

STUDENT ACHIEVEMENT MANAGEMENT SYSTEM

Problem Statement:

The project aims to address the challenge of tracking student achievement in extracurricular activities such as workshops, technical events, and competitions. By developing a comprehensive student achievement tracking system, educational institutions can identify high-performing students, encourage healthy competition, and make data-driven decisions for academic planning and student support initiatives.

Explanation with respect to data:

1. Workshops Participation:

The system will record student participation in various workshops conducted by the institution. Data may include workshop titles, dates, duration, and student attendance.

2. Technical Events:

It will track student involvement in technical events, including hackathons, coding competitions, or engineering exhibitions. Data points may include event names, participation levels (individual or team), rankings, and awards received.

3. Competitions:

The system will monitor students' participation and performance in academic competitions, such as science fairs, math Olympiads, or robotics competitions. Data may include competition names, student teams, scores, and placements.

How it would help users when implemented:

1. Individual Student Progress:

Teachers and advisors can monitor students' extracurricular participation and achievements over time. This holistic view of student activities can provide insights into their interests, strengths, and areas for improvement.

2. Identifying High-performing Students:

The system enables the identification of high-performing students based on their achievements in workshops, events, and competitions. This recognition can motivate students and provide opportunities for further development.

3. Encouraging Healthy Competition:

By tracking participation and performance, the system fosters healthy competition among students, encouraging them to actively engage in extracurricular activities and strive for excellence.

4. Data-driven Decisions:

Administrators and academic planners can use the system's data to make informed decisions regarding resource allocation, curriculum development, and student support initiatives. Insights derived from student achievement data can guide interventions to support underperforming students or enhance enrichment opportunities for high achievers.

Objective:

1. Centralized Achievement Repository:

Provide a Centralized Platform: Establish a single hub for recording, accessing, and managing student achievements.

Ensure Accessibility: Make student achievements easily accessible to teachers, students, and administrators.

2. Role-Based Access Control:

Define User Roles: Implement distinct roles for admins, teachers, and students, each with specific privileges and responsibilities.

Secure Data: Ensure that users can only access and modify data appropriate to their role.

3. Enhanced User Experience:

Responsive Design: Develop a user-friendly and responsive interface that works seamlessly across various devices and screen sizes.

Interactive Features: Leverage HTML, CSS, and JavaScript to provide a dynamic and engaging user experience.

4. Efficient Data Management:

Utilize Reliable Technologies: Employ MySQL for robust and scalable data storage and management.

Ensure Data Integrity: Maintain the accuracy and consistency of student records and achievements.

5.Streamlined Processes:

Simplify Recording and Accessing Achievements: Enable teachers to easily record and update student accomplishments.

Facilitate Administrative Tasks: Provide tools for administrators to manage users, create announcements, and oversee system activities.

6.Foster Communication and Transparency:

Enhance Communication: Improve interaction and information sharing between teachers, students, and administrators.

Increase Transparency: Make student achievements visible to all stakeholders, fostering an environment of openness and accountability.

7. Motivation and Recognition:

Inspire Students: Allow students to view their peers' achievements, encouraging a healthy sense of competition and motivation.

Recognize Achievements: Provide a platform for students to be acknowledged and celebrated for their accomplishments.

Proposed Solution :

The Student Achievement Management System (SAMS) proposes a comprehensive web application designed to streamline the management and recognition of student achievements within educational institutions. The solution includes the following key components and features:

1. Centralized Platform :

- A web-based application that acts as a central repository for all student achievements.
- Accessible to administrators, teachers, and students through role-based access control.

2. User Authentication and Role-Based Access Control :

- Secure login and registration system for all users.

- Distinct user roles (Admin, Teacher, Student) with specific privileges and responsibilities.
- Admins can add new users, manage user roles, and oversee the system.

3. Responsive and Interactive User Interface :

- Utilizes HTML5, CSS3, JavaScript, and Bootstrap for a responsive and engaging user experience.
- Ensures compatibility across various devices and screen sizes.

4. Admin Dashboard :

- Admin-specific functionalities to manage users, create announcements, and view system statistics.
- Tools for overseeing system activities and ensuring smooth operation.

5. Teacher Dashboard :

- Teacher-specific functionalities to view and manage student achievements within their assigned classes.
- Tools for adding, editing, and deleting student records and achievements.

6. Student Dashboard :

- Student-specific functionalities to view their own achievements and those of their classmates.
- Option to edit personal information, fostering a sense of ownership and engagement.

7. Achievement Management :

- Central module for recording, editing, and displaying student achievements.
- Allows teachers to manage achievements and students to view them.

8. Database Management :

- MySQL database integrated with the XAMPP stack for efficient data storage and management.
- Ensures data integrity, reliability, and scalability.

Benefits of the Proposed Solution:

1. Streamlined Achievement Management :

- Centralizes the recording and management of student achievements, reducing administrative overhead.
- Simplifies the process for teachers and administrators to keep track of student accomplishments.

2. Enhanced Communication and Transparency :

- Improves communication between teachers, students, and administrators through a unified platform.
- Increases transparency by making achievements visible to all stakeholders, fostering an environment of trust.

3. User-Friendly and Responsive Design :

- Provides a consistent and intuitive user experience across various devices.
- Enhances engagement with interactive features and a responsive layout.

4. Motivation and Recognition :

- Encourages students by showcasing their achievements and those of their peers.
- Fosters a sense of motivation and pride, which can lead to improved academic performance.

