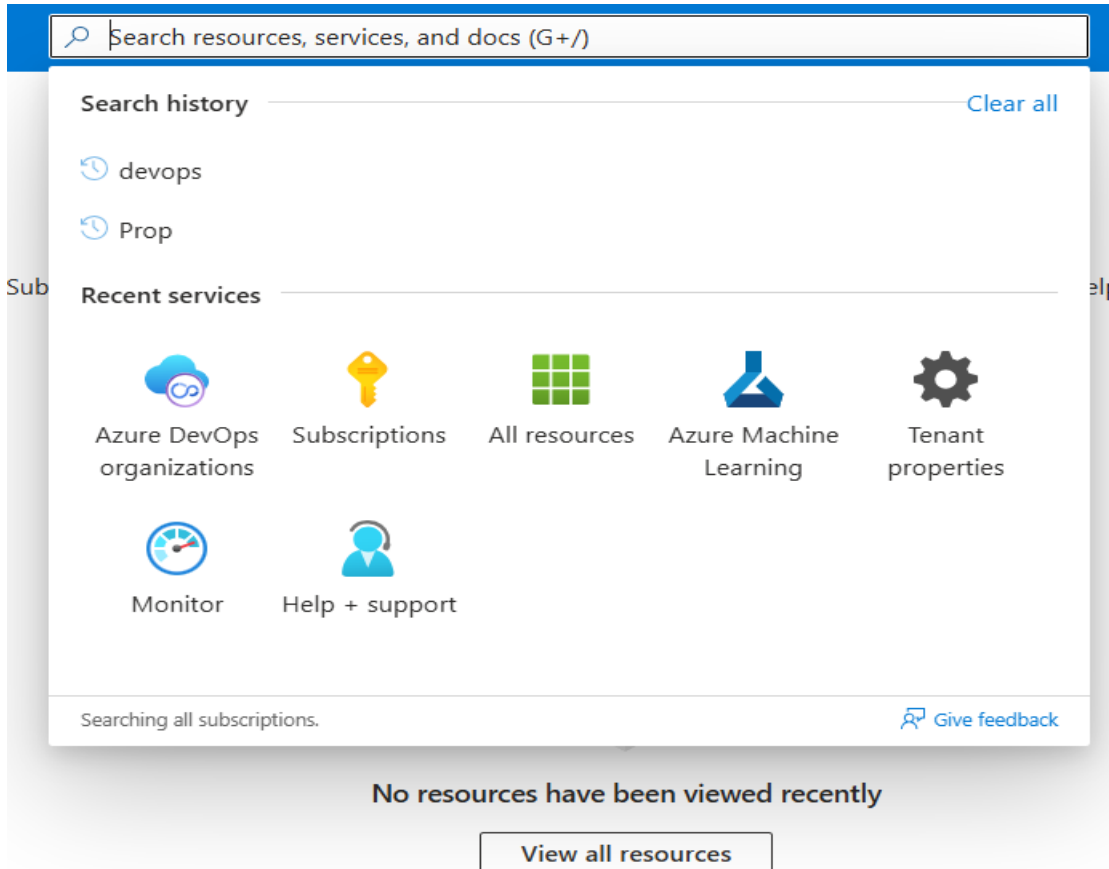
4. Click on the *My Azure DevOps Organization* link and create an organization and you should be taken to the Azure DevOps Organization Home page.

Home >

Azure DevOps   ...

We've made it easier to manage Azure DevOps billing and subscriptions. You can set up billing, change your subscription or pay for more users and resources within Azure DevOps. Learn more

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

Result:

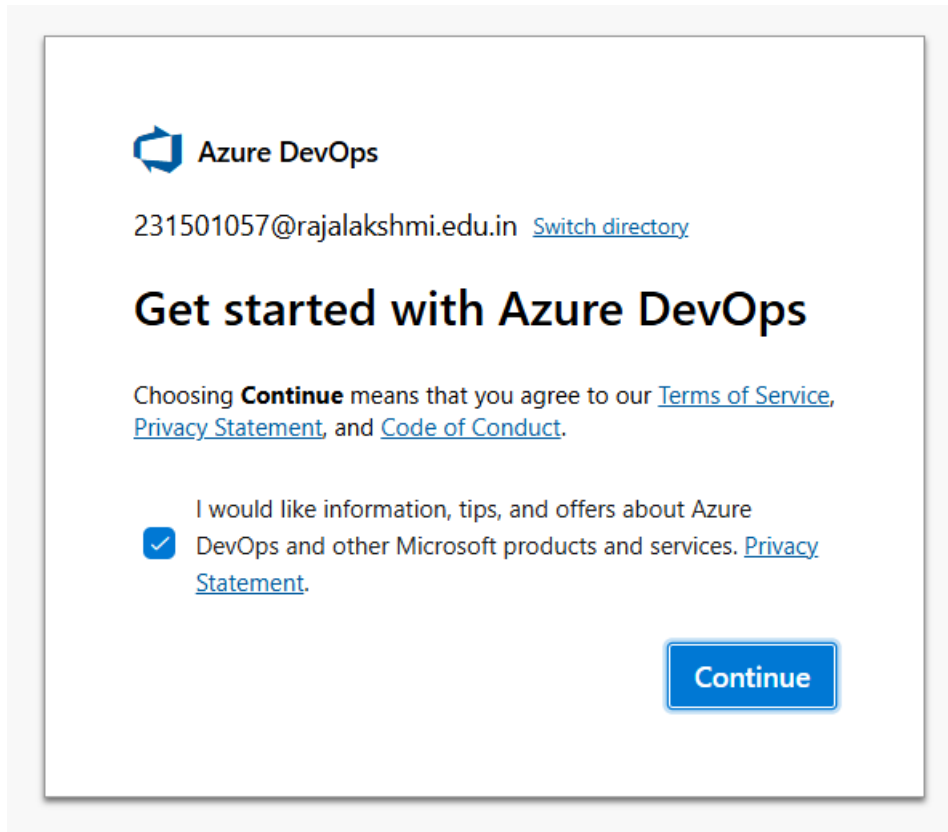Successfully accessed the Azure DevOps environment and created a new organization through the Azure portal.

