Smart University system (SUS)

Final Year Project

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Project Detail

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Appendix A.

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Date

Abstract

The Smart University System (SUS) is a web-based project and the set of technological tools applied to, improve the way of processing and getting output. This system includes a range of features aimed to enhancing efficiency and convenience. The key Features of (SUS) include an Automatic timetable generator, automatic datasheet generator, online enrollment system, Billing through NFC-cards. The automatic timetable generator gets rid of the manual process of creating timetable or date sheet by using 3rd party software (ASI). (SUS) ensures optimal utilization of resources and minimizes dispute. The automatic date sheet generator simplifies and automate the process of generating date sheets. By considering various facts such as faculty availability strength of students, room availability, room capacity. In generate a conflict free date sheet by considering these factors. The online enrollment system makes easy for the student to enroll or register themselves by providing online platform for registration. This eliminates the paper work and enable students to enroll course online. The (SUS) includes an NFC card-based billing system. This allows student to transaction by card instead of cash with in the university such as cafeteria bills, library fines, and other campus facilities. NFC card provides a secure and efficient payment method for student and faculty. By integrating these features, (SUS) aims to enhance productivity, reduce manual efforts and improve university system.

ACKNOWLEDGMENT

First and foremost, praise Allah Almighty, the Most Merciful, the Most Gracious, for His showers of blessings throughout our project work to complete the SUS proposal successfully. Before we begin developing the Proposed System and describing the comprehensive chapters, we want to thank everyone who assisted us at various phases of our project. We boldly state that the project's success is contingent on our parents' unending prayers and support. We would like to express our appreciation to our teachers, who assisted us in many ways and mentoring us from time - to - time in the creation of this project. We would want to express our special thanks to our respected faculty members who offered to assist us in many sections of the problem area. We are grateful to our esteemed teacher, Sir Muhammad Rehman Shahid, for always lending a helping hand in all aspects of the project's development, and especially for enabling us to move forward during the field of developing software products/projects. We are grateful to Mr. Uzair Saeed our supervisor, for their continued support and for inspiring us to create something unique and new.

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Chapter 1: Introduction

1.1 Introduction

The Smart University System (SUS) is a web-based project and the set of technological tools applied to, improve the way of processing and getting output. This system includes a range of features aimed to enhancing efficiency and convenience. Each university requires a general-purpose system that can handle huge amount of data and information. Similarly, each university requires a smart system that is used in some management activities. Smart University System (SUS) is a system that uses technological innovations within its organization to accomplish the task.

1.2 Objectives

Our vision is to improvement in university system by providing different module on a single platform, and also automate the system which are handled manually.

The main objective of our project (SUS) is to provide a flexible system for students and faculty. Make easy for students to enroll the subjects online instead of paper-based enrollment form. Many students feel uncomfortable to carry vault or hard cash and also afraid to lost the cash so, the objective is we provide billing through the NFC card you can buy things from cafeteria, photocopy shop, library etc. with in the university by using this card.

Our objective is to provide a automated system to generate time table and date sheet, because in previous system these are handled manually or using third party software.

1.3 Problem Statement

In the previous system there is no feature for students for enroll themselves using their portal and university student most of the time feels uncomfortable carrying a wallet or cash with him. Date Sheet generation and seating plan for students for exams were handled manually. Timetable generation is done by using 3rd party software (ASI time table generator).

1.4   Assumption and Constraints

Selection of Algorithm: selection of Algorithm and the results of applied algorithm because of the random result of algorithm, it made difficult for the developer to select a specific algorithm which will gives the best result.

NFC device and card availability: The major problem we face in the project is that the device which we require for the project is not available in the market easily, we visit different market in our city but the NFC card reader or writer are not available their so, we can search on internet for the device it is quite expensive there.

1.5   Project Scope

Smart university system helps to manage some activities that were handled manually, it provides the feature of Automatic timetable and date sheet generator to generate the timetable and date sheet schedule with seating plan. It also covers the aspect of enrollment, in this system student can enroll themselves by using their student portal and it also provide the benefit NFC card scanner that supports billing system.

1.5.1 Market Competitors

TUF Portal, NTU Portal, Riphah Portal, these are portals of three different universities for students and teachers also. These universities provide basic information of students and teachers, but we are going to provide those features which are not in these portals.

Table 1.1 **Comparison table**

Application Name	Enrollment System for Students	Billing System for Students using NFC cards	Timetable Generator for Faculty	Date Sheet Generator for Faculty
TUF Portal	●	●	●	●
Riphah Portal	✔	●	●	●
NTU Portal	✔	●	●	●

1.5.2 Business significance

The targeted audience of this system is Universities and Colleges. Each university and college need a timetable, date sheet generator, an enrollment system and smart NFC card system. SUS is better than other system because it provides these features combine rather than individually. So, a university will get a system that will provide these features combine rather than buying individual one, s.

1.5.3 Business Plan

1.5.3.1 Overview

Business name is SUS smart university system. It is a web-based university system that provides some features for students and as well as faculty members. This system provides those features that were handled manually. The targeted audience is clearly Universities, Colleges and different educational institutes.

1.5.3.2 Missions

Develop an automated system for the faculty members of university to manage those activities which are handled manually and paper based. Basically, this system overcomes the problems and provides those features that are not available in the existing systems.

1.5.3.3 Marketing Plan/ Marketing Mix/ Selling Plan

Marketing plan is basically one of the major things that comes to mind when discussing about to sell your project. It describes the project and what the product and how it is going to be price according to its feature. It helps the investors to understand what the project is their price promotion which makes up their mind for investment.

Product mix of SUS (Smart University System)

- SUS is a university system. Main aim to develop this project is to provide a better solution to the activities handled manually for both students and faculty members.
- This application is for specific purpose like only the students and faculty members of the university can use this for their specific need. It is not a general web application only those student and faculty member of the university can use this application.

Pricing strategy of SUS

- The target audience is basically the educational institute like universities and colleges, not for general public use. So, the price of the project will be accordingly.
- Pricing strategy will according to the project as a whole not single or multiple phases.

Promotion mix of SUS

- Promotion is one of the major roles in marketing mix.

- SUS is a system for only universities student and faculty, so, for its promotion can only be done within the university of through its social media platform.

Place strategy of SUS

- SUS is a web-based application so; it can be accessed using browser.

