Tech Titans

School Administration System
Software Requirements Specification

Version <1.0>

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1. Introduction

The **Web Based School Admin System** is a comprehensive software solution designed to streamline the management of administrative and academic activities within educational institutions. This system centralizes the control of student, teacher, staff, and school-related data, automating tasks such as enrollment, attendance tracking, exam scheduling, grading, fee management, and communication between teachers, parents, and students.

1.1 Purpose

The primary purpose of this Software Requirements Specification (SRS) is to provide a detailed description of the functionalities and features required for the development of the School Administration System. This document outlines the system's functional and non-functional requirements, technical specifications, and constraints, ensuring a clear understanding among all stakeholders. It will serve as a blueprint for developers, designers, and administrators involved in the project, facilitating the development of a robust, user-friendly, and efficient system for managing school operations.

1.2 Scope

The School Admin System is intended to support schools of varying sizes, allowing for the efficient management of essential administrative tasks such as:

- Student and staff information management
- Attendance and grade tracking
- Exam scheduling and result publication
- Fee collection and financial reporting
- Communication tools for staff, students, and parents
- Timetable and event management

By automating these tasks, the system will reduce administrative overhead, improve communication, and provide a more organized approach to school management.

1.3 Definitions, Acronyms and Abbreviations

- **SRS**: Software Requirements Specification
- **SIS**: Student Information System

- **UI**: User Interface
- **ERP**: Enterprise Resource Planning
- **DBMS**: Database Management System

1.4 References

This SRS references educational standards, school management best practices, and any external documents or specifications used in defining the requirements for the Web Based School Admin System.

1.5 Technologies to be used

The system will be built using modern web-based and mobile technologies. It will include:

- **Frontend**: React or Angular for web and mobile applications.
- **Authentication**: Role-based access control using secure methods such as JWT.
- **Backend**: Node for server-side processing.
- **Database**: MongoDB for data storage and retrieval.

1.6 Overview

This SRS document provides a comprehensive overview of the School Administration System's architecture, detailing its functional modules, non-functional requirements, and technical specifications. It includes use case diagrams, data flow diagrams, and other design documents that will guide the development process. The system is intended to be scalable, secure, and easy to use, catering to the needs of administrators, teachers, students, and parent.

2. Literature Survey

The literature survey conducted for the **School Administration System** involved a comprehensive review of existing research, industry practices, and technological advancements related to school management, educational technologies, and relevant software solutions.

2.1 Objective

- **School Management Systems:**
  The survey encompassed a thorough examination of existing school management systems, both commercial and open-source. Notable systems reviewed include **Moodle**, **Fedena**,

and **OpenSIS**. The analysis focused on their functionalities, user interfaces, and features, as well as their impact on administrative efficiency in educational institutions.

- **Technological Trends:**

  A review of technological trends and innovations in educational management, including **cloud computing** and **AI-based analytics**, was conducted to identify emerging technologies that could enhance the School Administration System. This includes the integration of real-time data analytics for performance tracking and predictive insights.

- **Research Papers and Publications:**

  Relevant research papers, publications, and articles in educational technology, software development for schools, and data privacy regulations were surveyed. This helped gather insights into methodologies, best practices, and findings shaping the educational software landscape.

  .

- **Standards and Regulations:**

  An exploration of industry standards, government regulations, and policies related to student data management, privacy (such as **FERPA**), and information dissemination was conducted. This ensures compliance and adherence to legal and ethical considerations in the development of the School Administration System.

- **Findings and Insights:**

  The literature survey revealed significant findings in the realm of school administration systems, emphasizing the importance of leveraging technological advancements to improve operational efficiency in educational institutions. It identified opportunities for integrating cutting-edge technologies, such as mobile solutions and AI-driven analytics, to enhance decision-making processes and foster a more collaborative educational environment. The need for user-friendly interfaces and comprehensive training for stakeholders was also highlighted to ensure successful adoption and implementation of the system.

2.2 Research Paper

A Comprehensive Study on School Management Systems *Written by: Lalit Mohan* Joshi This research paper analyzes various school management systems available in the market, highlighting their functionalities, user interfaces, and impact on administrative efficiency. It identifies key features that improve communication between parents, students, and teachers, and assesses user satisfaction levels among different stakeholders. *(*https://www.researchgate.net/publication/281995139_A_Research_Paper_on_College_Management_System*)*	**Impact of Mobile Applications on Student Engagement** *Written by: Umar Ibrahim* This study examines the influence of mobile applications on student engagement and academic performance. It focuses on features such as attendance tracking, assignment notifications, and communication tools. The findings indicate that mobile app integration in school administration significantly enhances student involvement in their educational activities. (https://www.researchgate.net/publication/378785994_Assessing_the_Impact_of_Mobile_Applications_on_Student_Engagement_in_ICT_and_Computer_Science_Education)

Conclusion

The School Administration System aims to create a more organized and transparent educational environment, ultimately contributing to improved academic performance and stakeholder satisfaction. With the insights gained from the literature survey and the defined requirements, this project is well-positioned to meet the evolving needs of modern educational institutions and support their continuous growth and success.

3.Specific Requirements

3.1 Functional Requirement

Functional requirements outline the specific functionalities and features that the **School**

Administration System must provide to meet the needs and expectations of administrators, teachers, students, and parents..

1. **Login Module**:
    - **Description**: The Login Module facilitates secure user authentication for administrators, teachers, students, and parents using unique usernames and passwords. It includes options for password recovery and multi-factor authentication for enhanced security.
    - **Key Features**:
        1. Secure username and password authentication
        2. Password recovery option
        3. Multi-factor authentication
2. **Student Information Management Module**:
    - **Description**: This module allows administrators to add, update, and manage student records, including personal details, academic history, and health information. It enables bulk uploads for new students and allows for easy searching and filtering of records.
    - **Key Features**:
        1. Add, update, and delete student records
        2. Bulk upload functionality
        3. Search and filter options
3. **Attendance Tracking Module**:
    - **Description**: The Attendance Tracking Module enables teachers to record daily attendance for their classes. It supports various methods of attendance logging, including manual entry and biometric scanning. Attendance reports can be generated for individual students or classes.
    - **Key Features**:
        1. Daily attendance recording
        2. Biometric scanning support
        3. Attendance reports generation
4. **Grade Management Module**:

- **Description**: This module allows teachers to enter and manage grades for students, create report cards, and calculate GPAs. It includes features for weight assignments and grading categories, as well as customizable grading scales.
- **Key Features**:
    1. Grade entry and management
    2. Report card generation
    3. GPA calculation

5. **Exam Management Module:**
    - **Description**: The Exam Management Module provides functionality for scheduling exams, assigning teachers for supervision, and managing exam results. It allows for the creation of different types of assessments, including online exams.
    - **Key Features**:
        1. Exam scheduling and management
        2. Supervision assignment
        3. Online exam creation and management
6. **Fee Management Module**:
    - **Description**: This module automates the collection of fees, allowing for the generation of invoices, tracking payments, and managing outstanding dues. It supports multiple payment methods and provides financial reports for administrators.
    - **Key Features**:
        1. Automated fee invoicing
        2. Payment tracking and management
        3. Financial reporting
7. **Communication Module:**
    - **Description**: The Communication Module enables messaging and notifications between teachers, students, and parents. It allows for announcements, reminders, and event notifications to keep all stakeholders informed.
    - **Key Features**:
        1. In-app messaging system
        2. Notification and announcement feature
        3. Event calendar integration

8. **Timetable Management Module:**
    - **Description**: This module allows administrators to create and manage class schedules, including teacher assignments and room allocations. It generates timetables for students and teachers, ensuring optimal resource utilization.
    - **Key Features**:
        1. Class schedule creation
        2. Teacher and room assignments
        3. Student timetable generation
9. **Reporting Module:**
    - **Description**: The Reporting Module generates various reports, including student performance, attendance statistics, financial summaries, and more. Administrators can customize reports based on different criteria.
    - **Key Features**:
        1. Customizable report generation
        2. Performance analytics
        3. Attendance statistics
10. **User Role Management Module:**
    - **Description**: This module allows administrators to define user roles and permissions, ensuring that users have appropriate access to various system functionalities based on their roles within the school.
    - **Key Features**:
        1. Role-based access control
        2. Permission management
        3. User activity logging

3.2 Non-Functional Requirements

Non-functional requirements define the qualities and characteristics that the School Administration System must possess, such as performance, security, usability, and reliability.

