

# Database Project

## Student Activity Tracker

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**Course:** Database - CSA



Submission Date:

December 27, 2025



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# Chapter 1

## Introduction

### 1.1 Background Problem

In many schools and universities, student participation in extracurricular activities such as clubs, community service, competitions, or sports is still tracked manually. These are often recorded on paper-based lists or simple digital spreadsheets. This can lead to problems like incomplete records, lost data, and difficulty in monitoring each student's level of participation. Advisors also face challenges in managing large numbers of participants and verifying who joined or completed certain activities. To solve these problems, the Student Activity Tracker System is designed to provide a structured, database-based solution. The system will allow advisors to register activities, record student participation, while students can view available activities, status of applications and their personal activity history.

### 1.2 System Objectives

- Provide an easy way to record and manage student extracurricular activities
- Help advisors register activities and track student participation
- Allow students to view available activities and their own participation history
- Keep activity records accurate, complete, and easy to access
- Reduce mistakes and data loss from manual recording
- Recognize active students based on their verified participation



## 1.3 System Users

The system involves three primary user roles: Admins, Advisors and Students.

- **Admins:** Staff members responsible for managing extracurricular activities. They can create, update, and maintain activity records within the system. Advisors review and approve or reject student participation requests and record activity outcomes once an activity is completed. Acting as supervisors, they oversee multiple activities and ensure accurate reporting of student involvement.
- **Advisors:** Staff members responsible for managing extracurricular activities and students enrolled on it. They can accept or reject students application as their advisor for the particular activities
- **Students:** The primary participants in extracurricular activities. They can view available activities, apply to participate, and track the status of their applications. Students can also access their participation history and view achievements and activity results, enabling them to maintain a complete record of their extracurricular involvement during their studies.

## 1.4 Use Cases

**Admins:**

- Register activity
- Update activity information
- View participation requests
- Change participation request status (accepted/rejected)

**Students:**

- Accept or reject student activity applications

**Students:**

- View list of activities
- Apply for an activity
- Track application status
- View participation history



