SMART ROOM BOOKING SYSTEM

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This Report Presented in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science in Computer Science and Engineering

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APPROVAL

This project titled **"Smart Room Booking System"**, submitted by **Joy Mondal , ID:191-15-13006** and **Istiak Uddin Md Tausif , ID: 191-15-13021** to the Department of Computer Science and Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation was held on 24/01/2023.

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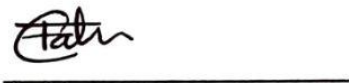**Professor and Head**
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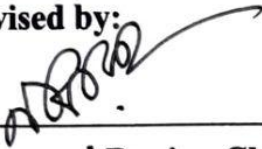   **External Examiner**

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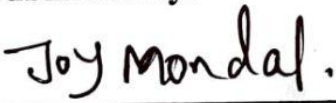United International University

DECLARATION

We hereby declare that, this project has been done by us under the supervision of **Mr. Narayan Ranjan Chakraborty, Associate Professor, Department of CSE** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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ABSTRACT

The smart room booking management system is a comprehensive tool that helps teachers and system administrators manage the use and availability of classrooms. The system allows users to upload class schedules and view which rooms are free at any given time. Administrators can then book rooms for different functions, and the system will show the booked rooms' details, including the booking's date, time, and purpose. Users will also receive a notification when their booking is confirmed.

The smart room booking management system is designed to be user-friendly and intuitive, making it easy for teachers and administrators to use. It is also scalable and highly available, handling large volumes of data and many users. The system is developed using agile software development methodologies and is tested thoroughly to ensure its reliability and performance.

Overall, the smart room booking management system is a valuable tool for helping educators and administrators manage the use of classrooms in their institution, saving time and effort and improving the efficiency of the scheduling process.

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CHAPTER 1

Introduction

1.1 Introduction

Smart room booking Management is a system designed to help students and administrators efficiently schedule and manage the use of classrooms on a college campus. The system allows users to input their class schedules and view a list of available classrooms during their specified time periods. Administrators can also use the system to book a room for a specific time and date. Once a room is booked, the system provides information about the reserved space, including its capacity, amenities, and any special features or restrictions. The system is designed to be user-friendly and intuitive, with a clean and easy-to-navigate interface. It is also secure, with robust permissions and access controls to ensure that only authorized users can book or view classroom information. Overall, Smart room booking Management streamlines classroom scheduling and managing, saving time and reducing confusion for students and administrators. It is an essential tool for any college campus looking to optimize the use of its classrooms and improve the overall learning experience for its students.

1.2 Motivation

Smart room booking Management is an innovative system that aims to address one of the most pressing issues faced by college campuses today - efficient scheduling and management of classrooms. The system is designed to make the process of finding and booking classrooms much simpler and more streamlined for both students and administrators. One of the key features of the system is its user-friendly interface. Students can input their class schedules and view a list of available classrooms during their specified time periods, making it easy for them to find a suitable space for their classes. Administrators, on the other hand, can use the system to book a room for a specific time and date, and can also view the details of the reserved space, including its capacity, amenities, and any special features or restrictions.

The system is also designed to be secure, with robust permissions and access controls to ensure that only authorized users can book or view classroom information. This ensures that the system is used only by those who are authorized to do so, and that the information is kept confidential. In today's fast-paced and technology-driven world, it is essential for college campuses to use the latest tools to optimize the use of their resources. Smart room booking Management is an essential tool that can help colleges do just that. By streamlining the classroom scheduling and management process, the system can save time and reduce confusion for students and administrators.

Moreover, it can improve the overall learning experience for students by making it easier for them to find and book classrooms. With Smart room booking Management, students can focus on their studies, knowing that they have the right space to learn and grow. And for administrators, it can help them manage the campus resources in a more effective and efficient way.

1.3 Objectives

1. To design and implement a user-friendly interface for teachers and administrators to easily upload and view class schedules and room availability.
2. To create and implement a secure and efficient booking system for administrators to reserve rooms for various functions, with the ability to view details of booked rooms
3. To integrate a notification system that alerts teachers and administrators of changes to class schedules or room availability, and continually test and refine the system to ensure it meets the needs of teachers and administrators in managing classroom schedules and bookings.

1.4 Expected Outcomes

The expected outcome of the Smart room booking Management project is a system that efficiently schedules and manages the use of classrooms on a university campus. The system will allow users to input their class schedules and view a list of available classrooms during their specified time periods, making it easy for them to find a suitable space for their classes. Administrators will be able to use the system to book a room for a specific time and date, and will also be able to view the details of the reserved space, including its

capacity, amenities, and any special features or restrictions. The system will also have robust permissions and access controls to ensure that only authorized users can book or view classroom information, ensuring the confidentiality of personal data and the integrity of the system. The system will be user-friendly, easy-to-navigate and intuitive, it will save time and reduce confusion for students and administrators and improve the overall learning experience for its students.

1.5 Project Management and Finance

Professors and students at CSE and DIU have set a six-month deadline for implementing a smart room booking management system by the spring of 2023. As it is for our final defense project cost analysis is skipped in this phase.

Month 1:

- Research and gather requirements for the smart room booking management system.

- Create a project plan and timeline.

- Design user interface and workflow of the system.

Month 2:

- Develop the system's database and backend functionality.

- Test the system's database and backend functionality.

Month 3:

- Implement the user interface and workflow.

- Test the user interface and workflow.

Month 4:

- Integrate the system with the school's scheduling software.

- Test the integration with the school's scheduling software.

Month 5:

- Train teachers and system administrators on how to use the system.

- Roll out the system to a small group of teachers for beta testing.

Month 6:

- Address any issues and make necessary changes based on feedback from beta testing.

- Roll out the system to all teachers and system administrators.

- Monitor the system's usage and address any issues that arise.

SI NO	Task Name	Jul-22			Aug-22			Sep-22			Oct-22			Nov-22			Dec-22		
		10 days	10 days	10 days	10 days	10 days	10 days	10 days	10 days	10 days	10 days	10 days	10 days	10 days	10 days	10 days	10 days	10 days	10 days
1	Initial Research	▓																	
2	Project Planning	▓	▓	▓															
3	Requirement Colecction		▓	▓															
4	Feasibility Study				▓														
5	SRS				▓	▓	▓												
6	UI/UX Design				▓	▓	▓												
7	Data Base Design				▓	▓	▓												
8	Backend Design					▓	▓	▓	▓	▓	▓	▓	▓						
9	Testing										▓	▓	▓	▓	▓	▓			
10	Final Report Writing																▓	▓	▓

Figure 1.1: Gantt Chart Smart Room Booking Management System

1.6 Report Layout

- Introduction: A brief overview of the project and its goals.
- Background: The problem that the project aims to address and the current state of the field.
- Requirement specification: Detailed description of the functional and non-functional requirements of the system.
- Design Specification: Description of the overall system design, including the architecture and key components.
- Implementation and Testing: Description of the development process, including any challenges encountered and how they were addressed, as well as the results of testing the system.
- Impact on Society: Discussion of the potential impact of the system on the college campus and its students, including any benefits or drawbacks.

- Conclusion: Summary of the key outcomes of the project and recommendations for future work.

CHAPTER 2

Background

2.1 Preliminaries

This initiative aims to develop and deploy a smart room booking management system to help instructors monitor and manage students' behavior, classroom progress, and learning motivation in real-time. Additionally, this smart room booking management project aims to develop a user-friendly and efficient system that allows students and administrators to quickly view and book available classrooms. Students can quickly see which classrooms are available and reserve a room for a specific time by entering their class schedules. Administrators can also view available classrooms and reserve a space for an event or meeting. This system will provide critical information about each classroom, such as its size, amenities, and availability, allowing users to decide which room is best for their needs.

Furthermore, the system will be adaptable to the needs of the most available classes in a given time frame. This technology will also manage and schedule classes, saving teachers and students time and reducing ambiguity. It will be simpler for students and teachers to express their interest in various activities, organize events such as conferences and meetings, and fulfill other responsibilities. The project's ultimate goal is to improve classroom management and make classrooms more exciting and engaging for students and teachers to improve student learning outcomes and classroom management and resource utilization on campus.

2.2 Related Works

The idea for a smart room booking management system arose from the frustration of teachers and administrators at schools and universities who were constantly struggling to keep track of class schedules and room availability. This often resulted in confusion and chaos, with classes being held in crowded rooms or rescheduled at the last minute due to lack of availability.

To address this issue, a team of developers set out to create a system that would allow teachers and administrators to easily upload class schedules and view the availability of classrooms in real time. The system would also allow administrators to book rooms for different functions, such as meetings or events, and display the details of these bookings to all users.

Through advanced algorithms and technology, the smart room booking management system was able to optimize class schedules and room usage to ensure that classrooms were being utilized to their full potential. This saved time and resources and helped create a more organized and efficient learning environment for students.

As the system gained popularity and was implemented in more schools and universities, it became clear that it was an invaluable tool for classroom management. Today, educators and administrators worldwide use it to streamline the scheduling and booking process and create a more efficient and productive learning environment.

2.3 Comparative Analysis

- **Improved efficiency for teachers and administrators**: By using the smart room booking management system, teachers and administrators can easily upload and view class schedules, saving time and effort compared to manually scheduling classes and checking room availability.

- **Increased utilization of classrooms:** With the ability to book rooms for different functions, the smart room booking management system allows for better utilization of classrooms, ensuring that all available space is utilized to its maximum potential.

- **Improved communication and transparency:** The system's ability to show the details of booked rooms allows for better communication and transparency among teachers, administrators, and other stakeholders, ensuring everyone is on the same page and aware of room availability.

- **Reduced conflicts and misunderstandings:** By providing a clear and easily accessible record of room bookings, the smart room booking management system can help reduce conflicts and misunderstandings over room availability and use.

- **Enhanced learning environment:** By streamlining the scheduling process and ensuring that classrooms are being used efficiently, the smart room booking

management system can help create a more organized and focused learning environment for students.

2.4 Scope of the Project

- Develop a user-friendly interface for teachers and administrators to easily upload and view class schedules and room availability.

- Implement a booking system for administrators to reserve rooms for various functions, with the ability to view details of booked rooms.

- Integrate a notification system to alert teachers and administrators of changes to class schedules or room availability.

- Implement security measures to ensure the confidentiality of personal data and the system's integrity.

- Test and refine the system to ensure it meets the needs of teachers and administrators in managing classroom schedules and bookings.

- Provide ongoing support and maintenance for the system to ensure its continued functionality.

- Explore opportunities for expanding the system to include additional features and functionality, such as integration with other university systems or the ability for students to view their class schedules.

2.5 Challenges

- User-Friendly Interface: Developing a user-friendly interface for teachers and administrators to easily upload and view class schedules and room availability may be challenging, as it requires a deep understanding of user behavior and needs, as well as design and development expertise.

- Data Security: Ensuring the confidentiality of personal data and the integrity of the system, while allowing authorized users to book or view classroom information, can be a challenging task, as it requires implementing robust security measures and constantly monitoring the system for any potential vulnerabilities.

- Testing and Refinement: Testing the system to ensure it meets the needs of teachers and administrators in managing classroom schedules and bookings, and refining it

based on feedback, may be challenging, as it requires continuous monitoring and testing of the system.

