UTM
UNIVERSITI TEKNOLOGI MALAYSIA

PHASE 2: Database Conceptual Design

SECD2523 - 08 Database

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Lecturer: Dr. Noor Hidayah Zakaria

Group name: 6G

Group members:

IVLYN TAY WAN ROU	A22EC0168
JOLYN LIN XIN EN	A22EC0127
TAN YUN XI	A22EC0282
YAP JUN CHENG	A22EC0294

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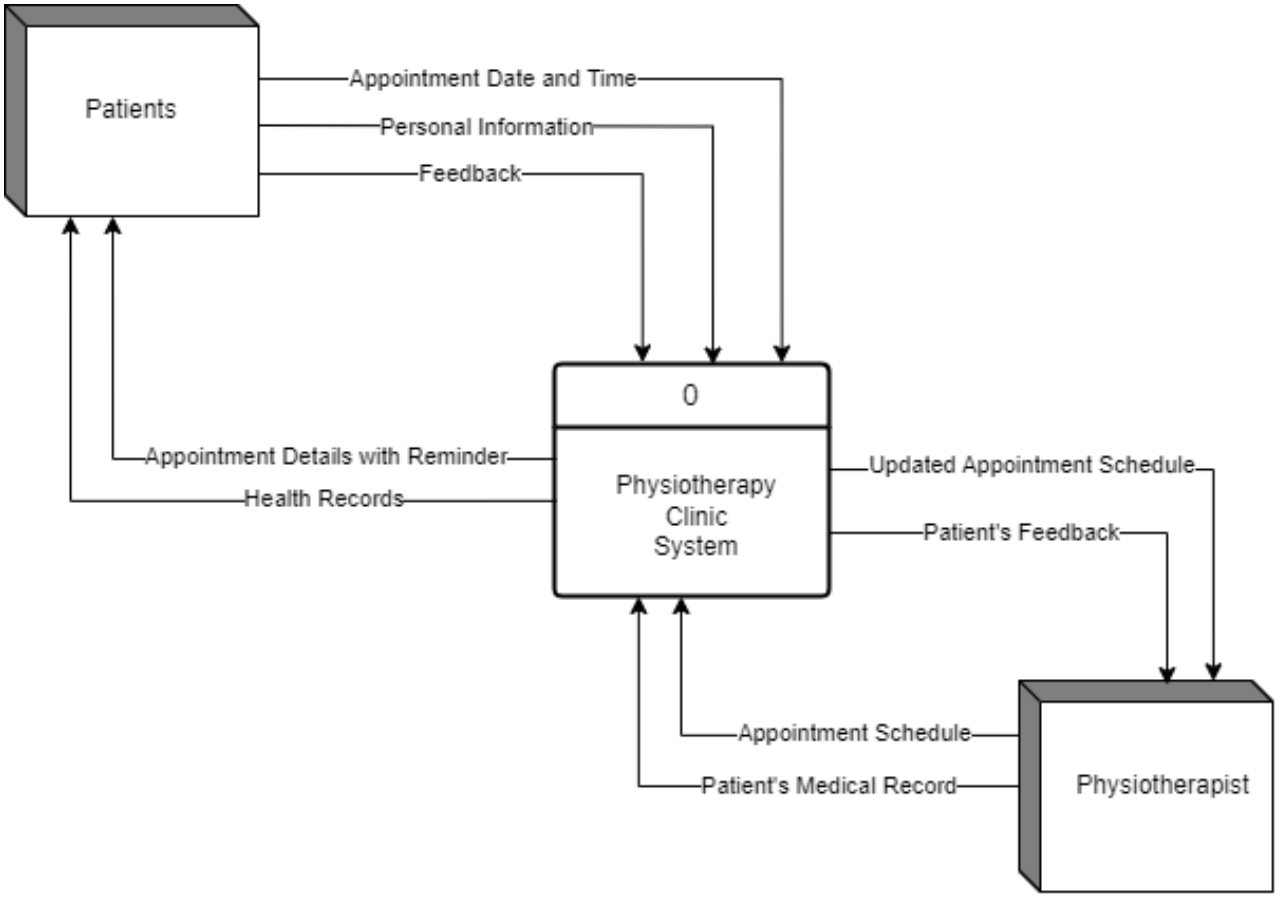
1.0 Introduction

In Phase 1, we conducted a thorough analysis of the challenges encountered by clinic staff and patients,which laid the foundation for developing the Physiotherapy Clinic Information Management System.We also gained a better understanding of the systemic issues that affect the clinic's operational efficiency and others hinder problems in patient engagement. As we enter Phase 2, our focus is on carefully developing a conceptual framework that not only meets the specified requirements but also maintains scalability, adaptability, and user-friendly design. This conceptual diagram will form the foundation for the entire system architecture, guaranteeing a unified and practical solution to address the unique needs of clinic staff and patients.

