Software Requirements Specification

for

Academia | Class and Exam Tracking System

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Chapter 1

Introduction

1.1 Purpose

The purpose of this Software Requirement Specification (SRS) document is to define the functional and non-functional requirements for the academic activity management system, named Academia. This system aims to streamline and manage the academic activities of a specific department of a university, by providing tools for class scheduling, performance tracking, course management, and exam committee assignments.

1.2 Intended Audience

- **Developers:** To fully understand the functional and non-functional requirements needed to build the system.
- **Testers:** To design detailed test cases and validation scenarios that will help create a bug-free and smooth user experience.
- **Business Analysts:** To ensure that the system requirements align with the business goals and user needs.
- **Project Managers:** To manage the project's scope, track progress, ensure team coordination and seamless feature integration so that development activities stay in line with institutional stakeholders' requirements.
- **System Architects:** To design the system architecture based on the specified requirements.
- **Institutional Stakeholders:** To verify that the SRS accurately reflects the needs of the Department and teachers, ensuring that the system will meet their expectations.

1.3 Intended Use

- Developers will use the SRS to guide the design and implementation of the system's features, ensuring that the Class and Exam Tracking System meets all specified functional and non-functional requirements.
- Testers will use the SRS to create test cases and validation scenarios, ensuring that the system functions as intended and meets the quality standards.
- Project Managers will use the SRS to track project milestones, monitor progress, and ensure that the development aligns with stakeholder expectations.

- System Architects will refer to the SRS to design the system architecture in a way that supports the required functionalities and performance criteria.
- Institutional Stakeholders, such as department administrators or IT consultants, will review the SRS to confirm that it accurately reflects the needs of the department and teachers, ensuring that the system will meet their expectations.

1.4 Product Scope

This web application will provide:

- **Course and Exam Management:** Scheduling, monitoring, and evaluating academic activities.
- **Performance Tracking:** Detailed tracking of class progress and teaching performance.
- **Communication and Notification System:** Facilitating communication between teachers, exam committees, and department chairs.

1.5 Risk Definition

- **Data Security and Privacy:** This system would likely handle sensitive information, including personal data of students and faculty and records of academic misconduct. If not properly secured, this data could be exposed to unauthorized access or breaches.
- **User Authentication and Access Control:** Unauthorized access to the system could lead to data tampering, academic fraud, or data theft.
- **Inaccurate or Incomplete Data:** Inaccurate data entry or incomplete records could lead to incorrect decisions, potentially harming the academic integrity of the institution.
- **Ethical Considerations:** The use of such a system could raise ethical concerns, particularly regarding surveillance and the handling of sensitive academic data.
- **Scalability and Performance Issues:** As the number of users and the volume of data grows, the system might experience performance issues or fail to scale effectively.
- **Usability Issues:** If the system is not user-friendly, it may lead to frustration and errors, decreasing overall productivity.
- **Growth Challenges:** As the department grows, the system may struggle to scale up, leading to performance issues.
- **Support and Updates:** Inadequate vendor support or delayed updates could affect the system's performance and security.
- **Compatibility Issues:** Integrating the AAMS with existing systems, such as Department Management system might present technical challenges.
- **Downtime & Data Loss:** If the system experiences frequent downtimes or crashes, it can disrupt academic activities, affecting both students and staff and poor backup procedures could lead to loss of important academic data due to system failures or human error.

Chapter 2

Overall Description

2.1 User Classes and Characteristics

2.1.1 Superadmin

- Characteristics
  - A member related to the department
  - Can be either a teacher, current student, or alumni of the department
- Roles
  - Manages access control
  - Manages user permission

2.1.2 Department Chairman

- Characteristics
  - Primary spokesperson for department faculty, staff, and students
  - Represents the central administration to department members
  - Implements university policies and directives in the department
  - Gets changed after three years
- Roles
  - Oversees all semester progress
  - Assigns exam committees and monitors them
  - Tracks the performance of teachers

2.1.3 Exam Committee

- Characteristics
  - Consists of three members, one of them being assigned the exam committee chairman
  - Carries out examinations in smooth manner
  - Keeps the record of each and every issue related to the examination

  - Gets changed after a year
- Roles
  - Assigns course teachers
  - Monitors the progress of courses under the semester
  - Uploads the academic calendar to the system

2.1.4 Course Teacher

- Characteristics
  - Has expertise in the assigned courses
  - Teaches the students
  - Takes exams and evaluates students' performance
  - Manages classroom
  - Completes the course within the given time
  - Retires after the age of 65
- Roles
  - Plans activities like taking classes and tutorials as per course schedule and academic calendar
  - Tracks own academic performance
  - Reports issues

2.2 User Needs

2.2.1 Superadmin

- Needs an user-friendly interface for managing and adjusting user access and permissions.
- Needs a system for tracking changes and receiving alerts for potential security issues.

