FACULTY OF COMPUTING
UTM Johor Bahru

SECD 2523 –DATABASE

PHASE 1: PROJECT PROPOSAL & DATABASE REQUIREMENTS

CareConnect System

SECTION: 08-SECJH

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1.0 Introduction

In today's dynamic and changing environment, hospital and clinic administration is an important component of healthcare delivery. In this context, hospital and clinic management systems have emerged as vital tools for healthcare organisations seeking to successfully streamline operations, optimise patient care, and assure the smooth operation of their facilities. In this project, our team must identify one system as a case study based on the requirements of the stakeholders which must be related to the Hospital or Clinic Management System. Therefore, our team has chosen PKU (PUSAT KESIHATAN UNIVERSITY) UTM as our stakeholders in this project.

The manual operational processes had brought a lot of problems or challenges for patients and staff which were manual waiting number entry, difficulty checking body checkup status and did not provide cashless payment option for patients. Therefore, our group is developing a CareConnect system which can solve these challenges faced by PKU now. The system provides a user-friendly interface and it includes an automated patient registration system, easily checking the online test status of patients and a cashless payment system.

For the successful execution of this project, we adopt the System Analysis and Design Methodology (SADM) as our guiding framework. The methodology used in this project must be based on the SADM methodology that are life cycle, method, tool and technique. In this project, Our group will put all effort into filling the requirements of stakeholders and also will give an efficient solution for the clinic management system at PKU.

2.0 Background Study

The PKU (PUSAT KESIHATAN UNIVERSITY) at UTM is facing some operational problems. Firstly, PKU only provides manual registration for patients. Patients need to enter their names at various counters by themselves before they can proceed to see the doctor. This is very inconvenient for the patient because of the manual registration, which adds to the staff's workload.

Another problem with PKU is the online test status system. This system can let the patient check their status, whether it is in process or complete. However, this system is rarely used by patients because they cannot navigate the website. They need to wait for the system to automatically cycle through the pages, which start from the initial page until they locate their name. If the patients miss their names on the page, they must begin the waiting process once more from the beginning of the website.

Last but not least, PKU did not provide a cashless payment system. Nowadays, people rely on gadgets such as smartphones and smartwatches for their daily activities. Therefore, they will habitually carry their phones everywhere and every time. They will also just bring their phones when going out because all the shops provide cashless payment. They can just pay using the Touch n Go e-wallet when buying something. Hence, patients, especially the younger generation, find it difficult to pay the fee when they are doing some treatment that they have to pay. This is very inconvenient for them when visiting PKU to see a doctor.

3.0 Problem Statement

1. Manual waiting number entry.

Upon conducting observations with our team members, we identified a problem that is faced by patients, which is they have to inform the staff inside that they are ready for inquiries. They need to manually key their waiting number into the system after registering at the counter. Since the patients at PKU are not only students, this process might be difficult, especially for elderly people who might not be as comfortable or familiar with computers as the younger generations. This will make this system less user-friendly for them. In order to improve the patient's overall experience and handle this issue, we should look into other ways of updating staff about the status of waiting lists of patients.

2. Difficulty in checking body checkup status.

At the beginning of each semester, it is a standard process for all new students to undergo a comprehensive body checkup at PKU. Students must wait patiently for their body checkup results after submitting their samples at the urine test results waiting station. However, the PKU are provided with the QR code for scanning to the website. The students still find it challenging to use the website because they have to wait for the system to cycle through the pages automatically, starting from the first page, until they find their name. Students must start the waiting process from the beginning of the website if they miss their name on the page. Besides, the website can not display the whole data on a page. Some of the data will be cut off. Consequently, reevaluating the layout and functionality of the website is important for resolving this problem and enhancing the overall experience for our students.

3. Lack of cashless payment option.

Cashless payments have become the standard method of financial transactions today, especially for younger people. PKU has not yet provided this practical payment option. Even though there are still cash payment options, and some treatments are still free, students may find it inconvenient when no cashless payment options are available, especially during emergencies or when they are sick. In such situations, they might accidentally forget their wallets, making the payment process even more difficult. Moreover, considering that certain procedures, such as x-rays, which are chargeable, students may find themselves in difficulties where they are unwilling to pay for the necessary healthcare services.