EXP NO: 2	**AZURE DEVOPS PROJECT SETUP AND USER STORY MANAGEMENT**

Aim:

To set up an Azure DevOps project for efficient collaboration and agile work management.

1. Create An Azure Account

2. Create the First Project in Your Organization

a. 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.

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

c. 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).

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

Create a project to get started

Project name *

Expense Tracker

Description

Expense Tracker App is a simple and powerful tool designed to help you manage your daily spending and take control of your finances. With an intuitive interface, you can easily log expenses, categorize transactions, and track your income versus expenses in real time.

Visibility

⊕

Public

Anyone on the internet can view the project. Certain features like TFVC are not supported.

🔒

Private

Only people you give access to will be able to view this project.

Public projects are disabled for your organization. You can turn on public visibility with organization policies.

∧ Advanced

Version control ⑦

Git ∨

Work item process ⑦

Agile ∨

+ Create project

3. 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.

231501057

Projects   My work items   My pull requests

ET   **Expense Tracker**

4. Project dashboard

E   **EXPENSE-TRACKER**   🔒 Private   👥 Invite   ☆

About this project   ♥ Liked 1   ✏️

Project Summary: Expense Tracker App

The Expense Tracker App is a user-friendly financial management tool developed to help individuals monitor and manage their personal expenses efficiently. The core objective of the app is to provide users with a seamless platform to record daily income and expenditures, categorize transactions, and gain insights into their financial habits through interactive charts and summaries.

Key features include income/expense entry, category-wise classification, monthly budget planning, and real-time visualization of financial data. The application aims to promote financial awareness and encourage better budgeting decisions. Developed using [mention tech stack, e.g., React Native, Firebase, etc.], the app ensures a responsive and secure user experience across devices.

This project highlights the practical application of software development and UI/UX design in solving real-world financial challenges and demonstrates effective use of modern technologies to build scalable personal finance solutions.

Project stats   Period: Last 7 days ⌄

Boards

📋 **1**   📋 **0**
    Work items   Work items
    created   completed

Members 3

HV AJ DS

5. 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.

ⓘ   Did you notice Azure Boards has a new look and awesome new features? Learn more.   ✕

Work items

Recently updated ∨   + New Work Item ∨   → Open filtered view in Queries   ✎ Column Options   ↑ Import Work Items   🗑 Recycle Bin   ⬚ ≡ ⤢

≡ Filter by keyword   Feature (+1) ∨   Assigned to ∨   States ∨   Area ∨   Tags ∨   ✕

ID	Title	Assigned To	State	Area Path	Tags
4	📘 Password	HV HARISH KUMAR V	● Active	EXPENSE-TRACKER	
3	📘 The user should chose a unique name with mix and max length of 5:1!	DS Dhivakar S	● New	EXPENSE-TRACKER	
5	📘 Email	AJ Aniketh J	● New	EXPENSE-TRACKER	
6	🏆 Transaction Management	DS Dhivakar S	● New	EXPENSE-TRACKER	
7	🏆 Budgeting	AJ Aniketh J	● New	EXPENSE-TRACKER	
26	📘 Generate Spending Reports	DS Dhivakar S	● New	EXPENSE-TRACKER	
27	📘 Visualization of Spending Trends	AJ Aniketh J	● New	EXPENSE-TRACKER	
28	📘 Filterable Reports	HV HARISH KUMAR V	● New	EXPENSE-TRACKER	
23	🏆 Add Budgeting Feature	HV HARISH KUMAR V	● New	EXPENSE-TRACKER	
25	📘 Budget Alerts	HV HARISH KUMAR V	● New	EXPENSE-TRACKER	
24	📘 Track Progress Towards Budgets	AJ Aniketh J	● New	EXPENSE-TRACKER	
✅ 22	📘 Quick Add Transaction ···	AJ Aniketh J	● New	EXPENSE-TRACKER	

Result:

       Successfully created an Azure DevOps project with user story management and agile workflow setup.

EXP NO: 3	SETTING UP EPICS, FEATURES, AND USER STORIES FOR PROJECT PLANNING

Aim:

To learn about how to create epics, user story, features, backlogs for your assigned project.