2.2.2 Department Chairman

- Needs a comprehensive dashboard to monitor and manage semester progress.
- Needs features to assign members to exam committees and oversee their activities.
- Needs features to evaluate and track faculty performance.

2.2.3 Exam Committee

- Needs functionality to assign course teachers to appropriate courses, based on their expertise and availability.
- Needs features to monitor the progress of courses throughout the semester.
- Needs a feature to upload and manage the academic calendar within the system.

2.2.4 Course Teacher

- Needs tools to plan and manage class activities and tutorials according to the course schedule and academic calendar.
- Needs a system to track and evaluate their academic performance through visual graphs and analyzed data.
- Needs a platform to report any issues related to the course or classroom.

2.3 Operating Environment

- Web Browser Compatibility
  - Supports recent versions of major browsers:
    - Google Chrome (Version 119.0 and above)
    - Mozilla Firefox (Version 120.0 and above)
    - Microsoft Edge (Version 119.0 and above)
    - Brave(Version 1.64 and above)
    - Safari (Version 17.1 (macOS) and above)
- Server Infrastructure
  - Hosted on a secure web server.
  - Supports modern web technologies.
- Operating Systems
  - Linux (Ubuntu 22.04 LTS and above)
  - Windows (Windows 11 (23H2) and above)
  - macOS (macOS Sonoma (14.0) and above)
  - Android (Version 11 and above)
  - iOS (Version 14 and above)
- Network and Security
  - Secured with firewalls, SSL/TLS(TLS 1.2 or TLS 1.3) encryption, and other security measures.
- User Devices
  - Accessible from desktops, laptops, tablets, and smartphones.

2.4 Constraints

- The users must have basic digital literacy skills and understanding of navigating web applications.
- The system must have adequate IT infrastructure for data storage and backups.
- The system should be optimized for quick load times and efficient processing, even under heavy loads.
- There should be adequate technical support available to resolve issues that users might face.
- The system should be easy to maintain and update, allowing for quick bug fixes and feature upgrades.

2.5 Assumptions

- The system will adhere to institutional academic regulations and policies.
- The department chairman and exam committee will provide accurate course and academic data.
- It will integrate with other institutional systems like Department Management Systems.
- The system will handle peak usage times, such as during registration periods or exam seasons, without crashing.
- Data privacy and security will be maintained.

Chapter 3

Requirements

3.1 Functional Requirements

1. As a **department chairman**, I want to assign an exam committee for semesters, so that I can ensure proper faculty management for exam supervision.

   - Success:
     (a) The department chairman is presented with an intuitive browser window displaying a list of faculty members.
     (b) By simply clicking on the names of available teachers, the chairman can easily assemble the exam committee.
     (c) Any teacher who is already assigned to another exam committee or is unavailable will have their name grayed out, ensuring there's no confusion or double-booking.
     (d) Once the selection is complete, a confirmation message appears, and all selected members are instantly notified with their exam duties.
   - Failure: Display message -
     (a) "Assignment failed – invalid user selected."
     (b) "Notification failed – please try again."
     (c) "System error – cannot assign committee at the moment."

2. As a **department chairman**, I want to view semester progress, so that I can monitor how courses are advancing throughout the academic term.

   - Success:
     (a) The system displays the progress of active and running semesters using real-time, accurate data.
     (b) Each semeter's progress is represented as a percentage, visualized through intuitive progress bars (e.g., "Course A: 23% complete").
     (c) The data is dynamically updated, ensuring the chairman always has the most up-to-date information.
   - Failure: Display message -
     (a) "Unable to load semester data."
     (b) "Course data missing."
     (c) "System error – Please try again later."
     (d) "Some data are missing, please reload." in case of partial loading

3. As a **department chairman**, I want to track the performance of course teachers, so that I can evaluate teaching effectiveness based on course expectations.

