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Software Requirements Specification(SRS)

For

KD Academy Web Application

Version 1.0.0

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1. Introduction

1.1 Purpose

The purpose of this Software Requirements Specification (SRS) is to provide a detailed and structured representation of the requirements for KD Academy's web application. This document aims to ensure a common understanding of the system's scope, objectives, and functionality among all stakeholders, including the development team, project managers, and end users (students, teachers, and administrators).

The platform's main objective is to streamline and digitalize key academic and administrative processes within KD Academy. It will serve as a centralized hub for managing various educational workflows, including course enrollments, attendance management, academic performance monitoring and administration. etc. This document will act as a comprehensive guide throughout the project lifecycle, covering all aspects of development, testing, deployment, and future system maintenance.

1.2 Scope

The KD Academy Web Application is a comprehensive solution designed to replace and streamline the academy's manual processes for academic and administrative activities. This innovative system offers several key functionalities to enhance efficiency and user experience. Through the Online Course Enrollment feature, students can search for courses, check availability, and enroll with ease, while receiving real-time notifications for enrollment confirmations. Administrators will have the ability to approve and manage enrollments seamlessly. The Attendance Tracking and Reporting module allows teachers to digitally mark attendance, minimizing errors and enabling administrators to export and analyze data for reporting. In the Academic Performance Management section, teachers can record grades for assignments, quizzes, and exams, while students benefit from access to detailed analytical reports and printable performance summaries. Finally, the Administrative Management Tools empower administrators to oversee courses, students, and teachers via a centralized control panel, with automated reports on enrollment, attendance, and performance. This application is a vital step toward modernizing and optimizing academic and administrative workflows.

1.3 Definitions, Acronyms, and Abbreviations

To ensure clarity and consistency, the following definitions and abbreviations are used throughout this document:

Term/Acronym	Definition
SRS (Software Requirements Specification)	A document that captures and specifies all the requirements of a software product.
Web Application	A software application that is accessible through a web browser.
Admin (Administrator)	A user role responsible for overseeing and managing the system's operations, including user accounts, course data, and reports.
Frontend	The visual interface of the application with which users interact.
Backend	The server-side components of the application, including logic and database operations.
Attendance Management	The process of recording and tracking student attendance during classes.
Academic Performance	A record of student grades and achievements, typically maintained by teachers and viewed by students and parents.

1.4 References

The following references were used to shape the requirements and standards for this project:

1. **KD Academy Operational Guidelines**: Internal policies and procedures for academic and administrative workflows.
2. **GDPR Compliance Standards**: Guidelines to ensure that the system complies with data protection and privacy regulations, especially when handling student and staff data.

3. **Academic and Industry Templates**: Established frameworks and templates for developing Software Requirements Specifications to ensure industry compliance and usability.

1.5 Overview

This document outlines the requirements for KD Academy's web application, covering both functional and non-functional needs. It details the interactions between users—students, teachers, and administrators—and the system, along with the technical specifications for development. Key sections include an Overall Description of the product's purpose and features, System Requirements focusing on performance, usability, and security, System Features like login, course enrollment, and External Interface Requirements for user interfaces and system interactions. This SRS serves as a guide for planning, development, testing, and evaluation to ensure the application meets the academy's goals and user needs.

2. Overall Description

2.1 Product Perspective

The KD Academy Web Application will serve as a standalone system designed to address the academy's key academic and administrative needs. It is intended to replace manual, paper-based processes with a centralized, automated, and user-friendly platform, ensuring improved efficiency, accuracy, and accessibility for all stakeholders.

Current Challenges Addressed by the System:

1. **Manual Processes**: Existing workflows such as course enrollment, attendance tracking, and grade management are time-consuming and prone to human error.
2. **Limited Accessibility**: Students and teachers face challenges in accessing academic resources and records outside the academy premises.
3. **Data Inconsistencies**: Managing records manually often leads to errors, redundancies, and delays in generating reports.

How the Product Addresses These Challenges:

- The application will digitize all processes, offering a seamless experience for students, teachers, and administrators.

