CLINIC MANAGEMENT SYSTEM

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This project report is submitted as fulfilling part of the requirements for the award of the Diploma in Information and Communication Technology

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2 ACKNOWLEDGMENT

I confess that the project report is titled

CLINIC MANAGEMENT SYSTEM

Is the result of my own work without plagiarizing any source except parts each of which I have explained the source.

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(TS. MASLITA BINTI ABD AZIZ)

3 DEDICATION

Thank to Allah S.W.T for His gracefulness for me to complete the final project for DITU 3964 Diploma Project Subject within the given period. In addition, I would like to thank my supervisor, TS. Maslita Binti Abd Aziz who has given me a lot of encouragement to complete this subject. On that occasion as well, I would like to thank my dear parents for giving me encouragement throughout this project.

4 APPRECIATION

A big thank you to TS. Maslita Binti Abd Aziz for guidance and assistance to complete this project

I am also thankful to both my parents who always provide encouragement and motivation throughout this semester.

5 ABSTRACT

Diploma Projects are used to complete part of the requirements for obtaining a Diploma in Information and Communication Technology by allowing students to put their knowledge into practice through the completion of a project. Students must employ their newly acquired knowledge and abilities to create a genuine system, solve system-related challenges, and analyse requirements using an appropriate computer programming language. Clinic Management System allows employees to quickly store, access, and manage patient medical records. The Clinic Management System improves the accuracy and speed of the recording process. By default, this system will arrange the appointment, which includes separating the updated appointment into a distinct interface to make it easier to handle. Furthermore, when all procedures are carried out by hand, a massive amount of ineffective paperwork is required. As a result, the Clinic Management System can help to simplify the process of recording medicine inventory, appointments, and important documents.

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Chapter I

6 INTRODUCTION

6.1 Introduction

Over the years, patient medical records have grown a lot in the healthcare sector and the sharing of patient records has become more complex. Prescription details, referral dates, diagnosis status, and schedules between different clinic departments can be a problem without a fully integrated system. Additionally, access to patient records requires privacy. Various work has been done in health services to address issues such as lack of instant record storage and retrieval, and difficulty handling billing procedures.

As a result, the need for an effective health care system is believed to be important as it reflects the capabilities of the organization, which in turn helps predict the future of potential challenges while providing appropriate solutions. They use simplified processes to improve proper management and control of premature threats.

The Clinic Management System is a patient information systems integration that collects and stores demographic, financial, and medical information from additional services such as registration, billing, pharmacy, and transcription. It also includes the network that connects these systems, databases, interfaces, and clinical workstations.

The system provides physicians with easy access to electronic records, which in turn minimizes the cost, difficulty, and inefficiency of archiving the patient records and increases the benefits and profits of operating clinical services. It can be used in decision-making, as it provides complete, reliable, accessible, and understandable information that indicates the progress and deficiencies of the clinic. Problems with the current system are lack of storing documents function and billing procedure matter, thus the requirements were specified and discussed. In this way, the objectives under which the system is defined have been met.

6.2 Problem statement

Today, clinic staff are concerned about the available system because it is not very popular and requires some specific skills to install or operate it. The functionality of the system can be replaced with the current way of archiving documents and billing procedures. The clinic management system currently available on the market only replaces the paperwork with the use of the computer and stores the data in the database for registration and scheduling purposes. The registration and schedule management module are one of the usual functionalities. There are not many new features available in the system. In this project, I intend to solve the problem that the clinic attends in the available system and bring innovations that help the clinic staff to my self-development system.

Here is some problem that has been collected from the internet and complaints from close friends:

1) Appointments

Patients always forget or remember the date and time for the appointment they made with the clinic. It will make extra trouble for the staff of the clinic to rearrange the appointment with the doctor again.

2) Billing

All the invoice and billing processes are done either on paperwork or in another system. That would be a hassle as it is not in the same database and staff can lose track of the billing process.

3) Documents

All the documents either being stored in another system and makes it harder to track the archived documents based on the patient.

6.3 Objectives And Main Goal

6.3.1 Main Goal

The main purpose of this proposal is to develop a management system that can help the staff at the clinic organized patients' information, medical inventory, documents, billing procedures, and monitor the patients' appointments with the doctors.

6.3.2 Objectives

1) Help the clinicians arrange the patients' appointments
2) Store important documents into the database server
3) Handle billing process such as generating an invoice
4) Generate a medical certificate

6.4 Scope

The scope of the Clinic Management System is divided into two, namely system user involvement as well as applied system modules. The description of the scope is as follows:

6.4.1 System User

The main users of this system are the admin who will handle the data processing services and the billing procedures. The second user is the doctor who will conduct medical check-ups with the patients and fill in the patients' information into the server to make medical records. The third user is the pharmacist who will implement the doctor's prescription and handle the drugs in the inventory. All three users are required to check in before using this system.

6.4.2 System Modules

6.4.2.1 Login Module

Each user is required to obtain login confirmation into this system. Registration of staffs such as newly appointed doctors and staff will be done by the administrator.

6.4.2.2 Employee Management Module

The administrator reserves the right to add employee records. Next adding records, the administrator can also view and delete the profiles of the employee. The coordinator is also able to monitor the status of the clinic staff list.

6.4.2.3 File Upload and Download Module

Online implementation necessarily requires staff to share material resources, then this module is required so that all file orders sent can be shared and forwarded for future reference.

6.4.2.4 Form Module

Forms will be filled in by the doctors based on the patients' medical check-up under their supervision. This form will be stored in a database and can be accessed at any time even after the end of the appointment.

6.4.2.5 Report Module

This reporting module facilitates the patients' medical and billing records. Reports such as the invoice and list of patients can also be seen by the administrator and clinic staff. All displayed reports can be downloaded by the medical staff.

6.5 Justification And Interest

This system is designed to reduce management inefficiency in the clinic. It helps to get rid of all the manual paperwork that can be quite difficult to manage. The clinic management system improves the overall efficiency of the organization by automating the entire system. The system helps in all sections of a health centre. This includes record-keeping, prescription printing, patient appointment scheduling, and billing functions. It also maintains accounts and inventory.

Automated process management saves medical staff time, and they can concentrate on more important tasks. This increases their productivity, and they find their work more satisfying. This minimizes clinic operating costs and improves staff efficiency.

With the presence of a clinical management system, they can establish effective clinical workflows. Every healthcare provider must be able to easily track, store, and access patients' medical records. With the help of clinic management software, important patient data can be easily recorded, updated, and archived in the system so that it can be accessed easily at future appointments.

With an integrated system for keeping records, this web application allows doctors and medical staff to coordinate with each other to better assess a patient's condition. In addition, the cloud-based system increasingly facilitates collaboration.

Chapter II

7 DEVELOPMENT PLANNING

7.1 Introduction

System development planning needs to be implemented thoroughly and in detail to facilitate the development and management process. Development plans need to be documented so that it is easy to monitor ad track the development of the system. This preparation process should begin after identifying the scope of system requirements to ensure that planning can be concluded accurately. This planning should also be in line with the plan that has been outlined.

7.2 Project needs

7.2.1 Software Requirements

7.2.1.1 Development Tools

a) Atom Text Editor

Used for the process of writing and storing codes for instructions display on websites such as PHP and Html5/CSS scripting languages.

b) draw.io

Used to create an ERD diagram for the clinic management database.

c) Xampp

To run a test on the codes created on localhost.

d) Google Search Engine

Search for references and research.

7.2.1.2 Operating System / Server

Operating System / Server - Windows 10 Pro

7.2.1.3 Databases

Databases - MySQL

MySQL is an open-source relational database management system. MySQL Database Service is a fully managed database service to deploy cloud-native applications.

7.2.2 Hardware Requirements

a) Laptop

Used in every part for system development.

Operating System: Windows 10 Pro
Processor: AMD Ryzen 5 2500U with Radeon Vega Mobile Gfx 2.00 GHz
Memory (RAM): 4.00 GB
System Type: 64-bit operating system, x64-based processor

b) Mobile Phone

search for references and research

Network Requirements - Internet/Wi-Fi Access

7.3 System Development Approach

The diagram below shows the Waterfall Methodology for the Clinic Management System.

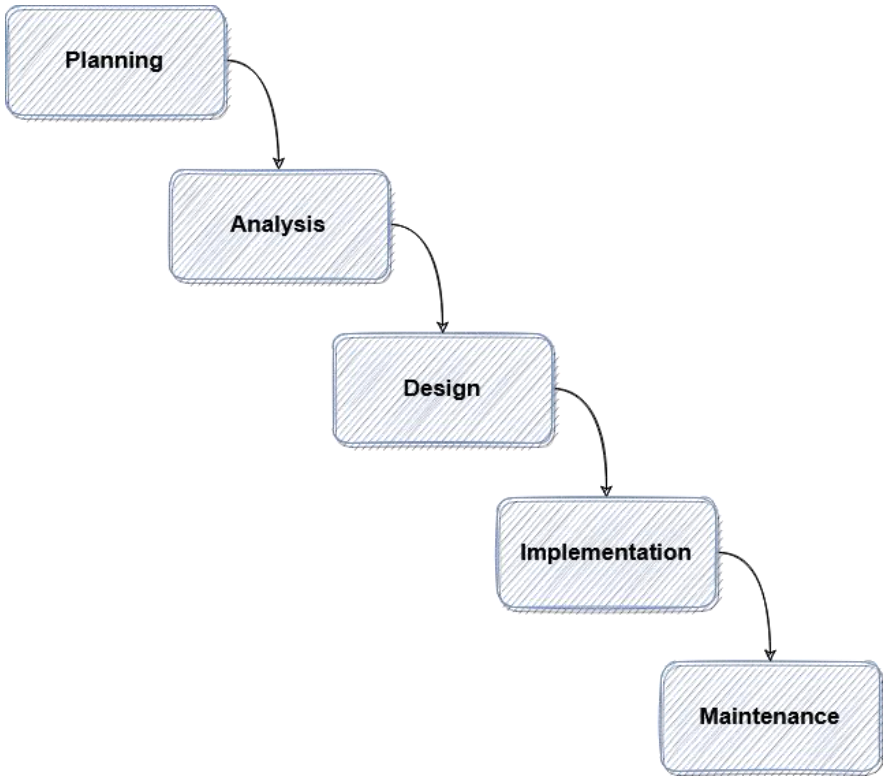


Figure 1. Waterfall Methodology

Planning

The planning phase involves documenting project plans, defining project deliverables and requirements, and putting together a project timetable. It entails developing a set of plans to assist in completing the project's implementation and closure phases.

This phase aims to identify the needs needed to renew and enhance the usability of existing systems. A specific plan is also made during this phase which is used as a timeline proposal to

be followed throughout the implementation of the project. Therefore, preliminary research can be done to determine the pattern of a project to be developed.

Based on the system to be developed, the planning phase is needed as the purpose or reason why the process of improving the Clinic Management System which is done manually needs to be upgraded. Gantt charts are created in this phase as a timeline to be followed in completing this system to be developed. Therefore, an online booking method has been devised which aims to improve the previous system.

Analysis

In this phase, the project developer analyzes the information systems used, improvement possibilities and develops concepts for the new systems to be developed. This phase is split up into two sub-phases namely System Requirements Assembly and Proposal. Based on the sub-phases of the Assembly requirements, analysts and users discuss in determining what is required of the system to be developed. There are several studies made based on current systems aimed at improving the system to be developed. The proposed system is the process of reviewing project requirements and eliminating redundancies.

Based on the system to be developed, a study of the management system that provides a similar facility procedure has been observed. This activity aims to get ideas or suggestions that need to be implemented in this system. Next, a proposal was drafted to be used as an initial reference to achieve the objectives of this project. Proposals that have an introduction to the project, a statement of problems that arise in the absence of a new system, main goals, objectives to be achieved, scope required in the system, software, hardware, and network requirements, and the importance of the system is developed.

Design

In this phase, the analyst describes the way of designing all the aspects present in the system. Data flow for each process required in this system also needs to be created. Next, each of these aspects needs to be described in detail to guide the implementation of the new system in the future.

For the Clinic Management System, Context Diagram (CD) and Data Flow Diagram (DFD) have been designed to show the flow of processes that will occur in this system. The interface design included with the deployment steps has also been detailed to explain how each of the scopes available in this system works.

Maintenance

The maintenance phase consists of its training, documentation, and support. The programmer will make improvements if they get a demand from the user to modify the system according to their taste. The programmer also needs to troubleshoot the errors that arise if found by the user. These changes are essential to keep the system running and functioning as planned.

Based on the comments and opinions from supervisors on this developed system, some changes have been made so that the built system can work properly. Error issues have been resolved so that users can use the system with no flaws.

7.4 Project Planning and Milestones

Table 1. Project Planning and Milestones

Week	Contents
W1 (4/10 → 10/10)	• The committee held a meeting to brief on the Diploma Project and give instructions to complete the proposal which has a project introduction, problem statement, goals, objectives, scope, project requirements and justification/importance of the project to be given to the supervisor.
W2 (11/10 → 17/10)	• Completed the proposal and sent it to the supervisor via email on October 11, 2021. • Uploaded the revised proposal on Microsoft Teams on October 14, 2021 and the supervisor signed the proposal as confirmation. • The supervisor instructed student to submit a proposal approved by him at Ulearn and gave instructions to complete Chapters 1, 2, and 3 found in the diploma project report.
W3 (18/10 → 24/10)	• Completed Chapter 3 in the report which is Context Diagram and Data Flow Diagram (DFD).
W4 → W5 (25/10 → 7/11)	• System design and completed the system design report (Chapter 4)
W6 → W7 (8/11 → 19/11)	• Start system implementation
(20/11 → 23/11)	• Semester Break
W8 → W9 (24/11 → 7/12)	• Continue system implementation
W10 → W11 (8/12 → 21/12)	• Continue system implementation
W12 → (22/12 → 2/1)	• Continue system implementation
W13 (3/1 → 9/1)	• Continue system implementation and completing report

W14 (10/1 → 16/1)	• Continue system implementation, fixing errors and completing report
W15 (17/1 → 23/1)	• Correction of draft report based on comments by the supervisor and assessor during PD presentation session • Submission of the final complete report (the updated and corrected PD report) and logbook onto the Ulearn system.
W16 (24/1 → 30/1)	• Submission of the final complete report (the updated and corrected PD report), logbook. Source codes and presentation slides onto the Supervisors' OneDrive.

Chapter III

8 SYSTEM ANALYSIS

8.1 Introduction

This chapter examines the system analysis which is the process of gathering information about the current non-computerized system, identifying problems, and analyzing them all to produce a new system concept that is from a manual system to an online system or computerized system.

8.2 Analyzing an Existing System (Manual System or Computerized System/Automation)

This figure shows the Context Diagram (CD) for the existing system. This figure describes the data flow briefly for the Clinic Management System manually.

