UTM

UNIVERSITI TEKNOLOGI MALAYSIA

Faculty of Computing

SECD2523 : Database

Project Phase 3

Lecturer Name :	Dr. Noor Hidayah Zakaria	
Section :	08	
Group :	10	
Group Member :	1. Chan Wen Kang	A22EC0146
	2. Cheng See Chee	A22EC0043
	3. Lau Yun Xi	A22EC0063
	4. Yee Si Ru	A22EC0120

Table of Content

1.0 Introduction

In this project, Klinik Lee Taman Perling is the user of the new system, which is a database system which changed the old database system to a more efficient and convenient system. In the old system, Klinik Lee is facing some of the problems which are manual patient data management, inefficient appointment scheduling and lack of comprehensive medical records management. Therefore we are going to implement a new database system which will help both patients and staff. In our system, there are 3 main processes which are automated patient data management, automated appointment scheduling and electronic medical records.

2.0 Overview of project

Phase 3 builds upon the groundwork laid in Phase 2 by transforming the conceptual data model into a logical model, ensuring efficient data management and optimizing the overall performance of Klinik Lee Taman Perling's new integrated system. We'll achieve this through the following key steps.

First, translating the conceptual ERD into a Logical ERD. We'll analyze the conceptual ERD from Phase 2, addressing any complexities like many-to-many relationships or non-relational aspects. This conversion will ensure compatibility with relational database structures, paving the way for efficient data storage and retrieval.

Next, deriving relational schema and defining attributes. From the refined logical ERD, we'll extract the schema for each relation, outlining individual tables and their constituent attributes. Each attribute will be clearly defined with its data type, constraints, and any applicable business rules, guaranteeing data integrity and consistency.

The third step will be applying normalization techniques. To minimize redundancy and eliminate potential data anomalies, we'll meticulously normalize the relations, aiming for the stringent Boyce-Codd Normal Form (BCNF) as a minimum. This normalization process optimizes data storage, reduces inconsistencies, and enhances data manipulation efficiency.

Next step will be finalizing the Logical ERD and Data Dictionary. The normalized relations will be reflected in a revised and optimized logical ERD, visually representing the final database structure with enhanced clarity and precision. The data dictionary will be updated to meticulously document all data elements and their properties, ensuring comprehensive and accurate reference for system development and maintenance.

Finally, we'll critically evaluate the logical ERD against the system's specific transaction requirements through interface design. This validation ensures that the data model effectively supports all necessary data interactions and transactions, guaranteeing seamless system operation.

3.0 Database conceptual design

3.1 Updated business rule

Patient Registration

1. Patient must provide a complete and accurate personal information
2. A unique identifier must generate for each registered patients

Appointment Scheduling

1. Appointments can only be scheduled during the available working hours
2. A confirmation message need to send for the patients
3. Patients must confirm or reschedule appointments within a specified timeframe

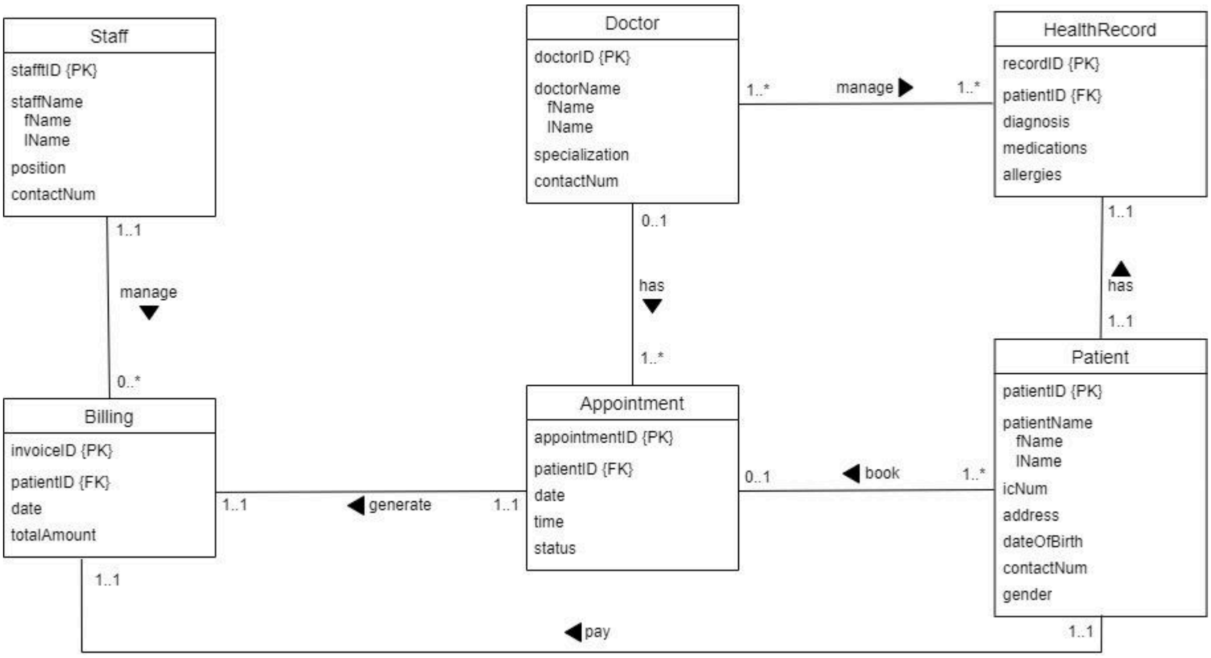
Electronic Health Records (EHR) Management

1. Only the authorized person can access and update patient health records
2. Health records should be updated in real-time during and after patient consultations.

Billing and Invoicing

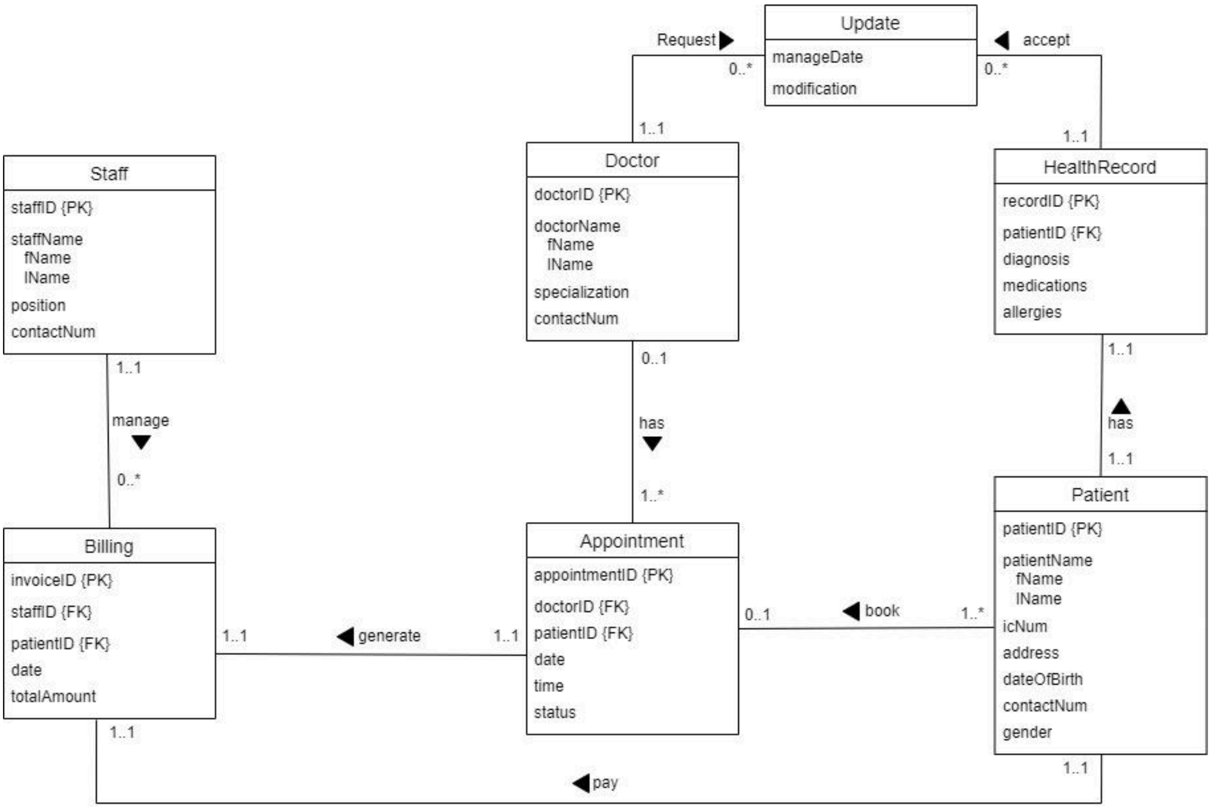
1. Billing information must accurately reflect the services provided during the appointment
2. The system should accept various type of payment method

3.2 Conceptual ERD



4.0 DB logical design

4.1 Logical ERD



4.2 Updated Data Dictionary

Relation : Staff

Attribute	**Data type**	**Data length**	**Constraint**	**Description**
staffID	VARCHAR2	10	PRIMARY KEY	auto-generated staff's ID
fName	VARCHAR2	20	NOT NULL	staff's first name
lName	VARCHAR2	20	NOT NULL	staff's last name
position	VARCHAR2	20	NOT NULL	staff position
contactNum	NUMBER	12	NOT NULL	staff's contact number

