UTM

UNIVERSITI TEKNOLOGI MALAYSIA

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Phase 1: Project Proposal

E-Clinic System

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Section 08

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Table Of Content

Introduction

Technology in the 21st century progresses very rapidly. Almost every few years a new invention is introduced. This is the same for hospital and other medical institution environments. With databases, it is far easier to maintain the administration of an institution, data can be stored in a central database server. In the context of this proposal, to streamline the administration process of the PKU (Pusat Kesihatan Universiti) of UTM.

As of now, PKU is using a manual operating process. This means that appointments are made on the spot with the patient having to go to the PKU building and wait for their registration which can prove difficult during busy hours as patients have to wait in a queue before they can make their appointment.

In the case of common consultation, patients need to have the aforementioned appointment schedule before having a consultation with the doctors. This also means that in the case where patients are unable to go to the PKU, they can't ask the doctors on what medications they can take or know if their ailments are just mild symptoms or a part of a more severe illness.

For that, we are proposing a system we call the E-Clinic System to help with both the appointment and consultation issue for patients such as online booking and online consultation. We believe that by using this system it can help PKU serve their patients better and make the operational cost cheaper.

Background Study

Pusat Kesihatan Universiti (PKU) is an university health center that provides primary health services to university students and staff. It is a facility that offers medical services, health education, and counseling services to promote the health and well-being of the university community.

The current PKU system still uses a system that relies on physical appointment, which requires the patient to do the registration by going to the receptionist to get the queue number. The problem with this method of appointment registration is that it could lead to a long queue. In addition, after doing the registration we are required to input the queue number into the computer in front of the doctor's office which makes the system unreliable.

Another thing that can be pointed out is that the consultation with the doctor is still offline, which is a problem for some patients who had a hard time going to the PKU because they have no vehicle or have a sickness which makes them unable to go. If there is a way to make the consultation online it could also help with queue reduction.

Problem Statement

1. **Manual Appointment Scheduling**
   The current process for making an appointment in the PKU is done through a physical registering process. A patient must come to the PKU and request the receptionist to schedule an appointment. The receptionist will then manually check to see if the doctor is available. This process makes it difficult for patients to schedule an appointment, especially for students who might have other activities scheduled at the same time as the appointment beforehand. This problem also applied to other patients such as lecturers who might have a meeting or have to prepare lecture materials at the same time.

2. **Physical Consultation Process**
   As of now the process of consultation with doctors in PKU is done through physical interaction. Patients, as with the first problem mentioned above, must come to the PKU and wait through the queue before having a consultation. This process makes it difficult for patients, especially students who have no vehicle and live outside of the UTM area, to have a consultation.

Proposed Solution

1. **Automated Appointment System**
   This proposal is centered around the creation of an automated system, the E-Clinic, to streamline the process of appointment at the PKU. Our proposed system will be integrated into the UTMsmart application. Users can use the application to register themselves by pressing the E-Clinic Extension in the UTMsmart application and selecting the available appointment time, the system will give the user a confirmation code. On arrival on the PKU, the user will have to scan a QR code in which they can input their confirmation code.

2. **Online Consultation**
   This solution is focused around an optional feature of the new system for the PKU. The online consultation gives users options to conduct consultation without going to the PKU itself. The user needs to apply for an appointment using the UTMsmart application then the user can choose between having a physical consultation or online consultation. For the purpose of this solution, the PKU will be notified on the online consultation the user chooses. The PKU will give a video-conference link for the user to join during their appointment time via email.

   Technical Feasibility
   The Automated appointment system and the Online Consultation will use a familiar technology that is easily understood by the users. The user only needs the UTMsmart app and internet connection in order to use the system. Integration is also a part that

we deem feasible for this system as the system only needs to be integrated into UTMsmart and a dedicated database server.

Operational Feasibility

Operational feasibility is our main concern in this system and from our initial analysis and discussion, the operational feasibility of the E-Clinic system can be easily operated on a regular basis. The integration to the UTMsmart application, which are commonly used by students and staff, provides easy implementation to PKU daily workflow ensuring that the regular operation is unhinged by time-consuming training process for both patients and PKU staff.