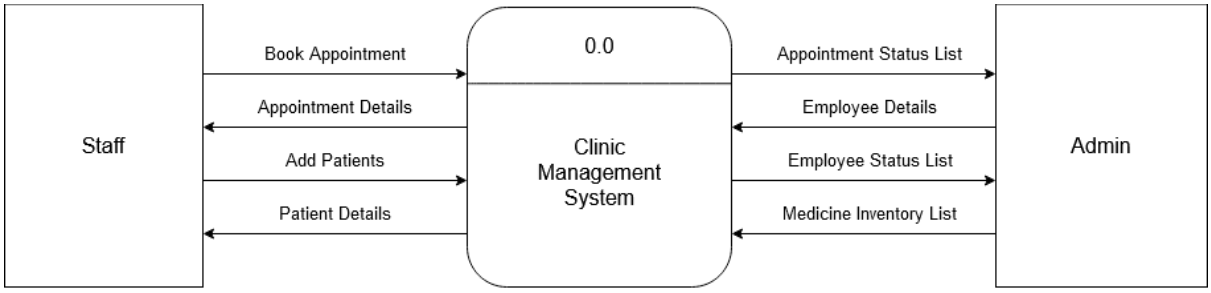


Figure 2. Existing System Context Diagram

this figure displays the first level of the Data Flow Diagram (DFD) for the Clinic Management System. This stage describes the data flow in more detail than the Context Diagram (CD).

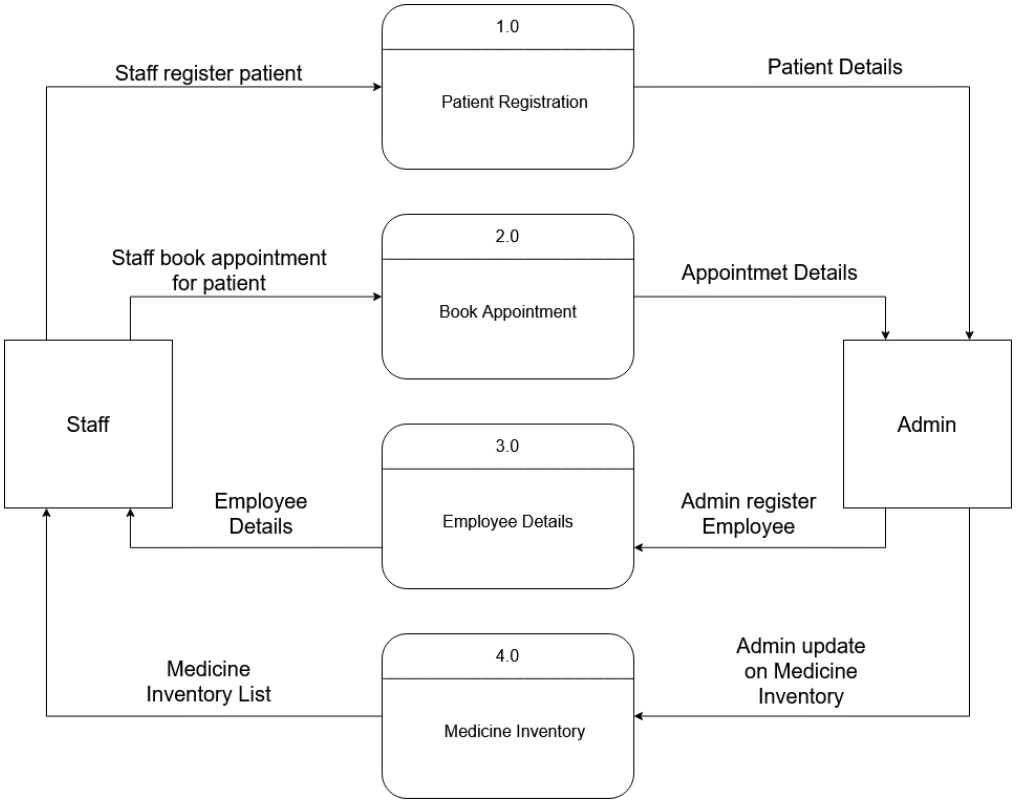


Figure 3. Existing System Data Flow Diagram

8.3 New system analysis

8.3.1 Decomposition diagram

This figure shows the decomposition diagram for the whole system. This diagram aims to identify the sub-processes found in each module.

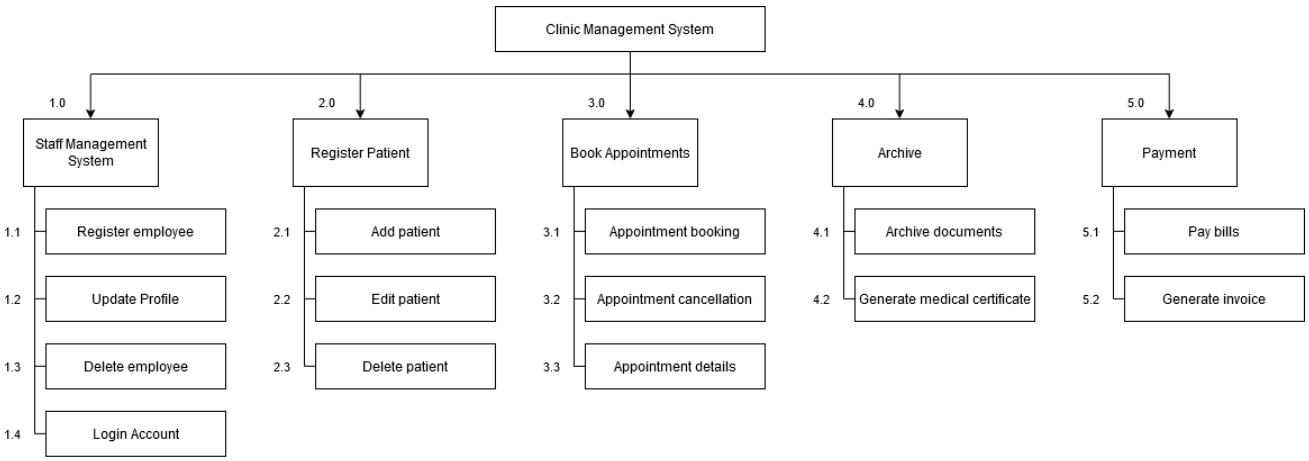


Figure 4. Decomposition Diagram

8.3.2 Process/function description

i. Process name:

Staff management system

Purpose:

Registering new staff

Definition:

There's 4 sub-phases included:-

1. **Register Employee**

admin will register new staff into the clinic management system

2. **Update Profile**

staff can update and edit their profile

3. **Delete Employee**

admin can delete staff from the clinic management system

4. **Login Account**

staff log into the system using their username and password

ii. *Process name:*

Register patient

Purpose:

Patient registration process for new patient

Definition:

There's 3 sub-phases included:-

1. **Add patient**

Staff and admin can add patient into the system

2. **Edit patient**

Staff can update and edit patient

3. **Delete patient**

Staff and admin can delete patient from the system

iii. *Process name:*

Book appointments

Purpose:

Booking appointment for patient process

Definition:

There's 3 sub-phases included: -

1. **Appointment booking**

This process allow staff to book an appointment for a patient

2. **Appointment cancellation**

This process allow staff to cancel an appointment for a patient

3. **Appointment details**

Staff can have access to the appointment details

iv. *Process name:*

Archive

Purpose:

Archive process

Definition:

There's 2 sub-phases included: -

1. **Archive documents**

Archive documents into the system

2. **Generate medical certificate**

System can generate medical certificate for the patient. It can be in a hard copy or soft copy form.

v. *Process name:*

Payment

Purpose:

Staff do the payments process.

Definition:

There's 2 sub-phases included: -

1. **Pay bills**

Staff do the payment process for the medical fees. Staff need to fill all the payment information for the patient.

2. **Generate invoice**

System generate invoice based on the information that have been fill in by the staff. It can be in a hard copy or soft copy form.

8.3.3 Data Flow Diagram (DFD)

Figure 5 shows the data flow for the system to be developed. This figure describes the data flow briefly for the Clinic Management System.

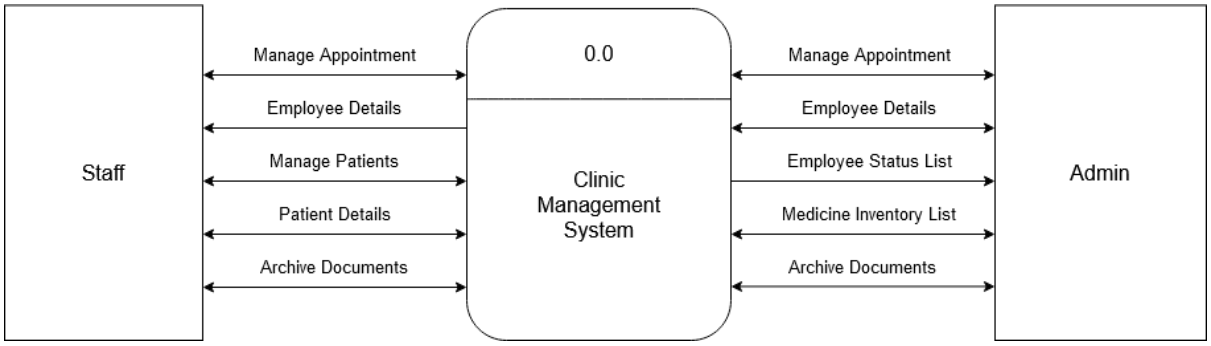


Figure 5. Data Flow Diagram

Figure 6 shows the first stage data flow for the Clinic Management System. This figure describes the data flow in more depth. Based on the figure below, there are two types of users for this system, namely employees and customers.

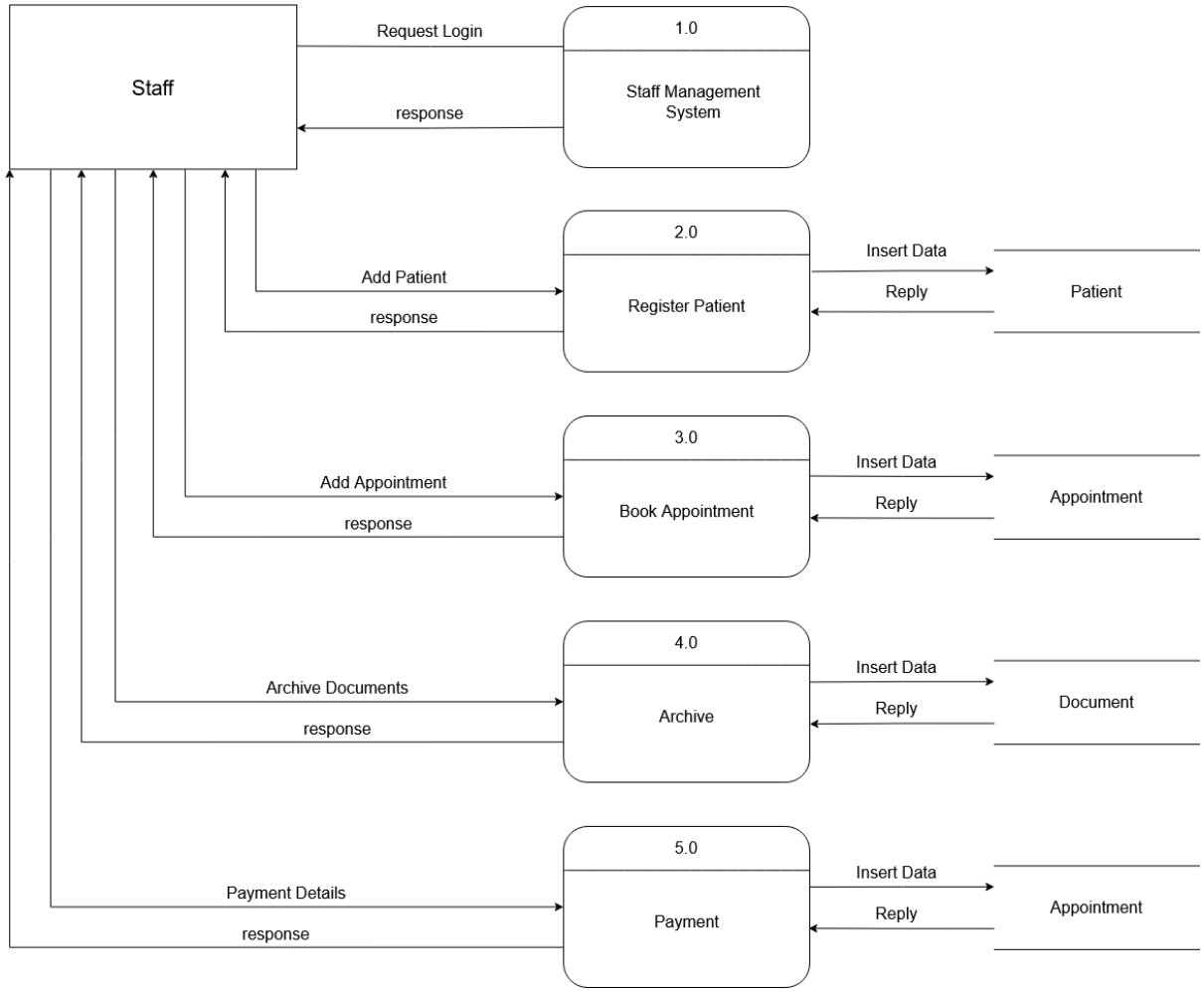


Figure 6.Data Flow Diagram Level 1

Figure 7 shows the decomposition of process 1.0 from the first stage figure. This figure describes the data flow in more depth for process 1.0 which is Staff Management.