1.5.3.4 SWOT analysis

It is a method or technique used to find out strength, weakness, opportunity and threats which are used to evaluate a company competitive position in market to develop a tactical plan. A SWOT analysis helps to determine the strength and weakness, so we can overcome our weakness and enhance our strength and get opportunity and also work on threats.

Strength
- Provide automated solutions of activities.

- Basic IT skills.

- Quality improvements in system.

Weakness
- Stressful when time is limited.

- Dependency on internet.

- Awareness of people to use this system.

- Poor integration of system.

- Only for educational institute not for general public use.

Opportunity
- Motivating faculty and students to use the system.

- We can add more or upgrade the system according to the requirements.

- Technological Development.

Threats
- Unreliable internet connection.

- System maintenance.

1.5.3.5 FAB Feature Advantages and Benefits

FAB is used to describe the features, advantages and benefits of the product to get customer and investors response towards the application in the product market.

Feature
- Automatic Timetable Generator

- Automatic Date Sheet Generator

- Automated Enrollment System

- NFC card for billing system

Advantages
- Login with email and password when require.

- Generate timetable and date sheet automatically, does not have to work manually.

- Students have the feature to enroll their courses using their LMS portal.

- Student card can also be used for billing inside the universities in many cases.-

Benefits
- Time saving for students and faculty members.

- Using NFC card for payment method is secured for students.

1.6   Constraints

- **Selection of Algorithm**: selection of Algorithm and the results of applied algorithm because of the random result of algorithm, it made difficult for the developer to select a specific algorithm which will gives the best result.

- **NFC device and card availability**: The major problem we face in the project is that the device which we require for the project is not available in the market easily, we visit different market in our city but the NFC card reader or writer are not available their so, we can search on internet for the device it is quite expensive there.

Chapter 2: Requirement Analysis

2.1 Literature review

In the context of this research, as far as a university is concerned, in relation to big data, it can be used to store a huge archive of students', lecturers' and employees' data and that data can be used to be as a reference for future lecturers and employees to attract future students or stakeholders or to look into better ways to teach students. So, we did some research regarding the university system and I found all are the same but the features I had been looking for were not found in those systems. To achieve those features, we have to use 3rd party software or have to do those tasks manually.

Then we came up with an idea to develop a system in which we developing those features. The system is called Smart University System (SUS). The system will provide the features of Automatic timetable generator, Automatic seating plan generator Which are handled manually using third party software, Online Enrollment system for students and NFC card services (smart card services) for students inside a university.

Survey report:

2.2 Stakeholders list

- Admin

- Students

- Accounts

- Management

- Teachers

2.3 Functional Requirements:

Functional requirements of a Smart University System are:

- **Automatic Timetable Generator:** It will take certain required inputs and generate a timetable.

- **Automatic Date Sheet Generator:** It will also take input that are required for date sheet and then generate a Date Sheet and seating plan as well.

- **Automated Enrollment System:** This feature is for student that can enroll themselves using their LMS portal.

- **NFC Card for Billing:** This card is used for students to use their student NFC card in billing rather using cash inside universities.

2.4 Non-Functional Requirement

- **Usability:** Smart university system (SUS) is easy to use system with not much guidance or orientation needed to be done on the student's (card user's) side. However, for library management, cafeteria and book shop management, a brief work shop will be conducted to make them familiar of the system they are about to use and also some guideline needed to use automated time table or generator.

- **Performance:** For good performance it will be advised to the institute to use well managed and well networked system for fastest data transfer.

- **Reliability:** (SUS)is based upon a local server, thus chances of it crashing mainly depend upon the maintenance and care of the network structure being used and the type of storage media used in the server. Otherwise, it will be assured that no crash occurs due to any software issue.

- **Portability:** NFC Card Service provide a web-based interface to all the related areas of functionality .It is easily to use on any modern-day operating systems.

2.5 Use case Diagram:

Description: Figure describes all modules in our application. This is the main use case diagram in our project where we describe how user interact with our system modules. It includes registration, login, Dashboard, and Admin side. It explains the interaction of all users with different modules.
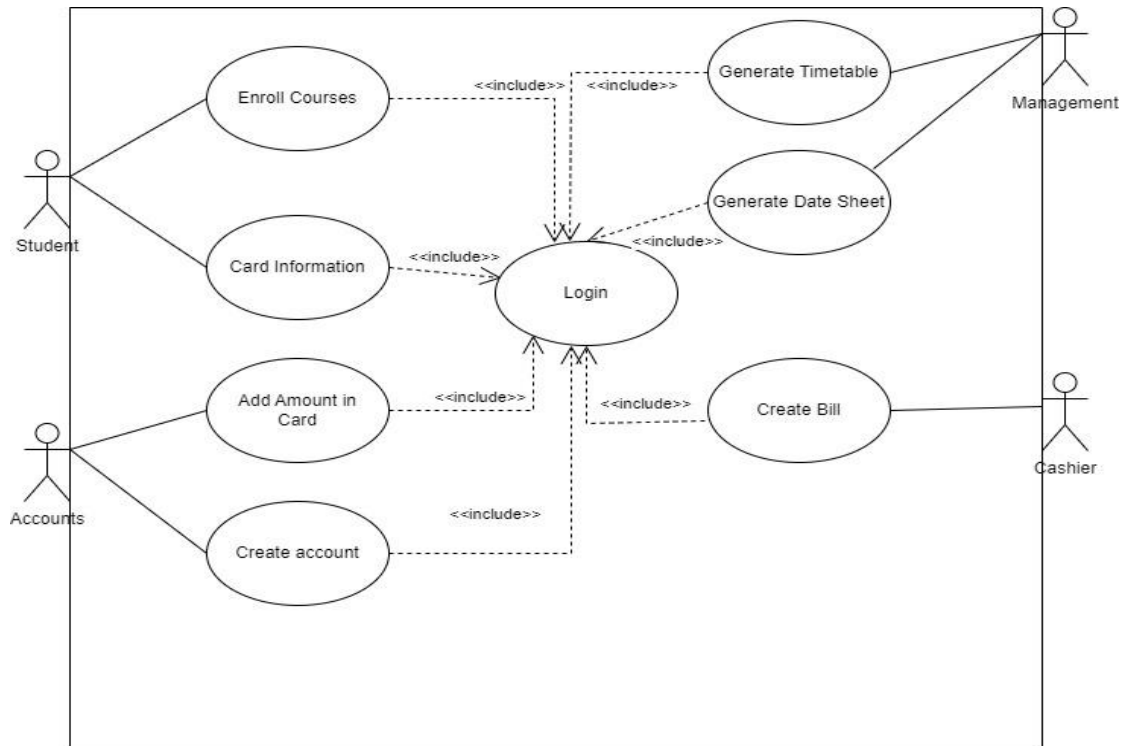