Objective

1. To provide more accessible and less time-consuming registration/appointment process
2. To increase overall user satisfaction of PKU services
3. To provide a remote consultation process to ensure easier healthcare access for patients.

Scope

Project Scope

The scope of this project is to create and integrate a system that will streamline the daily operations of the Pusat Kesihatan Universiti (PKU) that are mainly focused on the two main services in the PKU that patients use, namely Registration/Appointment and Doctor Consultation. The system can also be used to organize patients' data into a more accessible form for PKU staff. Overall, the system will reduce the operational cost of PKU and with digitalized registration and appointment, it will make daily operation faster.

System Boundaries

The E-Clinic system, as explained in the Scope section, revolves around UTM community overall accessibility to the PKU. The system will ensure that data about patients are easy to access by the staff. While the integration of the system is the main focus, it has some limitations that the integration process will not touch upon such as changes in the digital infrastructure of PKU, changes in equipment used in the PKU, and other major changes that may change the daily operations in PKU. This system integration is mainly concerned with streamlining the two main services without interfering in other PKU services

Project Planning

Human Resource

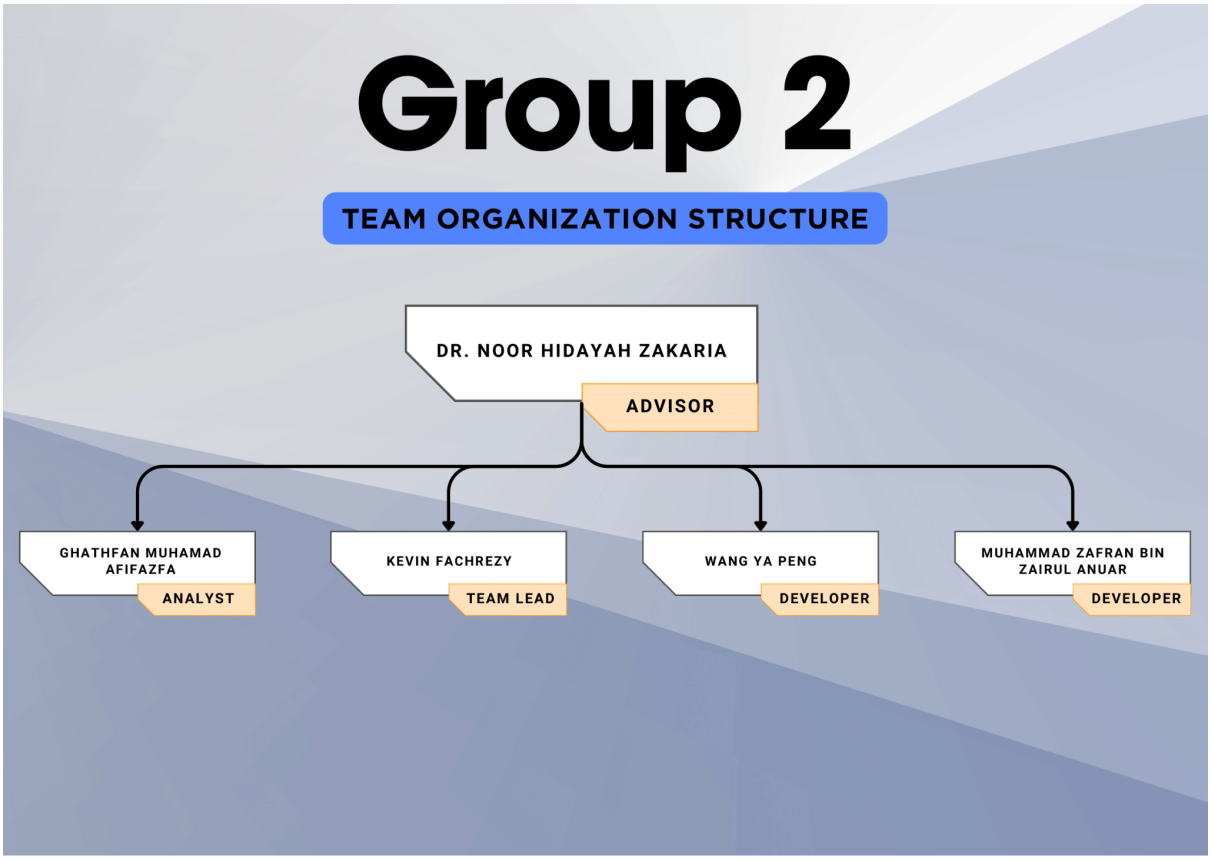

Figure 1: Team Organization Structure

(Team Structure G2.png

Work Breakdown Structure

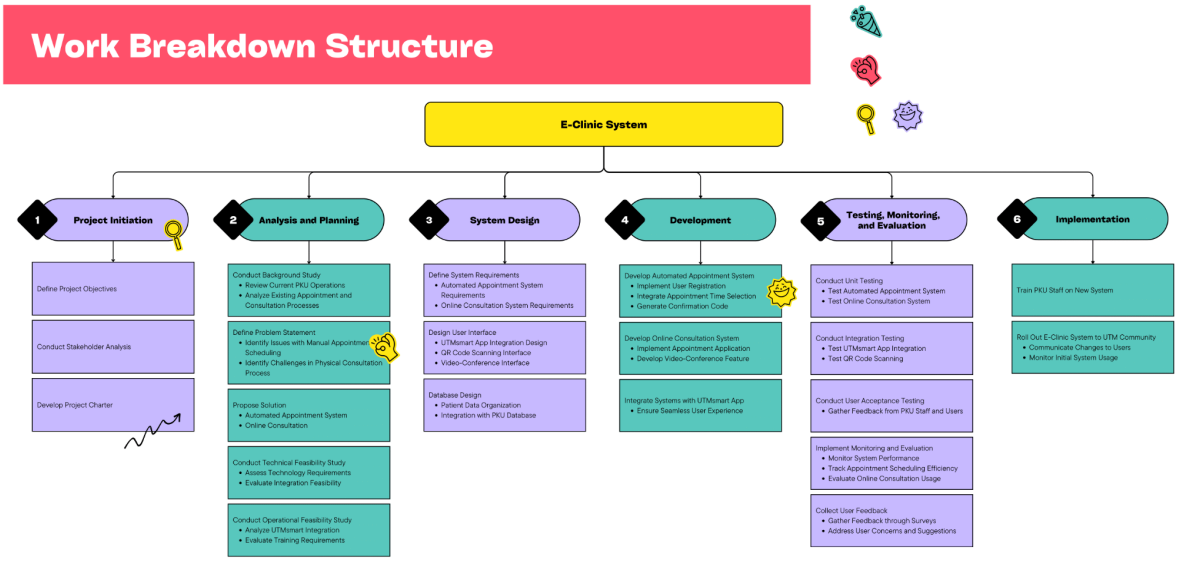