- Integration with other systems: Integrating the system with other university systems or allowing students to view their class schedules, if it's included as an additional feature, may be challenging as it requires extensive research, development, and testing to ensure seamless integration and compatibility with existing systems.

CHAPTER 3

Requirement Specifications

3.1 Business Process Modeling

Smart Room Booking Management is a system that can provide significant value to college campuses by streamlining the process of scheduling and managing classrooms. The system can be marketed to college administrators as an essential tool for optimizing the use of their resources and improving the overall learning experience for their students. Additionally, the system's user-friendly interface and efficient booking process can also attract students as it will make it easy for them to find and book classrooms.

The system can be sold on a subscription basis, with colleges paying a yearly or monthly fee for access to the system. Additionally, the system can also generate revenue through advertising, by displaying sponsored ads on the system's interface. Additionally, the system can be offered as an add-on service to other systems already in use at the college, such as student information systems or learning management systems, making it an easy and convenient solution for administrators to adopt.

The system can also be marketed to other educational institutions such as schools and universities, as well as to other organizations that require efficient scheduling and management of their resources such as conference centers, community centers, and event venues.

3.2 Requirement Collection and Analysis

Functional Requirements

The representation of a project's functional requirements should accurately reflect the actual application requirements that have been identified and agreed upon by the project team and stakeholders. This can be done through detailed user stories, flow diagrams, and technical specifications that outline the specific actions and behaviors that the system or product must exhibit to meet the needs and expectations of the users. These representations must be clear, concise, and easy to understand to ensure that the project is delivered successfully and meets the desired functional requirements.

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Here is a list of functional requirements for a smart room booking management system:

1. The system allows teachers and system administrators to register and log in to the system.
2. The system allows teachers and system administrators to upload class schedules.
3. The system can display which classrooms are available at a given time.
4. The system allows administrators to book classrooms for different functions.
5. The system displays the details of the classrooms that have been booked, including the purpose of the booking, the time and date of the booking, and the duration of the booking.
6. The system allows users to search for available classrooms by date and time.

FR-01	Register to the System
Description	Administrators and teachers can use this module to sign up for the smart room booking management system. Admin can see all the information in the class routine management system's membership list.
Stakeholders	Admin

FR-02	Update System Details
Description	This module makes it easier to modify their profile information. The database can also be used to store information that teachers can update.
Stakeholders	Admin, Teacher

FR-03	Login System
Description	Each user must have a unique access point. If users fail to enter their credentials correctly, the system will never grant them access.
Stakeholders	Admin, Teacher

FR-04	Upload Class Schedule
Description	Users can easily upload their course schedules with the system using this module. This module can display which classrooms are available at a given time.
Stakeholders	Admin, Teacher

FR-05	Search Option
Description	This function gives the capacity of administrators and teachers to conduct classroom searches. The system also allows users to search for available classrooms by date and time.
Stakeholders	Admin, Teacher

FR-06	Reserve Classroom
Description	The system allows administrators to book classrooms for different functions.
Stakeholders	Admin

Performance Requirements

The representation of a project's functional requirements should accurately reflect the project's performance requirements. This means that the applicable requirements should clearly outline the specific tasks that the project must be able to perform, as well as the performance criteria that must be met for the project to be deemed successful.

Additionally, the functional requirements should provide detailed information about the inputs and outputs the project is expected to produce and any necessary constraints or limitations on its operation. By clearly and accurately representing the project's

performance requirements, the functional requirements can help ensure that the project can meet its performance goals and deliver the desired outcomes to its users.

Here is a list of performance requirements for a smart room booking management system:

1. The system accurately and efficiently displays class schedules and room availability in real-time.
2. The system allows teachers and system administrators to upload and update class schedules easily.
3. The system allows system administrators to book rooms for different functions and events.
4. The system shows the booked rooms' details, including the booking's date, time, and purpose.
5. The system has robust security measures to protect personal and sensitive information.
6. The system has a user-friendly interface that is easy to navigate for all users.

Speed and Latency Requirements

A project's speed and latency requirements should be clearly outlined in the project specification or requirements document. These requirements should reflect the actual performance needs of the project, including any specific performance targets that need to be met. For example, the project may require a certain level of speed to process data or perform tasks within a particular timeframe, or it may require a certain level of latency to respond promptly to user input or requests. To accurately represent the project's speed and latency requirements, performing performance testing or simulations may be necessary to determine the required performance levels.

1. The system's speed should be fast enough to allow teachers and admins to upload and access class schedules and room availability information quickly.
2. The system's latency should be low enough to ensure that the information displayed is accurate and up-to-date.
3. The system should be able to handle multiple users accessing and updating the information simultaneously without any delays or errors.

4. The system should be able to handle high-traffic periods (such as during the start of a new semester) without any delays or performance issues.

5. The system should have a response time of less than 1 second when accessing and updating information.

6. The system should be able to handle large amounts of data without any performance issues.

7. The system should be able to handle frequent updates to class schedules and room availability without any delays or errors.

PR-01	Within a second, the landing page will display its content.
Description	The homepage will load within a fraction of a second of the user navigating the system. Also relevant is the quality of the user's Internet connection.
Stakeholders	Admin, and Teacher.

Dependability Requirements

The representation of a project's dependability requirements should clearly outline the level of reliability and consistency expected from the project. This may include provisions such as a certain uptime percentage, the ability to recover from failures or errors, and the ability to handle large workloads without breaking down. These requirements should be aligned with the actual performance requirements of the project, ensuring that the project can meet the users' needs and expectations. The representation of these dependability requirements needs to be clear and concise so that all stakeholders understand what is expected from the project.

1. The system must be reliable and consistently available to users.
2. The system must accurately and promptly display class schedules and room availability.
3. The system must allow for easy and efficient booking of rooms by admins.
4. The system must accurately display the details of booked rooms.

5. The system must have a secure login and user access controls to prevent unauthorized access or changes to schedules and bookings.

6. The system must have the ability to handle multiple users and concurrent access without errors or delays.

7. The system must have robust data backup and recovery measures to prevent loss of schedules or bookings.

8. The system must have a straightforward and user-friendly interface for teachers and admins.

9. The system must be able to handle and display changes to schedules or bookings in real time.

10. The system must have a system for alerting users of any changes or updates to schedules or bookings.

Reliability and Availability

The representation of a project's reliability and availability requirements should accurately reflect the actual performance requirements of the project. This means that the project's reliability and availability goals should be clearly defined and measurable, and the project should have appropriate systems to ensure these goals are met. This may include using redundant systems, regular maintenance and testing, and robust design and engineering practices to ensure that the project consistently meets its reliability and availability targets over time. By accurately representing the actual performance requirements of the project, organizations can ensure that their projects can meet the needs of their users and stakeholders and deliver the desired level of performance and reliability.

1. The system must always be available, with minimal downtime for maintenance or updates.

2. The system must handle multiple users uploading and accessing class schedules simultaneously.

3. The system must accurately display the availability of classrooms in real time.

4. The system must allow for easy and reliable booking of classrooms by administrators.

5. The system must alert users if a conflict arises with a previously booked classroom.

6. The system must have robust security measures to protect sensitive data, such as class schedules and personal information.

7. The system must have a reliable backup system to prevent data loss.

8. The system must handle large amounts of data without experiencing performance issues.

9. The system must have a user-friendly interface that is easy to navigate.

10. The system must be tested thoroughly before deployment to meet all reliability and availability requirements.

DR-01	The system must continue to be available 24x7
Description	- The system must be accessible at all times and must be updated frequently. - The system must be available 24 hours a day, seven days a week; it must be regularly updated; - It must publish notices, events, and job listings; and update these frequently.
Stakeholders	Admin, and Teacher.

Safety-Critical Requirements

Safety critical requirements are essential requirements that must be satisfied to ensure the safety and reliability of a project. These requirements should be clearly defined and documented to ensure that they are correctly understood and implemented by all stakeholders.

One way to represent safety-critical requirements is by using a safety requirements specification (SRS). This document outlines the safety-related requirements for a project and provides a detailed description of the measures that must be taken to ensure that these requirements are met. The SRS should be reviewed and approved by all relevant parties, including project stakeholders, regulatory bodies, and experts in the field.

Another way to represent safety-critical requirements is through safety case documents. A safety case is a structured argument demonstrating how a project's safety requirements have been satisfied. It typically includes a description of the hazard analysis, risk assessment,

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and safety measures implemented to address identified hazards and reduce risk to an acceptable level.

Overall, it is essential to have a clear and thorough representation of safety-critical requirements to ensure the safety and reliability of a project.

1. The system must have secure login credentials for teachers and administrators to ensure that only authorized users can access the system.
2. The system must have a way to verify the identity of teachers and administrators before allowing access to the system.
3. The system must have a secure database to store class schedules and room booking information.
4. The system must have a robust system for handling user errors, such as incorrect login credentials or room booking information.
5. The system must have a way to alert administrators if a room has been double-booked or if there is a conflict with a previously scheduled class.
6. The system must have a plan to prevent unauthorized access or tampering with class schedules and room bookings.
7. The system must have a way to alert teachers and administrators if there are any technical issues with the system, such as server downtime or system errors.
8. The system must have a way to automatically back up all data in case of system failure or data loss.
9. The system must have a way to log all user activity, including login attempts, class schedule updates, and room bookings, to ensure accountability and security.
10. The system must have a plan for regularly updating and maintaining the software to ensure it is secure and functioning correctly.

Maintainability and Supportability

The representation of a project's maintainability and supportability requirements should accurately reflect the actual performance requirements of the project. This includes ensuring that the project is designed and developed to make it easy to maintain and support over time. It also provides adequate resources and processes to address any issues or challenges. This may involve incorporating best practices and industry standards, as well

as leveraging tools and technologies that help to optimize the maintenance and support process. Ultimately, the goal is to ensure that the project can continue functioning as intended, meet users' needs, and deliver value to stakeholders over the long term.

1. Easy to update class schedules and room availability information
2. Ability to access and update information from multiple devices (e.g., computer, tablet, smartphone)
3. User-friendly interface for teachers and administrators
4. Transparent notification system for booking conflicts or availability changes
5. Ability to handle large amounts of data and multiple users simultaneously
6. Regular software updates to fix bugs and add new features
7. Detailed documentation and training materials for users
8. Robust security measures to protect sensitive data
9. Flexibility to customize systems for different schools or organizations
10. 24/7 customer support for technical issues or user questions.

Maintenance Requirements

The representation of a project's maintenance requirements should accurately reflect the actual performance requirements of the project. This means that the maintenance requirements should be based on the specific needs and goals of the project and should be designed to ensure that the project can meet those requirements on an ongoing basis. This can include regular updates and upgrades to maintain the functionality of the project, as well as constant monitoring and testing to ensure that the project is operating at optimal levels. Ultimately, the maintenance requirements aim to ensure that the project can consistently meet the performance requirements set out for it and continue to deliver value to its users over time.

1. Regular software updates to ensure the system is running smoothly and efficiently.
2. Regular backups of all data to prevent loss of important information.
3. Periodic testing of the booking and scheduling functions ensures they are working correctly.
4. Maintenance and cleaning of any hardware components, such as servers or computers.