Relation : Doctor

Attribute	**Data type**	**Data length**	**Constraint**	**Description**
doctorID	VARCHAR2	10	PRIMARY KEY	auto-generated doctor's ID
fName	VARCHAR2	20	NOT NULL	doctor's first name
lName	VARCHAR2	20	NOT NULL	doctor's last name
specialization	VARCHAR2	60	NOT NULL	the specific area of expertise focus within the field of medicine for a doctor
contactNum	NUMBER	12	NOT NULL	doctor's contact number

Relation : Patients

Attribute	**Data type**	**Data length**	**Constraint**	**Description**
patientID	VARCHAR2	10	PRIMARY KEY	auto-generated patient’s ID
fName	VARCHAR2	20	NOT NULL	patient’s first name
lName	VARCHAR2	20	NOT NULL	patient’s last name
icNum	VARCHAR2	20	NOT NULL	the treatments of doctors provided
address	VARCHAR2	60	NOT NULL	patient’s residential address
dateOfBirth	DATE		NOT NULL	patient’s birth date
contactNum	NUMBER	12	NOT NULL	patient’s contact number
gender	VARCHAR2	10	NOT NULL	patient’s gender

Relation : HealthRecord

Attribute	**Data type**	**Data length**	**Constraint**	**Description**
recordID	VARCHAR2	10	PRIMARY KEY	auto-generated patient’s record ID
patientID	VARCHAR2	10	FOREIGN KEY	auto-generated patient’s ID
dianogsis	VARCHAR2	60	NOT NULL	doctor’s examination of the patient’s situation
medication	VARCHAR2	60	NOT NULL	doctor’s provided treatment
allergies	VARCHAR2	60	NOT NULL	patient’s allergy to something

Relation : Appointment

Attribute	**Data type**	**Data length**	**Constraint**	**Description**
appointmentID	VARCHAR2	10	PRIMARY KEY	auto-generated appointment ID
doctorID	VARCHAR2	10	FOREIGN KEY	auto-generated doctor's ID
patientID	VARCHAR2	10	FOREIGN KEY	auto-generated patient's ID
Appointmentdate	DATE		NOT NULL	appointment date
time	TIMESTAMP		NOT NULL	appointment time
status	VARCHAR2	20	NOT NULL	appointment status like schedule, reschedule or cancel

Relation : Billing

Attribute	**Data type**	**Data length**	**Constraint**	**Description**
invoiceID	VARCHAR2	10	PRIMARY KEY	auto-generated invoice ID
staffID	VARCHAR2	10	FOREIGN KEY	auto-generated staff's ID
patientID	VARCHAR2	10	FOREIGN KEY	auto-generated patient's ID
Billingdate	DATE		NOT NULL	appointment date
totalAmount	NUMBER	10	NOT NULL	The total amount of billing

Relation : Update

Attribute	**Data type**	**Data length**	**Constraint**	**Description**
manageDate	DATE			The date of doctor manage the health records
modification	VARCHAR2	70	NOT NULL	The content that has been modify by doctor

4.3 Normalization

Functional Dependency

FD1: staffID → fName, lName, position, contactNum

FD2: fName, lName, position → staffID

FD3: contactNum → staffID

FD4: doctorID → fName, lName, specialization, contactNum

FD5: fName, lName, specialization → doctorID

FD6: contactNum → doctorID

FD7: patientID → fName, lName, icNum, address, dateOfBirth, contactNum, gender

FD8: fName, lName, icNum, address, dateOfBirth, contactNum, gender → patientID

FD9: contactNum → patientID

FD10: recordID → patientID, diagnosis, medication, allergies

FD11: patientID → recordID

FD12: diagnosis, medication, allergies → recordID

FD13: appointmentID → doctorID, patientID, Appointmentdate, time, status

FD14: doctorID, patientID, Appointmentdate, time, status → appointmentID

FD15: doctorID, patientID → Appointmentdate, time, status

FD16: Appointmentdate, time → doctorID, patientID, status

FD17: invoiceID → staffID, patientID, Billingdate, totalAmount

FD18: staffID, patientID, Billingdate, totalAmount → invoiceID

FD19: staffID, patientID → Billingdate, totalAmount

FD20: Billingdate, totalAmount → staffID, patientID

1st Normalized form database

Staff(staffID, fName, lName, position, contactNum)

Doctor (doctorID, fName, lName, specialization, contactNum)

Patients (patientID, fName, lName, icNum, address, dateOfBirth, contactNum, gender)

HealthRecord (recordID, patientID, diagnosis, medication, allergies)

Appointment (appointmentID, doctorID, patientID, Appointmentdate, time, status)

Billing (invoiceID, staffID, patientID, Billingdate, totalAmount)

2nd Normalized form database

Staff(staffID, fName, lName, position)

FD1: staffID -> fName, lName, position (Primary Key)

FD2: contactNum → staffID

Doctor (doctorID, fName, lName, specialization)

FD3: doctorID → fName, lName, specialization (Primary Key)

FD4: contactNum → doctorID

Patients (patientID, fName, lName, icNum, address, dateOfBirth, contactNum, gender)

FD5: patientID → fName, lName, icNum, address, dateOfBirth, contactNum, gender (Primary Key)

HealthRecord (recordID, patientID, diagnosis, medication, allergies)

FD6: recordID → patientID (FK), diagnosis, medication, allergies (Primary Key)

Appointment (appointmentID, doctorID, patientID, Appointmentdate, time, status)

FD7: appointmentID → doctorID, patientID, Appointmentdate, time, status (Primary Key)

FD8: doctorID, patientID → Appointmentdate, time, status

Billing (invoiceID, staffID, patientID, Billingdate, totalAmount)

FD9: invoiceID → staffID (FK), patientID (FK), Billingdate, totalAmount (Primary Key)

FD10: invoiceID, patientID -> Billingdate, totalAmount

3rd Normalized form database

Staff(staffID, fName, lName, position)

FD1: staffID -> fName, lName, position (Primary Key)

FD2: contactNum → staffID

Doctor (doctorID, fName, lName, specialization)

FD3: doctorID → fName, lName, specialization (Primary Key)

FD4: contactNum → doctorID

Patients (patientID, fName, lName, icNum, address, dateOfBirth, contactNum, gender)

FD5: patientID → fName, lName, icNum, address, dateOfBirth, contactNum, gender (Primary Key)

HealthRecord (recordID, patientID, diagnosis, medication, allergies)

FD6: recordID → patientID (FK), diagnosis, medication, allergies (Primary Key)

Appointment (appointmentID, doctorID, patientID, Appintmentdate, time, status)

FD7: appointmentID → doctorID, patientID, Appointmentdate, time, status (Primary Key)

Billing (invoiceID, staffID, patientID, Billingdate, totalAmount)

FD8: invoiceID → staffID (FK), patientID (FK), Billingdate, totalAmount (Primary Key)

BCNF

Staff(staffID, fName, lName, position)

StaffContact (staffID, contactNum)

Doctor (doctorID, fName, lName, specialization)

DoctorContact (doctorID, contactNum)

Patients (patientID, fName, lName, icNum, address, dateOfBirth, contactNum, gender)

HealthRecord (recordID, patientID, diagnosis, medication, allergies)

Appointment (appointmentID, doctorID, patientID, Appointmentdate, time, status)

Billing (invoiceID, staffID, patientID, Billingdate, totalAmount)

5.0 Relational DB Schemas (after normalization)

The relational database schema for Clinic Lee Taman Perling database is a set of relation schemas, namely :

Staff	(staffID, fName, lName, position)
StaffContact	(staffID, contactNum)
Doctor	(doctorID, fName, lName, specialization)
DoctorContact	(doctorID, contactNum)
Patients	(patientID, fName, lName, icNum, address, dateOfBirth, contactNum, gender)
HealthRecord	(recordID, patientID, diagnosis, medication, allergies)
Appointment	(appointmentID, doctorID, patientID, Appointmentdate, time, status)
Billing	(invoiceID, staffID, patientID, Billingdate, totalAmount)