4.0 Proposed Solutions (include feasibility study)

1. Automated Patient Registration

Our proposal centres on creating a specialized website named CareConnect to streamline the patient registration process at PKU. Upon arrival, patients will receive a unique QR code, allowing them seamless access to the patient registration website. The website offers three options: new patients (visitors outside UTM) will be redirected to complete an information form before registering. Current students can conveniently enter their matric number, while UTM staff can use their staff ID for registration. The system further prompts users to choose between medical treatment or a body checkup. If the patient choose medical treament option, the system lists diseases for medical treatment and suggests the corresponding department. Patients then receive a waiting number and room assignment, accessible in the doctors' computer system.

Additionally, for the patient who undergoes a medical checkup, the system allows them to check the status of the test results. If the status of the result is completed, the system will prompt them to proceed to the following department, such as x-ray or blood tests. This comprehensive system enhances the healthcare experience at PKU by facilitating a smoother registration process and providing valuable information and guidance to patients.

Automated Patient Registration Feasibility Study:

The proposed solution for an automated patient registration system, personalised department suggestions, and digital displays in the waiting area demonstrates strong feasibility across multiple dimensions.

Technical Feasibility:

In terms of technical feasibility, the proposed automated patient registration system demonstrates strong viability. Developing a dedicated website with QR code integration, user-friendly interfaces, and decision-support features aligns well with modern web development technologies. Overcoming challenges related to the integration of a decision-support system is deemed feasible. Similarly, implementing features like result tracking for medical checkups and prompt notifications for the following department

showcases a technically robust solution. The system is expected to be smoother by integrating these features and utilising readily accessible digital technologies.

Economic Feasibility:

Economically, the initial investments required for software development, hardware implementation, and digital platform creation are justifiable. The initial investment is high but it is worthy as it brings long-term benefits, including enhanced efficiency, reduced administrative workload and heightened patient satisfaction, which contribute to the economic feasibility of the proposal.

Operational Feasibility:

The automated patient registration system is favourable in the aspect of operational feasibility. The system design is user-friendly for both patients and staff because it provides a straightforward registration process and clear instructions. The predicted operational expenditures are moderate and manageable, and integrating digital displays in the waiting area aligns seamlessly with current front desk operations. Hence, the staff can update and provide information efficiently, which contributes to overall operational efficiency.

In conclusion, the automated registration system is technically, economically, and operationally feasible. It offers a comprehensive solution to improve the patient experience and enhance the overall efficiency of the healthcare system at PKU.

2. Cashless Payment System

The cashless payment system proposed for PKU includes a user-friendly feature where patients, upon completing their medical consultation, can conveniently view and settle their payments. The system provides two payment options either cash or cashless. Patients opting for cash payment can proceed to the designated counter for payment processing. On the other hand, those choosing the cashless option can use popular digital payment methods such as TnG e-wallets or Boost, ensuring a seamless and convenient transaction experience. A receipt will be generated automatically after a successful transaction. The system payment system is a dual payment system that provides patients with flexible and efficient payment choices within the healthcare services at PKU.

Cashless Payment System Feasibility Study

Technical Feasibility:

Nowadays, digital payment platforms like e-wallets and Boost have become popular which are highly supported and can be easily implemented without any complications. By leveraging existing payment gateways and technologies, the proposed cashless payment system is technically feasible. Hence the system is supported with this modern payment technologies which can guarantee a strong and secure transaction process.The technical infrastructure required for this implementation is readily available, making it a viable solution from a technical perspective.

Economic Feasibility:

The potential benefits and long-term savings outweigh the initial setup costs from a monetary viewpoint. The cost associated with implementing the cashless payment system can be offset by increased patient convenience and the anticipated reduction in administrative overhead.

Operational Feasibility:

Operational feasibility is crucial for the success of the cashless payment system. The usability and safety of the proposed cashless payment system are of utmost importance. A robust training programme will be implemented for both staff and patients to ensure operational feasibility. Instructions will be straightforward and easy to follow to improve the adoption and user satisfaction. The system can be easily implemented into present workflows because its operation is consistent with PKU's current healthcare service processes.

