DEPARTMENT OF SOFTWARE ENGINEERING

GROUP MEMBERS NAMES:

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SUBJECT: SOFTWARE DESIGN ARCHITECTURE

CLASS: BSE 4-A

TOPIC: UNIVERSITY MANAGEMENT SYSTEM

TEACHERS NAME:

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University Management System – Software Design Specification Document

Project Objective:

The University Management System (UMS) is a desktop-based application built using Java Swing, offering role-based access for Admins, Students, and Teachers. It supports core academic and administrative tasks. A unique feature is the integration of an AI assistant named Spark AI, available upon user login for help and queries.

A. Requirements Specification

1. User Stories in JIRA (Features & Epics)

Epic 1: Admin Features

- **Story 1:** Add/Remove Courses
- **Story 2:** View Time Table (Section Wise, Day Wise, Room Wise, Teacher Wise)
- **Story 3:** Add/Remove Students
- **Story 4:** Add/Remove Rooms
- **Story 5:** Add Departments
- **Story 6:** Search Student Availability
- **Story 7:** Generate and Track Challans

Epic 2: Student Features

- **Story 1:** Check Time Table
- **Story 2:** View Announcements
- **Story 3:** Register Courses
- **Story 4:** Check Scores
- **Story 5:** View Attendance
- **Story 6:** Submit/View Assignments
- **Story 7:** View Challans

Epic 3: Teacher Features

- **Story 1:** Mark Attendance
- **Story 2:** View Time Table
- **Story 3:** Make Announcements
- **Story 4:** Enter Student Marks
- **Story 5:** View Student Profiles
- **Story 6:** Upload Assignments
- **Story 7:** View Submissions

Epic 4: Spark AI Integration

- **Story 1:** Login/Signup for Spark AI
- **Story 2:** Access Help from Spark AI

Non-Functional Requirements:

- Secure, role-based login.
- All operations should complete under 3 seconds.
- The system should support at least 100 concurrent users.
- Should maintain 99.9% uptime and data persistence.

GITHUB LINK : https://github.com/aizazahmed001/SDA-PROJECT

B. Design Specification

1. System Architecture and Design Patterns

Architecture Style: Model-View-Controller (MVC)

Justification:

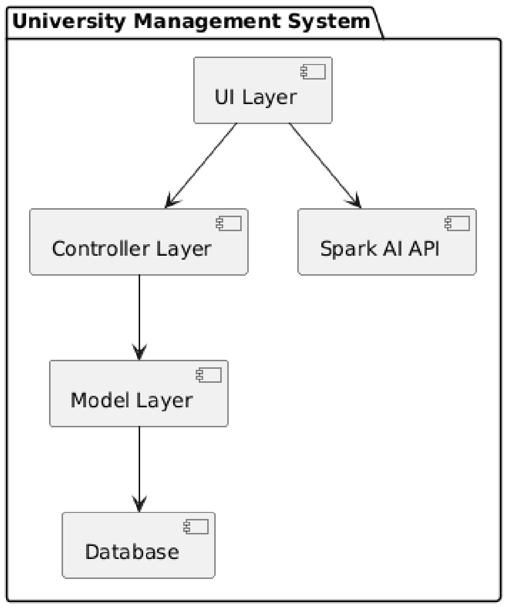
- Promotes separation of concerns.
- Enables easy modifications in UI or logic.
- Scalable and testable.

Design Patterns Used:

- **Singleton:** For database connection management.

- **Factory:** For user-role object creation.
- **Observer:** For announcements and notifications.

Architecture Diagram (PlantUML)



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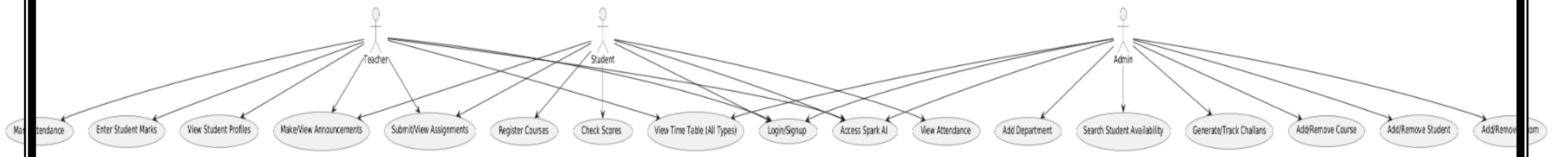
2. Detailed Design

A. Use Case Diagram:



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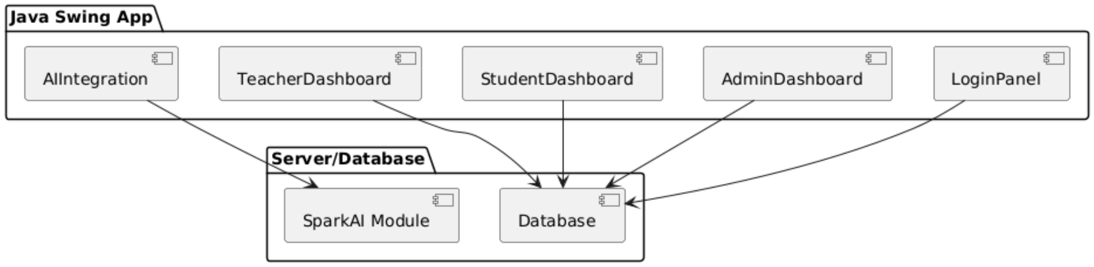
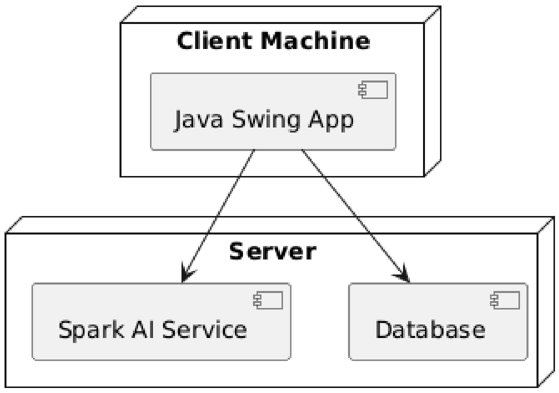
b. UI Design