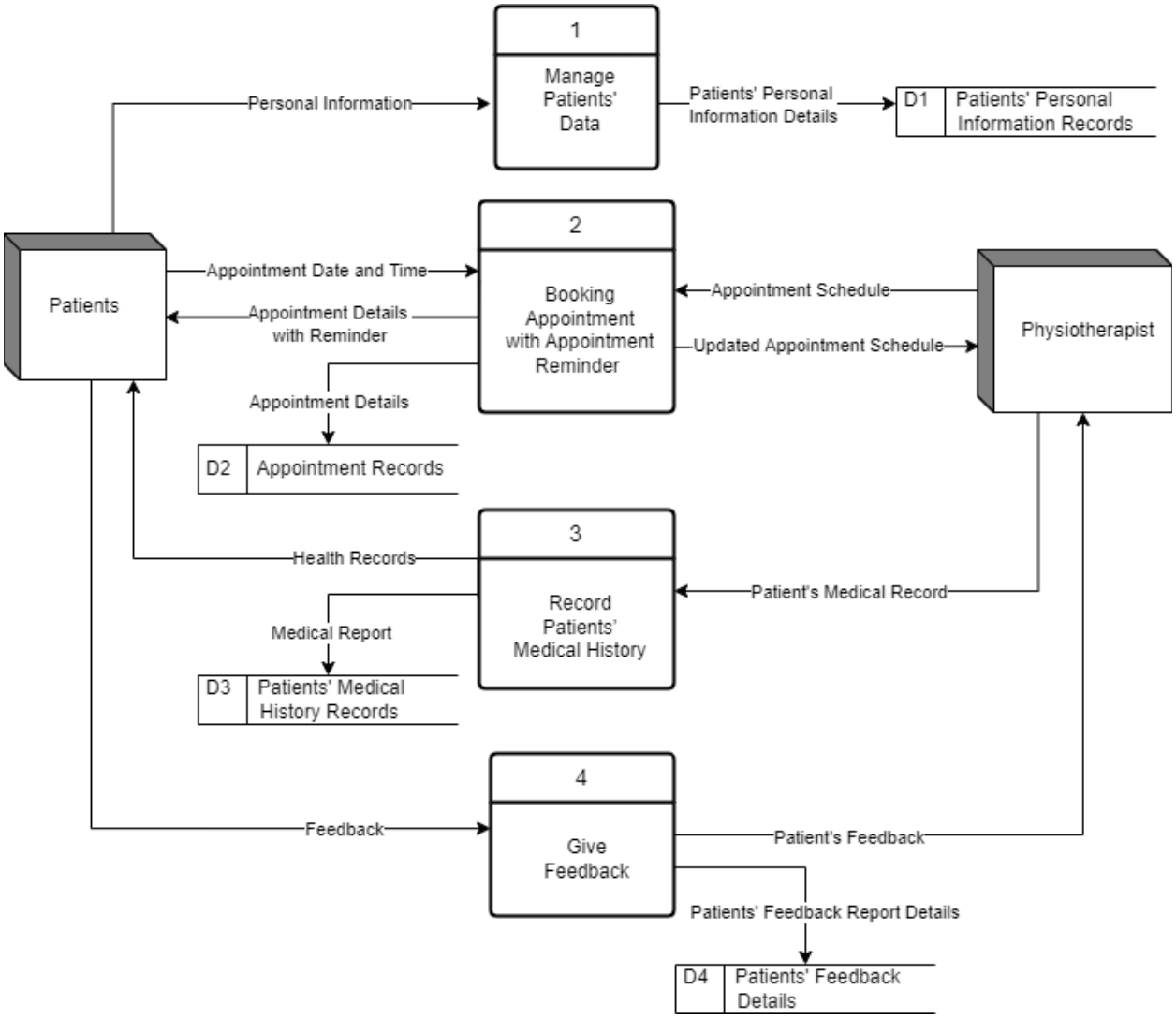
By outlining the connections among system components, data movement, and user interfaces, the conceptual diagram will offer a visual guide for the following development stages. It will clarify how automated appointment reminders, efficient patient record management, and improved accessibility, and the overall patient experience.This exploration aims to identify the constraints within the current database while understanding how a new system can effectively collect and manage data through its transaction requirements. The Entity-Relationship Diagram (ERD) plays a crucial role in providing a clear overview of the existing database system as we seek to understand how Physiotherapy Clinic Information Management System can achieve lasting success and growth with its current database structure.