5. Monitoring of system security to prevent unauthorized access or data breaches.

6. Training for teachers and administrators on how to use the system effectively.

7. Troubleshooting and support for any issues or technical problems that arise.

8. Periodic review and updates to the system to ensure it meets users' needs.

9. Maintenance of any integrations with other systems or software used in the classrooms.

10. Regular system audits to ensure it is being used appropriately and efficiently.

MS-01	The system helps to update any information at any time
Description	The admin can post any events and enable them to change or update any information.
Stakeholders	Admin.

3.3 Use Case Modeling and Description

A use case diagram visually represents the interactions between the various actors and the system in a software development project. It is used to identify and describe the system's functional requirements and to model the interactions between the system and its users.

To represent the actual performance requirements of a project in a use case diagram, you can include performance-related details in the descriptions of the individual use cases. For example, you might specify the maximum response time for a particular use case or the maximum number of concurrent users that the system should be able to handle. You could also include performance goals or targets as part of the acceptance criteria for each use case. Additionally, you might consider using performance modeling techniques, such as queueing theory or simulation, to help predict and analyze the system's performance under different scenarios.

Overall, the goal of representing performance requirements in a use case diagram is to ensure that the system is designed and built in a way that meets the performance needs of the users and stakeholders. This can help to ensure that the system is reliable, efficient, and scalable and can help to avoid issues such as bottlenecks, delays, or outages that might negatively impact the user experience.
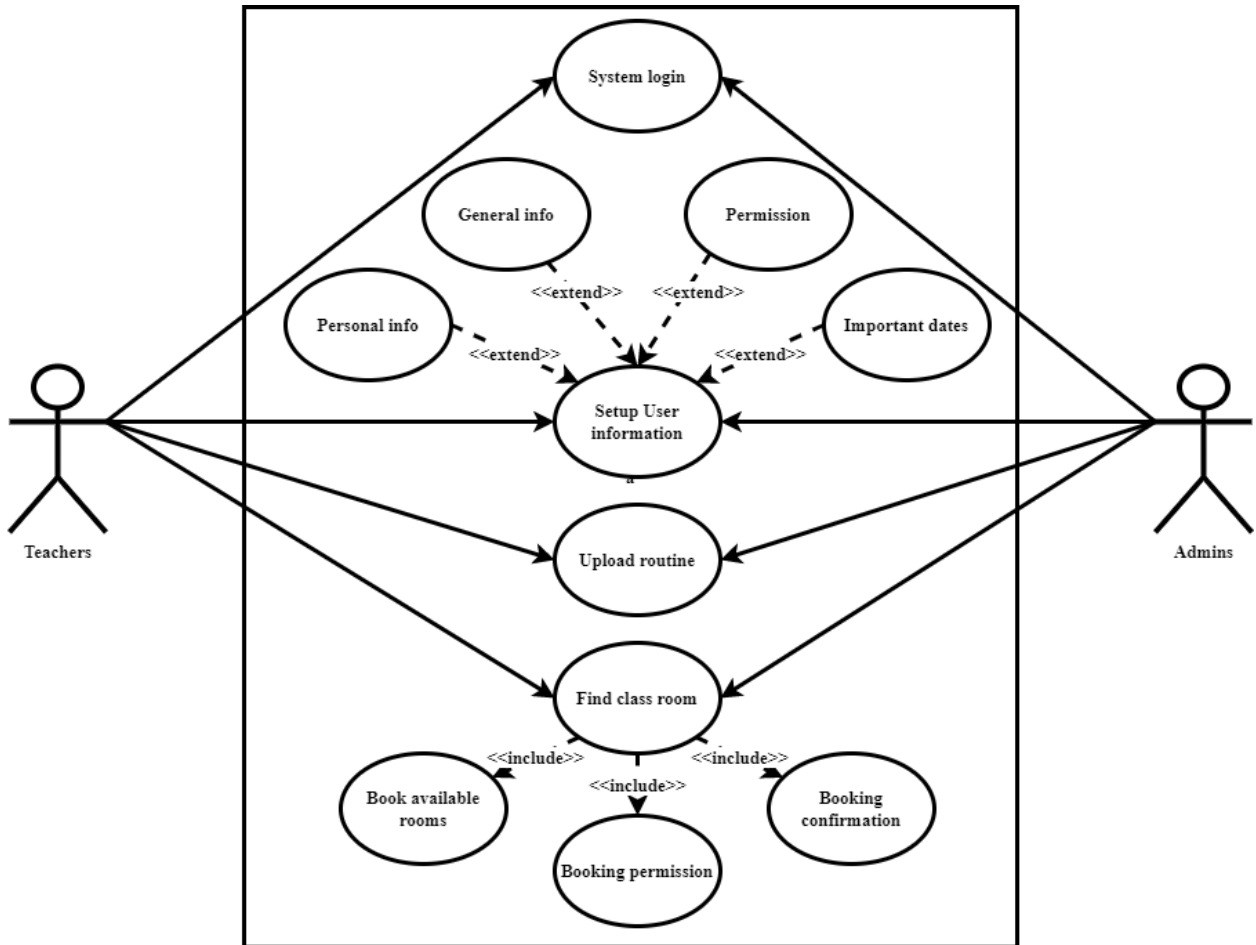
Figure 3.1: Use Case Diagram of Smart room booking Management System

Use Case Description

Under this concept, users can be split into two categories. This system has two types of users: teachers are the primary end users, while administrators can set up the system, make modifications, and determine each user's access level.

Teachers: This is a widespread application situation for this system. In exchange for reserving a classroom, this user can view each instructor's customized timetable, observe revised classes, and attend make-up or additional sessions as necessary. This system is prohibited until a teacher authenticates using their credentials.

Admin: After installing the system, users with administrative access can finish the initial system configuration and administer user accounts. Within the usual operating parameters of the system, they are automatically assigned approved user privileges.

System Login

Table 3.1: Use Case Description of System Login

Use Case Name	System Login.
Priority	Essential.
Goal	Sign in to the system.
Actor	1. Primary Actor: Teacher. 2. Secondary Actor: Admin.
Trigger	Account authentication.
Pre-condition	✦ Go to Smart room booking Management System. ✦ Register to the system. ✦ Insert user details into the required field.
Post-condition	✦ Sign in to the system.
Success Scenario	✦ Register Successful. ✦ Sign in successfully.
Alternative Scenario	✦ Couldn't open the web page correctly. ✦ Crash web page due to system error. ✦ The registration field is not working correctly. ✦ Field validation is not working correctly. ✦ Invalid User details inserted. ✦ Registration failed. ✦ Sign-in failed.

Setup User Information

Table 3.2: Use Case Description of Setup User Information

Use Case Name	Setup User Information.
Priority	Essential.
Goal	Set up user information in the system.
Actor	1. Primary Actor: User. 2. Secondary Actor: Admin.
Trigger	Account authentication.
Pre-condition	↓ Go to Smart room booking Management System. ↓ Log in to the system. ↓ Go to the user's section. ↓ Insert user details into the required field.
Post-condition	↓ Set up user information in the system.
Success Scenario	↓ Sign in Successful. ↓ Set up information successfully.
Alternative Scenario	↓ I couldn't open the web page correctly. ↓ Crash web page due to system error. ↓ The login field is not working correctly. ↓ Invalid User details inserted. ↓ Sign-in failed. ↓ Information setup failed.

Upload Routine

Table 3.3: Use Case Diagram of Upload Routine

Use Case Name	Upload Class Schedules.
Priority	Essential.
Goal	Upload class routine to the system.
Actor	1. Primary Actor: User. 2. Secondary Actor: Admin.
Trigger	Account authentication.
Pre-condition	♦ Go to Smart room booking Management System. ♦ Log in to the system. ♦ Need to go to the dashboard. ♦ Click the upload option and upload routine.
Post-condition	♦ Upload routine into the system.
Success Scenario	♦ Sign in Successful. ♦ Upload routine successfully.
Alternative Scenario	♦ I couldn't open the web page correctly. ♦ Crash web page due to system error. ♦ The login field is not working correctly. ♦ Invalid User details inserted. ♦ Sign-in failed. ♦ The dashboard didn't work correctly. ♦ The upload option didn't work correctly. ♦ The routine upload failed due to a system error.

Find Classroom

Table 3.4: Use case Description of Find Classroom

Use Case Name	Find a Classroom.
Priority	Essential.

Goal	Find an empty classroom and reserve it for reorganizing programs in the system.
Actor	1. Primary Actor: Admin.
Trigger	Account authentication.
Pre-condition	- Go to Smart room booking Management System. - Log in to the system. - Need to go to the find classroom section. - Enter the specific time and date.
Post-condition	Available rooms are shown in the system.
Success Scenario	- Sign in Successful. - Find a classroom successfully.
Alternative Scenario	- I couldn't open the web page correctly. - Crash web page due to system error. - The login field is not working correctly. - Invalid User details inserted. - Sign-in failed. - Finding classroom options didn't work correctly. - The insert option didn't work correctly. - Find classroom failed due to a system error.

3.4 Logical Data Model

A data flow diagram (DFD) is a graphical representation of data flow through a system. It is used to visualize how data is processed, transformed, and stored within a system. In a DFD, information is represented by labeled arrows, and labeled boxes represent processing steps.

The representation of a project's DFD should correspond to the actual performance requirements of the system. This means that the DFD should accurately reflect how data is processed and transformed within the system and consider any constraints or conditions on the system's performance. For example, suppose the system needs to process a large volume of data in a short amount of time. The DFD should reflect this by showing the data

processed through multiple parallel paths or using high-speed processing elements. On the other hand, if the system has more relaxed performance requirements, the DFD can be more straightforward, with fewer processing steps and data flows.

Overall, it is essential that the representation of a project's DFD accurately reflects the actual performance requirements of the system, as this will help ensure that the system is designed and implemented correctly and will meet the users' needs.
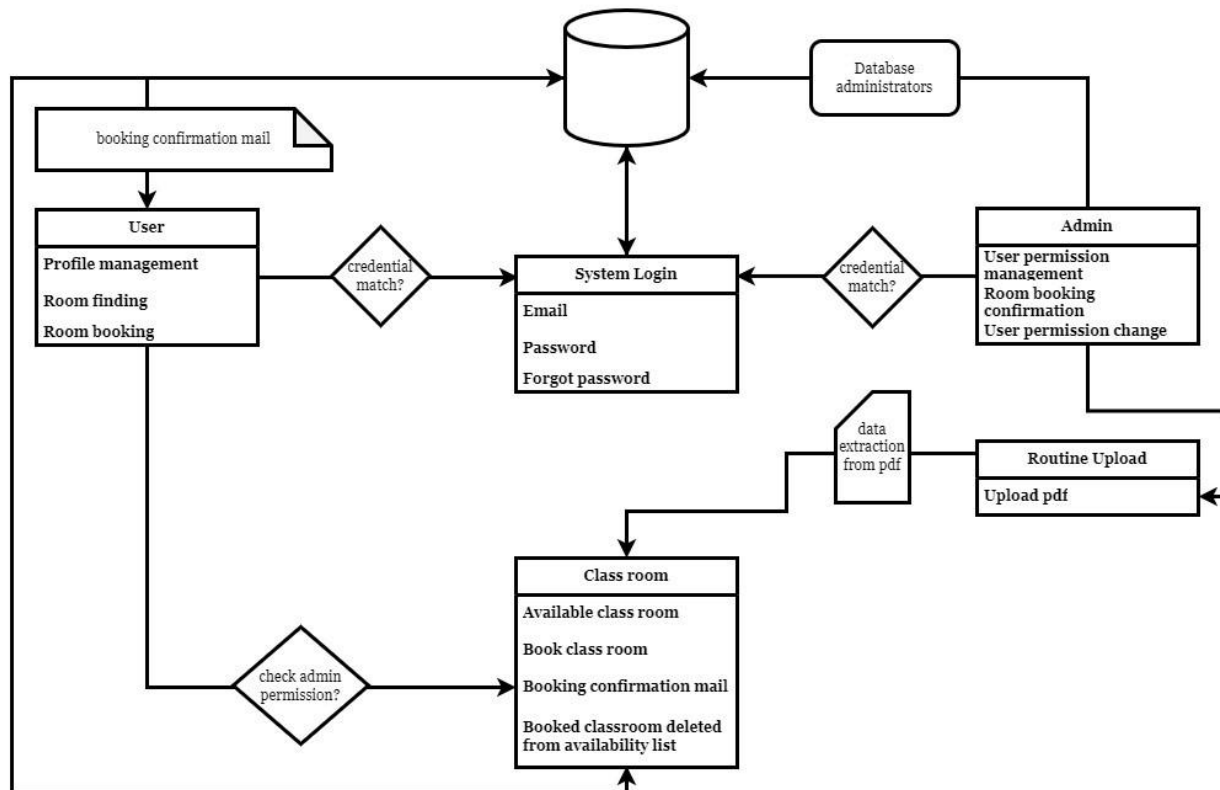