Figure 2.1 Use Case Diagram

2.5.1 Login use case

Description: Figure describes the log in module These requirements describe how the user gets login and access Dashboard and user authentication.
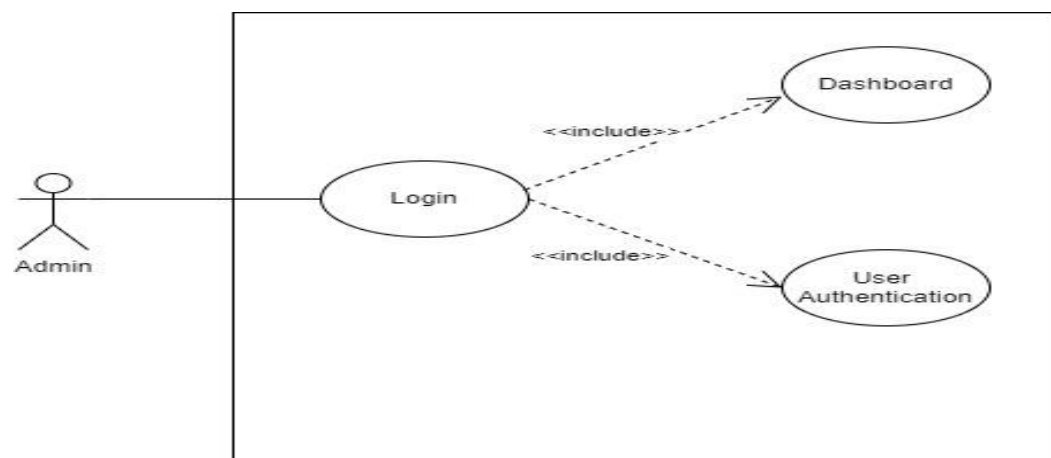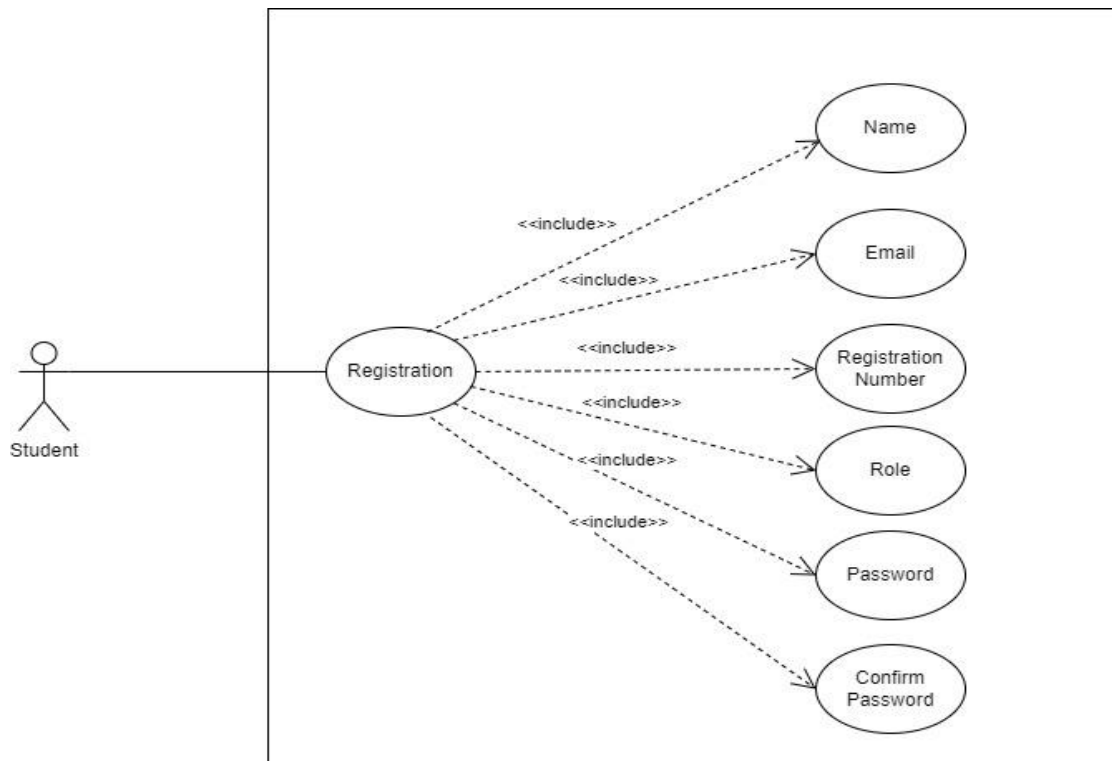

Figure 2.2 Login use Case Diagram

2.5.2 Registration Use case

Description: Figure describes the Registration module; these requirements describe how the student gets registered. In this module students register themselves by give the info, such as name, roll number, Email etc.

Figure 2.3 Registration Use Case Diagram

2.6 SDLC

(SDLC) stands for Software Development Life Cycle is a process that enables the production of high-quality in possible production time. It is a structural approach, goal of the SDLC is to produce good software that meets all customer expectations and demands. A project or program divided into many phases or different tasks or sub-tasks and activities that need to be completed in specified time. So to maintain the core aspects of project is time, resources and cost every project should follow a (SDLC). As far as our project is concerned, we chose "Iterative Model" as the development life cycle.

Iterative Model:

Iterative model is a development approach that breaks the project into different chunks, iterations or cycles. We chose iterative approach for our project (SUS)

because it is suitable for it , In iterative model each iteration contains a sequence of planning, designing, implementation and testing. In each iteration additional features can be designed, implemented, tested until it fulfils the all requirements of the customer or users. In iterative model the requirements and solutions evolve through collaboration or feedbacks from stakeholder and user.