2.0 DFD (to-be)

2.1 Context Diagram

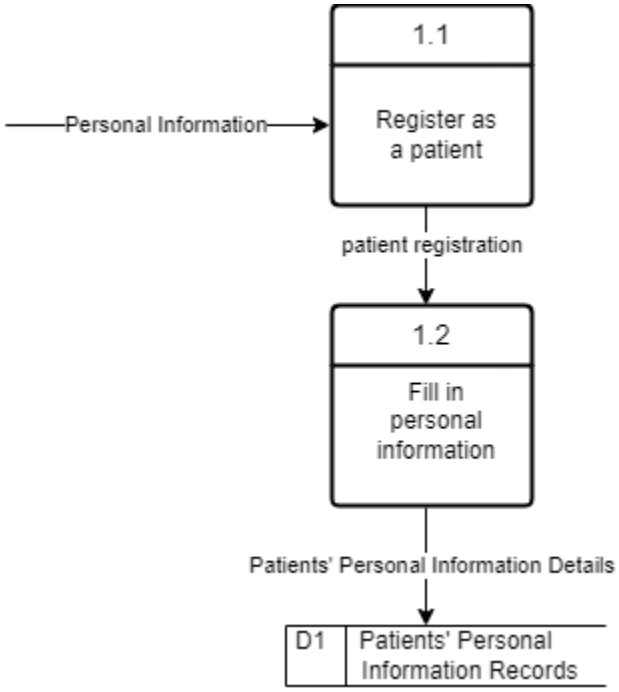


2.2 Level 0 Diagram

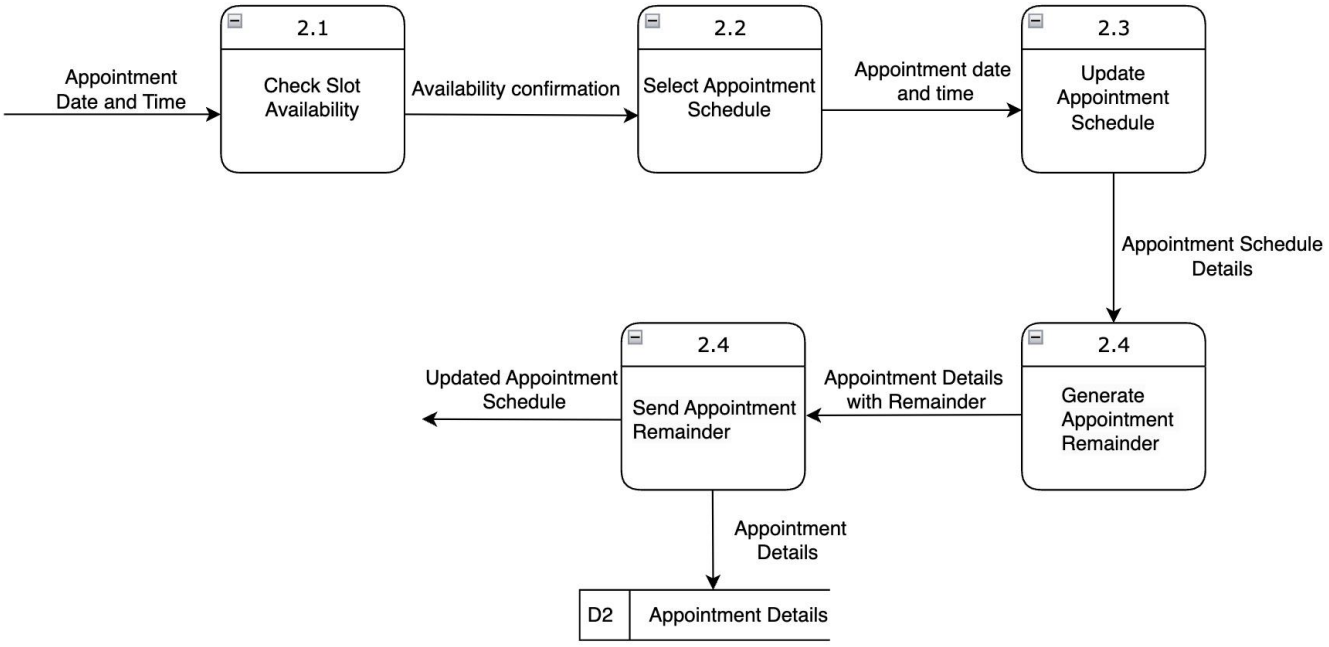


2.3 Level 1 Diagram