Figure 3.2: Data Flow Diagram of Smart room booking Management System

3.5 Design Requirement

To design the model we need the actor like teachers, viewer, admin etc. Viewer can only see the home page. The teachers can booked any empty room. The admin have the supreme power.

In front end we use here HTML, CSS, JAVASCRIPT and BOOTSTRAP.

In back-end we use here PYTHON, DJANGO, SQLite (Database), Sendinblue (Mail).

CHAPTER 4

Development Environment

4.1 Front-end Design

In our " Smart room booking Management System" project, we used Python as the programming language and Django as the framework. Python is a popular and influential programming language widely used in various applications, including web development, data analysis, artificial intelligence, and scientific computing. It is known for its simplicity, flexibility, and readability, making it an excellent choice for many projects.

Django is a high-level Python web framework that provides tools and libraries for building web applications quickly and efficiently. It is built on the principle of "don't repeat yourself," which means that it provides a set of components and tools that can be reused throughout a project, allowing developers to focus on building the unique features of their application. Django is well-suited for complex, data-driven projects and is used by many companies and organizations worldwide, including Instagram and Pinterest.

In the Smart room booking Management System, we used Python and Django to build a web-based platform that allows teachers to manage their classrooms more effectively. The system includes features such as uploading course schedules, searching available classrooms, reserving empty classrooms for different functions and arrangements, and communication tools, all of which are implemented using Python and Django. Overall, the combination of Python and Django proved to be a powerful and efficient choice for developing this project.

CSS Framework

For the HTML design of our project, called " Smart room booking Management System," we decided to use the Bootstrap CSS framework. This framework is a popular choice for web design and development due to its wide range of features and pre-designed elements that make it easy to create responsive, mobile-first websites. Some of the Bootstrap features that we found particularly useful for our project included the grid system for layout, the

extensive collection of pre-designed UI components such as buttons, forms, and navigation elements, and the ability to customize the appearance of factors using the provided themes and customization options. Overall, we found that using Bootstrap allowed me to quickly and effectively design and develop the HTML interface for our project, and we would recommend it to others looking for a reliable and user-friendly CSS framework.

Twitter Bootstrap

we used Twitter Bootstrap to develop our Smart room booking management system project as the front-end design framework. This decision was based on the convenience and versatility of Bootstrap, which allows for quick and efficient development of responsive, mobile-first projects. The pre-designed components and layout options in Bootstrap allowed me to create a cohesive and visually appealing interface for the classroom management system. Additionally, the extensive documentation and active community support for Bootstrap made it easy to find solutions to any design challenges that arose. Overall, the use of Twitter Bootstrap significantly contributed to the successful front-end design of the Smart room booking management system.

4.2 Back-end Design

Various tools and platforms were implemented to develop and deploy the system for the Smart room booking management system project. These included software development tools like Eclipse and Visual Studio and programming languages like Python. The plan was created using an agile software development approach, with version control managed using Git. Various testing and debugging tools, including JUnit and GDB, were used to test and debug the system. The plan was also designed to be scalable and highly available, and as such, cloud computing platforms were utilized to host the system and its various components. Various monitoring and management tools were also implemented to monitor and maintain the system. Overall, combining these tools and platforms enabled the development and deployment of a robust and reliable Smart room booking management system.

Web Server

In our project, called the Smart room booking Management System, we used a web server to serve the files that form the web pages to users in response to their requests. The web server we used was a program that implemented the HTTP (Hypertext Transfer Protocol) to facilitate communication between the users' devices and the web server. HTTP is a standard networking protocol for transmitting hypertext documents, such as HTML (Hypertext Markup Language) files, between clients and servers. Many web servers are available, such as Apache, Nginx, and Microsoft IIS. The choice of which web server to use can depend on various factors, including the operating system, the website's needs, and the developers' preferences. In our project, we chose to use a web server that was able to handle the high traffic and workload of the Smart Room Booking Management System, and that was able to integrate seamlessly with the other components of the system.

Database Server

In our project, called smart room booking management system, we used a MySQL database server to store and manage the data for the system. MySQL is a popular open-source relational database management system widely used in various applications, including web development, data warehousing, and the development of software applications. One of the key benefits of using MySQL for our project was its reliability and performance, as well as its flexibility in terms of the types of data it can store and how it can be accessed and queried. Additionally, MySQL has a large and active user community, which means that a wealth of resources and support is available for those working with the database. Overall, the use of MySQL played a critical role in the success of our smart room booking management system project.

4.3 Interaction Design and User Experience (UX)

When designing a project's user interface, it is essential to consider the system's performance requirements and choose technologies that will meet those requirements effectively. This may involve selecting optimized technologies for specific tasks, such as quickly rendering large amounts of data or handling complex user interactions. It may also include selecting technologies compatible with the hardware and software platform on which the system will be deployed.

Many technologies can represent a project's user interface, including HTML, CSS, and JavaScript for web-based applications or native frameworks such as Java or Swift for mobile applications. It's essential to consider the specific needs and goals of the project and choose technologies that will deliver the desired user experience while meeting the system's performance requirements.

4.4 Implementation Requirements

When representing a project's development tools and technologies, it is essential to consider the actual performance requirements of the project to choose the most appropriate tools and technologies. This can involve taking into account factors such as the project's complexity, the amount of data that needs to be processed, the expected performance and scalability of the system, and any specific constraints or requirements that must be met.

Some standard tools and technologies in developing a project include programming languages, frameworks, libraries, databases, and tools for testing, debugging, and deployment. It is essential to carefully evaluate the capabilities and limitations of these tools and technologies concerning the project's performance requirements to ensure they can meet the project's needs. This may involve performing performance testing and benchmarking and seeking expert guidance from other developers or subject matter experts.

CHAPTER 5

Implementation and Testing

5.1 Implementation of Database

In the smart room booking management system project, a range of testing features were implemented to ensure the system's reliability and functionality. These testing features included black box, white box, and unit tests, which were used to test the individual components and functions of the system, as well as integration tests, which were used to ensure that the various parts of the system worked together as intended. In addition, system-level tests were conducted to verify the system's overall performance and behavior. These tests were designed to simulate various scenarios and test the system's ability to handle different workloads and conditions. Other testing features included user acceptance tests, which were used to ensure that the system met the requirements and needs of the teachers and system administrators who would be using it, as well as stress tests, which were used to determine the system's limits and identify any potential bottlenecks or vulnerabilities. Overall, these testing features helped to ensure the quality and reliability of the smart room booking management system.

Features to be Tested

Table 5.1: Tested Features of Smart Room Booking Management System

Features	Priority	Description
Registration	1	To get all services from this system, it is required to be registered.
Modify	3	Edit the information when needed.
Delete	2	Delete information from the list.
Show details	1	All posted information will show on the page.
Login	1	Login as an authenticated user.
Logout	1	Log out of the system.

Change password	1	Change the password of the system users.
Upload routine	1	Upload routine by the system users.
Book available rooms	1	Book open space by system users.
Booking Confirmatio n	1	Getting notified of booking confirmations through the system.
Application error message processing	1	All need to get the proper error message.
Technological Features		
Database	1	Entre to the database is often wanted to process. So, this technical feature should firmly control the management system.

Features no to be Tested

Table 5.2: Not-Tested Feature of Smart Room Booking Management System

Features	Description
Check users' status	It is not required because the system administrator will do it.

5.2 Implementation of Front-end Design

5.2.1 Test Strategy

The test strategy for the smart room booking management system project was designed to ensure the reliability and functionality of the system. The testing approach for the project

was based on a combination of manual and automated testing methods. Manual testing validated the system's core features and functionality, including uploading class schedules, viewing available rooms, and booking rooms for different functions. Automated testing was used to verify the system's performance, scalability, and stability and to identify potential issues or defects.

The project's test strategy also included using various types of testing, including unit testing, integration testing, and system-level testing. These tests were designed to verify the individual components and functions of the system, as well as the interactions between different parts. In addition, user acceptance testing was conducted to ensure that the system met the requirements and needs of the teachers and system administrators who would be using it.

Overall, the test strategy for the smart room booking management system project was designed to ensure the reliability and functionality of the system and to identify and resolve any issues or defects that may arise.

Test Approach

A comprehensive test approach was adopted for the smart room booking management system project to ensure the system's reliability and functionality. This approach included manual and automated testing methods, ensuring that all system components were thoroughly tested and any defects or issues were identified and addressed.

To begin with, unit tests were conducted on each component of the system to verify that they were functioning correctly. These tests were designed to cover a wide range of scenarios and conditions and were run manually and using automated testing tools. Next, integration tests were conducted to ensure that the various components of the system worked together as intended. These tests involved setting up test environments that simulated real-world conditions and scenarios and were used to verify the system's overall performance and behavior.

In addition to these tests, system-level testing was conducted to verify the system's overall performance and behavior. This included conducting stress tests to determine the system's limits and identify potential bottlenecks or vulnerabilities. User acceptance tests were also

conducted to ensure that the system met the requirements and needs of the teachers and system administrators who would be using it.

Overall, this test approach helped to ensure the quality and reliability of the smart room booking management system.