# Chapter 2

## Database Design

### 2.1 Entity Relationship Diagram (ERD)

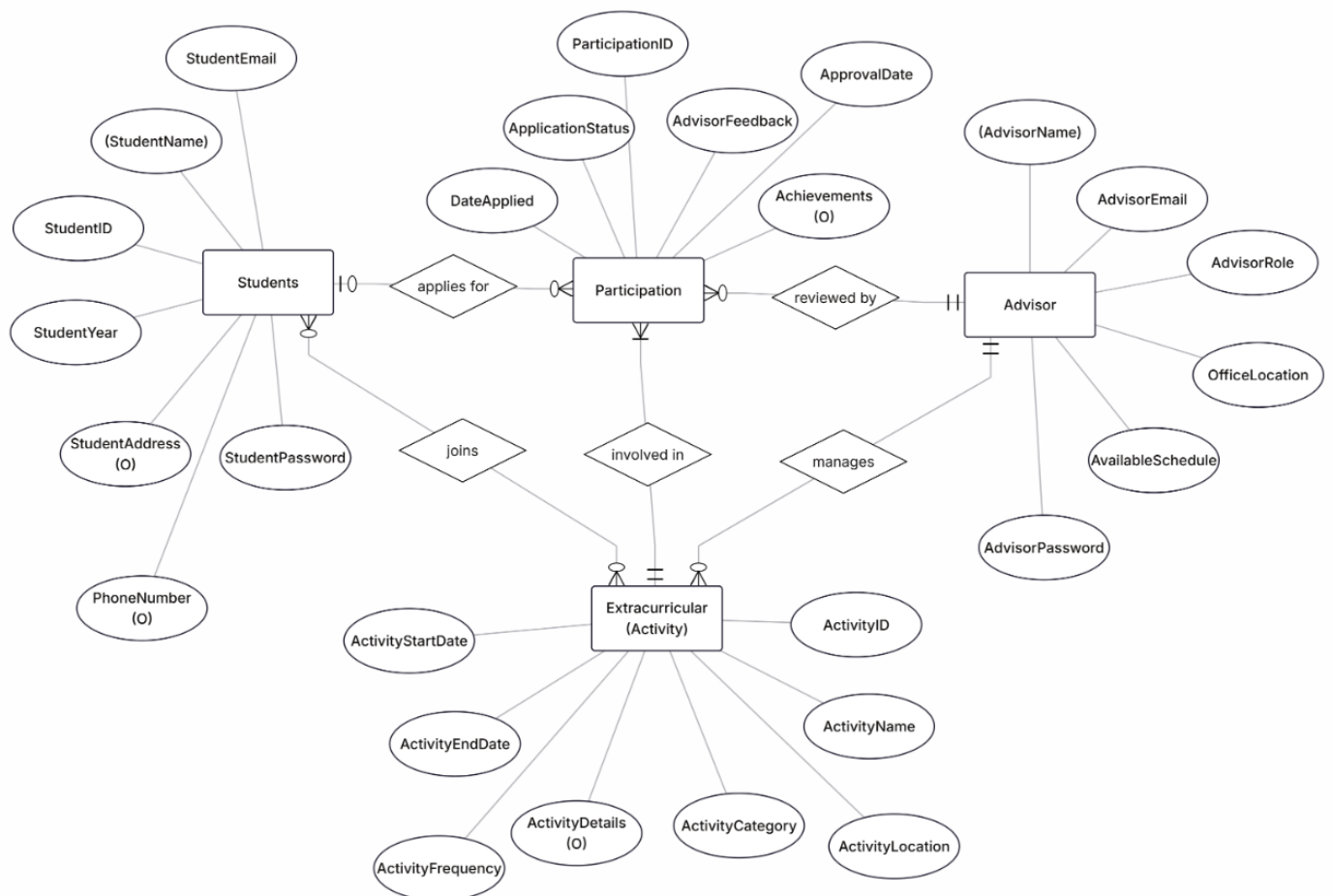


Figure 2.1: Entity Relationship Diagram



## 2.2 Entity Descriptions

### 2.2.1 Students Entity

The students entity represents individuals who can apply for and participate in extracurricular activities.

- **StudentID**: A unique identifier for each student
- **StudentName**: The full name of the student
- **StudentEmail**: The email address of the student
- **StudentYear**: The academic year of the student
- **StudentAddress**: The home address of the student (optional)
- **PhoneNumber**: The student's phone number (optional)
- **StudentPassword**: The password used by the student

### 2.2.2 Participation Entity

The participation entity represents the relationship between students and extracurricular activities, including application and approval details.

- **ParticipationID**: A unique identifier for each participation record
- **DateApplied**: The date when the student applied for the activity
- **ApplicationStatus**: The current status of the application
- **AdvisorFeedback**: Feedback provided by the advisor
- **ApprovalDate**: The date on which the application was approved
- **Achievements**: Achievements earned during participation (optional)

### 2.2.3 Advisor Entity

The advisor entity represents staff members who manage and review extracurricular activities.

- **AdvisorName**: The full name of the advisor
- **AdvisorEmail**: The email address of the advisor



- **AdvisorRole:** The role of the advisor
- **OfficeLocation:** The office location of the advisor
- **AvailableSchedule:** The advisor's working schedule
- **AdvisorPassword:** The password used by the advisor

## 2.2.4 Extracurricular Entity

The extracurricular entity represents activities that students can join.

- **ActivityID:** A unique identifier for each activity
- **ActivityName:** The name of the activity
- **ActivityCategory:** The category of the activity
- **ActivityLocation:** The location of the activity
- **ActivityFrequency:** When the activity takes place
- **ActivityStartDate:** The start date of the activity
- **ActivityEndDate:** The end date of the activity
- **ActivityDetails:** Additional details about the activity (optional)

## 2.3 Normalization Steps

### 2.3.1 Unnormalized Form (UNF)

At the beginning, all the information about students, advisors, extracurricular activities, and participation is stored in one large table. This causes a lot of repetition because the same student, advisor, or activity details may appear many times.

### 2.3.2 First Normal Form (1NF)

To convert the data into 1NF, each field is made so that it contains only one value. Repeating groups are removed, and the data is separated into different tables based on their entities, such as Students, Advisors, Extracurricular, and Participation.



### **2.3.3 Second Normal Form (2NF)**

A table becomes 2NF if all non-key attributes depend on the full primary key. In this database, each table uses a single-column primary key, so there are no partial dependencies. Thus, all tables meet the conditions of 2NF.