5. Efficient Data Management :

- Ensures data integrity and security through a robust MySQL database.
- Facilitates easy retrieval and management of user and achievement data.

6. Role-Based Access Control :

- Ensures that users have access only to the functionalities and data relevant to their role.
- Enhances security and prevents unauthorized access to sensitive information.

7. Administrative Efficiency :

- Provides admins with tools to efficiently manage users and system activities.
- Reduces the time and effort required for administrative tasks, allowing more focus on strategic initiatives.

8. Scalability and Flexibility :

- Designed to accommodate the needs of different educational institutions, regardless of size.
- Scalable architecture allows for future growth and addition of new features as needed.

Business Need of the project

The Current Process:

Manual Process:

In many educational institutions, the process of managing student achievements is still largely manual. Here's how it typically works:

- **Data Collection:**

Teachers manually record student achievements, such as grades, attendance, participation in extracurricular activities, and awards.

- **Record Keeping:**

This data is often kept in physical files or spreadsheets, which can be prone to errors, loss, and mismanagement.

- **Analysis and Reporting:**

Administrators manually compile reports and analyze data to understand student performance and achievements. This can be time-consuming and labor-intensive.

- **Communication:**

Information about student achievements is communicated to parents, students, and other stakeholders through physical report cards, emails, or parent-teacher meetings.

Automated Process (Existing Systems):

In institutions with some level of automation:

- **Digital Records:**

Achievements are recorded in digital systems, such as Learning Management Systems (LMS) or Student Information Systems (SIS).

- **Basic Analytics:**

These systems offer basic analytics and reporting features but may lack advanced data integration and real-time insights.

- **Limited Integration:**

Existing systems might not be fully integrated, causing data silos and inefficiencies in information flow.

Personas and Usage:

1. Students:

- Current Process: Students receive feedback on their achievements through report cards, verbal feedback, and occasional meetings.
- Challenges: Delayed feedback, lack of comprehensive view of their progress, and limited access to personal achievement data.
- Desired State: Real-time access to their achievements, personalized feedback, and a clear understanding of their strengths and areas for improvement.

2. Teachers:

- Current Process: Teachers spend considerable time on administrative tasks, recording achievements manually or on disparate systems.
- Challenges: High administrative workload, risk of errors, difficulty in tracking individual student progress over time.
- Desired State: Streamlined process for recording achievements, tools for detailed analysis of student performance, and efficient communication with students and parents.

3. Parents:

- Current Process: Parents receive information through report cards, emails, or parent-teacher meetings.
- Challenges: Limited and delayed access to their child's performance data, lack of real-time insights.
- Desired State: Continuous access to their child's achievement data, timely notifications of progress or issues, and tools for supporting their child's educational journey.

4. Administrators:

- Current Process: Administrators compile data manually or from different systems to generate reports and insights.
- Challenges: Time-consuming data collection and reporting, fragmented data sources, difficulty in making data-driven decisions.
- Desired State: Integrated system providing comprehensive data, advanced analytics for informed decision-making, and streamlined reporting processes.

3. Business Problems

1. Inefficient Achievement Recording and Management :

- **Manual Processes :** Many institutions rely on paper-based or disparate digital systems to record student achievements, leading to inefficiencies and data inconsistencies.
- **Data Duplication and Loss :** The lack of a centralized system increases the risk of data duplication, loss, and errors in recording student achievements.

2. Lack of Centralized Data Repository :

- **Scattered Information :** Student achievement data is often scattered across different platforms and formats, making it difficult to access and manage comprehensively.
- **Difficulty in Data Retrieval :** Administrators and teachers face challenges in retrieving and analyzing student performance data due to the lack of a centralized repository.

3. Limited Access Control and Security :

- **Inadequate Role-Based Access :** Existing systems may not have robust role-based access control, leading to potential security breaches and unauthorized access to sensitive information.
- **Data Security Concerns :** Ensuring the security and privacy of student data is critical, and many institutions struggle with securing their data against unauthorized access and cyber threats.

4. Poor Communication and Collaboration :

- **Disjointed Communication Channels :** Communication between teachers, students, and administrators is often fragmented, leading to misunderstandings and delayed information sharing.
- **Lack of Transparency :** The absence of a transparent system for tracking and displaying student achievements can lead to mistrust and dissatisfaction among students and parents.

5. Limited Student Motivation and Engagement :

- **Recognition Deficit** : Without a system to showcase and recognize student achievements, students may feel undervalued and less motivated to excel.
- **Peer Inspiration** : Students lack opportunities to be inspired by their peers' achievements, which can drive healthy competition and motivation.

Addressing These Problems with SAMS :

By addressing these business problems, SAMS provides several strategic advantages:

Streamlined Processes : Automates and streamlines the recording, management, and retrieval of student achievements, reducing administrative overhead and errors.

Enhanced Security : Implements robust role-based access control and data security measures to protect sensitive information.

Improved Communication : Facilitates better communication and transparency between teachers, students, and administrators, promoting collaboration and trust

Increased Motivation : Provides a platform for recognizing and showcasing student achievements, boosting student motivation and engagement

Administrative Efficiency : Reduces the time and effort required for administrative tasks, allowing administrators to focus on strategic goals.

