DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING LAB MANUAL

CS23432 – Software Construction

(REGULATION 2023)

RAJALAKSHMI ENGINEERING COLLEGE
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Year / Branch / Section: 3rd / CSE(CS) / A

Semester: V

Academic Year: 2025 - 2026

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EXP NO: 1	AZURE DEVOPS ENVIRONMENT SETUP

Aim:

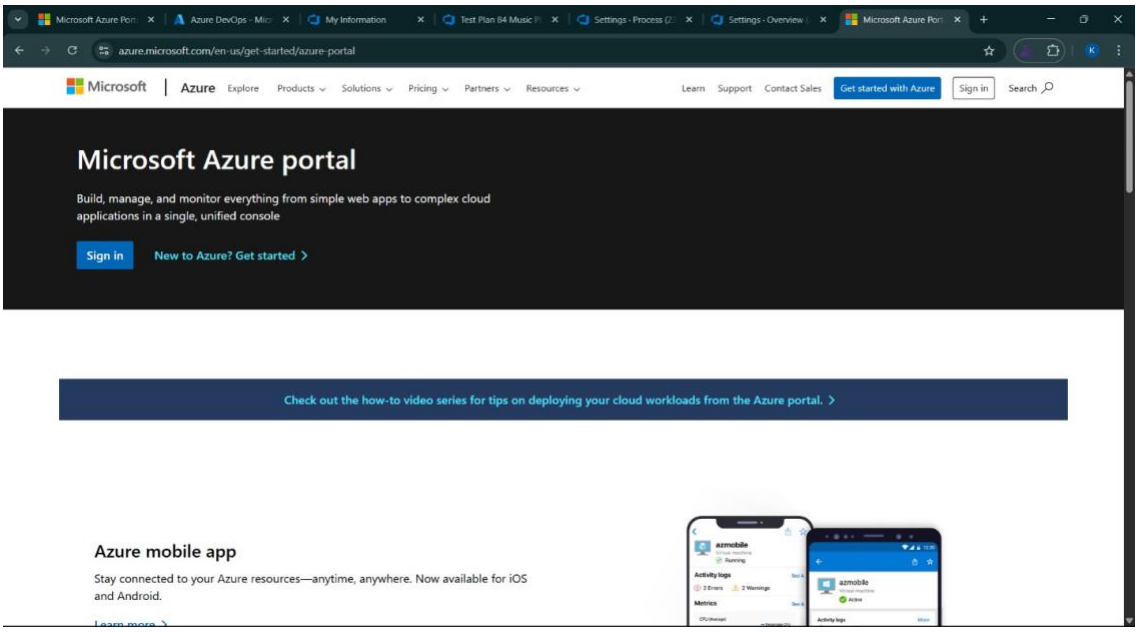
To set up and access the Azure DevOps environment by creating an organization through the Azure portal.

INSTALLATION

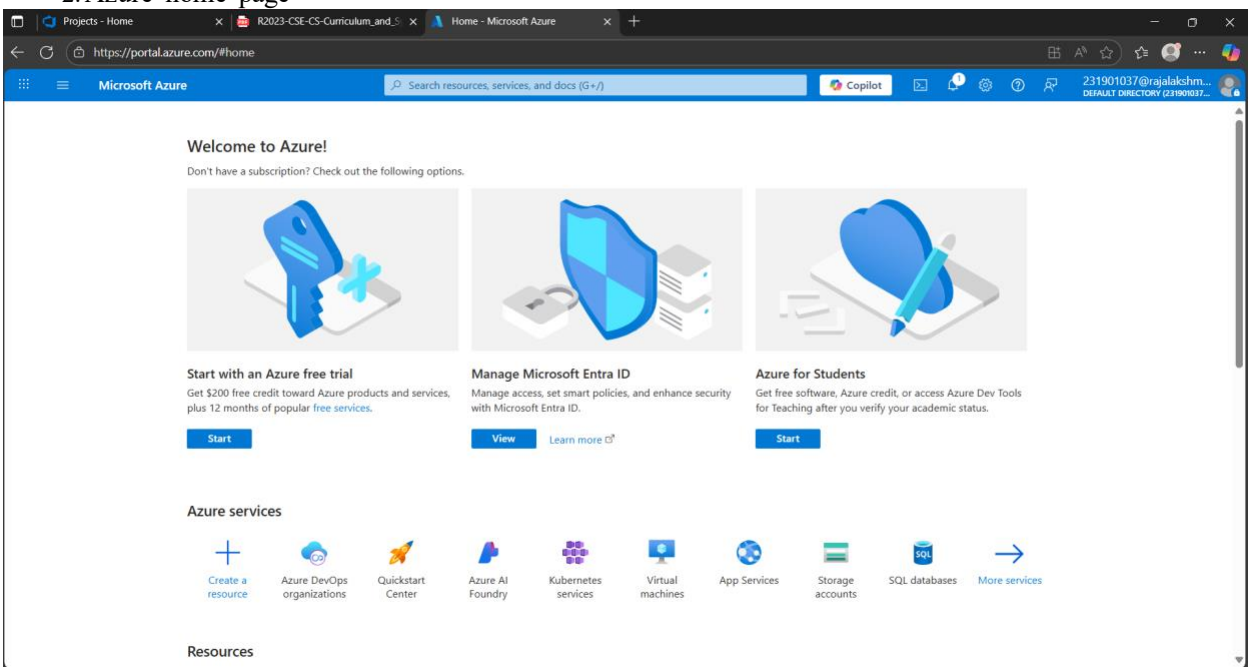
1. Open your web browser and go to the Azure website: https://azure.microsoft.com/en-us/get-started/azure-portal.

Sign in using your Microsoft account credentials.

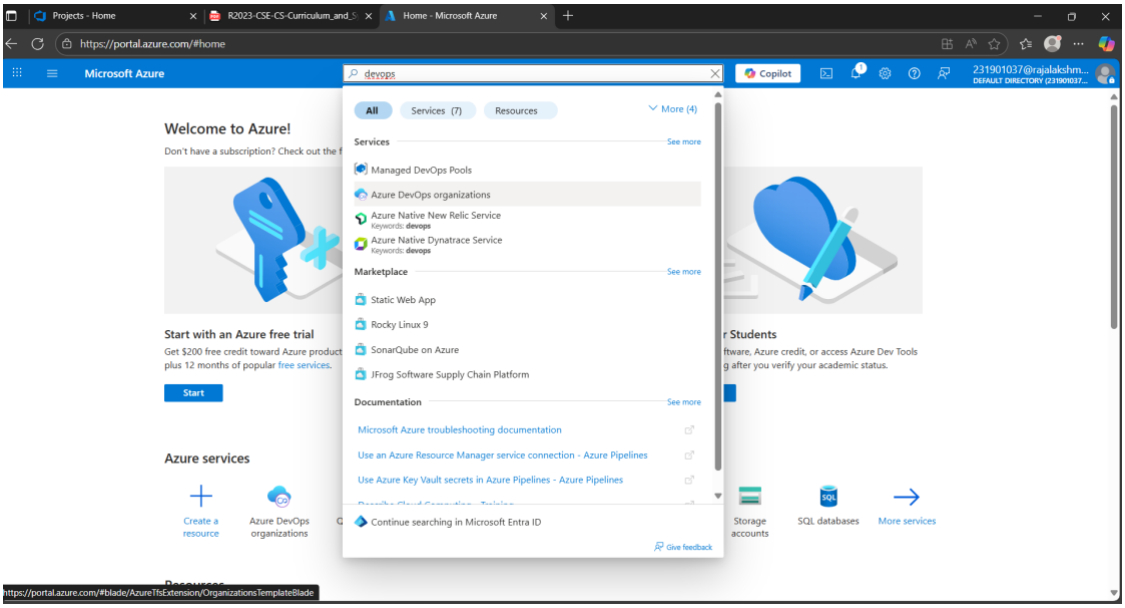
If you don't have a Microsoft account, you can create one here: https://signup.live.com/?lic=1



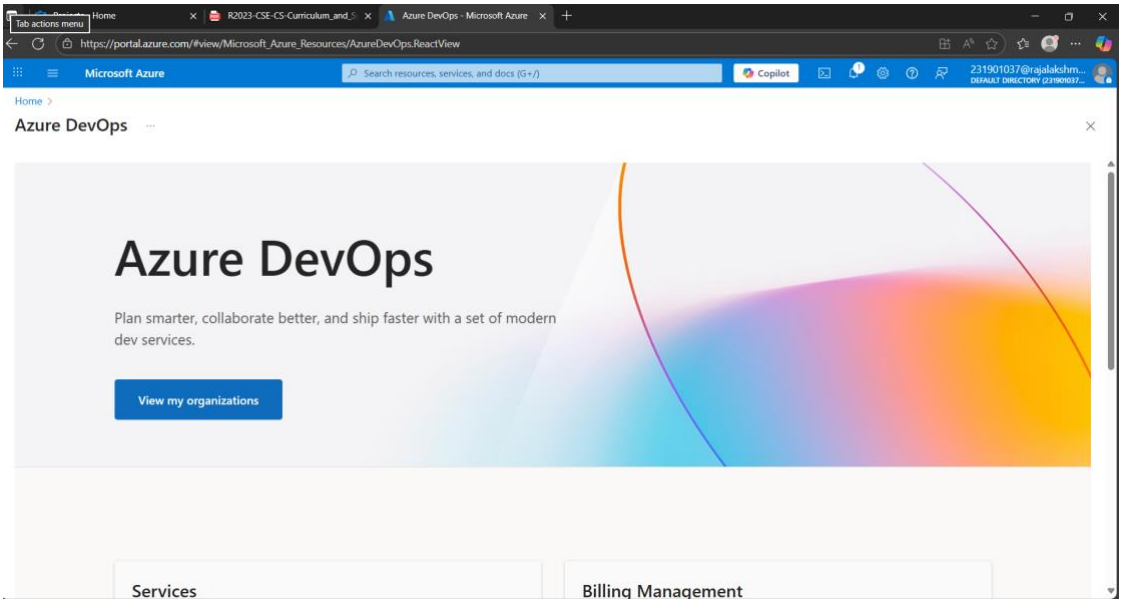
2. Azure home page



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.



Result:

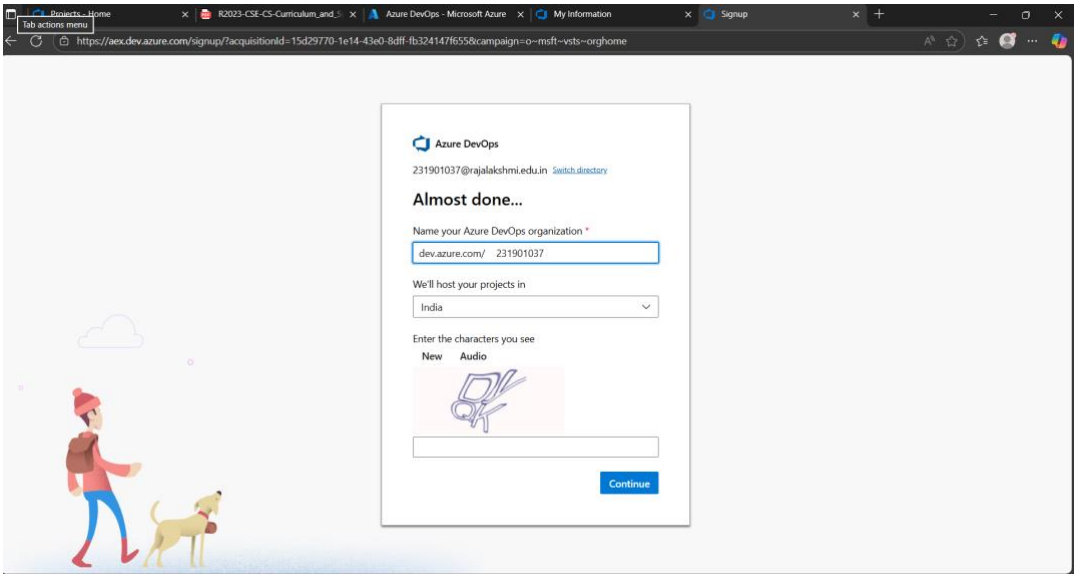
Successfully accessed the Azure DevOps environment and created a new organization through the Azure portal.