Figure 2: Work Breakdown Structure
(Work Breakdown Structure DB G2.png)

Project Gantt Chart

	Task Name	Duration	Start	ETA
1	Project Initiation	10 days	01/11/2023	10/11/2023
	Define Project Objectives	2 days	01/11/2023	02/11/2023
	Conduct Stakeholder Analysis	3 days	03/11/2023	05/11/2023
	Develop Project Charter	5 days	06/11/2023	10/11/2023
2	Analysis and Planning	25 days	11/11/2023	04/12/2023
	Conduct Background Study	7 days	11/11/2023	17/11/2023
	Define Problem Statement	6 days	18/11/2023	23/11/2023
	Propose Solution	4 days	24/11/2023	27/11/2023
	Conduct Feasibility Studies	5 days	28/11/2023	01/12/2023
	Develop Testing and Monitoring Plan	3 days	02/12/2023	04/12/2023
3	System Design	15 days	05/12/2023	09/12/2023
	Define System Requirement	5 days	05/12/2023	09/12/2023
	Design User Interface	7 days	10/12/2023	16/12/2023
	Database Design	3 days	17/12/2023	19/12/2023
4	Development	30 day	20/12/2023	25/01/2023
	Develop Automated Appointment System	12 days	20/12/2023	03/01/2023
	Develop Online Consultation System	10 days	04/01/2023	15/01/2023
	Integrate Systems with UTMsmart App	8 days	16/01/2023	25/01/2023
5	Testing, Monitoring, and Evaluation	25 days	26/01/2023	21/02/2023
	Conduct Unit Testing	7 days	26/01/2023	01/02/2023
	Conduct Integration Testing	5 days	02/02/2023	06/02/2023
	Conduct User Acceptance Testing	8 days	07/02/2023	16/02/2023
	Implement Monitoring and Evaluation	5 days	17/02/2023	21/02/2023
6	Implementation	15 days	22/02/2023	08/03/2023
	Train PKU Staff on New System	7 days	22/02/2023	28/02/2023
	Roll Out E-Clinic System to UTM Community	8 days	29/02/2023	08/03/2023