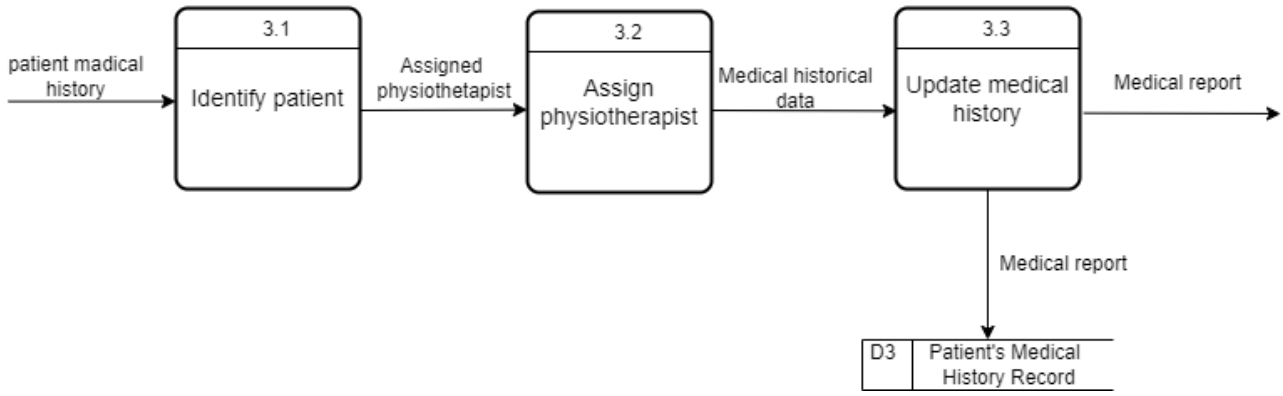
2.3.1 Process 1: Manage patients' data



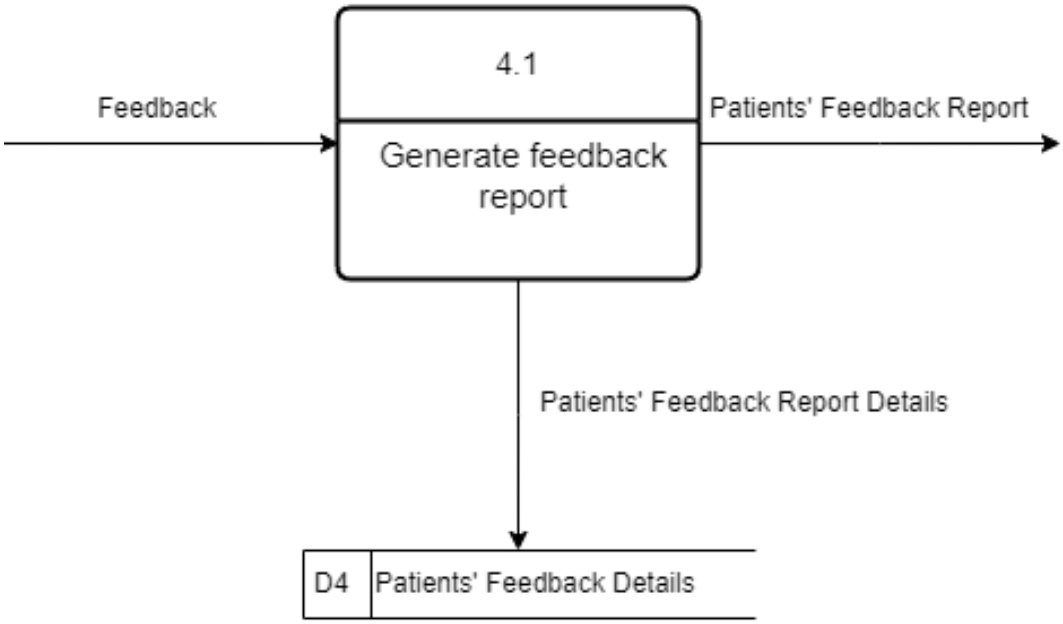
2.3.2 Process 2: Booking appointment with appointment reminder