1. Performance
    - The system's response time for displaying student information, schedules, or grades shall be within **2 seconds**.
    - The platform shall handle a concurrent user load of at least **5000 users** (students,

teachers, and administrators).

- The system must process and generate reports (e.g., attendance, grades) within **5 seconds**.

2. Security
    - User passwords (for administrators, teachers, parents, and students) shall be securely stored using **industry-standard encryption algorithms** (e.g., SHA-256).
    - The system shall implement **role-based access control** to ensure that users only access data and features appropriate to their roles (e.g., admin, teacher, student).
    - **Multi-factor authentication (MFA)** shall be implemented for administrators and teachers to enhance security.
    - The system must comply with **FERPA** and **GDPR** to ensure the privacy of student data and personal information.
3. Usability
    - The user interface shall follow **industry best practices** for user experience (UX) design to ensure ease of navigation for all users, including non-technical stakeholders like parents and students.
    - The The platform shall support **multiple languages** for enhanced accessibility, allowing users to switch between available language options.
    - The system shall be **mobile-responsive**, ensuring compatibility across devices, including desktops, tablets, and smartphones.
4. Reliability
    - The system shall maintain a minimum **uptime of 99.9%**, ensuring availability during school hours and critical operations.
    - **Data backup and recovery mechanisms** shall be in place to prevent data loss, with backups occurring daily and stored securely.
    - The system must handle **graceful degradation**, ensuring essential services remain functional in the event of partial system failure.

3.3 Hardware Requirements

The hardware requirements outline the necessary infrastructure to ensure the smooth deployment

and functioning of the **School Administration System** across various platforms.

1. Server Infrastructure:
    - **Processor**: Minimum of **quad-core processors** (2.5 GHz or higher) to handle backend operations.
    - **Memory (RAM)**: Minimum **16 GB RAM** to ensure smooth processing of concurrent tasks.
    - **Storage**: Minimum **500 GB SSD** for system files, databases, and backup storage.
    - **Storage**: **1 TB SSD** for high-speed data access and redundancy (RAID configuration recommended).
2. Mobile Devices
    - The mobile application shall be compatible with **Android devices** (version **7.0 and above**).
    - The mobile application shall be compatible with **Android devices** (version **7.0 and above**).
3. Client Devices
    - **Desktops and Laptops**:
    - **Processor**: Minimum **dual-core 2.0 GHz**.
    - **Memory (RAM)**: Minimum **4 GB RAM** for efficient system access.
    - **Storage**: At least **20 GB free disk space** for temporary files and app caches.
    - **Display**: Minimum screen resolution of **1280x720**.
4. Network Requirements
    - **Internet Speed**: Minimum **10 Mbps download** and **5 Mbps upload** speed for smooth access to the system.
    - **Wi-Fi Compatibility**: Dual-band routers (2.4 GHz and 5 GHz) for stable wireless connections.

3.4 Software Requirements

Software requirements detail the necessary software components and dependencies for the School Administration System to function efficiently and effectively.

1. Backend Technologies:
    - **Node** for the backend server application to handle requests and manage data processing.
    - **MongoDB** for database management and secure storage of student, staff, and school-related data.

2. Frontend Technologies:
    - **React.js** or **Angular** for building the web-based frontend, providing a responsive and interactive user interface.
    - **Bootstrap** or **Material UI** for consistent styling and responsive design across various devices and platforms.

3.5 Agile Methodology

The School Administration System embraces the **Agile development methodology**, recognizing its efficiency in managing dynamic project requirements and fostering continuous improvements. Agile ensures flexibility, collaboration, and iterative development cycles to meet the evolving needs of the school system.

The Agile methodology is implemented in the following steps:

1. **Project Initiation:**
    - Define project objectives, goals, and scope.
    - Assemble the project team comprising developers, designers, and domain experts.
2. **Product Backlog Creation:**
    - Identify and list all desired features and functionalities.
    - Prioritize these features based on their importance and potential impact on Users.
3. **Sprint Planning:**
    - Break down prioritized features into smaller tasks.
    - Estimate the effort required for each task and assign them to sprint cycles (typically 2-4 weeks).
4. **Sprint Execution:**
    - Teams work on assigned tasks within the sprint.
    - **Daily stand-up meetings** are held to track progress, discuss challenges, and make adjustments.
5. **Continuous Integration and Testing:**
    - Developers continuously integrate code into the shared repository.
    - Automated and manual testing is performed to ensure the developed features meet quality standards.
6. **Sprint Review:**
    - At the end of each sprint, the team reviews completed work and gathers feedback

from stakeholders to refine the backlog.

- Feedback is collected, and adjustments are made to improve the next sprint.

7. **Sprint Retrospective:**
    - The team evaluates sprint successes and challenges, identifying areas for improvement.
    - **Enhancements**: Implement changes to improve team efficiency and product quality.
8. **Incremental Deployment:**
    - **Feature Rollout**: Completed features are deployed incrementally, such as attendance or grading modules.
    - **User Feedback**: Teachers and administrators begin using features and provide feedback on functionality.
9. **Continuous Feedback and Adaptation:**
    - **Feedback Gathering**: Regular input from school staff, students, and parents is collected.
    - **Adaptation**: The system's features and priorities are adjusted based on feedback and changing requirements.
10. **Iterative Development:**
    - **Ongoing Cycle**: The development cycle continues with each sprint, incorporating new features and improvements.
    - **Continuous Improvement**: Each iteration enhances usability and responds to stakeholder needs.

3.6 Business Process Model

1. **Login Module**:
    - **Input**: User's (administrator, teacher, student, or parent's) username and password
    - **Process**: Verify login credentials for authentication.
    - **Output**: Successful login or error message.
2. **Student Information Management Module**:
    - **Input**: Administrator adds or updates student details (name, grade, address, etc.).
    - **Process**: Store or update student information in the database.

- **Output**: Updated student profile or confirmation of new student entry.