- Through a browser-based interface, users will have 24/7 access to academic resources, enabling flexible learning and management.
- A centralized database will ensure data consistency and integrity, supporting accurate recordkeeping and reporting.

The system will interact with several components, including:

- **Frontend Interface**: Accessible through any modern web browser, providing a responsive and intuitive user experience.
- **Backend Server**: Responsible for handling business logic, data processing, and secure user authentication.
- **Relational Database**: Stores all data, including student information, course details, attendance records, grades, and administrative reports.

By integrating these components, the KD Academy Web Application will enhance operational efficiency and provide an end-to-end solution for academic and administrative management.

2.2 Product Functions

The KD Academy Web Application will deliver the following key functions:

1. **Online Course Enrollment System**:
    - Students will be able to search for and enroll in courses through an intuitive interface.
    - Real-time course availability updates will ensure students can make informed decisions.
    - Notifications for successful enrollment and pending approvals will be sent via email.
2. **Attendance Tracking and Reporting**:
    - Teachers will have access to tools for marking attendance, either manually or using automated integrations (e.g., barcode scanners for student IDs).
    - Attendance records will be accessible to students, parents, and administrators.
    - Reports summarizing attendance data can be generated for compliance and academic purposes.
3. **Academic Performance Tracking and Visualization**:
    - Teachers can input grades for assignments, quizzes, and exams.

- Students will have access to detailed performance analytics, including grade trends and feedback.
- Administrators can generate reports to analyze academic performance across courses.

4. **Administrative Tools**:
   - Administrators will have access to dashboards for managing courses, students, and teachers.
   - Features will include user role management, system configuration, and report generation.
   - The system will ensure compliance with data privacy regulations (e.g., GDPR).

2.3 User Classes and Characteristics

The application is designed to serve three primary user groups: students, teachers, and administrators. Each user class has unique needs and characteristics:

User Class	Key Functions	Characteristics
Students	- Search and enroll in courses.	- Typically non-technical users requiring an intuitive interface with minimal training.
	- View attendance records and academic performance.	- The system will provide step-by-step instructions and tooltips to guide students through key processes.
Teachers	- Manage student attendance records and input grades.	- Require a role-specific dashboard with streamlined access to attendance, grade management, and scheduling tools.
	- Schedule and host virtual classes.	- The interface will include bulk upload options for attendance and grades to reduce manual effort.
Administrators	- Manage system-wide settings, including user roles and access permissions.	- Need advanced tools for managing large datasets and configuring system settings.

	- Generate reports on attendance, academic performance, and course enrollment trends.	- The system will include audit trails and logs to track administrative actions.

2.4 Operating Environment

The KD Academy Web Application will operate in the following environment:

- **Platform**:
  - The application will be accessible through modern web browsers, including Google Chrome, Mozilla Firefox, and Microsoft Edge.
  - A responsive design will ensure compatibility with desktops, laptops, tablets, and smartphones.
- **Hosting**:
  - The system will be deployed on a cloud-based hosting service such as AWS or Microsoft Azure, ensuring scalability and reliability.
  - Load balancers will distribute traffic efficiently, minimizing downtime during peak usage.
- **Database**:
  - A relational database management system (RDBMS), such as MySQL or PostgreSQL, will be used to store and manage data.
  - The database will support ACID (Atomicity, Consistency, Isolation, Durability) compliance to ensure data integrity.
- **Security**:
  - Data will be encrypted both in transit (using HTTPS) and at rest (using database-level encryption).
  - User authentication will be secured through role-based access control and multi-factor authentication.

2.5 Assumptions and Dependencies

The development and operation of the KD Academy Web Application rely on the following assumptions and dependencies:

1. **Assumptions**:
   - All users will have stable internet connectivity to access the system.

- Students, teachers, and administrators will have access to devices capable of running modern web browsers.
- Stakeholders will provide timely feedback during the development and testing phases.

2. **Dependencies**:
   - The system will depend on third-party services for email notifications (e.g., SMTP servers) and virtual class hosting (e.g., Zoom APIs).
   - Cloud hosting services must provide a reliable and scalable infrastructure to support the system.
   - Regular backups will be implemented to prevent data loss in case of system failure.

