UTM UNIVERSITI TEKNOLOGI MALAYSIA

FACULTY OF COMPUTING
UTM Johor Bahru

Project: Phase 2

Pulse+

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Section: 08

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1.0 Introduction

Pulse+ is an advanced electronic health record system designed especially to meet the specific requirements of Foo Ong Hoe, a well-known clinic focusing on traditional Chinese medicine. Previously dependent on traditional paper-based data storage techniques, the clinic recognized the urgent need for a modern alternative, which led to the ideation and creation of Pulse+.

The prevalent use of paper records has highlighted shortcomings and inefficiencies in the current information management system. As the ultimate solution to these problems, Pulse+ is a paradigm shift toward an electronic integrated, and modern medical data management system.

This proposal describes the details of the Pulse+ system and how Foo Ong Hoe's traditional Chinese medicine clinic will incorporate it into its daily operations. We provide a detailed Data Flow Diagram (DFD) to clarify the workings of Pulse+ in Foo Ong Hoe's traditional Chinese medicine clinic. This graphic depiction will explain how information moves through the system and show how different stakeholders and components interact with one another. For stakeholders to fully understand the details of applying Pulse+ into the clinic's everyday operations, this DFD provides an essential resource.

In the pursuit of optimizing the utilization of Pulse+, a delineation of pertinent business rules is imperative. These rules serve as guidelines for stakeholders, ensuring a standardized and effective usage of the system. They encompass data input protocols, access permissions, and procedural mandates. This section will articulate the essential business rules that govern the interaction with Pulse+, thereby facilitating a seamless integration into the clinic's operational framework.

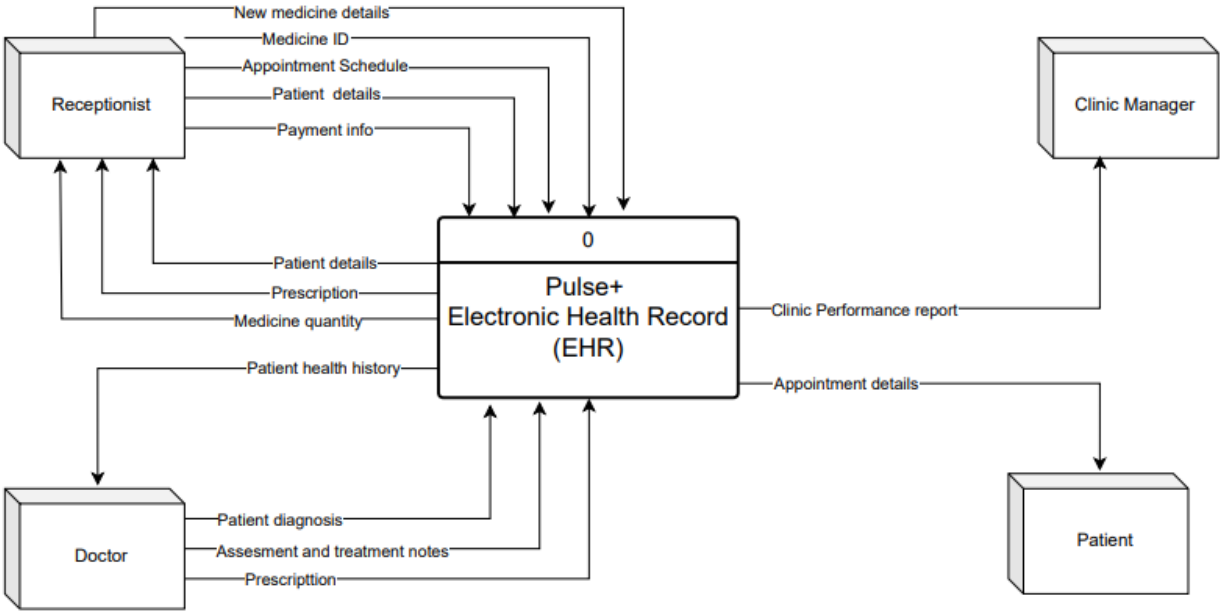
The powerful database architecture of Pulse+ is one of its key features. We present an Extended Entity Relationship Diagram (EERD) and an Entity Relationship Diagram (ERD) to stakeholders so they can visualize the system's underlying data structure. The relationships between data entities are made clear by these diagrams, which provide stakeholders with a thorough understanding of the database architecture of the system.

As part of the last stage of this proposal, we provide an extensive Data Dictionary. This detailed document offers a complete list of all the data elements that are used in Pulse+ along with accurate definitions, formats, and relationships. The Data Dictionary is an essential reference guide that improves stakeholder understanding and guarantees consistency in the interpretation and use of data.