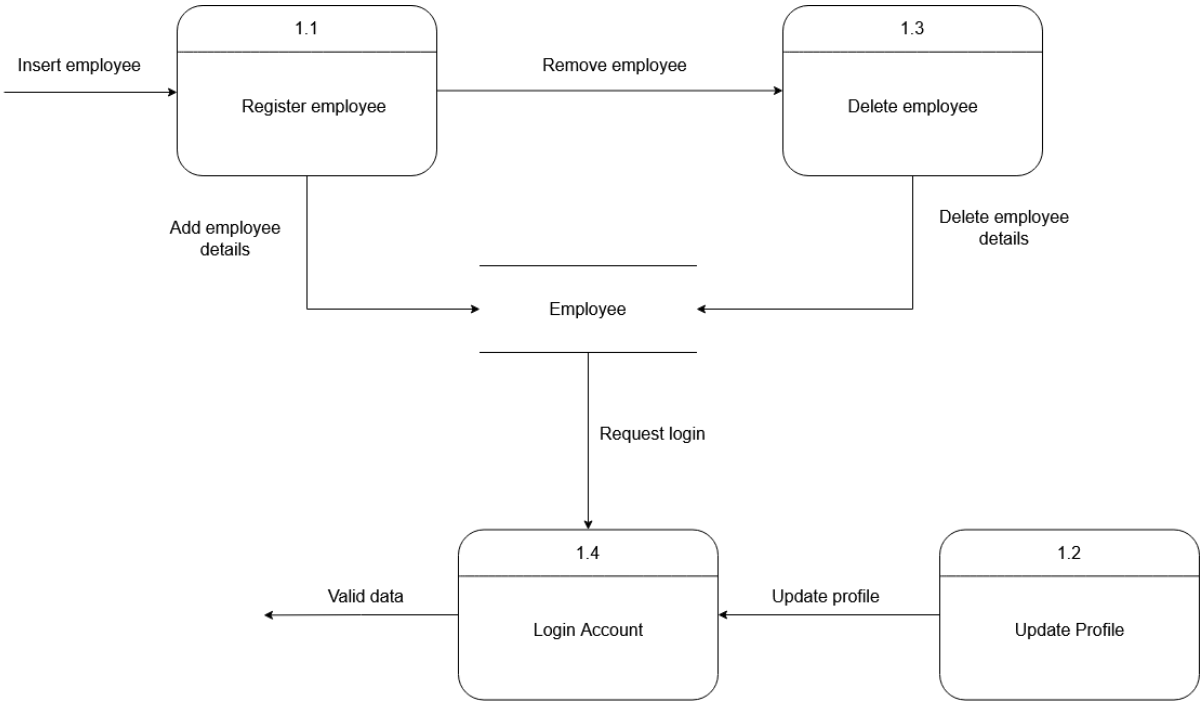


Figure 7.Data Flow Diagram Process 1.0

Figure 8 shows the decomposition of process 2.0 from the first stage figure. This figure describes the data flow in more depth for process 2.0 which is to Register Patient

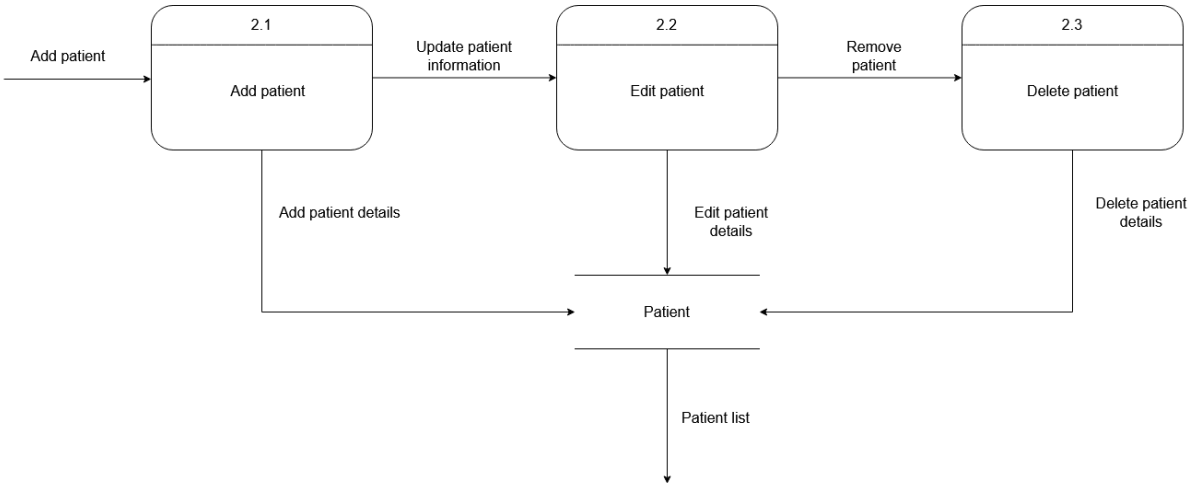


Figure 8. Data Flow Diagram Process 2.0

Figure 9 shows the decomposition of process 3.0 from the first stage figure. This figure describes the data flow in more depth for process 3.0 which is to Book appointments

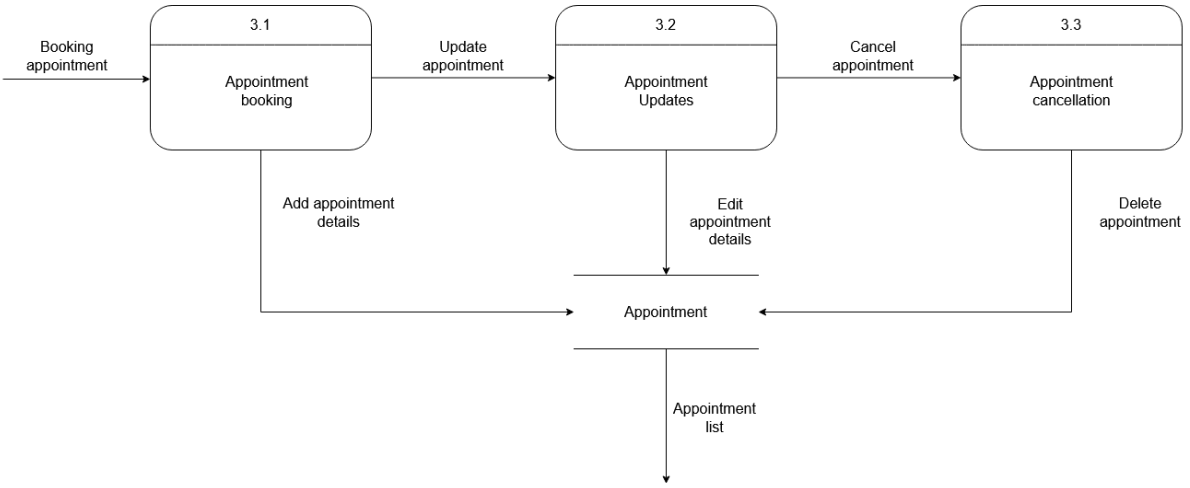


Figure 9. Data Flow Diagram Process 3.0

Figure 10 shows the decomposition of process 4.0 from the first stage figure. This figure describes the data flow in more depth for process 4.0 which is Archive.

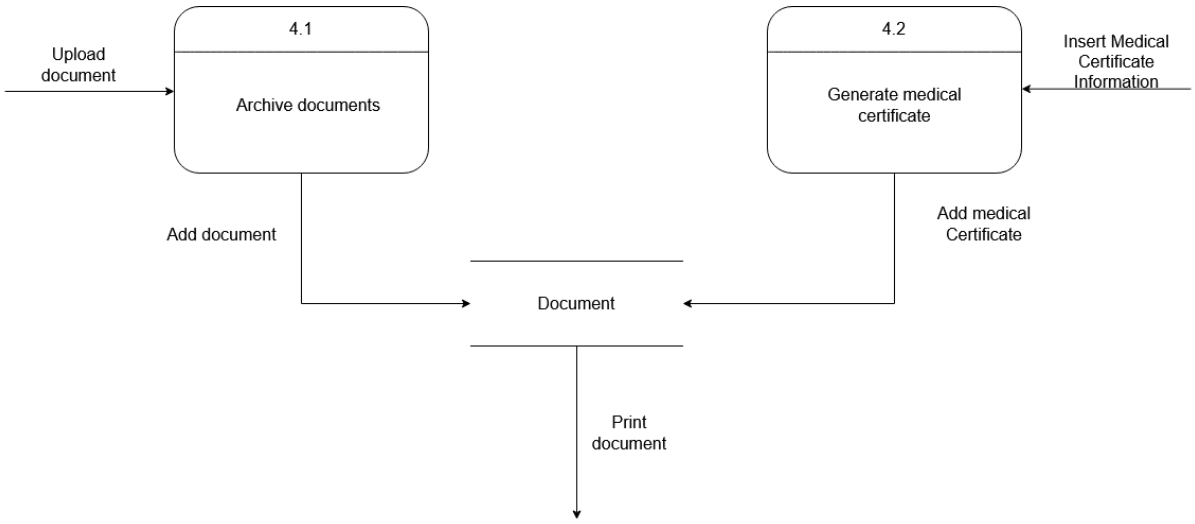


Figure 10. Data Flow Diagram Process 4.0

Figure 11 shows the decomposition of process 5.0 from the first stage figure. This figure describes the data flow in more depth for process 5.0 which is Payment.

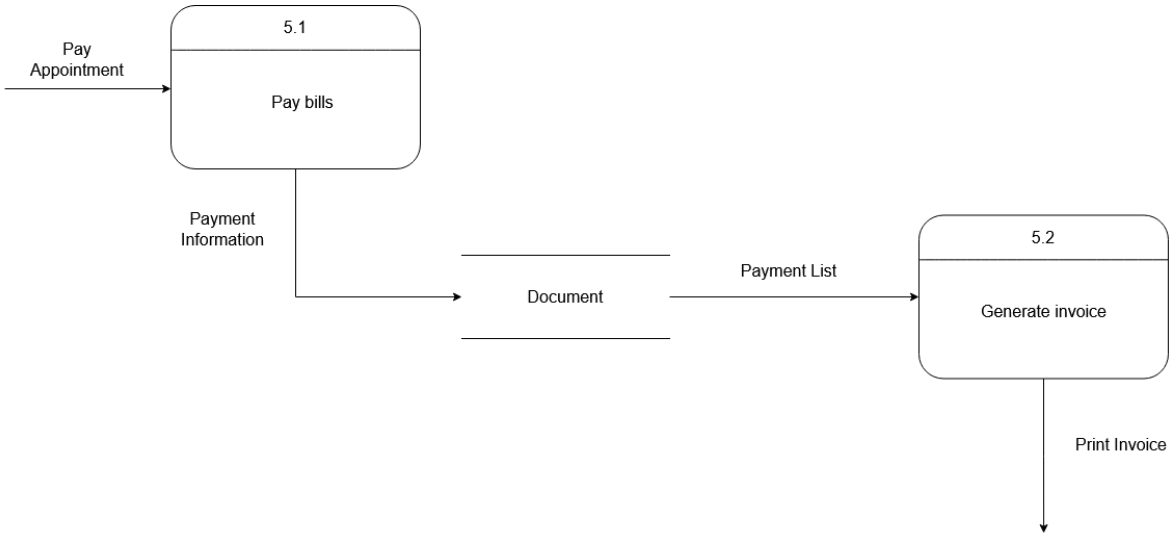


Figure 11. Data Flow Diagram Process 5.0

Chapter IV

9 SYSTEM DESIGN

9.1 Introduction

This chapter aims to identify the activities involved in the development of this system. In addition, this chapter also describes all the aspects found in the system and describes its functions in detail. This is because the design is fundamental to the development of the system itself.

9.2 Module/Design Function Specification

9.2.1 Module/Program Specifications

9.2.1.1 Employee Registration (Admin)

Program name:
Register employee

Purpose:
Admin add new employee details in the system.

Input/Output
Input: employee data (EMP_FULLNAME, EMP_USERNAME, EMP_PASSWORD, EMP_PHONE, EMP_POS)
Output: employee details will be displayed on the table in the same page.

Screen/ Report format:

Logic/pseudo code:

1. Admin click the *Employee* button on the dashboard
2. Admin fill in form and click *Add Employee* button to submit it

When *Employee* button in the menu is clicked, it will display a table of employee details and a form to register new employee.

When the *Add Employee* button is clicked:

i. If all the input is being filled in with correct format, the employee details will be inserted into the database.

ii. The new employee details will then be displayed in the employee detail table.

9.2.1.2 Update profile (Staff and Admin)

Program name:
Update Profile

Purpose:
Admin and staffs have access to update their profile.

Input/Output
Input: Employee data (EMP_FULLNAME, EMP_PASSWORD, EMP_PHONE, EMP_POS)
Output: employee details will be displayed on the form in the same page.

Screen/ Report format:

Logic/pseudo code:

1. Admin and staff click the Profile button on their dashboard.
2. Admin and staff click Update button to update their profile.

When Update button is clicked:

i. If all the input is being filled in with correct format, the employee details will be updated into the database.
ii. The new employee details will then be displayed in the profile form.

9.2.1.3 Delete employee (Admin)

Program name:
Register employee

Purpose:
Admin delete employee details in the system.

Input/Output
Input: Employee data (EMP_FULLNAME, EMP_USERNAME, EMP_PASSWORD, EMP_PHONE, EMP_POS)
Output: employee details will be displayed on the table in the same page.

Screen/ Report format:

Logic/pseudo code:

1. Admin click the *Employee* button on the dashboard
2. Admin click *Delete* button to delete the employee details.

When *Employee* button in the menu is clicked, it will display a table of employee details and a form to register new employee.

When the *Delete* button in employee detail table is clicked:

i. A confirmation window will pop up to ask confirmation to proceed with the action.
ii. If the window pop up is confirmed, the employee details in the database will be deleted.

9.2.1.4 Login Account (Staff and Admin)

Program name:
Login Account

Purpose:
Login into the system.

Input/Output
Input: Employee data (EMP_USERNAME, EMP_PASSWORD)
Output: directed into their own dashboard.

Screen/ Report format:

Logic/pseudo code:
Employees click the *Log In* button.

When employee clicked the Log In button:

i. If all the input is being filled, the system will verify the data if it's the correct employee username and password.
ii. The system will then verify employee positions.
iii. If the username and password matched an Admin position, the system will direct to an Admin Dashboard.
iv. If the username and password matched other positions, the system will be directed to a Staff Dashboard.

9.2.1.5 Patient Registration (Staff & Admin)

Program name:
Register patients

Purpose:

Employees add patients into the system.

Input/Output
Input: Patient data (PAT_NAME, PAT_PHONE, PAT_EMAIL, PAT_ADDRESS)
Output: Patient details will be displayed on the table in the same page.

Screen/ Report format:

Logic/pseudo code:

1. Employees click the *Patient* button on the dashboard
2. Employees fill in form and click *Add Patient* button to submit it

When *Patient* button in the menu is clicked:

i. It will display a table of patient details and a form to register new patient.

When the *Add Patient* button is clicked:

i. If all the input is being filled in with correct format, the patient details will be inserted into the database.
ii. The new patient's details will then be displayed in the patient's detail table.

9.2.1.6 Edit Patient (Staff and Admin)

Program name:
Edit patient

Purpose:
Employees edit patient details in the system.

Input/Output
Input: Patient data (PAT_NAME, PAT_PHONE, PAT_EMAIL, PAT_ADDRESS)
Output: Patient details will be displayed on the table in the same page.

Screen/ Report format:

Logic/pseudo code:

1. Employees click the *Patient* button on the dashboard
2. Employees fill in form and click Edit button to submit it

When *Patient* button in the menu is clicked, it will display a table of patient details and a form to register new patient.

When the *Edit* button in patient detail table is clicked:

i. If all the input is being filled in with correct format, the patient details will be updated into the database.
ii. The updated patient's details will then be displayed in the patient's detail table.

9.2.1.7 Delete Patient (Staff and Admin)

Program name:
Delete patient

Purpose:
Employees delete patient details in the system.

Input/Output
Input: Patient data (PAT_NAME, PAT_PHONE, PAT_EMAIL, PAT_ADDRESS)
Output: Patient details will be displayed on the table in the same page.

