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CHAPTER 1 PROJECT BACKGROUND

Project Background

This chapter presents the Clinic Management Database System (CMDS) project, which aims to develop a comprehensive database management system for HealthyLife Clinic. The primary objective is to efficiently handle medical tasks while providing a robust data management function that caters to both clinic staff and patients.

As a medium-sized clinic, HealthyLife Clinic experiences a significant influx of patients seeking medical treatment. During clinic procedures, patients must provide detailed information such as their name, age, reason for the visit, symptoms, and preferred appointment date. Additionally, the details of the attending doctors are meticulously recorded. Therefore, it is crucial to design an effective and user-friendly database capable of managing the extensive information related to patients, doctors, appointments, medical records, billing, payments, and clinic inventory.

Our approach begins with constructing the database using an Entity-Relationship Diagram (ERD) to define the relationships and cardinalities between entities. Additionally, business rules will be established based on the terms and conditions of HealthyLife Clinic. The ERD will serve as a foundational tool for designing a user-friendly system that effectively manages the clinic's resources and services. This groundwork will facilitate the subsequent phases of database design, implementation, evaluation, and application.

1.1 System Overview

This project is to design and develop a comprehensive database administration system for the HealthyLife Clinic. It aims to simplify procedures such as obtaining, holding and retrieving data from clinic resources and services.

This system is available every day except maintenance day. We will set several limits on data input based on the requirements of the clinic manager to ensure the data entry is properly recorded and can be categorized easily.

Besides that, this system can track every transaction, information of appointment, doctor's duty shift, the number of stocks. The business rules and regulations of clinic operation in HealthyLife Clinic are enforced in our CMDS. These rules were cited from clinic

management's terms and condition to ensure every clinical task operating will be suitable for clinical management.

Our CMDS also has forms and queries to let clinic staff store data, search for data and categorize data. It also has reports that summarize the clinic's overall operations and provide valuable data to help top management make better decisions in clinic's policy.

HealthyLife Clinic can install and apply extensively this CMDS to increase the efficiency of clinic task operating, decrease the load of clinic staff and increase the experience of patients in using CMDS.

1.2 Project Objectives

i. To create a CDMS with user-friendly data input and retrieval functions are intended to handle patient and doctor information effectively. This guarantees that staff members can easily access, securely store, and properly record patient data.

ii. The system is configured to improve the doctors' ability to diagnose and treat patients. It will help doctors make accurate diagnoses and choose the best courses of action by making each patient's medical history easily accessible. Additionally, by keeping an extensive record of diagnoses and prescriptions, it will facilitate well-informed drug prescription decision-making.

iii. To create a CDMS that offers a simplified way to monitor the status of a patient's appointments, which is meant to improve HealthyLife operations. This will enhance staff productivity, reduce wait times, and maximize clinic resources. Patients are guaranteed prompt and appropriate care by the system, which maintains and secures medical data.

1.3 Target Database User

The targeted users who can access this database system include the staff members such as clinic administrators, doctors and nurses who oversee the administrative and business operation of HealthyLife clinic.

CHAPTER 2 DATABASE DESIGN

2.1 List of Entities and Attributes

Entity	Attributes
Patient	Patient_ID (PK) Patient_FirstName Patient_LastName Patient_DateOfBirth Patient_Email Patient_PhoneNumber
Patient_Condition	Patient_ID (PK) (FK) Condition_ID (PK) (FK)
Health_Condition	Condition_ID (PK) Condition_Description
Doctor	Doctor_ID (PK) Doctor_FirstName Doctor_LastName Doctor_DateOfBirth Doctor_Email Doctor_PhoneNumber
Doctor_Specialty	Doctor_ID (PK) (FK) Specialty_ID (PK) (FK)
Specialty	Specialty_ID (PK) Specialty_Name
Availability	Availability_ID (PK) Doctor_ID (FK) Availability_Date Availability_StartTime Availability_EndTime Availability_Status
Shift	Shift_ID (PK) Shift_StartTime Shift_EndTime

Doctor_Shift	Shift_ID (PK) (FK) Doctor_ID (PK) (FK)
Appointment	Appointment_ID (PK) Doctor_ID (FK) Patient_ID (FK) Availability_ID (FK) Appointment_Purpose Appointment_Status
Medical_History_Record	Record_ID (PK) Patient_ID (FK) Appointment_ID (FK) Record_Diagnosis Record_Test_Result Record_Treatment Record_Prescription
Expended_Resources	Record_ID (PK) (FK) Inventory_ID (PK) (FK) Expended_Amount
Billing_Payment	Payment_ID (PK) Appointment_ID (FK) Patient_ID (FK) Payment_Consulation Payment_Treatment Payment_Medication Payment_Total Payment_Method Payment_Status
Invoice	Invoice_ID (PK) Payment_ID (FK) Invoice_Amount Invoice_Date
Inventory	Inventory_ID (PK) Inventory_Name

	Inventory_Type Inventory_InitialAmount Inventory_CurrentAmount

Table 2.1.1

2.2 Entity Relationship Diagram (ERD)

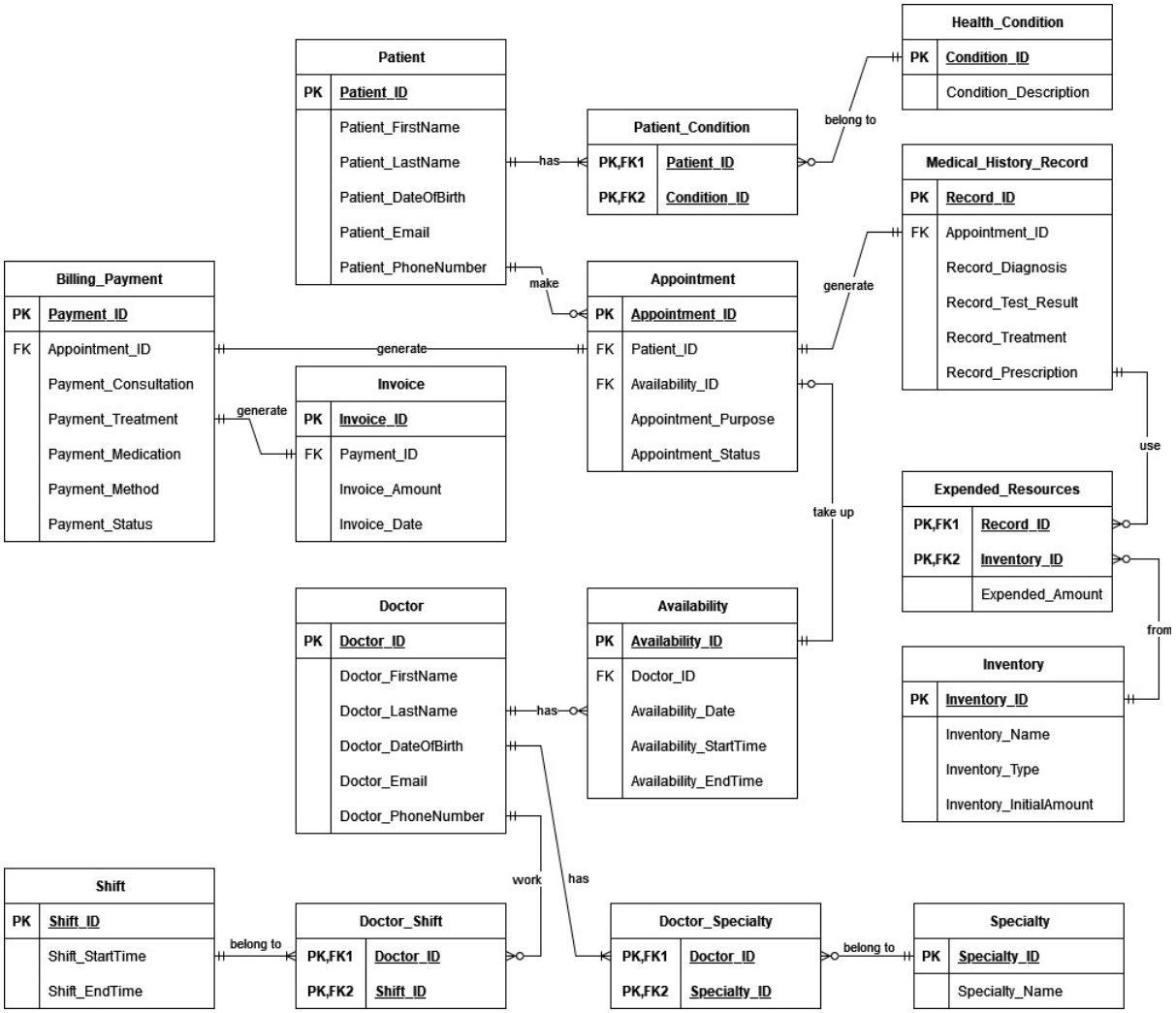


Figure 2.2.1

During the logical design stage, one method to present the entity and attribute requirements for the database management is using an ERD diagram.

The main purpose of creating an ERD is so that we may reduce the number of adjustments required during the implementation phase and ensure the structure's coherence. Apart from that, a comprehensive and well-thought-out ERD diagram may facilitate the

building of databases and the conversion of our conceptual design into a logical and physical database more easily.

In addition, we can establish relationships and connections between the entities using notations. This also allows us to quickly identify the relationships between these items by reading the crow foot's notation and relationships in both directions.

Furthermore, we may determine whether our object has any errors, such as multi-valued and volatile attributes, or many-to-many relationships.

In our instance, a clear ERD diagram aids in providing the clinic staff and upper management with a better understanding of the data that will be kept in the database and how it is connected to other data. It conveys complicated relationships in a more straightforward manner.

In conclusion, our clinic database system is clearly illustrated by our ERD diagram.

2.3 Assumptions and Business Rules

2.3.1 Patient

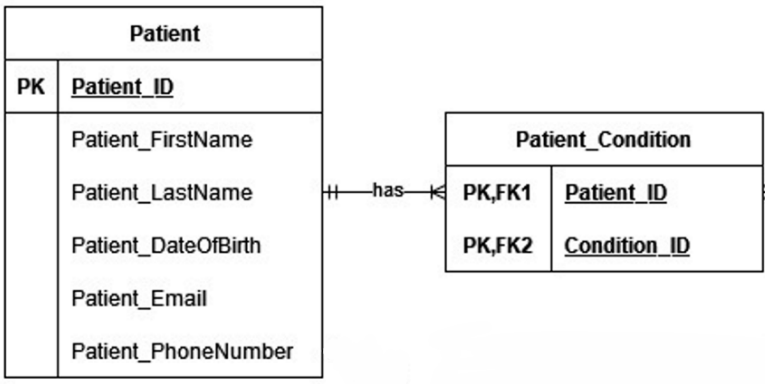


Figure 2.3.1

a) List of assumptions:

- Assume that each patient has a unique Patient_ID.
- Patients' personal information, including their first name, last name, date of birth, email, and phone number, is recorded in the Patient table.
- Each patient can have multiple health conditions associated with them.

b) List of business rules (according to ERD):

- Each patient must have a unique Patient_ID.
- A patient can have multiple health conditions, which are recorded in the Patient_Condition table.

- The Patient table holds essential personal information about the patient, which is used to manage and track patient records.

2.3.2 Health Condition

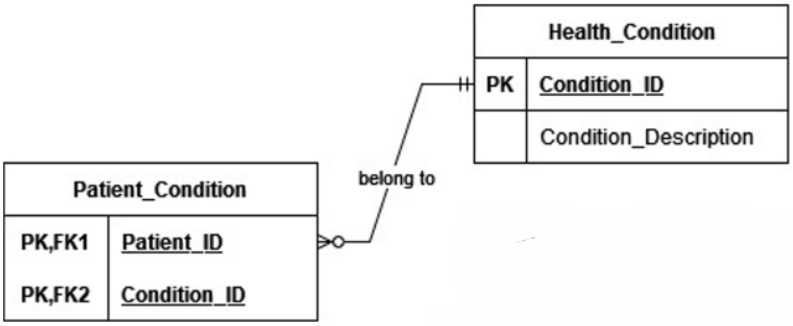


Figure 2.3.2

a) List of assumptions:

- Assume that each entry in the Patient_Condition table links one patient (Patient_ID) to one specific health condition (Condition_ID).
- The relationship between patients and their health conditions is many-to-many

b) List of business rules (according to ERD):

- Each entry in the Patient_Condition table must have a unique combination of Patient_ID and Condition_ID, ensuring that a patient cannot be associated with the same condition more than once within the same record.
- The Patient_Condition table captures the relationship between patients and their diagnosed health conditions, linking each patient to their specific health conditions.
- Each patient can have multiple health conditions, and each condition can be associated with multiple patients.