In conclusion, the proposed cashless payment System demonstrates technical, economic, and operational feasibility. Its integration aligns with modern payment trends, offering a secure and convenient payment experience for patients while potentially reducing administrative burdens and enhancing financial efficiency within the healthcare services at PKU.

5.0 Objectives of the project

1. To provide a user-friendly hospital management system
2. To provide a better patient experience
3. To increase the stability of the hospital management system
4. To simplify the workflow of the staff
5. To provide better coordination among the different departments in the hospital.
6. To reduce the operating cost.

6.0 Scope

Our team is trying to develop a website named CareConnect System that will include improving procedures, enhancing staff collaboration, and optimising patient experiences across PKU exhaustively. The objectives are to lower operating expenses and guarantee a more effective and convenient healthcare system at PKU.

For patient:

The automatic registration process eliminates the need for users to enter the waiting number into the system by hand. This is especially helpful for people who are elderly and may not be comfortable using computers. The system will also facilitate cashless payments, which would enhance the efficiency of healthcare operations at PKU. A new website has been created so that students can view the results of their urine tests. To find out how long the test will take, they can either type in their name or manually select the page number.

For staff:

The system is to help the job of the employees easier. This included an automatic patient registered system that can reduce the administrative work of the staff so that they can focus more on patient care. In addition, the staff will have better experiences when using the system that allows staff to access and use the system during offline periods or when the internet connection is unstable.

6.1 System Boundaries

The scope of this project includes many critical aspects of the CareConnect System's development. The automated patient registration system will completely change the way patients are registered at UTM, benefiting not just new patients but also present students and faculty. User-friendly interfaces and real-time information for patients are two aspects of the online test status system that fall under this remit. Cashless payment systems, such the Touch 'n Go e-wallet or Boost, can also be integrated to facilitate smooth financial transactions for patients.

However, there are some things that can't be included in the project. Not included are major renovations to PKU's buildings, alterations to the current IT infrastructure, or the addition of specialised medical equipment. This tailored strategy facilitates the installation of impactful upgrades without disturbing the broader operational structure of PKU.

6.2 Database Application Boundaries

The CareConnect System's database application is critical to the system's operation. It will be much simpler to handle and keep patient data securely if a database dedicated to tracking the status of tests in progress and those that have been finished is also implemented. A transaction records database, used for securely recording and managing financial transactions, will be required for the integration of a cashless payment system.

Nevertheless, it should be noted that the project's scope does not encompass the archival of extensive volumes of historical data that exceed the requirements for operating functions. For best system efficiency, recent and real-time data are prioritised. Due to the project's emphasis on administrative and operational considerations, the database application will not support maintaining in-depth medical records.

6.3 Major User Views

The automated patient registration system features separate but equally important user interfaces for the general public, current students, and UTM employees. Each point of view provides a quick and easy registration process to accommodate PKU's numerous users. The outsider patient will require to fill in the information form in the registration system while the students and staff can enter the matric number and staff IDs for registration. The system further allow patients to choose between medical treatment or a body checkup. If the patient select medical treament, the system lists diseases for medical treatment and suggests the corresponding department. Patients then receive a waiting number and room assignment. for the patient who undergoes a medical checkup, the system allows them to check the status of the test results.

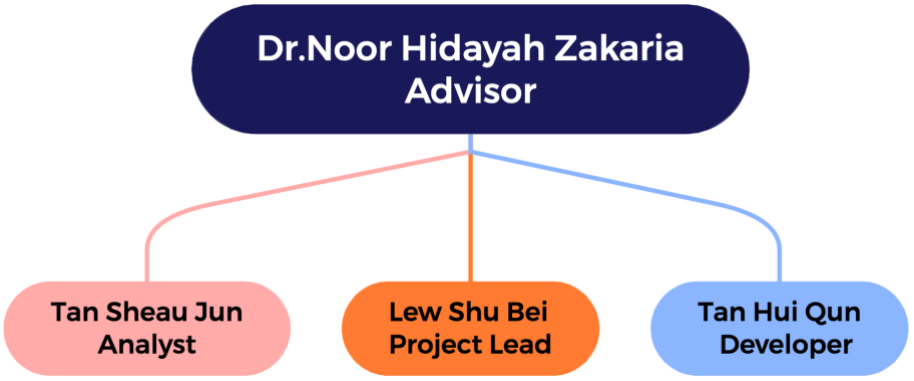
Primary user views for the online test status system encompass a comprehensive test status overview, offering a consolidated display of ongoing and completed tests. The user interface makes the system more intuitive for patients to use by getting rid of the barriers that were previously in place.