### **2.3.4 Third Normal Form (3NF)**

A table becomes 3NF if it doesn't contain transitive dependencies. Meaning that non-key attributes should not depend on other non-key attributes. In this design, all attributes depend directly on their unique identifier, such as StudentID, AdvisorID, ActivityID, or ParticipationID. Because there are no transitive dependencies, the database meets the conditions of 3NF.



# Chapter 3

## Database Implementation

### 3.1 Relational Schema

The relational schema defines the structure of the database tables, attributes, and how they are connected with primary and foreign keys

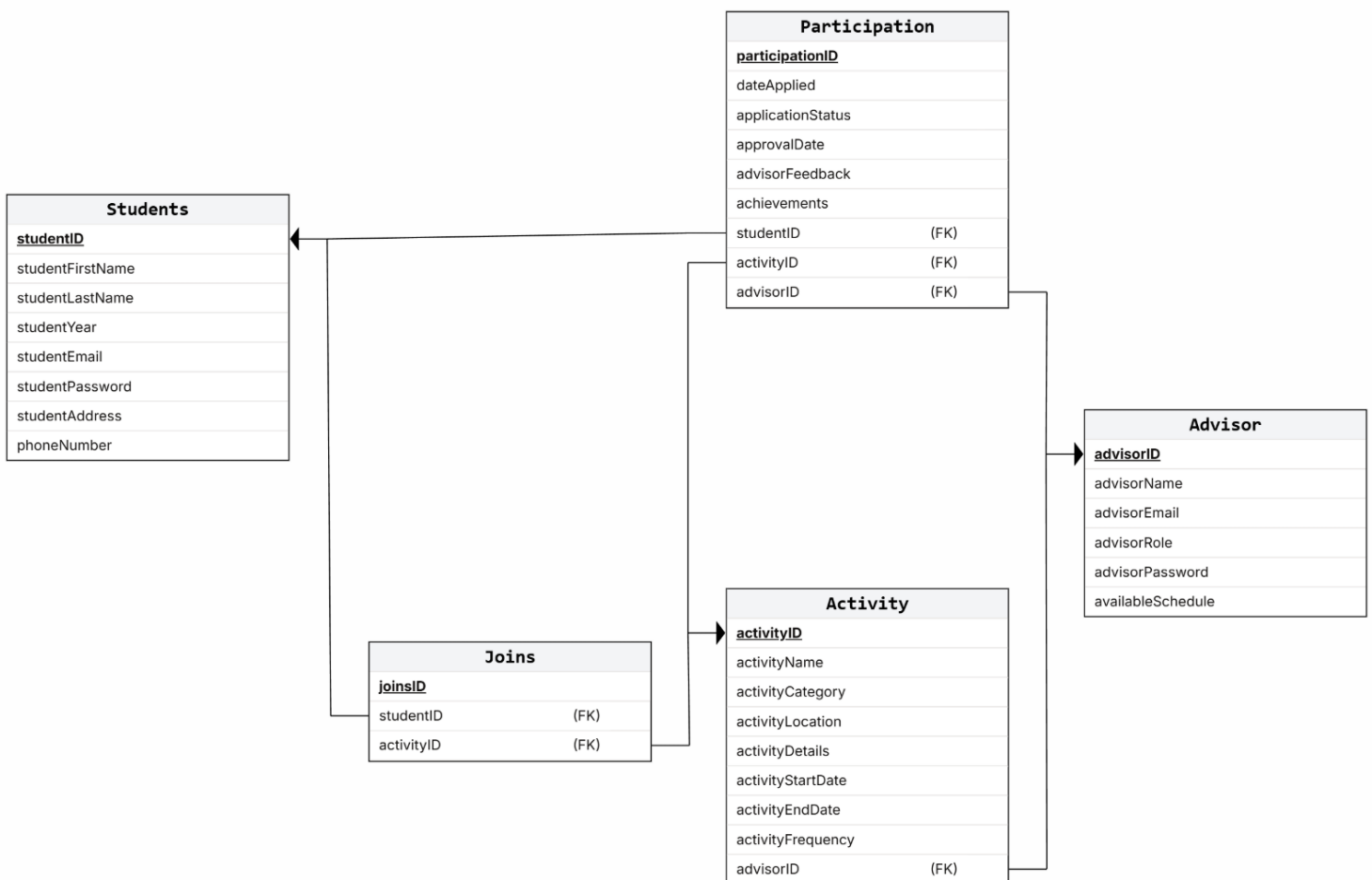


Figure 3.1: Entity Relationship Diagram



## 3.2 Key Constraints

### 3.2.1 Primary Key Constraints

Primary keys are used to uniquely identify each record in a table.