Black Box Testing

Black box testing is a method of testing that focuses on the functionality of a system without requiring any knowledge of its internal implementation or structure. In the context of the smart room booking management system project, black box testing could be used to verify that the system can correctly and accurately display class schedules and room availability and allow administrators to book rooms for different functions. This could involve creating test cases that exercise various aspects of the system's functionality, such as uploading class schedules, searching for available rooms, and booking rooms for different functions. The testers would not need to know the system's internal implementation or structure to perform these tests. Instead, they would need to interact with the system through its user interface and observe the results to determine whether it is functioning correctly. Black box testing can be an effective way to validate the functionality of the smart room booking management system and ensure that it meets the requirements and expectations of its users. In light of this, we have chosen to do boundary value analysis and equivalence partitioning on this system.
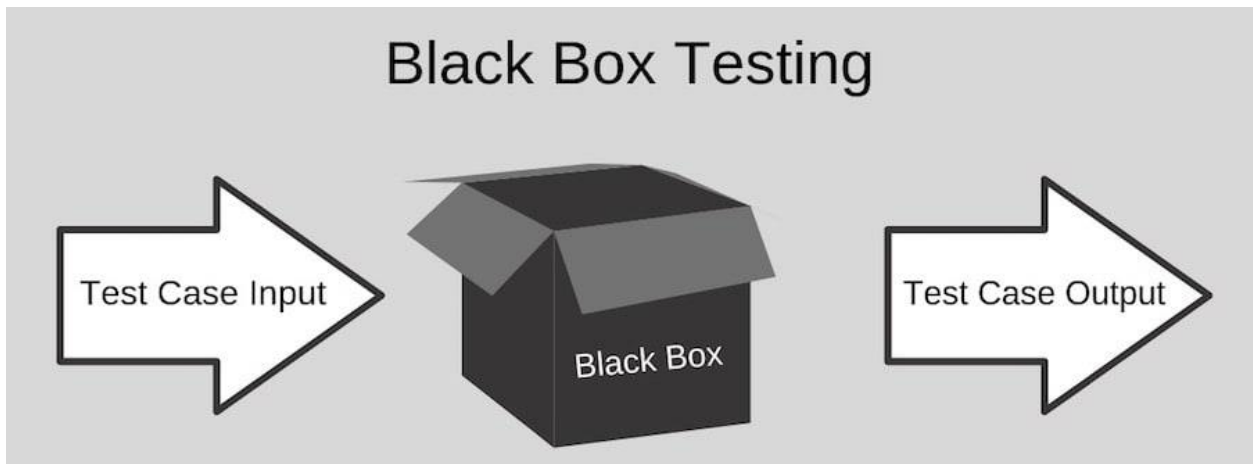

Figure 5.1: Representation of the process of Black Box Testing

White Box Testing

White box testing is a type of testing that focuses on the internal structure and implementation of a system. In the context of the smart room booking management system project, white box testing could be used to ensure that the various components and functions of the system are working as intended. This could involve testing the algorithms and data structures that make up the system and the interactions between different components and functions. White box testing could also include testing the system's error handling and recovery mechanisms and security and privacy features. Testing the system's internal workings in this way makes it possible to identify and fix any issues or bugs present, helping to ensure its reliability and functionality.
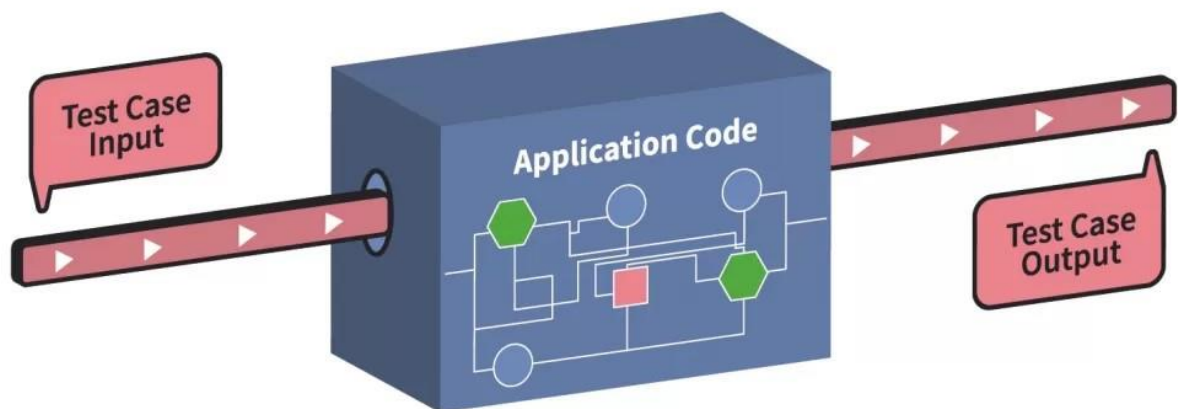

Figure 5.2: Representation of the procedure of White Box Testing

Unit Testing

In the smart room booking management system project, unit testing was an essential aspect of the testing process. Unit tests are individual tests designed to test the functionality and

behavior of specific components or functions within the system. For the smart room booking management system, unit tests were created to test the various features and functionality of the system, such as the ability to upload class schedules, display room availability, and book rooms for different functions. These tests were designed to ensure that each system component worked correctly and as intended. In addition, unit tests were also used to validate the input and output of each function, as well as to verify the system's ability to handle different types of data and scenarios. Overall, unit testing played a crucial role in ensuring the quality and reliability of the smart room booking management system.
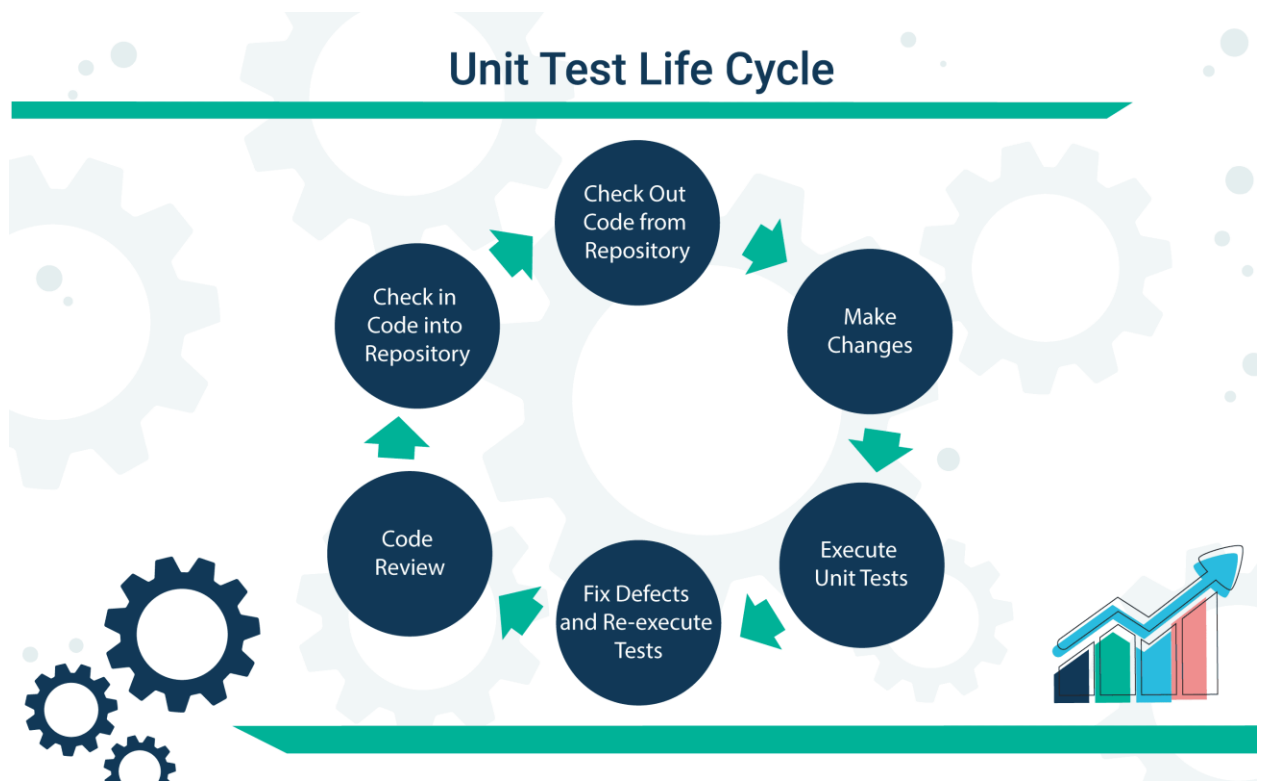

Figure 5.3: Representation of the Life Cycle of Unit Testing

Pass-Fail Criteria

For the smart room booking management system project, the pass/fail criteria for testing were established to determine the system's overall quality and reliability. These criteria were used to evaluate the system during testing and decide whether or not it met the

required standards and specifications. Some of the key pass/fail criteria for testing the system included the following:

- **Functionality:** The system must be able to perform all of the required functions as intended, including uploading class schedules, showing available rooms, and booking rooms for different parts.

- **Performance:** The system must meet the required performance standards, including response times and throughput.

- **Reliability:** The system must be reliable and operate without failures or errors.

- **User experience:** The system must be easy to use and provide a positive user experience for teachers and system administrators.

- **Security:** The system must be secure and protected against unauthorized access and data breaches.

Overall, these pass/fail criteria were used to ensure that the smart room booking management system met the requirements for deployment.

Testing Schedule

In the smart room booking management system project, a detailed testing schedule was developed to ensure that all aspects of the system were thoroughly tested before deployment. The testing schedule was designed to be iterative and incremental, with testing performed at each development stage. This approach allowed for frequent testing and validation of the system and for identifying and resolving any issues.

The testing schedule began with unit tests conducted during the project's initial development phase. These tests were designed to verify the functionality of individual components and ensure that they were working correctly. Integration tests were then conducted to confirm that the various components of the system were working together as intended.

Once the system's basic functionality had been verified, system-level tests were conducted to evaluate the overall performance and behavior. These tests were designed to simulate

various scenarios and test the system's ability to handle different workloads and conditions. User acceptance tests were also conducted to ensure that the system met the requirements and needs of the teachers and system administrators who would be using it.

Finally, stress tests were conducted to determine the system's limits and identify potential bottlenecks or vulnerabilities. The results of these tests were used to fine-tune the system and ensure that it was reliable and robust before deployment. Overall, the testing schedule for the smart room booking management system was thorough and comprehensive and helped to ensure the quality and reliability of the system.

This section will describe the testing schedule below:

- Stipulate test signs.

- Stipulate entirely article transmitted proceedings.

- Approximation time is obligatory to do each testing mission.

- Schedule entirely testing tasks and test signs

- For each testing supply, stipulate its retro of use.

Table 5.3: Testing Schedule of Smart Room Booking Management System

Test Phase	Time
Test Plan Creation	1 week
Test specification creation	2 weeks
Black Box Testing	1 week
White Box testing	1 week
Unit Testing	During Development time
Component testing	1 week
Test Phase	**Time**
Integration Testing	1 week

Use case validation	1 week
User interface testing	1 week
Load testing	1 week
Performance Testing	2 weeks
Release to Production	1 week

Traceability Matrix

A traceability matrix is a document or tool used to trace the relationships between different requirements, design elements, and test cases in a project. In the context of the smart room booking management system project, a traceability matrix could be used to trace the relationships between the system's various requirements and design elements and the corresponding test cases used to validate these elements. The traceability matrix could be used to ensure that all of the needs for the system were adequately covered by the design and testing activities and that all design elements were traced correctly back to the corresponding conditions. It could also be used to identify gaps or inconsistencies in the coverage of the requirements or design elements and to ensure that all test cases were adequately linked to the appropriate prerequisites or design elements. Overall, the traceability matrix would be an essential tool in helping to ensure the quality and reliability of the smart room booking management system.