In the cashless payment system integration, designated user views allow patients to view and settle their payments effortlessly. Users will have additional options when making digital transactions with multiple cashless payment system perspectives.

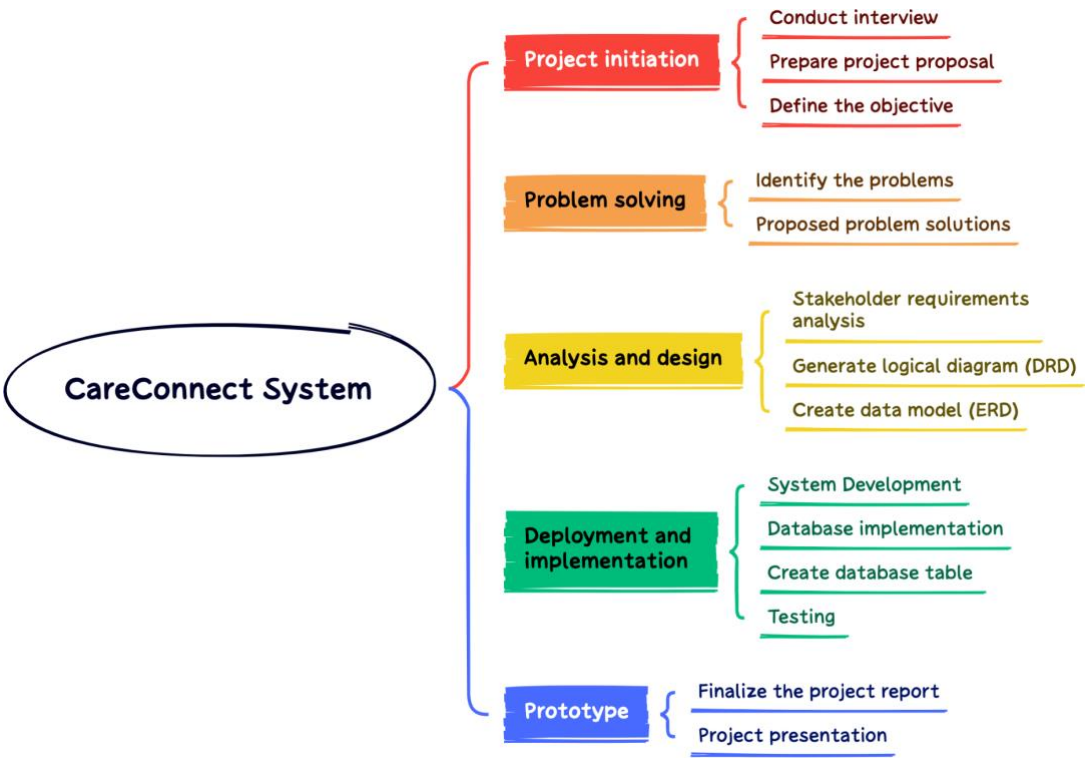
Together, these considerations inform an approach to designing PKU's CareConnect System that places the demands of the system's various end users front and centre.