- studentID is the primary key of the STUDENTS table
- advisorID is the primary key of the ADVISOR table
- activityID is the primary key of the ACTIVITY table
- participationID is the primary key of the PARTICIPATION table
- joinsID is the primary key of the JOINS table

### 3.2.2 Foreign Key Constraints

Foreign keys are used to connect tables and maintain relationships between them.

- PARTICIPATION.studentID references STUDENTS(studentID)
- PARTICIPATION.activityID references ACTIVITY(activityID)
- PARTICIPATION.advisorID references ADVISOR(advisorID)
- ACTIVITY.advisorID references ADVISOR(advisorID)
- JOINS.studentID references STUDENTS(studentID)
- JOINS.activityID references ACTIVITY(activityID)

## 3.3 Example SQL Statements

### Advisor Table

```
CREATE TABLE advisor (  
  advisorID INT(11) NOT NULL AUTO_INCREMENT,  
  advisorName VARCHAR(20),  
  advisorEmail VARCHAR(25),  
  advisorRole VARCHAR(15),  
  advisorPassword VARCHAR(15),  
  availableSchedule VARCHAR(100),  
  PRIMARY KEY (advisorID)  
);
```



## Students Table

```
CREATE TABLE students (  
  studentID INT(11) NOT NULL AUTO_INCREMENT,  
  studentFirstName VARCHAR(15),  
  studentLastName VARCHAR(15),  
  studentYear INT(11),  
  studentEmail VARCHAR(25),  
  studentPassword VARCHAR(15),  
  studentAddress VARCHAR(255),  
  phoneNumber INT(11),  
  PRIMARY KEY (studentID)  
);
```

## Activity Table

```
CREATE TABLE activity (  
  activityID INT(11) NOT NULL AUTO_INCREMENT,  
  activityName VARCHAR(30),  
  activityCategory VARCHAR(20),  
  activityLocation VARCHAR(50),  
  activityDetails TEXT,  
  activityStartDate DATE,  
  activityEndDate DATE,  
  activityFrequency VARCHAR(20),  
  advisorID INT(11),  
  PRIMARY KEY (activityID),  
  FOREIGN KEY (advisorID) REFERENCES advisor(advisorID)  
);
```

## Joins Table

```
CREATE TABLE joins (  
  joinsID INT(11) NOT NULL AUTO_INCREMENT,  
  studentID INT(11),  
  activityID INT(11),  
  PRIMARY KEY (joinsID),  
  FOREIGN KEY (studentID) REFERENCES students(studentID),  
  FOREIGN KEY (activityID) REFERENCES activity(activityID)  
);
```



## Participation Table

```
CREATE TABLE participation (  
  participationID INT(11) NOT NULL AUTO_INCREMENT,  
  dateApplied DATE,  
  applicationStatus VARCHAR(20),  
  approvalDate DATE,  
  advisorFeedback TEXT,  
  achievements TEXT,  
  studentID INT(11),  
  activityID INT(11),  
  advisorID INT(11),  
  PRIMARY KEY (participationID),  
  FOREIGN KEY (studentID) REFERENCES students(studentID),  
  FOREIGN KEY (activityID) REFERENCES activity(activityID),  
  FOREIGN KEY (advisorID) REFERENCES advisor(advisorID)  
);
```



# Chapter 4

## Application Implementation

### 4.1 System Overview

The Student Activity Tracker is implemented as a web-based application using the Flask framework in Python. The system follows a modular architecture where each functionality is separated into different components such as authentication, database models, views, and application programming interfaces (API).

The application uses SQLAlchemy as an Object Relational Mapping (ORM) tool to interact with a SQLite database. User authentication and session management are handled using Flask-Login, while a RESTful API secured with JSON Web Token (JWT) is provided for external access.

### 4.2 Application Architecture

The system follows an MVC-style architecture:

- **Models:** Define database tables using SQLAlchemy ORM.
- **Views:** Handle routing, user interaction, and rendering templates.
- **Controllers:** Business logic implemented through Flask Blueprints.