2.3.3 Patient Condition

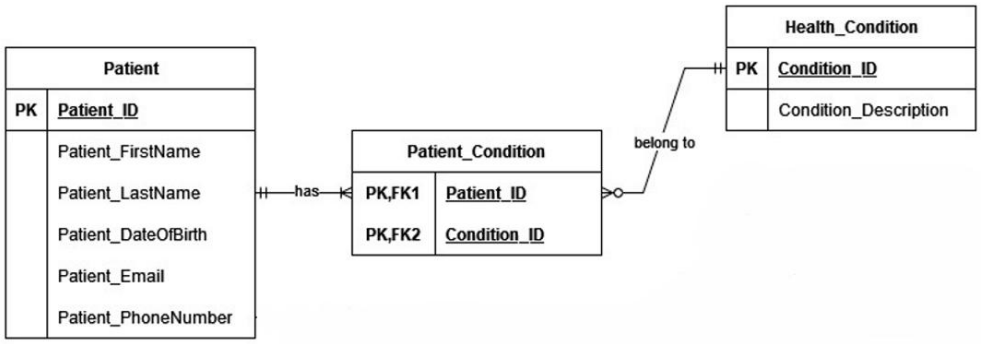


Figure 2.3.3

a) List of assumptions:

- Assume that each health condition has a unique Condition_ID.
- The Health_Condition table records descriptions of various health conditions.

b) List of business rules (according to ERD):

- Each health condition must have a unique Condition_ID.
- The Health_Condition table must contain a description (Condition_Description) of each health condition, which is linked to patients through the Patient_Condition table.
- Each health condition can be associated with multiple patients through the Patient_Condition table, enabling the tracking of various conditions across different patients.

2.3.4 Appointment

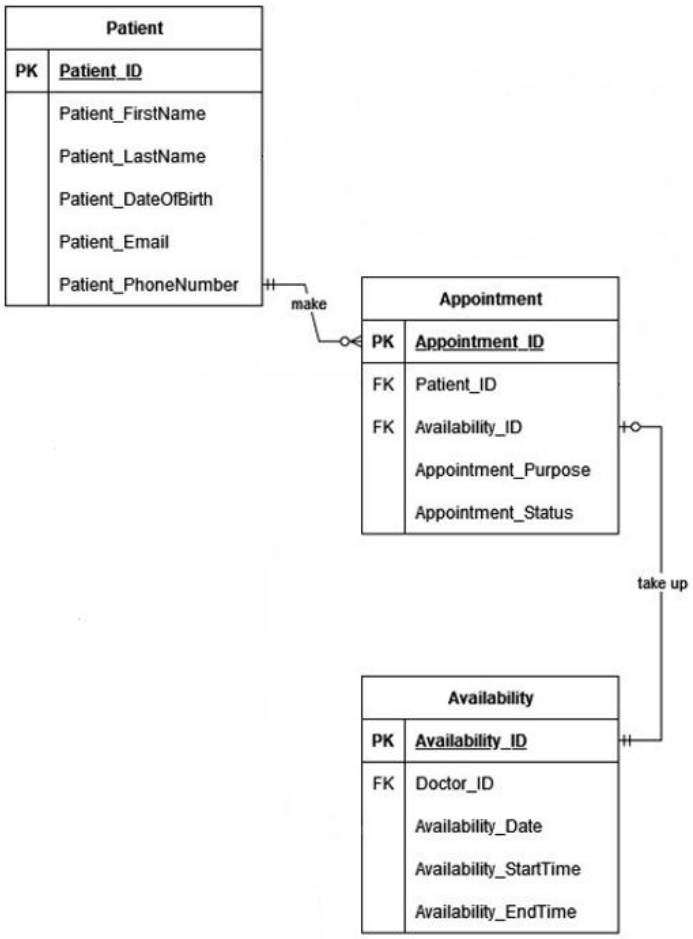


Figure 2.3.4

a) List of assumptions:

- Assume that each appointment has a unique Appointment_ID.
- Appointments are scheduled based on the availability of doctors.

- Appointment details include purpose and status.

b) List of business rules (according to ERD):

- Each appointment must have a unique Appointment_ID.
- Each appointment must be linked to a patient (Patient_ID) and a doctor's availability (Availability_ID).
- Appointment status must be updated and recorded accurately.

2.3.5 Billing Payment

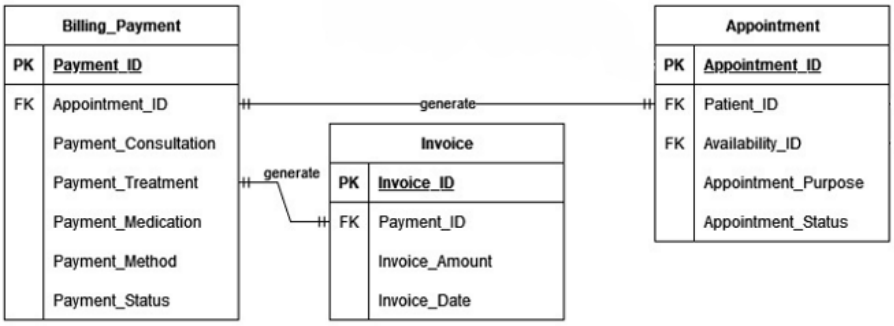


Figure 2.3.5

a) List of assumptions:

- Assume that each payment transaction has a unique Payment_ID.
- Payments are associated with consultations, treatments, and medications.
- Payment status and method are recorded in the database.

b) List of business rules (according to ERD):

- Each payment must have a unique Payment_ID.
- A payment is linked to an appointment through the Appointment_ID.
- Each payment generates an invoice, recorded in the Invoice table.

2.3.6 Invoice

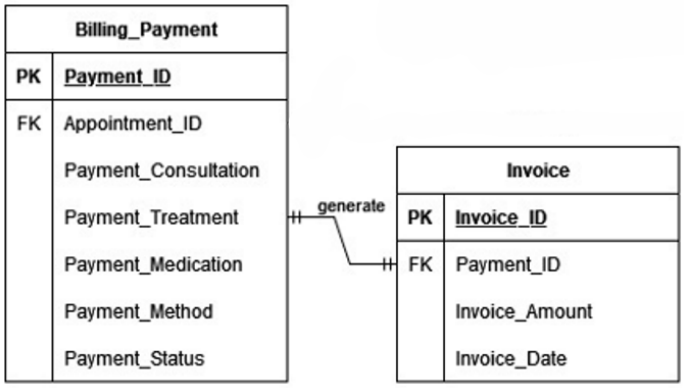


Figure 2.3.6

a) List of assumptions:

- Assume that each invoice has a unique Invoice_ID.
- Invoices are generated based on payments made by patients.
- Invoice details include the amount and date.

b) List of business rules (according to ERD):

- Each invoice must have a unique Invoice_ID.
- An invoice must be linked to a payment (Payment_ID).
- The invoice date and amount must be accurately recorded in the database.

2.3.7 Doctor

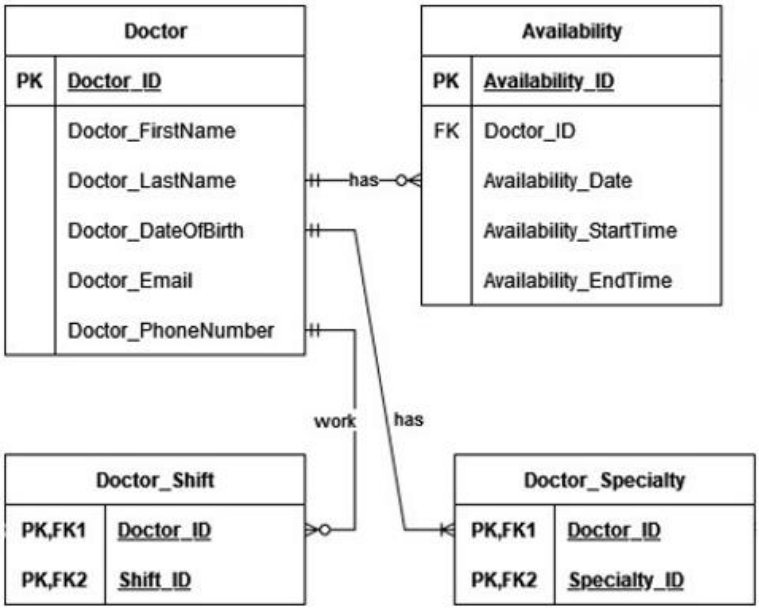


Figure 2.3.7

a) List of assumptions:

- Assume that each doctor has a unique Doctor_ID.
- Doctors' availability times are recorded in the Availability table with details such as date, start time, and end time.
- Each doctor's specialization is recorded in the Doctor_Specialty table.
- A doctor's shift details are maintained in the Doctor_Shift table, linking them to specific shifts.

b) List of business rules (according to ERD):

- Each doctor must have a unique Doctor_ID.
- A doctor can have multiple availability slots, which are recorded in the Availability table, capturing the specific dates and times a doctor is available.

- A doctor can have multiple specializations, with each specialization linked through the Doctor_Specialty table using the Doctor_ID and Specialty_ID.
- A doctor may work in multiple shifts, and these shifts are recorded in the Doctor_Shift table, where each entry links a Doctor_ID with a Shift_ID.

2.3.8 Availability

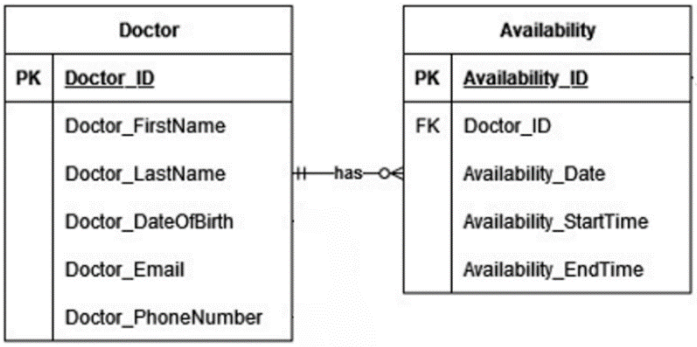


Figure 2.3.8

a) List of assumptions:

- Assume that each availability slot has a unique Availability_ID.
- Availability slots are linked to specific doctors.

b) List of business rules (according to ERD):

- Each availability slot must have a unique Availability_ID.
- Each availability slot is linked to one doctor (Doctor_ID).
- Availability slots must include start and end times.

2.3.9 Shift

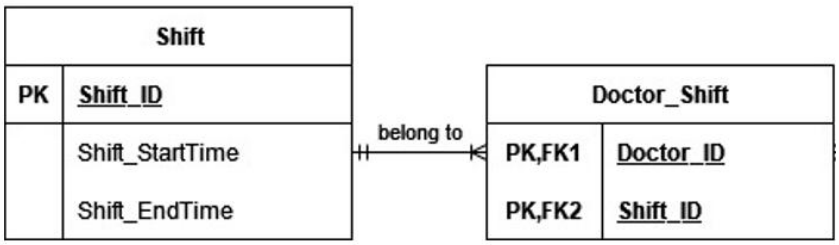


Figure 2.3.9

a) List of assumptions:

- Assume that each shift has a unique Shift_ID.
- Shifts have defined start and end times.

b) List of business rules (according to ERD):

- Each shift must have a unique Shift_ID.

- Shifts are linked to doctors through the Doctor_Shift table.
- Shift times must be accurately recorded.

2.3.10 Doctor Shift

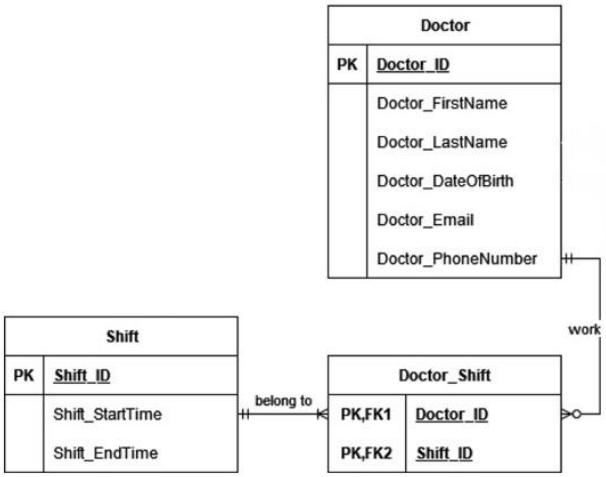


Figure 2.3.10

a) List of assumptions:

- Assume that each doctor shift entry links one doctor (Doctor_ID) to one specific shift (Shift_ID).
- The Shift table contains details about the shift timings, including Shift_StartTime and Shift_EndTime.

b) List of business rules (according to ERD):

- Each doctor shift entry must have a unique combination of Doctor_ID and Shift_ID in the Doctor_Shift table.
- A doctor can work multiple shifts, and each of these shifts is recorded as a separate entry in the Doctor_Shift table.
- The Doctor_Shift table captures the relationship between doctors and their assigned shifts, indicating which shifts a doctor works.
- Each shift is uniquely identified by Shift_ID and includes specific start and end times in the Shift table.