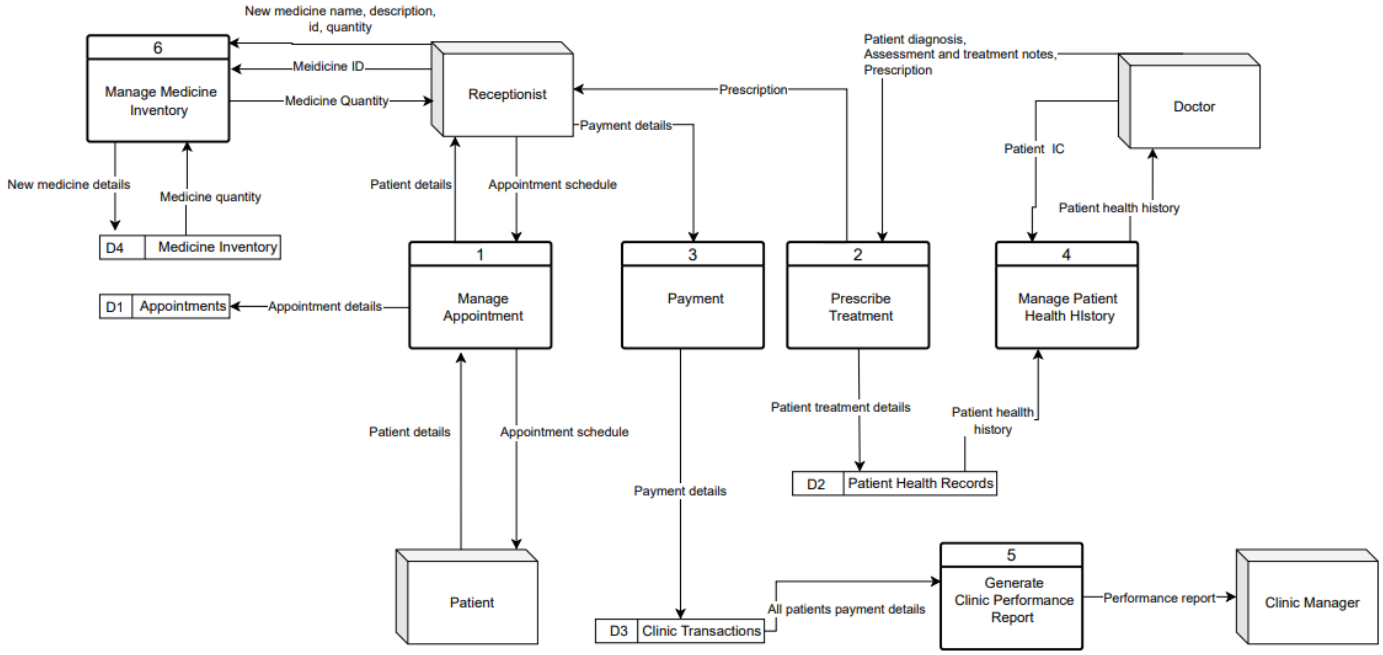
The objective of this comprehensive approach is to provide stakeholders with a comprehensive understanding of Pulse+ and its optimal integration into the operations of Foo Ong Hoe's traditional Chinese medicine clinic. It includes a Data Flow Diagram, Business Rules, Database Conceptual Design, and a Data Dictionary.