   - Success:
     (a) Comparison between the number of classes taken with the number of classes expected of specific teacher on specific courses is shown using line plots.
     (b) The line plots of number of classes taken and number of classes expected are differentiated using two separate colors (e.g. blue and orange).
     (c) Comparison between the number of classes of different courses taken by a specific course teacher is shown using bar plots of different colors.
     (d) Comparison between number of classes and tutorials of the courses in a specific semester is shown using bar plots.
     (e) The bar plots of number of classes and number of tutorials have different colors (e.g. blue and purple).
   - Failure: Display message -
     (a) "Unable to load semester data."
     (b) "Course data missing."
     (c) "System error – Please try again later."

4. As a **member of the Exam Committee**, I want to assign teachers to courses so that teachers can access their assigned courses.

   - Success:
     (a) The system displays a list of available teachers and courses.
     (b) Notifications are sent to teachers about their assigned courses.
     (c) A confirmation message "Course assignment successful" is displayed upon completion.
     (d) Assigned courses are reflected in the teacher's dashboard.
   - Failure: Display message -
     (a) "Unable to assign teachers."
     (b) "No available teachers found for the selected courses."
     (c) "System error – please try again later."

5. As a **member of the Exam Committee**, I want to view a detailed semester progress overview so that I can effectively monitor the advancement of all courses throughout the academic term.

   - Success:
     (a) At the top of the screen, a progress bar shows the overall semester progress (e.g., 60% complete).
     (b) Below the overall progress, each course's progress is displayed individually using course-specific progress bars. These bars use different colors to indicate completion rates (e.g., green for $>80\%$, yellow for 40-80%, red for $<40\%$).
     (c) When a committee member clicks on any course's progress bar, they are taken to a detailed view of that course, showing finer details such as assignment completion rates and lecture coverage.
     (d) All progress data are updated in real time.
   - Failure: Display message -
     (a) "Unable to load semester progress overview."
     (b) "Course data missing or incomplete."
     (c) "System error – please try again later."

6. As a **course teacher**, I want to view my dashboard with upcoming events, academic calendars, and course schedules so that I can plan my activities accordingly.

   - Success:
     (a) The dashboard loads with the schedule of all the classes and exams of different semesters for the week.
     (b) Academic calendar can be viewed from the dashboard.
     (c) Upcoming events/meetings along with event changes are highlighted and categorized by urgency.
   - Failure: Display message -
     (a) "Unable to load dashboard data."
     (b) "Schedule information missing."
     (c) "Academic calendar unavailable."
     (d) System error – please try again later."

7. As a **course teacher**, I want to view an overview of my classes and tutorials so that I can ensure I am staying on track with the course requirements and student progress.

   - Success:
     (a) The system displays an up-to-date overview of classes and tutorials, reflecting accurate course data.
     (b) Upon entering the page, the following information is shown:
       – Course details (name, code, etc.).
       – Expected number of classes and the number of classes already conducted for the course.
       – Expected number of tutorials and the number of tutorials already conducted.
       – Progress status displayed as a qualitative indicator (Very bad, Bad, Good, Very good, Excellent) based on the percentage of completed classes and tutorials.
     (c) A pie chart is shown, visually representing the distribution of tasks on the Kanban board:
       – Categories for the number of "To Do," "Doing," and "Done" cards are displayed, providing a quick overview of task progress for the respective course.
   - Failure: Display message -
     (a) "Unable to load class and tutorial overview."
     (b) "No course data available."
     (c) "System error – unable to retrieve progress chart."

8. As a **course teacher**, I want to use a visual, drag-and-drop Kanban board to manage my course activities so that I can stay organized, reduce stress, and ensure that all my responsibilities are completed on time.

   - Success:
     (a) Tasks are created, updated, and moved easily across the Kanban board, providing a clear and visual overview of the progress.
     (b) Deadlines are assigned to tasks to ensure timely completion.
     (c) Color-coded labels (red, orange, yellow, green, purple, blue) immediately indicate priority, ensuring quick identification of high-priority tasks.
     (d) Tasks are grouped into three categories (Class, Tutorial, and Others), which helps to efficiently organize and manage different aspects of a course.
     (e) Each card has a description section for quick notes, allowing to jot down important details or reminders to keep the tasks clear.
     (f) A notification system acts as a reminder for upcoming deadlines or overdue tasks, ensuring to never fall behind.
   - Failure: Display message -
     (a) "Unable to update task."

(b) "Task creation failed."
(c) "System error – unable to load Kanban board."

9. As a **course teacher**, I want to receive AI-driven, intelligent workflow suggestions so that I can complete pending tasks efficiently, minimize delays, and stay on top of my responsibilities without feeling overwhelmed.