2.3.11 Doctor Specialty

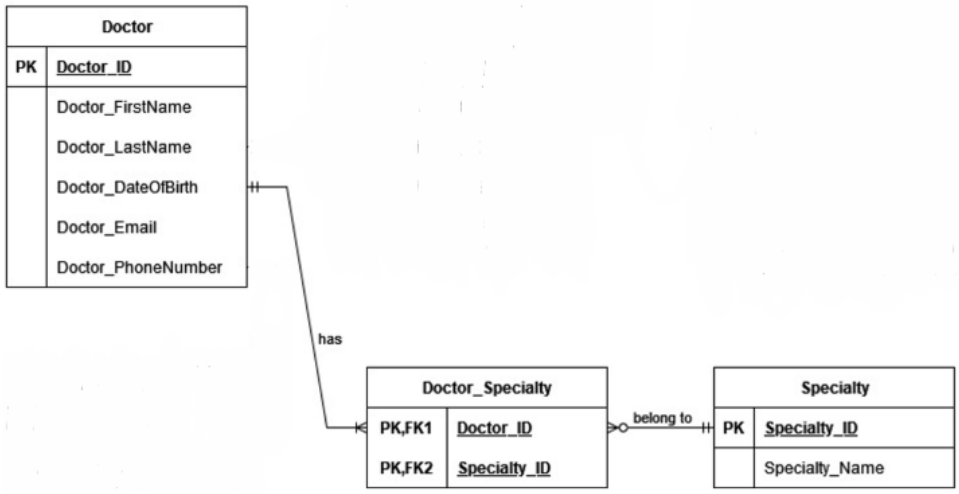


Figure 2.3.11

a) List of assumptions:

- Assume that each doctor may have one or more specialties.
- Specialties are recorded in the Specialty table and are linked to doctors through the Doctor_Specialty table.

b) List of business rules (according to ERD):

- Each entry in the Doctor_Specialty table must have a unique combination of Doctor_ID and Specialty_ID, ensuring that a doctor cannot be assigned the same specialty more than once.
- A doctor can have multiple specialties, and each specialty is linked to the doctor through a unique Specialty_ID.
- The Doctor_Specialty table serves as an associative entity, creating a many-to-many relationship between doctors and specialties.
- Each specialty listed in the Specialty table is uniquely identified by Specialty_ID and includes the Specialty_Name attribute to describe the area of specialization.

2.3.12 Specialty

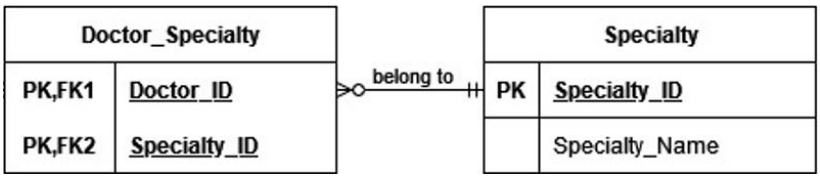


Figure 2.3.12

a) List of assumptions:

- Assume that each specialty has a unique Speciality_ID.

- Specialty names are recorded accurately in the database.

b) List of business rules (according to ERD):

- Each specialty must have a unique Speciality_ID.
- A specialty can be linked to multiple doctors through the Doctor_Specialty table.

2.3.13 Medical History Record

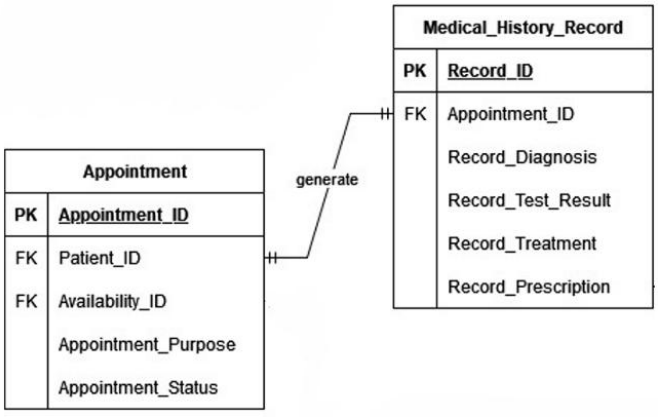


Figure 2.3.13

a) List of assumptions:

- Assume that each medical history record has a unique Record_ID.
- Medical history includes diagnosis, test results, treatments, and prescriptions.
- Medical records are linked to appointments.

b) List of business rules (according to ERD):

- Each medical history record must have a unique Record_ID.
- Medical history records must be linked to an appointment (Appointment_ID).
- Medical history details must be accurately recorded.

2.3.14 Expended Resources

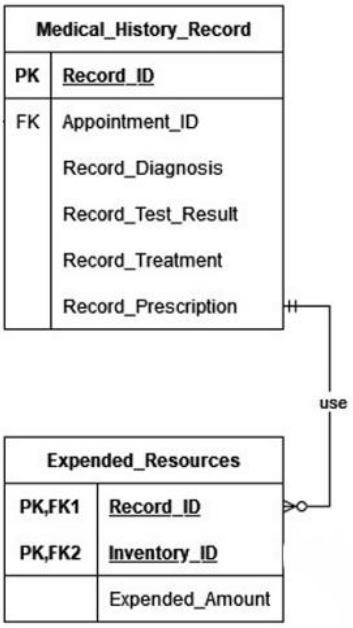


Figure 2.3.14

a) List of assumptions:

- Assume that each expended resource record links one medical history record (Record_ID) to one inventory item (Inventory_ID). The amount of resources used is tracked in the Expended_Resources table as Expended_Amount.

b) List of business rules (according to ERD):

- Each expended resource record must have a unique combination of Record_ID and Inventory_ID.
- The Expended_Amount (amount of resources used) must be recorded in the Expended_Resources table.
- The Expended_Resources table acts as a junction table, maintaining the many-to-many relationship between Medical_History_Record and Inventory.

2.3.15 Inventory

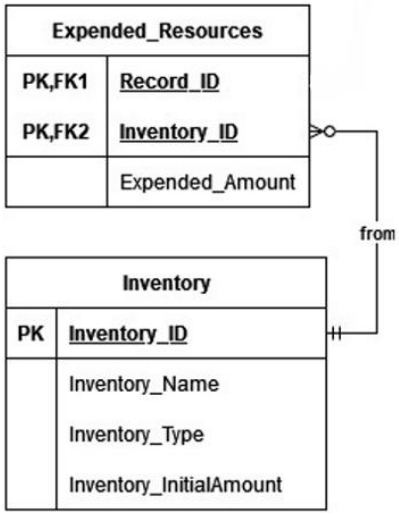


Figure 2.3.15

a) List of assumptions:

- Assume that each inventory item has a unique Inventory_ID.
- Inventory items are categorized by their Inventory_Type and have an initial stock amount (Inventory_InitialAmount).

b) List of business rules (according to ERD):

- Each inventory item must have a unique Inventory_ID.
- Inventory usage must be tracked and linked to Medical_History_Record through the Expended_Resources table.
- Inventory details such as Inventory_Name, Inventory_Type, and Inventory_InitialAmount must be recorded in the Inventory table.
- The Expended_Resources table must accurately reflect the decrement in Inventory_InitialAmount whenever an inventory item is used.

CHAPTER 3 DATABASE DEVELOPMENT

3.1 List of Tables

In this project, tables involved include Patient, Patient_Condition, Health_Condition, Doctor, Doctor_Specialty, Specialty, Availability, Shift, Doctor_Shift, Appointment, Medical_History_Record, Expended_Resources, Billing_Payment, Invoice and Inventory. There are a total of 15 tables in the project, each of which contains a collection of named columns and an unspecified number of rows to store data and information. The data type of each column is predetermined, and domain constraints include check, not null, unique, and default constraints control the values that may be placed into each field.

3.1.1 Data Dictionary and Table Records

a) Patient

- Data Dictionary

Field Name	Data Type	Description (Optional)
Patient_ID	Short Text	Patient ID (Primary Key)
Patient_FirstName	Short Text	Patient First Name
Patient_LastName	Short Text	Patient Last Name
Patient_DateOfBirth	Date/Time	Patient Date of Birth
Patient_Email	Short Text	Patient Email
Patient_PhoneNumber	Short Text	Patient Phone Number

Figure 3.1.1.1: Data dictionary of Patient entity

- Records

Patient ID	Patient _FirstName	Patient _LastName	Patient_ DateOfBirth	Patient Email	Patient _PhoneNumber
ABW7776	Ariana	Woodward	27-Aug-00	wariana7590@hotmail.com	60-18-532-8408
ADI4883	Lionel	Levine	11-Jan-87	llionel2652@hotmail.com	60-14-191-1315
AFT8524	McKenzie	Sharp	24-Aug-57	mckenzie-sharp@google.com	60-16-279-1575
AGH6451	Kiayada	Ramos	17-Jul-87	k-ramos964@google.com	60-12-789-7028
AIU7598	Tanek	Gilmore	03-Jun-99	g.tanek4966@icloud.com	60-17-469-1544
AJC3298	Cairo	Montgomery	04-Feb-53	cairomontgomery@outlook.com	60-15-560-1072
AJG5245	Xenos	Pennington	11-Jun-85	xenospennington2394@icloud.com	60-17-536-6608
AJH6792	Norman	Sweeney	12-Aug-53	nsweeney@google.com	60-18-740-7118
AJJ0736	Kaitlin	Mccoy	09-Dec-57	k_mccoy2370@hotmail.com	60-16-857-1358
AJN1591	Constance	Nash	25-Oct-50	cnash6187@hotmail.com	60-18-611-3062
ANA7692	Callum	Dalton	28-Jan-62	dalton_callum@google.com	60-12-520-5527
AOV3565	Adara	Carter	01-Apr-54	carteradara@outlook.com	60-13-463-7007
AQT8811	Ifeoma	Orr	14-Dec-60	orr.ifeoma8724@outlook.com	60-12-494-6494
ARJ7195	Vielka	Cleveland	23-Jan-90	cleveland-vielka@icloud.com	60-11-117-1067
ASH4493	Justine	Hewitt	11-Dec-78	justine_hewitt1729@hotmail.com	60-14-431-3200
ASI2474	Jonas	Wells	16-Nov-77	j-wells9740@hotmail.com	60-11-762-2845
ASZ8663	Lionel	Hayden	03-Aug-69	l_hayden@outlook.com	60-10-020-4630
ATR1620	Idola	Case	19-Nov-68	c-idola@hotmail.com	60-13-217-2212
ATV6108	Kiara	Whitehead	03-Nov-53	k-whitehead@outlook.com	60-11-375-7116
AUG5737	Hu	Malone	07-Jan-84	h_malone1324@icloud.com	60-12-756-5777
AUU1068	Hector	Hayden	14-Nov-57	h_hayden6852@icloud.com	60-18-463-9523
AUY6326	Melyssa	Lawson	28-Apr-86	lawson-melyssa@outlook.com	60-12-673-7454
AWU0011	Adele	Hanson	08-Sep-59	adele.hanson@google.com	60-17-982-0411
AWY1544	Pearl	Robinson	25-Jul-59	robinson.pearl8449@outlook.com	60-18-183-4778
AWZ8584	Damon	Todd	19-May-78	d_todd3584@outlook.com	60-18-553-9901
AXK1120	Althea	Ray	20-Jan-81	aray@google.com	60-14-488-3520

AYC2712	Uriah	Logan	10-May-52	loganuriah@outlook.com	60-17-273-5181
AYE5566	Gray	Cantrell	05-Sep-97	g.cantrell@hotmail.com	60-10-256-5484
AYJ9232	Kelsey	Robles	30-Sep-98	krobles@outlook.com	60-15-883-1986
AYU4547	Mufutau	Edwards	10-Sep-56	mufutau.edwards@icloud.com	60-16-861-1008

Table 3.1.1.2: Table Records of Patient entity

b) Patient_Condition

- Data Dictionary

Field Name	Data Type	Description (Optional)
Patient_ID	Short Text	Patient ID (Primary Key) (Foreign Key)
Condition_ID	Short Text	Patient Health Condition (Primary Key) (Foreign Key)

Figure 3.1.2.1: Data dictionary of Patient_Condition entity

- Records

Patient ID	Condition ID
ABW7776	CAA0521
ABW7776	CEF7890
AD14883	CBC8901
AD14883	CRT9071
AFT8524	CAB0341
AFT8524	CBT1290
AGH6451	CEF7890
AGH6451	CRT9070
AIU7598	CBT1290
AIU7598	CTS5409
AJC3298	CRT9071
AJG5245	CTS5409
AJG5245	CZY9998
AJH6792	CBC8901
AJH6792	CEF7890
AJJ0736	CBC8901

AJJ0736	CZY9998
AJN1591	CBT1290
AJN1591	CRT9070
ANA7692	CAA0521
ANA7692	CZY9998
AOV3565	CBC8901
AQT8811	CRT9069
AQT8811	CZY9998
ARJ7195	CTS5409
ARJ7195	CZY9998
ASH4493	CTS5409
ASH4493	CZY9998
ASI2474	CAA0521
ASZ8663	CEF7890
ASZ8663	CRT9070
ATR1620	CBT1290
ATR1620	CRT9069
ATV6108	CBT1290
ATV6108	CTS5409
AUG5737	CBC8901
AUG5737	CBT1290
AUU1068	CZY9998
AUY6326	CEF7890
AWU0011	CRT9071
AWY1544	CRT9070
AWZ8584	CEF7890
AXK1120	CAA0521
AYC2712	CBC8901
AYE5566	CRT9071
AYJ9232	CBC8901
AYU4547	CBC8901