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.

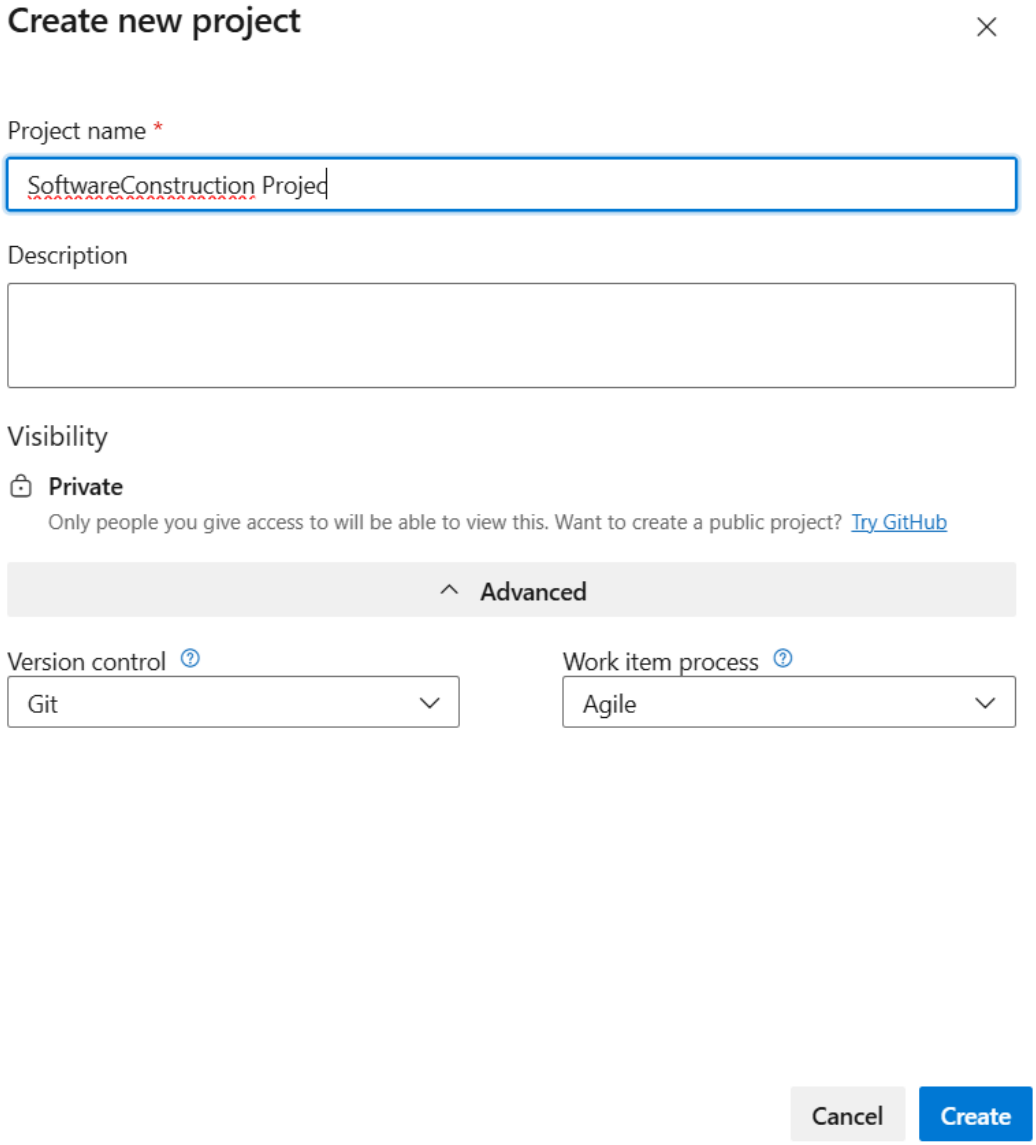
c. Enter the project name, description, and visibility options:

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

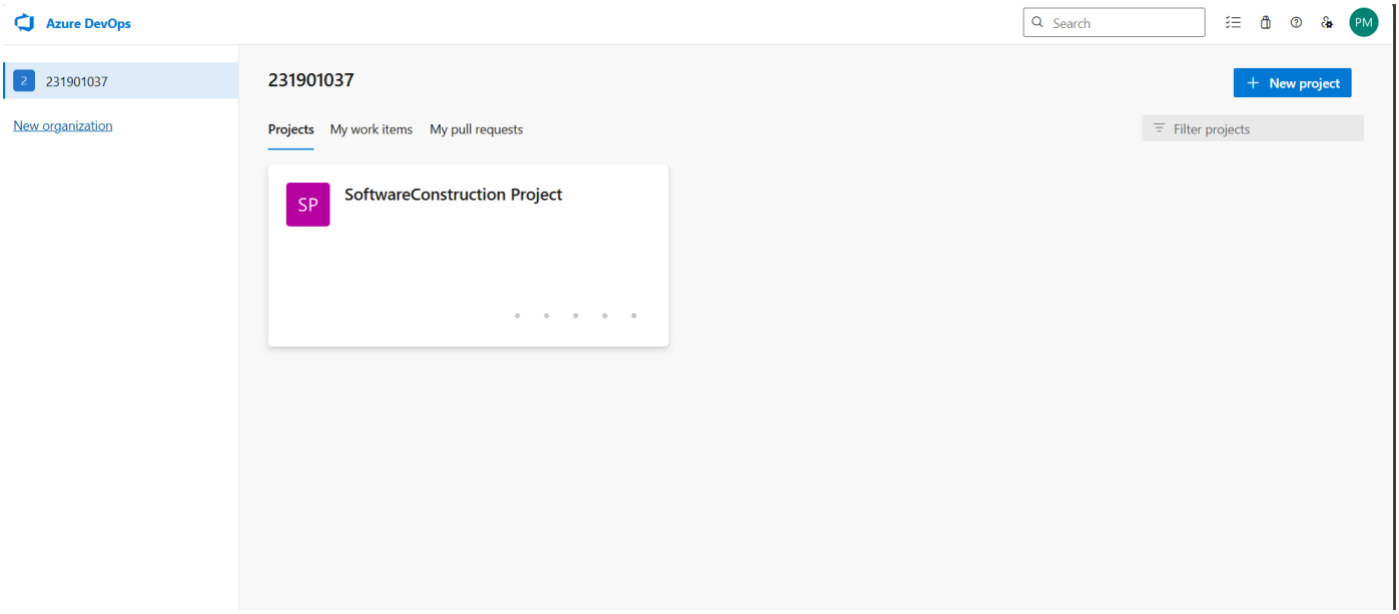
***Description**:* Optionally, add a description to provide more context about the project.

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

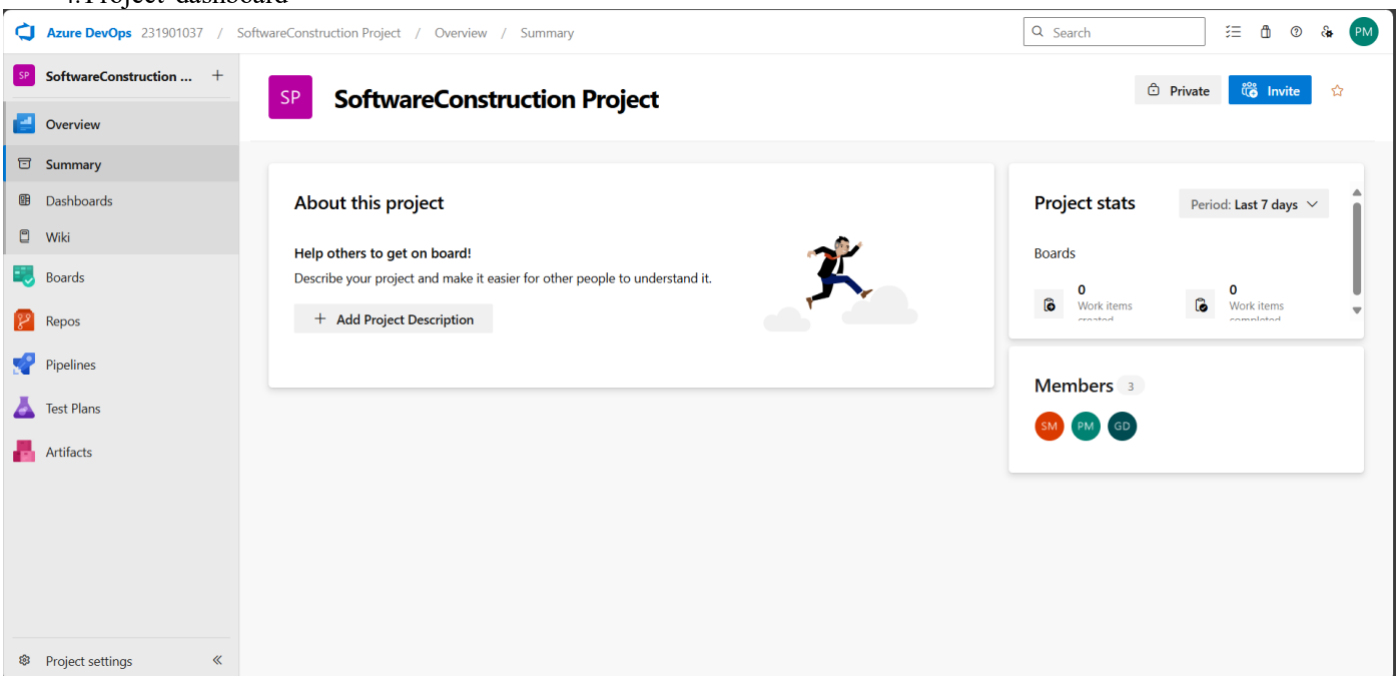
d. Once you've filled out the details, click **Create** to set up your first project.



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.