Chapter 3: **System Design**

Systems design is the process of defining the architecture, components, modules, interfaces, and data for a system to satisfy specified requirements. It provides some pictorial or diagrammatical design that specifies it's working. Some of the diagrams are as follows:

3.1 Work Breakdown Structure

Description: The work breaks down structure of our web app defines the components such as user interface, servers, database and their further components
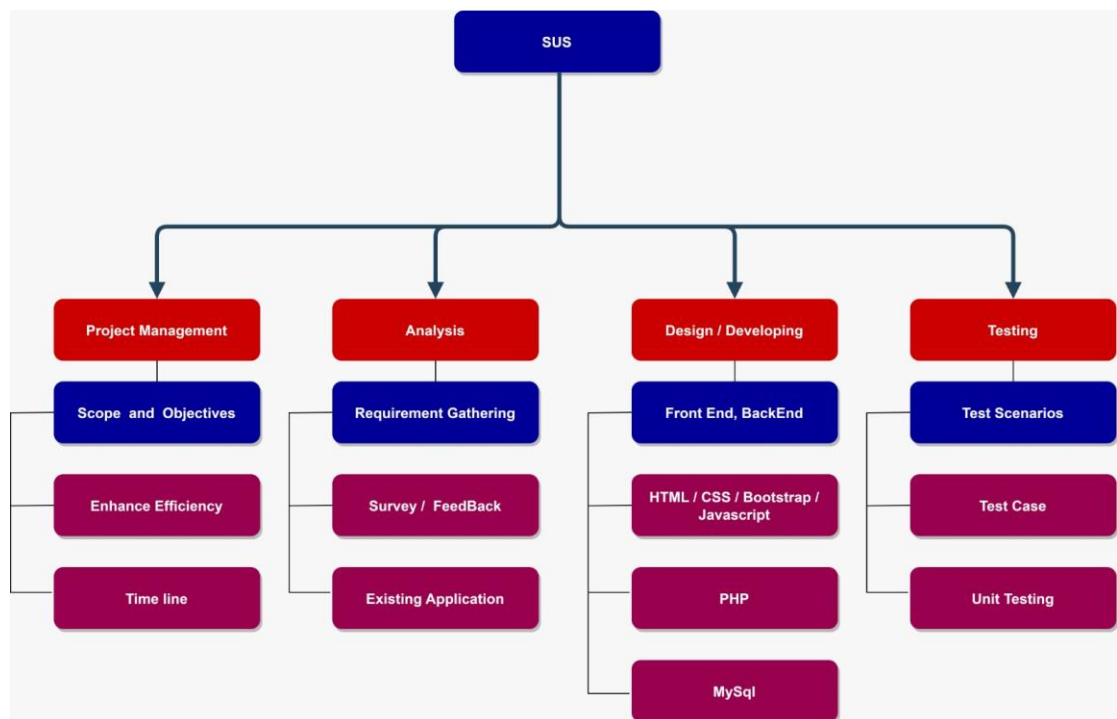

Figure 3.1 work Breakdown Structure

3.2 Activity Diagram

Our Smart university system (SUS) project utilizes an activity diagram to illustrate the flow of the application, depicting various scenarios and conditions, and how the user will be directed to different locations after each operation. The diagram begins with the user interacting with the UI of the system, followed by the login process, the user is directed to the login page, where they can log in using their credentials. After successful login, the student directed to the dashboard page, which displays the

enrollment courses and their personal information and the information of their smart card. On the other hand, admin directed after successful login to the dashboard where they can access automatic time table and date sheet generator, billing system and the enrollment request of the students.
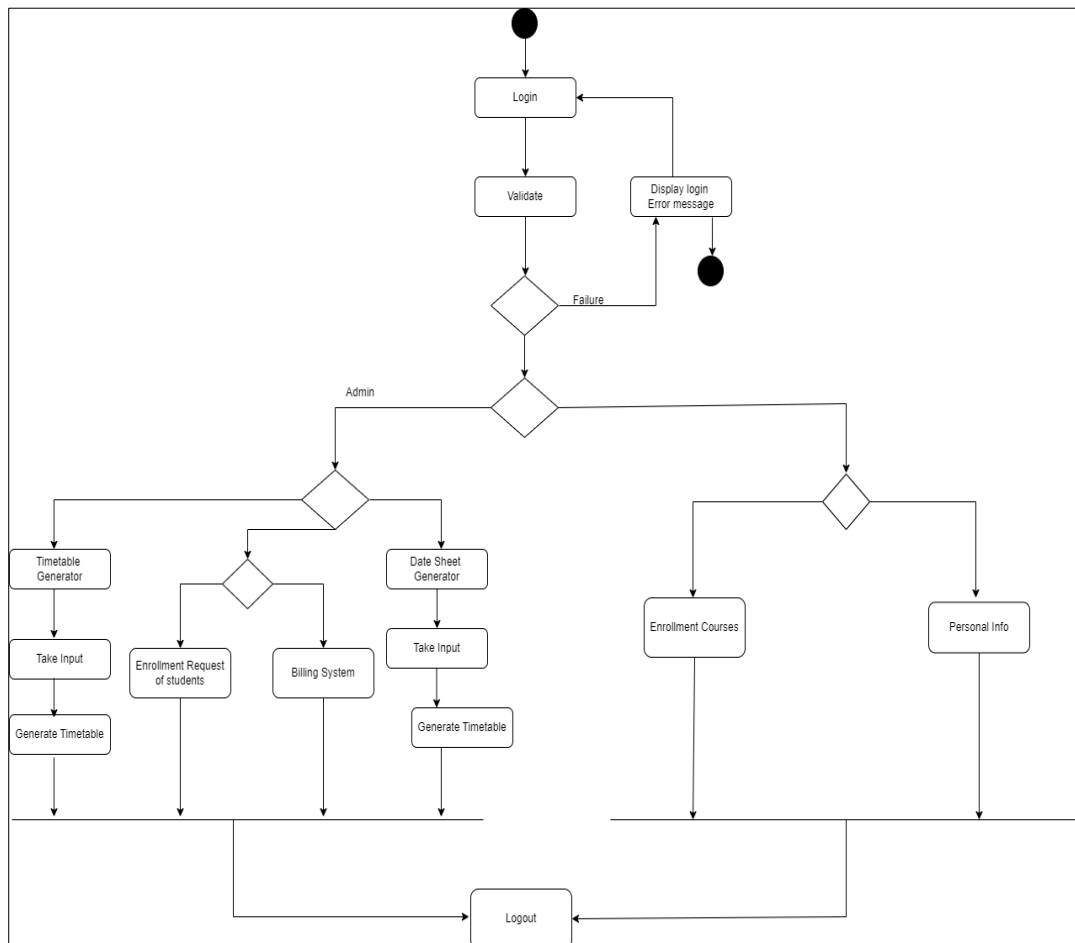

Figure 3.2 Activity Diagram

3.3 Sequence Diagrams

Sequence diagram is widely used in software development to visualize the flow of communication. Sequence diagram is type of UML diagram that elastase the interaction and the sequence of messages between objects and components in a system. sequence diagrams show the interaction visually by using vertical axis of the diagram to show what massage sent or when.