7.0 Project Planning

7.1 Human Resource

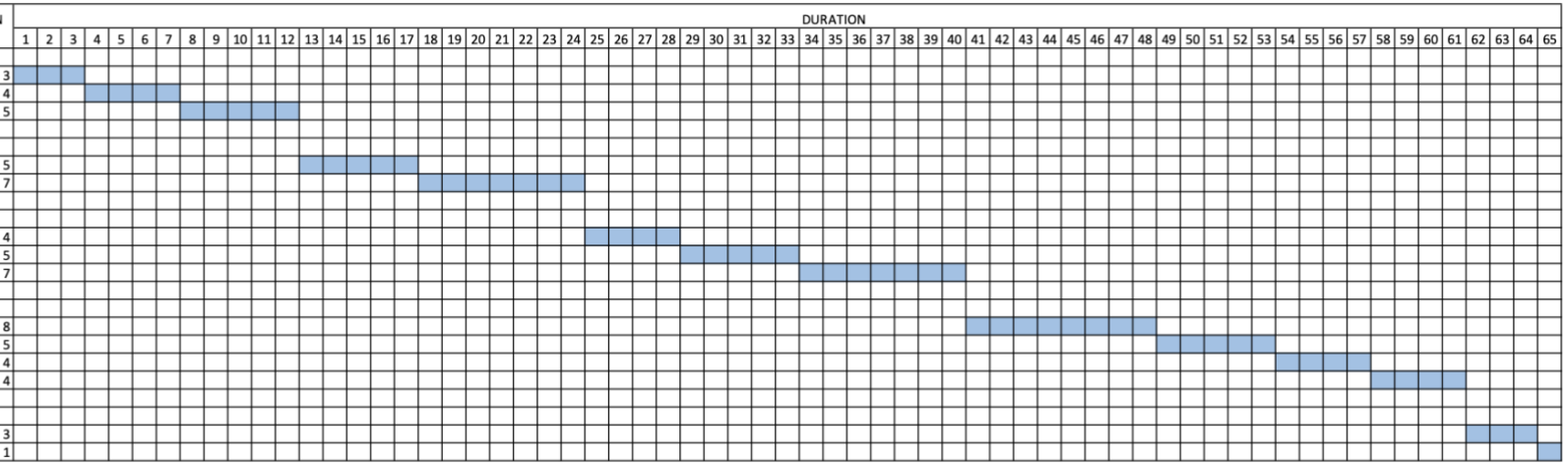


7.2 Work Breakdown Structure (WBS)



7.3 Gantt chart

TASK	START	END	DURATION
Project initiation			
Conduct Interview	20/10/2023	22/11/2023	3
Define the objectives	23/10/2023	27/10/2023	4
Prepare project proposal	28/10/2023	01/11/2023	5
Problem solving			
Identify the problems	02/11/2023	06/11/2023	5
Proposed problem solutions	07/11/2023	13/11/2023	7
Analysis and design			
Skateholder requiements analysis	14/11/2023	17/11/2023	4
Generate logical diagram (DRD)	18/11/2023	22/11/2023	5
Create data model (ERD)	23/11/2023	29/11/2023	7
Development and implementation			
System development	30/11/2023	07/12/2023	8
Database implementation	08/12/2023	12/12/2023	5
Create database table	13/12/2023	16/12/2023	4
Testing	17/12/2023	20/12/2023	4
Prototype			
Finalize the project report	21/12/2023	23/12/2023	3
Project presentation	24/12/2023	24/12/2023	1



8.0 Requirement Analysis (based on AS-IS analysis)

8.1 Current business process (scenarios, workflow)

8.1.1 Current Database Overview

PKU's current database system stores critical information necessary for healthcare operations. Patient data, including personal details, medical history, and appointment records, is stored in a structured manner. Staff can track the health status of patients by accessing the database. The repository also encompasses data pertaining to tests that have been completed and are ongoing. Financial transactions pertaining to patient payments are also recorded by the current system.

8.1.1.1 Current Data and Usage

1. Patient Information

• Stored data: Name, contact details, medical history, appointment records.

• Usage: Facilitates appointment scheduling, treatment history tracking, and patient communication.

2. Test Status Information

• Stored data: Test types, ongoing or completed status, relevant timestamps.

• Usage: Aids staff monitors patient tests and facilitates communication regarding their test status.

3. Financial Transaction Information

• Stored data: Transaction details and cashless payment methods and receipts.

• Usage: Records financial interactions, contributes to financial reporting and ensures transparency in billing.

8.1.1.2 Current Database Features

1. Performance Requirements

• The current system ensures timely retrieval and storage of patient data.

• Only cash payment method available

2. Security Levels

• Access controls restrict unauthorized access to sensitive patient information.