2.3.3 Process 3: Record patients' medical history



2.3.4 Process 4: Give feedback



3.0 Data & Transaction Requirement

3.1 Proposed business rule

1.The system should automatically send appointment reminders to patients via email or SMS before the appointment within 3 days prior to the scheduled date and time.

2. The system identifies cases for the receptionist to proactively contact and reschedule if a patient misses two consecutive appointments, ensuring proactive patient engagement.

3. Patient records are stored securely for a minimum of 7 years after the last appointment in compliance with healthcare regulations, after which they are anonymized or securely deleted.

4.Each physiotherapist can manage up to three appointments per hour, ensuring sufficient time for personalized care and preventing practitioner overload.

5.A physiotherapist must create a treatment plan for each patient within 48 hours of the initial consultation.

6.Invoices for services rendered are generated within 24 hours of the appointment, with a 15-day payment window. Unpaid bills result in automatic reminders at 7-day intervals.

7.Users with administrative privileges can access compiled feedback reports, enabling the clinic to assess overall patient satisfaction and individual practitioner performance regularly.

8.The physiotherapist are able to view the feedback to follow up with the concerned patient regarding their experience or concerns.

9. Each patient can schedule multiple appointments across different departments.

10.Patients should have control over their data privacy and can choose to share or withhold specific information.

3.2 Proposed data and transactional

Proposed Data Requirement

Patient: The patient data store should include fields for personal information such as name, contact details, date of birth, address, and email. Additionally, it can store the medical history of previous injuries, allergies, treatment details, and appointment history.

Appointment: When the appointment is confirmed, the appointment details such as appointment ID, patient ID, physiotherapist ID, scheduled date and time, and appointment status should be stored in the appointment data table.

Reminder: The reminder data store contains patient ID, appointment ID, reminder ID, and physiotherapist ID. It will ensure that patients receive timely notifications about their appointments through their preferred communication method like email or SMS to help decrease the chances of missed appointments.

Medical Record: The medical record database should include fields for record ID, patient Physiotherapist ID ,consultation details, diagnosis and allergy. It is essential to maintain accurate and updated medical records to ensure continuity of care and facilitate effective communication between healthcare providers.

Physiotherapist: The physiotherapist database should include fields for personal information such as contact details, qualifications and physiotherapist ID. The availability schedule, specialized treatments or techniques offered, and patient feedback can also be stored in the physiotherapist database to help manage and assign appointments effectively.

Feedback: The feedback database should include fields for patient ID, appointment ID, feedback ID details such as rating or satisfaction score, comments or suggestions, and date submitted.

Proposed Transactional Requirement

Data entry:

- Enter the information of patients, including personal details, medical history, and contact information.
- Enter treatment details, such as types of therapy provided, duration, and progress of each session.
- Enter referral doctor information, including their name, specialty, and contact details.
- Enter the date and time for appointments, allowing patients to schedule their sessions conveniently.
- Enter personalized treatment plans for patients, outlining procedures, exercises, and progress tracking.
- Enter patient feedback, allowing them to provide comments and suggestions for improvement.
- Enter billing details including services rendered, charges, payment methods, and insurance claims for accurate financial records.