3. **Attendance Tracking Module:**
    - **Input**: Teacher inputs daily attendance data for students.
    - **Process**: Record the attendance for each student in the system.
    - **Output**: Attendance report for the class, accessible to administrators and parents.
4. **Grade Management Module:**
    - **Input**: Teacher inputs student grades for an exam or assignment.
    - **Process**: Calculate and store grades in the database.
    - **Output**: Generated report cards and GPA updates for students.
5. **Fee Management Module:**
    - **Input**: Fee payment information from parents or students.
    - **Process**: Record payment, update outstanding balance, and generate a receipt.
    - **Output**: Updated fee status and receipt for the user.
6. **Timetable Management Module**:
    - **Input**: Administrator or teacher inputs class schedule details.
    - **Process**: Create and store the timetable for students and teachers.
    - **Output**: Generated class schedules accessible to students and teachers.
7. **Communication Module**:
    - **Input**: Administrator or teacher drafts a message or announcement.
    - **Process**: Send the message to selected recipients (students, parents, teachers).
    - **Output**: Notification or message delivered via the app, email, or SMS.
8. **Reporting Module**:
    - **Input**: User requests specific reports (e.g., attendance, grades, fee status).
    - **Process**: Query the database for the requested information
    - **Output**: Generated report (downloadable or viewable within the system).
9. **Main Screen Module**:
    - **Input:** User interaction with the navigation menu (teachers, students, administrators,
      or parents).
    - **Process**: Navigate between home, dashboard, and various system modules (e.g., attendance, grades, messages).

- **Output**: Seamless access to key school-related information such as schedules, announcements, and notifications.

10. **Notification Module**:
    - **Input**: System-generated notifications based on user roles (e.g., event reminders, assignment due dates, fee payment reminders).
    - **Process**: Filter notifications by category (e.g., announcements, reminders, alerts).
    - **Output**: Display filtered notifications to users (students, parents, teachers) through in-app messages, email, or SMS.
11. **Home Screen Module**:
    - **Input**: User interaction with the home screen via clicks or taps.
    - **Process**: Display essential updates such as school announcements, upcoming events, and notifications.
    - **Output**: Easy navigation options to various functionalities, ensuring users can quickly access the information they need.
12. **Dashboard Module**:
    - **Input**: User access to personal and school-related information after secure login.
    - **Process**: Authenticate user credentials to ensure secure and personalized access.
    - **Output**: Quick links for managing records, generating reports, and communicating with other users.

This business process model outlines the critical processes within the School Administration System, detailing the inputs, processes, and outputs of the Home Screen and Dashboard modules. It illustrates how these functionalities interact to create an efficient platform for school management. By streamlining administrative tasks and providing key information at a glance, the system empowers school administrators, teachers, and staff to enhance their operational effectiveness and improve communication within the school community.

3.7 Supplementary Requirements

Supplementary requirements include any additional requirements that are not covered by the previous sections but are essential for the success of the project.

1. **Scalability**:

- The system architecture shall be designed to scale horizontally, allowing the addition of new servers and resources to accommodate an increasing user base without degradation in performance.
- Implement load balancing to evenly distribute user requests and ensure reliability during peak times
- Support sharding and replication in the database to manage large volumes of data effectively

2. **Documentation:**
    - Develop comprehensive user manuals for all user classes, providing clear guidance on functionalities.
    - Provide detailed developer documentation, including architecture diagrams and API specifications for maintenance.
    - Create training materials such as video tutorials and FAQs to assist users in navigating the system.
3. **Security Measures:**
    - Implement multi-factor authentication (MFA) for secure user access.
    - Encrypt all sensitive data in transit and at rest to protect against unauthorized access.
    - Develop an incident response plan for swift action in case of security breaches.
4. **Compatibility and Integration:**
    - **API Integration**: Provide well-documented APIs to allow seamless integration with third-party applications or services.
5. **Performance Optimization:**
    - **Load Balancing:** Implement load balancing techniques to ensure optimal performance, especially during high traffic periods.