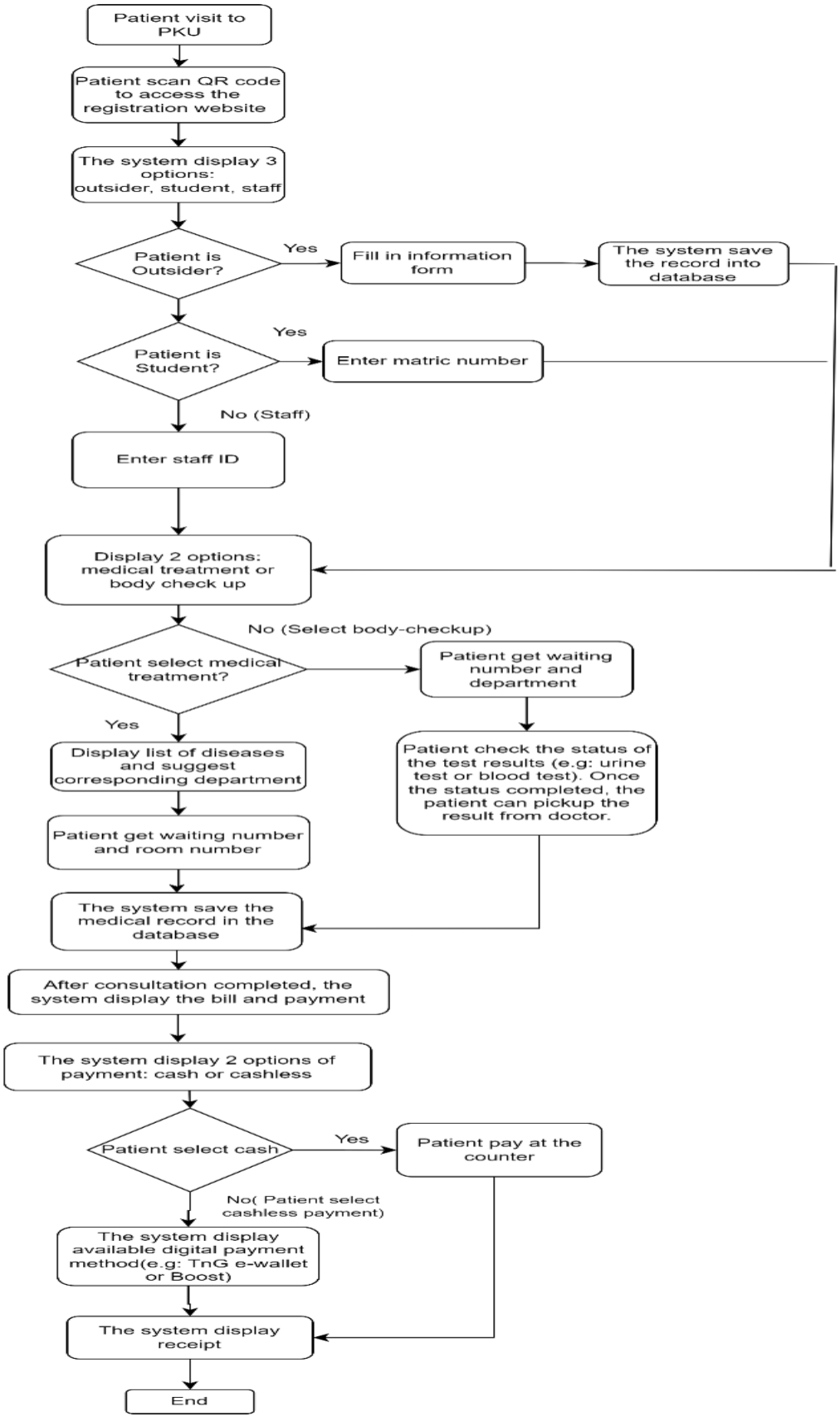
• Data encryption is employed to safeguard patient privacy and financial transactions.

8.1.1.3 Current Database User Views Management

User views in the current system are managed through role-based access controls. Staff members are assigned roles based on their responsibilities and determining their access level within the system. For example, medical staff may have access to patient medical histories, while administrative staff may have access to appointment scheduling and financial transactions. This approach ensures that each user group interacts with the database based on their specific needs and responsibilities.