3.3.1 Student sequence diagram

Description: Sequence diagram shows the working of student and response of the system in smart university system (SUS).it shows how the student login, and their interaction with the enrollment and card.
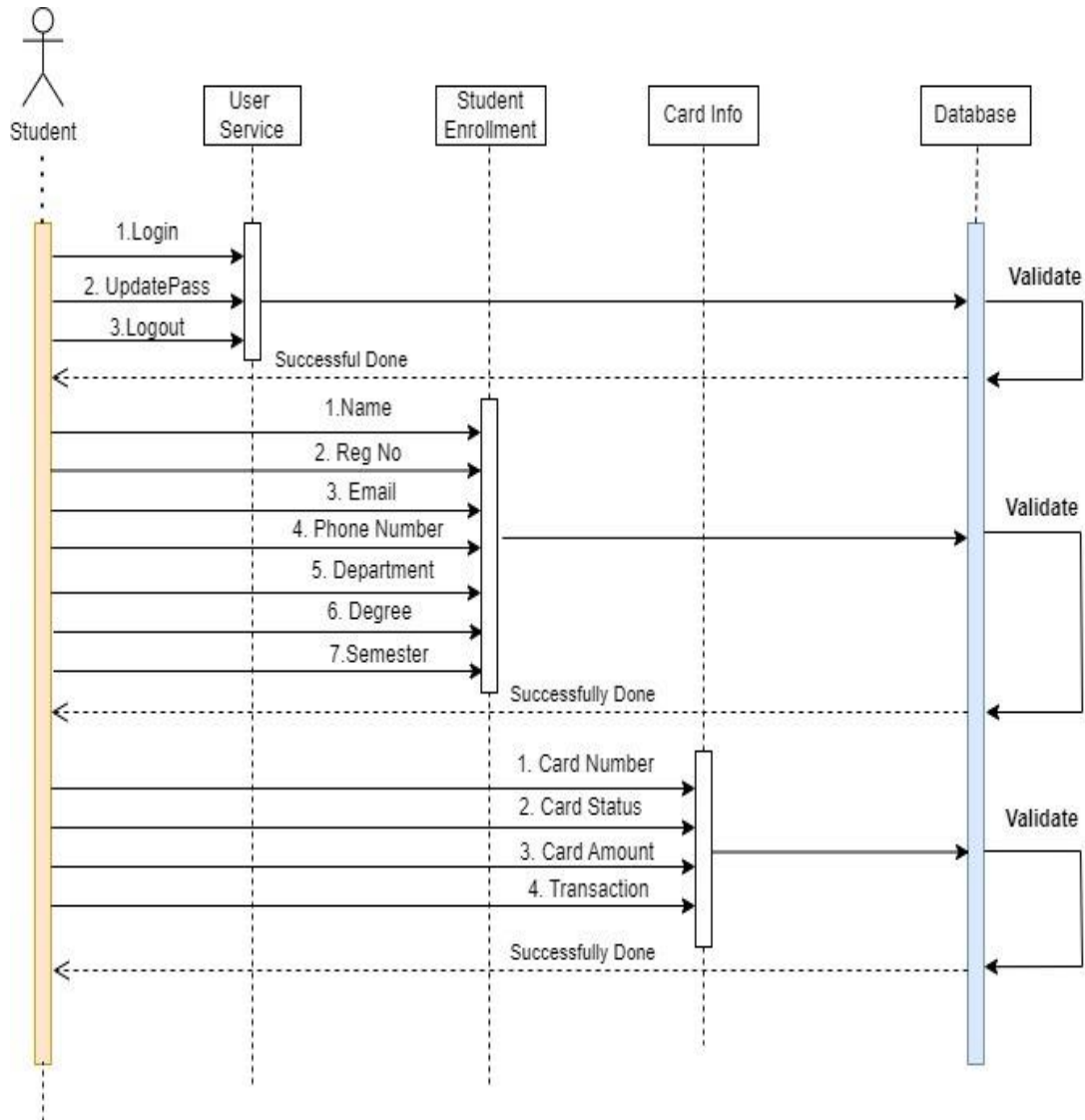
Figure 3.3 student Sequence Diagram