Create Epic, Features, User Stories, Task

Work Item Type	Title	State	Effort	Busin...	Value Area
Feature	⌄ 🏆 Login Page	● Active	12	1	Business
User Story	📘 Username	● Closed			Business
User Story	📘 The user should chose a unique name with mix and max ...	● New			Business

1.Fill in Epics

👑 EPIC 31*

31 Build a Mobile Application to Track Expenses, Set Budgets, and Visualize Spending Trends

DS Dhivakar S   💬 0 Comments **Add Tag**

State	● Active	Area	EXPENSE-TRACKER
Reason	Implementation started	Iteration	EXPENSE-TRACKER\Iteration 1

Description

This project involves building a **mobile application** that enables users to **track daily expenses**, **set monthly budgets**, and **visualize spending trends** through interactive charts and summaries. The app is designed to promote financial awareness by allowing users to categorize transactions, monitor their budget limits, and identify overspending patterns. With a user-friendly interface and real-time data updates, the application serves as a personal finance assistant, helping individuals manage their money more effectively and make informed financial decisions.

Discussion

HV Add a comment. Use # to link a work item, @ to mention a person, or ! to link a pull request.

switch to Markdown editor

Planning

Priority
2

Risk
2 - Medium

Effort
13

Business Value
1

Time Criticality
1

Start Date
4/16/2025 12:00 AM

Target Date
4/30/2025 12:00 AM

Classification

Value area
Business

2. Fill in Features

FEATURE 6*

6   Transaction Management

HV   HARISH KUMAR V   💬 0 Comments   Add Tag

State	● Active	Area	EXPENSE-TRACKER
Reason	Implementation started	Iteration	EXPENSE-TRACKER\Iteration 1

Description

Transaction Management refers to the core functionality of recording, updating, categorizing, and deleting financial transactions within the app. Users can log their income and expenses, assign them to specific categories (like food, travel, bills), add notes, and view transaction history. This feature ensures accurate tracking of financial activities, supports real-time updates, and provides the foundation for generating budgets, summaries, and spending analysis. It helps users stay organized and in control of their personal finances.

Discussion

HV   Add a comment. Use # to link a work item, @ to mention a person, or ! to link a pull request.

switch to Markdown editor

Planning

Priority
2

Risk
2 - Medium

Effort
12

Business Value
1

Time Criticality
1

Start Date
4/18/2025 12:00 AM

Target Date
4/22/2025 12:00 AM

Classification

3. Fill in User Story Details

USER STORY 24

24   Track Progress Towards Budgets

AJ   Aniketh J   💬 0 Comments   Add Tag

State	● New	Area	EXPENSE-TRACKER
Reason	🔒 New	Iteration	EXPENSE-TRACKER\Iteration 1

Description

As a user,
I want to see how much of my budget I have used and how much remains,
So that I can manage my spending efficiently.

Acceptance Criteria

1.Users Can View Budget Progress

2.Budget Progress Updates in Real Time
3.Notifications for Budget Limits
4.Monthly & Weekly Budget Tracking
5.Insights & Reports

Planning

Story Points

Priority
2

Risk

Classification

Value area
Business

Result:

Thus, the creation of epics, features, user story and task has been created successfully.

EXP NO: 4	**SPRINT PLANNING**

Aim:

To assign user story to specific sprint for the Expense Tracker Application Project.