Data Consistency : Ensures data integrity and consistency across the institution, supporting better decision-making and educational outcomes

Scalable Architecture: Designed to be scalable, allowing the system to grow and adapt to the institution's evolving needs

USER STORIES OF STUDENT ACHIEVEMENT MANAGEMENT SYSTEM:

- As a student, I want to view my achievement dashboard so that see an overview of my accomplishments and progress
- As a student, I want to receive notifications when I earn a new achievement or badge so that I am aware of my progress.
- As an administrator, I want to create, update, and manage student profiles so that I can maintain accurate records of students participating in workshops and competitions.
- As a Teacher, I want to track student participation in various workshops and events so that I can monitor their extracurricular involvement and achievements.
- As an Administrator, I want to view the teacher and student list so that i can get details about them.
- As an administrator, I want to create, update, and manage Teacher profiles so that I can maintain accurate records of teachers handling the students.
- As a student, I want to view a dashboard of my participation and achievements so that I can track my progress and accomplishments over time
- As a student, I can upload my participation and achievements as photos so that I can track my progress and accomplishments over time.

- As a faculty member, I want to record student achievements and awards in workshops and competitions so that we can get to know about student various achievements
- As a faculty member, I want to record students from various classes and departments so that we can compare the achievements between different classes and department

POKER PLANNING ESTIMATES:

USER AUTHENTICATION AND AUTHORIZATION:

Task: Implement user login, roles, and permissions.

Estimate: 8 points

STUDENT PROFILE MANAGEMENT:

Task: Create, update, and view student profiles.

Estimate: 5 points

TEACHER PROFILE MANAGEMENT:

Task: Create, update, and view teacher profiles.

Estimate: 5 point

DASHBOARD:

Task: Develop a dashboard for students and faculty to view number of faculty and students list

Estimate: 8 point

UPLOAD PARTICIPATION:

Task : Develop functionality for student to upload photos.

Estimate: 5 point

RECORD STUDENT ACHIEVEMENT

Task : Develop functionality for faculty to record student achievements.

Estimate: 5 point

PARTICIPATION DASHBOARD

Task : Develop functionality for faculty to record student achievements

Estimate: 6 points

STUDENTS RECORD

Task : Develop functionality to manage student class and department information.

Estimate: 4 points

Non-Functional Requirements for the Student Achievement Management System (SAMS)

1. Performance:

Response Time: The system should respond to user actions within 2 seconds for 95% of requests.

Throughput: The system should support at least 100 concurrent users without performance degradation.

Data Processing: Batch processes for data updates should complete within 5 minutes.

2. Scalability:

Horizontal Scalability: The system should support the addition of more servers to handle increased load without significant changes to the application.

Vertical Scalability: The system should support upgrading hardware (CPU, memory) to improve performance.

3. Reliability:

Uptime: The system should have an uptime of 99.9%, allowing a maximum of 8.76 hours of downtime per year.

Fault Tolerance: The system should be able to handle server failures without losing data or significant downtime by using backup servers and data redundancy.

4.Security:

Authentication and Authorization: Role-based access control must be implemented to ensure only authorized users can access specific features.

Data Encryption: Sensitive data must be encrypted both in transit (using TLS/SSL) and at rest.

Data Privacy: Ensure compliance with data protection regulations (e.g., GDPR, FERPA) to safeguard student information.

5.Maintainability:

Modular Design: The system should be designed in a modular way, allowing for easy updates and maintenance of individual components without affecting the entire system.

Code Documentation: All code should be well-documented to facilitate easier understanding and maintenance by developers.

Automated Testing: Implement automated testing (unit, integration, and regression tests) to ensure the system remains reliable and maintainable.

6.Usability:

User Interface: The interface should be intuitive and user-friendly, ensuring ease of use for all user roles (admins, teachers, students).

Accessibility: The system should comply with accessibility standards (e.g., WCAG 2.1) to ensure it is usable by people with disabilities.

Business Architecture Diagram for the Student

A business architecture diagram is a crucial component in the planning and execution of a project like the Student Achievement Management System (SAMS). The primary reasons why a business architecture diagram is essential for SAMS:

1. Visualizing System Structure and Relationships:

Clear Representation: It provides a clear, visual representation of the system's components and their interrelationships, making it easier for stakeholders to understand the overall architecture

Stakeholder Communication: Enhances communication among stakeholders, including developers, administrators, teachers, and students, by providing a common visual language.

2. Identifying Key Components and Interactions:

Component Identification: Helps in identifying the key components of the system, such as user interfaces, databases, and controllers, and their specific roles within the system.

Interaction Mapping: Maps out how different components interact with each other, ensuring that all necessary interactions are accounted for and properly designed.

3. Ensuring Alignment with Business Goals: Business Objectives

Alignment: Ensures that the technical design aligns with the business objectives, such as improving efficiency, enhancing communication, and motivating students.

Requirement Traceability: Provides a traceable link between business requirements and system components, ensuring that all business needs are addressed in the design.

4.Facilitating System Design and Development:

Guiding Development: Acts as a blueprint for developers, guiding the design and development of the system's components and their interactions.

Consistency and Standards: Ensures consistency in design and adherence to architectural standards, reducing the risk of design flaws and implementation issues.

5.Improving System Management and Maintenance:

Manageability: Simplifies system management by clearly delineating the responsibilities and functions of each component, making it easier to manage and maintain the system.