Screen/ Report format:

Logic/pseudo code:

1. Employees click the *Patient* button on the dashboard

When *Patient* button in the menu is clicked, it will display a table of patient details and a form to register new patient.

When the *Delete* button in patient detail table is clicked:
i. A confirmation window will pop up to ask confirmation to proceed with the action.
ii. If the window pop up is confirmed, the patient details in the database will be deleted.

9.2.1.8 Appointment booking (Staff and Admin)

Program name:
Book appointment.

Purpose:
Employee book appointments for patients.

Input/Output
Input: Appointment data (APP_ID, PAT_ID, START_TIME)
Output: appointment details displayed on the dashboard.

Screen/ Report format:

Logic/pseudo code:
Employees click the Book Appointment on the menu in the dashboard.
Employees fill in the appointment details and click the Book Appointment to submit it.

When Book Appointment in the menu is clicked, it will be directed to the Book Appointment form.

When the Book Appointment button is clicked:

i. If all the input is being filled in with correct format, the appointment details will be inserted into the database.
ii. The appointment details will then be displayed in the dashboard.

9.2.1.9 Appointment cancellation (Staff and Admin)

Program name:
Delete appointment

Purpose:
Employees delete appointment details in the system.

Input/Output
Input: Appointment data (APP_ID)
Output: Appointment details will be displayed on the table in the same page.

Screen/ Report format:

Logic/pseudo code:

1. Employees click the *Cancel Appointment* button on the dashboard

When employee clicked *cancel appointment* button:

i. A confirmation window will pop up to ask confirmation to proceed with the action.
ii. If the window pop up is confirmed, the appointment details in the database will be deleted.

9.2.1.10 Appointment details (Staff and Admin)

Program name:
Update appointment

Purpose:

Employees edit patient details in the system.

Input/Output
Input: Appointment data (END_TIME, APP_DETAIL)
Output: Appointment details will be displayed into the updated appointment interface.

Screen/ Report format:

Logic/pseudo code:

1. Employee clicked on *Update Appointment* in their dashboard.
2. Employees fill in the form and click the *Update Appointment* to update it.

When *Update Appointment* in the table is clicked:

i. The system will get the APP_ID and directed to the appointment detail form

When the *Update Appointment* in the form detail is clicked:

i. If all the input is being filled in with correct format, the appointment details will be updated into the database.
ii. The updated appointment details will then be displayed in the updated appointment table.

9.2.1.11 Archive documents (Staff and Admin)

Program name:
Archive documents.

Purpose:
Employee archive documents into the system.

Input/Output
Input: Document data (DOCT_NAME, DOCT_TYPE, DOCT_DETAIL, DOCT_DESC)
Output: Documents detail will be displayed at the document table.

Screen/ Report format:

Logic/pseudo code:

3. Employee clicked on Document in the dashboard.
4. Employees fill in the form and click the Upload Document to archive it.

When the Document button in the menu is clicked:
It will display the archived document table and the form to upload the documents.

When Upload Document is clicked:

i. If all the input is being filled in with correct format, the document details will be inserted into the database.
ii. The document details will then be displayed in the document table.

When the Delete button is clicked:
i. The document will be deleted from the system.

9.2.1.12 Generate medical certificate (Staff and Admin)

Program name:
Generate medical certificate.

Purpose:
Employees generate medical certificate for patient.

Input/Output
Input: (name, address, diagnosis, day, emp_fulname)
Output: Medical certificate will be generated and printed out.

Screen/ Report format:

Logic/pseudo code:
1. Employee clicked *Generate MC* button on the dashboard.
2. Employees fill in the form and click the *Generate Medical Certificate* button to submit it.

When the *Generate MC* is clicked:
i. The system will be directed to the medical certificate form.

When the *Generate Medical Certificate* button is clicked:
i. If all the input is being filled in with correct format, the system will generate the medical certificate.
ii. Employee then click the *Print* button from the print window.

9.2.1.13 Pay Bills (Staff and Admin)

Program name:
Pay bills.

Purpose:
Employees manage bills for patients.

Input/Output
Input: Appointment data (TOTAL_COST, AMOUNT_PAID)
Output: Display the archive appointment details in the Archive Appointment interface.

Screen/ Report format:

Logic/pseudo code:

1. Employee clicked Pay Fee in the Pay Medical Fee table in Pay Appointment interface.
2. Employee clicked Make Payment button and directed to Archive Appointment table.

When the Pay Fee is clicked:

i. The system will be directed to the Payment form.

When the Make Payment is clicked:

i. If all the input is being filled in with correct format, the appointment details will be updated into the database.
ii. The system will be directed to the Archive Appointment interface.

When the Generate Invoice is clicked:

i. The system will generate an invoice.
ii. Employee then click the *Print* button from the print window.

9.2.1.14 Generate Invoice (Staff and Admin)

Program name:
Generate invoice.

Purpose:
Employees generate invoice for patient.

Input/Output
Input: Appointment data (APP_ID)
Output: Invoice will be generated and printed out.

Screen/ Report format:

Logic/pseudo code:

1. Employee clicked Generate Invoice in the Archive Appointment table in Archive Appointment interface.

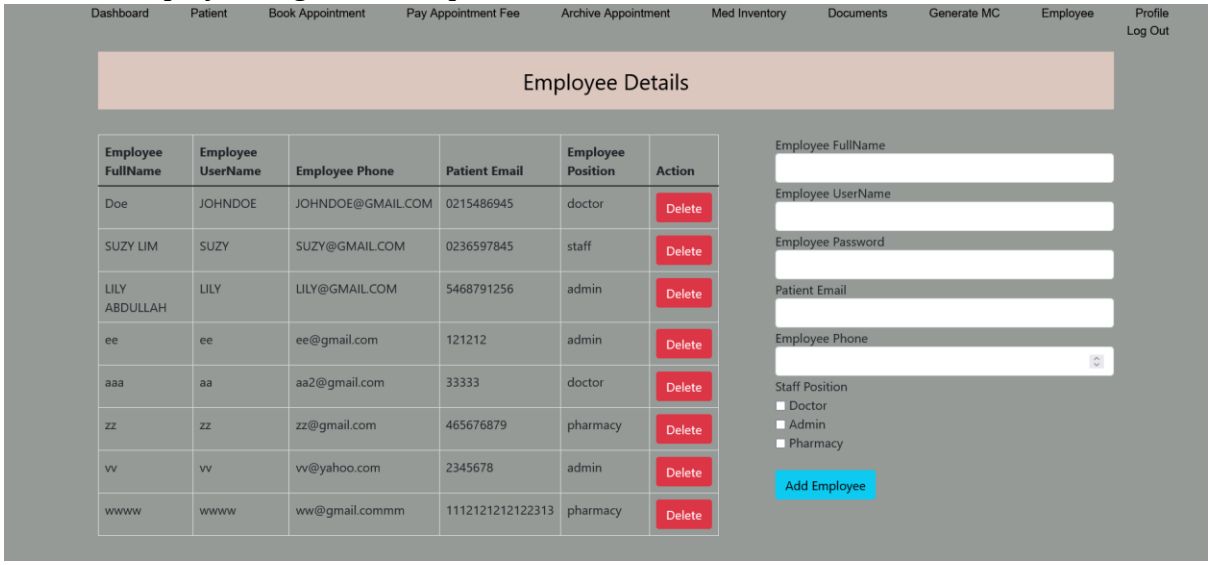
When the Generate Invoice is clicked:

iii. The system will generate an invoice.
iv. Employee then click the *Print* button from the print window.

9.3 Interface Design

9.3.1 Input Design

9.3.1.1 Employee Registration Input



Employee FullName	Employee UserName	Employee Phone	Patient Email	Employee Position	Action
Doe	JOHNDOE	JOHNDOE@GMAIL.COM	0215486945	doctor	Delete
SUZY LIM	SUZY	SUZY@GMAIL.COM	0236597845	staff	Delete
LILY ABDULLAH	LILY	LILY@GMAIL.COM	5468791256	admin	Delete
ee	ee	ee@gmail.com	121212	admin	Delete
aaa	aa	aa2@gmail.com	33333	doctor	Delete
zz	zz	zz@gmail.com	465676879	pharmacy	Delete
vv	vv	vv@yahoo.com	2345678	admin	Delete
wwww	wwww	ww@gmail.commm	1112121212122313	pharmacy	Delete

Figure 12.Employee Registration Interface

Figure 12 shows the employee registration form. Admins must register the new employee first before they can log in into the system. During the registration process, the admin must fill in all the employee's data such as full name, username, password, email and phone number. If the admin did not enter the information correctly, the system will display a warning message. For example, if the admin enters an incorrect email without the '@', the system will display the message "Please enter an email address.". In the phone number input, the admin will not be able to insert any characters except for numbers. If the admin inserted an incorrect input, the system would display the message "Please enter a number.". The admin must submit the employee details by clicking the *Add Employee* button.

9.3.1.2 Login Input Interface

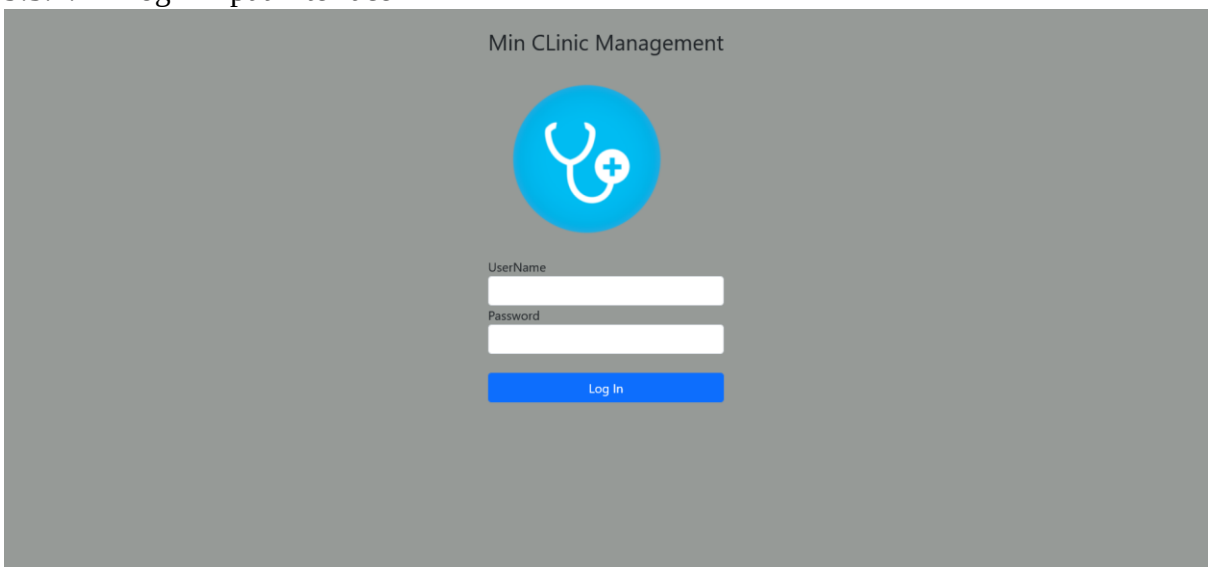


Figure 13. Login Input Interface

Figure 13 shows the login interface of the system. There are two textbox that required the employee to input respectively as “Username” and “Password”. The combination of the username and password must be correct, so that the system can proceed to verify the employee position and proceed to login successfully, directing the user into their own respective dashboard.

9.3.1.3 Update Profile Interface Input

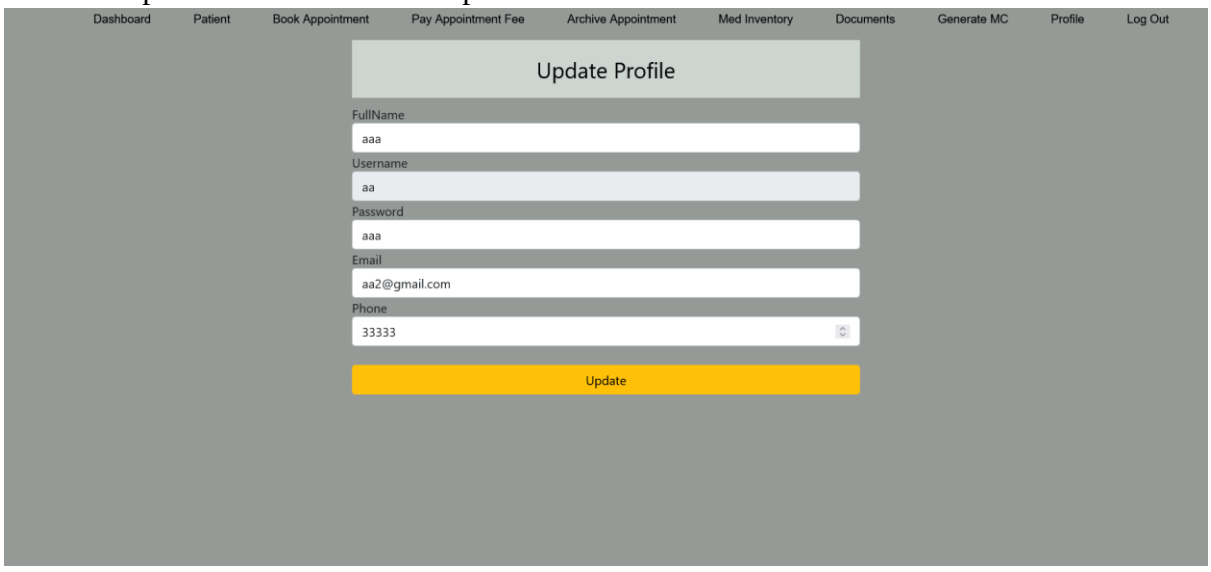
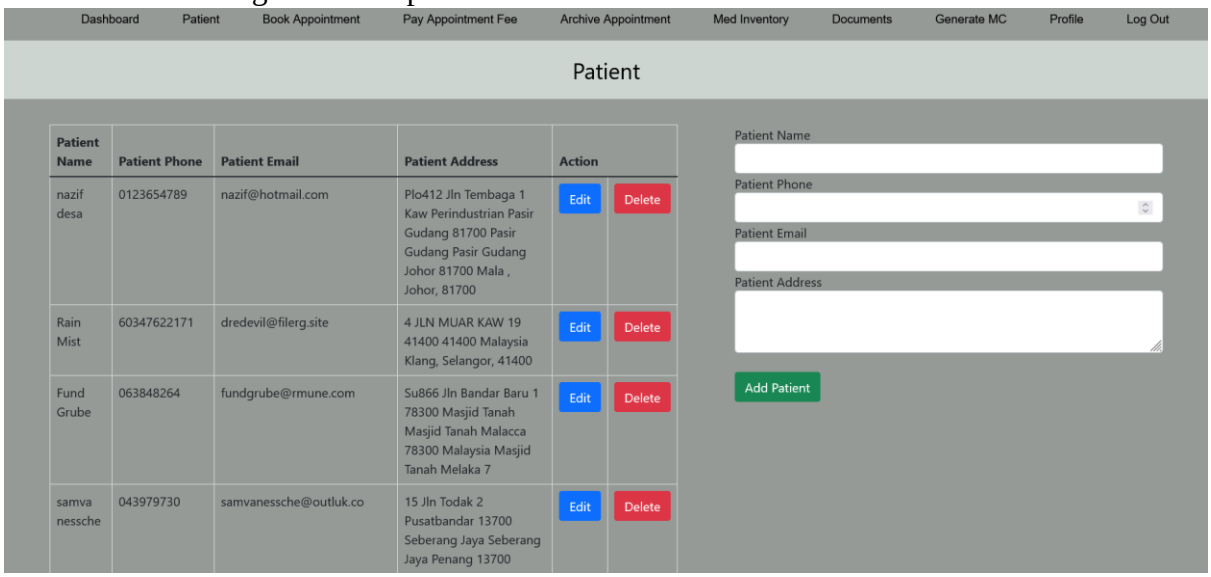


Figure 14. Update Profile Interface Input

Figure 14 shows the Update Profile Interface. During the update process, employees can change their full name, password, email address or phone number. If the textbox is left empty, the warning message “Please fill out this field” will pop up. If the employee did not enter the information correctly, the system will display a warning message. For example, if the employee

enters an incorrect email without the '@', the system will display the message "Please enter an email address.". In the phone number input, the employee will not be able to insert any characters except for numbers. If the admin inserted an incorrect input, the system would display the message "Please enter a number.". The employee must submit the updated employee details by clicking the *Update* button.