Sprint Planning
Sprint 1
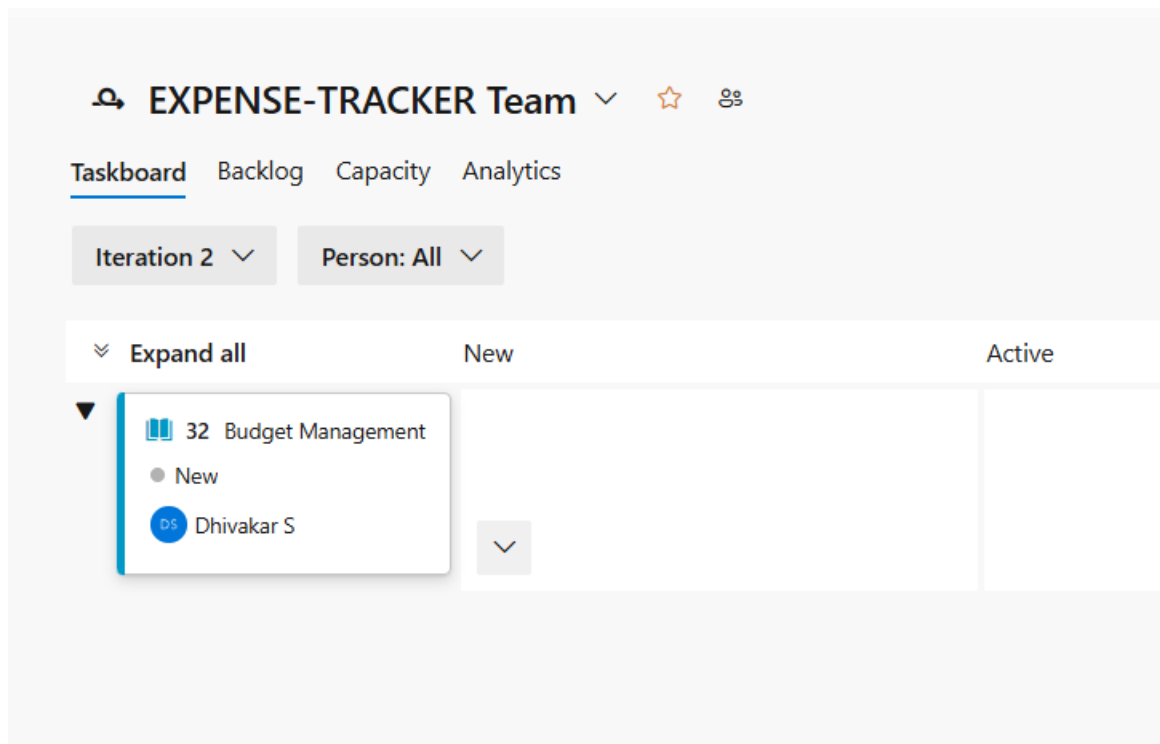
Sprint 2

Result:

The Sprints are created for Expense Tracker App Project

EXP NO: 5	# POKER ESTIMATION

Aim:

Create Poker Estimation for the user stories Expense Tracker App Project.

Poker Estimation

📖 USER STORY 15*		
15 User Authentication		
(AJ) Aniketh J	💬 0 Comments Add Tag	
State ● Active	Area	EXPENSE-TRACKER
Reason Implementation started	Iteration	EXPENSE-TRACKER\Iteration 1

Description

As a user,
I want to securely sign up, log in, and log out of the application,
So that my personal financial data is protected and accessible only to me.

Acceptance Criteria

- The user must be able to create an account using email/password or social media login (Google, Facebook).
- The app should support multi-factor authentication (optional).
- The user should be able to log in and log out securely.
- Passwords should be encrypted, and sensitive data should be stored securely.

Planning

Story Points
10

Priority
2

Risk
2 - Medium

Classification ⌄

Result:

The Estimation/Story Points is created for the project using Poker Estimation.

EXP NO: 6	**DESIGNING CLASS AND SEQUENCE DIAGRAMS FOR PROJECT ARCHITECTURE**

Aim:

To Design a Class Diagram and Sequence Diagram for the given Project.