Table 5.4: Traceability Matrix of Smart Room Booking Management System

BR#	Category/Functional Activity	Requirement Description	Use Case Reference	Test Case Reference	Comments
BR_1	Functional	Login page	Use case 1	Test case 5.4.1	
BR_2	Functional	Modify user information	Use case 2	Test case 5.4.2	

BR_3	Functional	Admin panel	Use case 2.3	Test case 5.4.3	
BR_4	Functional	Upload routine	Use case 3	Test case 5.4.4	
BR_5	Functional	Search Classroom	Use case 4	Test case 5.4.5	
BR_6	Functional	Reserve available rooms	Use case 4.1	Test case 5.4.6	
BR_7	Functional	Booking confirmation	Use case 4.2	Test case 5.4.7	
BR_8	Performance requirements	Speed & latency requirements	N/A	N/A	

5.3 Testing Implementation

5.3.1 Testing Environment

The testing environment for the smart room booking management system project was designed to closely mimic the real-world conditions in which the system would be used. This included replicating the hardware and software configurations that would be used in production and simulating the various user scenarios and workloads the system was expected to handle. To ensure the reliability and validity of the test results, the testing environment was carefully controlled and monitored, with any external factors that could affect the test results being carefully accounted for and maintained. The testing environment also included a range of monitoring and diagnostic tools, which were used to track the performance and behavior of the system as it was being tested. These tools helped identify any issues or problems during the testing process and allowed the development team to address and resolve any issues identified quickly. Overall, the testing environment played a crucial role in ensuring the quality and reliability of the smart room booking management system.

For the test environment, the critical part of setting up comprises:

- System and applications
- Test data
- Database server

- Front-end running environment

- Client operating system

- Browser

- Hardware includes Server Operating system

- Network

- Documentation required like reference documents/configuration guides/installation guides/ user manuals

5.4 Test Results and Reports

In the smart room booking management system project, various test cases were developed to thoroughly test the system's functionality and behavior. Some of the test cases that might be used for this project could include the following:

- Testing the ability of teachers and system administrators to upload class schedules and view available rooms

- Testing the ability of the system to show which rooms are free and which are occupied accurately

- Testing the ability of the system to handle different types of class schedules, including schedules with conflicting or overlapping classes

- Testing the ability of the system to handle different types of room bookings, including bookings for one-time events and recurring events

- Testing the ability of the system to accurately show the details of booked rooms, including the date, time, and purpose of the booking

- Testing the system's ability to handle multiple bookings for the same room at the same time

- Testing the system's ability to handle large volumes of data, including a large number of class schedules and room bookings

These are just a few examples of test cases that might be developed for this project. The specific test cases used will depend on the particular requirements and functionality of the system.

Login

Table 5.5: Test Case of Login

Test Case #01					Test Case Name: Login		
System: Smart Room Booking Management System					Subsystem: Admin & Faculty		
Designed By: Joy Mandal					Designed Date: 12/25/2022		
Executed By:					Executed Date:		
Short Description: They both are registered and trying to log into the system							
Pre-condition:							

1. Admins and Teachers both are registered

2. Assume username is 'joy_roy@gmail.com' and password is 'joy123456'

Step	User_id	Email	Password	Expected result	Pass/ Fail	Comment
1	1797418758	joy@gmail.com	joy123456	Wrong user-id	Pass	
2	---	joy_roy@gmail.com	joy123456	Invalid user-id	Pass	
3		joy_roy@gmail.com	joy123456	The user id can't be blank	Pass	
4	01797418758	---	joy123456	email can't be blank	Pass	
5	01797418758	joy_roy@gmail.com		Password can't be blank	Pass	
6	A142-35-726	joy_roy@gmail.com	joy123456	Wrong userid	Pass	
7	01797418758	joy_roy@gmail.com	@@Joy@@	Invalid password	Pass	
8	01797418758	joy_roy@gmail.com	joy123456	Successfully logged in	Pass	
9				User id, email & password can't be blank	Pass	
10	01797418758 11	joy_roy@gmail.com	joy123456	User id can't be greater than 11 number	Pass	
11	01797418758 11	joy_roy@gmail.com	Joy126	Password cannot be less than 6 characters	Pass	

12	01797418758 11	joy_roy@ gmail.com	joy1234561112 3	Password cannot be more than 12 characters	Pass	

Post Condition: Admin and teacher both successfully logged into this system and can access the system**.**

Modify User Information

Table 5.6: Test Case of Modify User Information

Test Case #02	**Test Case Name**: Modify User Information		
System: Smart Room Booking Management System	**Subsystem:** Admin & Faculty		
Designed By: Joy Mandal	**Designed Date:** 12/25/2022		
Executed By:	**Executed Date:**		
Short Description: When modifying any user information then, show the result on the page			
Pre-condition: 1. Users need to go to the setup user information			
Action	**Expected result**	**Pass/Fail**	**Comment**
Modify user information	Modify the effect and show it on the page	Pass	
Post Condition: If any information is modified, then show it on the page			

Admin Panel

Table 5.7: Test Case of Admin Panel

Test Case #03	**Test Case Name**: Admin Panel
System: Smart Room Booking Management System	**Subsystem:** Admin
Designed By: Joy Mandal	**Designed Date:** 12/25/2022
Executed By:	**Executed Date:**

Short Description: When modifying or accessing control of any user information then, show the result on the page				
Pre-condition:				
1. Users need to go to the user's section				
2. For permission, the user needs to go to the authentication and authorization page				
Step	**Action**	**Expected result**	**Pass/Fail**	
1	Modify user information	Modify the effect and show it on the page	Pass	
2	Control access of the user	Performed actions and results are shown on page	Pass	
Post Condition: If any information and access are modified, then show them on the page				

Upload Routine

Table 5.8: Test Case of Upload Routine

Test Case #04	Test Case Name: Upload Class Schedule		
System: Smart Room Booking Management System	**Subsystem:** Admin & Faculty		
Designed By: Joy Mandal	**Designed Date:** 12/25/2022		
Executed By:	**Executed Date:**		
Short Description: When uploading the class schedule then show the result on the page			
Pre-condition:			
1. User needs to go to the dashboard page and then upload the routine section			
Step	**Action**	**Expected result**	**Pass/Fail**	**Comment**
1	Upload routine	Performed actions and results are shown on page	Pass	
Post Condition: If any schedule is uploaded, then show it on the page				

Search Classroom

Table 5.9: Test Case of Search Classroom

Test Case #05			Test Case Name: Search Classroom		
System: Smart Room Booking Management System			Subsystem: Admin & Faculty		
Designed By: Joy Mandal			Designed Date: 12/25/2022		
Executed By:			Executed Date:		
Short Description: When the search for any empty classroom, then show the result on the page					
Pre-condition: 1. User need to go to the search find classroom section					
Step	Action	Expected result		Pass/Fail	Comment
1	Search classroom by given specific time and date	Performed actions and results are shown on page		Pass	
Post Condition: If any search is performed, then show the result on the page					

Reserve Available Rooms

Table 5.10: Test Case of Reserve Available Rooms

Test Case #06		Test Case Name: Reserve Available Rooms		
System: Smart Room Booking Management System		Subsystem: Admin		
Designed By: Joy Mandal		Designed Date: 12/25/2022		
Executed By:		Executed Date:		
Short Description: When the user needs to reserve any empty classroom, then show the result on the page				

Pre-condition:
 	
    1. Users need to go to the search find classroom section
 	
    2. After that user need to insert a specific period and date to perform this action				

Step	Action	Expected result	Pass/Fail	Comment
1	Search classroom by given specific time and date	Performed actions and results are shown on page	Pass	
2	Select empty classroom and click on book	Performed actions and results are shown on page	Pass	
Post Condition: If any room is reserved, then show it on the page				

Booking Confirmation

Table 5.11: Test Case of Booking Confirmation

Test Case #07	Test Case Name: Booking Confirmation
System: Smart Room Booking Management System	Subsystem: Admin & Faculty
Designed By: Joy Mandal	Designed Date: 12/25/2022
Executed By:	Executed Date:
Short Description: When the user book any classroom, then shows the result on the page	

Pre-condition:
 	
    1. Users need first to select a classroom
 	
    2. After that user need to click the book option	

Step	Action	Expected result	Pass/Fail	Comment
3. Users need to get booking permission from the super admin				
1	Select empty classroom and click on book	Performed actions and results are shown on page	Pass	
2	Wait for booking permission	Performed actions and results are shown on page	Pass	
3	Confirm booking	Performed actions and results are shown on page	Pass	

Post Condition: If the booking is made, then show a booking confirmation on the page

5.4.1 Overview of Projects User Manual

Here is a summarized outline for the **"User Manual"** section of a user manual for a smart room booking management system:

1. **Accessing the Class Scheduling and Room Booking module:**

- To access the class scheduling and room booking module, log in to the system using your teacher or administrator account.

- Once logged in, click on the "Class Scheduling and Room Booking" tab in the main menu.

2. **Uploading class schedules:**

- Teachers can upload their class schedules by clicking on the "Upload Class Schedule" button.

- Select the relevant file from your computer, and click "Submit" to upload the schedule.

- The system will automatically parse the schedule and display it in the calendar view.

3. **Viewing available rooms:**

- To view a list of available rooms at a specific time, click on the desired date and time in the calendar view.

- The system will display a list of accessible rooms during the selected period.

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5.4.1 Overview of Projects User Manual

Here is a summarized outline for the **"User Manual"** section of a user manual for a smart room booking management system:

2. **Accessing the Class Scheduling and Room Booking module:**

- To access the class scheduling and room booking module, log in to the system using your teacher or administrator account.

- Once logged in, click on the "Class Scheduling and Room Booking" tab in the main menu.

3. **Uploading class schedules:**

- Teachers can upload their class schedules by clicking on the "Upload Class Schedule" button.

- Select the relevant file from your computer, and click "Submit" to upload the schedule.

- The system will automatically parse the schedule and display it in the calendar view.

4. **Viewing available rooms:**

- To view a list of available rooms at a specific time, click on the desired date and time in the calendar view.

- The system will display a list of accessible rooms during the selected period.

5. **Booking a room:**

- Administrators can book a room for a specific function by clicking on the "Book Room" button.

- Enter the details of the function, including the Name, start time, end time, and any other relevant information.

- Select the desired room from the dropdown list, and click "Submit" to book the room.

6. Viewing booked rooms:

- To view a list of rooms that have been booked for a specific period, click on the "View Booked Rooms" button.

- Select the desired period from the calendar, and the system will display a list of booked rooms and the details of the functions that have been scheduled.