2.0 DFD(To-Be)

2.1 Context Diagram

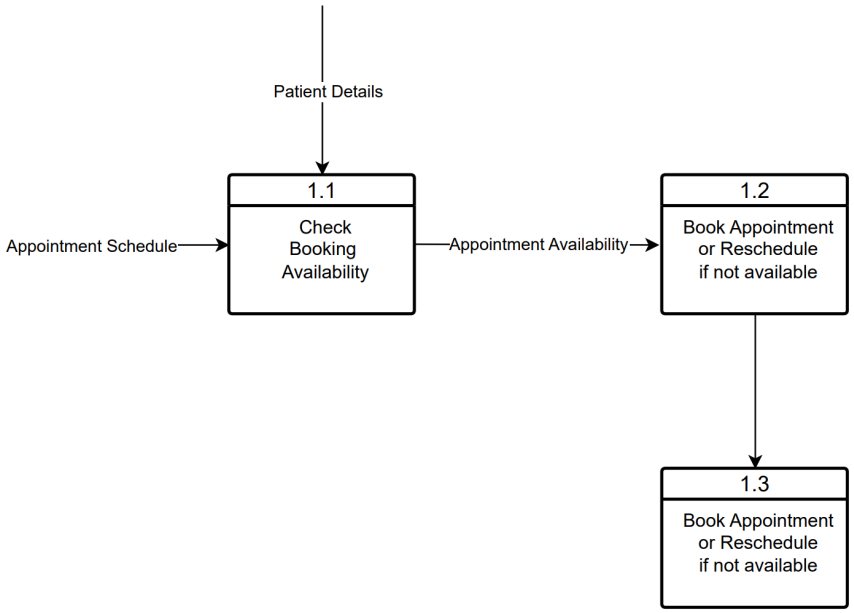


2.2 Level 0 Diagram

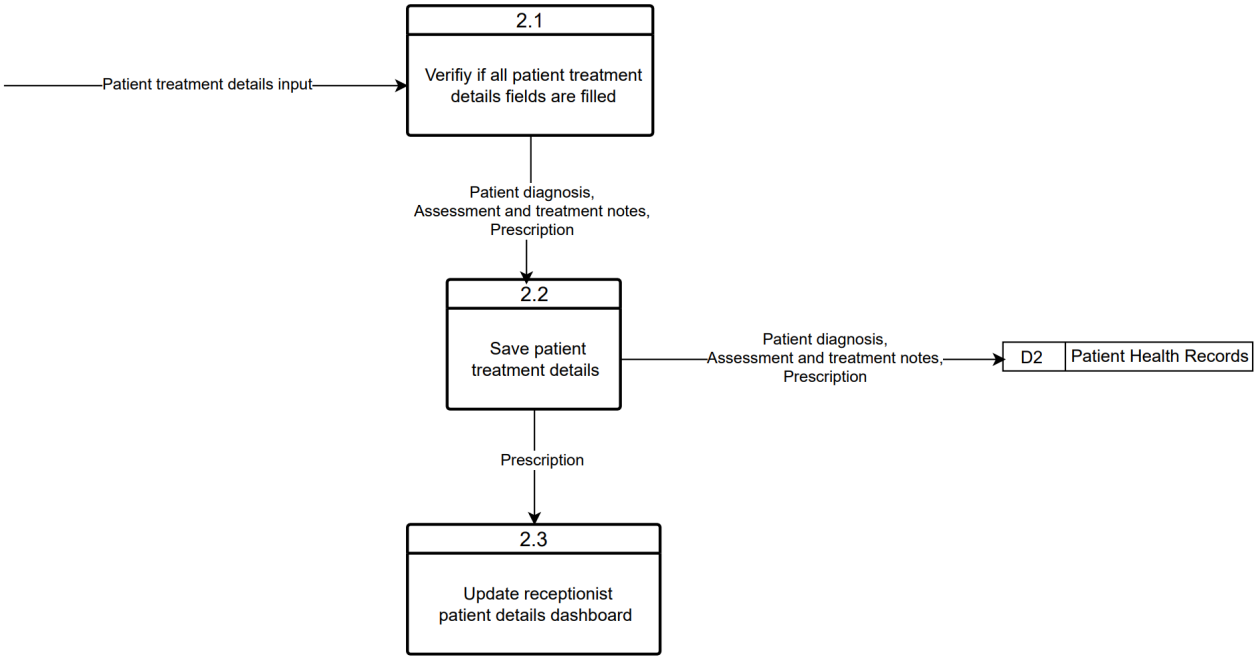


2.3 Level-1 Diagram

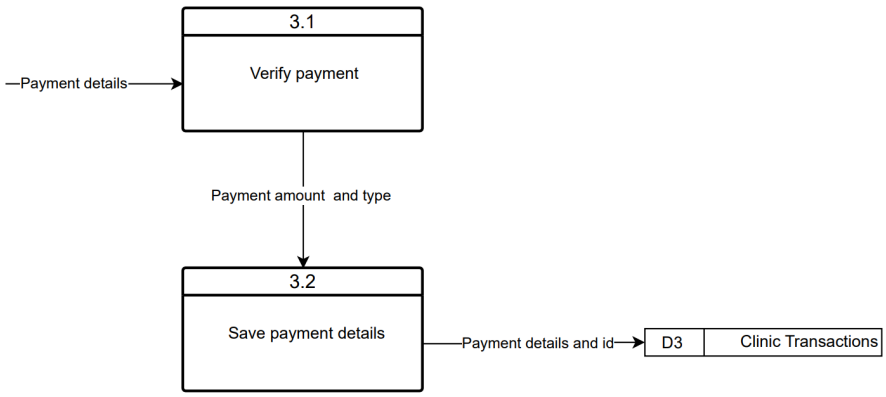
2.3.1 Process 1: Manage appointment