6A. Class Diagram
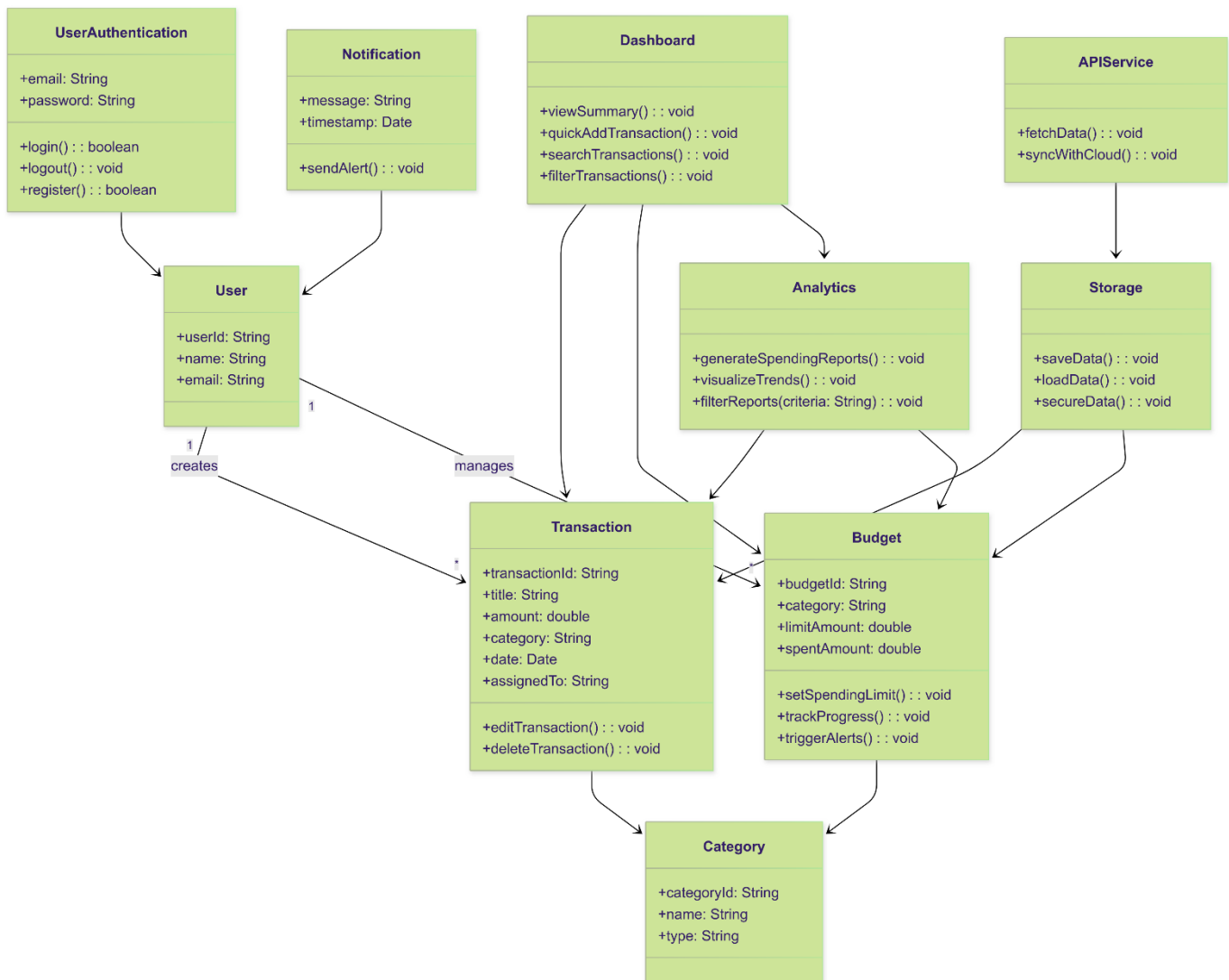
6B. Sequence Diagram
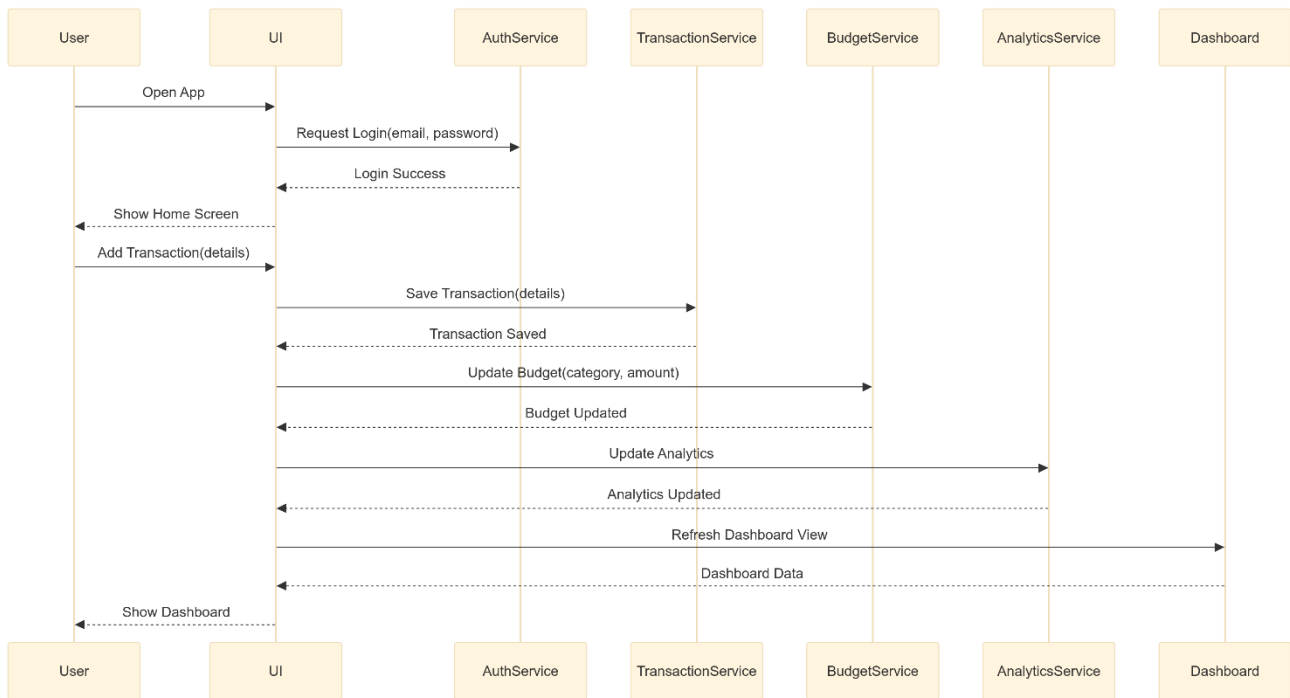
Result:

The Class Diagram and Sequence Diagram is designed Successfully for the SMS/MMS Sending Project

EXP NO: 7	DESIGNING ARCHITECTURAL AND ER DIAGRAMS FOR PROJECT STRUCTURE

Aim:

To Design an Architectural Diagram and ER Diagram for the given Project.