5.4.2 Dashboard of Smart Room Booking Management System

This is the dashboard for our project, the SRBS (smart room booking management system). The upload routine function allows users to enter their class schedules and receive the corresponding information.
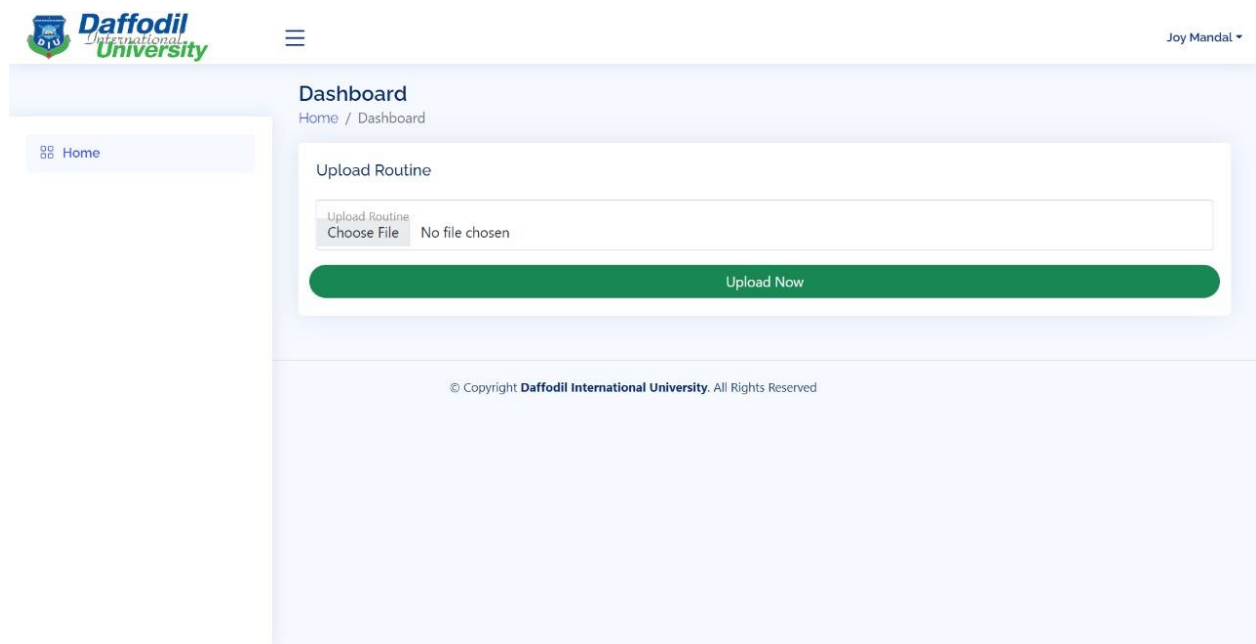
Figure 6.4: Dashboard of Intelligent Classroom Management System

5.4.3 Login Panel of Smart Room Booking Management System

Here is the login interface for the project. Users with credentials, such as school administrators and teachers, must log into the system first. This is how authentication in this system is performed. Nobody can gain access to anything without submitting their credentials first.
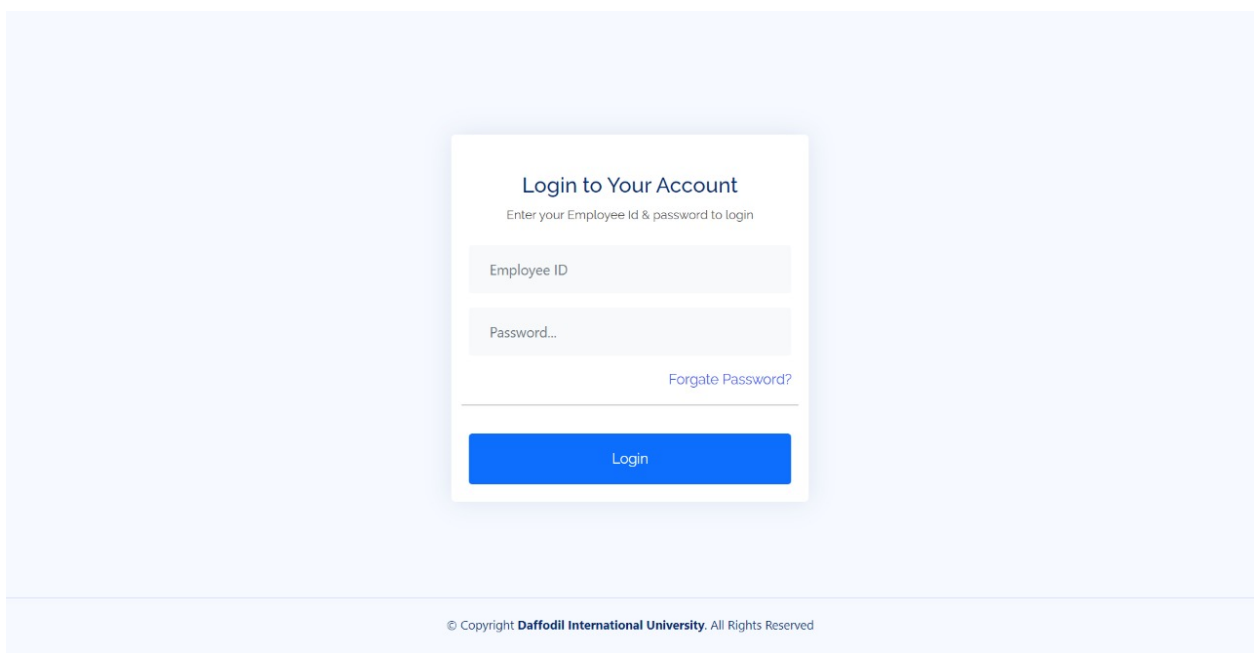
Figure 6.5: Login Panel of Smart Room Booking Management System

5.4.4 General Information of Users of Smart Room Booking Management System

This section contains the user's basic information, such as their Name and email address. Their credentials for logging in are included with the data they receive. In this section, the user can add new information to their profile.
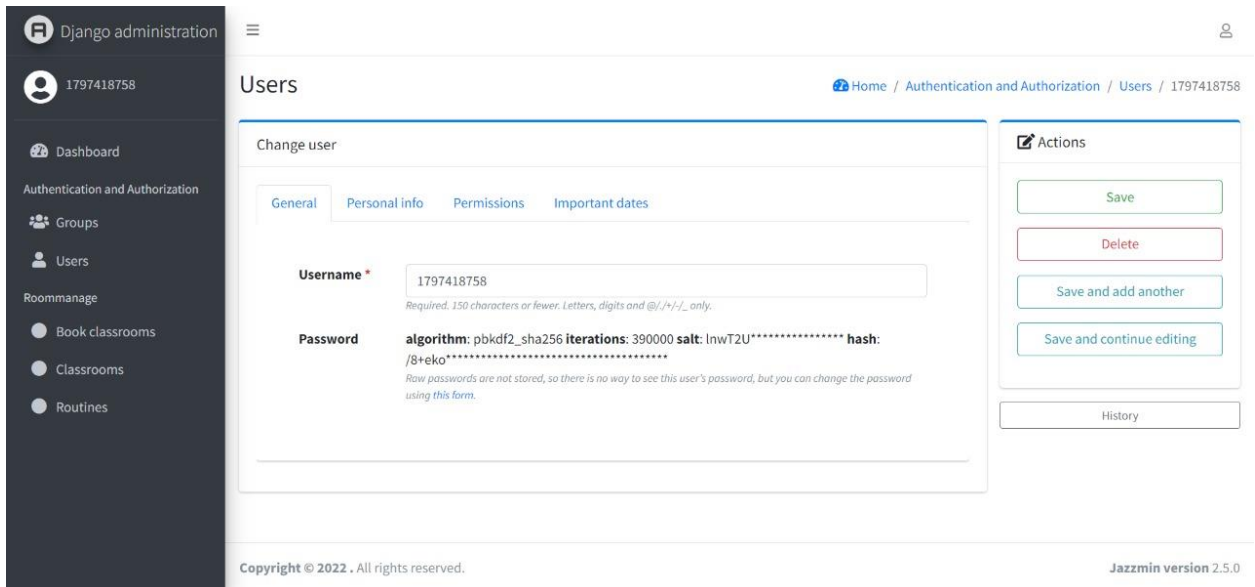
Figure 6.6: General Information of Smart Room Booking Management System

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5.4.5 Personal Information of Users of Smart Room Booking Management System

This section contains the user's basic information, such as their Name and email address. Included will be their first and last names and email addresses. At any time, the user can edit their profile.
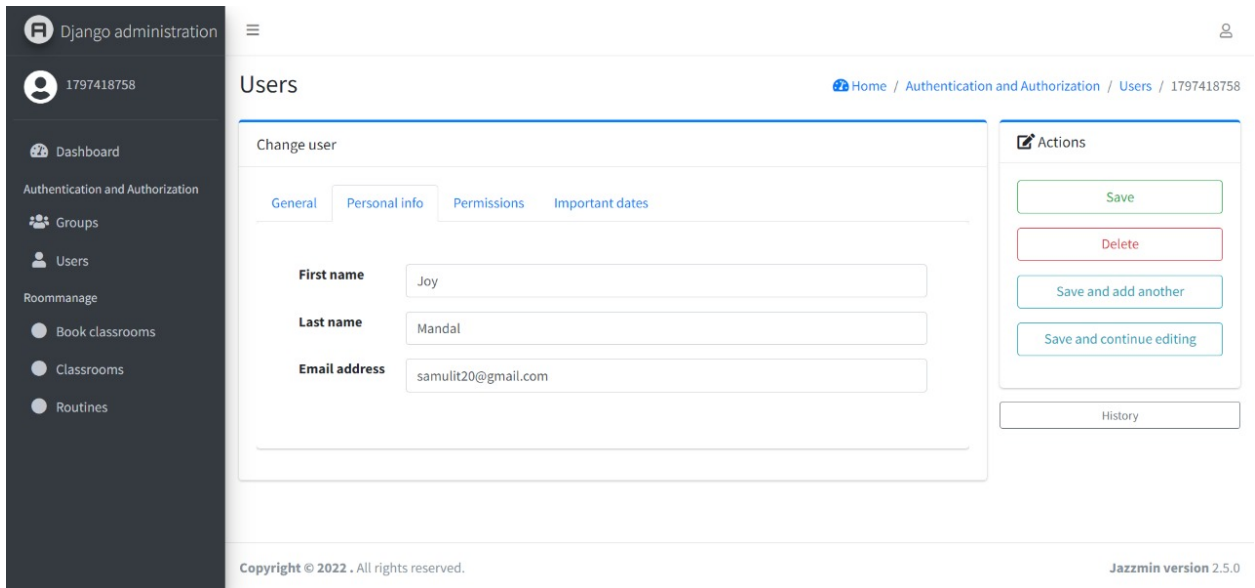
Figure 6.7: Personal Information of Smart Room Booking Management System

5.4.6 Access Points (Permission) for Users of Smart Room Booking Management System

This section contains the permissions administrator. Super Admin possesses virtually all the keys to the fortress in this part. Administrators are responsible for deciding which permissions to grant and how to implement them. The faculty may reserve a space for various purposes if the super administrator approves.