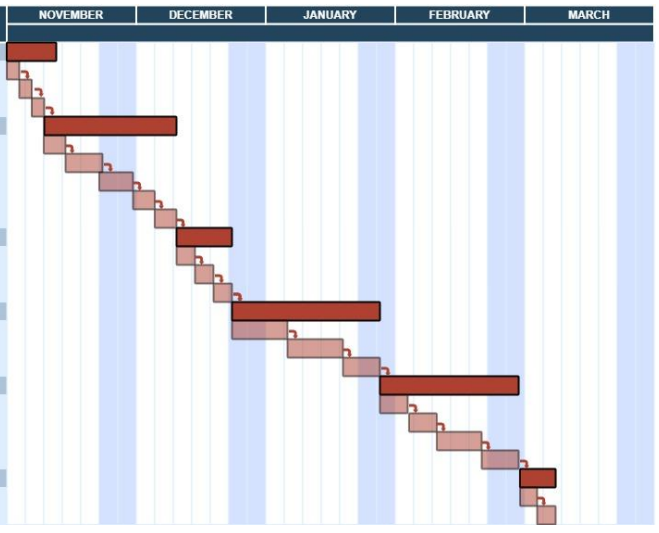

Figure 3: Gantt Chart
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Requirement Analysis

Current Business Process (Scenarios, Workflow)

Current Database Overview

The existing database system at PKU holds vital information crucial for healthcare operations. Patient data, encompassing personal details, medical history, and appointment records, is systematically stored. This structured repository allows staff to monitor the health status of patients by accessing the database. Additionally, the database includes information on completed and ongoing tests. Financial transactions related to patient payments are also meticulously recorded within the current system.

Current Data and Usage

1. Patient Information
   - Stored Data: Name, contact details, medical history, appointment records.
   - Usage: Enables appointment scheduling, tracks treatment history, and facilitates patient communication.

2. Test Status Information
   - Stored Data: Test types, ongoing or completed status, relevant timestamps.
   - Usage: Assists staff in monitoring patient tests and communicating their status.

3. Financial Transaction Information
   - Stored Data: Transaction details, cashless payment methods, and receipts.
   - Usage: Records financial interactions, contributes to financial reporting, and ensures billing transparency.