By addressing these assumptions and dependencies, the application will be equipped to deliver a robust, reliable, and user-friendly experience for all stakeholders.

3. System Requirements

3.1 Functional Requirements

The functional requirements describe the key features and operations of the system to ensure it fulfills its intended purpose.

Feature	Description
User Management	
Secure User Registration	Users (students, teachers, administrators) can create accounts with unique credentials. Email addresses are verified through an email confirmation process.
Role-Based Authentication	Role-based access control (RBAC) ensures users access functionalities relevant to their roles (e.g., students cannot access administrative features).

Password Management	Users can reset forgotten passwords through email recovery. Passwords must meet security standards, including minimum length, complexity, and expiration policies.
Profile Management	Users can securely update personal information, such as name and contact details, through a profile management interface.
Course Enrollment	
Course Viewing and Enrollment	Students can browse courses for the semester with details like schedule, instructor, and prerequisites. Real-time updates display course availability.
Enrollment Confirmation	Students receive email notifications upon successful enrollment. Waitlists notify students when seats become available in full courses.
Attendance Management	
Attendance Marking	Teachers can mark attendance manually or automatically using barcode/QR code scanning during or after classes.
Attendance Editing	Teachers can update or correct attendance records, with changes logged for transparency.
Student Access	Students can view attendance history and receive notifications if their attendance falls below the required threshold.
Academic Performance Tracking	
Grade Input and Management	Teachers can input grades for assignments, quizzes, exams, and projects. Bulk upload functionality is available for uploading multiple grades.
Performance Reports	Students can access detailed performance reports, including scores and feedback. Administrators can generate analytics reports for individual students, classes, or courses to identify trends.
Notifications and Reports	

Email Notifications	Automated email notifications are sent for enrollment confirmations, class reminders, attendance warnings, and grade updates.
Report Generation	Teachers and administrators can generate reports for attendance, academic performance, and enrollment trends in PDF or Excel formats for analysis and sharing.

3.2 Non-Functional Requirements

The non-functional requirements define the system's quality attributes, including performance, usability, security, reliability, and scalability.

Performance

1. The system must handle up to **1000 concurrent users** with minimal latency (response times below 2 seconds for standard operations).
2. Real-time updates for course availability and attendance records must occur within 1 second.

Usability

1. The user interface must be intuitive, ensuring that non-technical users (e.g., students and teachers) can navigate the platform without prior training.
2. A responsive design will optimize the system for use across devices, including desktops, tablets, and smartphones.
3. Tooltips, tutorials, and FAQs will be provided to assist users with common tasks.

Security

1. All sensitive data, including passwords and personal information, must be encrypted during transmission (via HTTPS) and at rest (using AES-256 encryption).
2. Role-based access control (RBAC) will ensure users can only access data and features specific to their roles.
3. Multi-factor authentication (MFA) will be implemented for administrative accounts to enhance security.

4. Audit logs will track all critical system actions, such as login attempts, data updates, and report generation.

Reliability

1. The system must maintain **99.9% uptime**, with failover mechanisms to ensure continuity during server outages.
2. Daily backups will be performed to prevent data loss in the event of a system failure.

Scalability

1. The system must be designed to accommodate future growth, including increased numbers of users, courses, and data.
2. Cloud-based infrastructure (e.g., AWS or Azure) will allow for dynamic scaling based on usage demands.
3. The database schema must be optimized for handling large datasets without performance degradation.

4. System Features

4.1 Login and Authentication

The login and authentication module is a critical component of the system, ensuring secure and role-based access to features and data.

- **Secure Login**:
    - The system will provide a secure login mechanism using **encrypted user credentials** (e.g., email and password).
    - Data transmission during login will be secured with HTTPS to prevent interception.
- **Role-Based Access Control (RBAC)**:
    - The system will implement **role-based access control** to restrict access based on user roles:
        - **Students**: Access features like course enrollment, attendance records, and performance tracking.
        - **Teachers**: Access attendance management, grading, and virtual class hosting.