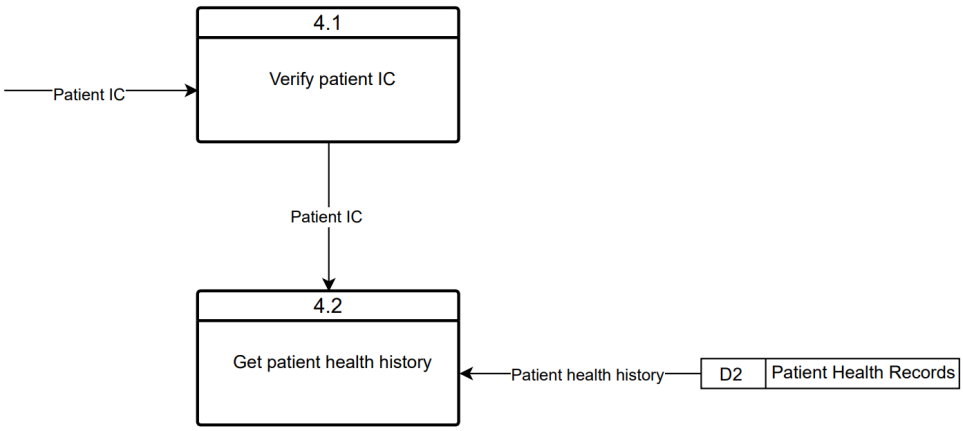
2.3.2 Process 2: Prescribe treatment



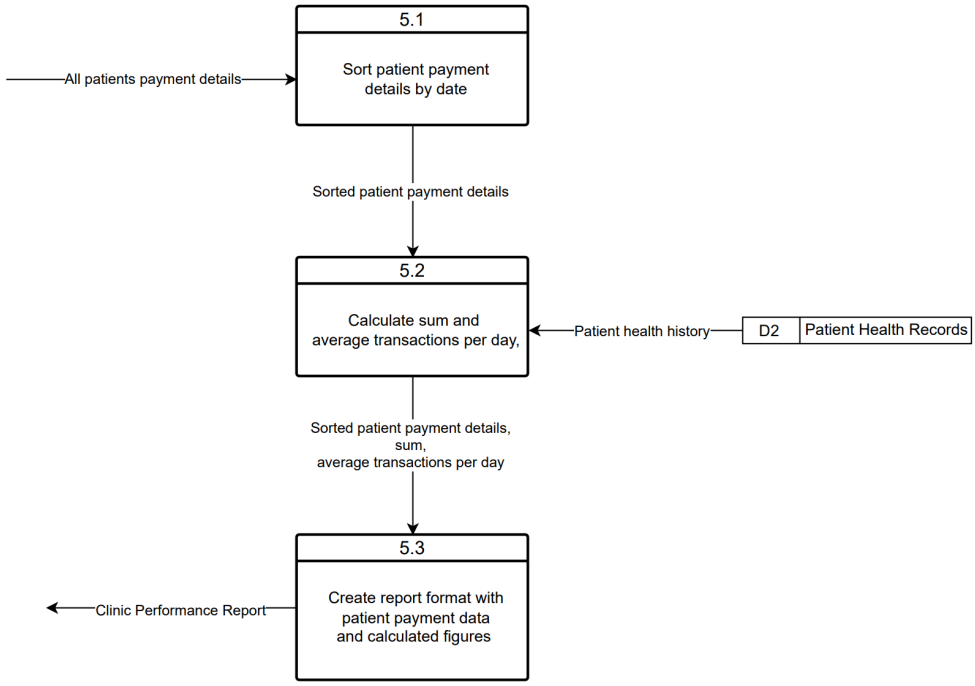
2.3.3 Process 3: Payment



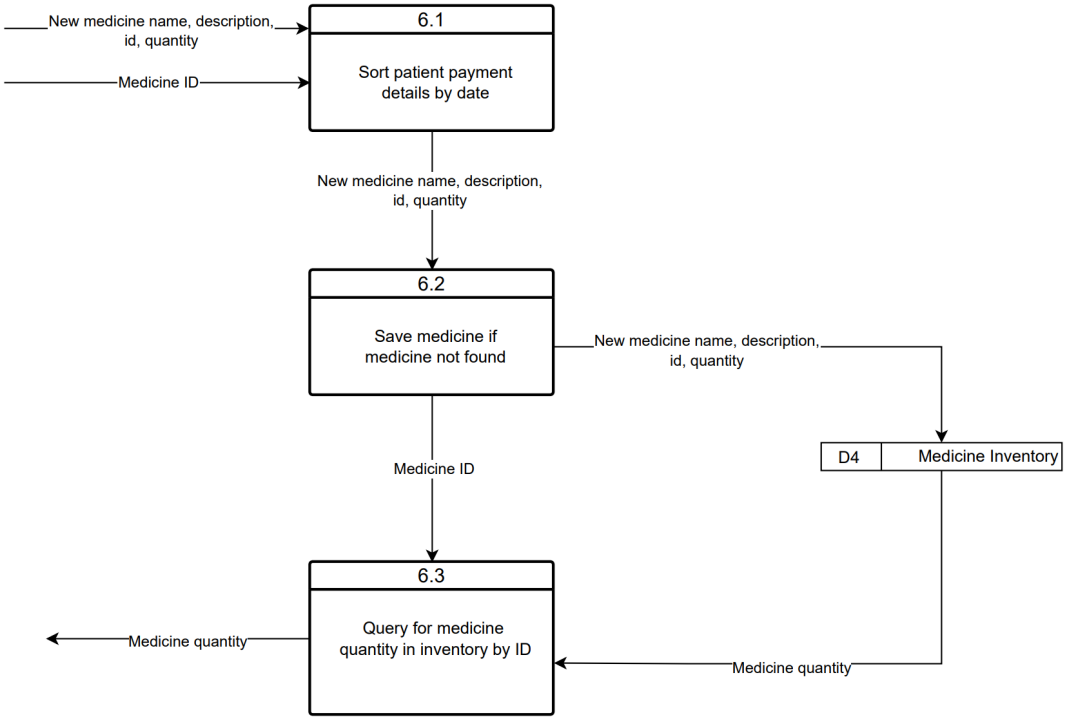
2.3.4 Process 4: Manage Patient Health History