4. Overall Description

4.1 Use-Case Model

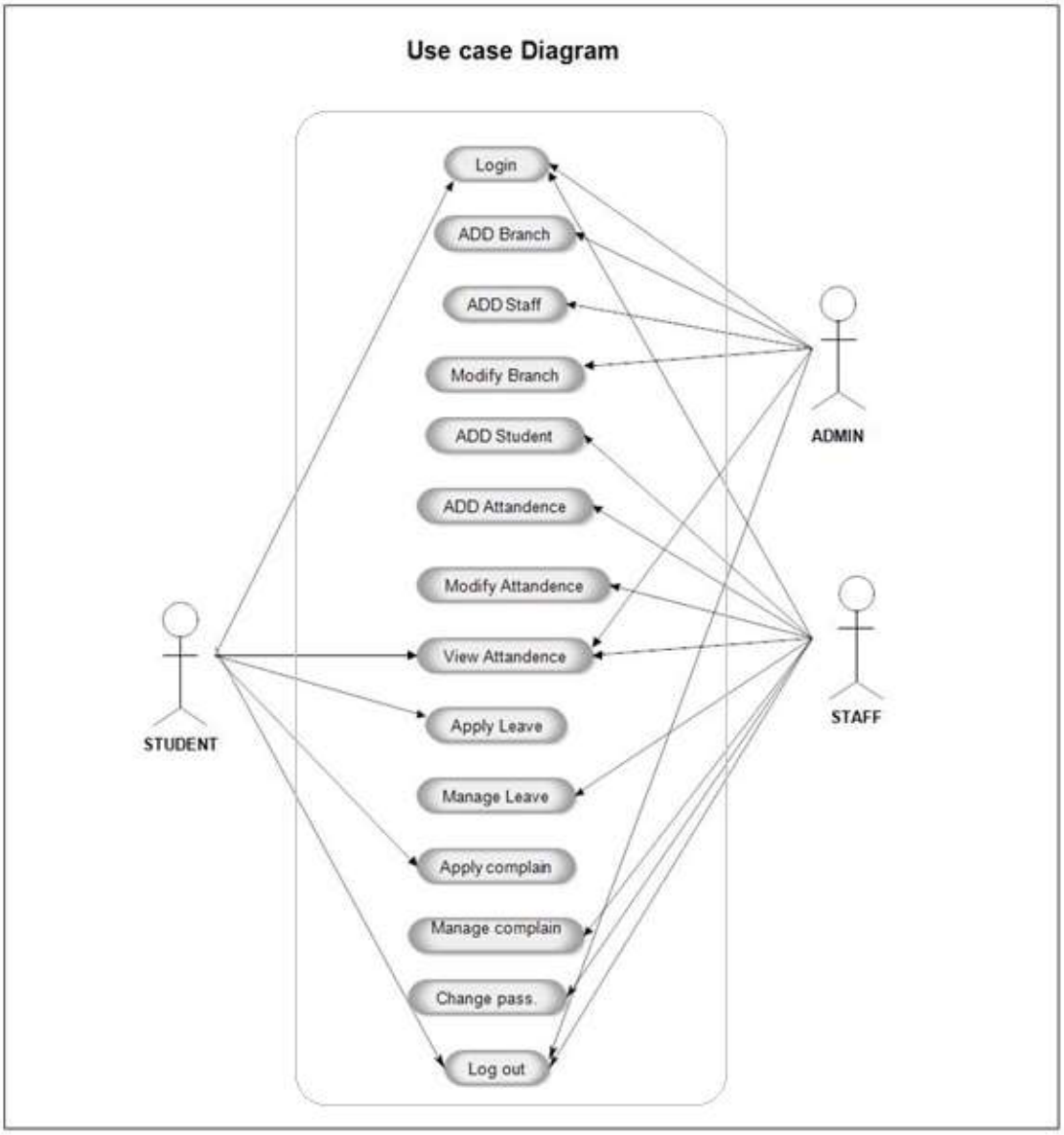

Figure 1: School Admin System Use Case Diagram

4.2 Behaviors Diagrams

- Activity Diagram

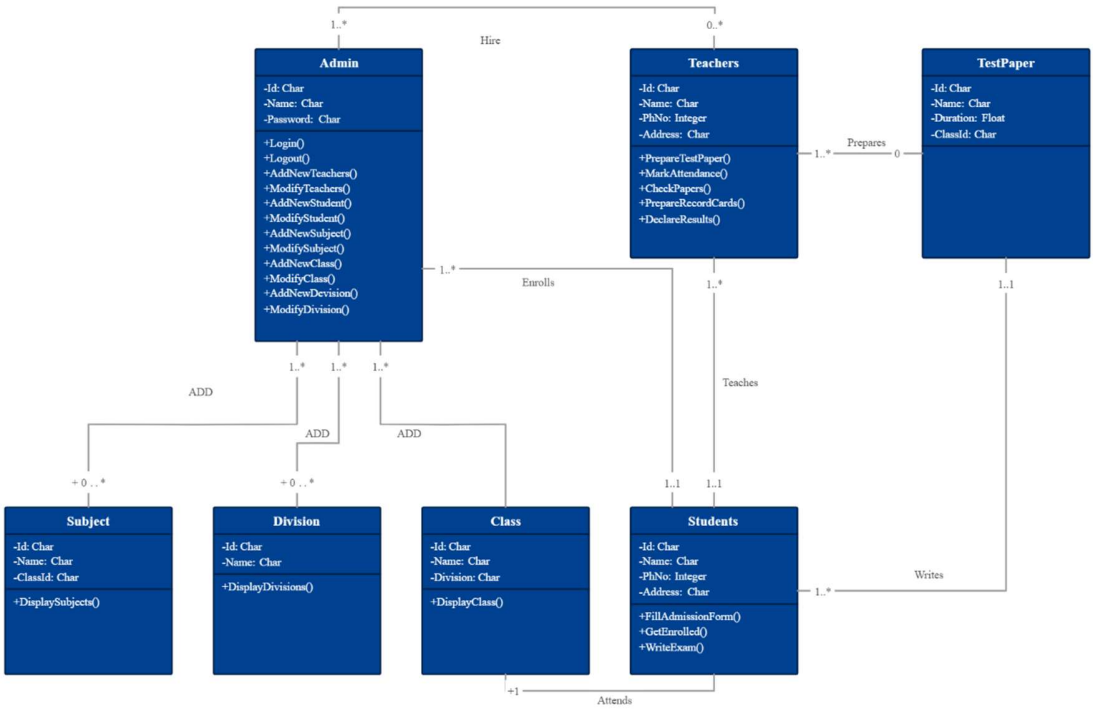

Figure 2: School Admin System Activity Diagram

- Sequence Diagram

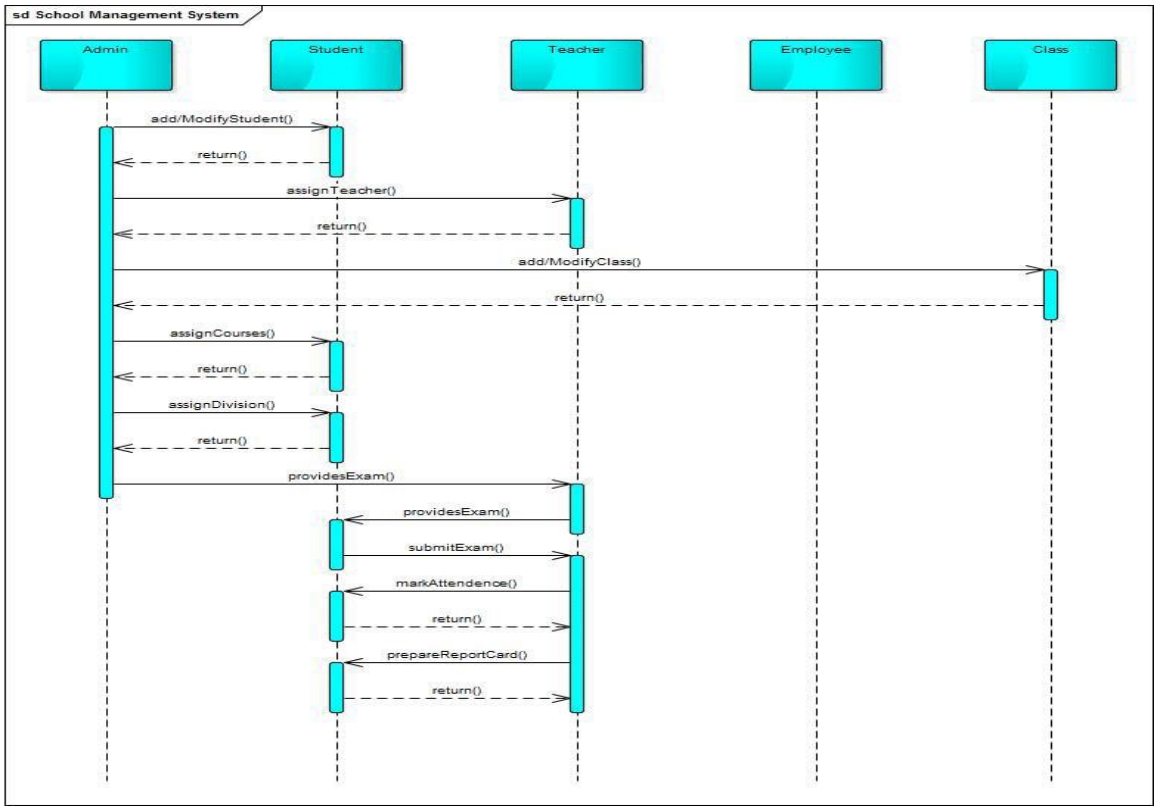

Figure 3: School Admin System Sequence Diagram

- Data Flow Diagram – Level 0

