System Requirements Specification Document For Clash Finder Project

Group Members:

- Imran Ahmad (22L-7983)
- Saad Tariq (22L-7912)
- Uzair Ahmad (22I-1503)
- Tayyab Kamran (22I-2505)

Submitted To: Professor Zeeshan Ali Rana

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1. Introduction

1.1. Purpose

Our Project is Clash Finder in the given timetable. The purpose of this system is to help the administration of FAST NUCES to effectively manage timetables for classes and resolve the clashes easily. Its main goal is to minimize the time and effort the administration puts into resolving the clashes in between the classes. The clashes detected in the timetable can be resolved through this product with minimum effort. The clashes are resolved in such a way that they provide useful suggestions for the detected clashes.

1.2. Document Conventions

The SRS document follows certain standards and typographic conventions to make it clear, consistent, and easy to use. Time New Roman (TNR) is used for the general text and the headings. Bold and Italic text are used for emphasis and for variable names respectively. Each requirement statement has a priority level. Sequential numbering is used for requirement identification. Constant terminology and formatting is maintained throughout the entire document. Acronyms should be defined when first used and consistently used after that. References to external sources should be clearly identified and formatted in a consistent manner.

1.3. Intended Audience and Reading Suggestions

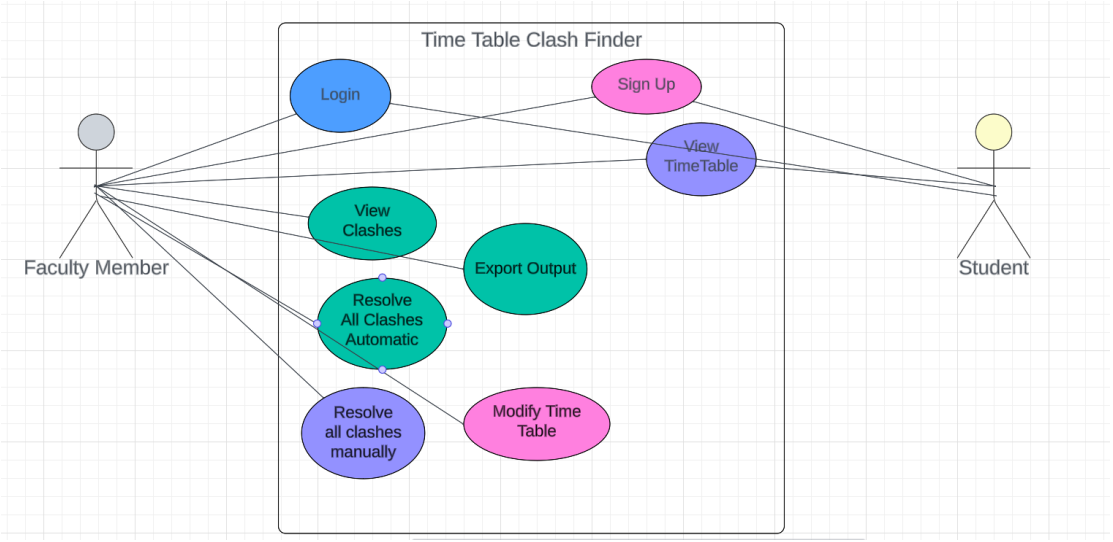
The intended audience for our Clash Finder is students, faculty and staff, IT and technical support. Students can see their clashes from the clash finder, faculty and staff will do the main goal i.e., resolve the clashes (they are direct stakeholders who interact with our Clash Finder). Developers focus on technical aspects. Project managers focus on planning and goals. Marketing staff focus on product value. System users focus on system performance. Testers focus on potential issues. Documentation writers focus on user-friendly user guides. For a basic understanding, start with the overview section and work your way up to the sections that best suit your role.

1.4. Product Scope

The scope of timetable clash finder is to provide a way to identify clashes in timetable classes. It is used within the premises of a university and it is only used by the administration. The timetable class finder can display the timetable and allow users to edit events, highlight conflicting events, and create custom schedules.

2. Overall Description

2.1 Product Perspective



The Clash Finder System is a self-contained software solution meticulously crafted to tackle the distinctive requirements and challenges encountered in academic institutions' course scheduling. This system seamlessly integrates with existing modules, notably the Timetable Reader, enhancing its capabilities and ensuring a harmonious collaboration within the University Management System. The Clash Finder System addresses the evolving complexities associated with academic scheduling, streamlining processes and providing valuable insights for optimizing course schedules. It is tailored to meet the unique needs of academic institutions.

2.2. Product Functions

The Clash Finder System offers a comprehensive set of features designed to streamline academic scheduling, providing efficient solutions for identifying, resolving, and managing scheduling clashes. Key functionalities include:

- Find Clashes
- Resolve Clashes
- Access Control
- Display Clash

2.3 User Classes and Characteristics

User classes and their characteristics for the Departmental Clash Finder are mentioned below:

2.3.1 Faculty Members:

- ***Add Courses:*** Faculty members have the ability to add courses to the scheduling system, contributing to the creation of the overall academic timetable.
- ***See Clashes:*** They can view scheduling clashes, gaining insights into potential conflicts within the timetable.
- ***Resolve Clashes:*** Faculty members possess the capability to suggest resolutions for identified scheduling conflicts, contributing to the optimization of course schedules.
- ***Access Control:*** While not explicitly mentioned, faculty members likely have controlled access to the system, ensuring they can contribute to the scheduling process effectively.

2.3.2 Students:

- ***View Timetable:*** Students are indirect users who can access and view the academic timetable. However, they do not have the capability to make changes to the system.
- ***No Direct System Changes****:* Unlike faculty members, students do not have the authority to add courses, resolve clashes, or make any direct alterations to the scheduling system.

These user classes play distinct roles in the Clash Finder System, with faculty members actively participating in the scheduling process and students primarily utilizing the system to access relevant timetable information.

2.4. Operating Environment :

The Clash Finder System is optimized to operate on standard computing hardware with a minimum specification of Windows 7 or later. The recommended system configuration includes a minimum of 2GB of RAM and 1GB of available disk space to ensure smooth performance. The system seamlessly integrates with existing hardware components, including computers, servers, and devices running the Windows operating system.

2.5. Design and Implementation Constraints

The development and implementation of the Clash Finder System are governed by various constraints that shape its design and functionality. These constraints include adherence to academic and institutional policies, ensuring regulatory compliance with educational standards, and compatibility with existing hardware infrastructure in academic institutions. Additionally, seamless integration with other university management applications, such as the Timetable Reader, is imperative for efficient interoperability. The choice of development technologies and tools must align with the academic technological ecosystem, and the system should accommodate language requirements prevalent in educational settings. Furthermore, adherence to established communication protocols, robust security measures, and conformity to design

conventions in academic scheduling software are essential considerations. Meeting these constraints is crucial for the successful development, deployment, and usability of the Clash Finder System, influencing the selection of development methodologies and impacting code reusability throughout its lifecycle.

2.6. User Documentation for Clash Finder System:

The Clash Finder System will come equipped with extensive user documentation, encompassing a user manual, online help resources, and tutorials. This documentation will be meticulously crafted following industry-standard formats and guidelines, ensuring accessibility and ease of use for users. The goal is to empower users with the necessary information to efficiently navigate the system, understand its functionalities, and make the most effective use of the Clash Finder features. This user-centric documentation strategy aims to facilitate a seamless user experience, allowing both faculty members to easily access relevant information and successfully utilize the Clash Finder System in the academic scheduling process.

2.7. Assumptions and Dependencies for Clash Finder System:

The Clash Finder System operates under the assumption of compatibility with existing hardware components and software applications within the university's infrastructure. However, its functionality and efficiency are contingent upon several factors. The system's performance relies on the processing power and memory capacity of the underlying hardware platform. Additionally, accurate updates from external systems, such as the Timetable Reader, are crucial for ensuring the integrity of scheduling data. These assumptions and dependencies underscore the interconnected nature of the Clash Finder System within the broader academic management ecosystem, emphasizing the importance of synchronized and accurate data inputs for optimal performance.

3. External Interface Requirements

3.1 User Interfaces

- The Departmental Store POS System will utilize a user-friendly and intuitive console based interface designed to enhance productivity and minimize training requirements. The interface will follow established design principles and industry standards for consistency, accessibility, and compatibility.

- User interfaces will be required for the Faculty Members to interact with the clash finder. Students will see their corrected timetable through the interface provided by Clash Finder.

3.2 Hardware Interfaces

Our Clash Finder Project shall have hardware interfaces like displays and computers. The product will be installed in computers and users can use it by interacting with their computers. The additional displays may also be installed for the students to let them see their clashes in their respective timetables.

3.3 Software Interfaces

The system is built to work with Windows 8 or higher. The operating system is chosen for this reason because it is widely used and works well with current hardware and software, making it stable and familiar for users. The system will be developed in Microsoft Visual Studio. Visual Studio is one of the most powerful integrated development environments in the world. It is well-known for its versatility when it comes to building Windows applications. Visual Studio provides a wide range of tools and capabilities that simplify the development process so that you can code, debug, and test quickly and easily.

3.4 Communications Interfaces

The students (indirect stakeholders) can be informed about their clashes through e-mails. So, the communication interface here is email through which our students are connected with the faculty who are interacting with the clash finder.

4. System Features

4.1: Login

4.1.1 Description and Priority: The Login feature enables users to access the Clash Finder System securely. This is a high-priority feature as it establishes the foundation for user interactions and system functionality. Priority components include a benefit rating of 9 for enhancing security, a penalty rating of 3 for potential usability concerns, a cost rating of 4 for implementation, and a risk rating of 7 due to security implications.

4.1.2 Stimulus/Response Sequences:

- **Stimulus:** User initiates the login process.
- **Response:** System prompts for username and password.
- **Stimulus:** User enters valid credentials.
- **Response:** System grants access and navigates to the user's dashboard.
- **Stimulus:** User enters invalid credentials.

- **Response:** System provides an error message and prompts for correct credentials.

4.1.3 Functional Requirements:

- The system shall present a secure login interface.
- Users must enter a valid username and password.
- The system shall authenticate user credentials against stored data.
- Upon successful login, the system shall grant access to the appropriate user role.
- In case of invalid credentials, the system shall display an error message.
- User accounts shall be locked after a specified number of unsuccessful login attempts to enhance security.
- The system shall provide a "Forgot Password" option for users to reset their passwords.

4.2: Find Clash

4.2.1 Description and Priority: The Find Clash feature is a high-priority functionality designed for faculty members using the Clash Finder System. It allows users to identify potential scheduling conflicts within the academic timetable, ensuring the optimization of course schedules. This feature holds significant importance in enhancing the overall efficiency of academic planning. Priority components include a benefit rating of 8 for improving scheduling accuracy, a penalty rating of 2 for potential complexity, a cost rating of 5 for implementation, and a risk rating of 6 due to the potential misidentification of clashes.

4.2.2 Stimulus/Response Sequences:

- **Stimulus:** User selects the "Find Clash" option.
- **Response:** System prompts the user to specify parameters for clash identification.
- **Stimulus:** User inputs parameters such as time slots and course types.
- **Response:** System analyzes the timetable data based on specified parameters to identify potential clashes.
- **Stimulus:** System identifies clashes.
- **Response:** The system presents a list of identified clashes without displaying detailed information.

4.2.3 Functional Requirements:

- The system shall feature a "Find Clash" option in the user interface accessible to faculty members.
- Users shall be able to specify parameters for clash identification, including time slots and course types.
- The system shall analyze the timetable data for potential conflicts based on user-specified parameters.
- Identified clashes shall be presented to the user without displaying detailed information, emphasizing a summary view.

- The system shall provide an option for users to explore detailed information on each identified clash.
- Users shall have the ability to adjust parameters and re-run clash identification as needed.
- The system shall ensure real-time clash identification for accurate and up-to-date information.

4.3: Resolve Clash

4.3.1 Description and Priority: The Resolve Clash feature is of high priority within the Clash Finder System, offering faculty members the capability to address scheduling conflicts identified in the academic timetable. This functionality is crucial for optimizing course schedules and ensuring a harmonious academic calendar. Priority components include a benefit rating of 9 for streamlining scheduling processes, a penalty rating of 3 for potential complexity, a cost rating of 6 for implementation, and a risk rating of 5 due to the potential for unintended consequences during resolution.

4.3.2 Stimulus/Response Sequences:

- **Stimulus:** User selects the "Resolve Clash" option.
- **Response:** System prompts the user to review the list of identified clashes.
- **Stimulus:** User selects a clash to resolve.
- **Response:** System provides options for resolving the selected clash, including alternative time slots and locations.
- **Stimulus:** User selects a resolution option.
- **Response:** System updates the academic timetable to reflect the chosen resolution and notifies relevant stakeholders.

4.3.3 Functional Requirements:

- The system shall feature a "Resolve Clash" option accessible to faculty members.
- Users shall be presented with a list of identified clashes for review.
- The system shall provide resolution options for each clash, including alternative time slots and locations.
- Users shall be able to select a resolution option for each clash.
- The system shall update the academic timetable based on the chosen resolution, reflecting the changes in real-time.
- Notifications shall be sent to relevant stakeholders, such as students and administrators, about the resolved clash and the updated schedule.
- A log of clash resolutions shall be maintained for auditing purposes.
- The system shall provide the option to undo clash resolutions in case of errors.

4.4: Resolve Clashes Manually

4.4.1 Description and Priority: The Resolve Clashes Manually feature is of high priority within the Clash Finder System, providing faculty members the ability to

manually address scheduling conflicts identified in the academic timetable. This feature is essential for granting users granular control over clash resolutions, ensuring flexibility in optimizing course schedules. Priority components include a benefit rating of 9 for empowering users with manual resolution capabilities, a penalty rating of 3 for potential complexity, a cost rating of 6 for implementation, and a risk rating of 5 due to the potential for unintended consequences during manual resolution.

4.4.2 Stimulus/Response Sequences:

- **Stimulus:** User selects the "Resolve Clashes Manually" option.
- **Response:** System prompts the user to review the list of identified clashes.
- **Stimulus:** User selects a clash to resolve manually.
- **Response:** System provides a manual resolution interface, allowing the user to input specific adjustments, such as alternative time slots and locations.
- **Stimulus:** User submits the manual resolution.
- **Response:** System updates the academic timetable to reflect the manual resolution and notifies relevant stakeholders.

4.4.3 Functional Requirements:

- The system shall feature a "Resolve Clashes Manually" option accessible to faculty members.
- Users shall be presented with a list of identified clashes for manual review.
- The system shall provide a manual resolution interface, allowing users to input specific adjustments, including alternative time slots and locations.
- Users shall be able to submit the manual resolution for each clash.
- The system shall update the academic timetable based on the manual resolution, reflecting changes in real-time.
- Notifications shall be sent to relevant stakeholders, such as students and administrators, about the manually resolved clash and the updated schedule.
- A log of manually resolved clashes shall be maintained for auditing purposes.
- The system shall provide the option to undo manual clash resolutions in case of errors.

4.5: Display Clash

4.5.1 Description and Priority: The Display Clash feature holds a medium priority within the Clash Finder System, allowing users, primarily faculty members, to visualize identified scheduling conflicts within the academic timetable. While not directly involved in conflict resolution, this feature provides valuable insights for users to understand and manage clashes effectively. Priority components include a benefit rating of 7 for enhancing user awareness, a penalty rating of 4 for potential information overload, a cost rating of 5 for implementation, and a risk rating of 3 due to potential usability concerns.

4.5.2 Stimulus/Response Sequences:

- **Stimulus:** User selects the "Display Clash" option.

- **Response:** System retrieves and presents a visual representation of identified clashes, highlighting affected courses, faculty, and locations.
- **Stimulus:** User adjusts display settings or filters.
- **Response:** System modifies the clash display based on user preferences.
- **Stimulus:** User selects a specific clash for detailed information.
- **Response:** System provides a detailed view of the selected clash.

4.5.3 Functional Requirements:

- The system shall feature a "Display Clash" option accessible to faculty members.
- Users shall be able to view a visual representation of identified clashes, emphasizing affected courses, faculty, and locations.
- The clash display shall include filtering options for users to customize the view based on specific criteria.
- Users shall have the ability to adjust display settings, such as zoom and focus, for a clearer view.
- The system shall provide a summary view of clashes for quick assessment and analysis.
- Users shall be able to select a specific clash for detailed information, including the courses involved and potential resolutions.
- The clash display shall be updated in real-time to reflect changes in the academic timetable.
- The system shall ensure a user-friendly and intuitive clash visualization interface.

4.6: Display Timetable After Resolving Clash

4.6.1 Description and Priority: The Display Timetable After Resolving Clash feature is of medium priority within the Clash Finder System, offering users the ability to visualize the academic timetable after resolving scheduling conflicts. This feature is valuable for faculty members to review the updated schedule and ensure clarity after clash resolutions. Priority components include a benefit rating of 7 for enhancing post-resolution visibility, a penalty rating of 4 for potential information overload, a cost rating of 5 for implementation, and a risk rating of 3 due to potential usability concerns.

4.6.2 Stimulus/Response Sequences:

- **Stimulus:** User selects the "Display Timetable After Resolving Clash" option.
- **Response:** System retrieves and presents an updated visual representation of the academic timetable, reflecting recent clash resolutions.
- **Stimulus:** User adjusts display settings or filters.
- **Response:** System modifies the timetable display based on user preferences.
- **Stimulus:** User selects a specific course for detailed information.
- **Response:** System provides a detailed view of the selected course within the updated timetable.

4.6.3 Functional Requirements:

- The system shall feature a "Display Timetable After Resolving Clash" option accessible to faculty members.
- Users shall be able to view an updated visual representation of the academic timetable, reflecting recent clash resolutions.
- The timetable display shall include filtering options for users to customize the view based on specific criteria.
- Users shall have the ability to adjust display settings, such as zoom and focus, for a clearer view.
- The system shall provide a summary view of the updated timetable for quick assessment and analysis.
- Users shall be able to select a specific course for detailed information within the updated timetable.
- The timetable display shall be updated in real-time to reflect changes in the academic schedule.
- The system shall ensure a user-friendly and intuitive timetable visualization interface.

5. Other Nonfunctional Requirements

Performance Requirements

1. The system shall find clashes in the timetable within 6 seconds.
2. 2. The Clash Finder System shall give the solutions to the clashes in less than 5 seconds.
3. The system shall display the corrected timetable without clashes within 4 seconds.
4. The system shall authenticate user credentials and grant access to the appropriate interface within 2 seconds of the user submitting their login information.

These performance requirements collectively highlight the Clash Finder System's dedication to efficiency, responsiveness, and user-centric design. By meeting these benchmarks, the system is positioned to not only fulfill its primary function of resolving scheduling clashes but also to enhance overall user satisfaction and contribute positively to the operational dynamics of the users it serves.

5.1. Safety Requirements

1. The POS system shall allow access to sensitive data and system functions to authorized users (faculty members).

5.2. Software Quality Attributes

1. The Clash Finder system shall accurately and consistently resolve clashes, ensuring correctness in timetable adjustments and maintaining accurate clash resolution records.
2. The Clash Finder system shall be reliable, minimizing operational failures to ensure user satisfaction and protect the integrity of the timetable management process.
3. The Clash Finder system shall be designed with reusability in mind, minimizing development costs and enabling efficient incorporation of future enhancements or customizations.
4. The Clash Finder system shall provide easy-to-use interfaces for both students and faculty members.
5. The Clash Finder system shall be designed for high availability, minimizing downtime to ensure continuous access and functionality, thereby supporting uninterrupted timetable management.
6. The Clash Finder system shall be robust and handle unexpected inputs, errors, and system failures gracefully to maintain operational integrity

5.3. Business Rules

1. The system should perform thorough validation of the CSV data, checking for errors, missing information, or incorrect formats.
2. Define policies for resolving clashes, such as prioritizing certain classes, adjusting timings, or suggesting alternative classrooms(venues).
3. Notify the students about the detected clashes through their official university emails by faculty sent with the help of clash finder.
4. Implement automatic resolution for simple clashes, such as adjusting class times by a few minutes to eliminate overlaps(one of the feature of Clash Finder).