6.0 SQL Statements (DDL & DML)

6.1 Data Definition Languages (DDL)

```
CREATE TABLE Staff
(
   staffID VARCHAR2(10) NOT NULL,
   fName VARCHAR2(20) NOT NULL,
   lName VARCHAR2(20) NOT NULL,
   position VARCHAR2(20) NOT NULL,
   CONSTRAINT Staff_pk PRIMARY KEY(staffID)
);

CREATE TABLE StaffContact
(
   staffID VARCHAR2(10) NOT NULL,
   contactNum NUMBER(12) NOT NULL,
   CONSTRAINT StaffContact_pk PRIMARY KEY(staffID),
        CONSTRAINT StaffContact_fk FOREIGN KEY (staffID) REFERENCES Staff(staffID)
);

CREATE TABLE Doctor
(
   doctorID VARCHAR2(10) NOT NULL,
   fName VARCHAR2(20) NOT NULL,
   lName VARCHAR2(20) NOT NULL,
   specialization VARCHAR2(60) NOT NULL,
   CONSTRAINT Doctor_pk PRIMARY KEY(doctorID)
);

CREATE TABLE DoctorContact
(
   doctorID VARCHAR2(10) NOT NULL,
   contactNum NUMBER(12) NOT NULL,
   CONSTRAINT DoctorContact_pk PRIMARY KEY(doctorID),
      CONSTRAINT DoctorContact_fk FOREIGN KEY (doctorID) REFERENCES Doctor(doctorID)
```

```
);

CREATE TABLE Patients
(
   patientID VARCHAR2(10) NOT NULL,
   fName VARCHAR2(20) NOT NULL,
   lName VARCHAR2(20) NOT NULL,
   icNum VARCHAR2(20) NOT NULL,
   address VARCHAR2(60) NOT NULL,
   dateOfBirth DATE NOT NULL,
   contactNum NUMBER(12) NOT NULL,
   gender VARCHAR2(10) NOT NULL,
   CONSTRAINT Patients_pk PRIMARY KEY(patientID)
);

CREATE TABLE HealthRecord
(
   recordID VARCHAR2(10) NOT NULL,
   patientID VARCHAR2(10) NOT NULL,
   diagnosis VARCHAR2(60) NOT NULL,
   medication VARCHAR2(60) NOT NULL,
   allergies VARCHAR2(60) NOT NULL,
   CONSTRAINT HealthRecord_pk PRIMARY KEY(recordID),
      CONSTRAINT HealthRecord_fk FOREIGN KEY (patientID) REFERENCES
Patients(patientID)
);

CREATE TABLE Appointment(

   appointmentID VARCHAR2(10) NOT NULL,
   doctorID VARCHAR2(10) NOT NULL,
   patientID VARCHAR2(10) NOT NULL,
   Appointmentdate DATE NOT NULL,
   time TIMESTAMP NOT NULL,
   status VARCHAR2(20) NOT NULL,
   CONSTRAINT Appointment_pk PRIMARY KEY(appointmentID),
    CONSTRAINT Appointment_fk1 FOREIGN KEY (doctorID) REFERENCES
Doctor(doctorID),
    CONSTRAINT Appointment_fk2 FOREIGN KEY (patientID) REFERENCES
Patients(patientID)
);

CREATE TABLE Billing
(
  invoiceID VARCHAR2(10) NOT NULL,
  staffID VARCHAR2(10) NOT NULL,
  patientID VARCHAR2(10) NOT NULL,
  Billingdate DATE NOT NULL,
  totalAmount NUMBER(10) NOT NULL,
  CONSTRAINT Billing_pk PRIMARY KEY(invoiceID),
       CONSTRAINT Billing_fk1 FOREIGN KEY (staffID) REFERENCES
Staff(staffID),
      CONSTRAINT Billing_fk2 FOREIGN KEY (patientID) REFERENCES
Patients(patientID)
);
```

6.2 Data Manipulation Languages (DML)

```
INSERT INTO Staff
VALUES ('S001','Wong','Jenny','Receptionist');
INSERT INTO Staff
VALUES ('S002','Lim','Danny','Medical Secretary');
INSERT INTO Staff
VALUES ('S003','Adam','Faris','Billing Specialist');

INSERT INTO StaffContact
VALUES ('S001','0123456789');
INSERT INTO StaffContact
VALUES ('S002','0174731562');
INSERT INTO StaffContact
VALUES ('S003','0154789632');

INSERT INTO Doctor
VALUES ('D001', 'Lai', 'Chee', 'Paediatrician');
INSERT INTO Doctor
VALUES ('D002', 'Perry', 'Chan', 'General Practitioner');

INSERT INTO DoctorContact
VALUES ('D001', '0198762453');
INSERT INTO DoctorContact
VALUES ('D002', '0135672890');

INSERT INTO Patients
VALUES ('P001', 'John', 'Smith', '0020504106254', '123 Main Street',
TO_DATE('1995-08-20', 'YYYY-MM-DD'), '0123456789', 'Male');

INSERT INTO Patients
VALUES ('P002', 'Alice', 'Johnson', '0020504106255', '456 Oak Avenue',
TO_DATE('1980-03-10', 'YYYY-MM-DD'), '9876543210', 'Female');
```

```
INSERT INTO Patients
VALUES ('P003', 'Michael', 'Brown', '0020504106256', '789 Pine Road',
TO_DATE('1972-11-25', 'YYYY-MM-DD'), '5552223333', 'Male');

INSERT INTO Patients
VALUES ('P004', 'Emily', 'Miller', '0020504106257', '567 Maple Lane',
TO_DATE('1993-06-18', 'YYYY-MM-DD'), '1112345678', 'Female');

INSERT INTO Patients
VALUES ('P005', 'Daniel', 'Davis', '0020504106258', '890 Birch Street',
TO_DATE('1985-02-08', 'YYYY-MM-DD'), '9998887777', 'Male');

INSERT INTO Patients
VALUES ('P006', 'Sophia', 'Wilson', '0020504106259', '234 Cedar Avenue',
TO_DATE('1998-12-03', 'YYYY-MM-DD'), '4445556666', 'Female');

INSERT INTO Patients
VALUES ('P007', 'Ethan', 'Moore', '0020504106260', '678 Elm Road',
TO_DATE('1982-09-15', 'YYYY-MM-DD'), '7776665555', 'Male');

INSERT INTO Patients
VALUES ('P008', 'Olivia', 'Taylor', '0020504106261', '901 Pine Lane',
TO_DATE('1991-04-27', 'YYYY-MM-DD'), '3334445555', 'Female');

INSERT INTO Patients
VALUES ('P009', 'Mason', 'Hill', '0020504106262', '345 Oak Street',
TO_DATE('1979-07-12', 'YYYY-MM-DD'), '8889990000', 'Male');

INSERT INTO Patients
VALUES ('P010', 'Ava', 'Jones', '0020504106263', '678 Maple Avenue',
TO_DATE('1996-11-08', 'YYYY-MM-DD'), '2223334444', 'Female');

INSERT INTO Patients
```

```
VALUES ('P011', 'Carter', 'Brown', '0020504106264', '123 Cedar Road',
TO_DATE('1988-03-22', 'YYYY-MM-DD'), '6667778888', 'Male');

INSERT INTO Patients
VALUES ('P012', 'Chloe', 'Anderson', '0020504106265', '456 Elm Lane',
TO_DATE('1997-05-14', 'YYYY-MM-DD'), '1112223333', 'Female');

INSERT INTO Patients
VALUES ('P013', 'Liam', 'Clark', '0020504106266', '789 Birch Avenue',
TO_DATE('1983-08-29', 'YYYY-MM-DD'), '5554443333', 'Male');


INSERT INTO HealthRecord
VALUES ('HR001', 'P001', 'Common Cold', 'Ibuprofen', 'None');

INSERT INTO HealthRecord
VALUES ('HR002', 'P002', 'Hypertension', 'Lisinopril', 'Peanut');

INSERT INTO HealthRecord
VALUES ('HR003', 'P003', 'Influenza', 'Tamiflu', 'Penicillin');

INSERT INTO HealthRecord
VALUES ('HR004', 'P004', 'Migraine', 'Sumatriptan', 'Sulfites');

INSERT INTO HealthRecord
VALUES ('HR005', 'P005', 'Diabetes', 'Metformin', 'None');

INSERT INTO HealthRecord
VALUES ('HR006', 'P006', 'Asthma', 'Albuterol', 'Aspirin');

INSERT INTO HealthRecord
VALUES ('HR007', 'P007', 'Allergic Rhinitis', 'Loratadine', 'Dust');

INSERT INTO HealthRecord
```

```
VALUES ('HR008', 'P008', 'Gastroenteritis', 'Ondansetron', 'Shellfish');

INSERT INTO HealthRecord
VALUES ('HR009', 'P009', 'Anxiety', 'Sertraline', 'None');

INSERT INTO HealthRecord
VALUES ('HR010', 'P010', 'Osteoarthritis', 'Ibuprofen', 'None');

INSERT INTO HealthRecord
VALUES ('HR011', 'P011', 'Hypothyroidism', 'Levothyroxine', 'None');

INSERT INTO HealthRecord
VALUES ('HR012', 'P012', 'Urinary Tract Infection', 'Ciprofloxacin', 'Sulfa Drugs');

INSERT INTO HealthRecord
VALUES ('HR013', 'P013', 'Rheumatoid Arthritis', 'Methotrexate', 'None');


INSERT INTO Appointment
VALUES ('A001', 'D001', 'P003', TO_DATE('2024-01-10', 'YYYY-MM-DD'),
TO_TIMESTAMP('2024-01-10 17:30:00', 'YYYY-MM-DD HH24:MI:SS.FF6'),
'Scheduled');

INSERT INTO Appointment
VALUES ('A002', 'D002', 'P001', TO_DATE('2024-01-08', 'YYYY-MM-DD'),
TO_TIMESTAMP('2024-01-08 15:30:00', 'YYYY-MM-DD HH24:MI:SS.FF6'),
'Rescheduled');

INSERT INTO Appointment
VALUES ('A003', 'D001', 'P008', TO_DATE('2024-01-20', 'YYYY-MM-DD'),
TO_TIMESTAMP('2024-01-20 18:30:00', 'YYYY-MM-DD HH24:MI:SS.FF6'),
'Scheduled');

INSERT INTO Appointment
```

```
VALUES ('A004', 'D001', 'P011', TO_DATE('2024-01-25', 'YYYY-MM-DD'),
TO_TIMESTAMP('2024-01-25 09:00:00', 'YYYY-MM-DD HH24:MI:SS.FF6'),
'Scheduled');

INSERT INTO Appointment
VALUES ('A005', 'D002', 'P006', TO_DATE('2024-01-17', 'YYYY-MM-DD'),
TO_TIMESTAMP('2024-01-17 12:30:00', 'YYYY-MM-DD HH24:MI:SS.FF6'),
'Cancelled');

INSERT INTO Billing
VALUES('INV001', 'S001', 'P001', TO_DATE('2024-01-05', 'YYYY-MM-DD'),
150.00);

INSERT INTO Billing
VALUES('INV002', 'S002', 'P002', TO_DATE('2024-01-05', 'YYYY-MM-DD'),
70.00);

INSERT INTO Billing
VALUES('INV003', 'S001', 'P003', TO_DATE('2024-01-07', 'YYYY-MM-DD'),
80.00);

INSERT INTO Billing
VALUES('INV004', 'S003', 'P004', TO_DATE('2024-01-08', 'YYYY-MM-DD'),
120.00);

INSERT INTO Billing
VALUES('INV005', 'S002', 'P005', TO_DATE('2024-01-11', 'YYYY-MM-DD'),
100.00);
```