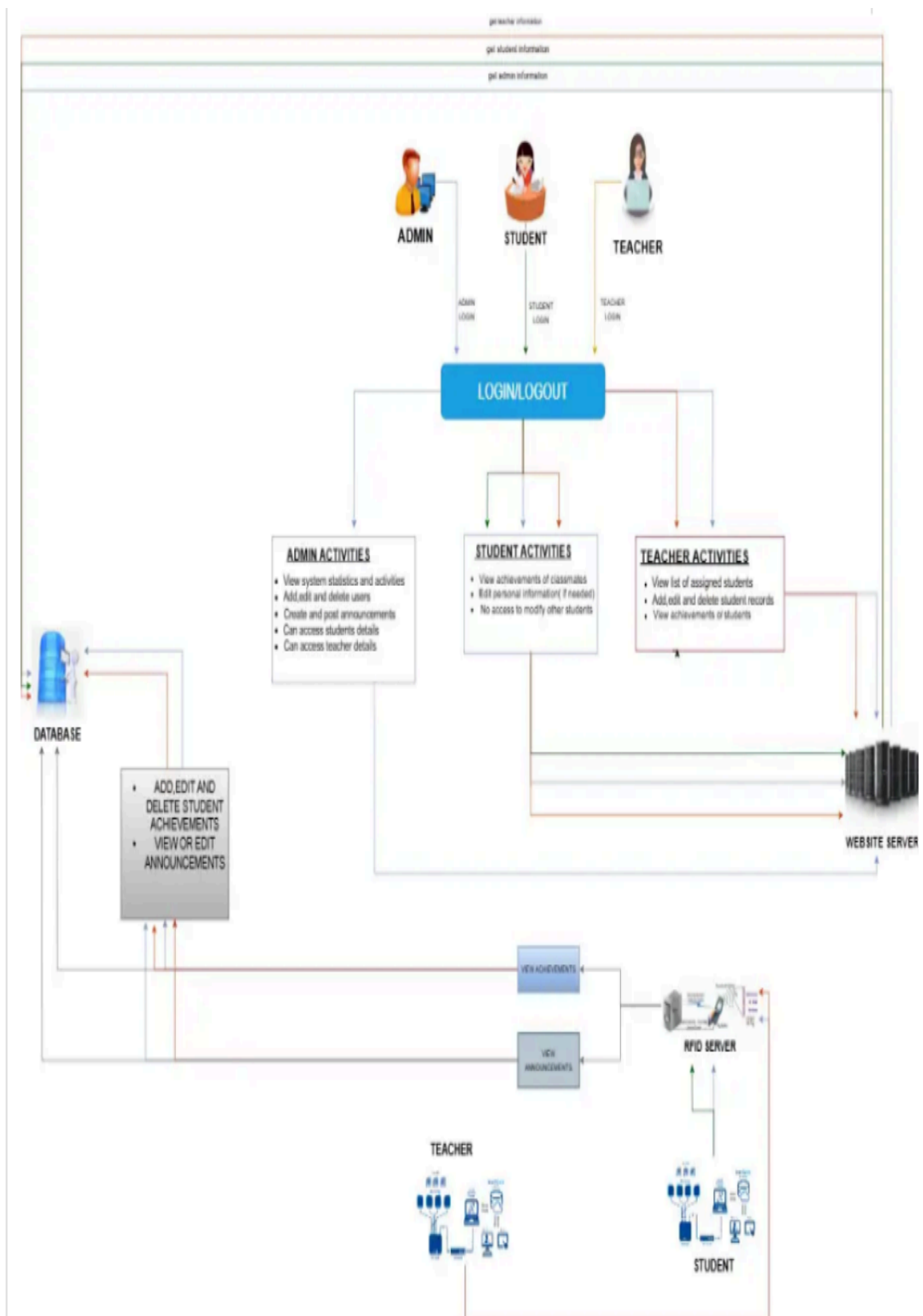
Scalability and Flexibility: Aids in designing a scalable and flexible architecture that can accommodate future changes and enhancements with minimal disruption.

6. Risk Identification and Mitigation:

Risk Management: Identifies potential risks in the system's design early in the process, allowing for proactive mitigation strategies to be developed.

Dependency Analysis: Highlights dependencies between components, helping to identify and address potential bottlenecks and failure points.

BUSINESS ARCHITECTURE OF SAMS



Design Principles for the Student Achievement Management System (SAMS)

1. Single Responsibility Principle (SRP):

Definition: A class should have only one reason to change, meaning it should have only one job or responsibility.

Application in SAMS: Each module (e.g., User Authentication, Achievement Management) should handle a single functionality. For example, a ``UserController`` class should handle user-related operations, while an ``AchievementController`` should manage student achievements.

2. Open/Closed Principle (OCP):

Definition: Software entities (classes, modules, functions, etc.) should be open for extension but closed for modification.

Application in SAMS: The system should be designed so that new features can be added with minimal changes to the existing code. For instance, if a new type of user role needs to be added, it should be possible without modifying existing role management code.

3. Liskov Substitution Principle (LSP):

Definition: Objects of a superclass should be replaceable with objects of a subclass without affecting the correctness of the program.

Application in SAMS: When defining user roles (Admin, Teacher, Student), subclasses should extend a base user class in such a way that they can be used

interchangeably where appropriate. For example, a `Teacher` class should be able to replace a base `User` class without introducing errors.

4.Interface Segregation Principle (ISP):

Definition: A client should not be forced to depend on interfaces it does not use.