7A. Architectural Diagram
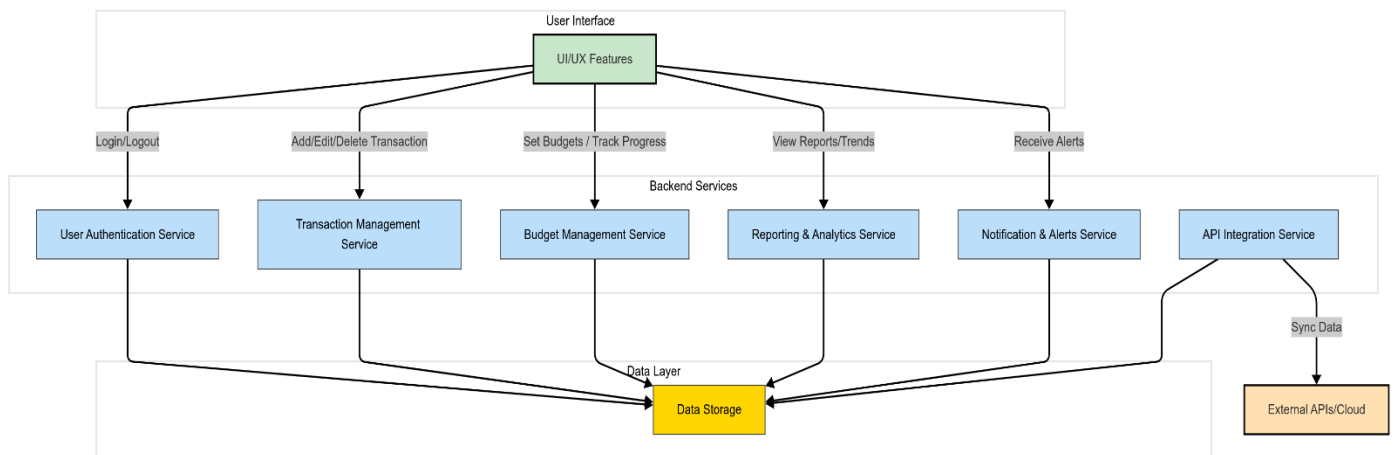
7B.ER Diagram
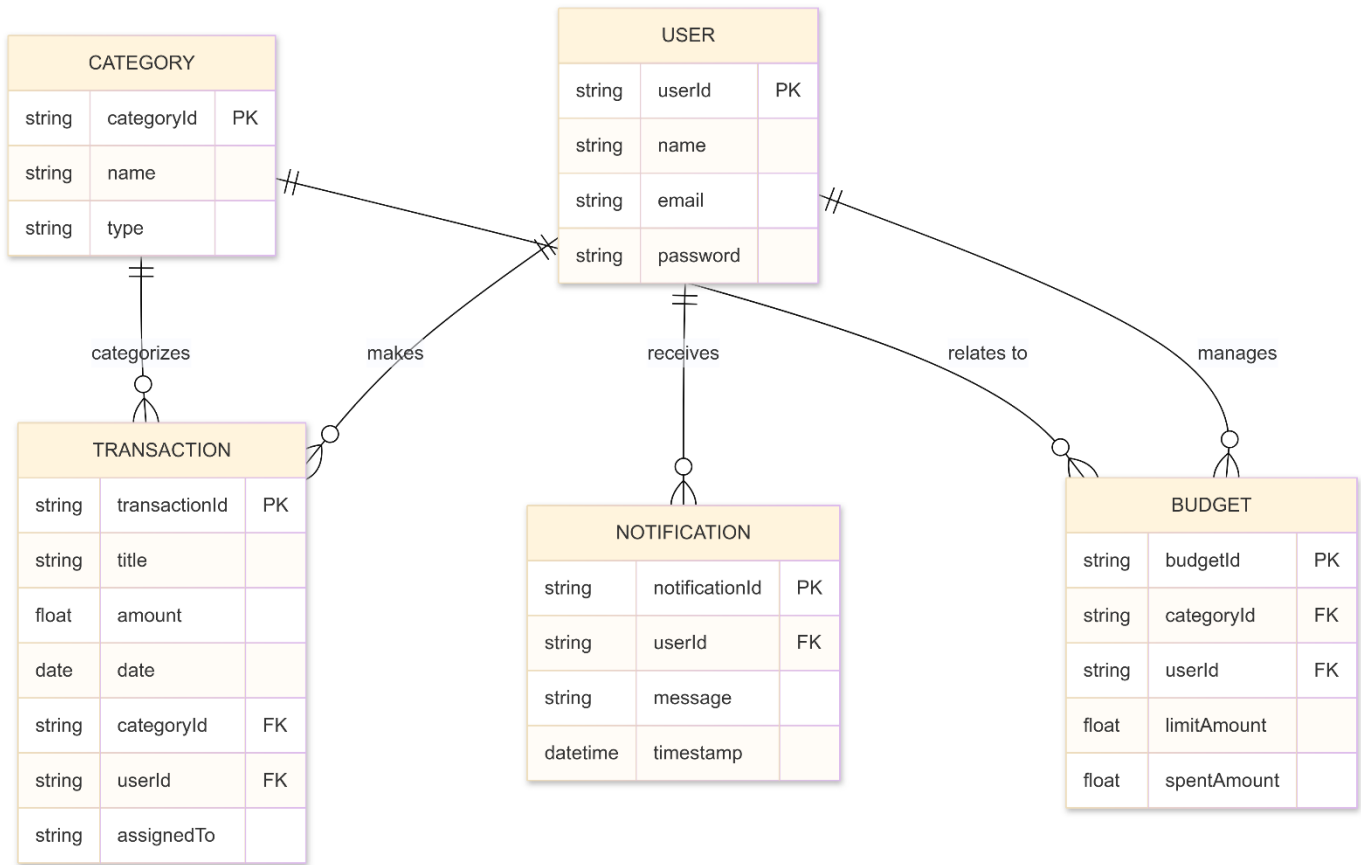
Result:

The Architecture Diagram and ER Diagram is designed Successfully for the Music Playlist Batch Creator

EXP NO: 8	**TESTING – TEST PLANS AND TEST CASES**

Aim:

Test Plans and Test Case and write two test cases for at least five user stories showcasing the happy path and error scenarios in azure DevOps platform.