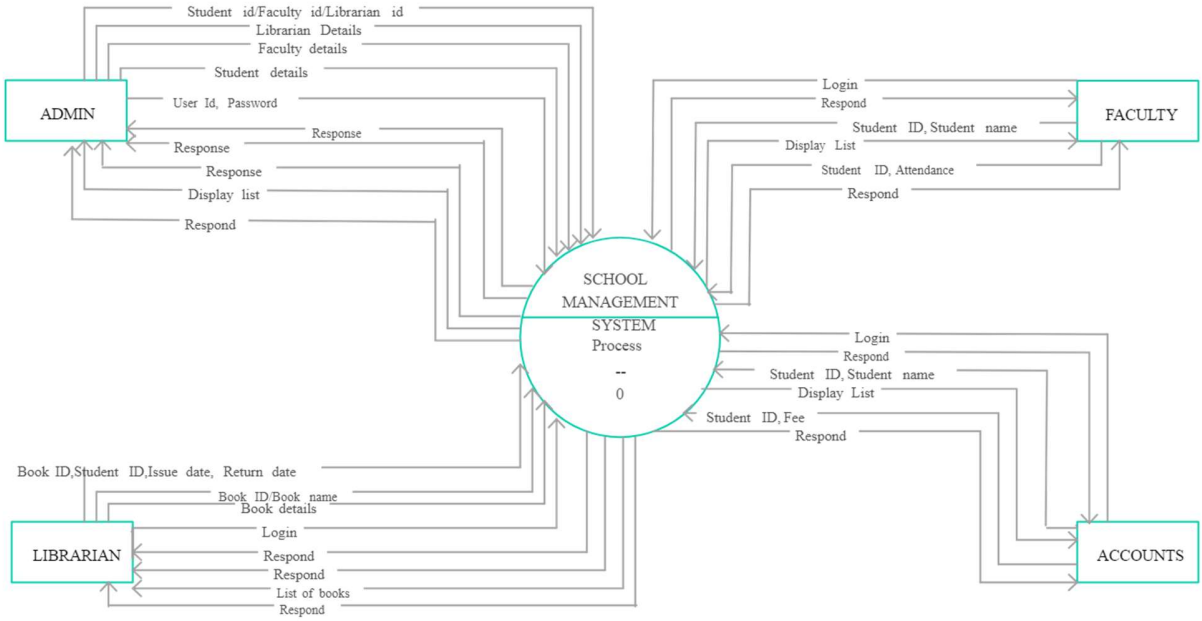

Figure 4: DFD Level 0

- Data Flow Diagram – Level 1

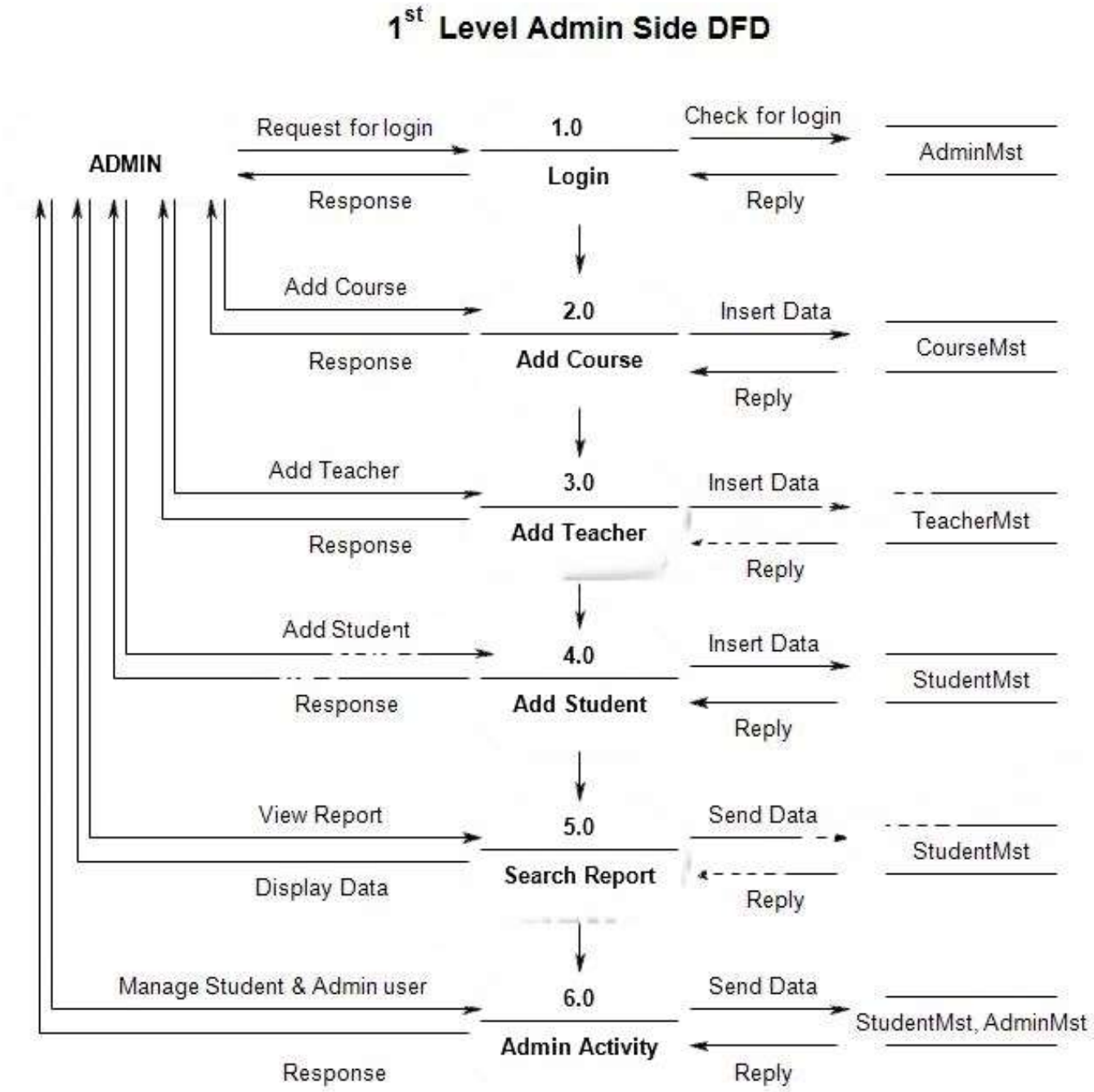

Figure 5: DFD Level 1

- Data Flow Diagram – Level 2

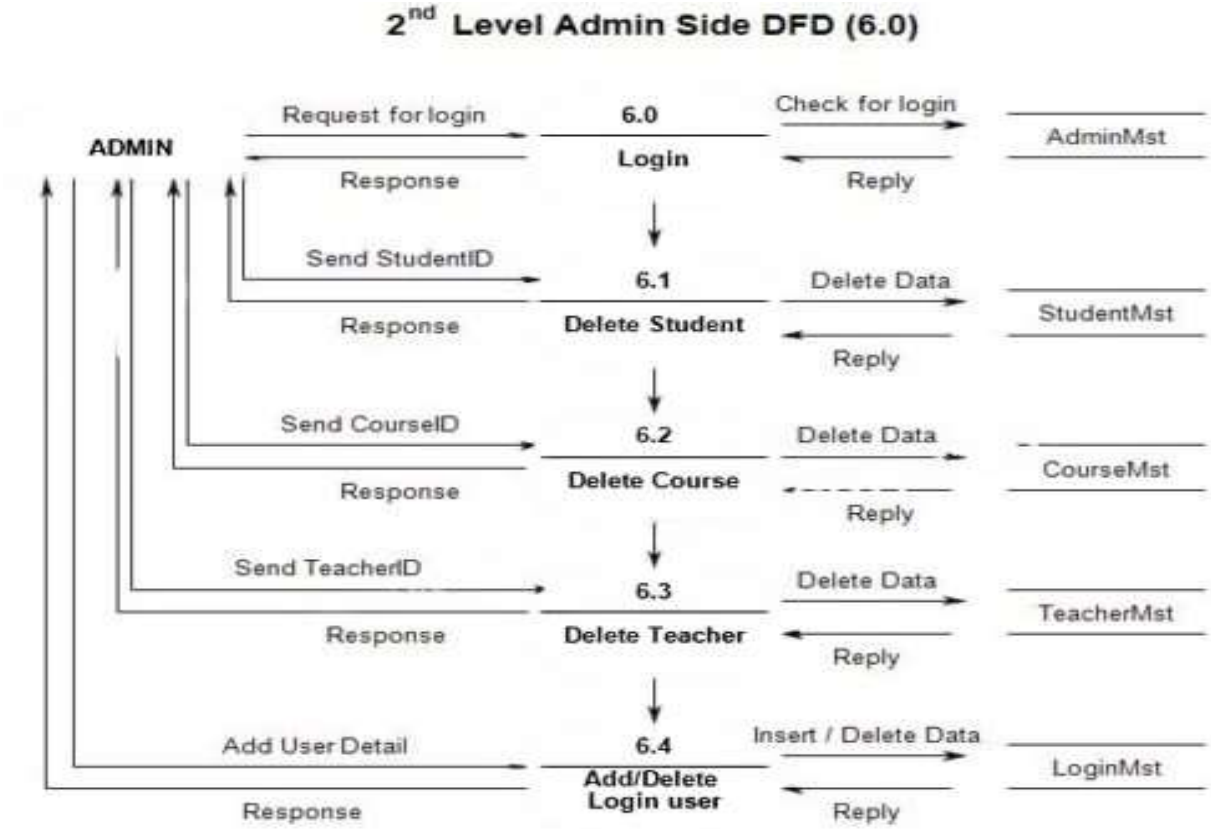

Figure 6: DFD Level 2

4.3 Structural Diagrams

- Deployment Diagram

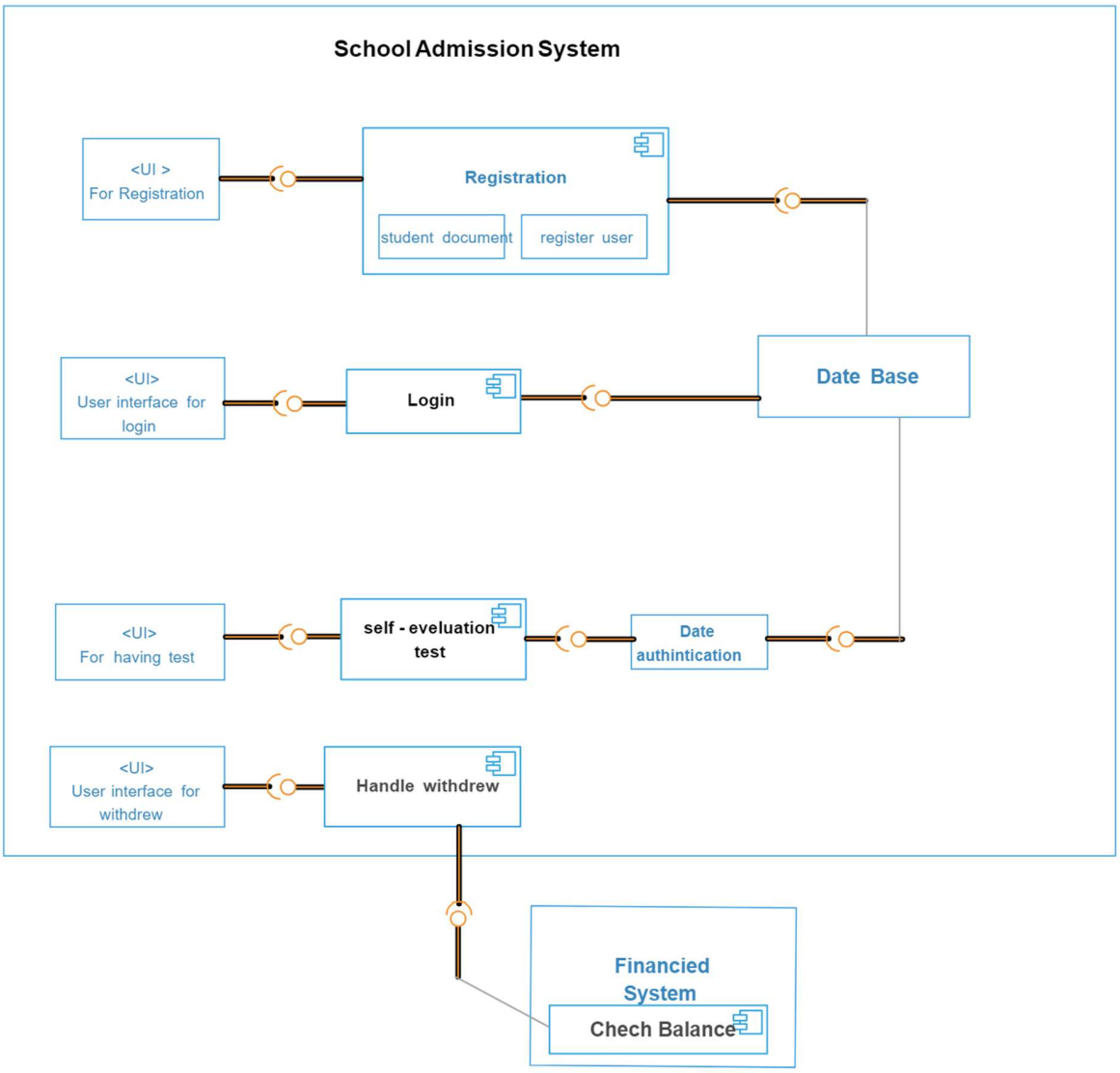

Figure 7: School Admin System Deployment Diagram

- Component Diagram