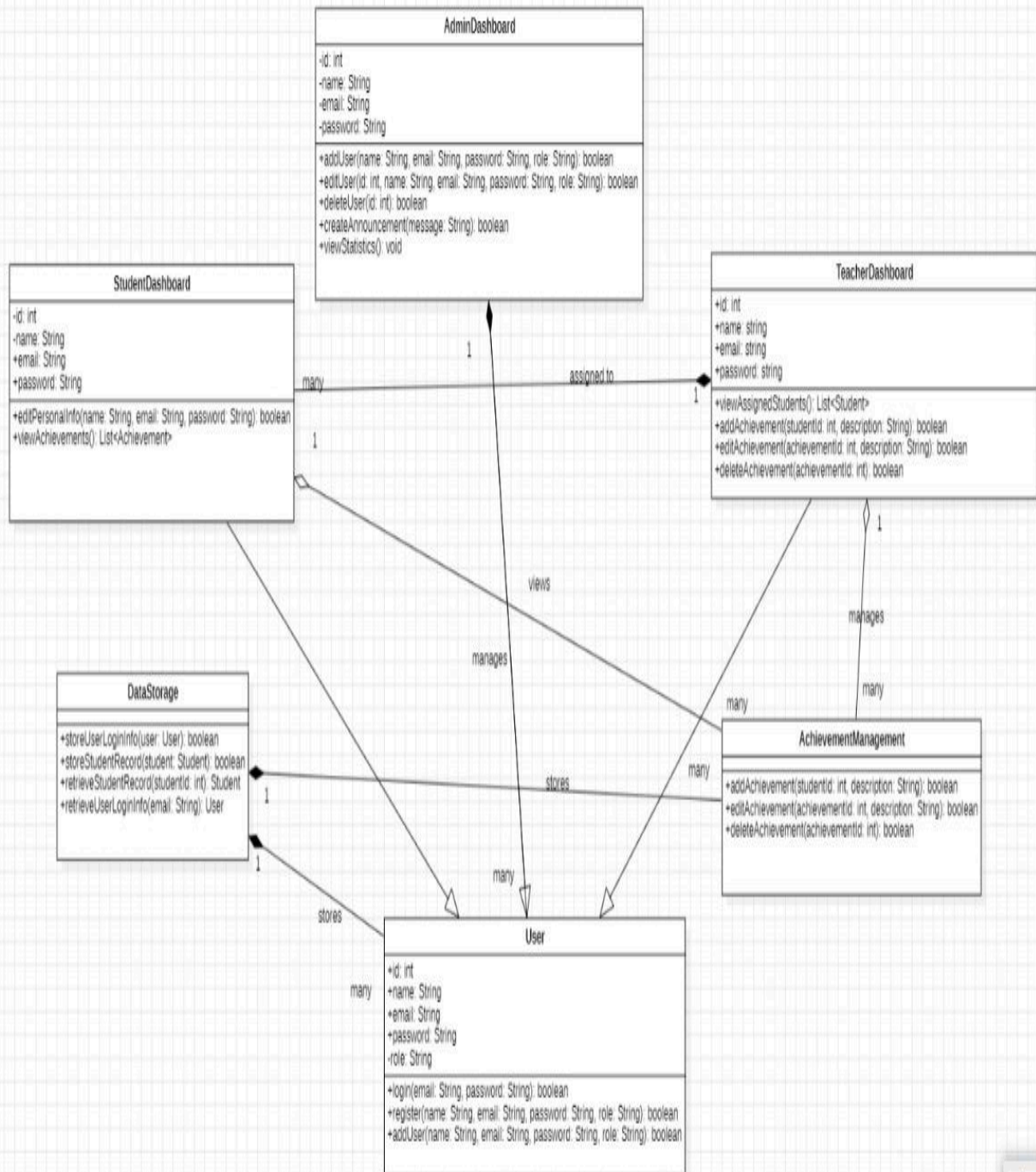
Application in SAMS: Create specific interfaces for different functionalities. For example, an `IAchievementManagement` interface for managing achievements and an `IUserManagement` interface for user-related operations, so that classes implementing these interfaces are not forced to implement methods they do not need.