3.3.2 Account sequence diagram

Description: Sequence diagram of accounts management in smart university system (SUS), Show the working of accounts management, such as add card, get records, update, delete records and add amount etc.
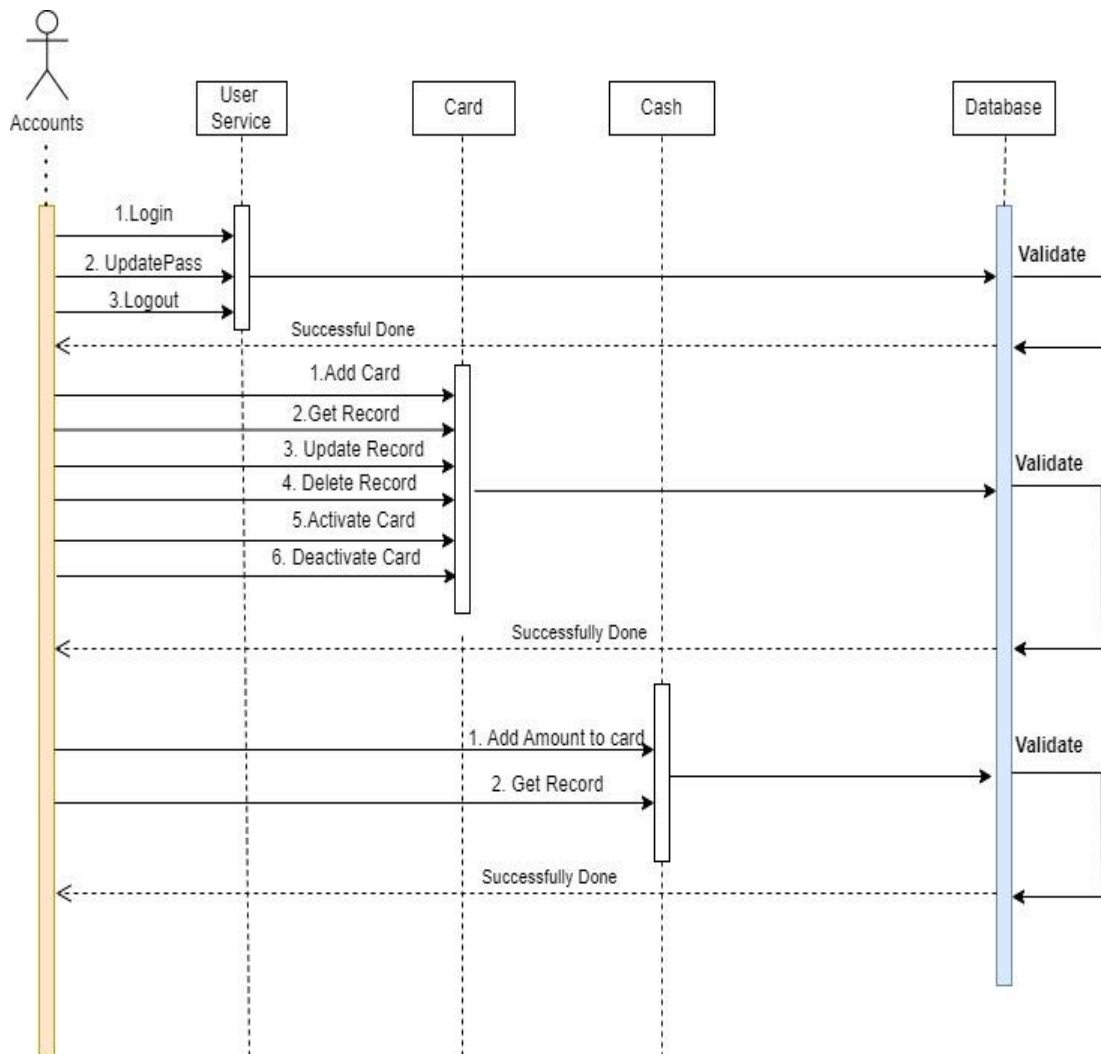

Figure 3.4 Account Sequence Diagram

3.3.3 User sequence diagram

Description: Sequence diagram of user in smart university system (SUS), Show the interaction of student with the system to add card, add amount, get records etc. User can just request to update pass, add amount and get records.
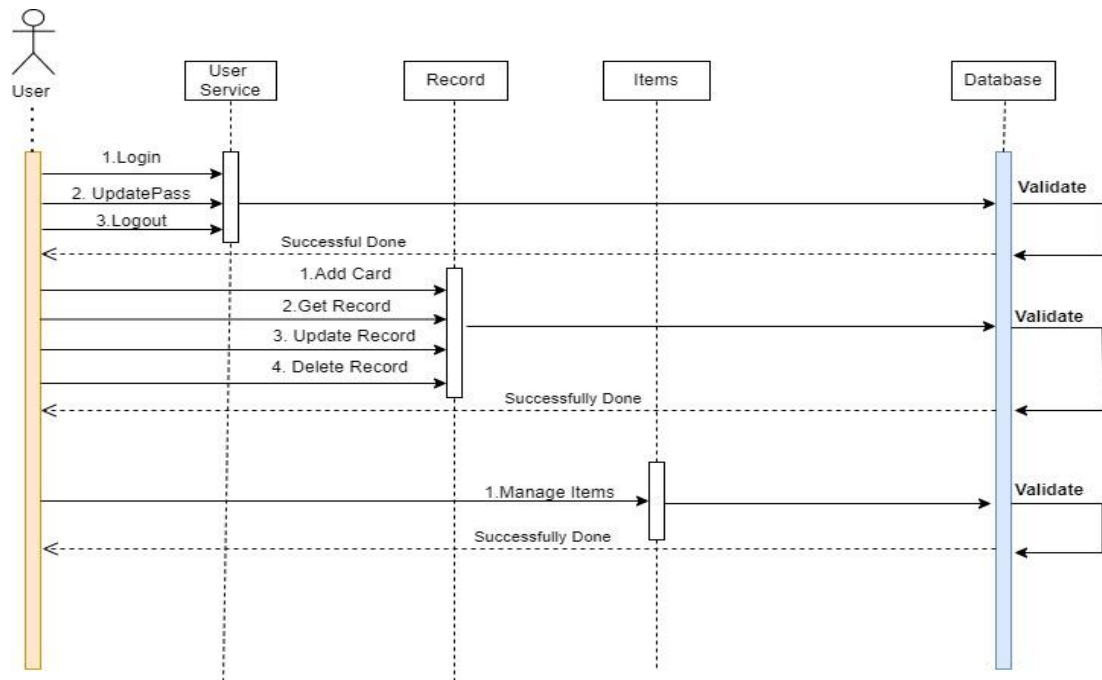
Figure 3.5 User Sequence Diagram

3.3.4 Management sequence diagram

Description: Sequence diagram of management in smart university system (SUS), Show the working of management in the system. The management create the time table, date sheet and handle enrolment requests. Management can add class, add room numbers etc.
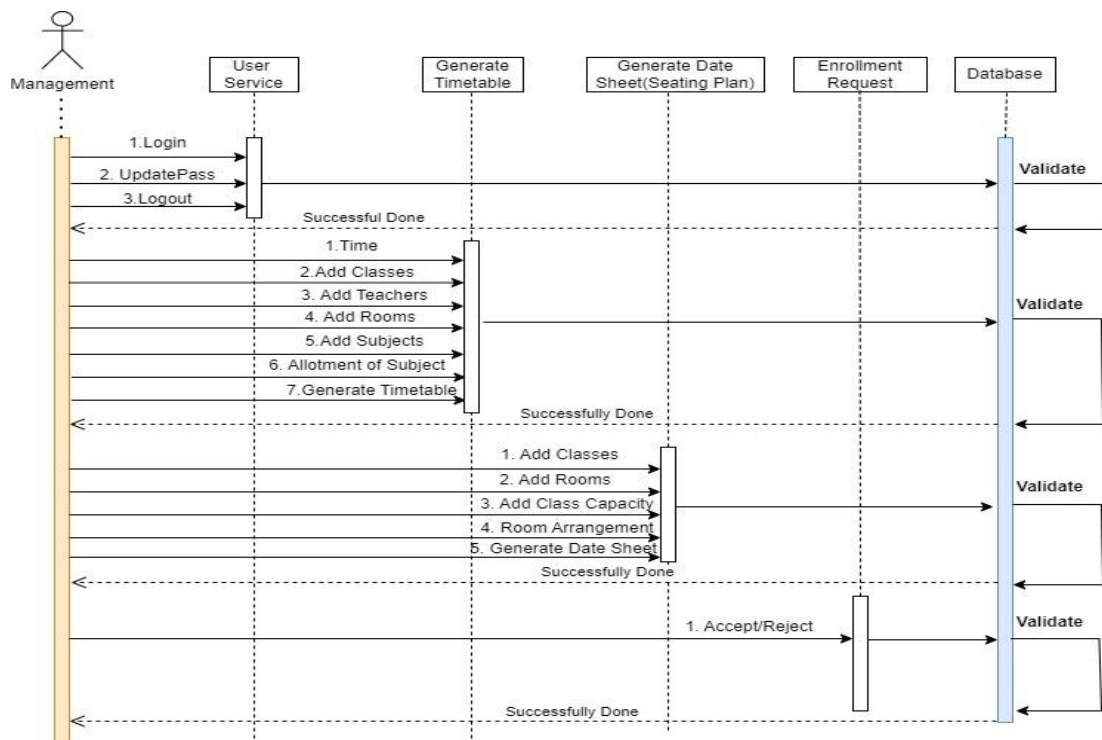