6.3 View Query

6.3.1 View Staff table

```
SELECT *
FROM Staff ;
```

6.3.2 View Staff Contact table

```
SELECT *
FROM StaffContact;
```

6.3.3 View Doctor table

```
SELECT *
FROM Doctor;
```

6.3.4 View Doctor Contact table

```
SELECT *
FROM DoctorContact;
```

6.3.5 View Patients table

```
SELECT *
FROM Patients;
```

6.3.6 View Patients Health Record

```
SELECT *
FROM HealthRecord;
```

6.3.7 View Appointment details

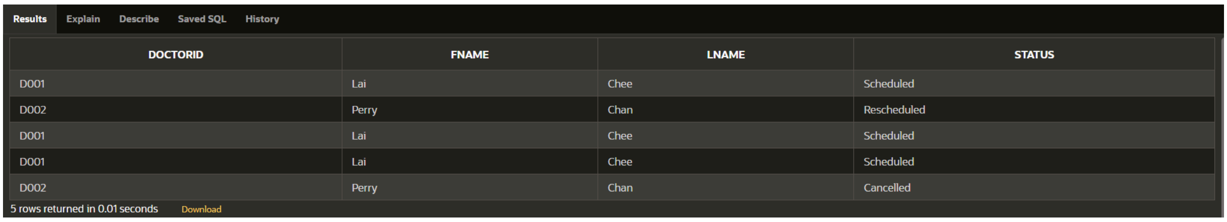
```
SELECT *
FROM Appointment;
```

6.3.8 View Billing details

```
SELECT *

FROM Billing;
```

6.3.9 Join (Demo query)

```
SELECT

    Doctor.doctorID,

    Doctor.fName,

    Doctor.lName,

    Appointment.status

FROM

    Doctor

JOIN

    Appointment ON Doctor.doctorID = Appointment.doctorID;
```

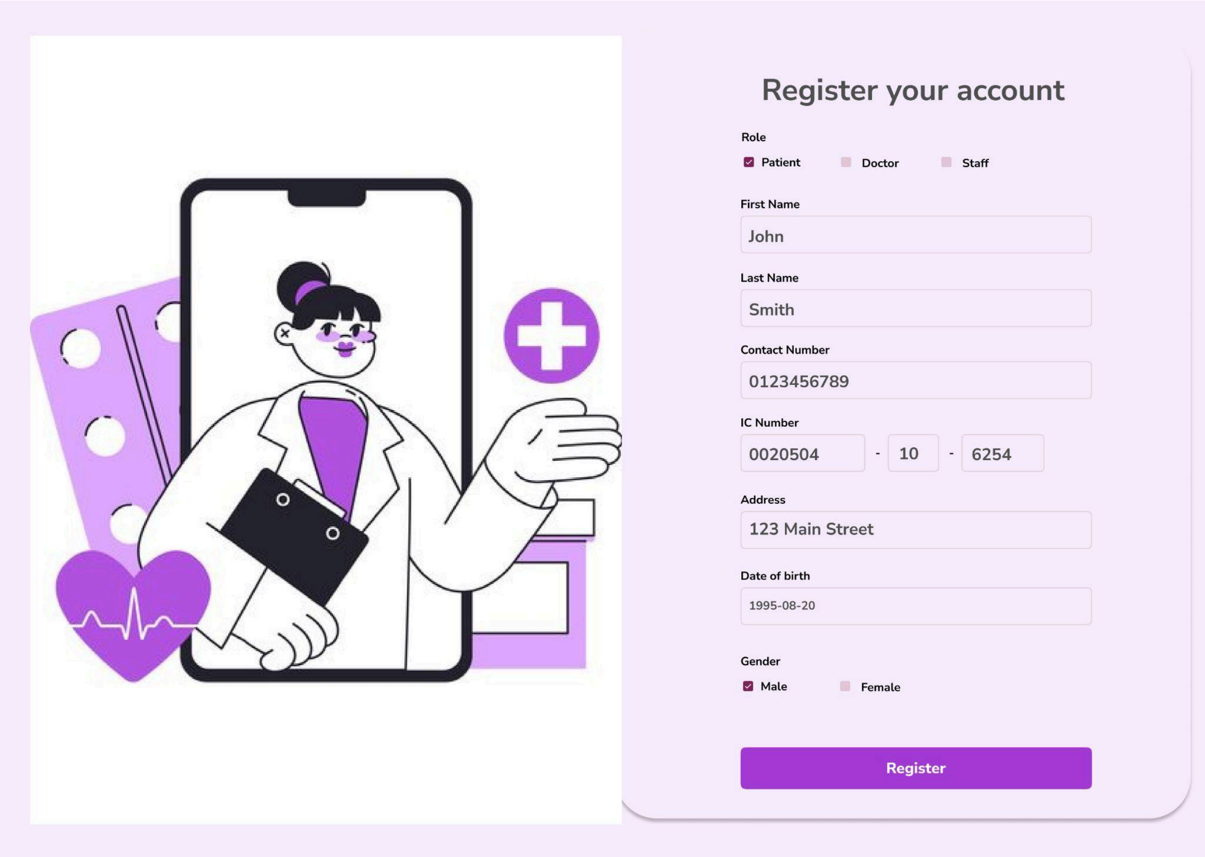


DOCTORID	FNAME	LNAME	STATUS
D001	Lai	Chee	Scheduled
D002	Perry	Chan	Rescheduled
D001	Lai	Chee	Scheduled
D001	Lai	Chee	Scheduled
D002	Perry	Chan	Cancelled