Table 3.1.2.2: Table Records of Patient_Condition entity

c) Health_Condition

- Data Dictionary

Field Name	Data Type	Description (Optional)
Condition_ID	Short Text	Health Condition ID (Primary Key)
Condition_Description	Short Text	Health Condition Description

Figure 3.1.3.1: Data dictionary of Health_Condition entity

- Records

Condition_ID	Condition_Description
CAA0521	Medical Advice
CAB0341	Chronic Illness
CBC8901	Regular Check-up
CBT1290	Intermediate Care
CEF7890	Vaccination
CRT9069	Minor Emergency
CRT9070	Intermediate Emergency
CRT9071	Severe Emergency
CTS5409	Test for Disease
CZY9998	Intensive Care

Table 3.1.3.2: Table Records of Health_Condition entity

d) Doctor

- Data Dictionary

Field Name	Data Type	Description (Optional)
Doctor_ID	Short Text	Doctor ID (Primary Key)
Doctor_FirstName	Short Text	Doctor First Name
Doctor_LastName	Short Text	Doctor Last Name
Doctor_DateOfBirth	Date/Time	Doctor Date of Birth
Doctor_Email	Short Text	Doctor Email
Doctor_PhoneNumber	Short Text	Doctor Phone Number

Figure 3.1.4.1: Data dictionary of Doctor entity

- Records

Doctor_ID	Doctor_First	Doctor_Last	Doctor_Date	Doctor_Email	Doctor_Phone Number
BBJ7847	Mechelle	Gould	10/2/1963	gmechelle7319@healthylife.my	60-15-540-3763
BEP4578	Griffin	Jenkins	12/5/1952	jenkinsgriffin405@healthylife.my	60-17-855-6678
BFN7144	Rajah	Duncan	12/15/1953	rajah_duncan@healthylife.my	60-17-973-2367
BGC4258	Delilah	Phelps	9/13/1997	p_delilah@healthylife.my	60-15-384-0238
BHX5767	Faith	Gross	4/19/1973	gross.faith@healthylife.my	60-16-192-9420
BIY9842	Wyoming	Cameron	4/30/1988	cameron.wyoming9072@healthylife.my	60-11-436-4529
BKK6818	Ronan	Chavez	1/27/1992	ronanchavez@healthylife.my	60-12-439-2310
BLB5856	Glenna	Fisher	3/4/1972	fisher glenna@healthylife.my	60-15-292-9522
BNL1540	Brett	Gates	4/28/1998	gates.brett@healthylife.my	60-19-738-6978
BPE7297	August	Fulton	1/11/1995	fultonaugust5014@healthylife.my	60-16-885-3368
BPR1738	Chaney	Woodard	7/27/1989	chaney-woodard@healthylife.my	60-12-305-3753
BSD5796	Pamela	Franco	2/4/1973	p_franco8751@healthylife.my	60-18-154-1448
BTE7373	Raja	Kerr	7/26/1990	kerrraja@healthylife.my	60-14-172-2452
BUY1426	Cathleen	Sweet	11/23/1976	scathleen@healthylife.my	60-11-582-6283

BVQ3321	Jamal	Ortiz	4/27/1986	jamal.ortiz874@healthylife.my	60-11-448-3153
BWR2757	Anastasia	Poole	6/16/1984	anastasiapoole7099@healthylife.my	60-10-442-1796
BXJ3535	Berk	Fields	5/18/1987	b_fields478@healthylife.my	60-13-529-6235
BXV8314	Brennan	Roberts	4/26/1991	broberts@healthylife.my	60-16-723-2683
BYG7542	Melissa	Cherry	10/25/1993	mcherry9336@healthylife.my	60-17-065-9152
BZB8471	Caleb	Henry	8/7/1985	henry.caleb8997@healthylife.my	60-10-114-2677

Table 3.1.4.2: Table Records of Doctor entity

e) Doctor_Specialty

- Data Dictionary

Field Name	Data Type	Description (Optional)
Doctor_ID	Short Text	Doctor ID (Primary Key) (Foreign Key)
Specialty_ID	Short Text	Specialty ID (Primary Key) (Foreign Key)

Figure 3.1.5.1: Data dictionary of Doctor_Specialty entity

- Records

Doctor_ID	Specialty_ID
BBJ7847	SBD6789
BBJ7847	SUV6789
BEP4578	SAB1234
BEP4578	SMN6789
BFN7144	SKL2345
BFN7144	SOP0123
BGC4258	SBD6789
BGC4258	SBE0123

BHX5767	SAB1234
BHX5767	SOP0123
BIY9842	SWX0123
BIY9842	SYZ4567
BKK6818	SOP0123
BKK6818	SWX0123
BLB5856	SBE0123
BLB5856	SHJ7890
BNL1540	SGH3456
BNL1540	SUV6789
BPE7297	SEF9012
BPE7297	SHJ7890
BPR1738	SHJ7890
BPR1738	SRQ8901
BSD5796	SCD5678
BSD5796	SEF9012
BTE7373	SKL2345
BTE7373	SQP4567
BUY1426	SRQ8901
BUY1426	SWX0123
BVQ3321	SEF9012
BVQ3321	SUV6789
BWR2757	SWX0123
BXJ3535	SQP4567
BXJ3535	SWX0123
BXV8314	SBF4567
BXV8314	SCD5678
BYG7542	SAB1234
BYG7542	SHJ7890
BZB8471	SBJ8901
BZB8471	SKL2345

Table 3.1.5.2: Table Records of Doctor_Specialty entity

f) Specialty

- Data Dictionary

Field Name	Data Type	Description (Optional)
Specialty_ID	Short Text	Specialty ID (Primary Key)
Specialty_Name	Short Text	Specialty Name

Figure 3.1.6.1: Data dictionary of Specialty entity

- Records

Specialty_ID	Specialty_Name
SAB1234	Allergist
SAH8901	Cardiologist
SBC2345	Dermatologist
SBD6789	Endocrinologist
SBE0123	Family Medicine Physician
SBF4567	Gastroenterologist
SBJ8901	Hematologist
SCD5678	Infectious Disease Specialist
SEF9012	Internal Medicine Physician
SGH3456	Nephrologist
SHJ7890	Neurologist
SKL2345	Oncologist
SMN6789	Ophthalmologist
SOP0123	Orthopedic Surgeon
SQP4567	Otolaryngologist
SRQ8901	Pediatrician
STU2345	Psychiatrist
SUV6789	Pulmonologist
SWX0123	Rheumatologist
SYZ4567	Urologist

Table 3.1.6.2: Table Records of Specialty entity

g) Availability

- Data Dictionary

Field Name	Data Type	Description (Optional)
Availability_ID	Short Text	Availability ID (Primary Key)
Doctor_ID	Short Text	Doctor ID (Foreign Key)
Availability_Date	Date/Time	Availability Date
Availability_Start_Time	Date/Time	Availability Start Time
Availability_End_Time	Date/Time	Availability End Time

Figure 3.1.7.1: Data dictionary of Availability entity

- Records

Availability_ID	Doctor_ID	Availability_Date	Availability_Start_Time	Availability_End_Time
THJ8901	BBJ7847	4/23/2024	2:41:00 AM	3:41:00 AM
TNL4567	BEP4578	2/5/2024	5:52:00 AM	6:52:00 AM
TXQ8901	BEP4578	3/7/2024	9:52:00 PM	10:52:00 PM
TBC8901	BEP4578	5/18/2024	4:15:00 AM	5:15:00 AM
TEF3456	BEP4578	10/19/2024	3:32:00 AM	4:32:00 AM
TJL0123	BEP4578	11/12/2024	7:41:00 AM	8:41:00 AM
TTG8901	BEP4578	12/20/2024	4:28:00 AM	5:28:00 AM
TAB4567	BEP4578	12/27/2024	11:45:00 PM	12:45:00 AM
TSB6789	BGC4258	8/30/2024	4:34:00 PM	5:34:00 PM
TTG4567	BHX5767	1/12/2024	3:43:00 AM	4:43:00 AM

TUJ8901	BHX5767	3/31/2024	7:57:00 AM	8:57:00 AM
TCD6789	BHX5767	6/9/2024	12:26:00 AM	1:26:00 AM
TNL8901	BIY9842	1/10/2024	11:22:00 PM	12:22:00 AM
TIK6789	BIY9842	2/23/2024	3:37:00 AM	4:37:00 AM
TAB8901	BIY9842	8/28/2024	7:04:00 AM	8:04:00 AM
TJL2345	BIY9842	10/20/2024	8:19:00 AM	9:19:00 AM
TRZ6789	BKK6818	2/22/2024	2:33:00 AM	3:33:00 AM
TGH4567	BKK6818	6/1/2024	3:54:00 PM	4:54:00 PM
TGH7890	BKK6818	7/30/2024	11:52:00 AM	12:52:00 PM
TAB1234	BKK6818	12/1/2024	4:15:00 AM	5:15:00 AM
TSB0123	BLB5856	2/20/2024	10:31:00 PM	11:31:00 PM
TRZ2345	BLB5856	3/6/2024	12:42:00 PM	1:42:00 PM
TKM6789	BNL1540	1/11/2024	5:15:00 PM	6:15:00 PM
TNL0123	BNL1540	5/28/2024	10:11:00 AM	11:11:00 AM
TCD2345	BNL1540	7/28/2024	12:32:00 PM	1:32:00 PM
TYZ4567	BPE7297	5/8/2024	6:44:00 PM	7:44:00 PM

TXW6789	BPE7297	6/1/2024	11:31:00 AM	12:31:00 AM
TBC5678	BPR1738	3/2/2024	12:54:00 PM	1:54:00 PM
THJ4567	BPR1738	3/21/2024	11:29:00 PM	12:29:00 AM
TRZ0123	BTE7373	11/11/2024	10:10:00 PM	11:10:00 PM
TJF0123	BUY1426	7/5/2024	9:02:00 AM	10:02:00 AM
TTE6789	BUY1426	7/7/2024	2:09:00 AM	3:09:00 AM
TCYZ789	BUY1426	8/5/2024	11:26:00 PM	12:26:00 AM
TKM0123	BVQ3321	3/24/2024	3:07:00 PM	4:07:00 PM
TQX2345	BVQ3321	7/17/2024	1:54:00 AM	2:54:00 AM
TOP6789	BVQ3321	8/31/2024	11:33:00 AM	12:33:00 AM
TKM4567	BVQ3321	11/19/2024	9:00:00 AM	10:00:00 AM
TIK8901	BWR2757	5/7/2024	5:04:00 PM	6:04:00 PM
TGH0123	BWR2757	5/7/2024	2:04:00 PM	3:04:00 PM
TVC2345	BWR2757	5/25/2024	7:39:00 PM	8:39:00 PM
TUJ2345	BWR2757	10/7/2024	2:11:00 PM	3:11:00 PM
TEF6789	BWR2757	12/4/2024	2:32:00 PM	3:32:00 PM

TTG0123	BXJ3535	2/26/2024	3:55:00 PM	4:55:00 PM
TUJ4567	BXJ3535	6/22/2024	6:51:00 AM	7:51:00 AM
TOP8901	BXJ3535	7/2/2024	5:45:00 PM	6:45:00 PM
TVC6789	BXJ3535	12/27/2024	10:30:00 AM	11:30:00 AM
TYZ0123	BXV8314	7/12/2024	4:36:00 AM	5:36:00 AM
TVC8901	BXV8314	9/24/2024	6:20:00 AM	7:20:00 AM
TSB4567	BXV8314	10/30/2024	3:14:00 AM	4:14:00 AM
TXW0123	BYG7542	2/9/2024	10:17:00 PM	11:17:00 PM
TAB0123	BZB8471	3/19/2024	8:59:00 PM	9:59:00 PM

Table 3.1.7.2: Table Records of Availability entity

h) Shift

- Data Dictionary

Field Name	Data Type	Description (Optional)
Shift_ID	Short Text	Shift ID (Primary Key)
Shift_Start_Time	Date/Time	Shift Start Time
Shift_End_Time	Date/Time	Shift End Time

Figure 3.1.8.1: Data dictionary of Shift entity

- Records

Shift_ID	Shift_Start_Time	Shift_End_Time
TAA0000	8:00:00 AM	10:00:00 AM
TAA0001	10:00:00 AM	12:00:00 PM
TAA0002	12:00:00 PM	2:00:00 PM
TAA0003	2:00:00 PM	4:00:00 PM
TAA0004	4:00:00 PM	6:00:00 PM
TAA0005	6:00:00 PM	8:00:00 PM
TAA0006	8:00:00 PM	10:00:00 PM
TAA0007	10:00:00 PM	12:00:00 AM
TAA0008	12:00:00 AM	2:00:00 AM
TAA0009	2:00:00 AM	4:00:00 AM
TAA0010	4:00:00 AM	6:00:00 AM
TAA0011	6:00:00 AM	8:00:00 AM