Figure 3.6 management Sequence Diagram

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3.4 Domain model

Description: A domain mode is a visual representation of diagrams that show the key concepts, entities and relationships, with in the specific problem domain. it is a technique used to understand the project problem description and to translate the requirements of that project into software components of a solution.
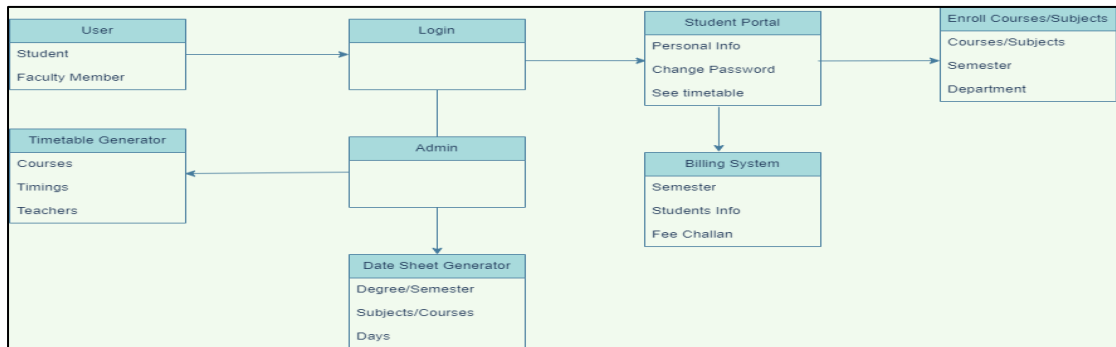

Figure 3.7 Domain Model

3.4 Data base diagram

Description: This database diagram shows the visual representation of the database structure and the collection of fields and attributes
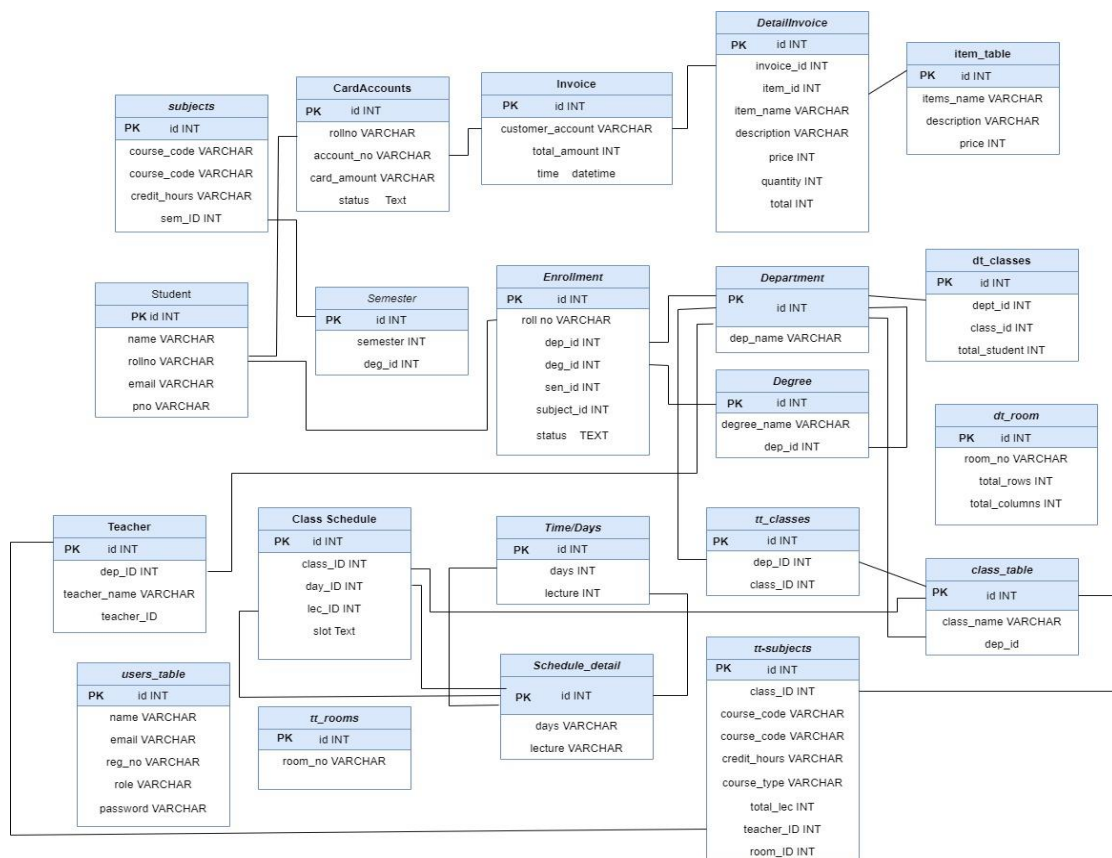

Figure 3.8 Database Diagram

Chapter 4: **Testing and Resulting**

The next most important and phase after the successful implementation of system development life cycle is System testing. In this phase the tester should know about the specification or characteristics of that thing which is going to be tested.