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Figure 6.8: Access Points for Users of Smart Room Booking Management System

5.4.7 Search Option for Classrooms of Smart Room Booking Management System

The find classroom page of this website provides users with a database of accessible lecture halls. After specifying the exact day and time, the actual results will be displayed.
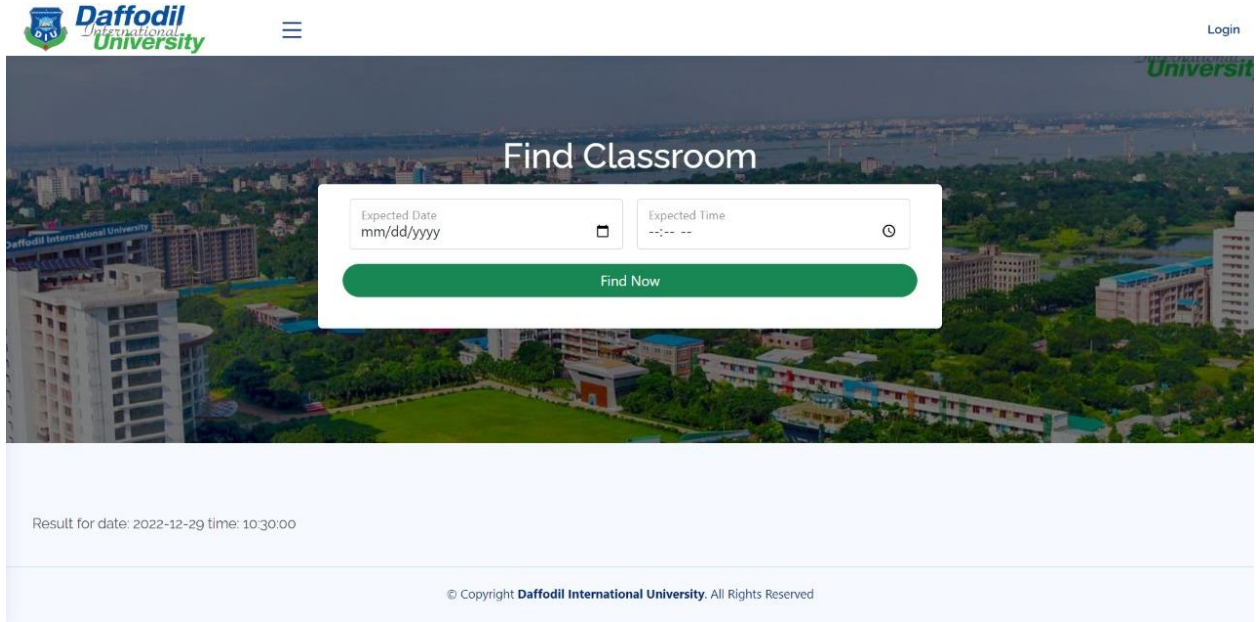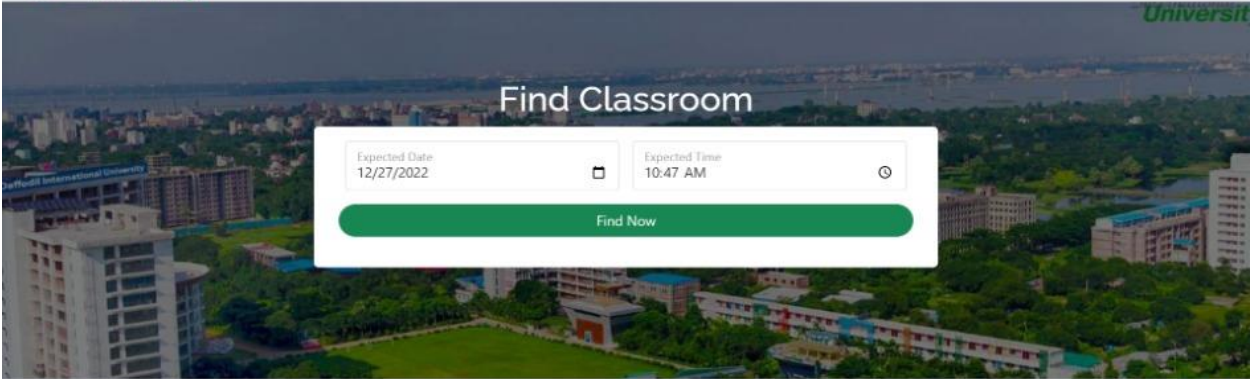

Figure 6.9: Search Option for Classrooms of Smart Room Booking Management System

5.4.8 Available Results of Classrooms of Smart Room Booking Management System

This section displays the available lecture halls at any given time. The user can observe and reserve a place where multiple coordinated activities can occur.

Figure 6.10: Available Results of Classrooms of Smart Room Booking Management System

CHAPTER 6

Impact on Society, Environment and Sustainability

6.1 Impact on Society

The Smart Room Booking Management system can have a significant impact on society by improving the overall learning experience for students on college campuses. By streamlining the process of scheduling and managing classrooms, the system can save students time and reduce confusion when trying to find and book classrooms for their classes. This can lead to a more positive and productive learning environment for students, and ultimately, better student outcomes.

Additionally, the system can also have a positive impact on college administrators by allowing them to efficiently manage the use of their resources and optimize the use of their classrooms. This can result in cost savings for the college and a more efficient use of resources.

The system can also have an impact on society by promoting the efficient use of resources. By optimizing the use of classrooms, the system can decrease the need for unnecessary construction and expansion of college campuses, reducing the environmental impact of the college.

Furthermore, the Smart Room Booking Management system can also have a positive impact on society by promoting a more inclusive and accessible learning environment. By ensuring that classrooms are easily accessible and equipped with the necessary amenities, the system can help to create a more inclusive environment for students with disabilities.

6.2 Impact on Environment

The Smart Room Booking Management system can have a positive impact on the environment by promoting the efficient use of resources. By optimizing the use of classrooms, the system can decrease the need for unnecessary construction and expansion of college campuses. This can reduce the environmental impact of the college, such as the

use of energy, water and other resources in the construction process, and also the usage of resources in maintaining the new buildings.

Furthermore, the system can also help to reduce the carbon footprint of the college by promoting more efficient use of energy and other resources in the operation of classrooms. For example, by ensuring that classrooms are not unnecessarily left open or heated when not in use, the system can help to reduce energy consumption and costs.

The Smart Room Booking Management system can also have a positive impact on the environment by promoting more sustainable practices on college campuses. For example, by providing information on the amenities and special features of classrooms, such as recycling facilities or green roofs, the system can encourage students and administrators to adopt more sustainable behaviors.

Moreover, the system can also support remote learning by allowing students to access classrooms from their devices, reducing the need for commuting and travel, which can also have a positive impact on the environment by reducing carbon emissions from transportation.

6.3 Ethical Aspects

The Smart Room Booking Management system raises several ethical considerations. One of the key ethical considerations is the protection of personal data. The system will collect and store personal information of students and administrators, such as class schedules and booking information. It is important to ensure that the system has robust security measures in place to protect this information and prevent unauthorized access or breaches.

Another ethical consideration is the potential for discrimination or bias in the system's algorithms or decision-making processes. It is important to ensure that the system is designed and implemented in a way that minimizes the potential for discrimination or bias, and that any such issues are identified and addressed quickly.

Additionally, the system should ensure accessibility for all students, including those with disabilities, by providing information about the accessibility features of classrooms and ensuring that the system is accessible to all users.

Finally, the system should respect the privacy of users, by not sharing or displaying personal information of users without their consent, and by implementing robust permissions and access controls to ensure that only authorized users can book or view classroom information.

6.4 Sustainability Plan

A sustainability plan for the Smart Room Booking Management system should include several key components. One of the most important components is to ensure that the system is designed and implemented in a way that minimizes its environmental impact. This can include using energy-efficient technologies and minimizing the use of resources during the development and operation of the system.

Another key component of the sustainability plan is to promote sustainable practices on college campuses. This can include providing information on the amenities and special features of classrooms, such as recycling facilities or green roofs, and encouraging students and administrators to adopt more sustainable behaviors.

Additionally, the sustainability plan should also include an ongoing monitoring and evaluation process to ensure that the system continues to meet the needs of students and administrators while minimizing its environmental impact.

Finally, it should also include measures to ensure the system's continuity and durability, such as regular maintenance, upgrades and backups, and to make it adaptable to the future changes.

CHAPTER 7

Conclusion & Future Scope

7.1 Discussion and Conclusion

The smart room booking management system is a comprehensive platform that enables teachers and system administrators to manage the scheduling and booking of classrooms in an educational institution. The system allows users to upload class schedules, view the availability of classrooms, and book rooms for different functions.

The system is designed to be user-friendly and intuitive, with a clear and easy-to-use interface that enables users to quickly and easily access the various features and functions of the platform. The system is also highly flexible, allowing users to customize their schedules and bookings to suit their specific needs and requirements.

The smart room booking management system is built on robust and reliable technology, ensuring that it can handle large volumes of data and transactions without downtime or performance issues. The system is also designed to be scalable, allowing it to easily accommodate growth and expansion as the educational institution's needs evolve.

Overall, the smart room booking management system represents a powerful and valuable tool for teachers and administrators, providing a simple and efficient way to manage the scheduling and booking of classrooms in an educational institution.

7.2 Scope for Further Developments

7.2.1 Limitations and Future Improvements

Our initiatives address certain constraints, such as that only administrators and teachers can utilize this system and modify specific pages. Under this arrangement, students will have no access to anything. In addition, we have a few issues with access permission, and the solution we refer to as "super access" can only be utilized by administrators. In addition, we cannot establish logical functionalities to prevent unnecessary and excessive activity

from occurring without our interaction. In this part, we have outlined potential future upgrades to this system, considering any potential obstacles.

List of Future Improvements

1. The system should have a secure login system for teachers and administrators.

2. The system should allow users to view the schedules of individual classrooms.

3. The system should allow users to cancel or modify existing bookings.

4. The system should notify users when a booking is made or modified.

5. The system should allow administrators to set rules and restrictions on bookings, such as maximum booking duration or blackout periods when no bookings are permitted.

6. The system should be able to add or remove classes from the system.

7. The system should have the ability to customize room capacity and features.

8. The system must be able to prevent double bookings or conflicts in room scheduling.

9. The system must be able to send notifications to relevant parties (e.g., teachers, students, administrators) regarding room bookings or schedule updates.

10. The system must be compatible with various devices (e.g., desktop computers, tablets, smartphones) and web browsers.

11. The system must have a reliable and fast response time to ensure efficient use and minimize downtime.

12. The system should be able to integrate with existing systems (e.g., calendar and notification systems).

13. The system should be able to generate reports on room usage and occupancy.

14. The system should provide a secure authentication system for users.

15. The system should have a backup and recovery system in place.

7.2.2 Obstacles and Achievements

Our education as a developer began at the system's inception. At the outset, we lack the expertise necessary to construct a design, such as a database design or the required algorithms and diagrams for a project. Before developing this system, We lacked an appreciation for the value of algorithms and the requirements of many fundamental elements of the programming language we use. Before commencing the logical portion of the project, it is significantly simpler to develop the code if the database architecture and user interface are complete. This system's creation was a tremendous success for me. We have also provided a list of the obstacles we have encountered while working on this project.

- Ensuring that the system is user-friendly and easy for teachers and administrators to use, especially if they are not particularly tech-savvy

- Integrating the system with the school's existing scheduling and booking systems, if applicable

- Ensuring that the system is secure and protects the privacy of students and teachers

- Ensuring that the system can handle a large number of users and a high volume of requests without crashing or experiencing downtime

- Ensuring that the system can address scheduling conflicts and other issues that may arise

Further, we believe this concept has more significant potential after we overcome these obstacles. If these issues could be resolved, the project may be able to do much. Here are a few examples of potential outcomes:

- Improving the efficiency and effectiveness of the school's scheduling and booking processes

- Allowing teachers and administrators to access and view class schedules and available rooms easily

- Reducing the amount of time and effort required to manage scheduling and bookings

- Providing a convenient and centralized location for teachers and administrators to access class schedules and booking information

- Improving communication and coordination between teachers, administrators, and other stakeholders within the school community

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