Data update/ delete:

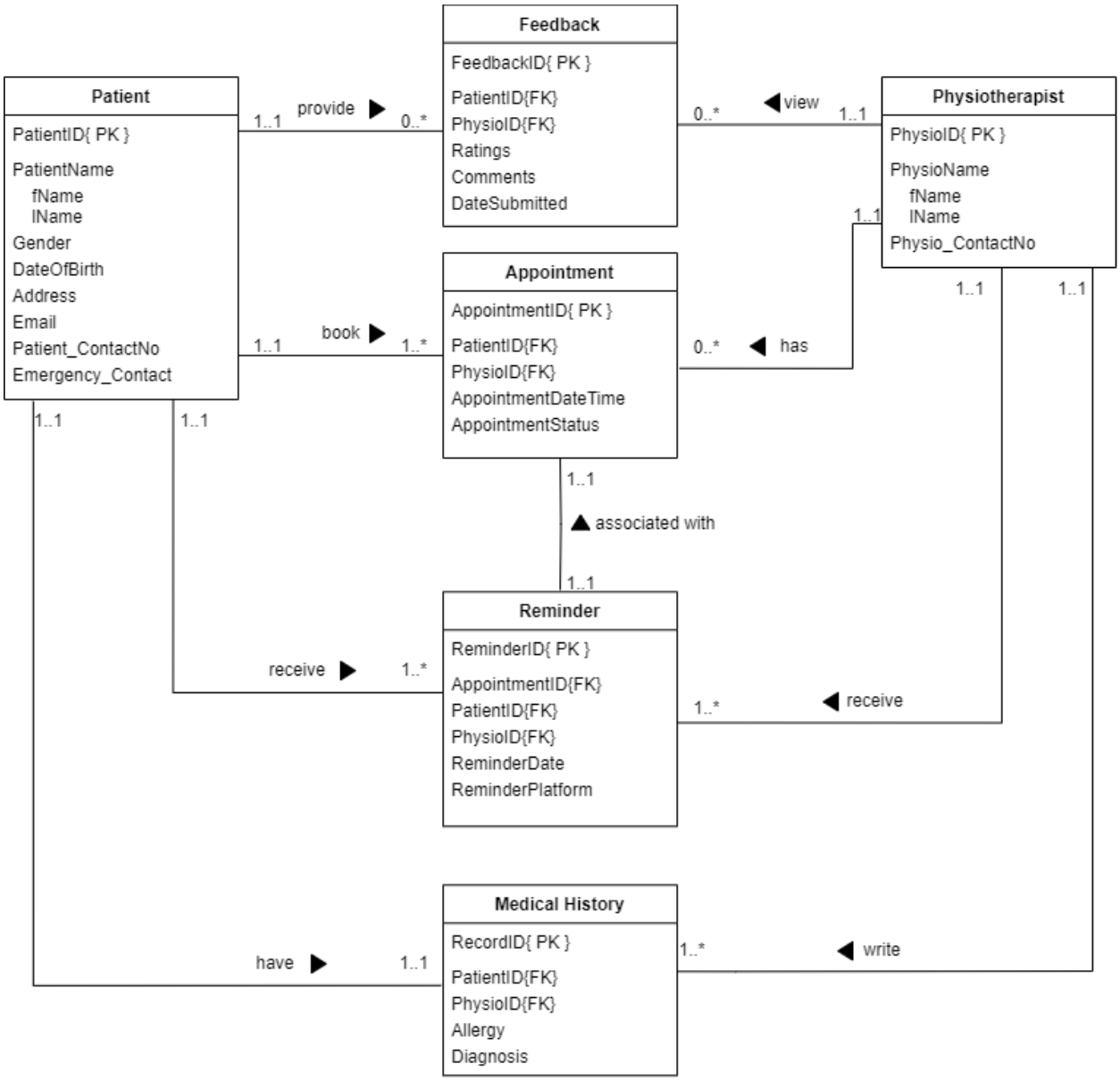
- Update/delete patient patient records with new medical information, changes in contact details, or insurance updates.
- Update/delete appointment details, such as dates, times, and treatment information.
- Update/delete physiotherapist information, including availability schedule and specialized treatments.
- Update/delete reminder settings, including delivery method and timing.
- Update/delete feedback information, including ratings, comments, and dates.
- Update/delete medical record information, including consultation details, diagnosis and treatment codes, physician notes, and attachments.