Black Box testing: This technique of involves the testing of the system without having any knowledge of the interior working of the system or how the system is implemented is called black box testing.

4.1 Test case of user Registration:

Table 4.1 User registration test case

Test Case ID	1
Test Description	User registration (Students, Teacher, Admin)
Purpose	To test the user registration and store data in MySQL db.
Input Data	Input of all important detail of user. (Must enter email and @)
Expected Result	The system will add user in MySQL db. table.
Actual Result	The user was added correctly.
Pass/Fail	Pass

4.2 Test case for login:

Table 4.2 login test case

Test Case ID	2
Test Description	User LOGIN (Students, Teacher, Admin)
Purpose	To test the user LOGIN and store data in MySQL db.
Input Data	Input of all important detail of user.
Expected Result	The system will login the user by checking user authority in MySQL db. table.
Actual Result	The user was login correctly.
Pass/Fail	Pass

4.3 Test case for billing system:

Table 4.3 Billing system test case

Test Case ID	3
Test Description	Billing system
Purpose	To test the Billing System for adding amount and store data in MySQL db.
Input Data	Input of all important detail for Adding Amount.
Expected Result	The system will add Amount and add in MySQL db. table.
Actual Result	Billing System added Amount and added correctly.
Pass/Fail	Pass

4.3.1 Test case for add new card:

Table 4.4 test case add new card

Test Case ID	4
Test Description	Billing system (Add new Card)
Purpose	To test the Billing System for adding new card and store data in MySQL db.
Input Data	Input of all important detail for Adding new card.
Expected Result	The system will add New Card and add in MySQL db. table.
Actual Result	Billing System Add New Card and added correctly.
Pass/Fail	Pass

4.3.2 Test case for input data via NFC card:

Table 4.5 testcase of input data via NFC card

Test Case ID	5
Test Description	Billing system
Purpose	To test the Billing System via NFC Card and store data in MySQL db.
Input Data	Input of all important detail for Billing.
Expected Result	The system will Generate Invoice and add in MySQL db. table.
Actual Result	Billing System Generate Invoice but not added correctly.
Pass/Fail	Fail

4.4 Test case for date sheet generator:

Table 4.6 test case for date sheet

Test Case ID	6
Test Description	Date sheet Generator
Purpose	To test the Date sheet Generator and store data in MySQL db.
Input Data	Input of all important detail for Date sheet Generator (Room NO)
Expected Result	The system will select Available room and add in MySQL db. table.
Actual Result	Rooms was added correctly.
Pass/Fail	Pass

4.4.1 Test case of add classes:

Table 4.7 test case of add classes

Test Case ID	7
Test Description	Date sheet Generator
Purpose	To test the Date sheet Generator and store data in MySQL db.
Input Data	Input of all important detail for Date sheet Generator (Classes or Semester)
Expected Result	The system will select Classes or Semester and add in MySQL db. table.
Actual Result	Classes or Semester was added correctly.
Pass/Fail	Pass

4.4.2 Test case for generate date sheet

Table 4.8 test case generate datasheet

Test Case ID	8
Test Description	Date sheet Generator
Purpose	To test the Date sheet Generator and store data in MySQL db.
Input Data	Input of all important detail for Date sheet Generator (Generate Date Sheet)
Expected Result	The system will Generate Date Sheet and add in MySQL db. table.
Actual Result	Generate Date Sheet And added correctly.
Pass/Fail	Pass

4.5 Test case for enrollment:

Table 4.9 test case for enrollment

Test Case ID	9
Test Description	Enrollment
Purpose	To test the Enrollment system and store data in MySQL db.
Input Data	Input of all important detail for Enrollment.
Expected Result	The system will Send Enrollment Request to admin for Approval and add in MySQL db. table.
Actual Result	Enrollment successful and added correctly.
Pass/Fail	Pass

Chapter 5:   Conclusion

The Smart University System (SUS) is a web-based project and the set of technological tools applied to, improve the way of processing and getting output. This system includes a range of features aimed to enhancing efficiency and convenience. A Smart University system focuses on improving its technological infrastructure for achieving its quality goals, boost operational efficiency, automate workflows and processes. The targeted audience of this system is Universities and Colleges. Each university and college need a timetable, date sheet generator, an enrollment system and smart NFC card system.

In previous versions there is a different kind of work done related to university systems, students cannot enroll themselves using their portal they have to this thing manually and their student card is only used for entering in the university.

Main aim to develop a Smart University System is to ensure, the use of technology to solve some tasks that are time consuming. The system will provide some features that are helpful for both students and faculty members. It includes the solution of some activities that were manually handled by students or staff. The use of efficient system will conclude; Resource Sustainability, Positive impact etc. The idea is to achieve a system that will provide software based or automated solution for the activities for time saving. The proposed project is mainly aimed to collect data and from different clients to a server to build a smart university system.

SUS is a web-based system so; tools and technology require building smart university system are: For frontend (HTML, CSS, and JavaScript), backend (PHP, Python) and for database (MySQL). Iterative model is used for this project because this method divides the project into small chunks that make it easy.

At the end of this project smart university system is designed to facilitate students and faculty members with a fast and automated solution on the previous existing systems that requires changes and needs.

5.2 Limitations:

- **Internet connectivity**: Internet connectivity is compulsory for some of the modules such as online enrollment.

- **Device required**: NFC-based billing requires compatible devices and infrastructure.

5.3 Future Work:

- **Enrollment System for summer students:** we will add enrollment system for summer student, to enroll their summer subjects online.

- **OTP system in billing system:** we will integrate a opt system in the billing system to enhance the security.

- **Time table for Teachers:** we will implement a system to generates time table for the teachers just like it generates for the classes.

Bibliography

1. "About smart card campus" available at https://www.researchgate.net/publication/4076331_Smart_card_for_smart_campus_KFUPM_case_study(Halawani & Mohandas, 2003)

2. "Details about online enrollment system", available at https://www.curacubby.com/resources/your-school-needs-online-enrollment (University Needs Online Enrollment, 2022.)

3. "LMS portal for students and teachers of The University of Faisalabad", available at https://tufportal.com/login (TUF LMS - Sign In, 2023.)

4. "LMS portal for students and teachers of Riphah University", available at http://admissions.riphahfsd.edu.pk/StudentLogin (Riphah International University, 2023.)

5. "LMS portal for students and teachers of National Textile University", available at https://student.ntu.edu.pk/ (*NTU Student – Log In*, 2023.)

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