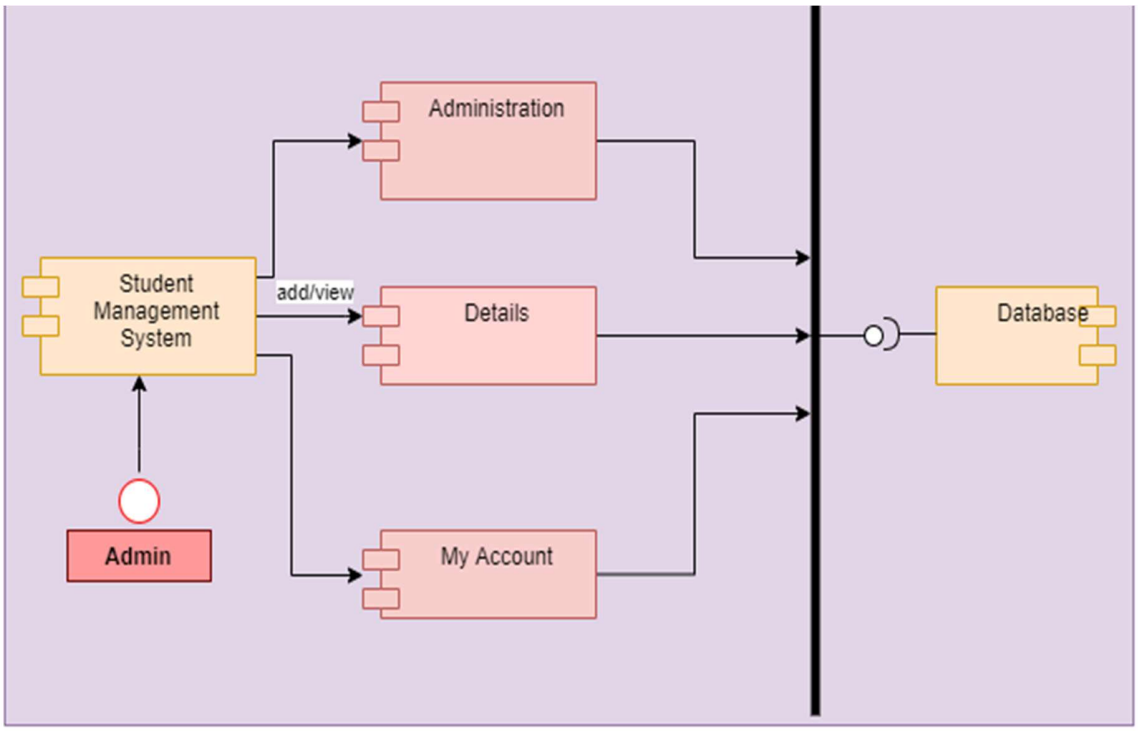

Figure 8: School Admin System Component Diagram

- Class Diagram

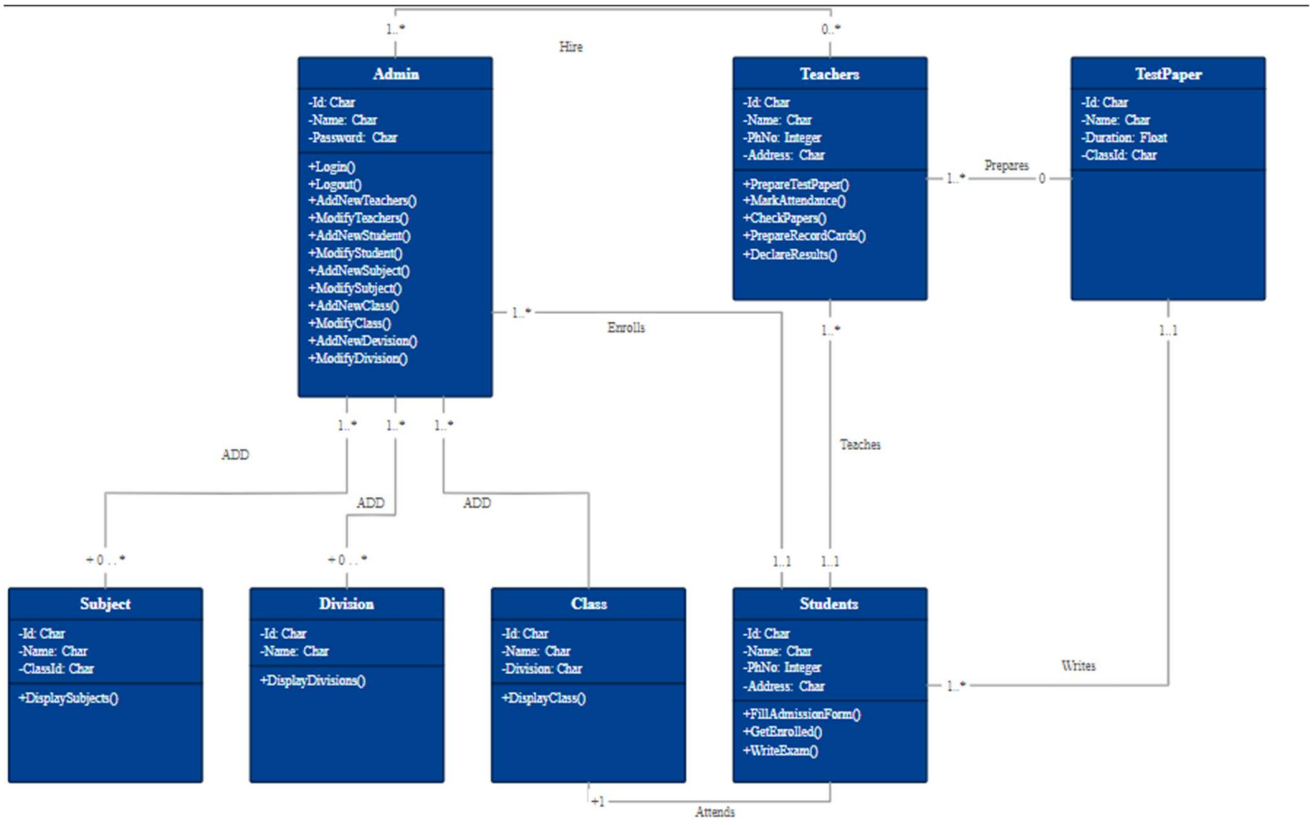

Figure 9: School Admin System Class Diagram

4.4 Database Diagram

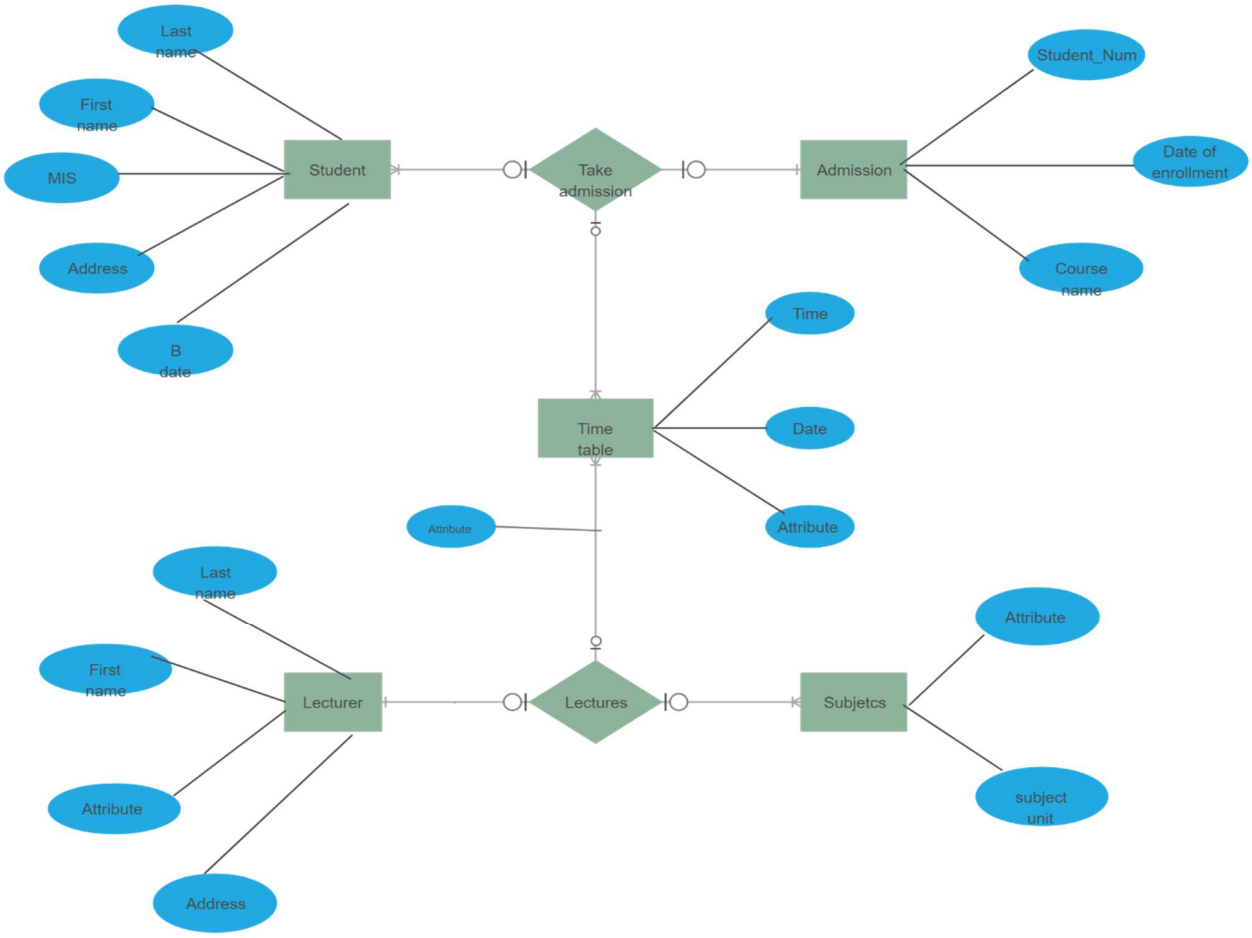

Figure 10: School Admin System Entity Relationship Diagram

4.5 Assumptions and Dependencies

1. **Technical Feasibility Assumptions:**
   - **Hardware Infrastructure:** The assumption is that the required hardware infrastructure, including servers, network components, and other devices, will be available and capable of supporting the system's functionalities.
   - **Software Dependencies:** The project assumes access to necessary software, including operating systems, database management systems, and any third-party applications that are

essential for system.