2.3.5 Process 5: Generate Clinic Performance Report



2.3.6 Process 6: Manage Medicine Inventory



3.0 (Data & Transaction Requirements)

3.1 Purposed Business Rules

1. Patients need to give their personal details when they come to the clinic for the first time.
2. Patients should give their personal identity when making every appointment .
3. Patients can make the appointment anytime as long as the operation hour of the clinic.
4. Patients need to reschedule the appointment time if they are not available.
5. Patients can have one appointment one time.
6. Patients can make the payment cash or cashless but only 1 method.
7. Patient’s health record can only be viewed by the doctor.
8. Doctors need to fill the empty patient treatment details fields if they submit the details but not fill in full.
9. Doctors must receive a patient's health history for every time treatment.
10. Clinic managers receive a true clinic performance report every day.

3.2 Purposed Transaction Requirement

Data Entry:

- Enter patient's information, including name, IC number, medical history, allergy and contact
- Enter the appointment time for the patient
- Enter patient diagnosis, assessment and treatment notes, prescription
- Enter payment method, billing and data

Data Update/ Data Delete:

- Update/ Delete patient's information, including name, IC number, medical history, allergy and contact
- Update/ Delete the appointment time for the patient
- Update/ Delete patient diagnosis, assessment and treatment notes, prescription
- Update/ Delete payment method, billing and data

Data queries:

- List of appointment details
- Identify appointment availability
- List of patient health record
- Identify details of user
- List of patient payment details

3.3 Purposed Data Requirement

Receptionist:
The receptionist will store the receptionistID, receiptionistName, numberIC, gender, phoneNumber, address and email. The receptionist is the primary key whereas the receiptionName is the composite attribute consisting of firstName and lastName. One receptionist can schedule many appointments. One receptionist also can manage multiple medicines.

Patient:
The patient details save all information for the patient. In addition to personal information, the patient details should save the patientID, patientName, numberIC, gender, phoneNumber, address and email. The patientID is the unique primary key. The patientName is a composite attribute consisting of firstName and lastname. One patient can just have one account. One patient can make one appointment at the same time. One patient is only treated by one doctor one time and makes only one payment. One patient can have multiple records.

Health record:
The health record saves the recordID, doctorID, patientID, description, treatmentType, treatmentNotes, prescription. The recordID is the primary key, whereas the doctorID and patientID is the foreign key from doctor and patient. One health record is recorded by one doctor for one patient. One health record has multiple payments.

Doctor:
The doctor details save all information for the doctor. In addition to personal information, the doctor details should save the doctorID, doctorName, numberIC, gender, phoneNumber, address and email. The doctorID is the unique primary key. The doctorName is a composite attribute consisting of firstName and lastname. One doctor has multiple appointments at different times. One doctor records multiple health records for multiple patients.

Appointment:
The appointment data stores all the appointment details including the appointmentID, patientID, doctorID, appointmentTime and appointmentDate. The appointmentID is the primary key for this data store. The doctorID is the foreign key reference to the table of doctors whereas the patientID is the foreign key reference to the table of patients. One appointment only can have one patient and also one doctor.

Clinic Manager:
The clinic manager details save all information for the he/she. In addition to personal information, the clinic manager details should save the managerID, managerName, numberIC,

gender, phoneNumber, address and email. The managerID is the unique primary key. The managerName is a composite attribute consisting of firstName and lastname. One clinic manager can view multiple performance reports.