### 4.3 Main Modules

#### 4.3.1 Authentication Module

The authentication module supports student and advisor login. Advisors require approval from an administrator before accessing the system. Passwords are stored securely using hashing. The module also supports advisor registration and logout functionality.



### 4.3.2 Student Module

Students can view available activities, search activities by name, category, or location, apply for participation, view application status, and manage their personal profile. Students can also view their activity history through a filtered search.

### 4.3.3 Advisor Module

Advisors can access a dashboard showing participation requests assigned to them. They can approve, reject, update feedback, or delete participation requests. Advisors can also update their personal profile.

### 4.3.4 Admin Module

The admin module provides full management of students, advisors, activities, and participation records. Admins can approve advisor accounts, assign admin privileges, and perform complete CRUD operations.

### 4.3.5 REST API Module

The system includes a RESTful API secured using JWT. The API supports login, student management, activity management, participation management, and activity search, allowing integration with external applications.

## 4.4 Application Screenshots

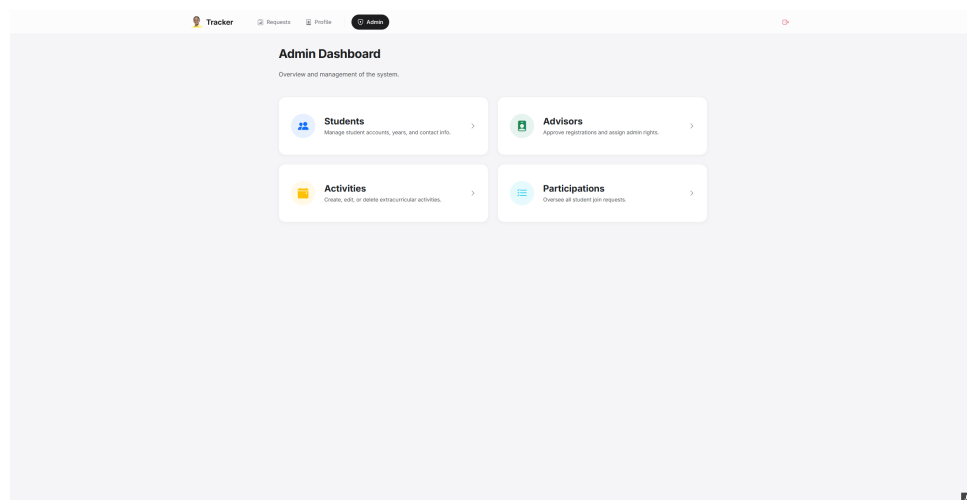


Figure 4.1: Student Dashboard Interface




## Available Activities

Explore and join activities for this semester.

ACTIVITY NAME	CATEGORY	LOCATION	SCHEDULE	ADVISOR	ACTION
<b>REPO</b> ID: #1	gimang	your own pc	everynight 2025-11-02 — 2025-11-30	-	<a href="#">Request</a>
<b>Tracking dieng</b> ID: #2	Sports	Bukit Dieng	2025-11-27 — 2025-11-28	-	<a href="#">Request</a>
<b>Tennis</b> ID: #3	Sports	Arari	Weekly 2025-12-01 — None	-	<a href="#">Request</a>
<b>Makrab Baik</b> ID: #4	aktivitas	villa kailurang	None — None	-	<a href="#">Request</a>
<b>Ice Skating</b> ID: #5	Sports	Sleman City Hall	2025-12-31 — 2025-11-28	-	<a href="#">Request</a>
<b>Billiard</b> ID: #6	Sports	Jogja Billiard	Weekly None — None	-	<a href="#">Request</a>
<b>Bowling</b> ID: #7	Sports	Ground Zero	Weekly None — None	-	<a href="#">Request</a>
<b>Renang</b> ID: #8	Sports	FIK UNY	Monthly None — None	-	<a href="#">Request</a>
<b>Mini Soccer</b> ID: #9	Sports	HK 99	None — None	-	<a href="#">Request</a>

Figure 4.2: Available Activities Page



## Edit Profile

Update your personal details and account security.

### Personal Information

First Name

Last Name

Email Address

Phone Number

Current Year

Address

Figure 4.3: Edit Profile Page



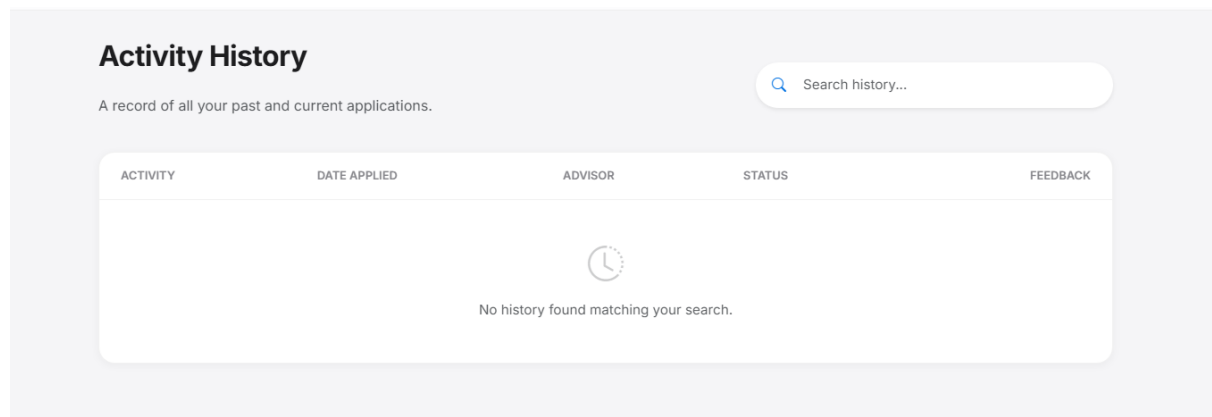


Figure 4.4: Activity History Page



# Chapter 5

## Testing and Results

### 5.1 Testing Methodology

The system was tested using functional testing by simulating real user actions for each role. Testing was performed for students, advisors, and administrators to ensure that access control, data processing, and database operations worked correctly.

Both web-based interactions and REST API endpoints were tested using sample data.

### 5.2 Sample Queries and Operations

The following database operations were tested through the application:

- Student registration and login
- Advisor registration and admin approval
- Creating, updating, and deleting activities
- Submitting participation requests
- Approving and rejecting participation requests
- Searching activities by keywords
- Viewing participation history

### 5.3 Results and Screenshots

All tested features functioned correctly. The system successfully enforced role-based access control and maintained data consistency through foreign key constraints.



STUDENT	ACTIVITY	CURRENT STATUS	ACTIONS / FEEDBACK
<b>bawah ill</b> ID: 3	Ethanol Mixing Fraud	Approved	Approve go for it
<b>mawang bejir</b> ID: 21	REPO ginang	Pending	Add feedback...
<b>mawang bejir</b> ID: 21	Tennis Sports	Approved	Add feedback...

Figure 5.1: Participation and Activity Data Displayed

## Request Participation

Applying for **REPO**

Select an Advisor

ATMIN

AVAILABLE SCHEDULE  
Everyday after lunch

Submit Request

Cancel

Figure 5.2: Request to join an activity

### Activity History

A record of all your past and current applications.

ACTIVITY	DATE APPLIED	ADVISOR	STATUS	FEEDBACK
<b>REPO</b> Ref: #4	2025-12-27	ATMIN	Pending	-
<b>Bowling</b> Ref: #5	2025-12-27	Ezra Hesperos Maskam	Pending	-

Figure 5.3: History record data from student POV



## 5.4 Discussion of Results

The testing results show that the application correctly implements the designed database structure. Data integrity is preserved, and user actions result in appropriate database updates. The use of ORM reduces query errors and improves maintainability.



# Chapter 6

## Conclusion and Reflection

### 6.1 Conclusion

The Student Activity Tracker system successfully implements a complete database-driven web application. The system supports multiple user roles, structured activity management, and a clear participation workflow. Core database concepts such as normalization, primary keys, foreign keys, and relational integrity are applied effectively.

### 6.2 Challenges Faced

Several challenges were encountered during development:

- Implementing role-based access control
- Managing approval workflows for advisors and students
- Ensuring secure authentication and authorization
- Designing scalable database relationships

### 6.3 Future Improvements

Possible future enhancements include:

- Adding activity attendance tracking
- Implementing reporting and analytics features
- Enhancing API security and permissions
- Developing a mobile application using the REST API