4. Project dashboard

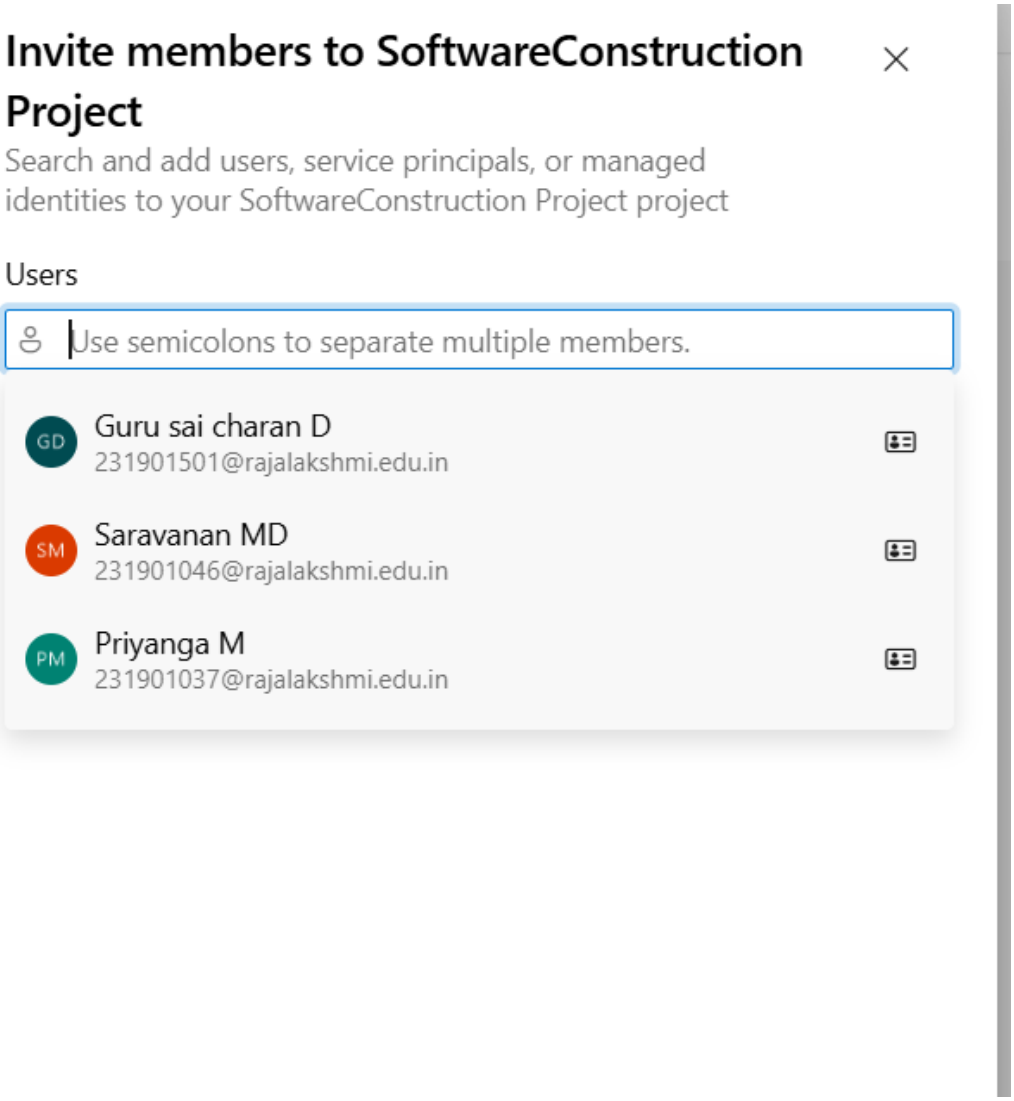


5. To manage user stories:

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.

c.



Result:

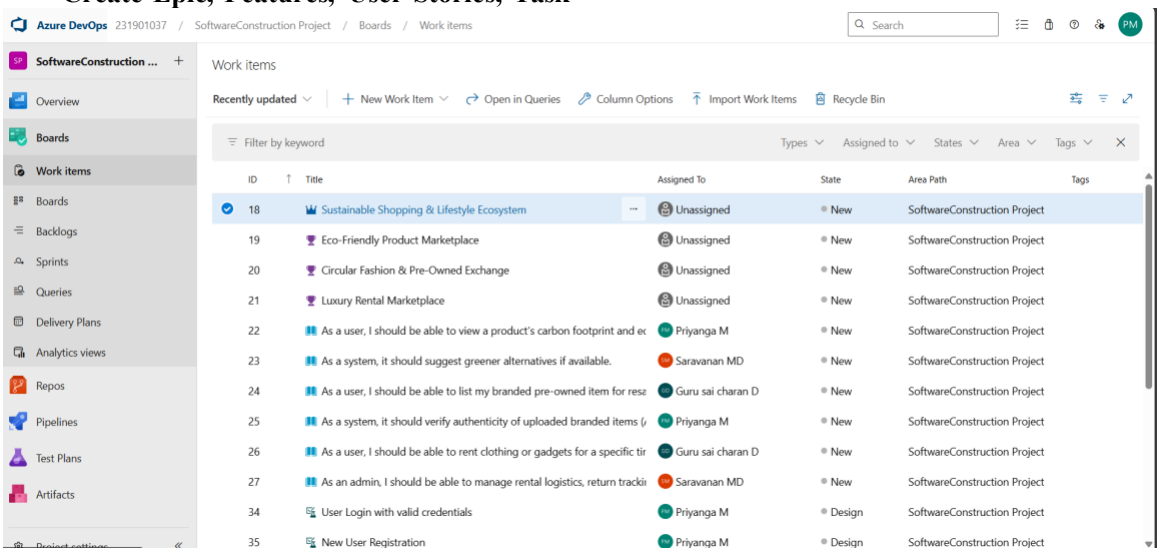
Successfully created an Azure DevOps project with user story management and agile workflow setup.

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

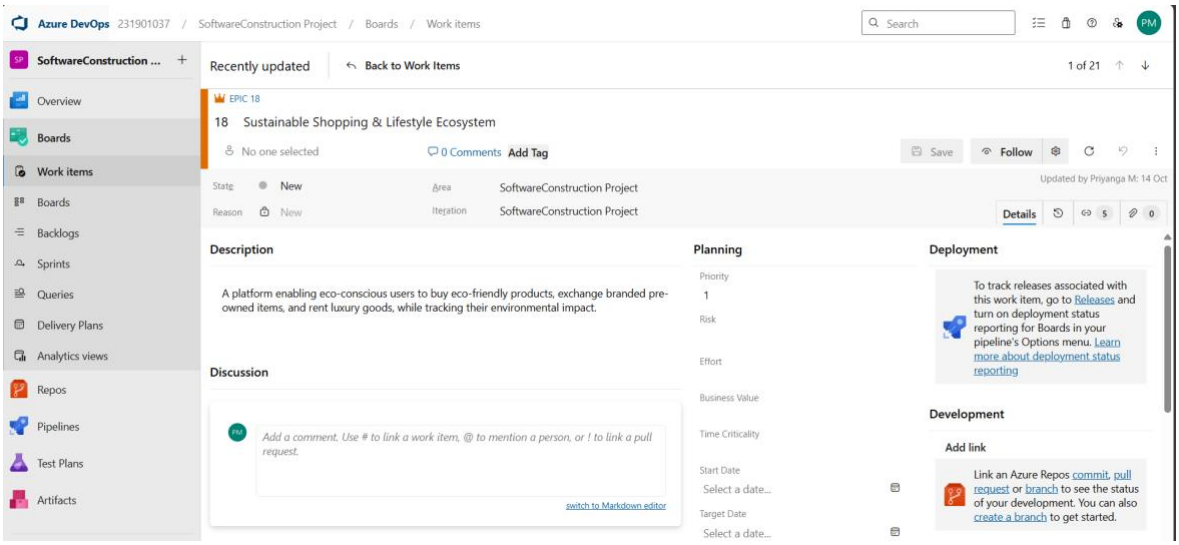
Aim:

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

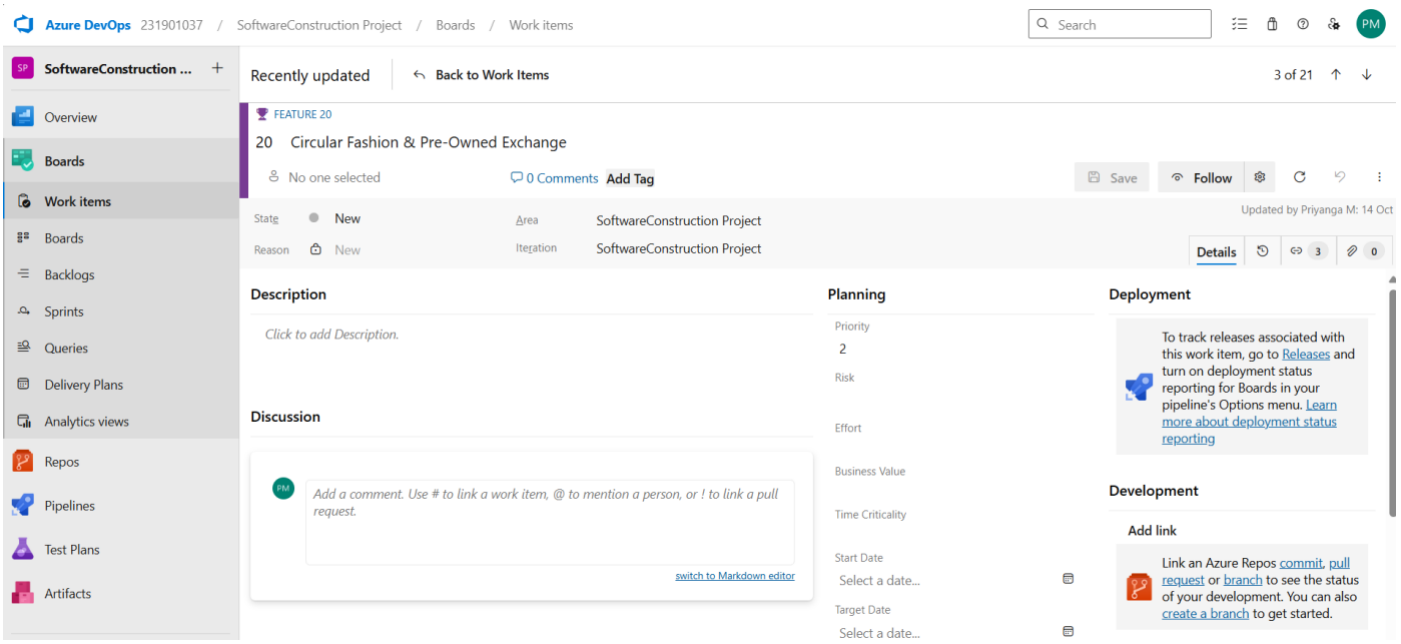
Create Epic, Features, User Stories, Task



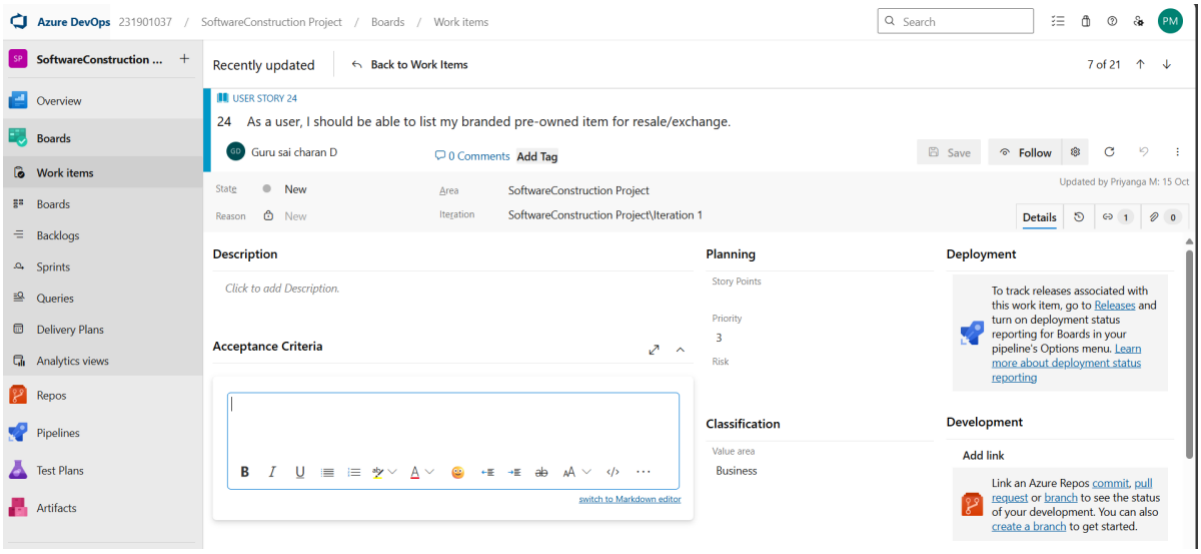
1. Fill in Epics



2. Fill in Features



3. Fill in User Story Details



Result:

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

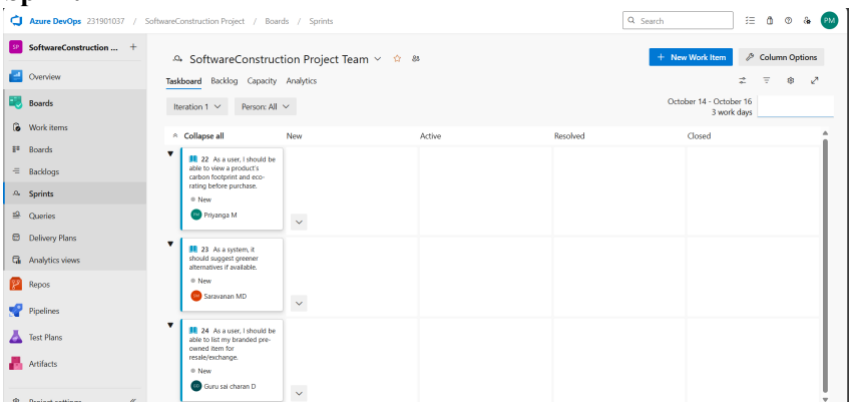
EXP NO: 4	SPRINT PLANNING

Aim:

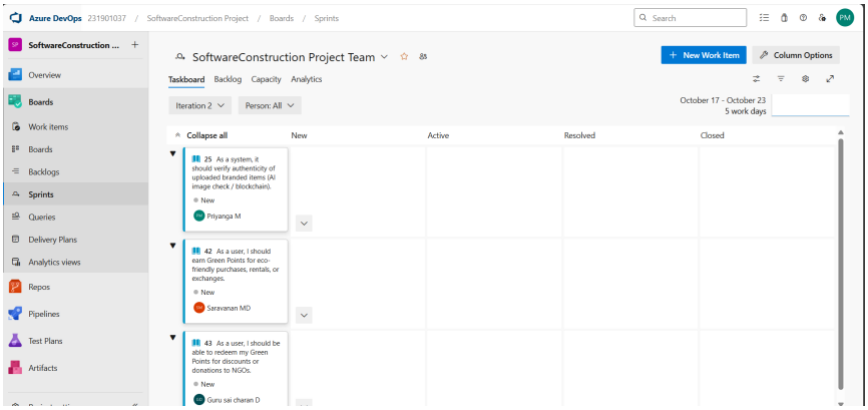
To assign user story to specific sprint for the Sustainable Shopping & Lifestyle Ecosystem projecct

Sprint Planning

Sprint 1



Sprint 2



Result:

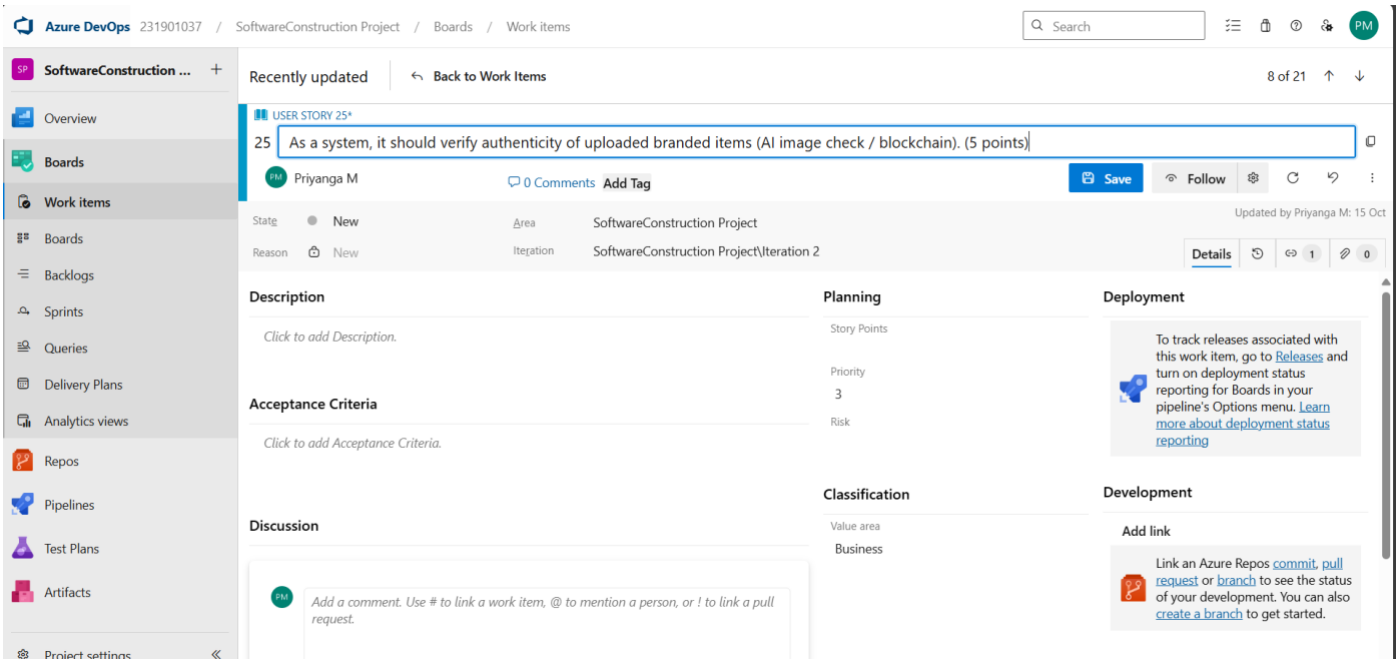
The Sprints are created for the Sustainable Shopping & Lifestyle Ecosystem project.

EXP NO: 5	POKER ESTIMATION

Aim:

Create Poker Estimation for the user stories – Sustainable Shopping & Lifestyle Ecosystem Project.

Poker Estimation



Result:

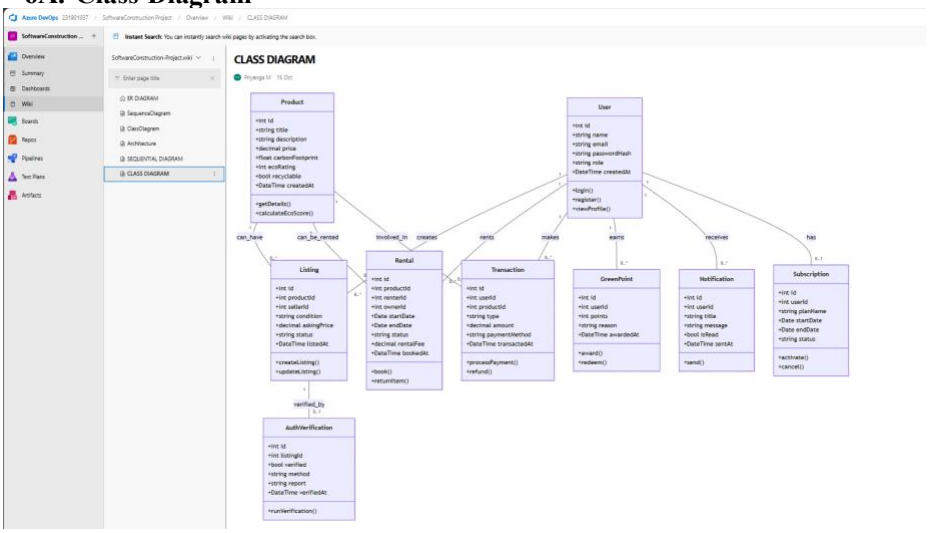
The Estimation/Story Points is created for the project using Poker Estima

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

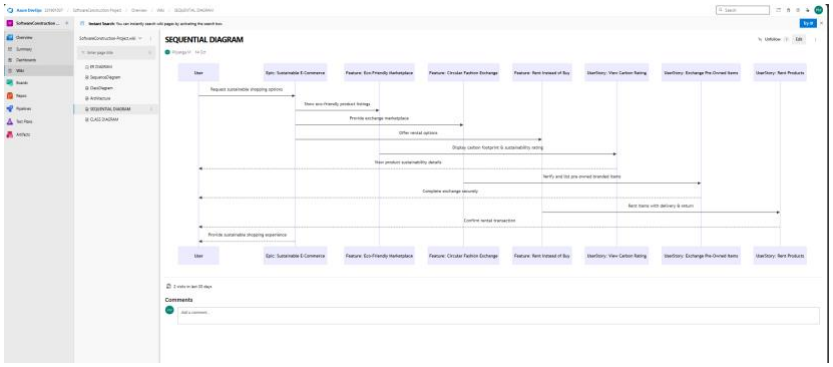
Aim:

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

6A. Class Diagram



6B. Sequence Diagram



Result:

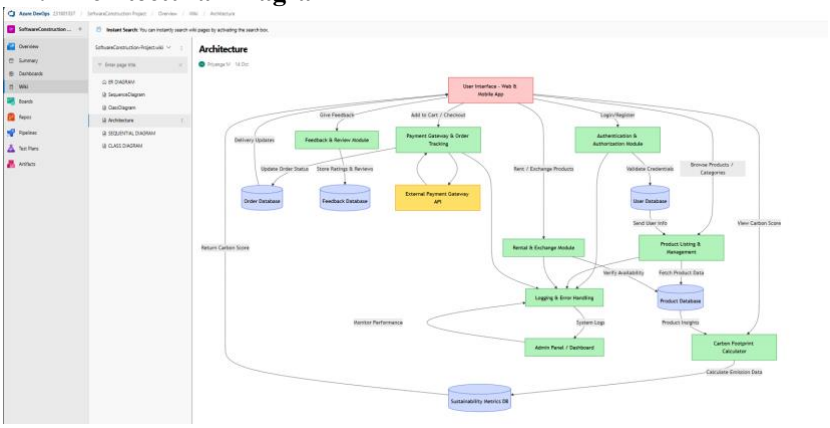
The Class Diagram and Sequence Diagram is designed Successfully for the Sustainable Shopping & Lifestyle Ecosystem

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

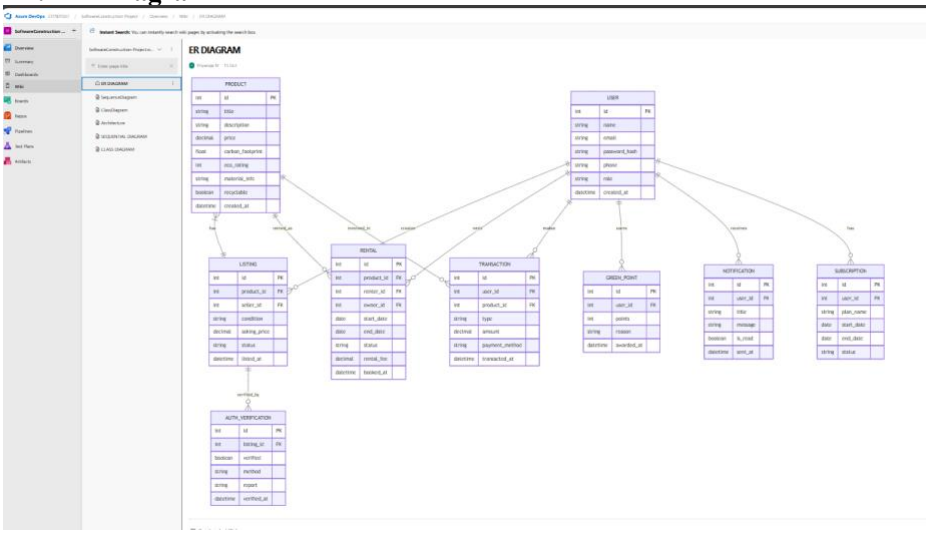
Aim:

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 Sustainable Shopping & Lifestyle Ecosystem.