2. **Subsystems or Component Availability:**
    - **Availability of APIs:** Relies on third-party APIs for essential data, assuming consistent availability and access.
    - **Database System:** Assumes uninterrupted access to the MongoDB database system for data storage and retrieval.

3. **Project-Related Assumptions:**
    - **User Adoption:** Assumes a sufficient adoption rate among the target user base (students, teachers, parents) for active engagement with web platforms.
    - **Data Accuracy:** Assumes a sufficient adoption rate among the target user base (students, teachers, parents) for active engagement with web platforms.

4. **Dependencies on External Factors:**
    - **Internet Connectivity:** Dependencies exist on stable internet connectivity for Farmer to access the system's online features and real-time data.
    - **Regulatory Compliance:** Assumes adherence to educational regulations and standards governing data privacy and security

5. System Architecture

5.1 Client-Server Architecture

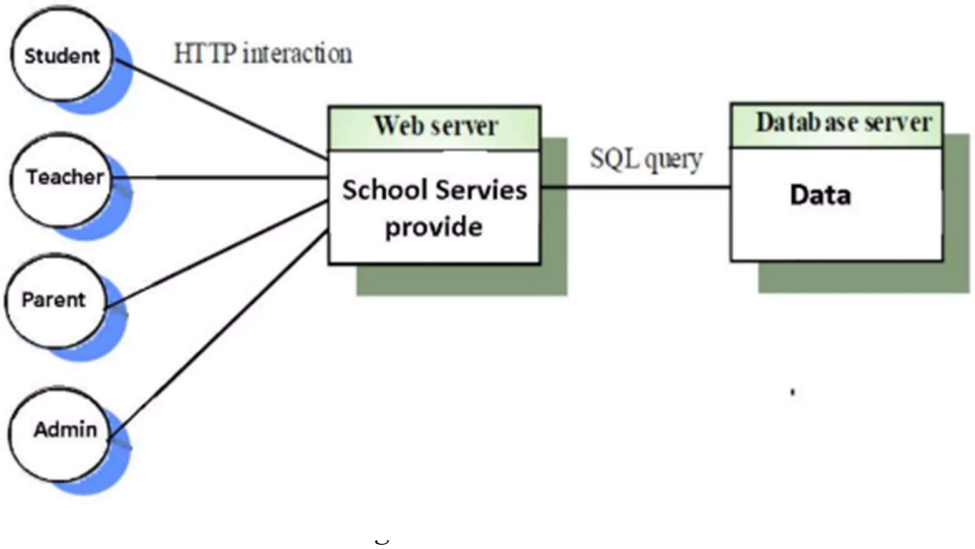

Figure 13: Client Server Architecture

5.2 Communication Interface

Communication interfaces refer to the channels or mechanisms through which various system components, devices, or modules interact and exchange data. Here's an outline of communication interfaces in the project:

API Endpoints:

- **Express.js:** Utilized for communication between client-side applications (web application and mobile app) and the server-side (Node.js).
- **Endpoints for Data Exchange**: The School Administration System features API endpoints for user authentication, student record management, grade input and viewing, attendance tracking, announcement posting, and class organization. These endpoints ensure efficient data exchange and user interaction across the system.

External Service Integration:

- **Weather Forecast API:** An interface that integrates with external weather services to retrieve real-time weather data, aiding in decision-making for school outdoor activities and events.
- **Market Data API**: Integration point for accessing market-related information, helping administrators and teachers stay informed about relevant educational resources and opportunities.

Database Interaction:

- **Database Connectivity:** Interfaces that connect the backend server (Node.js) to the MongoDB database for data storage and retrieval, ensuring smooth data flow.
- **Query Interfaces:** Mechanisms that facilitate the execution of database queries, allowing for efficient management and retrieval of information from the database, including:
  - CRUD operations (Create, Read, Update, Delete) for student and teacher records
  - Retrieval of attendance and grade data
  - Management of class schedules and assignments

Networking Interfaces:

- **Internet Connectivity:** Ensures connectivity between the client-side applications, server-side components, and external services via the internet.
- **Secure Communication Protocols:** Integration of secure communication protocols (HTTPS, SSL/TLS) for encrypted data transmission between the clients and the server.

These networking interfaces define the pathways for interaction between system components and external entities, ensuring effective data exchange and overall system functionality.

6. Conclusion & Future scope

6.1 Conclusion

Summary of Achievements:

- **Accomplishments**: The School Admin System successfully implemented core functionalities to streamline administrative tasks within educational institutions. This includes student enrollment, fee management, attendance tracking, examination scheduling, and result management. These achievements have automated many manual processes, improving overall operational efficiency.

- **Key Objectives:** The system has effectively addressed its primary objectives by simplifying school administrative operations. It has helped reduce paperwork, enhance communication between parents, students, and teachers, and provide real-time data access for better decision-making.

- **Challenges Overcome:** During the implementation, challenges such as data

migration from legacy systems, user adoption, and data security were encountered. These were mitigated by providing comprehensive user training, using data encryption methods, and integrating secure cloud storage for data management.

Impact:

- **Benefits to the Institution**: The system has positively impacted schools by reducing administrative workload, allowing staff to focus on educational quality. It has enhanced transparency, increased operational efficiency, and made administrative processes more reliable and less time-consuming.
- **Contribution to Education:** By digitizing administrative tasks, the project has advanced modern education management practices, contributing to a smoother, more organized school environment. It has fostered improved communication between all stakeholders, providing better insights into academic progress and attendance patterns.

6.2 Future Scope

Potential Enhancements:

- **New Features:** Additional functionalities that could be integrated include advanced data analytics for performance tracking, automated report generation, integration of student behavior and psychological assessment tools, and more personalized dashboards for different stakeholders (parents, teachers, students).
- **Technological Upgrades:** There are opportunities to enhance the platform with new technologies such as AI-based predictive analytics for student performance, enhanced user interface designs for better usability, and chatbot support for quick query resolution.
- **Scalability Considerations:** As schools grow, the system could be scaled to support multiple branches or even district-wide school systems. This may involve expanding server capacity, enabling cloud-based operations for larger data storage, and optimizing the system for multi-school functionality.

Research and Development:

- **AI Integration:** AI for predicting outcomes, teacher assessments, and early detection of disengagement.

- **IoT Integration:** Smart attendance systems, real-time classroom monitoring, and energy management.
- **Mobile App Enhancement:** Personalized notifications, mobile fee payments, and e-learning platform integration.

Community Engagement and Partnerships:

- **Collaborations:** Partnerships with educational boards, governments, and NGOs to expand services.
- **Community Growth:** Building forums and social platforms to foster collaboration among stakeholders.

Conclusion of Future Scope:

- **Vision and Direction:** The School Admin System will continue to grow by incorporating advanced technologies like AI, IoT, and mobile enhancements. The focus is on expanding scalability, improving analytics, and fostering better communication and efficiency in school management.

7. Concerns / Queries / Doubts if any:

Project-related Queries:

- How can we effectively integrate RFID or biometric-based attendance systems into the platform?
- What methods can be employed to ensure seamless multi-language support for users across diverse regions?

Technological Queries:

- How can we optimize UI development using React Native for both web and mobile applications?
- How can we ensure compatibility and reliability when connecting various IoT devices to the platform?
- What are the best practices for effectively implementing Agile methodology for continuous, iterative development?