Data queries:

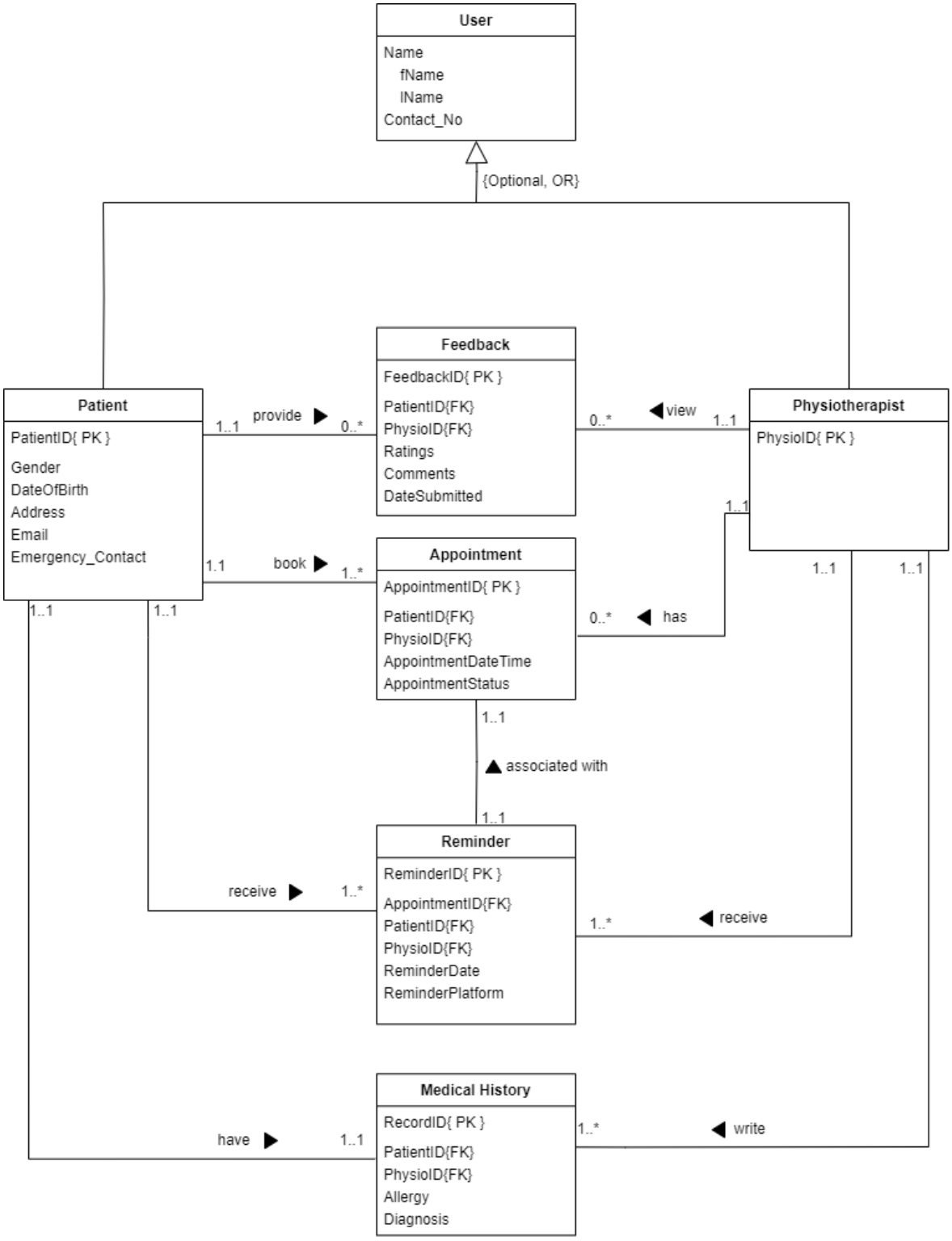
- List patient information, including personal details and medical history.
- List physiotherapist information, including availability schedule and specialized treatments.
- List medical record and reports information
- List appointment history, and treatment outcomes.
- Identify available time slots based on physiotherapist schedules and patient preferences.
- Identify patients based on specific criteria, such as age range or medical condition.
- Identify patients who have not attended appointments or have specific treatment needs.
- Identify insurance eligibility and benefits for patients based on their personal information and medical history.
- Display feedback information, including ratings and comments.