5. Dependency Inversion Principle (DIP):

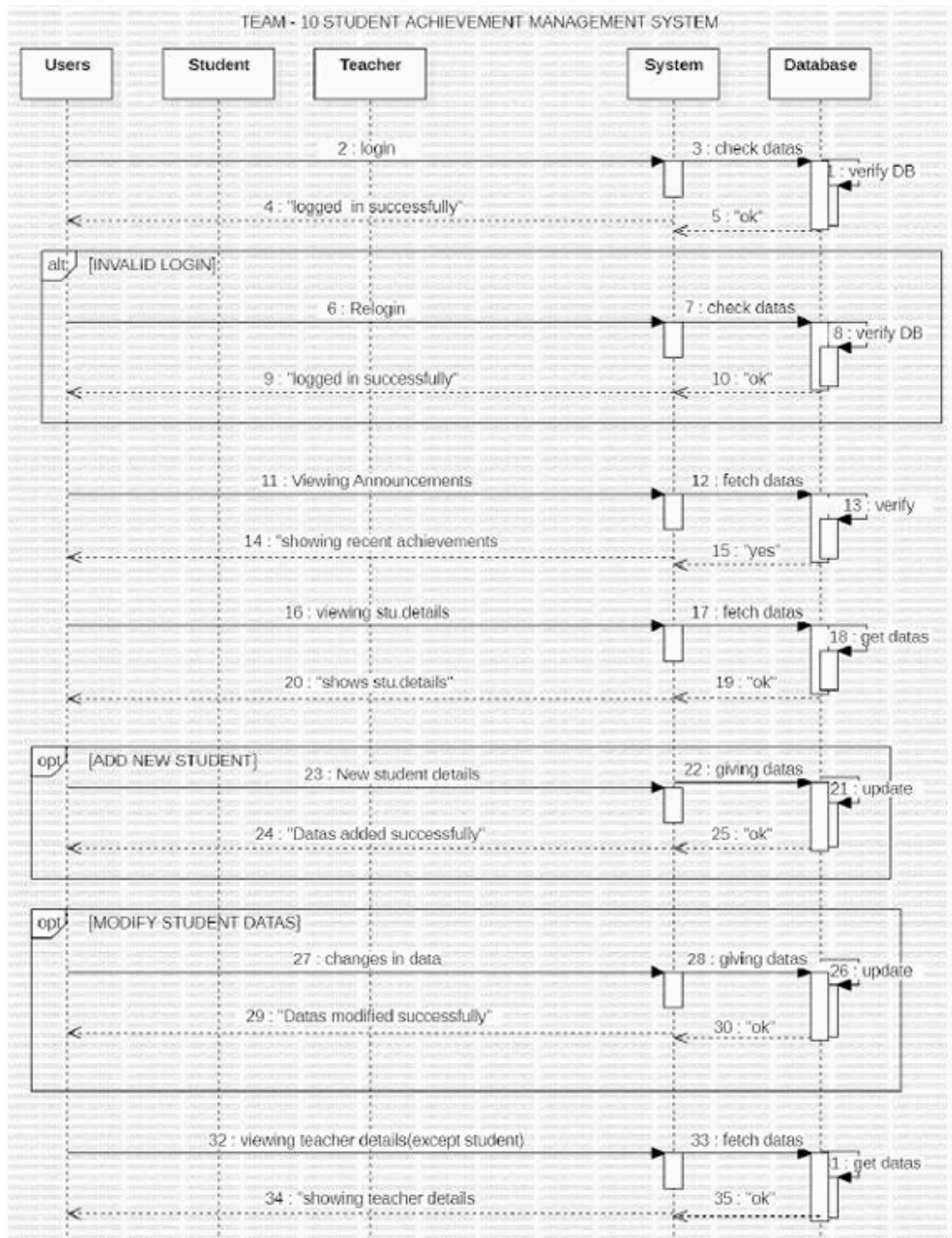
Definition: High-level modules should not depend on low-level modules. Both should depend on abstractions. Abstractions should not depend on details. Details should depend on abstractions.

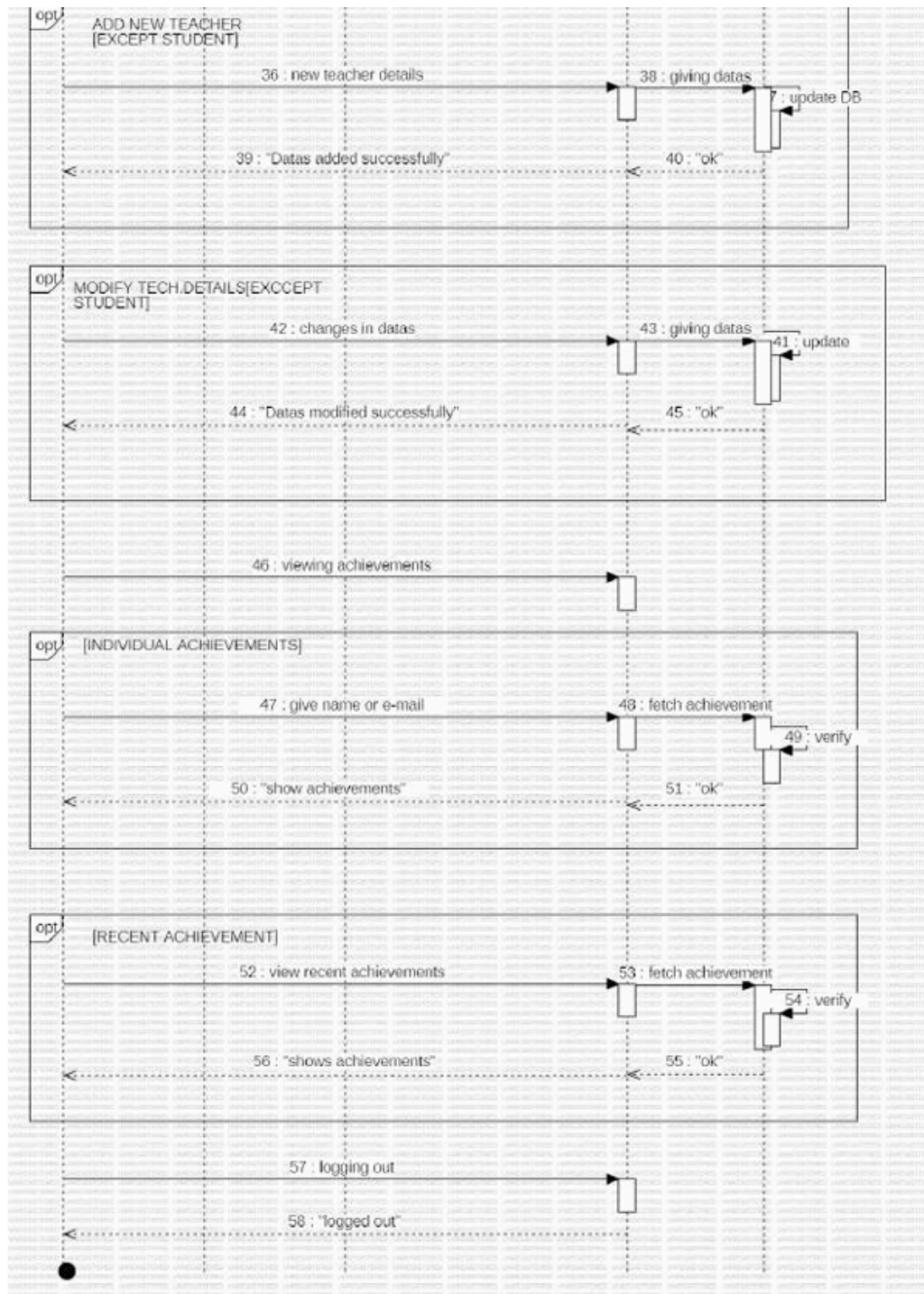
Application in SAMS: High-level components like controllers should depend on abstract services or interfaces rather than concrete implementations. For example, an `AchievementService` interface should be used by controllers, with concrete