Table 3.1.8.2: Table Records of Shift entity

i) Doctor_Shift

- Data Dictionary

Field Name	Data Type	Description (Optional)
Doctor_ID	Short Text	Doctor ID (Primary Key) (Foreign Key)
Shift_ID	Short Text	Shift ID (Primary Key) (Foreign Key)

Figure 3.1.9.1: Data dictionary of Doctor_Shift entity

- Records

Doctor_ID	Shift_ID
BHX5767	TAA0000
BTE7373	TAA0000
BUY1426	TAA0000
BHX5767	TAA0001
BNL1540	TAA0001
BPR1738	TAA0001
BLB5856	TAA0002
BNL1540	TAA0002
BPR1738	TAA0002
BTE7373	TAA0002
BGC4258	TAA0003
BNL1540	TAA0003
BSD5796	TAA0003
BWR2757	TAA0003
BBJ7847	TAA0004
BFN7144	TAA0004
BKK6818	TAA0004
BXJ3535	TAA0004
BZB8471	TAA0004
BEP4578	TAA0005
BIY9842	TAA0005
BSD5796	TAA0005
BXJ3535	TAA0005
BZB8471	TAA0005
BGC4258	TAA0006
BKK6818	TAA0006
BLB5856	TAA0006
BWR2757	TAA0006
BGC4258	TAA0007
BKK6818	TAA0007

BWR2757	TAA0007
BXJ3535	TAA0007
BXV8314	TAA0007
BBJ7847	TAA0008
BIY9842	TAA0008
BPE7297	TAA0008
BPR1738	TAA0008
BUY1426	TAA0008
BGC4258	TAA0009
BNL1540	TAA0009
BTE7373	TAA0009
BXV8314	TAA0009
BYG7542	TAA0009
BBJ7847	TAA0010
BEP4578	TAA0010
BIY9842	TAA0010
BKK6818	TAA0010
BEP4578	TAA0011
BFN7144	TAA0011
BIY9842	TAA0011
BXV8314	TAA0011

Table 3.1.9.2: Table Records of Doctor_Shift entity

j) Appointment

- Data Dictionary

Field Name	Data Type	Description (Optional)
Appointment_ID	Short Text	Appointment ID (Primary Key)
Patient_ID	Short Text	Patient ID (Foreign Key)
Availability_ID	Short Text	Availability ID (Foreign Key)
Appointment_Purpose	Short Text	Appointment Purpose
Appointment_Status	Short Text	Appointment Status ("Completed"/"Incomplete"/"Cancelled")

Figure 3.1.10.1: Data dictionary of Appointment entity

- Records

Appointment_ID	Patient_ID	Availability_ID	Appointment_Purpose	Appointment_Status
PAB1234	AOV3565	TAB1234	Urinary issues	Incomplete
PAB6789	AJN1591	TCD6789	Blood sugar	Completed
PBC0123	ASI2474	TEF0123	Vaccination update	Incomplete
PBC5678	ATV6108	TBC5678	Cough treatment	Cancelled
PCD4567	AGH6451	TGH4567	Nutritional advice	Completed
PCD9012	AQT8811	TCD9012	Hormone therapy	Incomplete
PED3456	AJC3298	TEF3456	Urinary issues	Completed
PED8901	AJC3298	THJ8901	Routine check-up	Incomplete
PEF2345	AUG5737	TIK2345	Chest pain	Completed
PEF7890	AXK1120	TGH7890	Fatigue assessment	Incomplete
PGH2345	ADX1883	TJL2345	Foot pain	Incomplete
PGH6789	ADI4883	TJL6789	Hormone therapy	Incomplete
PHJ0123	AUY6326	TKM0123	Skin check	Completed
PHJ6789	ABW7776	TIK6789	Infection control	Incomplete
PIJ0123	ATV6108	TJL0123	Joint swelling	Completed
PIJ4567	ARJ7195	TNL4567	Mental health	Completed
PJK4567	ASH4493	TKM4567	Headache relief	Cancelled

PJK8901	AWY1544	TOP8901	Fatigue assessment	Completed
PLM2345	AJJ0736	TQX2345	Blood pressure	Cancelled
PLM8901	AJH6792	TNL8901	Hormone therapy	Incomplete
PMN2345	ATR1620	TOP2345	Hormone therapy	Cancelled
PMN6789	AJN1591	TRZ6789	Heart rhythm	Incomplete
PNO0123	ATR1620	TSB0123	Medical advice	Incomplete
PNO6789	AXK1120	TRZ0123	Muscle strain	Completed
PP00123	AJC3298	TQX2345	Routine check-up	Incomplete
PPO4567	AIU7598	TTG4567	Fatigue assessment	Incomplete
PQR4567	ASH4493	TSB4567	Breathing problems	Incomplete
PQR8901	AWU0011	TUJ8901	Allergy management	Completed
PRS2345	AYE5566	TVC2345	Routine check-up	Incomplete
PRS8901	ATR1620	TTG8901	Flu symptoms	Incomplete
PST2345	AYE5566	TUJ2345	Recovery monitoring	Cancelled
PST6789	AUG5737	TXW6789	Sleep disorders	Incomplete
PUQ0123	ASH4493	TYZ0123	Cough treatment	Incomplete
PUQ6789	ATR1620	TVC6789	Blood pressure	Incomplete
PVW0123	AJC3298	TXW0123	Skin rash	Incomplete

PVW4567	AWU0011	TAB4567	Injury treatment	Completed
PWX4567	ARJ7195	TYZ4567	Thyroid check	Completed
PWX8901	AJH6792	TBC8901	Wound care	Incomplete
PXY8901	AJJ0736	TAB8901	Flu symptoms	Incomplete
PYZ2345	AFT8524	TBC2345	Foot pain	Incomplete

Table 3.1.10.2: Table Records of Appointment entity

k) Medical_History_Record

- Data Dictionary

Field Name	Data Type	Description (Optional)
Record_ID	Short Text	Record ID (Primary Key)
Appointment_ID	Short Text	Appointment ID (Foreign Key)
Record_Diagnosis	Short Text	Record Diagnosis
Record_Test_Result	Yes/No	Record Test Result
Record_Treatment	Long Text	Record Treatment
Record_Prescription	Short Text	Record Prescription

Figure 3.1.11.1: Data dictionary of Medical_History_Record entity

- Records

Record_ID	Appointment_ID	Record_Diagnosis	Record_Test_Result	Record_Treatment	Record_Prescription
R806842	PED3456	Urinary Tract Infection (UTI)	Yes	Increased fluid intake and pain relievers	Ciprofloxacin
RCV8200	PGH2345	Plantar Fasciitis	Yes	Stretching exercises, orthotic inserts, and	Ibuprofen

				physical therapy	
RDK9058	PU0123	Rheumatoid Arthritis	Yes	Physical therapy and lifestyle modifications	Methotrexate
RFG2910	PNO6789	Strained Hamstring Muscle	Yes	Rest, ice, compression, elevation (RICE), and gradual stretching exercises	Naproxen
RHL3479	PWX4567	Hypothyroidism	Yes	Regular monitoring of thyroid levels and lifestyle adjustments	Levothyroxine
RLM4718	PAB6789	Type 2 Diabetes Mellitus	Yes	Lifestyle changes (diet and exercise) and regular blood sugar monitoring	Metformin
RMJ8205	PCD4567	Vitamin D Deficiency	Yes	Dietary changes and increased sun exposure	Vitamin D3

RML7431	PEF2345	Angina Pectoris	No		
RNC3746	PHJ0123	Basal Cell Carcinoma	No		
RST5632	PU4567	Generalized Anxiety Disorder	Yes	Cognitive-behavioral therapy (CBT), relaxation techniques, and lifestyle changes	Sertraline
RWP8309	PJK8901	Chronic Fatigue Syndrome	Yes	Graded exercise therapy, cognitive-behavioral therapy, sleep management, and mindfulness techniques	Bupropion
RXP8204	PQR8901	Allergic Rhinitis	Yes	Avoiding allergens and immunotherapy if necessary	Loratadine
RZT5621	PVW4567	Ankle Sprain	Yes	Rest, ice, compression, elevation (RICE), pain	Acetaminophen

				relief, and physical therapy	

Table 3.1.11.2: Table Records of Medical_History_Record entity

l) Expended_Resources

- Data Dictionary

Field Name	Data Type	Description (Optional)
Record_ID	Short Text	Medical History Record ID (Primary Key) (Foreign Key)
Inventory_ID	Short Text	Inventory Item ID (Primary Key) (Foreign Key)
Expended_Amount	Number	Used Amount

Figure 3.1.12.1: Data dictionary of Expended_Resources entity

- Records

Record_ID	Inventory_ID	Expended_Amount
RBQ6842	IAD5943	1
RCV9203	IAX3207	2
RDK9058	IBP7056	2
RFG2910	IBP7056	1
RHL3479	ICV6527	1
RMJ8205	IFD8964	1
RNC3746	IGS7490	1
RST5632	IHL4832	1
RWP8309	IJK9625	2
RXP8294	IJP9816	1
RZT5621	IKT1549	1
RBQ6842	IQR4695	3
RMJ8205	IQR4695	1
RZT5621	IQR4695	1

RCV9203	IRX5928	2
RML7431	IRX5928	1
RDK9058	ISW7641	1
RNC3746	ISW7641	1
RFG2910	IUN5861	2
RST5632	IUN5861	1
RHL3479	IXY5410	1
RWP8309	IXY5410	3
RLM4718	IZT1829	1
RXP8294	IZT1829	1

Table 3.1.12.2: Table Records of Expended_Resources entity

m) Billing_Payment

- Data Dictionary

Field Name	Data Type	Description (Optional)
Payment_ID	Short Text	Payment ID (Primary Key)
Appointment_ID	Short Text	Appointment ID (Foreign Key)
Payment_Consultation	Currency	Payment Amount for Consultation
Payment_Treatment	Currency	Payment Amount for Treatment
Payment_Medication	Currency	Payment Amount for Medication
Payment_Method	Short Text	Payment Method
Payment_Status	Short Text	Payment Status

Figure 3.1.13.1: Data dictionary of Billing_Payment entity

- Records

Payment_ID	Appointment_ID	Payment_Consultation	Payment_Treatment	Payment_Medication	Payment_Status	Payment_Method

MHF3057	PQR8901	$130.00	$70.00	$30.00	Paid	Credit
MUB4583	PLU0123	$150.00	$90.00	$50.00	Paid	Credit
MKT3927	PGH2345	$120.00	$70.00	$30.00	Paid	Cash
MLC5870	PHJ0123	$110.00	$60.00	$40.00	Paid	Credit
MNB2746	PAB6789	$140.00	$75.00	$50.00	Unpaid	
MPU1441	PED3456	$150.00	$80.00	$40.00	Paid	Credit
MRL7590	PNO6789	$120.00	$60.00	$20.00	Paid	Credit
MTS0491	PU4567	$200.00	$150.00	$80.00	Unpaid	
MVD9315	PCD4567	$100.00	$50.00	$30.00	Paid	Credit
MVR2819	PVW4567	$160.00	$100.00	$60.00	Paid	Cash
MWP7624	PJK8901	$150.00	$80.00	$40.00	Unpaid	
MXQ6208	PVX4567	$130.00	$85.00	$60.00	Paid	Credit
MZW4832	PEF2345	$180.00	$120.00	$70.00	Paid	Cash

Table 3.1.13.2: Table Records of Billing_Payment entity

n) Invoice

- Data Dictionary

Field Name	Data Type	Description (Optional)
Invoice_ID	Short Text	Invoice ID (Primary Key)
Payment_ID	Short Text	Payment ID (Foreign Key)

Invoice_Amount	Currency	Invoice Amount
Invoice_Date	Date/Time	Invoice Date
Appointment_ID	Short Text	Appointment ID (Foreign Key)

Figure 3.1.14.1: Data dictionary of Invoice entity

- Records

Invoice_ID	Payment_ID	Invoice_Amount	Invoice_Date	Appointment_ID
OVR9135	MHF3057	$230.00	3/31/2024	PQR8901
OLM3921	MJB4583	$290.00	11/12/2024	PIJ0123
OJH2457	MKT3927	$220.00	7/14/2024	PGH2345
OWE5209	MLC5870	$210.00	6/22/2024	PHJ0123
OPT6789	MPU1441	$270.00	10/19/2024	PED3456
OQR8564	MRL7590	$200.00	8/31/2024	PNO6789
OBN3748	MVD9315	$180.00	6/1/2024	PCD4567
OPJ7823	MVR2819	$320.00	11/3/2024	PEF2345
OSK4873	MXQ6208	$275.00	7/2/2024	PJK8901
OUI8912	MZW4832	$370.00	5/8/2024	PWX4567

Table 3.1.14.2: Table Records of Invoice entity

o) Inventory

- Data Dictionary

Field Name	Data Type	Description (Optional)
Inventory_ID	Short Text	Inventory ID (Primary Key)
Inventory_Name	Short Text	Inventory Item Name
Inventory_Type	Short Text	Inventory Item Type
Inventory_InitialAmount	Number	Inventory Item Initial Amount