5 rows returned in 0.01 seconds

7.0 User Interface

7.1 Register Page



Register your account

Role

☑ Patient □ Doctor □ Staff

First Name

John

Last Name

Smith

Contact Number

0123456789

IC Number

0020504 - 10 - 6254

Address

123 Main Street

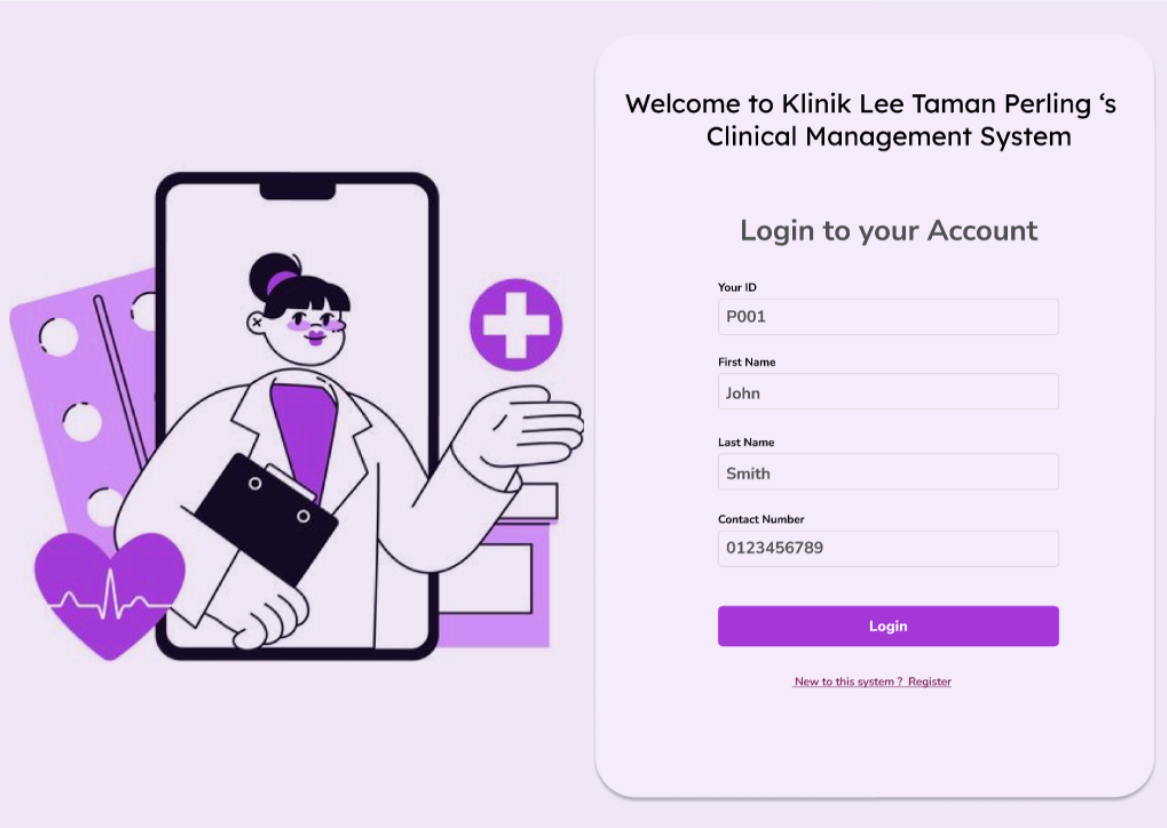
Date of birth

1995-08-20

Gender

☑ Male □ Female

7.2 Patient Login



Welcome to Klinik Lee Taman Perling ‘s Clinical Management System

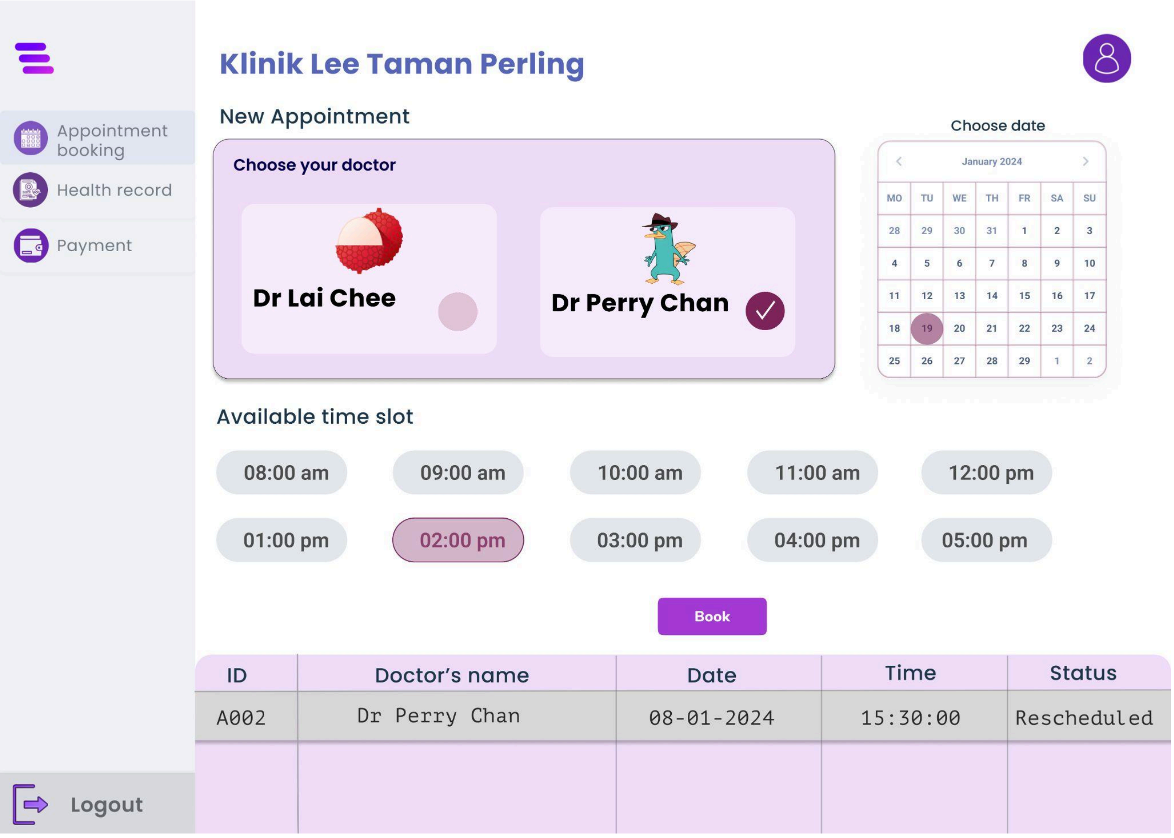
Login to your Account

Your ID
P001

First Name
John

Last Name
Smith

Contact Number
0123456789



Klinik Lee Taman Perling

New Appointment

Choose your doctor

Dr Lai Chee ○

Dr Perry Chan ✓

Choose date

January 2024

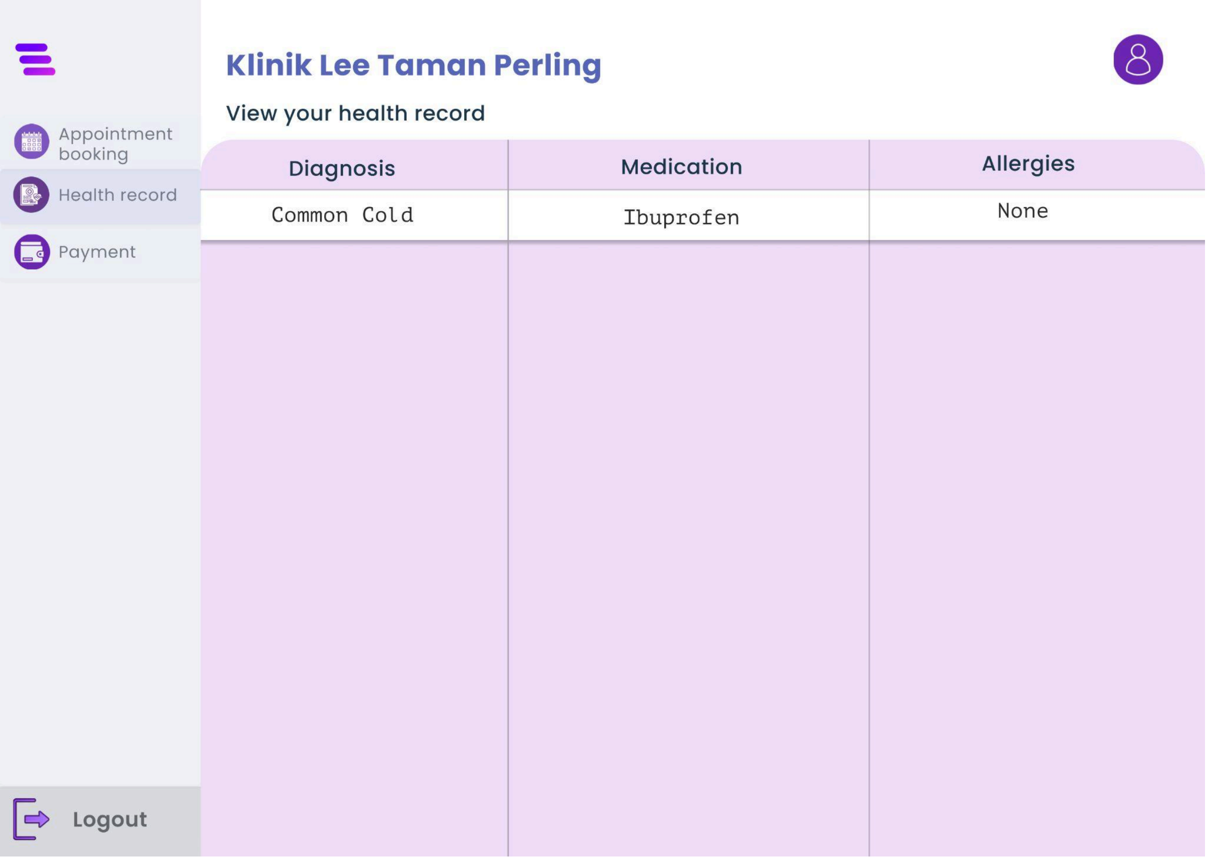
MO	TU	WE	TH	FR	SA	SU
28	29	30	31	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	1	2