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.

Test Planning and Test Case Design Procedure
Project: Sustainable Commerce Platform (GreenLoop)

1. Understand Core Features of the Application

The Sustainable Commerce Platform enables eco-conscious consumers to shop, rent, exchange, and track their carbon footprint. The major features under test include:

- User Authentication and Profile Management
- Product Search, Filter, and View
- Add to Cart and Checkout Process
- Rent or Exchange Product Workflow
- Carbon Footprint Tracking
- Reward Points and Sustainability Badges

2. Define User Interactions

Each test case is designed to simulate real-world user actions across multiple modules:

- Logging in or registering with valid and invalid data
- Searching and filtering sustainable products
- Adding or removing items from the cart
- Completing checkout with valid and invalid payment details
- Renting or exchanging products
- Viewing the sustainability dashboard and carbon footprint statistics
- Redeeming eco-reward points

3. Design Happy Path Test Cases

Verify that all modules function correctly under normal conditions.

Test ID	Test Description
TC01	Register with valid user details
TC02	Login with valid credentials
TC03	Search product by name and category
TC04	Filter products by sustainability rating
TC05	Add product to cart successfully
TC06	Checkout with valid payment details
TC07	Request a product for rent successfully
TC08	Exchange product with correct conditions
TC09	Track carbon footprint correctly after purchase
TC10	Redeem reward points for eco-friendly actions

4. Design Error Path Test Cases

Simulate invalid data or user mistakes to verify system resilience and validation.

Test ID	Test Description
TC11	Register with missing required fields
TC12	Login with invalid password
TC13	Search for unavailable product
TC14	Add out-of-stock product to cart
TC15	Checkout with expired card details
TC16	Rent product with invalid duration input
TC17	Exchange request without uploading proof of ownership
TC18	Access dashboard without login
TC19	Attempt to redeem more points than available
TC20	Upload invalid file format for exchange product

5. Break Down Steps and Expected Results

Each test case includes:

- **Preconditions:** For example, user is logged in or product available in catalog.
- **Test Steps:** Sequential actions such as "Click Login", "Enter Details", "Click Submit".
- **Expected Result:**
  - Success message or correct data displayed.
  - Error message displayed for invalid inputs.

Example:

TC06 – Checkout with Valid Payment Details

- Steps:

1. Add a product to the cart.
2. Go to checkout page.
3. Enter valid card details.
4. Click “Confirm Payment”.

- Expected Result:
  - Payment succeeds.
  - Confirmation message displayed.
  - Order ID generated.

6. Use Clear Naming and IDs

All test cases follow consistent naming for easy mapping in Azure Test Plans.

Format: TCXX – Module – Action

Example: TC04 – Product Filter – By Sustainability Rating

7. Separate Test Suites

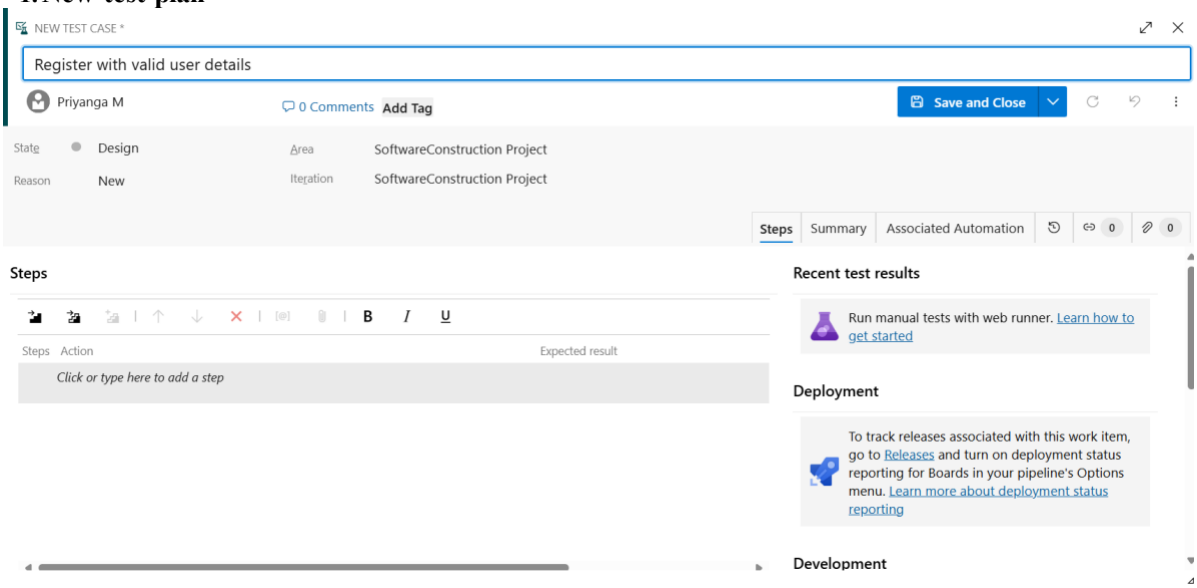
Organized based on core functionalities for modular testing and easier tracking in Azure DevOps Test Plans.

Test Suite	Modules Covered
Login and Registration	TC01–TC02, TC11–TC12
Product Search and Filter	TC03–TC04, TC13
Cart and Checkout	TC05–TC06, TC14–TC15
Rent and Exchange	TC07–TC08, TC16–TC17
Carbon Tracking and Rewards	TC09–TC10, TC18–TC20

8. Prioritize and Review

- **High Priority:** Login, Checkout, Rent/Exchange, and Reward Redemption
- **Medium Priority:** Product Search, Filter, and Carbon Tracking
- **Low Priority:** Profile Updates and UI Visuals
  All test cases were reviewed for:
- Complete feature coverage
- Traceability to user stories
- Accurate validation steps
- Reusability for automation

1. New test plan



2. Test case

Test Suite TS01 – User Authentication

User Story ID: US01
Title: As a user, I want to securely sign up and log in so that I can access the platform and manage eco-commerce activities.

Test Case TC01 – Successful Sign Up
Type: Happy Path
Steps:

1. Navigate to the Sign-Up page.
2. Enter valid name, email, and password.
3. Click on Sign Up.
   Expected Result: Account is created and user is redirected to the homepage/dashboard.

Test Case TC02 – Sign Up with Existing Email
Type: Error Path
Steps:

1. Navigate to the Sign-Up page.
2. Enter an already registered email.

3. Click on Sign Up.
   Expected Result: Error message displayed — “Email is already registered.”

Test Suite TS02 – Product Browsing and Filtering

User Story ID: US02
Title: As a user, I want to search and filter sustainable products to find items based on eco-ratings and categories.

Test Case TC03 – Successful Product Search
Type: Happy Path
Steps:

1. Log in to the platform.
2. Enter a valid product name in the search bar.
3. Click on Search.
   Expected Result: Matching products are displayed with name, image, and eco-rating.

Test Case TC04 – Filter Products by Sustainability Rating
Type: Happy Path
Steps:

1. Log in to the platform.
2. Open product listing page.
3. Select filter “Sustainability Rating ≥ 4”.
   Expected Result: Products with sustainability rating 4 and above are displayed.

Test Case TC05 – Search Product Not Found
Type: Error Path
Steps:

1. Enter an invalid or unavailable product name.
2. Click on Search.
   Expected Result: Message displayed — “No products found.”

Test Suite TS03 – Cart and Checkout Process

User Story ID: US03
Title: As a user, I want to add items to the cart and checkout securely.

Test Case TC06 – Add Product to Cart
Type: Happy Path
Steps:

1. Log in.
2. Search and open a product.
3. Click on Add to Cart.

Expected Result: Product added to cart and confirmation message shown.

Test Case TC07 – Checkout with Valid Payment Details
Type: Happy Path
Steps:

1. Go to the Cart page.
2. Click on Checkout.
3. Enter valid payment details.
4. Click on Pay Now.
   Expected Result: Payment succeeds and order confirmation is displayed.

Test Case TC08 – Checkout with Invalid Card
Type: Error Path
Steps:

1. Go to Checkout.
2. Enter expired card details.
3. Click on Pay Now.
   Expected Result: Payment fails and an error message is shown — "Invalid card details."

Test Suite TS04 – Rent and Exchange Workflow

User Story ID: US04
Title: As a user, I want to rent or exchange items with other users for sustainable consumption.

Test Case TC09 – Rent Product Successfully
Type: Happy Path
Steps:

1. Log in.
2. Select a rentable product.
3. Choose rental duration.
4. Click on Rent Now.
   Expected Result: Rental request is created and confirmation displayed.

Test Case TC10 – Exchange Product Successfully
Type: Happy Path
Steps:

1. Log in.
2. Go to Exchange Section.
3. Select item for exchange and upload ownership proof.
4. Click on Submit Request.
   Expected Result: Exchange request submitted successfully.

Test Case TC11 – Exchange Without Proof Document
Type: Error Path
Steps:

1. Log in.
2. Try to submit exchange request without uploading proof.
   Expected Result: Error message shown — "Ownership proof required."

Test Suite TS05 – Carbon Footprint and Rewards

User Story ID: US05
Title: As a user, I want to track my carbon footprint and earn reward points for sustainable purchases.

Test Case TC12 – Carbon Footprint Tracking After Purchase
Type: Happy Path
Steps:

1. Log in.
2. Complete a product purchase.
3. Go to Carbon Dashboard.
   Expected Result: Dashboard updates showing CO_2 saved and footprint reduced.

Test Case TC13 – Redeem Reward Points
Type: Happy Path
Steps:

1. Log in.
2. Go to Rewards Section.
3. Redeem available points for a voucher.
   Expected Result: Points redeemed and voucher generated.

Test Case TC14 – Redeem Insufficient Points
Type: Error Path
Steps:

1. Log in.
2. Try to redeem more points than available.
   Expected Result: Message displayed — "Not enough points to redeem."

Test Suite TS06 – System Access and Alert

User Story ID: US06
Title: As a user, I want to receive notifications for rent expiry, delivery status, and account alerts.

Test Case TC15 – Receive Rent Expiry Alert
Type: Happy Path
Steps:

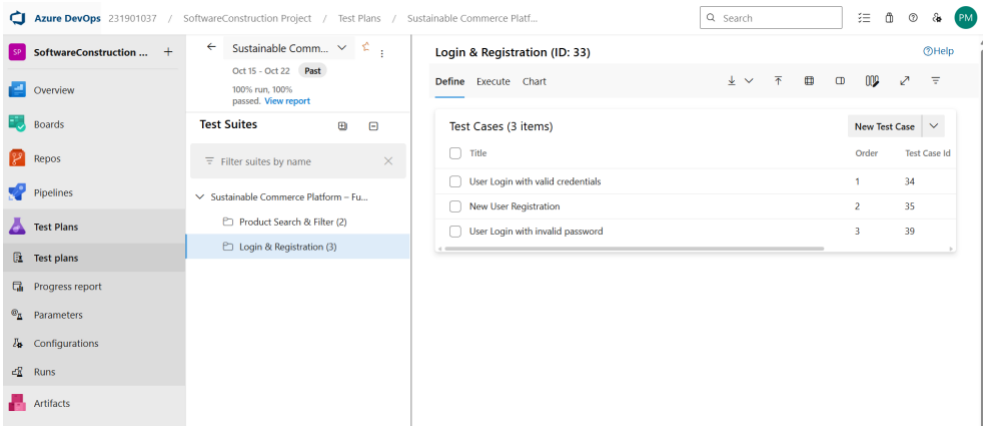
1. Log in.