Figure 3.1.15.1: Data dictionary of Inventory entity

- Records

Inventory_ID	Inventory_Name	Inventory_Type	Inventory_InitialAmount

IQR4695	Cotton Ball	Consumable	411
IRX5928	Syringe	Consumable	140
ISW7641	Popsicle Stick	Consumable	500
IUN5861	Facemask	Consumable	567
IXY5410	Bandage	Consumable	541
IZT1829	Disinfectant	Consumable	600
IAD5943	Ciprofloxacin Drug	Drug	234
IAX3207	Ibuprofen Drug	Drug	780
IBP7056	Methotrexate Drug	Drug	320
ICV6527	Levothyroxine Drug	Drug	321
IET2049	Metformin Drug	Drug	127
IGS7490	Nitroglycerin Drug	Drug	206
IHF9702	Imiquimod Drug	Drug	129
IHL4832	Sertraline Drug	Drug	128
IJK9625	Bupropion Drug	Drug	126
IJP9816	Loratadine Drug	Drug	123
IKT1549	Acetaminophen Drug	Drug	176
IUV8214	Flu Vaccine	Drug	129
IWB8190	Paracetamol Drug	Drug	783
IZT3045	Iodine Solution Drug	Drug	167
INM4073	Stethoscope	Equipment	631
IOP7102	Coat	Equipment	70
IPD4723	Test Tube	Equipment	125
IPR6589	Pen	Equipment	211
IWC7382	Thermometer	Equipment	100
IFD8964	Vitamin D	Supplement	432
ILQ2376	Vitamin A	Supplement	345

IML8307	Vitamin B	Supplement	543
IMQ3947	Vitamin C	Supplement	548

Table 3.1.15.2: Table Records of Inventory entity

3.2 Switchboard

In Microsoft Access, a Switchboard is a user interface feature that serves as a centralized navigation system for your database application. It essentially acts as a control panel, allowing users to easily navigate through various tables, queries, forms, reports, and another database object. In the main menu you can go to the forms menu, reports menu and exit the database system. The user can easily access the Clinic Database Management System.

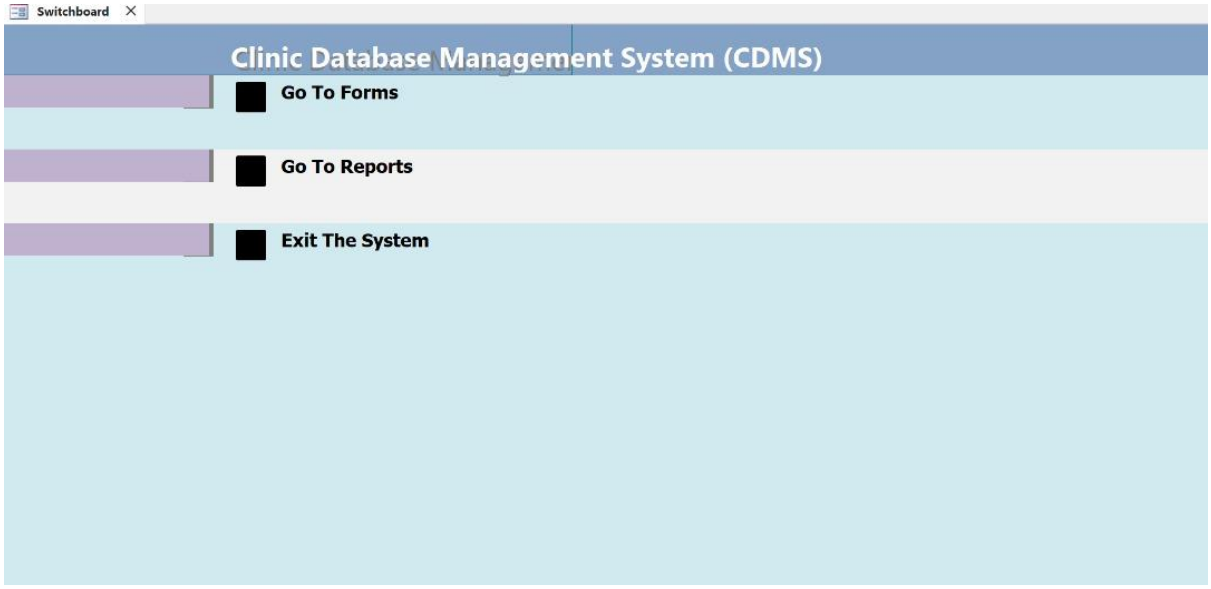


Figure 3.2.1

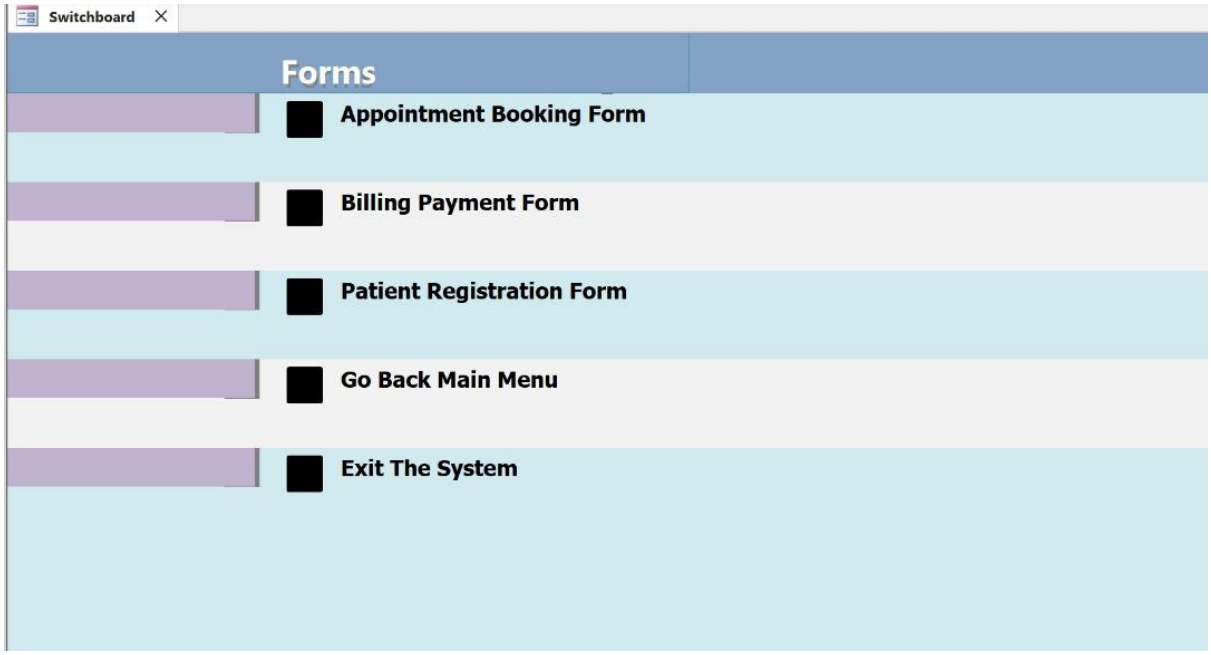


Figure 3.2.2

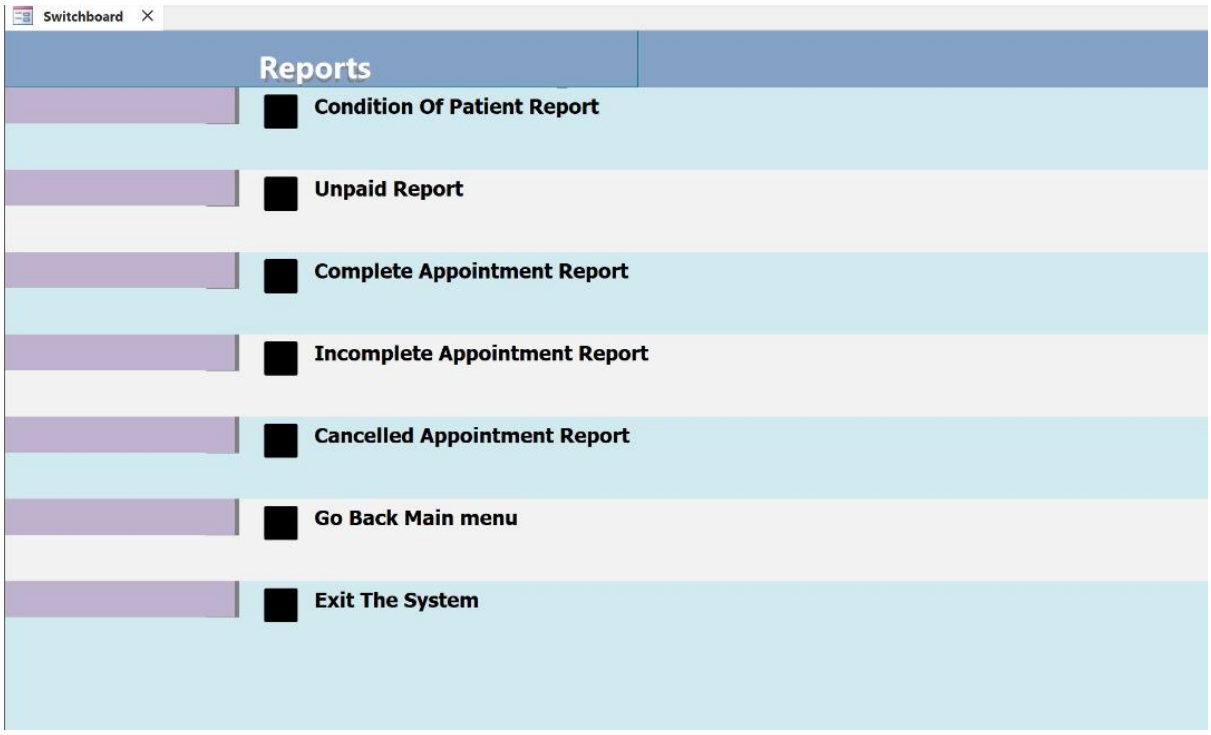


Figure 3.2.3

CHAPTER 4 DATABASE OBJECTS

Database Objects

A database object is an organized piece of data that has a specific purpose and is present in a database. Among these items are tables, queries, forms, reports, macros, and modules. Every object in the database has a specific function and serves as the basis for the database's general structure.

4.1 Queries

Queries are used for retrieving, updating, and analysing information efficiently. Queries are used to update inventory records and appointment records, mark bill which didn't paid and generate reports for clinic daily operations.

4.1.1 Query 1

Explanation: The command below is designed to retrieve detailed information about incomplete appointments from patient in clinic. It enables clinic staff and doctor to identify patients whose appointment is incomplete. Besides, this command has provided all details of each appointment so doctors can know the time and prepare for the appointment.

Sample query 1:

Appointmen	Patient_ID	Availability_I	Appointmen	Availability_I	Appointmen	Appointmen	SortMonth
PAB1234	AOV3565	TAB1234	Incomplete	12/1/2024	Urinary issues	December	202412
PBC0123	ASI2474	TEF0123	Incomplete	7/7/2024	Vaccination up	July	202407
PCD9012	AQT8811	TCD9012	Incomplete	10/9/2024	Hormone thera	October	202410
PED8901	AJC3298	THJ8901	Incomplete	4/23/2024	Routine check-u	April	202404
PEF7890	AXK1120	TGH7890	Incomplete	7/30/2024	Fatigue assessn	July	202407
PGH6789	ADI4883	TJL6789	Incomplete	7/5/2024	Hormone thera	July	202407
PHJ6789	ABW7776	TIK6789	Incomplete	2/23/2024	Infection contr	February	202402
PLM8901	AJH6792	TNL8901	Incomplete	1/10/2024	Hormone thera	January	202401
PMN6789	AJN1591	TRZ6789	Incomplete	2/22/2024	Heart rhythm	February	202402
PNO0123	ATR1620	TSB0123	Incomplete	2/20/2024	Medical advice	February	202402
PPO0123	AJC3298	TRZ0123	Incomplete	11/11/2024	Routine check-u	November	202411
PPO4567	AIU7598	TTG4567	Incomplete	1/12/2024	Fatigue assessn	January	202401
PQR4567	ASH4493	TSB4567	Incomplete	10/30/2024	Breathing prob	October	202410
PRS2345	AYE5566	TVC2345	Incomplete	5/25/2024	Routine check-u	May	202405
PRS8901	ATR1620	TTG8901	Incomplete	12/20/2024	Flu symptoms	December	202412
PST6789	AUG5737	TXW6789	Incomplete	6/1/2024	Sleep disorders	June	202406
PUQ0123	ASH4493	TYZ0123	Incomplete	7/12/2024	Cough treatme	July	202407
PUQ6789	ATR1620	TVC6789	Incomplete	12/27/2024	Blood pressure	December	202412
PVW0123	AJC3298	TXW0123	Incomplete	2/9/2024	Skin rash	February	202402
PWX8901	AJH6792	TBC8901	Incomplete	5/18/2024	Wound care	May	202405

Figure 4.1.1

SELECT Appointment.Appointment_ID, Appointment.Patient_ID, Appointment.Availability_ID, Appointment.Appointment_Status, Availability.Availability_Date, Appointment.Appointment_Purpose, Format([Availability_Date],"mmmm") AS AppointmentMonth, Format([Availability_Date],"yyyymm") AS SortMonth
FROM Availability INNER JOIN Appointment ON Availability.Availability_ID = Appointment.Availability_ID
WHERE (((Appointment.Appointment_Status)="Incomplete"));

4.1.2 Query 2

Explanation: The command below is designed to retrieve detailed information regarding inventory that need to restock in clinic. We set the range “below than 200” as an example of enough number of inventories. This standard can be adjusted by clinic manager to satisfy clinic need in every time. We also have list out inventory name and type for clinic staff identify it easier.