CLASS DIAGRAM FOR SAMS

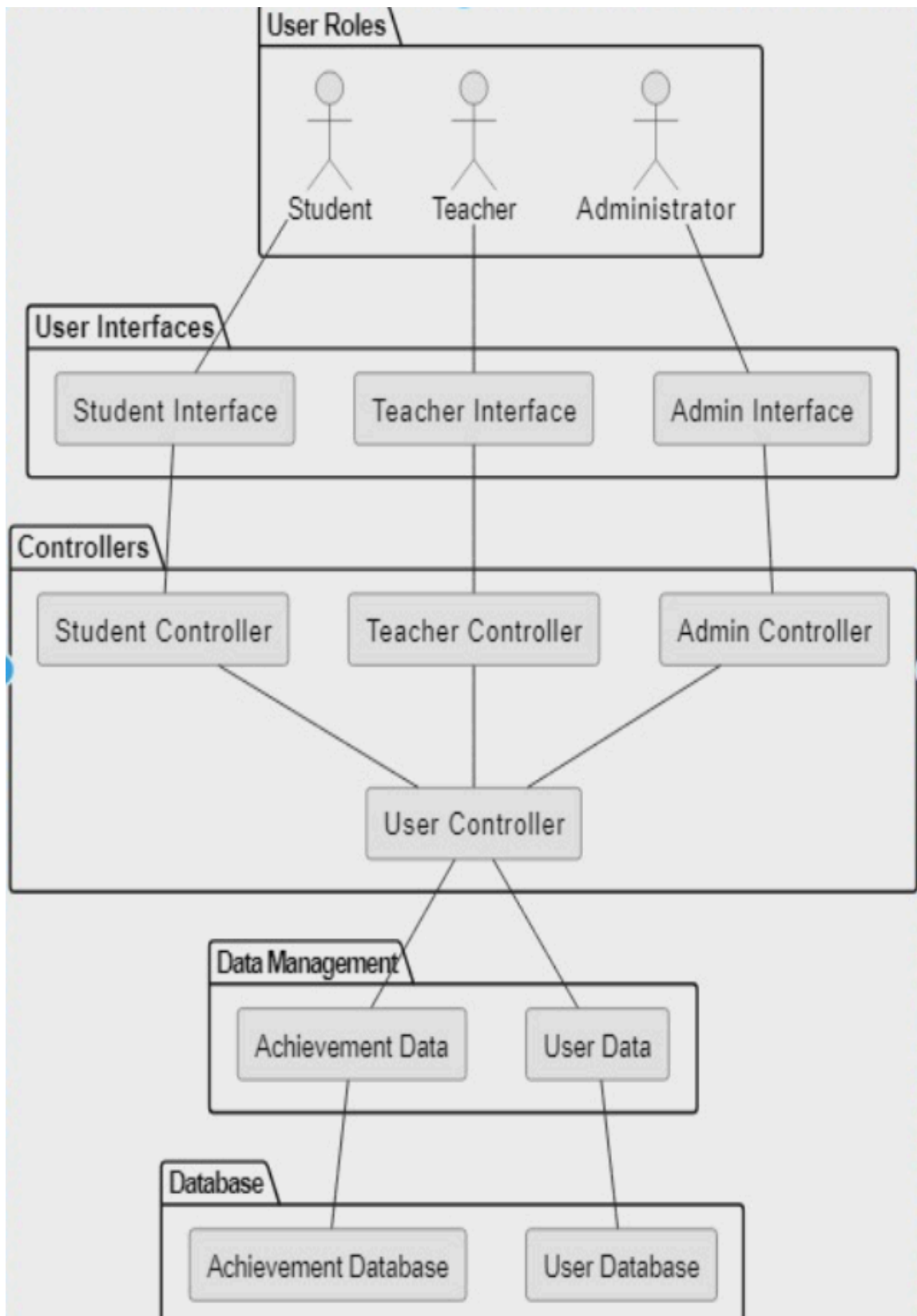


SEQUENCE DIAGRAM FOR SAMS:

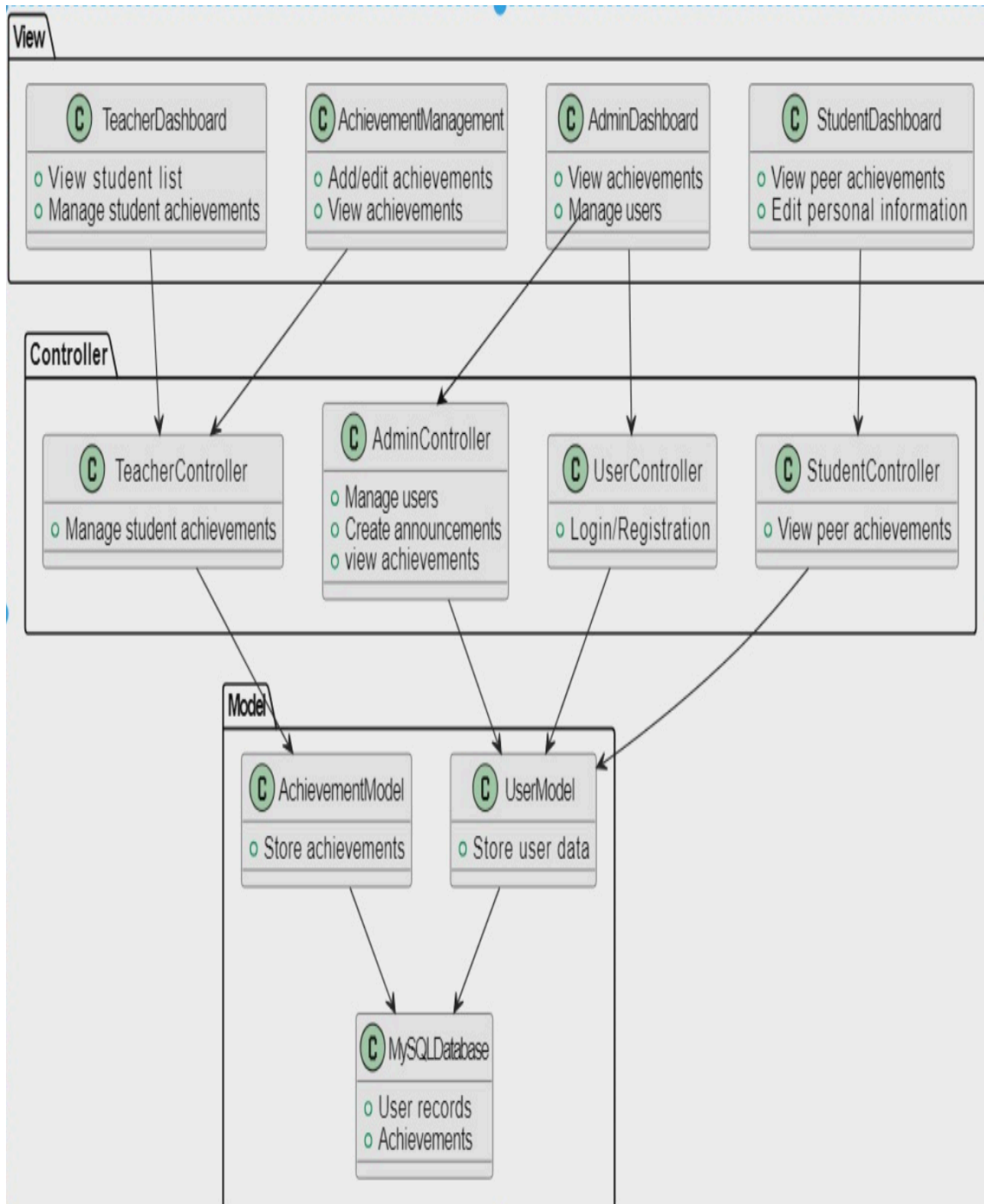




ARCHITECTURE PATTERN FOR SAMS



MVC ARCHITECTURE PATTERN FOR SAMS:



TEST CASES:

Test ID	Test Description	Expected Outcome	Validated Outcome
TC-01	Login with a valid student account and verify the achievement dashboard display.	The student achievement dashboard is displayed with relevant information (badges earned, achievements unlocked, participation stats).	The student sees their achievement dashboard populated with their achievements and participation details.
TC-02	Verify the accuracy of information displayed on the student achievement dashboard.	The achievement dashboard displays information that matches the student's actual participation and achievements in the system.	The information displayed (badges, achievements, stats) accurately reflects the student's recorded accomplishments.
TC-03	Test filters or sorting options available on the student achievement dashboard (if applicable).	Filters and sorting options function correctly, allowing students to view specific subsets of their achievements.	Students can filter and sort their achievements by various criteria (e.g., date earned, achievement type) as intended.

Test ID	Test Description	Expected Outcome	Validated Outcome
TC-04	Simulate earning a new achievement and verify notification receipt.	The student receives a notification (email, pop-up) with details about the newly earned achievement.	The student confirms receiving a notification upon earning a new achievement, containing accurate details.
TC-05	Test different notification types (if applicable) and delivery.	Different notification types (email, pop-up) are delivered correctly based on chosen settings.	The student receives notifications in their preferred format (e.g., email notification sent to the registered email address).

TC-06	Verify notifications are not sent for duplicate achievements.	The student does not receive a notification for the same achievement earned multiple times.	The student only receives one notification for each unique achievement earned.
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TC-07	Create a new student profile with valid data.	The new student profile is saved successfully and displayed in the system.	The administrator creates a new profile, and the system stores the information and displays it accurately.
TC-08	Update an existing student profile with changes.	The changes made to the student profile are reflected accurately in the system.	The administrator edits a profile, and the updated information is saved and displayed correctly.
TC-09	Test error handling for invalid data entry during profile creation or update.	The system displays appropriate error messages for invalid data entry.	The administrator attempts to save a profile with missing or invalid information, and the system prompts them to correct the errors.

TC-10	Verify administrator ability to search and filter student profiles.	Administrators can search and filter student profiles using specific criteria.	The administrator successfully searches and filters the student list based on chosen criteria (name, department, etc.).
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DEPLOYMENT DIAGRAM:

