AUTOMATED CLASS SCHEDULE AND ROOM AVAILABILITY SYSTEM

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Abstract—This study aimed to develop an Automated Class Schedule and Room Availability System at the Iloilo Science and Technology University - Barotac Nuevo Campus (ISAT U - BNC), Jalaud, Barotac Nuevo, Iloilo. The researchers employed the Software Development Life Cycle (SDLC) method for the design and architectural phase of the system. Upon completion, the system was evaluated based on the ISO/IEC 25010 standard for software quality, focusing on three key characteristics: functional suitability, performance efficiency, and usability. The evaluation was conducted by 30 purposively selected faculty and staff members of ISAT U - BNC. Data analysis was performed using the arithmetic mean to determine the system's quality levels. Findings revealed that the developed system is highly functional, highly efficient, and highly usable. Furthermore, the results indicate that the Automated Class Schedule and Room Availability System provides significant operational benefits and is recommended for full implementation within the university infrastructure.

Keywords—Automated Scheduling, Room Availability System, prescriptive analytics

I. INTRODUCTION

The management of class schedules and room assignments is a critical component in maintaining organized academic operations. At Iloilo Science and Technology University – Barotac Nuevo Campus (ISAT U – BNC), the current administrative process relies heavily on manual methods, including printed forms, handwritten notes, and basic spreadsheets. However, manual scheduling is increasingly prone to systemic inefficiencies, such as overlapping class times, double-booked rooms, and delayed updates. These discrepancies cause significant confusion among faculty and students, ultimately disrupting the instructional flow.

As institutions grow, the complexity of resource allocation increases. According to Santos [1], manual scheduling systems significantly elevate the likelihood of human error, particularly as the volume of subjects and room requests expands. Furthermore, the manual preparation of these schedules demands exhaustive time and effort from the Management Information System (MIS) and department staff. Each entry must be meticulously cross-referenced to avoid conflicts; a task that becomes exponentially more difficult as the institution scales.

Recent literature suggests that the integration of digital tools can drastically reduce scheduling delays and improve data accuracy [2]. To mitigate these operational challenges, this study proposes the development of an Automated Class Schedule and Room Availability System. This system is designed to automate the creation, verification, and updating of academic schedules. Key features include:

- Conflict Detection: Identifying overlapping schedules in real-time.
- Resource Management: Allowing administrators to assign and monitor room availability dynamically.
- Automated Generation: Producing comprehensive schedules based on predefined institutional data.

Automated systems have been shown to enhance communication and reduce clerical errors within academic environments [3]. By transitioning from manual to automated processes, ISAT U – BNC can improve scheduling precision, alleviate administrative workload, and ensure a more seamless academic experience for all stakeholders.

II. LITERATURE REVIEW

This section presents a comprehensive review of existing literature and empirical studies concerning automated class scheduling and room availability systems, organized by key thematic areas and evaluated against international software quality standards.

A. Conceptual Framework of Academic Scheduling

Class schedule management is a fundamental administrative function in higher education. As explained by Burke and Petrovic [4], scheduling involves the systematic assignment of subjects, instructors, time slots, and classrooms under institutional constraints. Manual handling of these variables often results in overlapping schedules and inefficient resource usage, which negatively impacts institutional planning.

Automated systems have been developed to mitigate these human errors. Wren [5] posits that computerized scheduling minimizes conflicts and significantly reduces the workload of academic staff, allowing institutions to respond dynamically to changing academic requirements.

B. Resource Optimization and Room Management

Effective room availability management ensures the optimal utilization of physical infrastructure. Al-Yakoob and Sherali [6] found that automated allocation systems prevent double-booking by matching room capacity with class requirements. Similarly, Carter and Laporte [7] emphasized that automated timetabling systems optimize faculty time and facility usage, avoiding the pitfalls of overcrowded or underutilized spaces.

C. Technical Features of Modern Scheduling Systems

1. Conflict Detection: Schaerf [8] highlighted that constraint-based techniques are essential for identifying overlapping class times and instructor unavailability, ensuring schedule reliability before implementation.
2. Web-Based Accessibility: According to Laudon [9], web-based systems provide a centralized platform for real-time updates. This accessibility reduces misinformation by allowing stakeholders to view schedules remotely.
3. System Integration: Abdullah et al. [10] stated that integrating class scheduling with room availability improves transparency and supports informed decision-making among administrators.

D. Related Studies and International Standards

Several studies have utilized the ISO/IEC 25010 standard to evaluate the quality of scheduling software. The following table summarizes recent findings in the field:

Author(s)	Focus Area	Key Findings (ISO/IEC 25010)
Santos et al. [11]	State University (PH)	High functional suitability; fast generation; simple navigation.
Villanueva et al. [12]	Centralized Management	Resolved conflicts accurately; high reliability during extended use.
Cruz et al. [13]	Web-based Conflict Detection	Strong security via role-based access; high intuitive design scores.
Navarro and Lim [14]	IT Department System	Excellent maintainability and stable performance without errors.
Ahmed et al. [15]	Algorithm-based Timetabling	Significantly faster than manual methods; high consistency in results.
Omar et al. [16]	Rule-based Intelligence	Excellent accuracy in conflict resolution and high data protection.

Table 1. Summary of recent findings in the field

Local studies by Reyes et al. [17] and Mendoza and Lopez [18] further validate the necessity of these systems in the Philippine context, noting that transition to automated web-based platforms significantly improved coordination and reduced confusion caused by manual schedule changes.

E. Synthesis

The reviewed literature and studies collectively indicate that an Automated Class Schedule and Room Availability System addresses the inherent weaknesses of manual processes. By leveraging information technology, educational institutions can minimize human error, optimize resource allocation, and ensure data security. While implementation may present initial challenges, the long-term benefits of improved efficiency, accuracy, and reduced operational costs are well-documented.

III. METHODOLOGY

This chapter details the systematic approach used to design, develop, and evaluate the Automated Class Schedule and Room Availability System. The researchers employed a combination of agile development and standardized quality assessment to ensure the system's effectiveness.

A. Project Description and Heuristic Approach

The study focuses on streamlining academic operations at ISAT U - BNC by automating class scheduling. The system utilizes a heuristic scheduling approach to intelligently allocate resources—instructors, rooms, and time slots—while adhering to predefined academic constraints. Unlike exhaustive algorithms, this heuristic method allows for near-optimal timetabling within a minimal processing window, ensuring institutional flexibility.

The architecture follows a web-based model using the following stack:

- Server-side: PHP for scheduling logic and processing.
- Database: MySQL for secure storage of records and availability data.
- Frontend: HTML, CSS, and JavaScript for a responsive user interface.
- Data Management: The Extract, Transform, Load (ETL) process was utilized to ensure data consistency and reliability during the migration from manual records to the digital database.

B. Project Development: Extreme Programming (XP)

The researchers adopted the Extreme Programming (XP) methodology, an agile development framework. This approach emphasizes iterative cycles, continuous user feedback, and frequent testing to accommodate changing requirements.

C. Requirement Analysis and System Modeling

To visualize the system's architecture and user interactions, the **Unified Modeling Language (UML)** was employed.

1. **Use Case Diagram:** Defines the roles of the Admin, MIS Staff, Faculty, and Students.
2. **Activity Diagrams:** Illustrates the workflow for record management (Admin) and class assignment (Staff).
3. **Sequence Diagrams:** Provides a step-by-step view of specific processes, such as user validation, subject management, and conflict detection.
4. **Class Diagram:** Details the attributes and methods of the underlying software objects.
5. **Deployment Diagram:** Shows the hardware configuration, where users access the application server via a network connected to a centralized SQL database.

D. Project Evaluation: ISO/IEC 25010

The system was evaluated using the **ISO/IEC 25010** software quality standard. Evaluation focused on three core characteristics:

- **Functional Suitability:** Assessing functional completeness, correctness, and appropriateness.
- **Performance Efficiency:** Measuring time behavior, resource utilization, and capacity.
- **Usability:** Evaluating recognizability, learnability, operability, and accessibility.

E. Respondents and Data Gathering

The evaluation was conducted on October 16, 2025, involving **thirty (30) purposively selected faculty and staff** of ISAT U - BNC. A structured ISO 25010-based questionnaire served as the primary data-gathering instrument.

The researchers used a Likert scale to interpret the mean scores of the evaluation as follows:

Range	Functional Suitability	Performance Efficiency	Usability
4.3 – 5.0	Highly Functional	Highly Efficient	Highly Usable
3.5 – 4.2	Very Functional	Very Efficient	Very Usable
2.7 – 3.4	Functional	Efficient	Usable
1.9 – 2.6	Slightly Functional	Slightly Efficient	Slightly Usable
1.0 – 1.8	Not Functional	Not Efficient	Not Usable

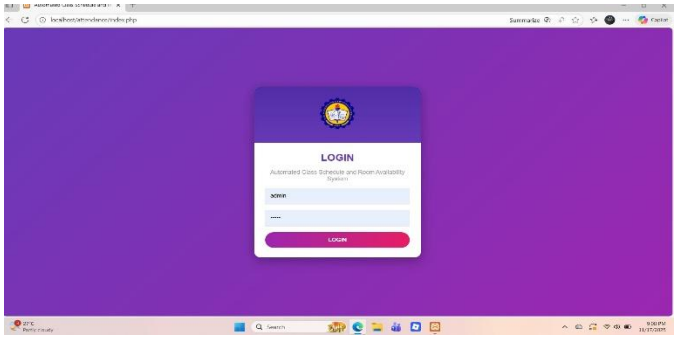
Table 2

F. Statistical Analysis

Data gathered from the evaluators were tallied and analyzed using **frequency counts** and **arithmetic mean**. These statistical measures provided a clear quantitative basis for determining the system's readiness for implementation based on the feedback of the end-users.

IV. RESULTS AND DISCUSSION

This chapter presents the findings, analysis, and interpretation of data.



FigFigure 14. Log in for Admin

Figure 1 presents the screenshot of security log-in window for Admin. The modules only authorized users to use the system, particularly the Management Information System.

Figure 1, shows Login Form for Admin that serves as the system's main security feature, ensuring that only authorized users can access and manage the Automated Class Schedule and Room Availability System. It requires the administrator to enter a valid username and password, which the system verifies before granting access to sensitive functions such as updating schedules, monitoring room availability, and managing records. This login module protects the system from unauthorized use and maintains the integrity and accuracy of all stored data.

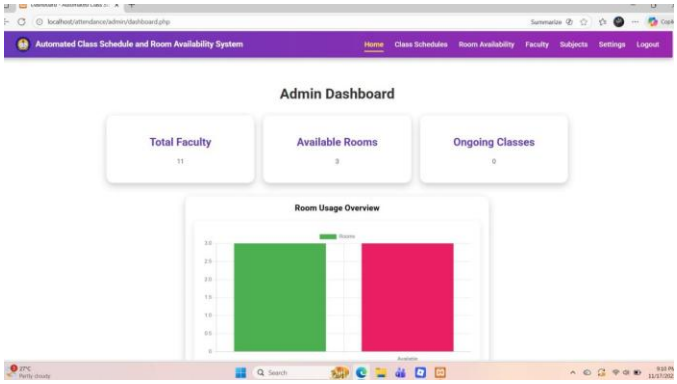


Figure 2. Screenshot for Dashboard

Figure 2, shows the dashboard provides a quick overview of key system information such as total faculty, available rooms, and ongoing classes. It also includes a room usage chart that helps the administrator easily monitor and manage schedules and room availability.

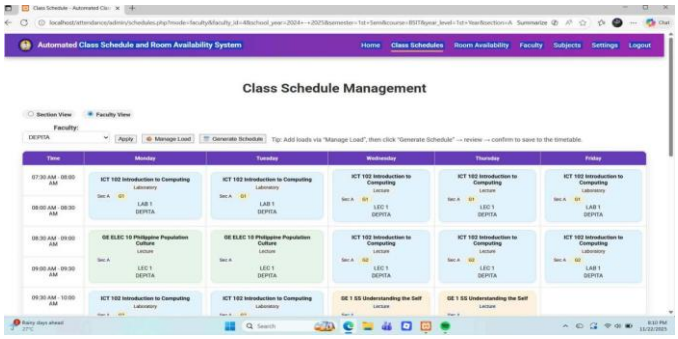


Figure 3. Screenshot for Manage Class Schedule for Faculty View

Figure 3, shows the Manage Class Schedule page for faculty, where instructors can easily view their assigned subjects, rooms, and time schedules. This feature helps faculty with their classes and ensures they can quickly check their timetable when needed.

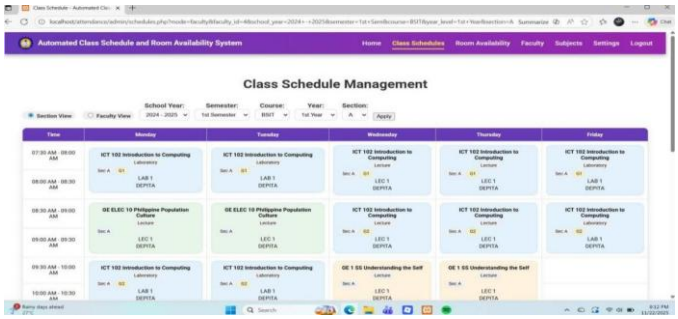


Figure 4.Screenshot for Manage Class Schedule for Section View

Figure 4, shows the Manage Class Schedule page for sections, where admin can view the complete schedule assigned to a specific year level or section. This feature displays the subjects, instructors, rooms, and time slots, making it easy to check and monitor the class timetable for an entire section.

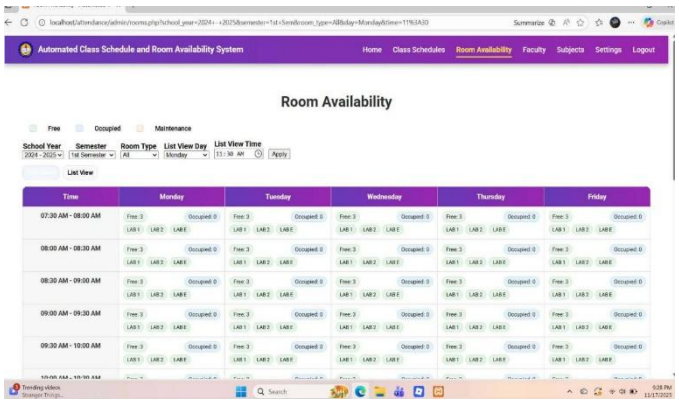


Figure 5. Screenshot for Shows Room Availability

Figure 5, shows the Manage Room Availability page, where admin can view which rooms are available or in use at specific times. This feature helps administrators easily monitor room status and assign rooms efficiently to avoid conflicts in scheduling.

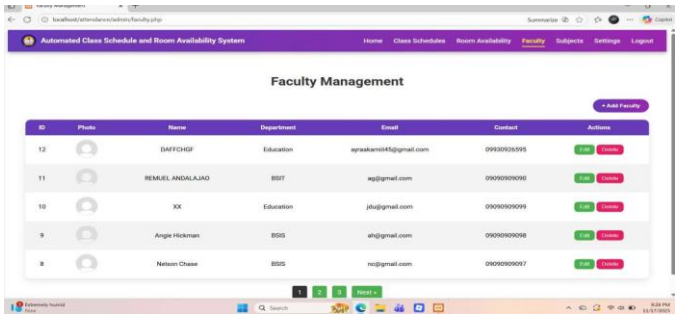


Figure 6. Screenshot for Manage Faculty Information

Figure 6, shows the Manage Faculty page, where the administrator can view, add, edit, or update faculty information. This feature allows the admin to manage teacher records easily and ensure that all faculty details are accurate and up to date for scheduling purposes.

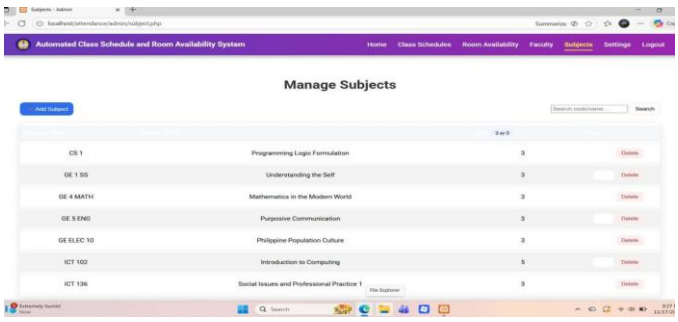


Figure 7. Screenshot for Manage Subjects Information

Figure 7, shows the Manage Subject page, where the administrator can view, add, edit, or update the list of subjects offered in the system. This feature helps the admin maintain accurate subject information, ensuring smooth and organized class scheduling.

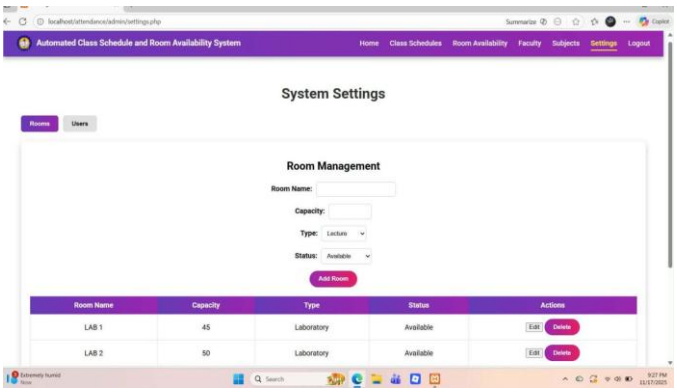


Figure 8.Screenshot for Manage Rooms

Figure 8, shows the Manage Rooms page, where the administrator can add, update, and organize room details. This feature helps ensure that all room information is accurate and available for efficient class scheduling and room assignment.

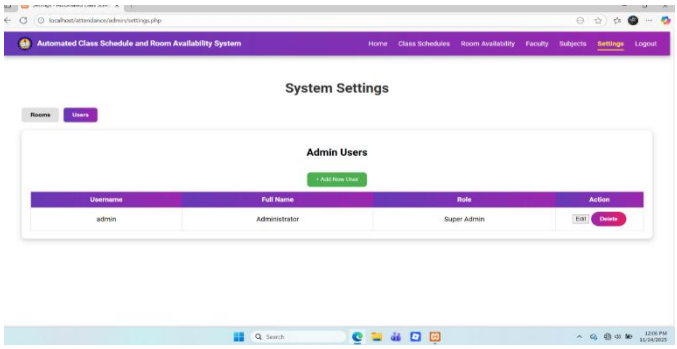


Figure 9.Screenshot for Manage User

Figure 9, shows the Manage Users page, which can only be accessed and used by the administrator. This feature allows the admin to add, edit, delete, and manage all user accounts.

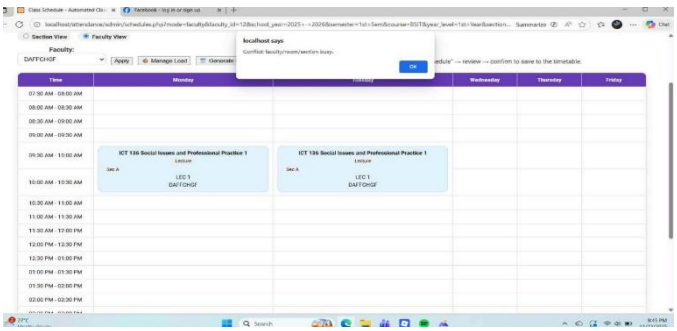


Figure 10. Screenshot for Detection of conflict

Figure 10, shows the Conflict Detection feature, which automatically notifies the administrator when a schedule conflicts with an already assigned time, room, or faculty. This feature helps prevent errors by alerting the admin immediately if the chosen schedule is not available.

Result and Data Interpretation

After the questionnaires were gathered, the data gathered were encoded, tabulated, computed, analyzed, and interpreted using the average mean.

Items	n	Mean	Description
Appropriateness Recognizability: Degree to which user can recognize whether a system is appropriate for their needs.	30	4.8	Highly Usable
Learnability: Degree to which a system can be used by specified users to achieve goals of learning with effectiveness and satisfaction.	30	4.8	Highly Usable
Operability: Degree to which the system has attributes that make it easy to operate and control.	30	4.8	Highly Usable
User Error Protection: Degree to which a system protects users against making errors.	30	4.8	Highly Usable
User Interface Aesthetics: Degree to which a user interface enables pleasing and satisfying interaction for the user.	30	4.8	Highly Usable
Accessibility: Degree to which a system can be used by people with the widest range of characteristics and capabilities.	30	4.8	Highly Usable
Grand Mean		**4.8**	**Highly Usable**

Table 3 Evaluation of the usability of the Automated Class Schedule and Room Availability system.

As shown in Table 3, the system was evaluated as excellent in terms of usability, with a grand mean score of 4.8. This means that the system is easy to learn, simple to operate, and user-friendly for administrators and faculty members. The high usability rating indicates that users can perform scheduling and room management tasks efficiently with minimal errors and without extensive training.

This conforms with the study of Navarro and Lim (2023), which evaluated an automated class scheduling and room reservation system using the ISO/IEC 25010 quality model. Their findings revealed that systems with clear interfaces, organized navigation, and easy-to-use features achieved high usability ratings among users. Similarly, the proposed system provides a well-structured interface and accessible functions that support effective academic scheduling. Therefore, the usability performance of the system confirms that it meets user requirements.