4.0 Database conceptual design

4.1 Conceptual ERD



4.2 Enhanced ERD (EERD)



5.0 Data dictionary

Relation: Patient

Entity	Attribute	Description	Data Type & Data Length	Constraint
Patient	PatientID	Unique ID for patient	VARCHAR2(20)	PRIMARY_KEY
	PatientName			
	fName	First name of patient	VARCHAR2(20)	NONE
	lName	Last name of patient	VARCHAR2(20)	NONE
	Gender	Gender of patient	VARCHAR2(20)	NONE
	DateOfBirth	Date of birth of patient	DATE	NONE
	Address	Address of patient	VARCHAR2(60)	NONE
	Email	Email of patient	VARCHAR2(40)	NONE
	Patient_ContactNo	Contact number of patient	NUMBER(15)	NONE
	Emergency_Contact	Emergency contact of patient	NUMBER(15)	NONE

Relation: Appointment

Entity	Attribute	Description	Data Type & Data Length	Constraint
Appointment	AppointmentID	Appointment ID of an appointment	VARCHAR2(20)	PRIMARY_KEY
	PatientID	Unique ID for patient	VARCHAR2(20)	FOREIGN_KEY
	PhysioID	Unique ID for physiotherapist	VARCHAR2(20)	FOREIGN_KEY
	AppointmentDateTime	The date and time of appointment made	TIMESTAMP	NONE
	AppointmentStatus	The status of current appointment	VARCHAR2(10)	NONE

Relation: AppointmentReminder

Entity	Attribute	Description	Data Type & Data Length	Constraint
Reminder	ReminderID	Unique ID for reminder	VARCHAR2(20)	PRIMARY_KEY
	AppointmentID	Unique ID for appointment	VARCHAR2(20)	FOREIGN_KEY
	PatientID	Unique ID for patient	VARCHAR2(20)	FOREIGN_KEY
	PhysioID	Unique ID for physiotherapist	VARCHAR2(20)	FOREIGN_KEY
	ReminderDate	Date of reminder created	DATE	NONE
	ReminderPlatform	Platform of reminder	VARCHAR2(20)	NONE

Relation: MedicalRecord

Entity	Attribute	Description	Data Type & Data Length	Constraint
Medical History	RecordID	Unique ID for medical record history	VARCHAR2(20)	PRIMARY_KEY
	PatientID	Unique ID for patient	VARCHAR2(20)	FOREIGN_KEY
	PhysioID	Unique ID for physiotherapist	VARCHAR2(20)	FOREIGN_KEY
	Allergy	The allergy details of patient	VARCHAR2(30)	NONE
	Diagnosis	The diagnosis results of patients	VARCHAR2(255)	NONE

Relation: Physiotherapist

Entity	Attribute	Description	Data Type & Data Length	Constraint
Physiotherapist	PhysiolID	Unique ID for Physiotherapist	VARCHAR2(20)	PRIMARY_KEY
	PhysioName			
	fName	First name of physiotherapist	VARCHAR2(20)	
	lName	Last name of physiotherapist	VARCHAR2(20)	
	Physio_ContactNo	Contact number of physiotherapist	VARCHAR2(15)	

Relation: Feedback

Entity	Attribute	Description	Data Type & Data Length	Constraint
Feedback	FeedbackID	Unique ID for feedback	VARCHAR2(20)	PRIMARY_KEY
	PatientID	Unique ID for patient	VARCHAR2(20)	FOREIGN_KEY
	PhysiolID	Unique ID for physiotherapist	VARCHAR2(20)	FOREIGN_KEY
	Ratings	Ratings in the feedback	NUMBER(1)	NONE
	Comments	Comments content of the feedback	VARCHAR2(255)	NONE
	DateSubmitted	Date of feedback submitted	TIMESTAMP	NONE

6.0 Summary

The new system for the physiotherapy clinic aims to address various shortcomings in the current setup, including occasional slowdowns and a lack of patient engagement features. As we completed this database requirement document, our team gained a better understanding of how the current database functions by outlining the Physiotherapy Clinic Information Management System. With data processes like entry, update/delete, and queries, the proposed system will enhance accuracy and efficiency in recording patient information while managing appointments and providing a platform for patient feedback. During development, our team recognized the importance of incorporating encrypted storage for patient information as well. Through AS-IS analysis data collections that included business rules and transaction requirements defined necessary functionalities for employment within this system proposal. To gather deeper logical knowledge about the existing set-up, we first analyzed these criteria before drawing Data Flow Diagram level 0 diagrams along with context diagram representations at level 1. The ERD representation illustrating entity relationships between patients, physiotherapists' appointments which helps visualize connections amongst different entities constituents stored inside databases.