9.3.1.4 Patient Registration Input



Patient Name	Patient Phone	Patient Email	Patient Address	Action	
nazif desa	0123654789	nazif@hotmail.com	Plo412 Jln Tembaga 1 Kaw Perindustrian Pasir Gudang 81700 Pasir Gudang Pasir Gudang Johor 81700 Mala , Johor, 81700	Edit	Delete
Rain Mist	60347622171	dredevil@filerg.site	4 JLN MUAR KAW 19 41400 41400 Malaysia Klang, Selangor, 41400	Edit	Delete
Fund Grube	063848264	fundgrube@rmune.com	Su866 Jln Bandar Baru 1 78300 Masjid Tanah Masjid Tanah Malacca 78300 Malaysia Masjid Tanah Melaka 7	Edit	Delete
samva nessche	043979730	samvanessche@outluk.co	15 Jln Todak 2 Pusatbandar 13700 Seberang Jaya Seberang Jaya Penang 13700	Edit	Delete

Figure 15. Patient Registration Interface

Figure 15 shows the patient registration form. Employees must register the new patient first before they can book an appointment for the patient. During the registration process, the employee must fill in all the patient's data such as their name, phone number, email address, and home address. If the employee did not enter the information correctly, the system will display a warning message. For example, if the employee enters an incorrect email without the '@', the system will display the message "Please enter an email address.". In the phone number input, the employee will not be able to insert any characters except for numbers. If the employee inserted an incorrect input, the system would then display the message "Please enter a number.". The employee must submit the patient details by clicking the *Add Patient* button.

9.3.1.5 Book Appointment Input

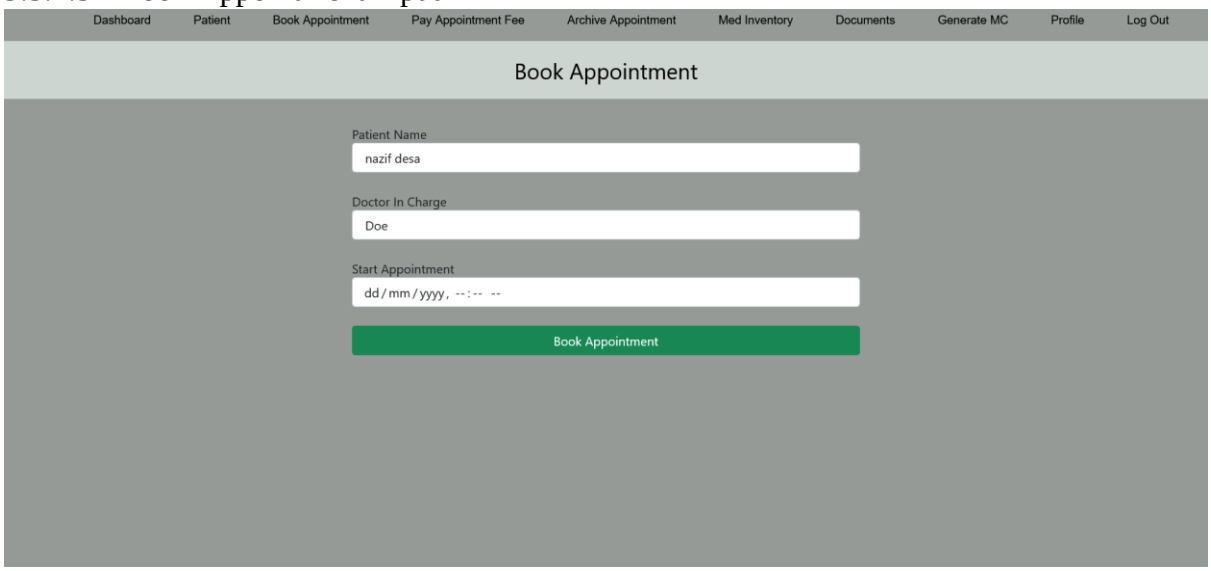


Figure 16. Book Appointment Interface

Figure 16 shows the interface to book appointment for the patients. The form includes a selection box for the patient's name and the doctor who will oversee the patient. It also includes the start appointment time for the appointment or consultations. During the booking process, the employee must select the patient and doctor in charge name. They also must insert the appointment date and time. If the appointment details are not fill in completely, the system would then display the message "Please fill out this field". The employee must submit the appointment details by clicking the *Book Appointment* button. They system will then insert the data into the database and display the booked appointment on the dashboard interface.

9.3.1.6 Update Appointment Details Interface

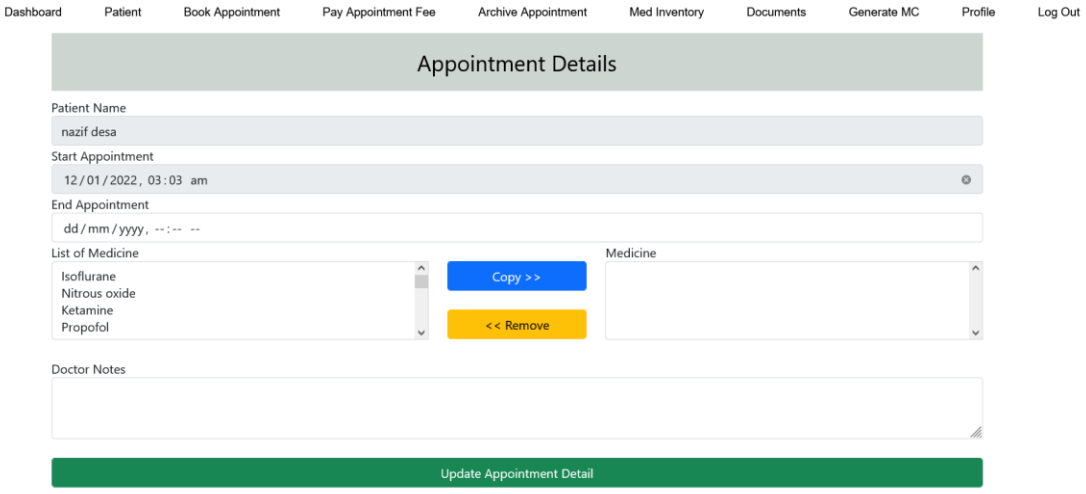


Figure 17. Appointment Detail Interface

Figure 17 shows the Update Appointment Details Interface. From the dashboard interface, there will be an action button to either update the appointment or to cancel the appointment. By clicking Update Appointment, they system will lead the employee to this interface. The employee will then fill out the appointment details. During the update process, the employee must insert the appointment end date and time. If the appointment details are not fill in completely, the system would then display the message "Please fill out this field". The employee must submit the appointment details by clicking the *Update Appointment Detail* button. They system will then update the data into the database and display the updated appointment on the Pay Appointment Fee interface.

9.3.1.7 Pay Fee Input

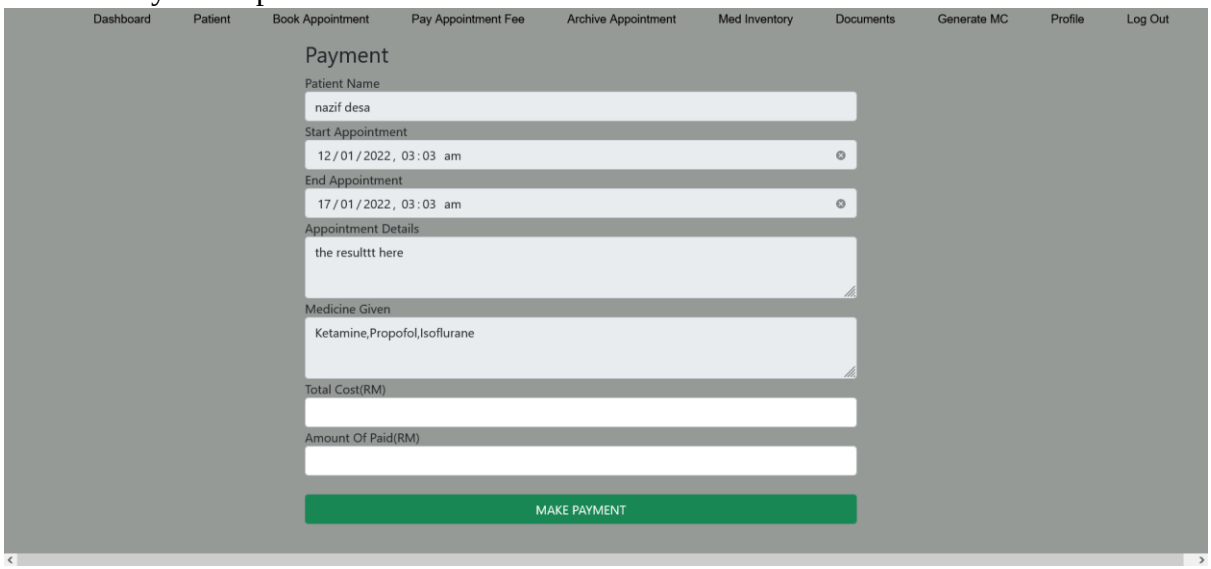


Figure 18. Payment Interface

Figure 18 shows the input interface to pay the appointment fee. The system will get the appointment ID from the Pay Appointment Fee interface and display the appointment details such as patient's name, the start of the appointment date and time, and the end of the appointment date and time. The data will be displayed in a textbox and the employee could not change the data. The employee will insert the total cost of the appointment and the amount paid by the patient. If the appointment fees are not fill in completely, the system would then display the message "Please fill out this field". When the *Make Payment* button is clicked, the data will be updated into the database and the system will then direct the page to Archive Appointment Interface.

9.3.1.8 Medicine Inventory Input

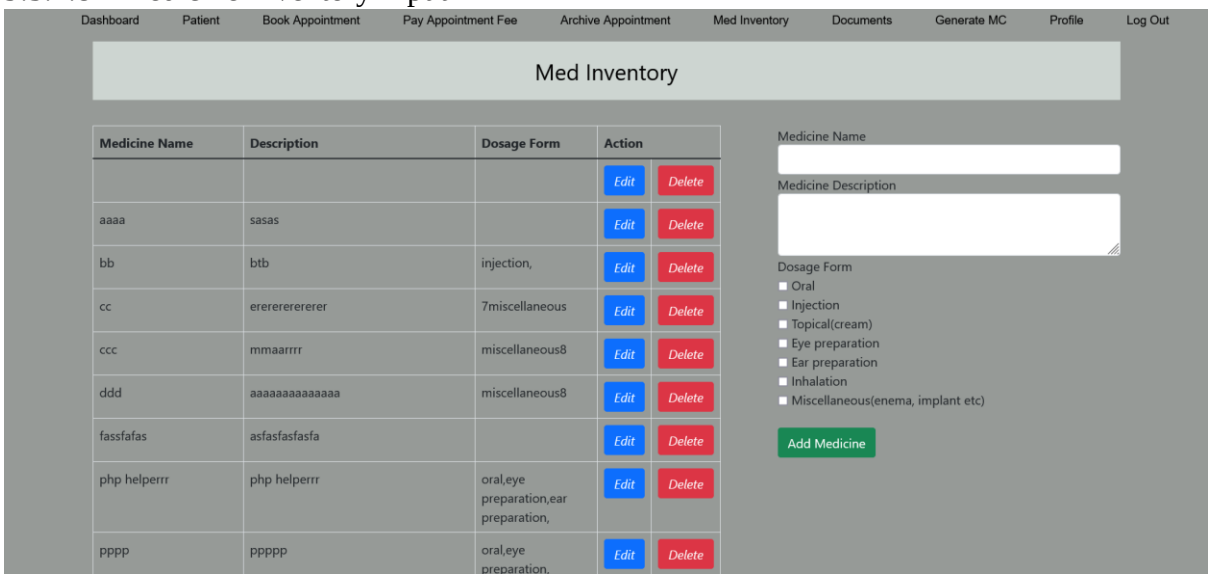


Figure 19. Medicine Inventory Interface

Figure 19 shows the medicine inventory interface. The table display all the medicine inventory that have been added into the system. The form to insert new medicine at the right of the interface includes textbox for medicine name, medicine description and an option button for the dosage form. During the insert process, the employee must insert medicine name. If the medicine details are not fill in completely, the system would then display the message "Please fill out this field". The medicine description and dosage form are optional. The employee must submit the medicine details by clicking the *Add Medicine* button. Then, the system will insert the data into the database and display the inserted medicine data on the Medicine table.