Current Database Features

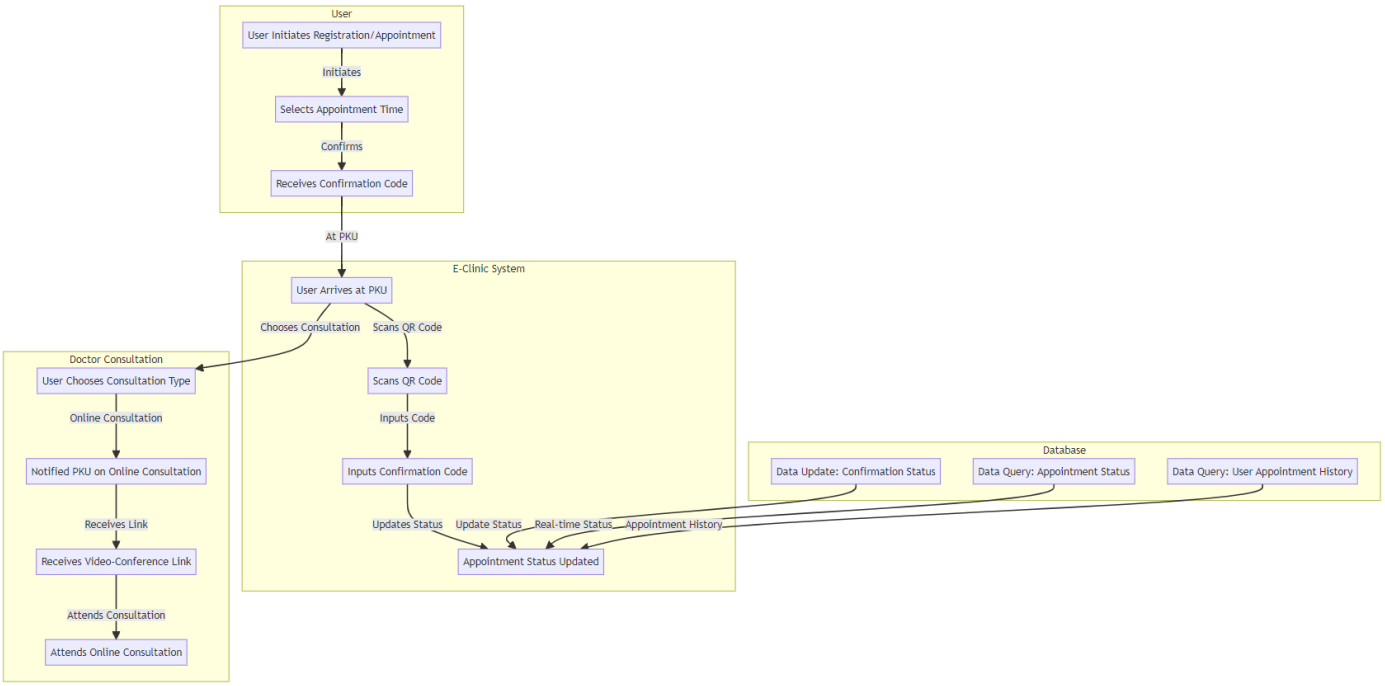
1. Performance Requirements
   - The current system ensures timely retrieval and storage of patient data.
   - Only a cash payment method is available.

2. Security Levels
   - Access controls limit unauthorized access to sensitive patient information.
   - Data encryption safeguards patient privacy and financial transactions.

Management of Current Database User Views

User views in the existing system are regulated through role-based access controls. Staff members are assigned roles based on their responsibilities, determining their access level. For instance, medical staff may access patient medical histories, while administrative staff may

handle appointment scheduling and financial transactions. This approach ensures tailored interaction with the database according to user needs and responsibilities.



Transaction Requirement

1. **Data entry**

Secure Appointment Application: Implement confidentiality for users to apply for appointments through the UTMsmart application, ensuring the confidentiality of their personal information.

Real-time Information Input Validation: Implement real-time information input checks to ensure that users provide accurate and effective information during the appointment scheduling process and facilitate users to confirm whether their input is correct. Reduced the risk of incorrect data input.

2. **Data update/delete**

Update Status: Enable the system to update the confirmation status of appointments upon user arrival. This involves updating the status from "scheduled" to "confirmed" after successful verification at the PKU staff through QR code scanning.

Delete Appointments: Users can cancel or reschedule appointments through the UTMsmart application.And update the status in real-time, and notify PKU staff of any changes.

3. **Data queries**

Real-time Query: Allow PKU staff to query the real-time status of appointments, checking for scheduled, confirmed, or canceled appointments. This ensures efficient management of patient flow.

User Appointment History: Provide users with the ability to query their appointment history through the UTMsmart application, displaying past and upcoming appointments.

Optimizing queries: Optimizing database queries by creating indexes, using query optimization techniques, and caching mechanisms to improve query efficiency.