Available time slot

08:00 am 09:00 am 10:00 am 11:00 am 12:00 pm

01:00 pm 02:00 pm 03:00 pm 04:00 pm 05:00 pm

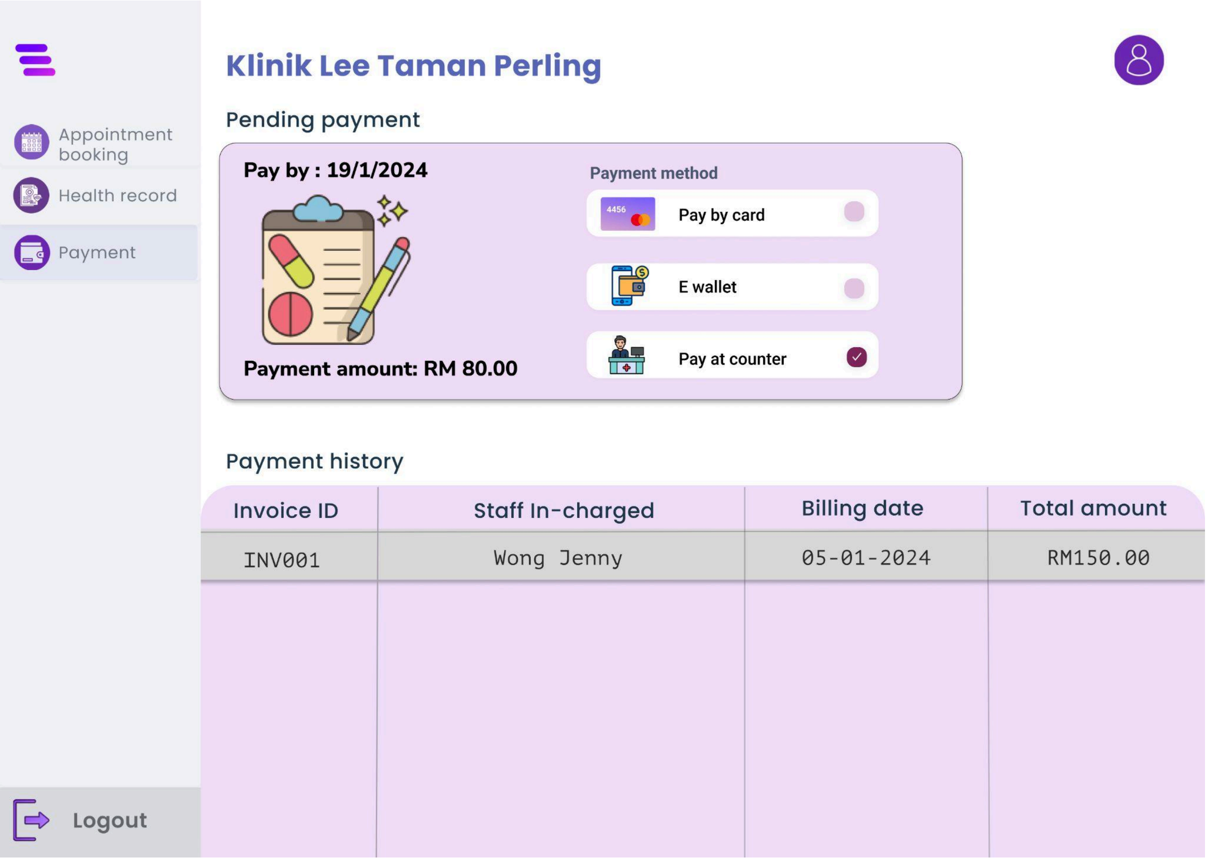
ID	Doctor’s name	Date	Time	Status
A002	Dr Perry Chan	08-01-2024	15:30:00	Rescheduled



Klinik Lee Taman Perling

View your health record

Diagnosis	Medication	Allergies
Common Cold	Ibuprofen	None



Klinik Lee Taman Perling

Pending payment

Pay by : 19/1/2024

Payment amount: RM 80.00

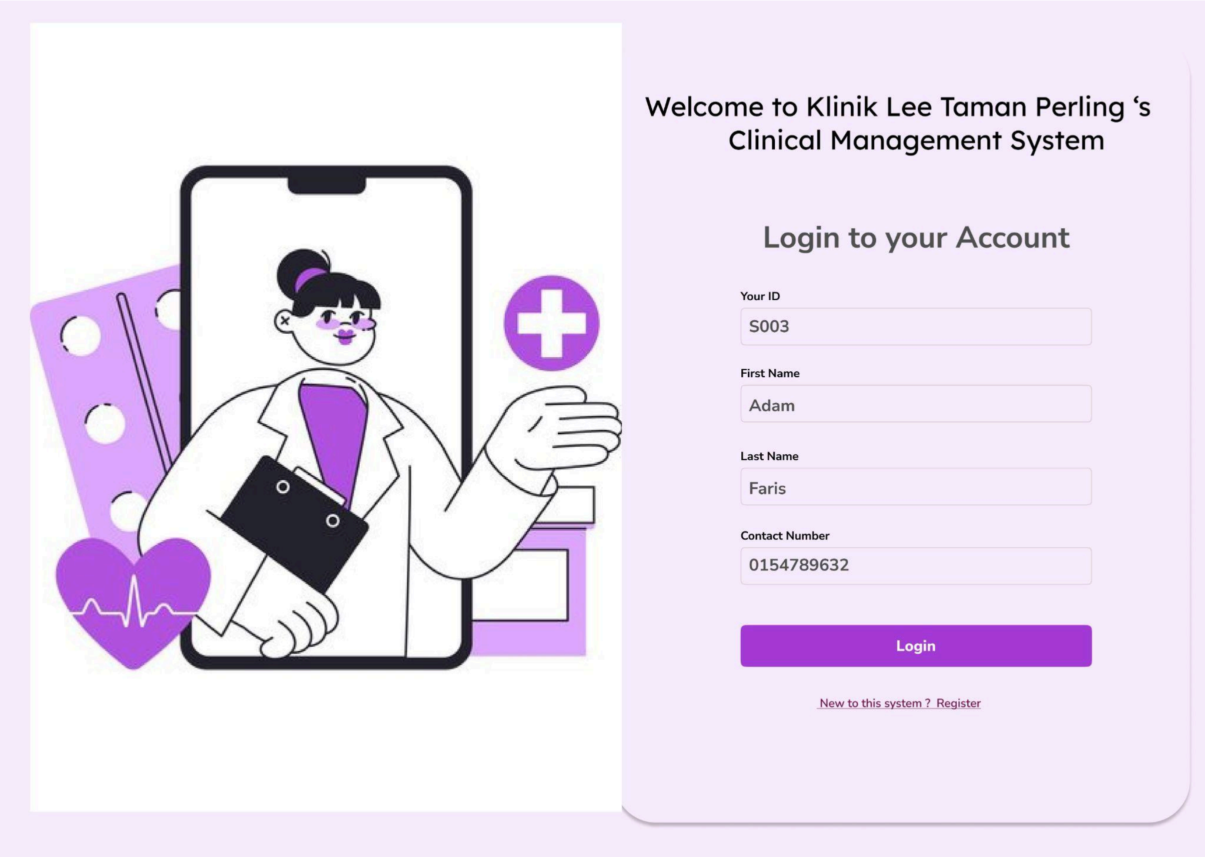
Payment method

- Pay by card ○
- E wallet ○
- Pay at counter ☑

Payment history

Invoice ID	Staff In-charged	Billing date	Total amount
INV001	Wong Jenny	05-01-2024	RM150.00