9.3.1.9 Medical Certificate Form for Registered Patients

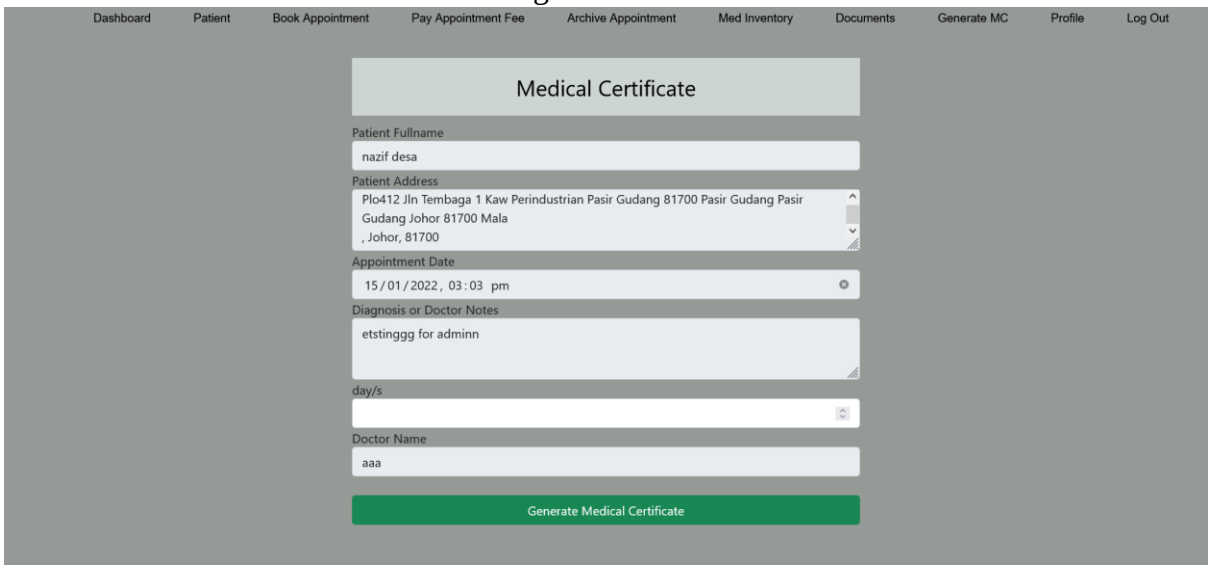


Figure 20. Appointment Medical Certificate Interface

Figure 20 shows the Medical Certificate Form Interface. When employee clicked the *Generate MC* on the action table button, the system will redirect the employee to the Medical Certificate Form Interface. the form includes a patient's full name, address, appointment date,

doctor's diagnosis or notes as well as the number of days for the medical leave and the name of the employee who manage the medical leave. The employee could not insert other data as the data already fetched from the database. Employee can only insert the number of days given for medical leave only. During the insert process, the employee must insert the number of days for medical leave given to the patient. If the medical certificate details are not fill in completely, the system would then display the message "Please fill out this field". The employee must submit the medical certificate details by clicking the *Generate Medical Certificate* button. The system will then generate a medical certificate for the employee to be hand out to the patient.

9.3.1.10 Medical Certificate Form Interface

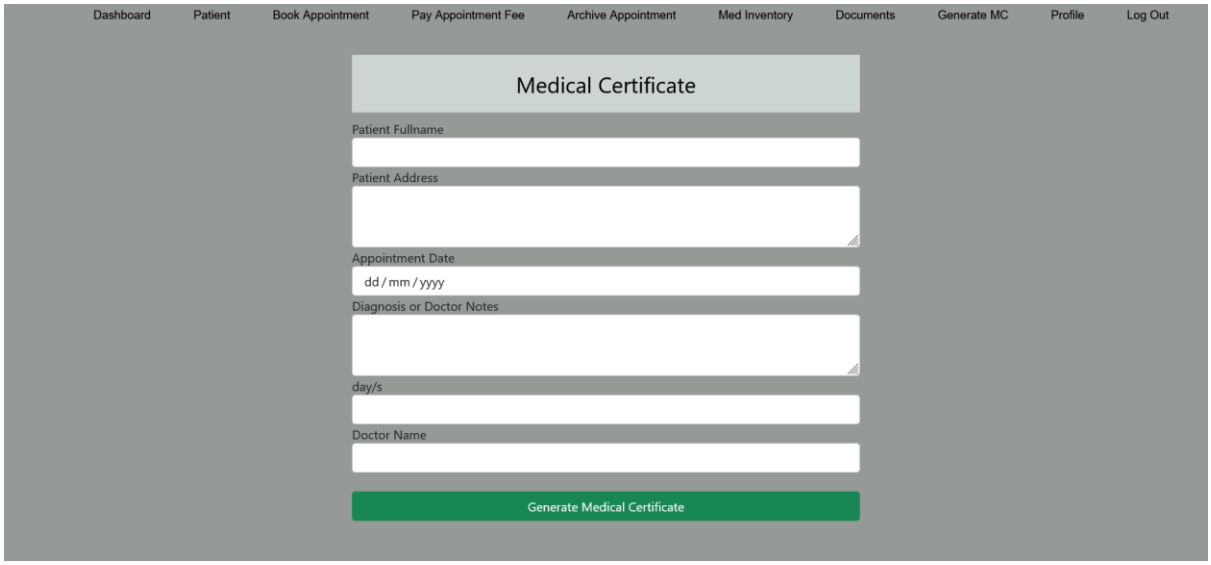


Figure 21. Medical Certificate Interface

Figure 21 shows the Medical Certificate Form Interface. When employee clicked the Generate MC on the menu button, the system will redirect the employee to the Medical Certificate Form Interface. the form includes a patient's full name, address, appointment date, doctor's diagnosis or notes as well as the number of days for the medical leave and the name of the employee who manage the medical leave. During the insert process, the employee must insert medical certificate information. If the medical certificate details are not fill in completely, the system would then display the message "Please fill out this field". The employee must submit the medical certificate details by clicking the *Generate Medical Certificate* button. The system will then generate a medical certificate for the employee to be hand out to the patient.

9.3.1.11 Archive Documents Input Interface

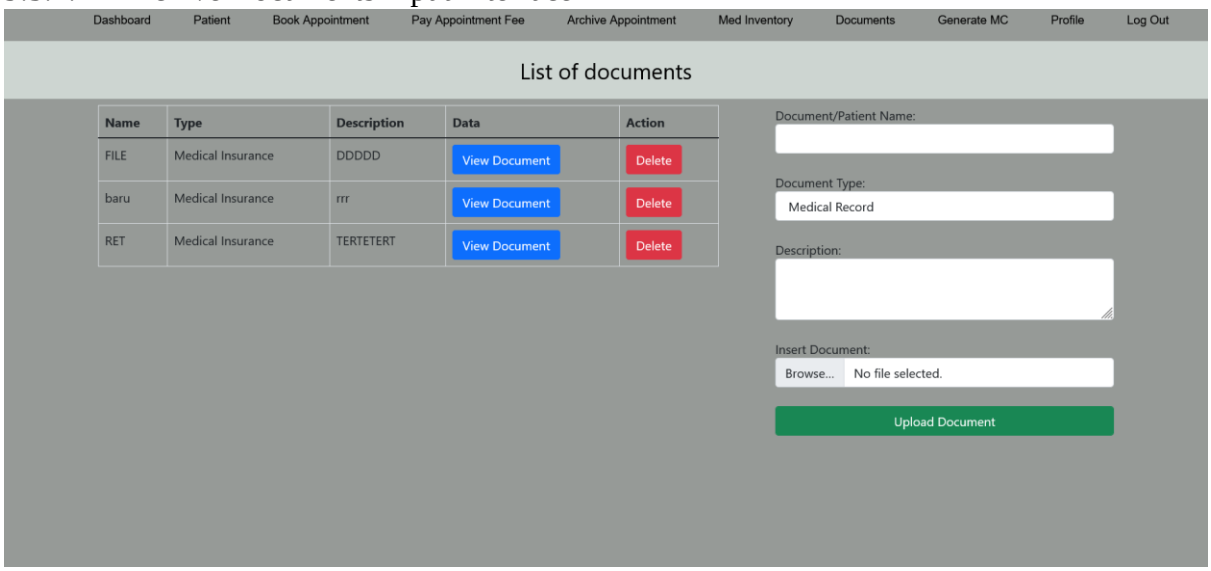


Figure 22. Documents Interface

Figure 22 shows the Archive Documents Input Interface. When employee clicked the Documents on the menu button, the system will redirect the employee to the Archive Documents Input Interface. The form includes a documents name, type, and description of the document as well as the file input for the document. During the insert process, the employee must all the information. If the documents details are not fill in completely, the system would then display the message “Please fill out this field”. The employee must submit the details by clicking the *Upload Document* button. Then, the system will insert the data into the database.

9.3.2 Output Design

9.3.2.1 Dashboard Interface

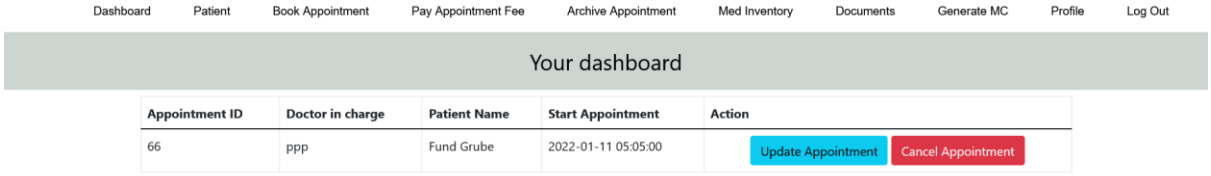


Figure 23. Dashboard Interface (Staff)

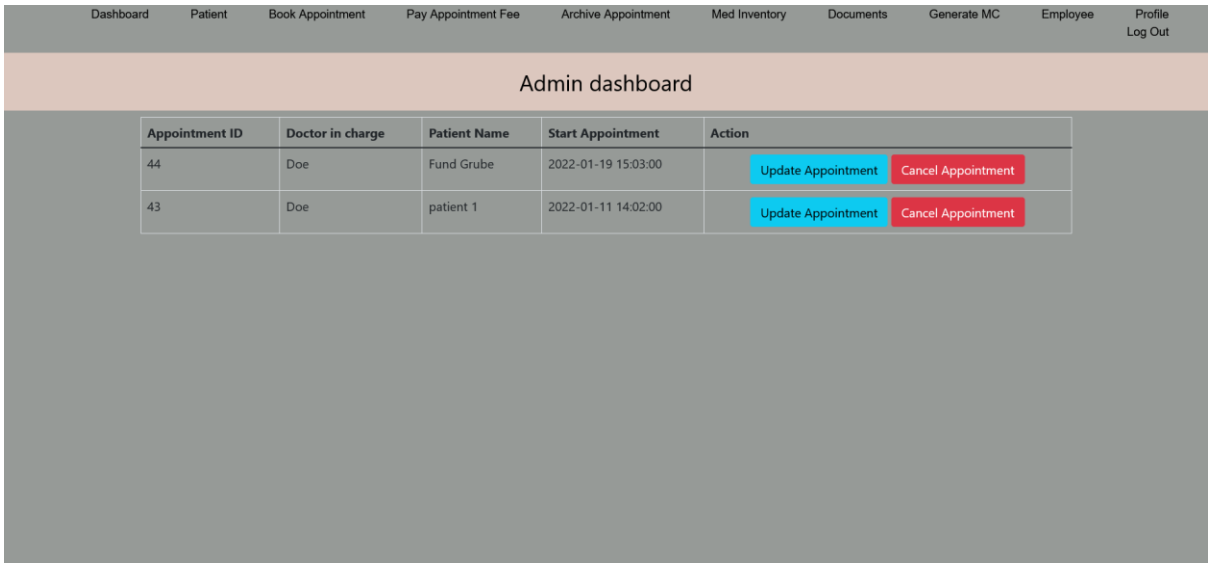


Figure 24. Dashboard Interface (Administrator)

Figure 23 and Figure 24 shows the dashboard interface of the system. The dashboard interface displays all the booked appointment in a table manner that is the appointment ID, patient name, doctor in charge name, and the datetime of the appointment. Figure 2 is an admin dashboard; admin have the access to register and delete employees. Figure 1 shows the dashboard of other employee position. They do not have access to add or delete employees. However, both employee positions can edit their employee details and admin could not edit other employee's details.

9.3.2.2 Display Profile Interface

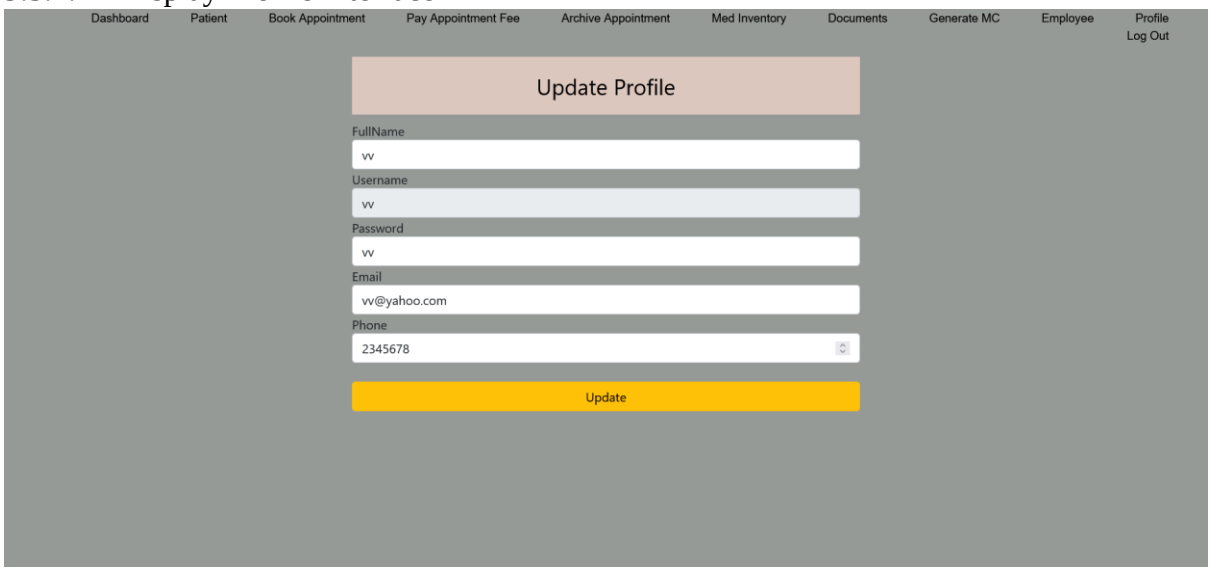
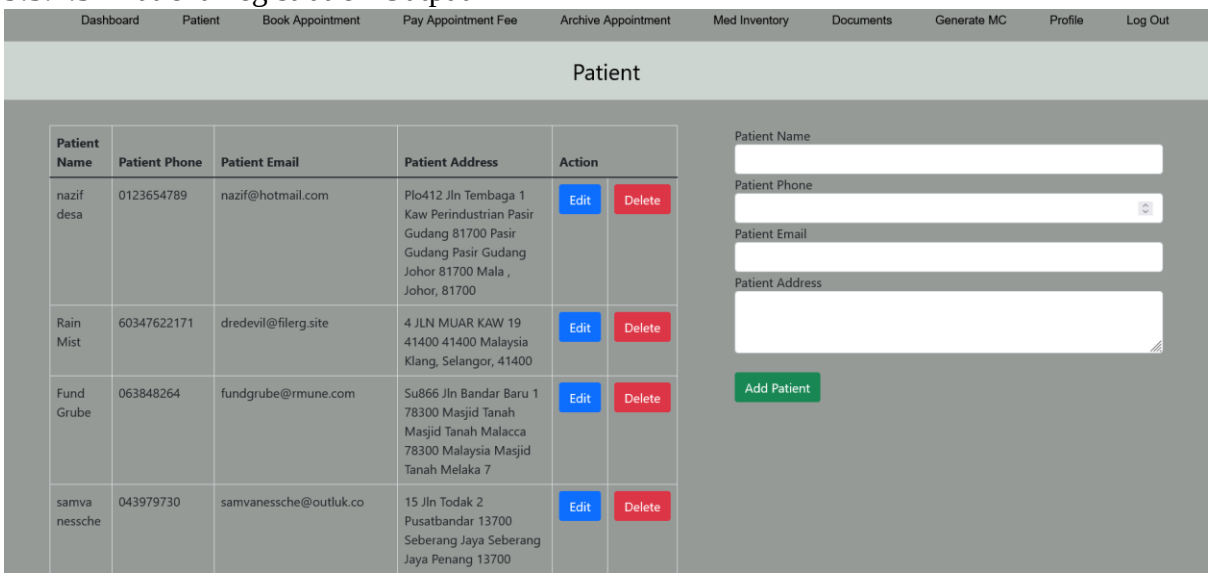


Figure 25. Display Profile Interface

Figure 25 shows the profile interface. It consists of the employee's full name, username, password, email, and phone number. Employee can only read their username and could not change it. Each employee can only update their own profile.