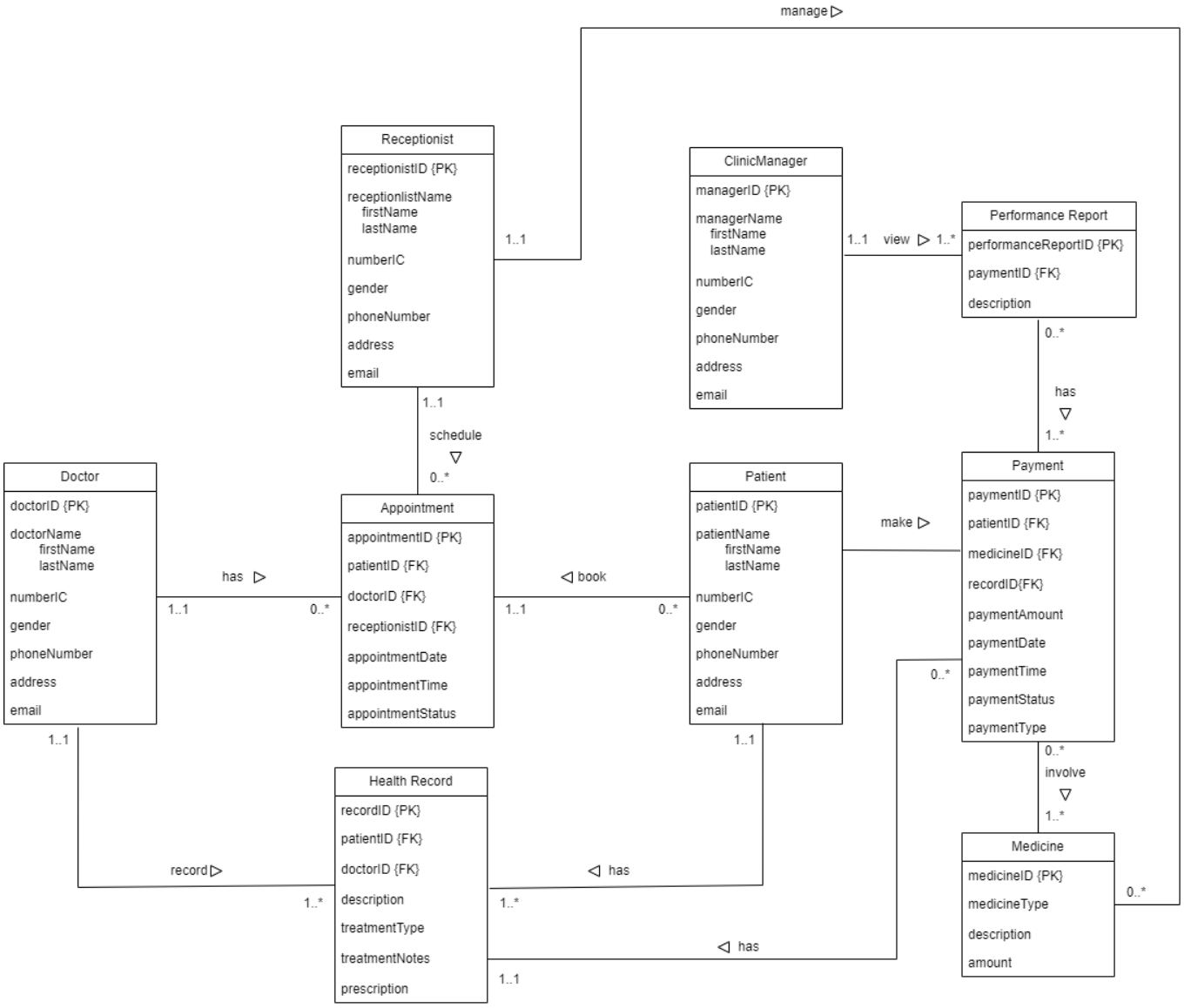
Performance report:
Performance report store performanceReportID, paymentID and description. The primary key is the performanceReportID whereas the paymentID is the foreign key from payment. One performance report has multiple payments.

Payment:
Payment save all paymentID, patientID, medicineID, recordID, paymentAccount, paymentDate, paymentTime, paymentType and paymentStatus. The primary key is the paymentID. The patientID is foreign key from patient, medicineID is foreign key from medicine, and the recordID is foreign key from health record. One payment can involve multiple medicines.

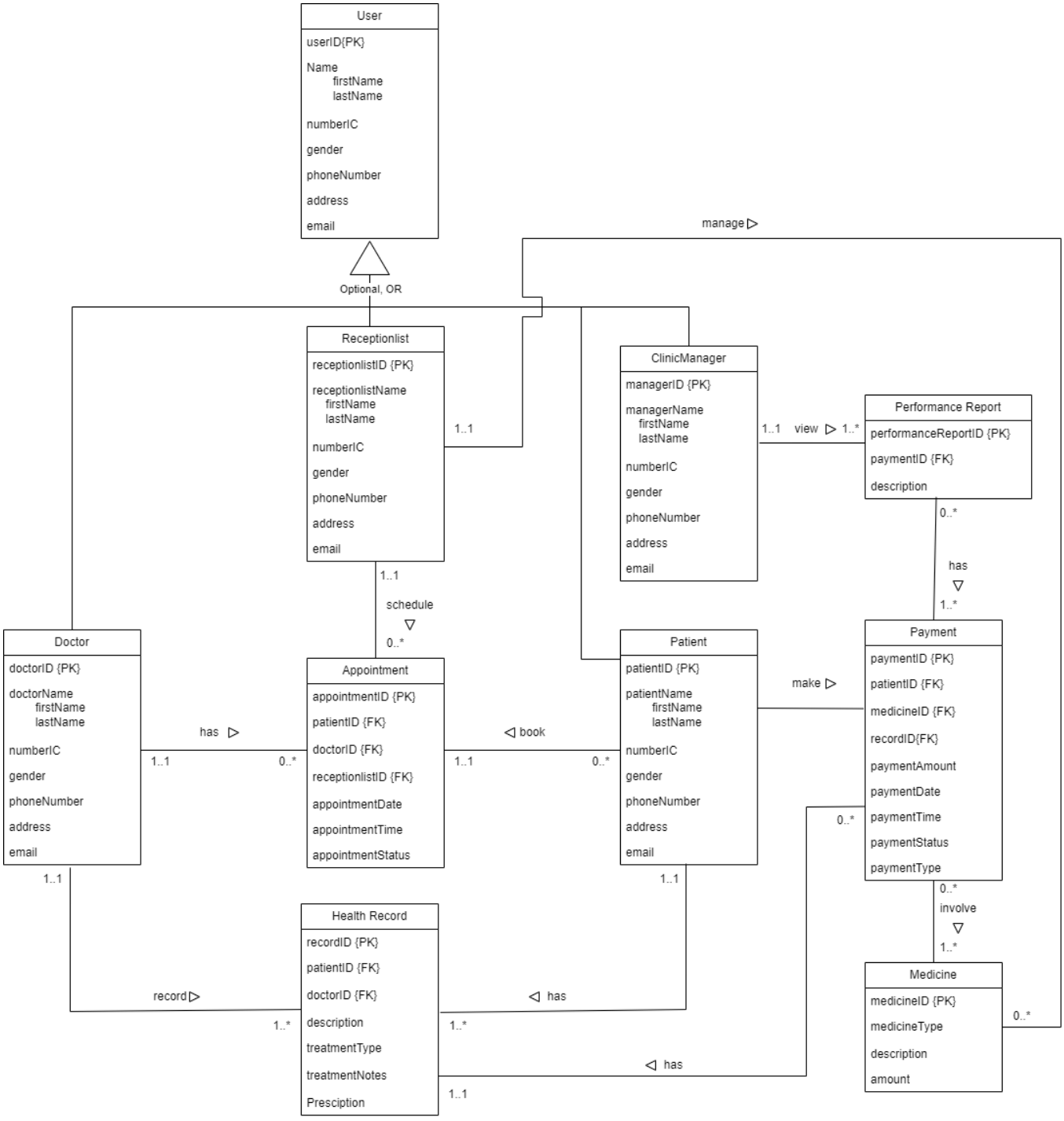
Medicine:
Medicine stores all medicineID, medicineType, description and amount. The primary key is medicineID. One medicine can have multiple receptionists. One medicine involved multiple payments.