Expense Tracker App - Test Plan

USER STORIES

- As a user, I want to add, edit, and delete expense transactions (ID: EXP01).
- Users can view categorized transactions and search/filter them by date or category (ID: EXP02).
- Users can set monthly budgets and get alerts when nearing or exceeding limits (ID: EXP03).
- Users can view spending reports and visualize trends via charts (ID: EXP04).
- Users receive notifications for budget limits and important reminders (ID: EXP05).
- Users can manually enter transactions and quick add frequently used expenses (ID: EXP06).
- The app securely stores user data and supports login/logout features (ID: EXP07).
- Users can sync data across devices using API integration (ID: EXP08).

TEST SUITES

- TS01 - Transaction Management (Add/Edit/Delete) (ID: 201)
- TS02 - Search and Filter Transactions (ID: 202)
- TS03 - Budget Management and Alerts (ID: 203)
- TS04 - Reporting and Analytics Visualization (ID: 204)
- TS05 - Notifications and Reminders (ID: 205)
- TS06 - User Authentication and Data Security (ID: 206)
- TS07 - API Integration and Data Sync (ID: 207)

TEST CASES

Test Suite: TS01 - Transaction Management (ID: 201)

1. **TC01 - Add a New Transaction (ID: 301)**

   o **Action:**
     - Log in as User A.
     - Navigate to "Add Transaction."
     - Enter valid details (title, amount, category, date).
     - Save the transaction.

   o **Expected Results:**
     - Transaction is saved and displayed in the transaction list.
     - Type: Happy Path

2. **TC02 - Edit Existing Transaction (ID: 302)**

   o **Action:**
     - Log in as User A.
     - Select an existing transaction.
     - Modify the amount and save.

   o **Expected Results:**
     - Changes are saved and updated correctly in the list.
     - Type: Happy Path

3. **TC03 - Delete a Transaction (ID: 303)**

   o **Action:**
     - Log in as User A.
     - Select a transaction and choose "Delete."
     - Confirm deletion.

   o **Expected Results:**
     - Transaction is removed from the list.
     - Type: Happy Path

Test Suite: TS03 - Budget Management and Alerts (ID: 203)

1. **TC04 - Set Monthly Budget (ID: 304)**

   o **Action:**
     - Log in as User B.
     - Navigate to "Budget Settings."
     - Set a budget for the "Food" category.
     - Save the budget.

- **Expected Results:**
  - Budget is saved and reflected in dashboard progress.
  - Type: Happy Path

2. **TC05 - Alert When Budget Approaching Limit (ID: 305)**

   - **Action:**
     - Log in as User B.
     - Add transactions to reach 90% of the set budget in "Food."

   - **Expected Results:**
     - User receives a notification alert about nearing budget limit.
     - Type: Happy Path

3. **TC06 - Prevent Budget Exceeding (ID: 306)**

   - **Action:**
     - Add a transaction that will exceed the set budget.

   - **Expected Results:**
     - Warning message appears: "Budget exceeded for this category."
     - Transaction can be saved but flagged.
     - Type: Error Path

Test Suite: TS04 - Reporting and Analytics Visualization (ID: 204)

1. **TC07 - Generate Spending Report (ID: 307)**

   - **Action:**
     - Log in as User C.
     - Navigate to Reports.
     - Select "Monthly Spending" report.

   - **Expected Results:**
     - Report is generated showing categorized expenses with charts.
     - Type: Happy Path

2. **TC08 - Filter Reports by Date Range (ID: 308)**

   - **Action:**

- Choose a custom date range for report generation.

- **Expected Results:**
  - Report accurately reflects transactions within the selected date range.
  - Type: Happy Path
  -

Test Suite: TS05 - Notifications and Reminders (ID: 205)

1. **TC09 - Receive Budget Alert Notification (ID: 309)**

   - **Action:**
     - User has set budget and reaches limit.

   - **Expected Results:**
     - Notification is pushed to user's device/app.
     - Type: Happy Path

2. **TC10 - Notification Settings Disabled (ID: 310)**

   - **Action:**
     - User disables notifications in settings.
     - Budget limit is reached.

   - **Expected Results:**
     - No push notification is received.
     - User can still see alerts in the app dashboard.
     - Type: Error Path

Result:

The test plans and test cases for the user stories is created in Azure DevOps with Happy Path and Error Path

EXP NO: 9	**LOAD TESTING AND PERFORMANCE TESTING**

Aim:

   To create an Azure Load Testing resource and run a load test to evaluate the performance of a target endpoint.

Load Testing

Steps to Create an Azure Load Testing Resource:

Before you run your first test, you need to create the Azure Load Testing resource:
1. Sign in to Azure Portal
   Go to https://portal.azure.com and log in.
2. Create the Resource
   o Go to *Create a resource* → Search for "Azure Load Testing".
   o Select Azure Load Testing and click Create.
3. Fill in the Configuration Details
   o Subscriptio*n:* Choose your Azure subscription.
   o *Resource Group:* Create new or select an existing one.
   o *Name:* Provide a unique name (no special characters).
   o *Location:* Choose the region for hosting the resource.
4. (Optional) Configure tags for categorization and billing.
5. Click Review + Create, then Create.
6. Once deployment is complete, click Go to resource.