Items	n	Mean	Description
Degree to which the set of functions covers all specified tasks and user objectives.	30	4.8	Highly Functional
Degree to which a system provides the correct results with the needed degree of precision.	30	4.8	Highly Functional
Degree to which the functions facilitate specified tasks and objectives.	30	4.8	Highly Functional
Grand Mean		**4.8**	**Highly Functional**

Table 4 Level of functionality of Automated Class Schedule and Room Availability System

As shown in Table 4, the system was evaluated as excellent in terms of functional suitability, with a grand mean score of 4.8. This indicates that the system provides complete, correct, and appropriate functions required for class scheduling and room availability management. The results imply that the system effectively generates schedules, detects conflicts, and assigns rooms accurately based on user inputs.

This conforms to the study of Santos et al. (2019), which evaluated an automated class scheduling system using the ISO/IEC 25010 quality standard. Their results showed that systems with well-defined and accurate functions achieved high ratings in functional suitability. Similarly, the proposed system performs its intended tasks reliably and supports academic operations efficiently. Therefore, the system meets the functional requirements of the users.

Items	n	Mean	Description
Degree to which the response and processing times and throughput rates of a system, when performing its functions, meet requirements.	30	4.7	Highly Efficient
Degree to which the amounts and types of resources used by a system, when performing its functions, meet requirements.	30	4.6	Highly Efficient
Degree to which the maximum limits of a system parameter meet requirements.	30	4.8	Highly Efficient
Grand Mean		**4.7**	**Highly Efficient**

Table 5 Level of Performance Efficiency of the Automated Class Schedule and Room Availability System

As shown in Table 5, the Automated Class Schedule and Room Availability System was evaluated as excellent in terms of performance efficiency, with a grand mean score of 4.8. This indicates that the system responds quickly, uses system resources efficiently, and can handle multiple scheduling and room management tasks without performance delays. The high rating suggests that users experience fast system processing during schedule generation and room availability checking. This result supports the findings of Mendoza and Flores (2021), who evaluated an online scheduling and room utilization system using the ISO/IEC 25010 quality model. Their study reported high performance efficiency due to optimized system response time and effective resource management. Similarly, the proposed system demonstrates efficient processing and reliable performance under normal usage conditions. Therefore, the system meets performance requirements and aligns with previous related studies.

V. CONCLUSION

A. Summary of the Study

This study focused on the design and development of an Automated Class Schedule and Room Availability System for the Iloilo Science and Technology University (ISAT-U), Barotac Nuevo Campus. The primary objective was to engineer a solution capable of managing faculty schedules, assigning rooms, detecting scheduling conflicts, and automatically generating timetables.

The software was subjected to a formal evaluation by thirty (30) purposively selected faculty and staff members. The ISO/IEC 25010 software quality model served as the primary data gathering instrument to measure the system's technical efficacy.

B. Findings

The empirical data gathered during the evaluation phase yielded the following results:

1. Operational Viability: The system successfully automated the generation of class schedules and room availability logs,

significantly reducing the manual workload for Management Information System (MIS) personnel.
2. Quality Metrics: Based on the ISO/IEC 25010 criteria, the system achieved high ratings across three core pillars: Functional Suitability, Performance Efficiency, and Usability, all of which were described by respondents as "Highly Functional" or "Highly Efficient."

C. Conclusions

Based on the synthesized findings, the following conclusions are drawn:

1. Objective Achievement: The system successfully met its technical goals by providing a streamlined, convenient method for semester-based scheduling and room management.
2. Performance Standards: The high degree of functionality in automatic schedule generation confirms that the software meets complex user expectations. The system's high efficiency and usability scores indicate a well-optimized user interface and backend logic.
3. Standard Compliance: The developed software fully complies with the international requirements of the ISO/IEC 25010 standard, validating its readiness for deployment in a professional academic environment.

D. Recommendations

To maximize the impact of the developed system, the following actions are recommended:

1. Deployment: The system should be formally integrated into the Management Information System (MIS) Office to optimize current scheduling workflows.
2. Accessibility and Output: Future iterations should focus on expanding accessibility for students and faculty members. Additionally, integrated print functionality should be prioritized to facilitate the distribution of hard-copy schedules.
3. Future Research: This study should serve as a technical framework for future researchers aiming to advance the field of automated academic information technology and resource management.

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