        - **Administrators**: Full control over system settings, reports, and data management.
    - Each user's access permissions will be dynamically loaded based on their role.
- **Password Management**:
    - Users will have access to a **password reset feature**, which will send recovery links to their registered email addresses.
    - Passwords must meet security standards (e.g., minimum length, use of special characters).
- **Session Management**:
    - The system will implement **session timeouts** to enhance security, automatically logging out inactive users.

This feature ensures that only authorized users can access the system, protecting sensitive data and maintaining system integrity.

4.2 Course Enrollment Management

The course enrollment module simplifies the process of course registration for students while providing administrators with tools for managing enrollments.

- **Online Enrollment**:
    - Students can browse available courses for a semester, view course details (e.g., schedule, instructor, prerequisites), and enroll with a single click.
    - Real-time updates will display the number of available seats for each course.
- **Waitlisting**:
    - If a course is full, students can be placed on a **waitlist**, with automatic notifications sent when a seat becomes available.
- **Enrollment Confirmation**:
    - After successful enrollment, students will receive an **automated confirmation email** with course details.
    - Teachers and administrators will also receive notifications of new enrollments for tracking purposes.
- **Administrative Management**:
    - Administrators can view, approve, or reject enrollments, ensuring compliance with academic policies.

    - Bulk enrollment options will allow administrators to register multiple students simultaneously.

This feature enhances the enrollment experience by automating workflows and minimizing errors.

4.3 Attendance Management

The attendance management feature provides tools for tracking and reporting student attendance efficiently.

- **Teacher Attendance Input**:
    - Teachers can mark attendance through their dashboard in real-time or update attendance records after a class session.
    - The system supports **manual input** as well as automated solutions (e.g., QR code or barcode scanning).
- **Student Attendance Records**:
    - Students can view their attendance records for each course, including attendance percentages and missed classes.
    - The system will display attendance trends to help students identify areas of improvement.
- **Notifications**:
    - The system will send automated **attendance alerts** to students who fall below the required attendance threshold.
    - Teachers and administrators will receive summaries of attendance data for their classes or departments.
- **Reporting**:
    - Attendance data can be exported into PDF or Excel reports, with options to filter by course, student, or date.

This feature helps maintain academic discipline by ensuring attendance records are accurate, accessible, and actionable.

4.4 Academic Performance Tracking

The academic performance tracking module allows teachers and administrators to manage grades and analyze student performance effectively.

- **Grade Input and Management**:
    - Teachers can input grades for assignments, quizzes, exams, and projects through their dashboard.
    - The system supports **bulk grade uploads** using standardized templates, reducing manual effort.
- **Performance Reports**:
    - Students can view detailed performance reports, including individual grades, feedback, and overall course performance.
    - Reports will include visualizations such as graphs and charts to illustrate performance trends.
- **Administrative Analytics**:
    - Administrators can generate aggregated performance reports to analyze trends across courses, departments, or semesters.
    - The system will flag at-risk students for additional support or intervention.

This feature ensures that academic progress is transparent and actionable for all stakeholders.

4.5 Notifications and Reports

The notifications and reporting module ensures that users stay informed about key events and have access to actionable insights.

- **Email Notifications**:
    - The system will send automated email notifications for:
        - Enrollment confirmations.
        - Attendance warnings.
        - Class reminders.
        - Grade updates.
    - Notifications can be customized based on user preferences.
- **Report Generation**:
    - Teachers and administrators can generate reports for attendance, grades, and enrollment trends.
    - Reports will be available in PDF or Excel formats for easy sharing and analysis.
- **System Alerts**:
    - System-wide alerts can be broadcast to all users (e.g., academic calendar updates, system maintenance notices).

5. External Interface Requirements

5.1 User Interfaces

The user interface (UI) of the KD Academy Web Application is a critical component that determines how effectively users can interact with the system. It is designed to be intuitive, responsive, and accessible to users with varying levels of technical expertise.