Steps to Create and Run a Load Test:

Once your resource is ready:
1. Go to your Azure Load Testing resource and click Add HTTP requests > Create.
2. Basics Tab
   o *Test Name:* Provide a unique name.
   o *Description:* (Optional) Add test purpose.
   o *Run After Creation:* Keep checked.
3. Load Settings
   o *Test URL:* Enter the target endpoint (e.g., https://yourapi.com/products).
4. Click Review + Create → Create to start the test.

Load Testing

Create a load testing resource ...

✅ Validation passed.

Basics   Encryption   Tags   **Review + create**

Basics

Subscription	Azure for Students
Resource group	231501057
Name	ExpenseTracker
Region	Central India

Encryption

Encryption type	MMK

☰ Microsoft Azure   🔍 Search resources, services, and docs (G+/)   💬 Copilot   231501057@rajalakshm...
DEFAULT DIRECTORY (231501057...

Home > Microsoft.CloudNativeTesting1747981669238 | Overview > ExpenseTracker >

TestRun_5/23/2025_12:05:35 PM ...
Last updated by: 231501057@rajalakshmi.edu.in | Initiated on: 5/23/2025, 12:05 PM

⊕ View all test runs   ☐ Stop   ↻ Refresh   ↺ Rerun   ⇄ Compare   ⊞ App components   ⚙ Configure metrics   ↓ Download ∨   ⧉ Copy artifacts   ⟲ Share | 🗑 Delete test run   📈 Mark as baseline   🕐 Auto refresh on (10s)

∧ Test run details

Start time	End time	Test run ID	Test type	Engine instances	Test result	Status
5/23/2025, 12:05:39 PM		2b4cb7e1-08af-4207-8b47-2...	URL	1		🔄 Executing

Load test results   Engine health

Client-side metrics

| Requests : All | Region : 0 | Aggregation : P90 | Error type : All | Time range : 5/23/2025, 12:05:39 PM - 5/23/2025, 12:06:42 PM | Group by : 10s |

Virtual Users (Max)

Response time (successful responses)

Request1
48

Request1 Pct 90
64.71 ms

Result:

Successfully created the Azure Load Testing resource and executed a load test to assess the performance of the specified endpoint.
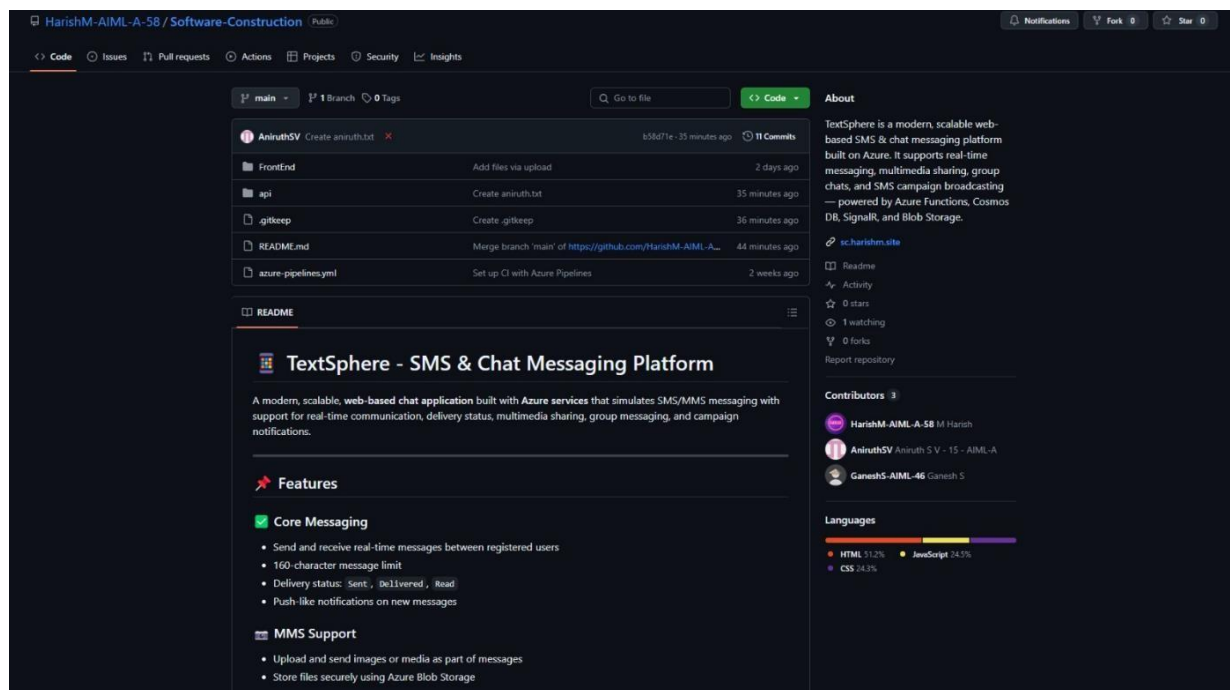
EXP NO: 10	**GITHUB: PROJECT STRUCTURE & NAMING CONVENTIONS**

Aim:

To provide a clear and organized view of the project's folder structure and file naming conventions, helping contributors and users easily understand, navigate, and extend the Expense Tracker App Project.

GitHub Project Structure

Result:

The GitHub repository clearly displays the organized project structure and consistent naming conventions, making it easy for users and contributors to understand and navigate the codebase.