7.3 Staff Login



Welcome to Klinik Lee Taman Perling ‘s Clinical Management System

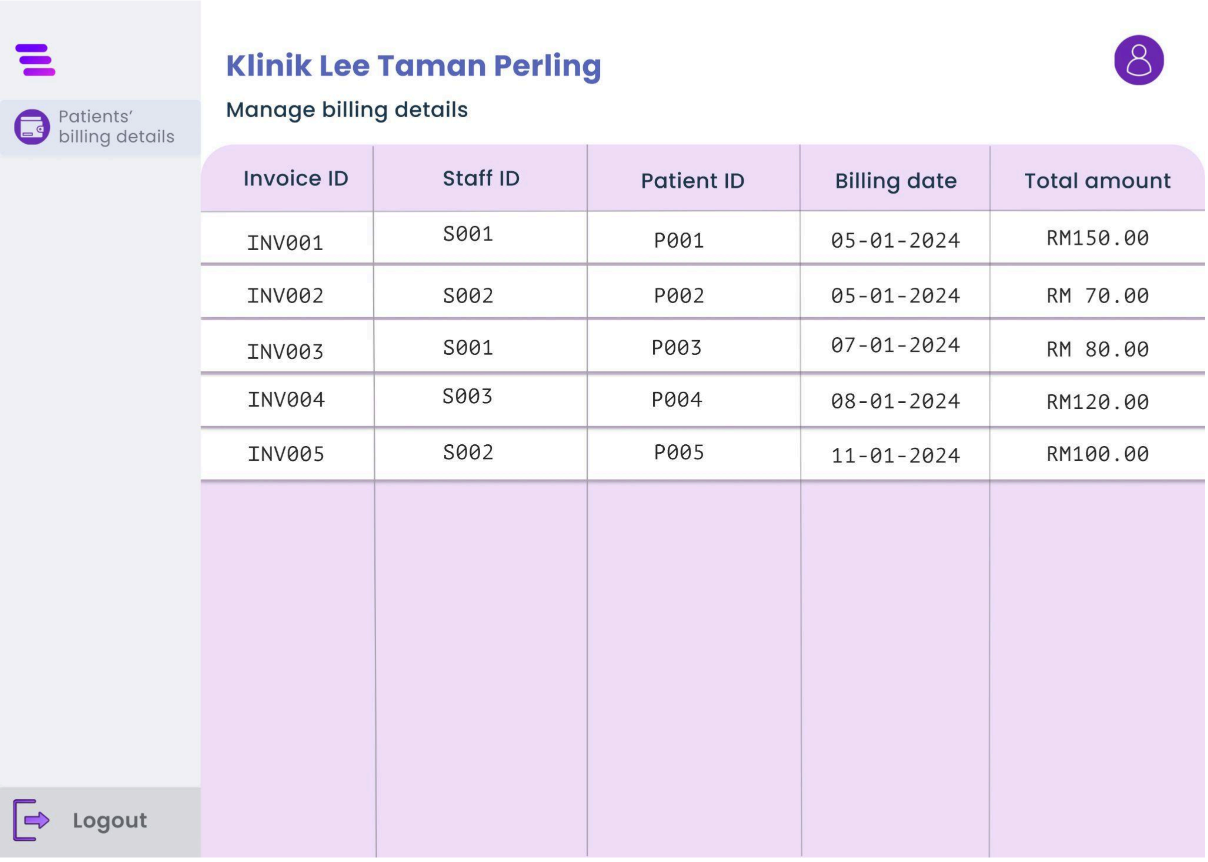
Login to your Account

Your ID: S003

First Name: Adam

Last Name: Faris

Contact Number: 0154789632

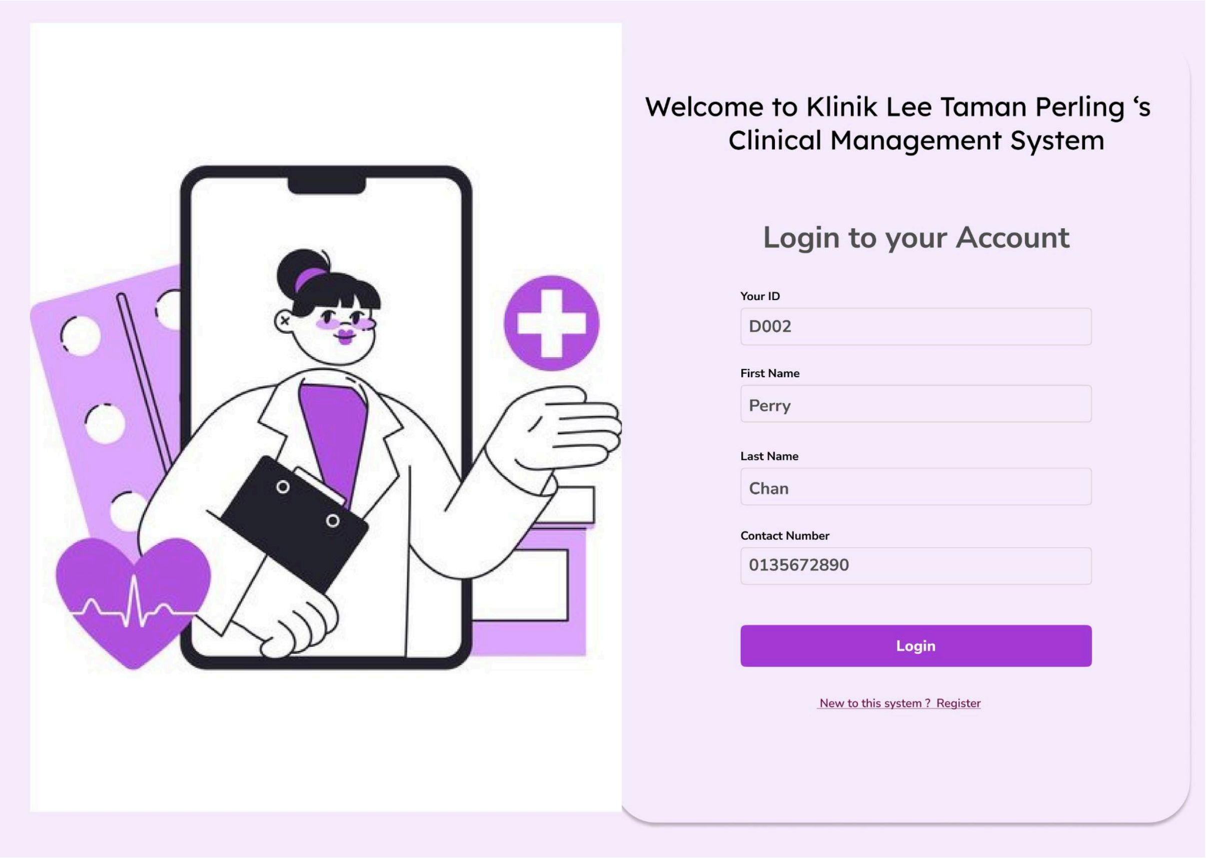


Klinik Lee Taman Perling

Manage billing details

Invoice ID	Staff ID	Patient ID	Billing date	Total amount
INV001	S001	P001	05-01-2024	RM150.00
INV002	S002	P002	05-01-2024	RM 70.00
INV003	S001	P003	07-01-2024	RM 80.00
INV004	S003	P004	08-01-2024	RM120.00
INV005	S002	P005	11-01-2024	RM100.00