- **Web-Based User Interface**:
    - The application will have a web-based UI accessible via modern browsers such as Google Chrome, Mozilla Firefox, Microsoft Edge, and Safari.
    - The design will follow **responsive web design principles**, ensuring usability across desktops, laptops, tablets, and smartphones.
    - Each user role (students, teachers, administrators) will have a personalized dashboard to access their specific functionalities:
        - **Students**: Dashboard for course enrollment, attendance tracking, grade reports, and virtual learning resources.
        - **Teachers**: Dashboard for managing attendance, grades, and virtual class schedules.
        - **Administrators**: Control panel for managing courses, users, reports, and system settings.
- **UI Design Features**:
    - A clean and modern interface with consistent styling and navigation.
    - Accessible design with support for features like high-contrast modes and scalable fonts to cater to users with visual impairments.
    - Integration of tooltips, guides, and FAQs to assist users with minimal training.
- **Key UI Elements**:
    - **Forms and Input Fields**: For user registration, course enrollment, and attendance management.
    - **Interactive Tables and Charts**: To display performance analytics, attendance records, and enrollment statistics.
    - **Notification Center**: Displaying alerts for upcoming classes, deadlines, and system messages.

The UI is designed to prioritize usability, ensuring that users can efficiently perform their tasks without extensive training or technical expertise.

5.2 Hardware Interfaces

The KD Academy Web Application is designed to operate on standard hardware, ensuring accessibility without requiring specialized equipment.

- **Client Devices**:
    - The system is compatible with commonly used client devices, including:
        - **Desktops and Laptops**: For teachers and administrators performing extensive data entry and management.
        - **Tablets and Smartphones**: For students accessing the platform on the go.
    - Minimum device specifications:
        - **Processor**: Dual-core or higher.
        - **RAM**: At least 4 GB.
        - **Storage**: No significant storage requirements (browser-based).
- **Peripheral Devices** (Optional):
    - **Barcode/QR Code Scanners**: For automated attendance marking, particularly in physical classrooms.
    - **Printers**: For generating hard copies of reports, attendance sheets, and academic records.

The platform's compatibility with standard hardware ensures that users can interact with the system without additional infrastructure investments.

5.3 Software Interfaces

The software interfaces define the interaction between the KD Academy Web Application and other software systems or components.

- **Operating Systems**:
    - The application will run on devices with modern operating systems, including:
        - Windows 10 or later.
        - macOS 10.15 (Catalina) or later.
        - Android 9.0 (Pie) or later.
        - iOS 13 or later.

- **Web Browsers**:
    - The application will be optimized for performance on modern, standards-compliant browsers:
        - Google Chrome (v90+).
        - Mozilla Firefox (v85+).
        - Microsoft Edge (v89+).
        - Safari (v13+).
- **Database Management System (DBMS)**:
    - The system will integrate with a relational database (e.g., MySQL, PostgreSQL) to manage data such as user information, course details, attendance records, and grades.
- **Third-Party Integrations**:
    - The application will interface with third-party software to provide additional functionalities:
        - **Email Services**: Integration with SMTP servers (e.g., Gmail API) for sending notifications.
        - **Video Conferencing Tools**: APIs for platforms like Zoom or Microsoft Teams to enable virtual class hosting.
        - **Payment Gateways** (Future Scope): For processing payments related to course fees or registrations.

These software interfaces ensure interoperability and seamless integration with external systems to enhance the system's functionality.

5.4 Communication Interfaces

The communication interfaces define how the system exchanges information with users and external components. The primary focus is on secure, efficient, and real-time data transfer.

- **Protocols**:
    - The system will use standard communication protocols to ensure reliable data transfer:
        - **HTTPS (HyperText Transfer Protocol Secure)**: For secure communication between the client and server, ensuring data encryption during transmission.
        - **SMTP (Simple Mail Transfer Protocol)**: For sending automated email notifications.

        - **WebSocket Protocols**: For real-time features like live attendance updates and virtual class notifications.
- **APIs**:
    - The application will expose and consume **RESTful APIs** for seamless integration with third-party services, including:
        - Course and attendance data for administrative reporting.
        - Virtual classroom scheduling with external video conferencing platforms.
- **Data Transfer**:
    - The system will support real-time synchronization of user data, attendance records, and academic performance metrics.
- **Notifications**:
    - Automated email notifications will keep users informed of key events, such as class reminders, enrollment updates, and grade releases.

These communication interfaces ensure that data is exchanged securely and efficiently, supporting real-time interactions and notifications.

6. Appendices