4.0 Database Conceptual Design

4.1 Conceptual ERD



4.2 Enhanced ERD



5.0 Data Dictionary

Relation:User

Attribute	Data Type	Data Length	Constraint	Description
userID	NUMBER	10	PRIMARY KEY	User ID, auto generated
firstName	VARCHAR2	20	NOT NULL	First name of user
lastName	VARCHAR2	20	NOT NULL	Last Name of user
numberIC	NUMBER	12	NOT NULL,UNIQUE	Identity Card number of user
gender	VARCHAR2	10	NOT NULL	Gender of user
phoneNumber	NUMBER	11	NOT NULL	Contact number of user
address	VARCHAR2	100	NOT NULL	Address of user
email	VARCHAR2	50	NOT NULL	Email of user

Relation:ClinicManager

Attribute	Data Type	Data Length	Constraint	Description
managerID	NUMBER	10	PRIMARY KEY	Manager ID, auto generated
firstName	VARCHAR2	20	NOT NULL	First name of manager
lastName	VARCHAR2	20	NOT NULL	Last Name of manager
numberIC	NUMBER	12	NOT NULL,UNIQUE	Identity Card number of manager

gender	VARCHAR2	10	NOT NULL	Gender of manager
phoneNumber	NUMBER	11	NOT NULL	Contact number of manager
address	VARCHAR2	100	NOT NULL	Address of manager
email	VARCHAR2	50	NOT NULL	Email of user

Relation:Patient

Attribute	**Data Type**	**Data Length**	**Constraint**	**Description**
patientID	NUMBER	10	PRIMARY KEY	Patient ID, auto generated
firstName	VARCHAR2	20	NOT NULL	First name of patient
lastName	VARCHAR2	20	NOT NULL	Last Name of patient
numberIC	NUMBER	12	NOT NULL,UNIQUE	Identity Card number of patient
gender	VARCHAR2	10	NOT NULL	Gender of patient
phoneNumber	NUMBER	11	NOT NULL	Contact number of patient
address	VARCHAR2	100	NOT NULL	Address of patient
email	VARCHAR2	50	NOT NULL	Email of patient

Relation:Doctor

Attribute	**Data Type**	**Data Length**	**Constraint**	**Description**
doctorID	NUMBER	10	PRIMARY KEY	Doctor ID, auto generated
firstName	VARCHAR2	20	NOT NULL	First name of doctor
lastName	VARCHAR2	20	NOT NULL	Last Name of doctor

numberIC	NUMBER	12	NOT NULL,UNIQUE	Identity Card number of doctor
gender	VARCHAR2	10	NOT NULL	Gender of doctor
phoneNumber	NUMBER	11	NOT NULL	Contact number of doctor
address	VARCHAR2	100	NOT NULL	Address of doctor
email	VARCHAR2	50	NOT NULL	Email of doctor