9.3.2.3 Patient Registration Output



Patient Name	Patient Phone	Patient Email	Patient Address	Action
nazif desa	0123654789	nazif@hotmail.com	Plo412 Jln Tembaga 1 Kaw Perindustrian Pasir Gudang 81700 Pasir Gudang Pasir Gudang Johor 81700 Mala , Johor, 81700	Edit Delete
Rain Mist	60347622171	dredevil@filerg.site	4 JLN MUAR KAW 19 41400 41400 Malaysia Klang, Selangor, 41400	Edit Delete
Fund Grube	063848264	fundgrube@rmune.com	Su866 Jln Bandar Baru 1 78300 Masjid Tanah Masjid Tanah Malacca 78300 Malaysia Masjid Tanah Melaka 7	Edit Delete
samva nessche	043979730	samvanessche@outluk.co	15 Jln Todak 2 Pusatbandar 13700 Seberang Jaya Seberang Jaya Penang 13700	Edit Delete

Figure 26. Display Patient Interface

Figure 26 shows the patient interface. It displays the table of all the registered patients in the system. The interface displays the patient's name, phone number, email address, address, and actions button to edit or delete the data.

9.3.2.4 Pay Appointment Fee Interface

Figure 27. Pay Medical Fee Interface

Figure 27 shows the updated appointment details. After the appointment is updated, the updated appointment will be displayed here with an action button, Pay Fee.

9.3.2.5 Archive Appointment Interface

Figure 28. Archive Appointment Interface

Figure 28 shows the Archive Appointment Interface. After the payment is completed, the system will display the appointment details in a table manner. The table consists of all the appointment data such as Appointment ID, the name of the doctor in charge, the patient's name, the appointment details, start and end datetime, total cost of the appointment, and the amount paid by the patient. It also consists of an action button to generate invoice for the patient.

9.3.2.6 Print Invoice Interface

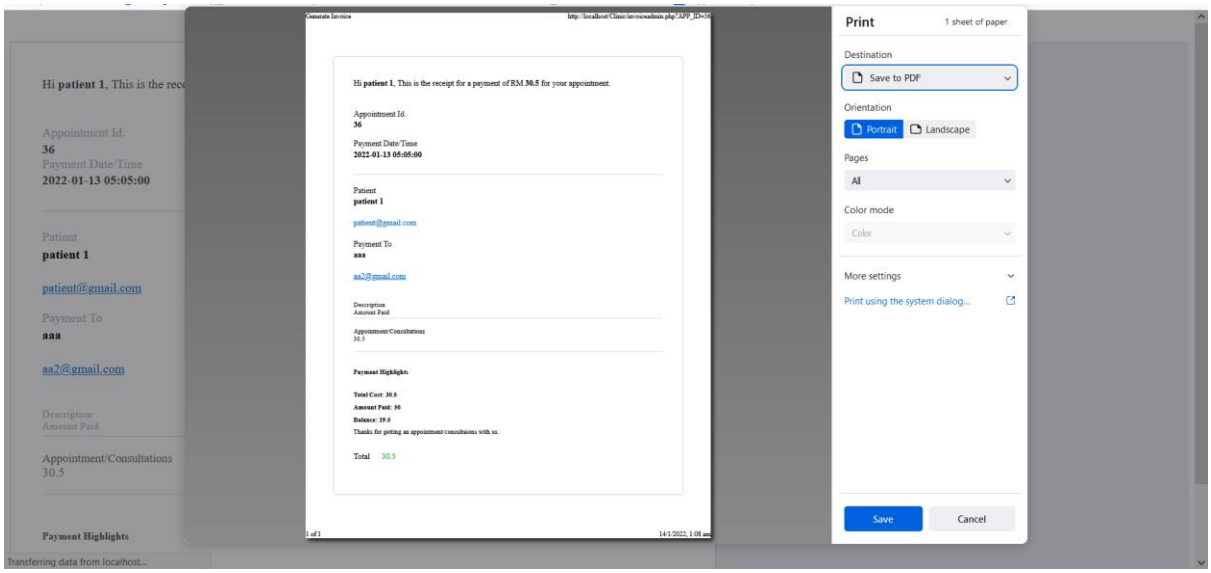


Figure 29. Print Invoice

Figure 29 shows the action when the *Generate Invoice* button in Archive Appointment Interface is clicked. The system will generate an invoice for the employee to print it out and hand it out to the respective patient.

9.3.2.7 Medicine Inventory Output

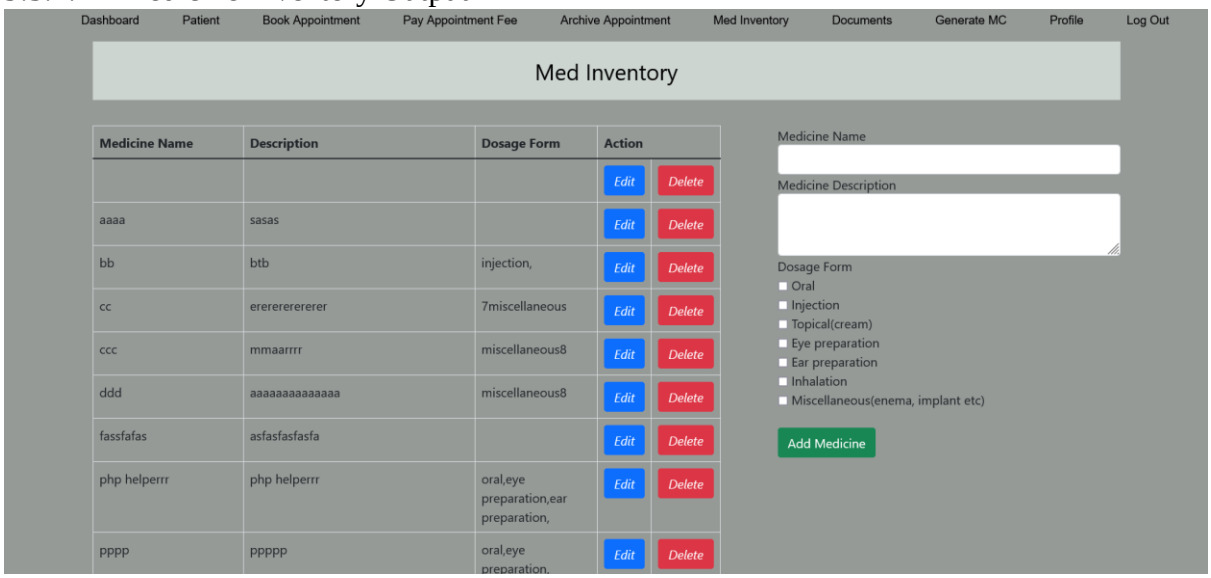


Figure 30. Display Medicine Inventory

Figure 30 shows the Medicine Inventory Interface. It displays the table of all the inserted medicines in the system. The interface displays the medicine's name, description and dosage form. The table also includes two action buttons, *Edit* button and *Delete* button.

9.3.2.8 Print Medical Certificate Interface

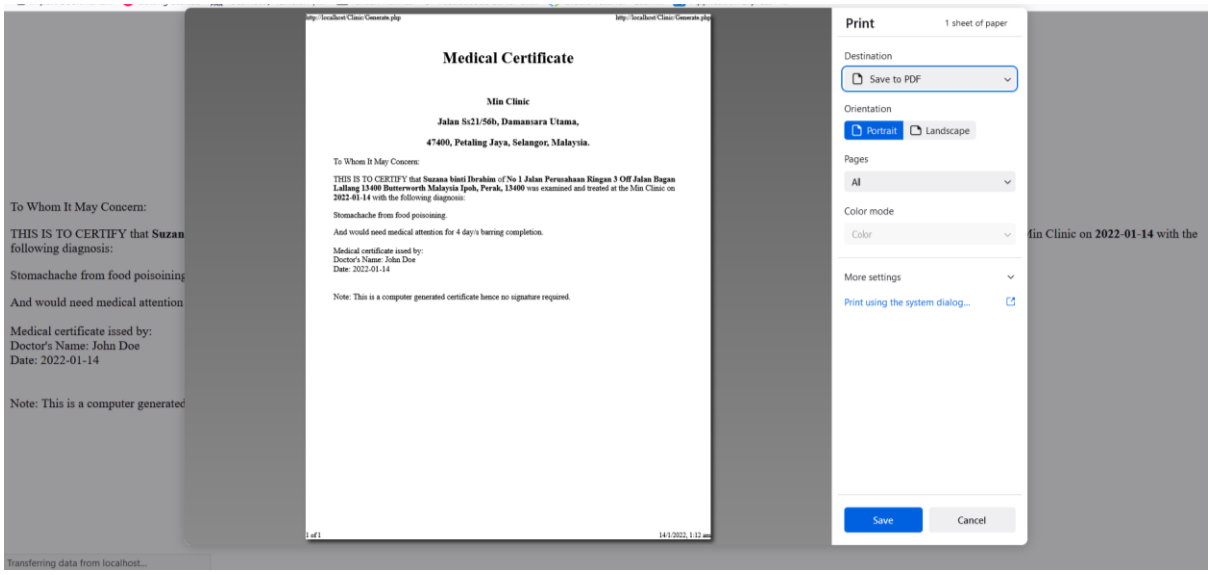


Figure 31. Print Medical Certificate

Figure 31 shows the action when the *Generate Medical Certificate* button in Medical Certificate Form Interface is clicked. The system will generate a medical certificate for the employee to print it out and hand it out to the respective patient.

9.3.2.9 Documents Interface

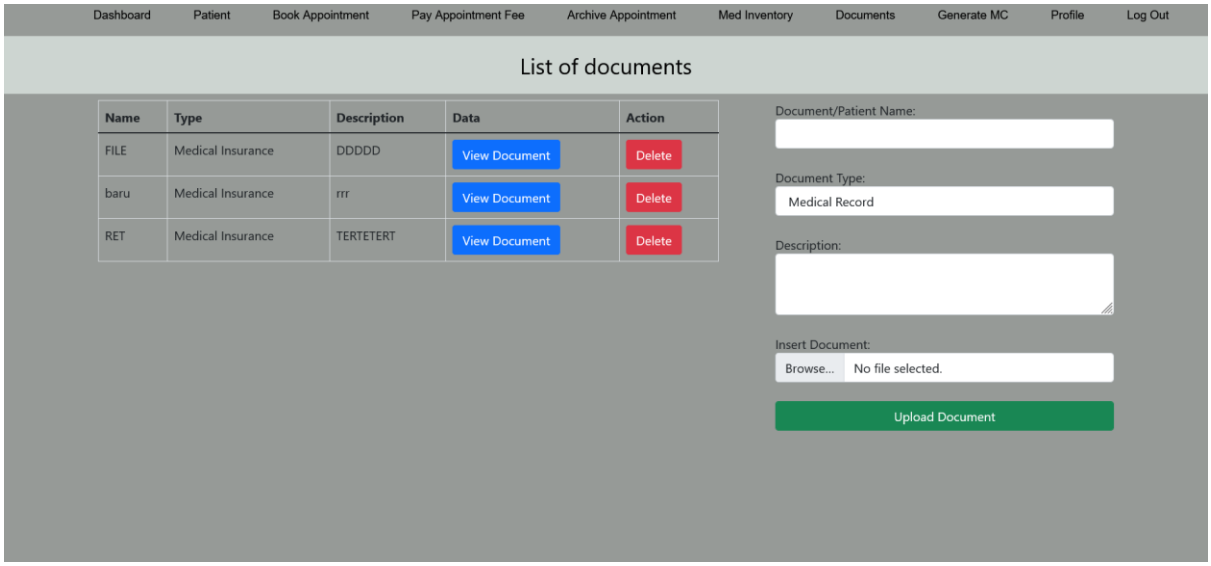


Figure 32. Display Documents Interface

Figure 32 shows the Documents Interface. It displays the table of all the inserted documents in the system. The interface displays the document's name, type, and description. The table also includes two action buttons, *View Document* button and *Delete* button.