8.1.2 Proposed System Enhancement

8.1.2.1 Proposed System Workflow



8.1.2.2 Proposed Business Rules

In alignment with the System Analysis and Design (SAD) methodology, proposed business rules are derived from critical business processes. For instance:

• **Appointment Scheduling Rule:** Appointments can only be scheduled during operating hours.

• **Test Status Update Rule:** Only authorized staff can update the test status of a patient.

8.1.3 Data Requirements

8.1.3.1 Patient Information

• **New Data Requirements**: Emergency contact details and insurance information.

• **Modified Data Requirements:** Expanded space for medical history to accommodate additional details.

8.1.3.2 Test Status Information

• **New Data Requirements:** Test duration, additional test types(urine test and blood test).

• **Modified Data Requirements:** Improved timestamps for real-time tracking.

8.1.3.3 Financial Transaction Information

• **New Data Requirements:** Cashless transaction confirmation details, and cashless payment record.

• **Modified Data Requirements:** Enhanced recording for cashless payment method to improve financial transparency.

9.0 Transaction requirement (data entry, data update/ delete, data queries)

9.1 Data Entry

9.1.1 Data Entry for Patient Information

• Outsider patients: Enter new patient details including the name, contact details during registration.

• UTM students: Enter matrix numbers.

• UTM staff: Enter staff IDs during registration.

• PKU's doctor : Enter medical information of the patient including

9.1.2 Data Entry for Test Status Information

• The authorised staff can enter details of physical examination tests, such as the test duration and the status of urine tests and blood tests.

9.1.3 Data Entry for Financial Transaction Information

• The system will automatically generate bill, payment data, and receipt so that the treasurer no need to key in the transaction record manually. The system allows the PKU's treasurer to make corrections or reversals of financial transactions to rectify errors promptly.

9.2 Data Update/Delete

9.2.1 Data Update/Delete for Patient Information

• Authorised staff can delete or update patient information details in case of changes.

9.2.2 Data Update/Delete for Test Status Information

• Authorised staff can update ongoing test details, including the duration of the test and the status of the urine test and blood test result.

9.2.3 Data Update/Delete for Financial Transaction Information

• The treasurer can update or delete the transactions data, such as the payment method, to rectify errors promptly.

9.3 Data Queries

- Identify details of users
- List details of treatments
- Identify the registration number
- Identify medical history
- List medical history
- Identify the online tracking status
- Identify payment status
- List of the disease and suggest the corresponding department

10.0 Benefit and Summary of Proposed System

The benefit that can be provided by the CareConnect system is an automated patient registration that will reduce the time of the registration process at PKU.Since the system has a clear and user-friendly interface and attentive guidance, the patients can get to their desired treatment or health checkup location easily and quickly.For example, the patients who want to have body checkup can check their status of the result just scanning the QR code that is directly link to the CareConnect system.In additions, the system will inform the patients once their test result is completed so that the patients can collect the result on time.

Given that PKU still does not provide a cashless payment method for patients,the CareConnect system has included this platform for patients to do their financial transactions.This payment method may improve the efficiency of the transaction process that will also provide the digital receipt for patients.As a result, the cashless payment method that included in the CareConnect system will increase the accuracy of financial report at PKU as patient no need to queue at the counter waiting to do their payment and can reduce the risk of errors instead of manually recording the transaction

11.0 Summary

In conclusion, the hospital management system project for PKU (Pusat Kesihatan Universiti) aims to create a CareConnect System that is transforming and modernising healthcare operations which can be easily accessed and conveniently used by the patient and staff throughout the healthcare experience.

This system is fully automatic compared to the system that is used by PKU now. This automatic system includes a registration process and streamlining the administrative procedure. Moreover, patients can pay using cashless payment in this system. This can enhance financial transactions within the healthcare setting. Next, this system has a more direct and more user-friendly interface. This lets patients have online access to check their test status and understanding of their healthcare status.

Besides, for the staff at PKU they can reduce their paperwork when this system is implemented. They can also reduce the burden associated with patient management. The most important thing is that the staff can spend more time delivering patient care of good quality.

The most important thing for this PKU system is to be more convenient, efficient, and cost-effective. If this system is successfully applied and used in the PKU system, our group believes that patients and staff will have a better experience with the hospital system.

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