Sample query 2:

Inventory_ID	Inventory_Name	Inventory_Type	Inventory_InitialAmount
IBP7056	Naproxen	Drug	123
IET2049	Metformin	Drug	127
IGS7490	Nitroglycerin	Drug	129
IHL4832	Sertraline	Drug	128
IJK9625	Bupropion	Drug	126
IJP9816	Loratadine	Drug	123
IKT1549	Acetaminophen	Drug	176
IOP7102	Coat	Equipment	70
IPD4723	Test Tube	Equipment	125
IRX5928	Syringe	Consumable	140
IUV8214	Flu Vaccine	Drug	129
IWC7382	Thermometer	Equipment	100
IZT3045	Iodine Solution	Drug	167

Figure 4.1.2

SELECT *
FROM inventory
WHERE Inventory_InitialAmount<200;

4.1.3 Query 3

Explanation: The command below is designed to retrieve detailed information about patient with unpaid bills. It enables clinic staff to identify patient who have didn't paid the bill and provide the information about the information of the bill such as patient's name and each payment amount. List up the patient's phone number and email to let clinic staff can easier contact them if necessary.

Sample query 3:

Patient_ID	Patient_F	Patient_Lastl	Appointmen	Patient_Email	Patient_PhoneNur	Payme	Payment_Co	Paymer	Payment_N
AJN1591	Constance	Nash	PAB6789	cnash6187@hotmail.com	60-18-611-3062	Unpaid	$140.00	$75.00	$50.00
ARJ7195	Vielka	Cleveland	PIJ4567	cleveland-vielka@icloud.c	60-11-117-1067	Unpaid	$200.00	$150.00	$80.00
AWY1544	Pearl	Robinson	PJK8901	robinson.pearl8449@outl	60-18-183-4778	Unpaid	$150.00	$80.00	$40.00

Figure 4.1.3

```
SELECT Patient.Patient_ID, Patient.Patient_FirstName, Patient.Patient_LastName, Appointment.Appointment_ID, Billing_Payment.Payment_Status, Billing_Payment.Payment_Consultation, Billing_Payment.Payment_Treatment, Billing_Payment.Payment_Medication
FROM Patient INNER JOIN (Appointment INNER JOIN Billing_Payment ON Appointment.Appointment_ID = Billing_Payment.Appointment_ID) ON Patient.Patient_ID = Appointment.Patient_ID
WHERE (((Billing_Payment.Payment_Status)="Unpaid"));
```

4.2 Forms

These forms are used to streamline different administrative tasks inside a healthcare setting, guaranteeing that patient care is managed productively and precisely. The Appointment Booking Form encourages the scheduling and tracking of patient appointments, the Billing Payment Form ensures that all financial transactions related to patient care are recorded and linked to the correct appointment, and the Patient Registration Form collects and organizes essential patient information for simple reference in future interactions. These forms help maintain a well-organized, patient-centred healthcare environment, allowing providers to provide convenient and effective care.

4.2.1 Form 1

Explanation:

This form is used to register new patients in the system. Patient_ID serves as the unique identifier for each patient. The form also captures personal details like Patient_FirstName, Patient_LastName, Patient_DateOfBirth, Patient_Email, and Patient_PhoneNumber. These

elements are interconnected to create a comprehensive profile for the patient, which can be referenced in future interactions, such as appointments or billing. The inclusion of navigation, save, print, create new form, and delete buttons ensures that patient registration is straightforward, allowing for quick access, updates, and management of patient information.

Sample form 1:

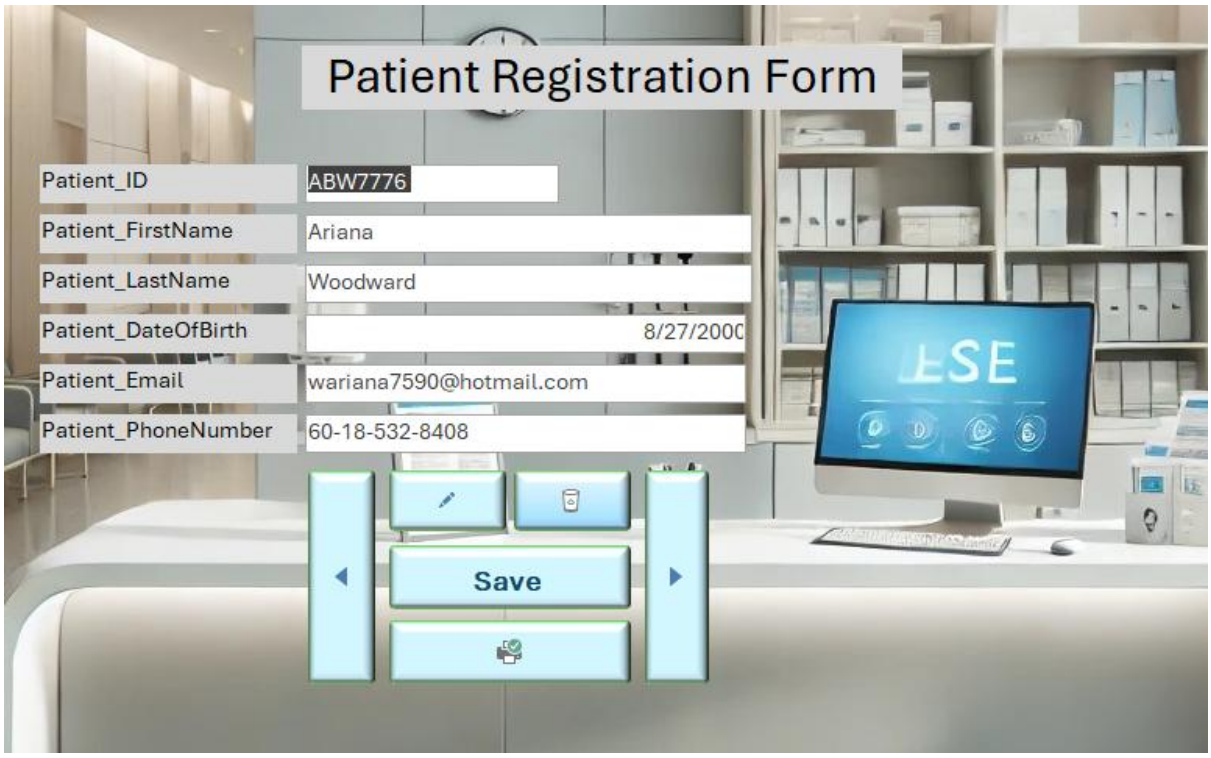


Figure 4.2.1

4.2.2 Form 2

Explanation:

This form is designed for scheduling appointments. The elements include Appointment_ID, which uniquely identifies the appointment; Patient_ID, which links the appointment to a specific patient; and Availability_ID, which matches the appointment to the available slots. The Appointment_Purpose field captures the reason for the appointment, such as medical issues the patient is experiencing. All fields work together to ensure that the appointment is properly scheduled and tracked for a specific patient and purpose within the system. The form also includes buttons for navigating between forms, saving changes, printing the form, creating a new form, and deleting the current form, making it easy to manage and maintain appointment records efficiently.

Sample form 2:

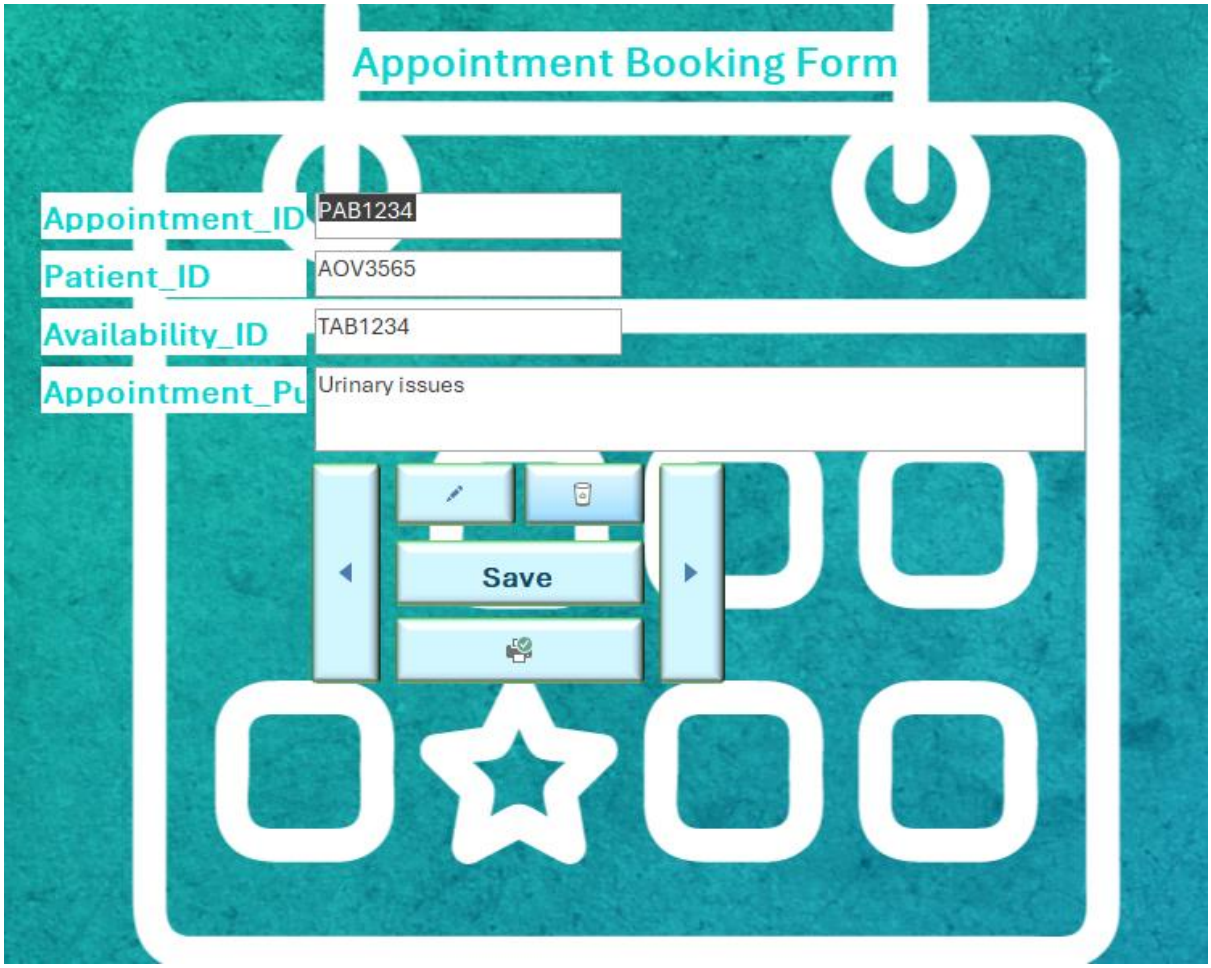


Figure 4.2.2

4.2.3 Form 3

Explanation:

This form handles the financial aspect of patient care, detailing the payment information. Payment_ID is the unique identifier for each payment transaction, while Appointment_ID connects the payment to a specific appointment. The fields Payment_Consultation, Payment_Treatment, and Payment_Medication specify the breakdown of costs associated with the consultation, treatment, and medication, respectively. Finally, Payment_Method indicates how the payment is made, such as through credit. The form ensures that all payment details are correctly documented and linked to the appropriate appointment and patient. The navigation, save, print, create new form, and delete buttons are included to allow for easy management and processing of billing information.