Benefit and Summary of Proposed System

The proposed E-clinic System is intended to improve and enhance the operations of Pusat Kesihatan Universiti at UTM. Through the implementation of an automated system that integrates with UTMsmart applications and offering online consultation options, the proposed system solves the issues with manual appointment scheduling and physical consultation. By utilizing well-known technology, the system ensures user-friendliness for PKU personnel as well as patients.

The anticipated benefits include improved accessibility, reduced queue times, enhanced user satisfaction, cost-efficient operations, and the flexibility of online consultations. The integration with UTMsmart establishes a seamless user experience within the UTM community. The system also helps to improve data management by guaranteeing patient information security and accessibility. More details of the benefit that could be seen as below:

1. **Improved Accessibility**
    - Patients can schedule appointments and consult with doctors remotely, reducing the need for physical presence at the PKU.
2. **Efficient Appointment Scheduling**
    - Automation of the appointment system reduces manual processes, streamlining the scheduling process for both patients and staff.
3. **Reduced Queue and Wait Times**
    - Online appointment scheduling and optional online consultation contribute to a significant reduction in queues, minimizing wait times for patients.
4. **Enhanced User Satisfaction**
    - The system's user-friendly interface and the flexibility of online consultations contribute to an overall improved experience for patients, resulting in higher satisfaction levels.
5. **Cost-Efficient Operations**

    - Automation and digitalization reduce operational costs associated with manual processes, paperwork, and resource-intensive appointment scheduling.
6. **Integration with UTMsmart**
    - Seamless integration with the UTMsmart application ensures familiarity for users, enhancing the adoption and usability of the system within the UTM community.
7. **Access to Historical Patient Data**
    - The system organizes patient data in a structured manner, providing quick and easy access for PKU staff to historical information, facilitating better-informed decisions.
8. **Time Savings for Patients and Staff**
    - The automated appointment system and online consultation options save time for both patients and PKU staff, contributing to increased efficiency in daily operations.
9. **Flexible Consultation Options**
    - The introduction of online consultations provides flexibility for patients who may face challenges attending physical appointments, thereby expanding access to healthcare services.
10. **Enhanced Data Security**
    - The centralized database ensures secure storage of patient information, with access restricted to authorized personnel, maintaining the confidentiality and integrity of medical records.

Summary

The rapid progression of technology in the 21st century has impacted various sectors, including the healthcare environment. The Pusat Kesihatan Universiti (PKU) of UTM currently operates with a manual process for appointment scheduling and consultations, leading to inefficiencies and challenges for patients. In response, a proposed solution, the E-Clinic System, aims to streamline these processes through online booking and consultations.

PKU, serving university students and staff, currently relies on physical appointments, causing long queues and unreliable systems. Additionally, offline consultations pose challenges for patients unable to physically visit the PKU. The proposed E-Clinic System addresses these issues by introducing an automated appointment system integrated into the UTMsmart application and an optional online consultation feature.

The system's technical feasibility is supported by its use of familiar technology, requiring only the UTMsmart app and an internet connection. Operational feasibility is a primary focus, ensuring seamless integration into PKU's daily workflow without extensive training.

The objectives include providing accessible and efficient registration/appointment processes, increasing user satisfaction, and offering remote consultation options.

The project's scope encompasses the creation and integration of the E-Clinic System, primarily focusing on registration/appointment and doctor consultation services. The system aims to reduce PKU's operational costs and enhance daily operations by digitizing registration and appointment processes.

The E-Clinic System project team is structured for efficiency, and the work breakdown structure and Gantt chart provide a comprehensive overview of the project timeline and tasks. The requirement analysis covers current business processes, data collection, transactions, data presentation, backup, recovery, and data security.

The benefits of the proposed system include improved accessibility, efficient appointment scheduling, reduced queue and wait times, enhanced user satisfaction, cost-efficient operations, seamless integration with UTMsmart, access to historical patient data, time savings for both patients and staff, flexible consultation options, and enhanced data security.

In summary, the E-Clinic System presents a comprehensive solution to modernize and optimize the operations of PKU, aligning with the technological advancements of the 21st century and promoting a more efficient and patient-friendly healthcare experience within UTM.