7.4 Dentist Login



Welcome to Klinik Lee Taman Perling ‘s Clinical Management System

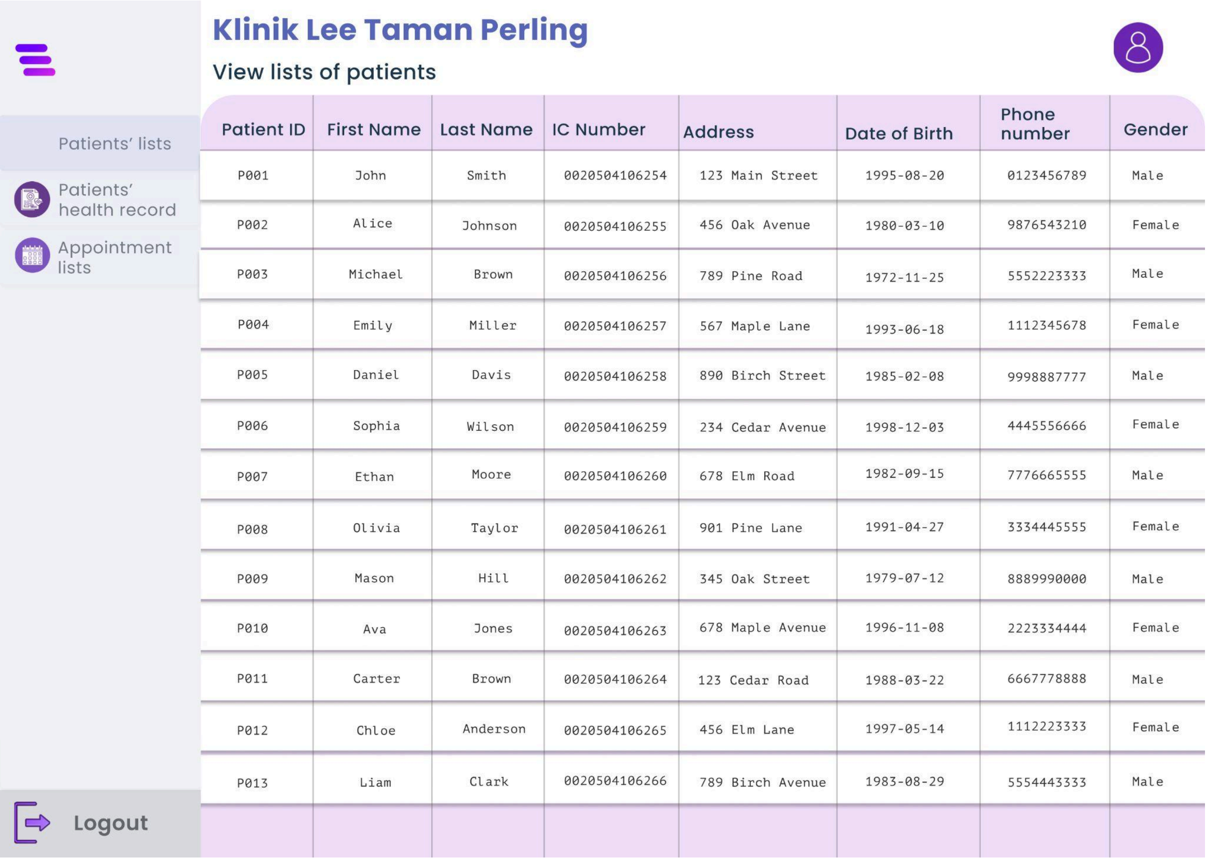
Login to your Account

Your ID: D002

First Name: Perry

Last Name: Chan

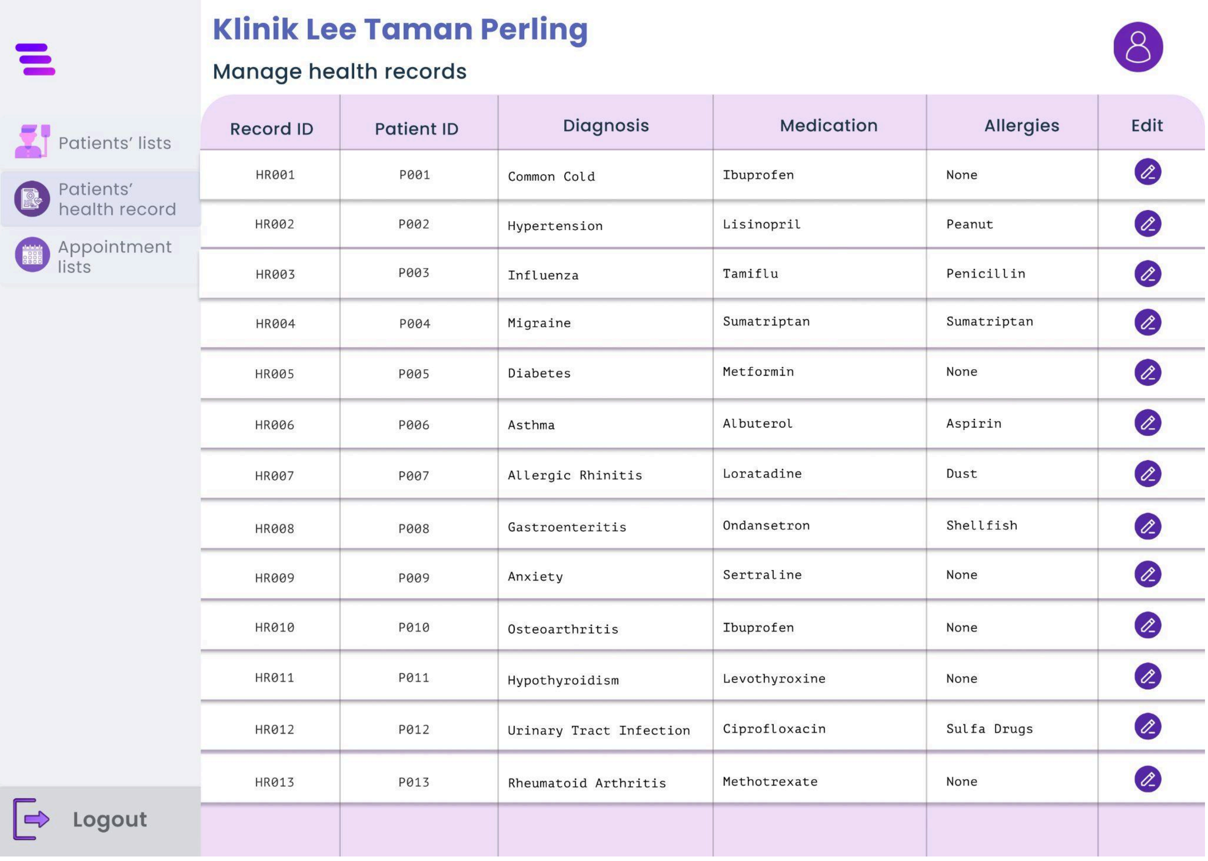
Contact Number: 0135672890



Klinik Lee Taman Perling

View lists of patients

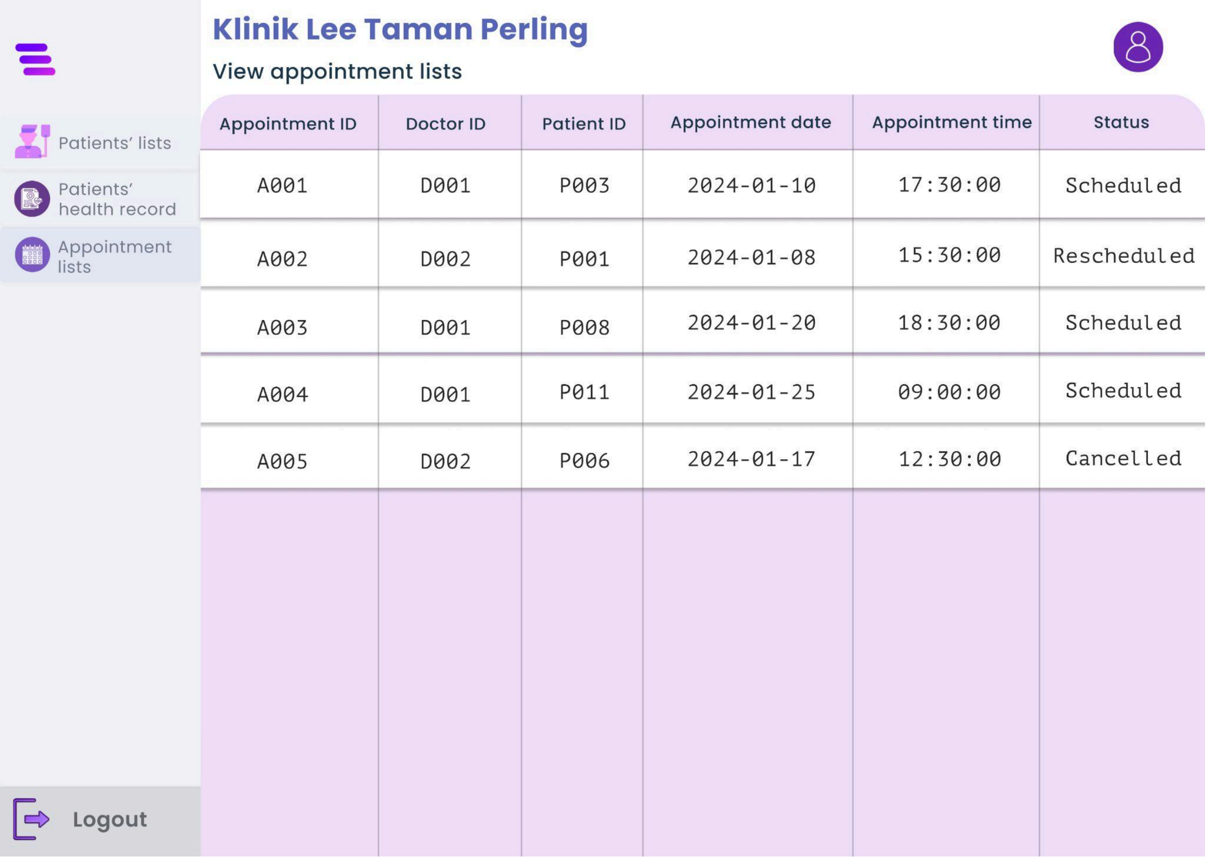
Patient ID	First Name	Last Name	IC Number	Address	Date of Birth	Phone number	Gender
P001	John	Smith	0020504106254	123 Main Street	1995-08-20	0123456789	Male
P002	Alice	Johnson	0020504106255	456 Oak Avenue	1980-03-10	9876543210	Female
P003	Michael	Brown	0020504106256	789 Pine Road	1972-11-25	5552223333	Male
P004	Emily	Miller	0020504106257	567 Maple Lane	1993-06-18	1112345678	Female
P005	Daniel	Davis	0020504106258	890 Birch Street	1985-02-08	9998887777	Male
P006	Sophia	Wilson	0020504106259	234 Cedar Avenue	1998-12-03	4445556666	Female
P007	Ethan	Moore	0020504106260	678 Elm Road	1982-09-15	7776665555	Male
P008	Olivia	Taylor	0020504106261	901 Pine Lane	1991-04-27	3334445555	Female
P009	Mason	Hill	0020504106262	345 Oak Street	1979-07-12	8889990000	Male
P010	Ava	Jones	0020504106263	678 Maple Avenue	1996-11-08	2223334444	Female
P011	Carter	Brown	0020504106264	123 Cedar Road	1988-03-22	6667778888	Male
P012	Chloe	Anderson	0020504106265	456 Elm Lane	1997-05-14	1112223333	Female
P013	Liam	Clark	0020504106266	789 Birch Avenue	1983-08-29	5554443333	Male



Klinik Lee Taman Perling

Manage health records

Record ID	Patient ID	Diagnosis	Medication	Allergies	Edit
HR001	P001	Common Cold	Ibuprofen	None	✎
HR002	P002	Hypertension	Lisinopril	Peanut	✎
HR003	P003	Influenza	Tamiflu	Penicillin	✎
HR004	P004	Migraine	Sumatriptan	Sumatriptan	✎
HR005	P005	Diabetes	Metformin	None	✎
HR006	P006	Asthma	Albuterol	Aspirin	✎
HR007	P007	Allergic Rhinitis	Loratadine	Dust	✎
HR008	P008	Gastroenteritis	Ondansetron	Shellfish	✎
HR009	P009	Anxiety	Sertraline	None	✎
HR010	P010	Osteoarthritis	Ibuprofen	None	✎
HR011	P011	Hypothyroidism	Levothyroxine	None	✎
HR012	P012	Urinary Tract Infection	Ciprofloxacin	Sulfa Drugs	✎
HR013	P013	Rheumatoid Arthritis	Methotrexate	None	✎



Klinik Lee Taman Perling

View appointment lists

Appointment ID	Doctor ID	Patient ID	Appointment date	Appointment time	Status
A001	D001	P003	2024-01-10	17:30:00	Scheduled
A002	D002	P001	2024-01-08	15:30:00	Rescheduled
A003	D001	P008	2024-01-20	18:30:00	Scheduled
A004	D001	P011	2024-01-25	09:00:00	Scheduled
A005	D002	P006	2024-01-17	12:30:00	Cancelled

8.0 Summary

In this phase of the project , we have managed to transform the conceptual ERD to logical ERD . In this process , we have further improved the details of the diagram.We also have updated previous business rules to ensure the business rules always comply to the goals of Klinik Lee Taman Perling and operates efficiently within the clinical management system.The data dictionary also has been updated by enhancing the data information for each relation such as attributes , data type,data length , constraint and description.The data information helps us to figure out the database requirements.Besides, we also identify all functional dependencies by determining the relationship between attributes which implies how attributes depend the other attributes. The functional dependencies also help to minimize the data redundancy by performing normalization.

The relations and their attributes are finalized through four consecutive normalization processes. In first normalization, we have to remove repeating groups to prevent data duplication.Next, the process proceeds with eliminating partial dependencies.The transitive dependencies will be removed in third normalization. Lastly , the third normal form of data is further normalized to Boyce-Codd normal form.The relational database schemas will reflect the logical view of database structure by listing out all attributes and underlined the primary key for each relation.We also implement queries to create object database using SQL language in Oracle Apex. The SQL statements are able to run successfully as all relations are created and all values for each attribute managed to be inserted.

In short, we have designed a logical structure of the database which provides the Klinik Lee Taman Perling a logical view of the proposed clinical management system database as well as helped them to organize all important data accordingly by managing the patients' data , appointment schedule and electronic medical records.