9.3.3 Database Design (ERD)

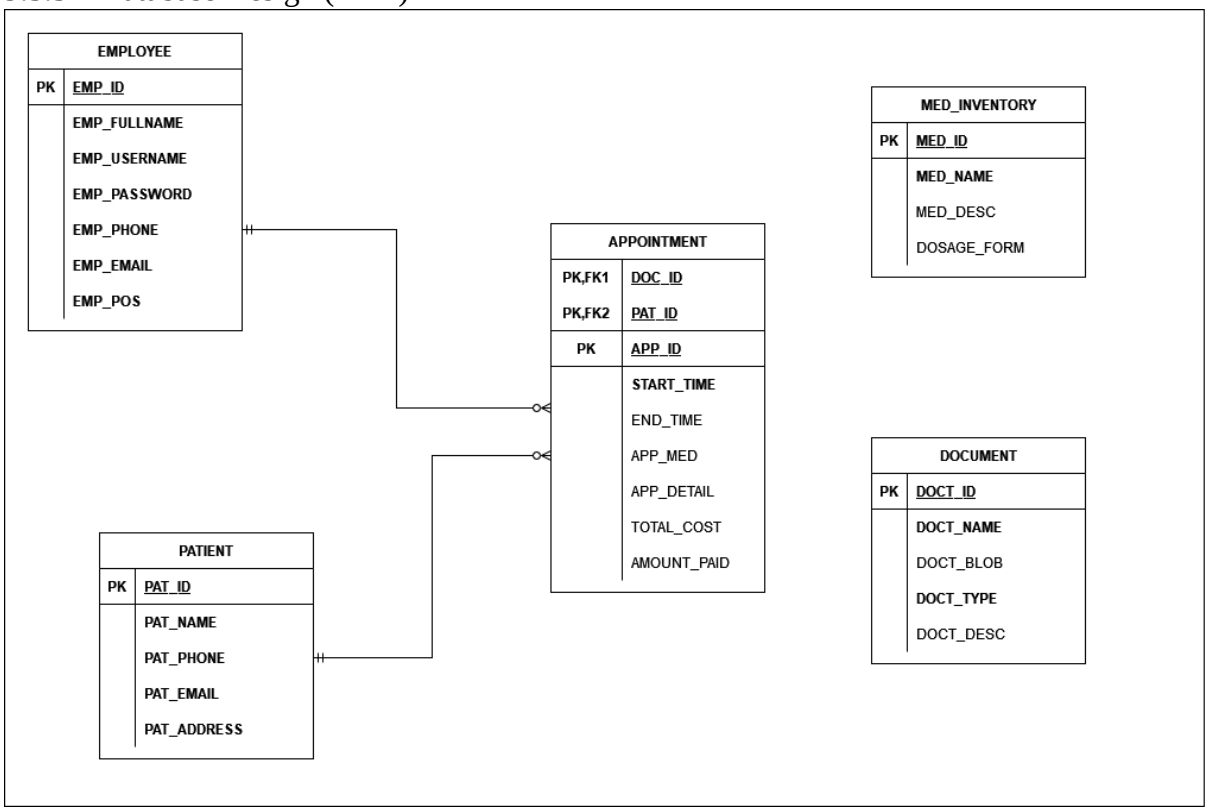


Figure 33. Entity Relationship Diagram (ERD)

9.3.4 Data Dictionary

9.3.4.1 Detailed Information of Employees (Table: EMPLOYEE)

Table 2. Data Dictionary Employee Table

No	Name	Datatype	Length	Primary Key	Description	Mandatory
1	EMP_ID	int	11	Yes	A unique employee identification	Yes
2	EMP_FULLNAME	varchar	200		Full name of the employee	Yes
3	EMP_USERNAME	varchar	200	Unique	Username of the employee	Yes
4	EMP_PASSWORD	varchar	200	Unique	Password of the employee	Yes
5	EMP_PHONE	int	200		Phone Number of the employee	Yes
6	EMP_EMAIL	varchar	200		Email of the employee	Yes

7	EMP_POS	varchar	10		Position type of the employee	Yes

9.3.4.2 Detailed Information of Patient (Table: PATIENT)

Table 3. Data Dictionary Patient Table

No	Name	Datatype	Length	Primary Key	Description	Mandatory
1	PAT_ID	int	11	Yes	A unique patient identification	Yes
2	PAT_NAME	varchar	200		Full name of the patient	Yes
3	PAT_PHONE	int	200		Phone Number of the patient	Yes
4	PAT_EMAIL	varchar	200		Email of the patient	Yes
5	PAT_ADDRESS	varchar	200		Address type of the patient	Yes

9.3.4.3 Detailed Information of Appointment (Table: APPOINTMENT)

Table 4. Data Dictionary Appointment Table

No	Name	Datatype	Length	Primary Key	Description	Mandatory
1	APP_ID	int	11	Yes	A unique appointment identification	Yes
2	EMP_ID	int	11	Foreign	A unique employee identification	Yes
3	PAT_ID	int	11	Foreign	A unique patient identification	Yes
4	START_TIME	varchar	200		Start time of the appointment	Yes
5	END_TIME	varchar	200		End time of the appointment	No
6	APP_MED	varchar	1000		Medicine prescribed by doctors	No
7	APP_DETAIL	varchar	1000		Appointment details or description	No
8	TOTAL_COST	float	200		Phone Number of the employee	No
9	AMOUNT_PAID	float	200		Email of the employee	No

9.3.4.4 Detailed Information of Medicine Inventory (Table: MED_INVENTORY)

Table 5. Data Dictionary Medicine Inventory Table

No	Name	Datatype	Length	Primary Key	Description	Mandatory
1	MED_ID	int	11	Yes	A unique medicine identification	Yes
2	MED_NAME	varchar	200		The name of the medicine	Yes
3	MED_DESC	varchar	200		Medicine description	No
4	DOSAGE_FORM	varchar	100		The dosage form of the medicine	No

9.3.4.5 Detailed Information of Archive Document (Table: DOCUMENT)

Table 6. Data Dictionary Document Table

No	Name	Datatype	Length	Primary Key	Description	Mandatory
1	DOCT_ID	int	11	Yes	A unique document identification	Yes
2	DOCT_NAME	varchar	200		The name of the document	Yes
3	DOCT_BLOB	varchar	255		The document file	No
4	DOCT_TYPE	varchar	100		The type of the document	Yes
5	DOCT_DESC	varchar	500		The description of the document	No

Chapter V

10 SYSTEM IMPLEMENTATION

10.1 Introduction

System implementation is the stage at which design decisions will transferred to software code and logical procedures. At this stage, the software will be tested to ensure the software developed meets the standard's needs.

10.2 Implementation Status

Table 7. Implementation Status

Program Name	Explanation	Completion Period	Completion Date	File Info
Employee Registration	Admins need to register employee member so they can have access into the system.	2 days	15/12/2021	Employee.php Func_employee.php Function.php Functionadmin.php
Update profile	In profile page, employee can update their profile such as full name, password, email address, and phone number	2 days	15/12/2021	Profile.php Function.php Functionadmin.php
Delete employee	Admin can delete employee in Employee page.	2 days	15/12/2021	Employee.php Func_employee.php
Login Account	Employees need to log in using username and password to get access into the system	2 days	10/11/2021	Login.php Function.php Functionadmin.php
Patient Registration	In Patient page, employees insert new patients' information	2 days	11/11/2021	Patient.php Func_patient.php Patientadmin.php Admin_func_patient.php

	such as patient name, email address, home address, and phone number.			
Edit Patient	Employee can edit patient information by clicking the *Edit* button in action table and the information will be displayed directly into the form.	2 days	11/11/2021	Patient.php Func_patient.php Patientadmin.php Admin_func_patient.php
Delete Patient	Employees can delete the patient by clicking the *Delete* button in the action table.	2 days	11/11/2021	Patient.php Func_patient.php Patientadmin.php Admin_func_patient.php
Appointment Booking	In Book Appointment page, employees book appointments foe registered patients.	2 days	31/12/2021	Book_appointment.php Book_appointmentadmin.php Func_appointment.php Admin_func_appointment.php
Appointment Cancellation	In Dashboard page, employees can cancel the appointment by clicking the *Cancel Appointment* button in action table	2 days	31/12/2021	Dashboard.php Dashboardamin.php Func_appointment.php Admin_func_appointment.php
Appointment Details	By clicking Update Appointment button in dashboard, the system will redirect employee to	2 days	31/12/2021	Appointment_detail.php Appointment_detailadmin.php Func_appointment.php Admin_func_appointment.php

	Appointment Details page to update the Appointment details.			
Archive Documents	By clicking Documents in the menu button, the system will direct employee to Document page where employee can insert and view document as well as deleting it.	5 days	15/1/2022	Documentsadmin.php Documentsadmin.php
Generate Medical Certificate	For generate purpose only, employee fill in patient information to generate a medical certificate.	2 days	25/12/2021	Medcert.php Medcertadmin.php Mc_patient.php Mc_patientadmin.php Generate.php Generate_mc_patient.php Generate_mc_patient_admin.php
Pay Bills	After patient finish appointment, the appointment detail will be updated including the appointment fee here.	2 days	31/12/2021	Payment.php Paymentadmin.php Func_payment.php Admin_func_payment.php
Generate Invoice	In Archive Appointment, employee generate an invoice to be hand out to the patient as a proof.	3 days	1/1/2022	Invoice.php Invoiceadmin.php

10.3 Testing

System: Clinic Management System | Version: -

Modul/Unit: Employee Management | Revision: -

Created by: Nur Farisah Afiqah binti Hannes | Date: 17 January 2022

Table 8. Testing Employee Management

Testing Number	Action	Expected Result	Actual Result
E_1	Cursor moves to an empty input text box.	The warning message "Please fill out this field" popped out.	OK
E_2	Input in the email section does not include an '@' symbol.	The warning message "Please enter an email address." Popped out.	OK
E_3	Input in the phone number section have other characters other than numbers.	The warning message "Please enter a number." Popped out.	OK
E_4	The data is not fully filled in.	The warning message "Please fill out this field" popped out.	OK
E_5	All the information is correctly filled in based on their respective fields	Data will be inserted into the database and the system will display the employee details.	OK
E_6	Delete employee from record.	Window popup for confirmation	OK
E_7	Delete employee who have an appointment with a patient.	Could not delete the employee, redirected back to employee page.	OK
E_8	Did not put data in the profile form after changing it.	The warning message "Please fill out this field" popped out.	OK
E_8	All the information is correctly filled in based on their respective fields in profile page.	Data will be updated into the database and the system will display the employee details in profile page.	OK

System: Clinic Management System | Version: -

Modul/Unit: Login | Revision: -

Created by: Nur Farisah Afiqah binti Hannes | Date: 17 January 2022

Table 9. Testing Login

Testing Number	Action	Expected Result	Actual Result
L_1	Cursor moves to an empty input text box.	The warning message "Please fill out this field" popped out.	OK
L_2	The data is not fully filled in.	The warning message "Please fill out this field" popped out.	Forced to insert data.
L_3	All the information is correctly filled in based on their respective fields	System will determine whether the employee is a staff or an administrator.	OK
L_4	If employee position is other than an administrator.	Will directed to staff dashboard.	OK
L_5	If employee position is an administrator.	Will directed to administrator dashboard.	OK

System: Clinic Management System | Version: -

Modul/Unit: Patient Management | Revision: -

Created by: Nur Farisah Afiqah binti Hannes | Date: 17 January 2022

Table 10. Testing Patient Management

Testing Number	Action	Expected Result	Actual Result
P_1	Cursor moves to an empty input text box.	The warning message "Please fill out this field" popped out.	OK
P_2	Input in the email section does not include an '@' symbol.	The warning message "Please enter an email address." Popped out.	OK

P_3	Input in the phone number section have other characters other than numbers.	The warning message "Please enter a number." Popped out.	OK
P_4	The data is not fully filled in.	The warning message "Please fill out this field" popped out.	OK
P_5	All the information is correctly filled in based on their respective fields	Data will be inserted into the database and the system will display the patient details.	OK
P_6	Delete patient from record.	Window popup for confirmation	OK

System: Clinic Management System Version: -

Modul/Unit: Appointment Management Revision: -

Created by: Nur Farisah Afiqah binti Hannes Date:17 January 2022

Table 11. Testing Appointment Management

Testing Number	Action	Expected Result	Actual Result
A_1	Cursor moves to an empty input text box.	The warning message "Please fill out this field" popped out.	OK
A_2	The data is not fully filled in.	The warning message "Please fill out this field" popped out.	OK
A_3	All the information is correctly filled in based on their respective fields in book appointment page.	Data will be inserted into the database and the system will display the appointment details in dashboard.	OK
A_4	Cancel appointment in dashboard	Window popup for confirmation	OK
A_5	Putting end appointment time before start time	Could not update the data in the database and directed back to appointment detail page.	OK
A_6	All the information is correctly filled in based on their	Data will be inserted into the database and the system will	OK

	respective fields in appointment detail page.	display the appointment details in Pay Appointment Fee.	
A_7	All the information is correctly filled in based on their respective fields in payment page.	Data will be inserted into the database and the system will display the appointment details in Archive Appointment.	OK
A_8	Click *Generate Invoice* in Archive Appointment.	System generate invoice for patient.	OK
A_9	Click *Generate MC* in Archive Appointment.	Direct to a form to ask for number of days given for medical leave.	OK
A_10	The data is not a number.	The warning message "Please enter a number." popped out.	OK
A_11	The data is not fully filled in.	The warning message "Please enter a number." popped out.	OK

System: Clinic Management System Version: -

Modul/Unit: Archive Document Revision: -

Created by: Nur Farisah Afiqah binti Hannes Date:17 January 2022

Table 12. Testing Archive Document

Testing Number	Action	Expected Result	Actual Result
D_1	Cursor moves to an empty input text box.	The warning message "Please fill out this field" popped out.	OK
D_2	The data is not fully filled in.	The warning message "Please fill out this field" popped out.	OK
D_3	All the information is correctly filled in based on their respective fields in documents page.	Data will be inserted into the database and the system will display the	OK

		appointment details in dashboard.	
D_4	Delete document in document page.	Window popup for confirmation	OK

10.4 Testing Result

a) OK – 25 Test Case

b) WORKED BUT NOT PERFECT – 1 Test Case

CHAPTER VI

11 CONCLUSION

11.1 Summary

This project can really help the clinic to manage their medical records of appointments and patients in a much more reliable and less complex way. This is because this system is created to make work more organized. All employees can view the medical records and all the medical records is archived into the system making it more secure and less clutter of paperwork.

The challenge and constraints encountered while designing the system are that it must have excellent data integrity, allowing only authorised people to interact with specific data. Furthermore, the system contains employee data that must be accessible only by administrators; otherwise, a security and privacy breach will occur, necessitating the need for a secure login system.

11.2 Strength And Weakness of System

The strength part in this system is that it allows you to archive previous appointments instead of deleting it. That make it hard for medical staff to retrieve the records. The common system we have, the appointment will be generated into a report and hand it to the patient. This makes it harder as patients sometimes forget to bring their medical records when attending an appointment. Hence, this system allows employees to retrieve data of the patient without asking them to bring the record.

The other strength of this system is at its appointment records management. All the data that have been updated or paid are separated and not in one interface. This leads to a cease of confusion when employee is managing the appointment. another strength of it is the billing procedure. Employee do not have to use another system or program to handle the payment as it is already one with the system.

Likewise, this system has its own weaknesses. For example, the medicine inventory is partially not up to date with other system. And lastly, they system billing process can only be done manually and not through online banking or card payment.

11.3 Recommendation To Enhance the System

As mentioned in the weakness of the system, the system needs to add a far more complex medicine management like the amount of measurement in the inventory, a more detailed prescription, and a function where the amount of medicine is calculated every time a patient receives a certain amount of medicine.

For the billing process, the system should attach a card payment and an online banking payment so that the system has made variety ways to pay the appointment hence making the procedure smoother and more compatible.

11.4 Conclusion

Overall, I conclude that this system is good but not perfect. This system can go much further and can have more complex functions to corporate with the medical department and contribute to the clinic. The system needs improvements in the term of its security, billing process and medicine inventory.

However, the system can perform properly and is very user-friendly. It is very reliable as it can store appointment data efficiently and could archive records to keep all the documents, reports, and records in a good shape.

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