Relation:Receptionist

Attribute	**Data Type**	**Data Length**	**Constraint**	**Description**
receptionist	NUMBER	10	PRIMARY KEY	Receptionist ID, auto generated
firstName	VARCHAR2	20	NOT NULL	First name of receptionist
lastName	VARCHAR2	20	NOT NULL	Last Name of receptionist
numberIC	NUMBER	12	NOT NULL,UNIQUE	Identity Card number of receptionist
gender	VARCHAR2	10	NOT NULL	Gender of receptionist
phoneNumber	NUMBER	11	NOT NULL	Contact number of receptionist
address	VARCHAR2	100	NOT NULL	Address of receptionist
email	VARCHAR2	50	NOT NULL	Email of receptionist

Relation:Appointment

Attribute	Data Type	Data Length	Constraint	Description
appointmentID	NUMBER	10	PRIMARY KEY	Appointment ID, auto generated
patientID	NUMBER	10	FOREIGN KEY	Patient ID from relation patient
doctorID	NUMBER	10	FOREIGN KEY	Doctor ID from relation doctor
receptionistID	NUMBER	10	FOREIGN KEY	Receptionist ID from relation receptionist
appointmentDate	DATE	10	NOT NULL	Date of making appointment
appointmentTime	TIMESTAMP	10	NOT NULL	Time of making appointment
appointmentStatus	VARCHAR2	20	NOT NULL	Status of making appopintment

Relation:Health Record

Attribute	Data Type	Data Length	Constraint	Description
recordID	NUMBER	10	PRIMARY KEY	Record ID, auto generated
patientID	NUMBER	10	FOREIGN KEY	Patient ID from relation patient
doctorID	NUMBER	10	FOREIGN KEY	Doctor ID from relation doctor
description	VARCHAR2	10000	NOT NULL	Record Description
treatmentType	VARCHAR2	30	NOT NULL	Type of treatment
treatmentNotes	VARCHAR2	10000	NOT NULL	Notes of treatment
prescription	VARCHAR2	100	NOT NULL	Prescription gave by doctor

Relation:Payment

Attribute	Data Type	Data Length	Constraint	Description
paymentID	NUMBER	10	PRIMARY KEY	Payment ID, auto generated
patientID	NUMBER	10	FOREIGN KEY	Patient ID from relation patient
medicineID	NUMBER	10	FOREIGN KEY	Medicine ID from relation medicine
recordID	NUMBER	10	FOREIGN KEY	Record ID from relation record
paymentAmount	NUMBER	10	NOT NULL	Payment amount needed
paymentDate	DATE	10	NOT NULL	Date of making payment
paymentTime	TIMESTAMP	10	NOT NULL	Time of making payment
paymentStatus	VARCHAR2	20	NOT NULL	Check whether it is paid or not
paymentType	VARCHAR2	10	NOT NULL	Type of payment , etc: credit card or bank payment

Relation:Medicine

Attribute	Data Type	Data Length	Constraint	Description
medicineID	NUMBER	10	PRIMARY KEY	Medicine ID, auto generated
medicineType	VARCHAR2	10	NOT NULL	Type of medicine
description	VARCHAR2	10000	NOT NULL	Medicine description
amount	NUMBER	100	NOT NULL	Amount of medicine

Relation:Performance Report

Attribute	Data Type	Data Length	Constraint	Description
performanceReportID	NUMBER	10	PRIMARY KEY	Performance Report ID, auto generated
paymentID	NUMBER	10	FOREIGN KEY	Payment ID from relation payment
description	VARCHAR2	10000	NOT NULL	Performance Report description

6.0 Summary

This proposal provides a detailed plan that addresses the needs of stakeholders in an organized way and describes how Pulse+ will be easily integrated into Foo Ong Hoe's traditional Chinese medicine clinic.

The proposal begins with a brief introduction that emphasizes the shift from manual, paper-based record-keeping to the use of Pulse+. This lays out the basis for those who are interested to understand the importance and necessity of the proposed modifications.

The Data Flow Diagram (DFD) presentation is an essential part of the proposal. With the help of this graphic depiction, stakeholders can better grasp Pulse+'s operational dynamics and the flow of information through the system. A detailed overview of each part and stakeholder's function is given, giving a thorough rundown of the system's operations.

Important guidelines for using Pulse+ are outlined in another section. These rules cover proposed business rules, proposed transaction requirements and proposed data requirements. It is stressed that following these guidelines is essential to maximizing the use of Pulse+ in the clinic.

The proposal points out the value of the Entity Relationship Diagram (ERD) and Extended Entity Relationship Diagram (EERD) when presenting the Database Conceptual Design section. By showing the connections between different data entities, these diagrams help stakeholders know the complex database architecture that supports Pulse+'s features.

A complete list of all the data elements is provided to stakeholders through the presentation of a complete Data Dictionary. Carefully laid out definitions, formats, and relationships highlight the Data Dictionary's importance as a reference tool. This section makes sure that data interpretation is consistent and clear, which helps with effective communication and Pulse+ utilization.

In short, the purpose of this proposal is to provide stakeholders with a comprehensive understanding of the Pulse+ integration process in order to facilitate the smooth transition of Foo Ong Hoe's traditional Chinese medicine clinic to a modern, efficient medical management system are restated again, emphasizing the thorough and well-structured nature of the organization of this system.