- Success:
  (a) The AI system provides intelligent and personalized workflow suggestions based on the specific pending tasks, helping to prioritize them effectively.
  (b) Suggestions are displayed in order of urgency and impact, with clear, actionable steps to ensure timely task completion.
  (c) If a task is updated after a suggestion is generated, the system dynamically updates the workflow suggestion based on the latest task status.
  (d) If no new suggestion is generated (button not clicked or the previous suggestion is still active), the current suggestion remains unchanged and has no impact on the task.
  (e) Suggestions are provided based on minimizing delay or lateness of task completion.
- Failure: Display message -
  (a) "Unable to generate workflow suggestions."
  (b) "No pending tasks to suggest workflows for."
  (c) "System error – please try again later."

10. As a **course teacher**, I want to track my own performance, so that I can evaluate how well I am meeting course expectations.

- Success:
  (a) Comparison between the number of classes taken with the expected number of classes per month is shown using line plots.
  (b) The line plots of number of classes taken and number of classes expected are differentiated using two separate colors (e.g. blue and orange).
  (c) Comparison between the number of classes and tutorials taken so far for different courses is shown using bar plots.
  (d) The bar plots of number of classes and number of tutorials have different colors (e.g. blue and purple).
- Failure: Display message -
  (a) "Unable to load semester data."
  (b) "Course data missing."
  (c) "System error – Please try again later."

11. As a **course teacher**, I want to get AI-generated detailed performance reports so that I can observe my course progress and gain actionable insights and recommendations.

- Success:
  (a) The report contains descriptions of all the graphs present in the performance tracking section.
  (b) AI-driven insights based on the analysis of the performance graphs helps suggest better workflow and where to pay attention to in terms of courses.
  (c) The reports are available in various formats (e.g., PDF, Docs file).
  (d) The system offers a summary of key findings and recommendations.
- Failure: Display message -
  (a) "Unable to generate report."
  (b) "Error loading report data."
  (c) "AI analysis failed – please try again later."
  (d) "System error – please try again later."

12. As a **course teacher**, I want to send messages to the Department Chairman or Exam Committee to report any academic-related issues, so that I can quickly address problems affecting my teaching.
    - Success:
        (a) The message is sent successfully, and the sender receives a confirmation.
        (b) The message is timestamped, indicating when it was sent.
        (c) A copy of the sent message is saved in the "Sent" folder for future reference.
        (d) A real-time alert is provided to the recipient once the message is sent.
    - Failure: Display message -
        (a) "Message failed to send."
        (b) "Recipient not available."
        (c) "System error – unable to send message. Please try again later."

3.2 Non Functional Requirements

3.2.1 Performance Requirements

- The system must handle at least 100 concurrent users without significant performance loss.
- All system processes should execute within an acceptable time frame (e.g., reports, workflows generated within 5 seconds).

3.2.2 Safety Requirements

- The system must ensure that data is accurate and consistent, with mechanisms to prevent data corruption or loss during operations such as backups, updates, and system failures. Transaction handling should ensure that all changes are atomic, consistent, isolated, and durable (ACID properties).
- Adhere to relevant national regulations and university policies, including data protection and privacy laws, to ensure compliance with institutional and legal requirements.

3.2.3 Security Requirements

- The system must ensure secure data transmission using encryption (e.g., SSL/TLS).
- User roles and access control must be implemented to restrict unauthorized data access.

3.2.4 Software Quality Attributes

- Availability
    - **Up-time guarantee :** The system must guarantee 99.9% up-time, ensuring continuous availability, especially during critical academic periods (e.g., evaluations , academic meeting periods).
    - **Redundancy and Failover:** Implement redundancy in critical system components (e.g., database, application servers) to ensure failover in the event of hardware or software failures.
- Usability
    - **User-Friendly Interface:** The system should have an intuitive and consistent user interface that allows users to navigate the platform without needing extensive training. All core features should be accessible with minimal clicks.

  - **Responsiveness:** The system should be responsive and adaptable to various screen sizes and devices (e.g., desktops, tablets, smartphones), ensuring a seamless user experience across platforms.

- Maintainability
  - **Modular Architecture:** The system should follow a modular architecture to allow for easy updates and maintenance. Each module should be independent enough to be updated or fixed without affecting other parts of the system.
  - **Code Documentation:** The codebase must be well-documented to facilitate maintenance, debugging, and further development.

- Portability
  - **Cross-Platform Compatibility:** The system should be portable across different operating systems (e.g., Windows, macOS, Linux) without requiring significant modifications.