- **Admin Dashboard:** Tabbed panes for student/course/room/dept management, time tables, challan module.
- **Student Dashboard:** Assignment viewer, course registration, scores, attendance.
- **Teacher Dashboard:** Assignment uploader, attendance sheet, mark entry, student viewer.
- Common Login Form, Spark AI Chat Interface

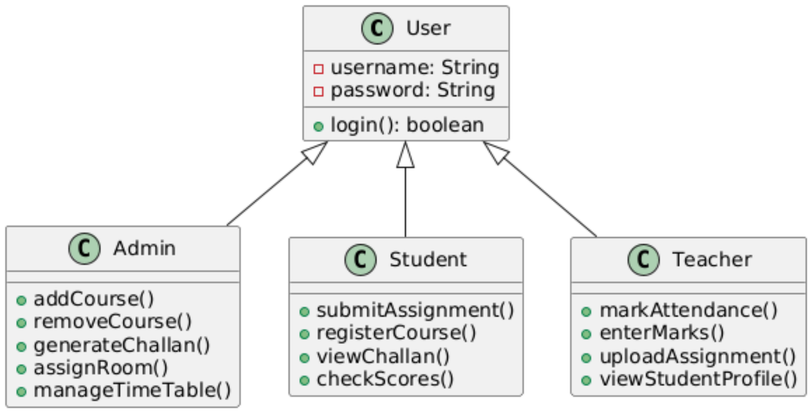
c. Component Diagram



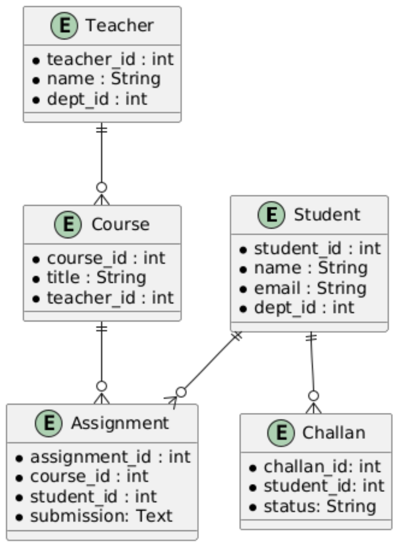
d. Deployment Diagram



e. Class Diagram

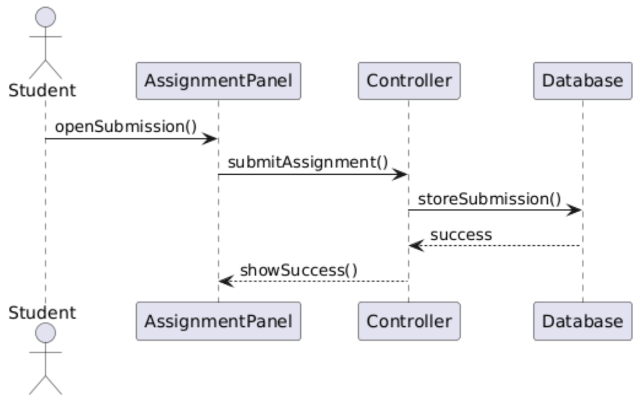


f. Data Model

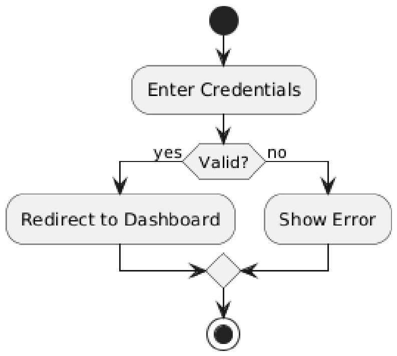


g. Dynamic Views

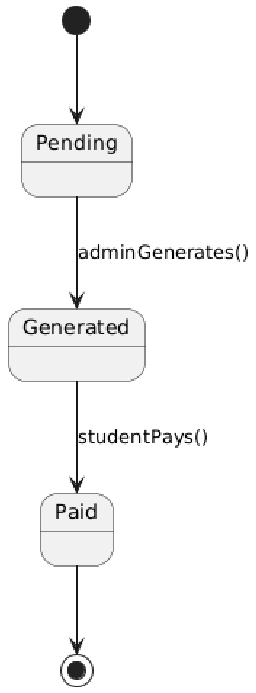
1. Sequence Diagram - Submit Assignment:



2. Activity Diagram - Login Flow:



3. State Diagram - Challan Status



Constraints Handled

1. **Authentication:** Only authenticated users can access features.
2. **Authorization:** Role-based access controls actions.
3. **Separation of Concerns:** MVC and design patterns enforce modularity.
4. **Data Access:** All data via centralized system.
5. **Extensibility:** Easily extendable features and components.