2. Check notifications for rented items nearing end date.
   Expected Result: Alert displayed — “Your rental period expires in 2 days.”

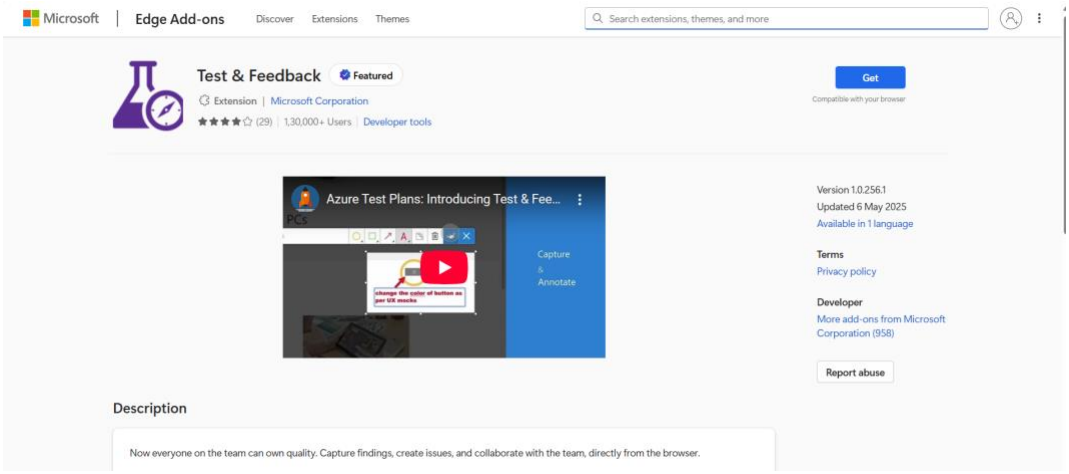
   Test Case TC16 – No Alert for Completed Rentals
   Type: Error Path
   Steps:

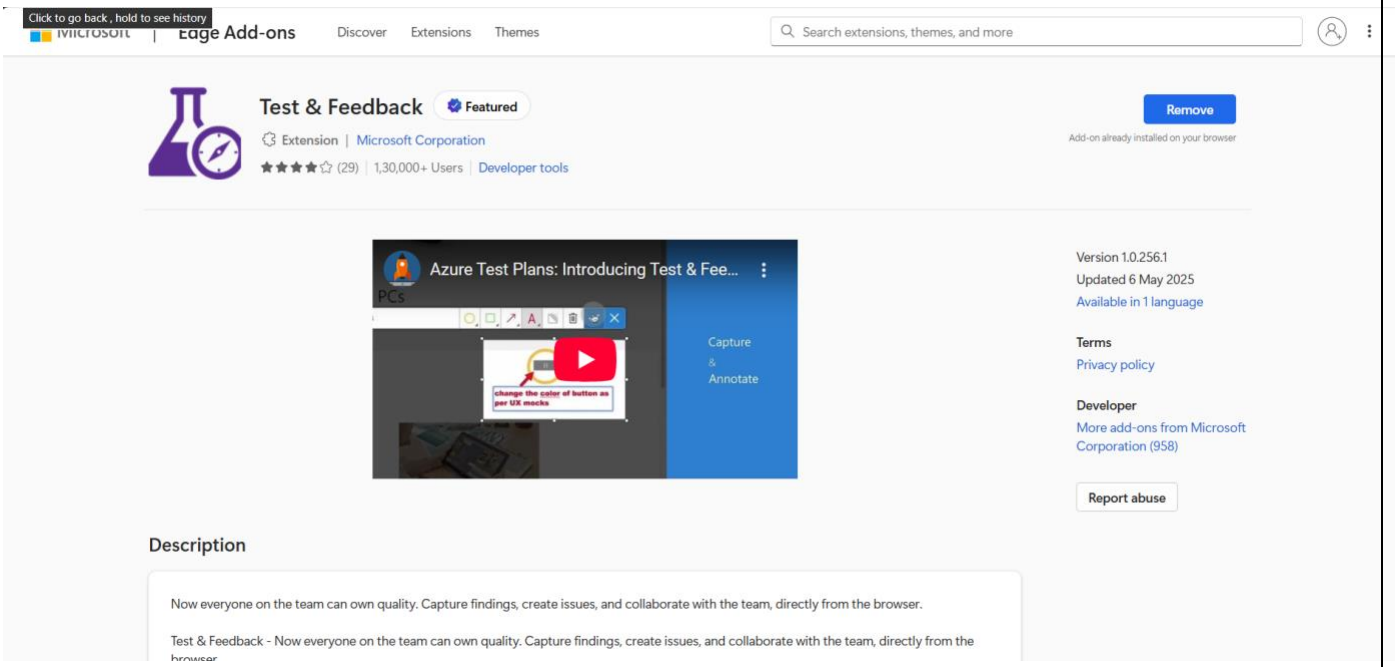
1. Log in after rental period has expired.
   Expected Result: No alert shown; status updated as “Completed.”

Test Cases

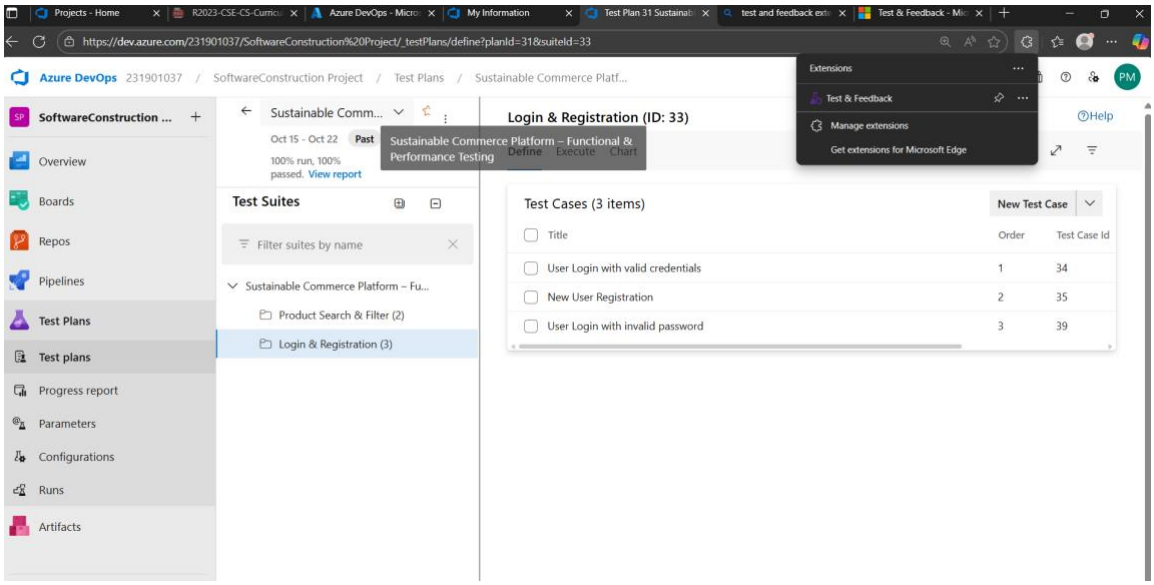


1. Installation of test

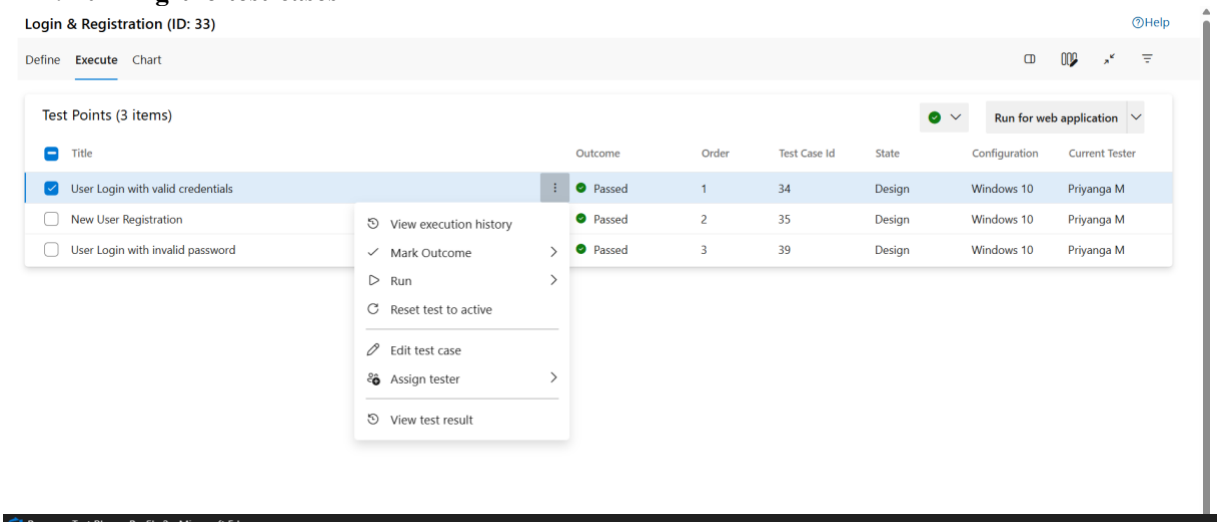


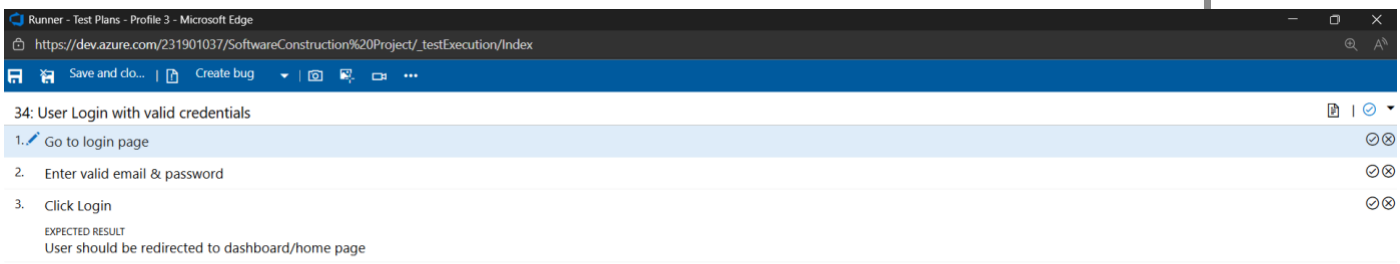


Test and feedback
Showing it as an extension

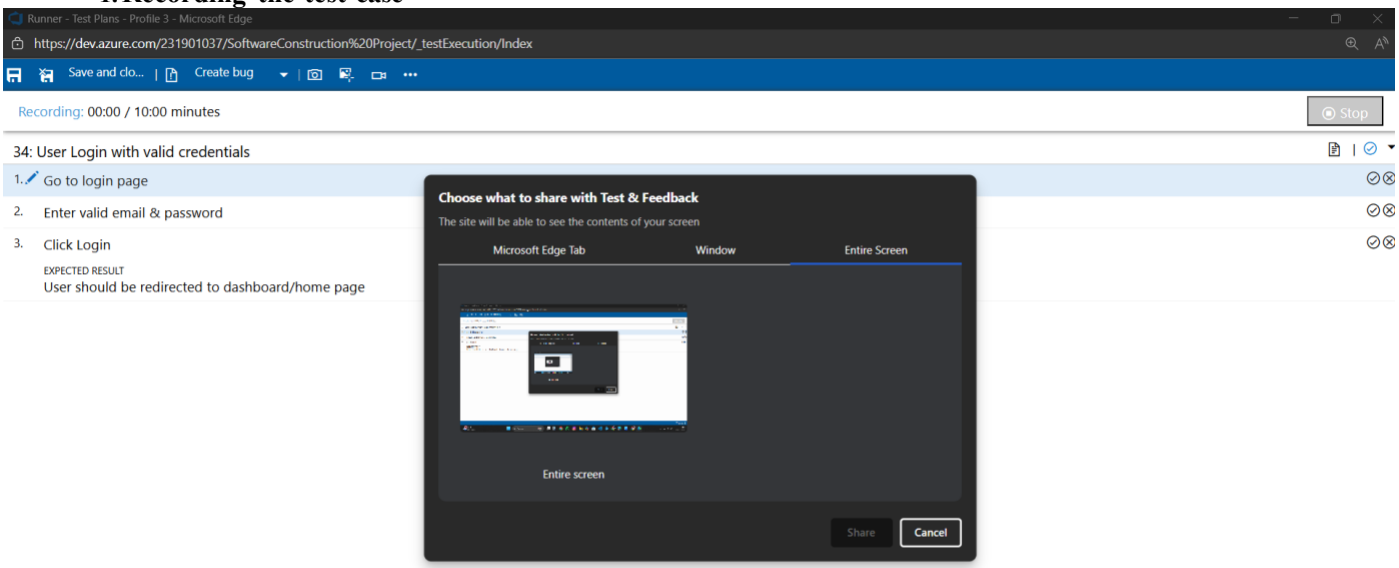


1. Running the test cases

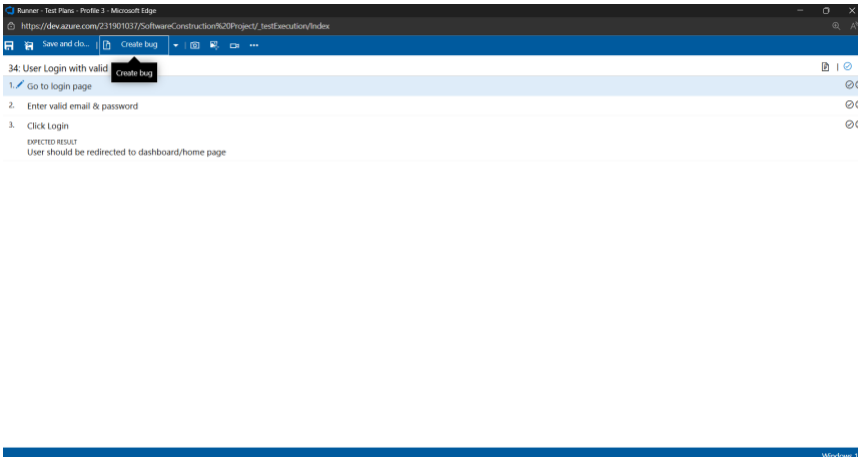




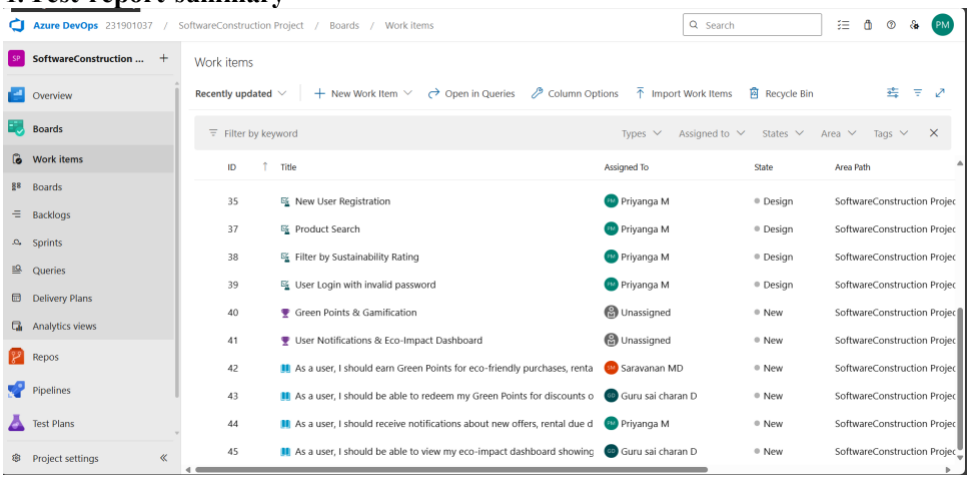
1. Recording the test case



2. Creating the bug

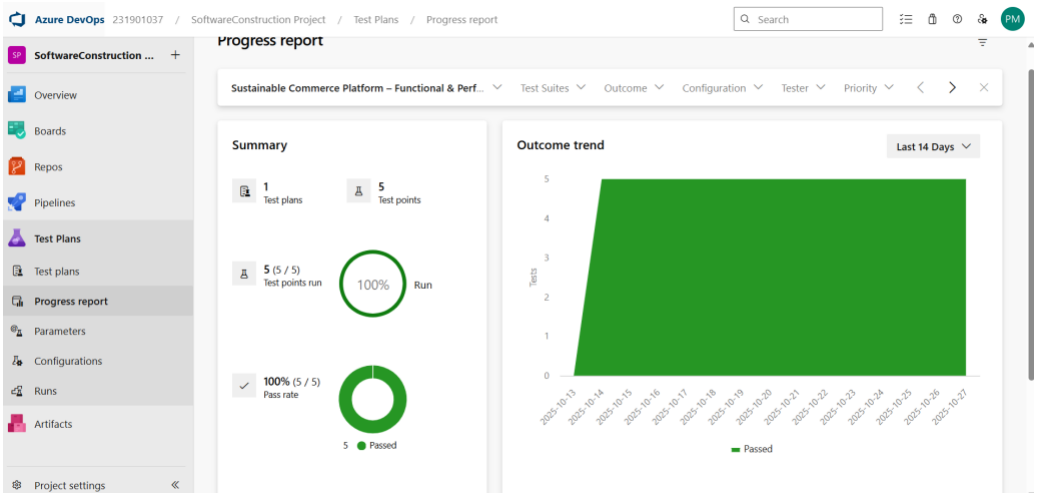


1. Test report summary

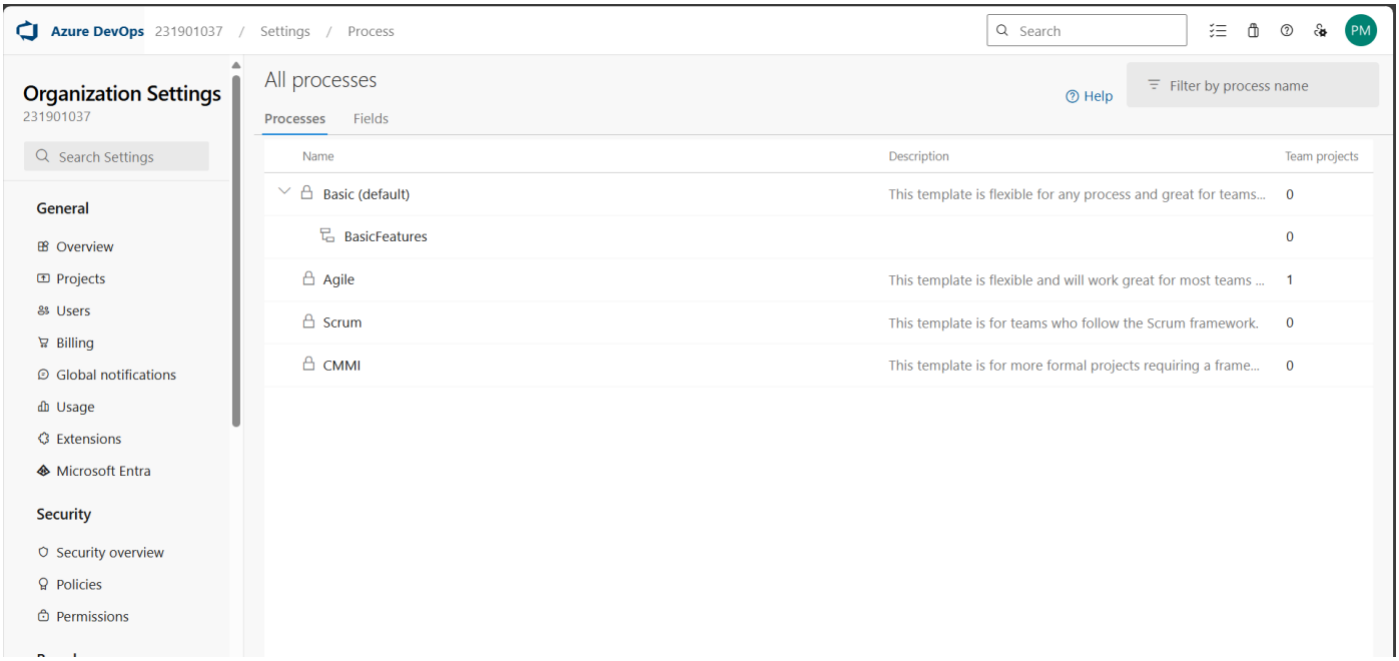


- Assigning bug to the developer and changing state

2. Progress report



1. Changing the test template



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 PIPELINES

Aim:

To create an Azure Load Testing resource and run a load test to evaluate the performance of a target endpoint and to create and demonstrate an Azure DevOps pipeline for automating application builds, tests, and deployment.

Load Testing

Azure Load Testing:
Azure Load Testing allows you to simulate high traffic and stress tests for your web applications and APIs to understand how they perform under load. It helps identify performance bottlenecks, scalability issues, and optimize resource usage before deployment.

Steps to Create an Azure Load Testing Resource:

Before you run your first test, you need to create the Azure Load Testing resource:

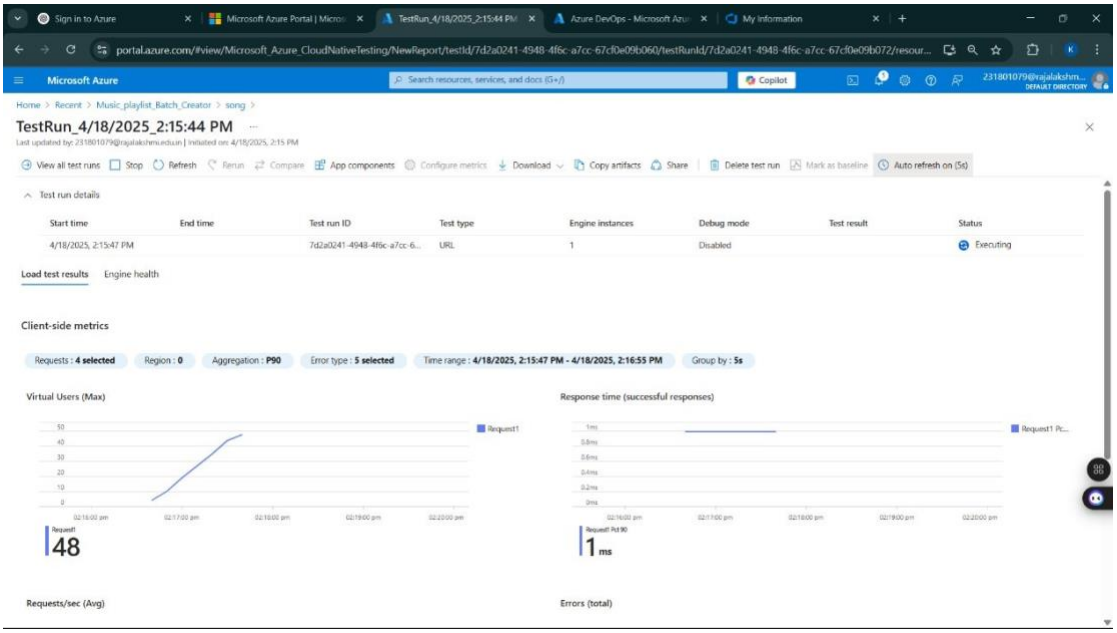
1. Sign in to Azure Portal
   Go to https://portal.azure.com and log in.
2. Create the Resource
   - Go to *Create a resource* → Search for "Azure Load Testing".
   - Select Azure Load Testing and click Create.
3. Fill in the Configuration Details
   - Subscription*:* Choose your Azure subscription.
   - *Resource Group:* Create new or select an existing one.
   - *Name:* Provide a unique name (no special characters).
   - *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.

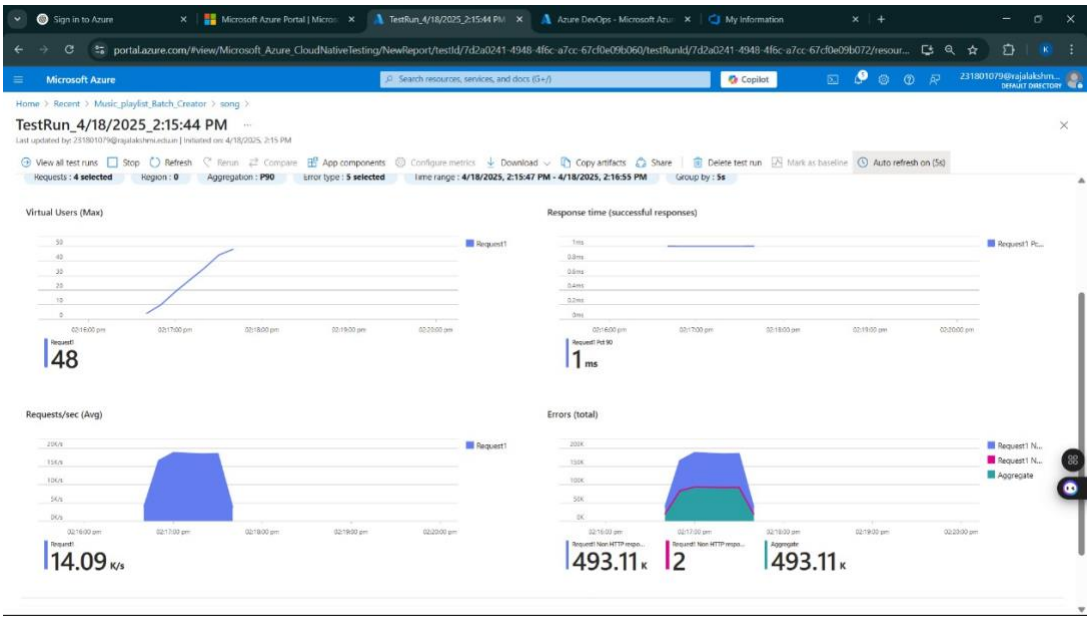
Steps to Create and Run a Load Test:

Once your resource is ready:

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

Load Testing





Pipelines

Description:

This experiment demonstrates how to connect a GitHub-hosted Flask-based music recommendation project with Azure DevOps. The pipeline will automatically install dependencies, run basic tests, and publish artifacts. This ensures that every commit triggers checks for reliability and smooth deployment.

Steps:

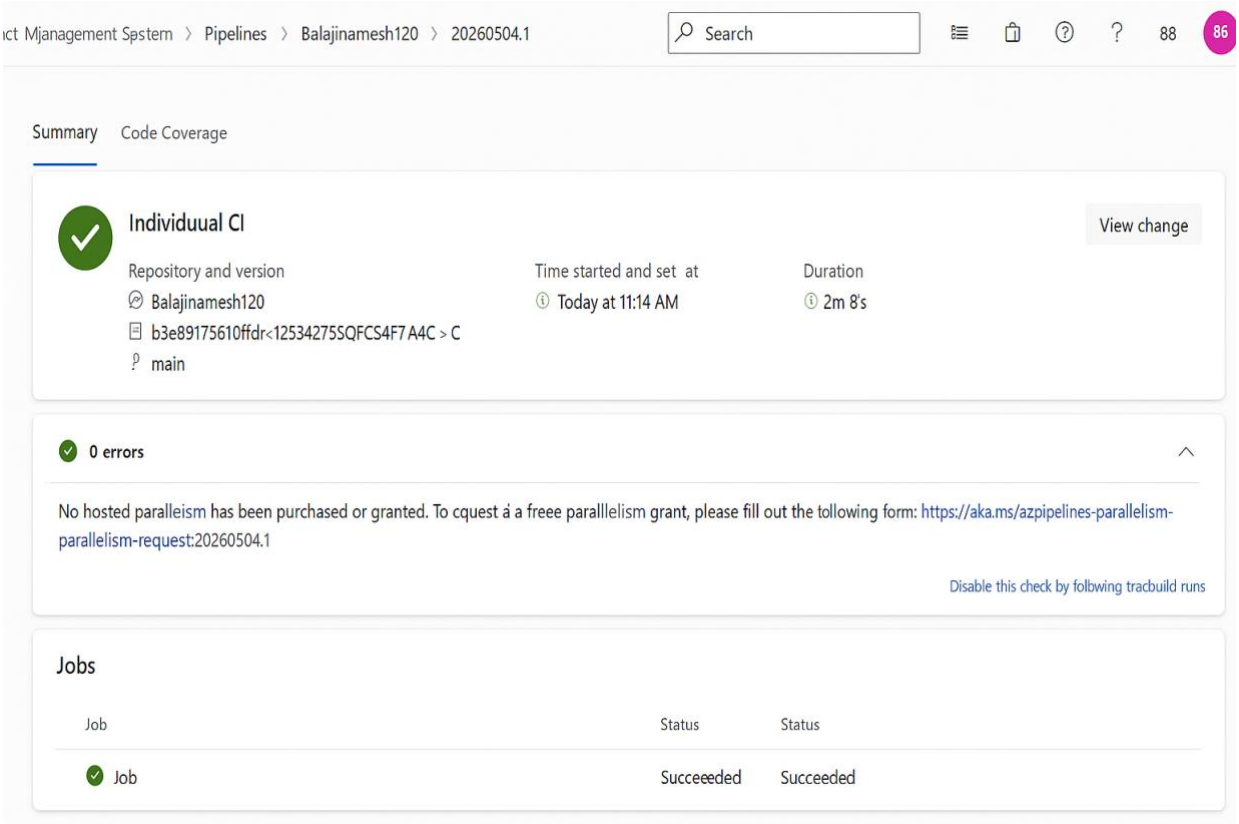
1. Connect GitHub to Azure DevOps:
   - In Azure DevOps, create a new project.
   - Create a pipeline and select GitHub as the source.
   - Authorize access to your GitHub repository, ensuring that Azure DevOps can pull the repository for your pipeline.
2. Create azure-pipelines.yml in Your Repo Root:
   - In your GitHub repository, create a new file called azure-pipelines.yml in the root directory.
   - Add the following basic pipeline configuration for Python and Flask:

yml Code

```
trigger:
  - main

pool:
  vmImage: 'ubuntu-latest'

steps:
- checkout: self

- script: echo "✅ Azure Pipeline for Contract Management System is running!"
                displayName: 'Run sample script'
```

3. Pipeline Tasks Include:
   - Setting up the Python environment using the UsePythonVersion task.
   - Installing project dependencies from project/requirements.txt. Make sure the path to requirements.txt is correct (it is located under the project folder).
   - Running a simple Python script to verify that Python is set up correctly and the pipeline works.
4. Run and Monitor Pipeline:
   - Commit changes to the main branch of your repository to trigger the pipeline in Azure DevOps.
   - Monitor the logs in the Azure DevOps portal to view logs, errors, or success messages and ensure everything runs smoothly.

Pipeline



Result:

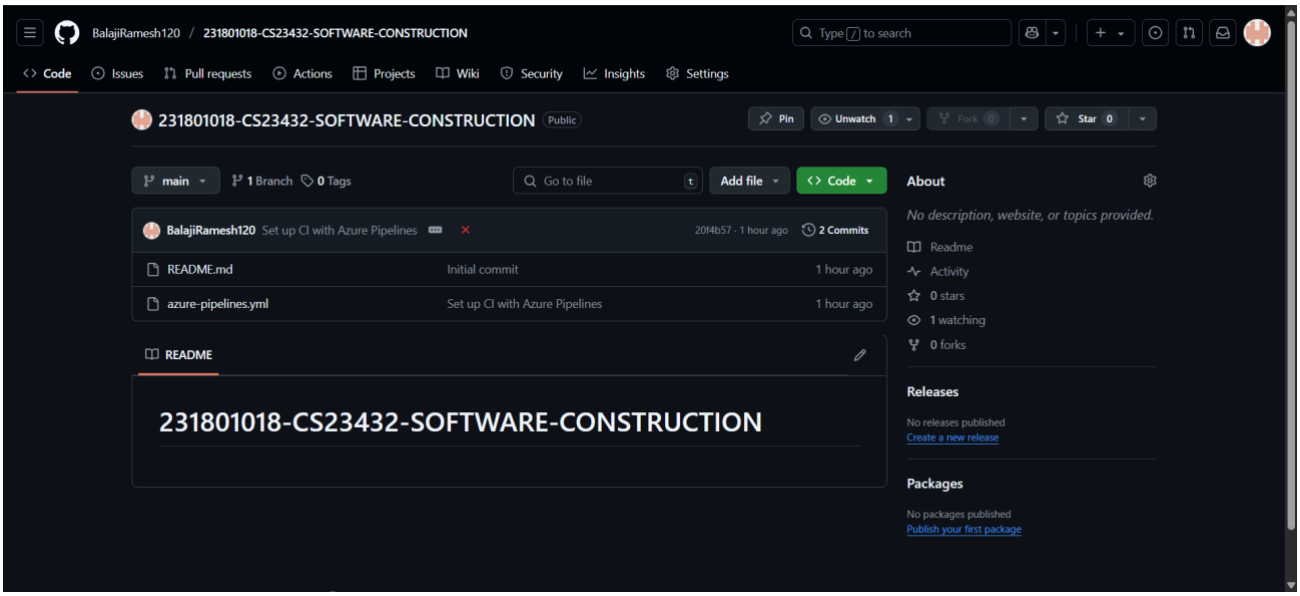
Successfully created the Azure Load Testing resource and executed a load test to assess the performance of the specified endpoint and also demonstrated pipelines in azure devops.

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 Contract Management System 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.