Sample form 3:

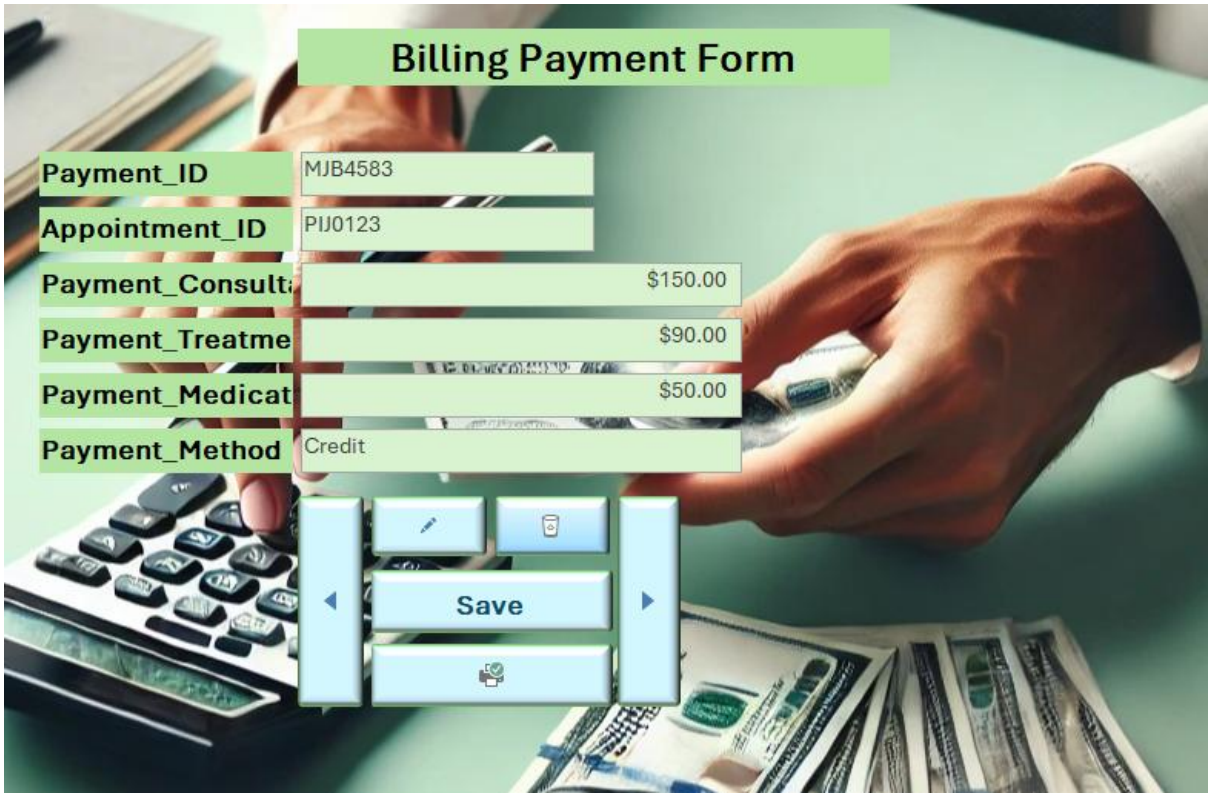


Figure 4.2.3

4.3 Report

Reports in a Clinic Database Management System (CDMS) are essential for presenting summarized and structured information extracted from the database. These reports enable clinic staff to efficiently track and manage various aspects of patient care such as generated to display the number of appointments made by each patient, the patient's current condition, billing and payment status, and their medical history. This structured approach allows the clinic staff to make informed decisions and ensures the smooth operation of the clinic.

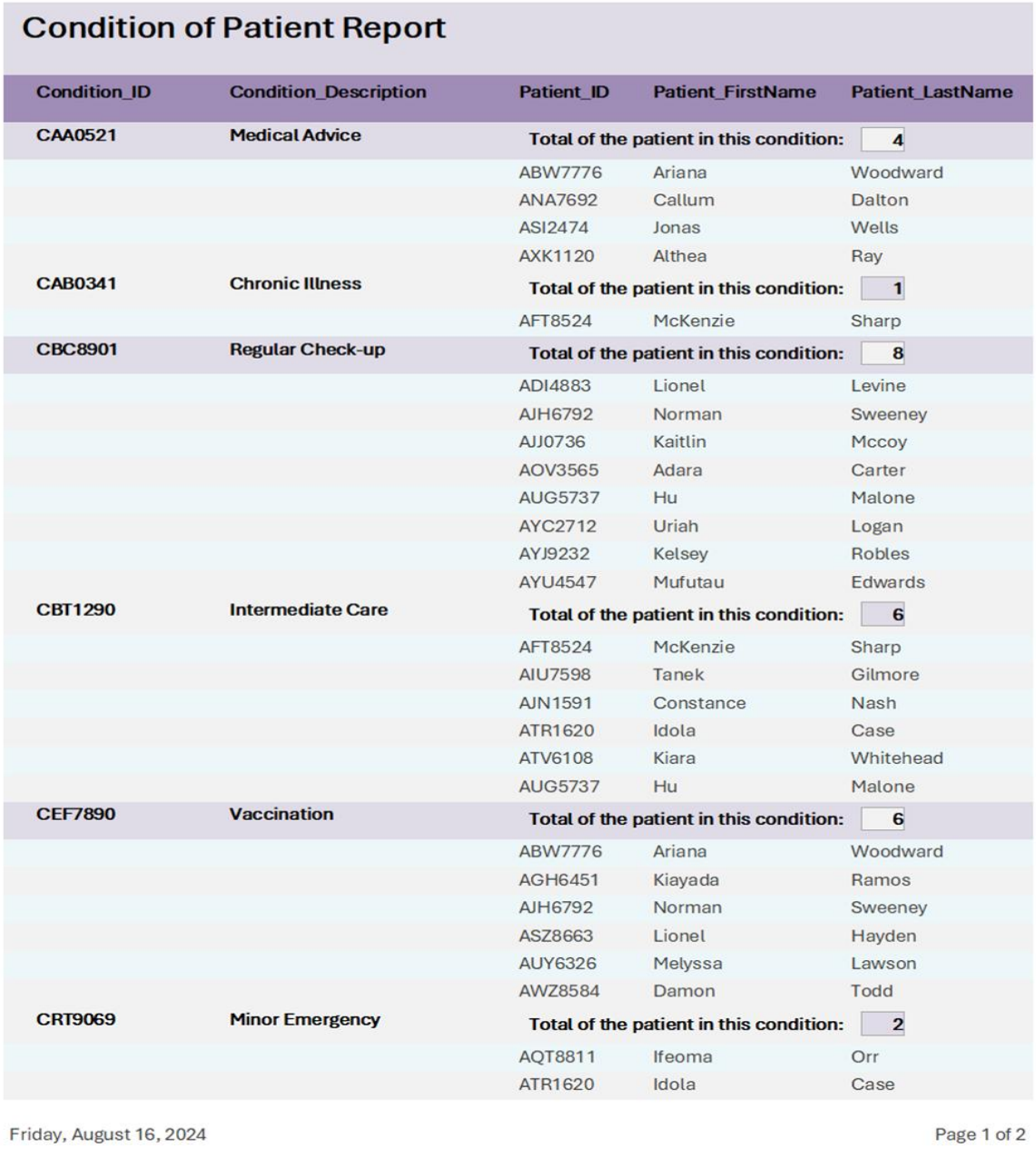
4.3.1 Report 1: Summary of the total number of patients with each condition

Explanation:

The Condition of Patient Report below demonstrates the total number of patients with each condition. The report contains crucial information such as condition ID, condition description, patient ID, patient first name, patient last name, and the total number of patients with each condition. This report aims to provide an overview of the number of patients with various conditions in the clinic. It serves as a valuable resource for both physicians and administrators,

offering insights into the total number of patients affected by each condition, ultimately helping to improve patient care.

Sample report 1:



Condition of Patient Report

Condition_ID	Condition_Description	Patient_ID	Patient_FirstName	Patient_LastName
CAA0521	Medical Advice	Total of the patient in this condition:		4
		ABW7776	Ariana	Woodward
		ANA7692	Callum	Dalton
		ASI2474	Jonas	Wells
		AXK1120	Althea	Ray
CAB0341	Chronic Illness	Total of the patient in this condition:		1
		AFT8524	McKenzie	Sharp
CBC8901	Regular Check-up	Total of the patient in this condition:		8
		ADI4883	Lionel	Levine
		AJH6792	Norman	Sweeney
		AJJ0736	Kaitlin	Mccoy
		AOV3565	Adara	Carter
		AUG5737	Hu	Malone
		AYC2712	Uriah	Logan
		AYJ9232	Kelsey	Robles
		AYU4547	Mufutau	Edwards
CBT1290	Intermediate Care	Total of the patient in this condition:		6
		AFT8524	McKenzie	Sharp
		AIU7598	Tanek	Gilmore
		AJN1591	Constance	Nash
		ATR1620	Idola	Case
		ATV6108	Kiara	Whitehead
		AUG5737	Hu	Malone
CEF7890	Vaccination	Total of the patient in this condition:		6
		ABW7776	Ariana	Woodward
		AGH6451	Kiayada	Ramos
		AJH6792	Norman	Sweeney
		ASZ8663	Lionel	Hayden
		AUY6326	Melyssa	Lawson
		AWZ8584	Damon	Todd
CRT9069	Minor Emergency	Total of the patient in this condition:		2
		AQT8811	Ifeoma	Orr
		ATR1620	Idola	Case

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Figure 4.3.1.1

Condition_ID	Condition_Description	Patient_ID	Patient_FirstName	Patient_LastName
CRT9070	Intermediate Emergency	Total of the patient in this condition:		4
		AGH6451	Kiayada	Ramos
		AJN1591	Constance	Nash
		ASZ8663	Lionel	Hayden
		AWY1544	Pearl	Robinson
CRT9071	Severe Emergency	Total of the patient in this condition:		4
		ADI4883	Lionel	Levine
		AJC3298	Cairo	Montgomery
		AWU0011	Adele	Hanson
		AYE5566	Gray	Cantrell
CTS5409	Test for Disease	Total of the patient in this condition:		6
		AIU7598	Tanek	Gilmore
		AJG5245	Xenos	Pennington
		ARJ7195	Vielka	Cleveland
		ASH4493	Justine	Hewitt
		ASI2474	Jonas	Wells
		ATV6108	Kiara	Whitehead
CZY9998	Intensive Care	Total of the patient in this condition:		7
		AJG5245	Xenos	Pennington
		AJJ0736	Kaitlin	Mccoy
		ANA7692	Callum	Dalton
		AQT8811	Ifeoma	Orr
		ARJ7195	Vielka	Cleveland
		ASH4493	Justine	Hewitt
		AUU1068	Hector	Hayden

Figure 4.3.1.2

4.3.2 Report 2: List of patient who have not made payment for their bills

Explanation:

The Unpaid Report below lists patients who have not yet made payments on their bills. The report contains crucial information such as Patient ID, patient first and last names, the status of unpaid payments, the amounts they should have paid in different categories, and the total unpaid amount. The purpose of this report is to identify patients who have outstanding bills. Clinic staff can use this report to follow up with these patients, reminding them to settle their bills promptly. This report helps facilitate efficient management of unpaid payments.

Sample report 2:

Unpaid Report

Patient_ID	Patient_FirstName	Patient_LastName	Payment_Status
AJN1591	Constance	Nash	Unpaid
Payment_Consultation			$140.00
Payment_Treatment			$75.00
Payment_Medication			$50.00
Total Unpaid			$265.00
ARJ7195	Vielka	Cleveland	Unpaid
Payment_Consultation			$200.00
Payment_Treatment			$150.00
Payment_Medication			$80.00
Total Unpaid			$430.00
AWY1544	Pearl	Robinson	Unpaid
Payment_Consultation			$150.00
Payment_Treatment			$80.00
Payment_Medication			$40.00
Total Unpaid			$270.00

Figure 4.3.2.1

4.3.3 Report 3: The number of appointments scheduled by month.

Explanation:

The Number of Appointments Scheduled by Month report is categorized into three distinct sections: Completed Appointments, Incomplete Appointments, and Cancelled Appointments. These reports offer valuable insights into the monthly appointment trends at the clinic. Each section provides key details, including the appointment month, the total number of appointments for the month, appointment status, appointment ID, and patient ID. This information enables staff, physicians, and administrators to effectively monitor and analyse appointment patterns and statuses on a monthly basis.

Sample report 3:

Complete Appointment Report

SortMonth	AppointmentMonth	Appointment_ID	Patient_ID	Appointment_Status
202402	February	Number of complete appointment in this month:		1
		PIJ4567	ARJ7195	Completed
202403	March	Number of complete appointment in this month:		1
		PQR8901	AWU0011	Completed
202405	May	Number of complete appointment in this month:		1
		PWX4567	ARJ7195	Completed
202406	June	Number of complete appointment in this month:		3
		PAB6789	AJN1591	Completed
		PCD4567	AGH6451	Completed
		PHJ0123	AUY6326	Completed
202407	July	Number of complete appointment in this month:		2
		PGH2345	AXK1120	Completed
		PJK8901	AWY1544	Completed
202408	August	Number of complete appointment in this month:		1
		PNO6789	AXK1120	Completed
202410	October	Number of complete appointment in this month:		1
		PED3456	AJC3298	Completed
202411	November	Number of complete appointment in this month:		2
		PEF2345	AUG5737	Completed
		PIJ0123	ATV6108	Completed
202412	December	Number of complete appointment in this month:		1
		PVW4567	AWU0011	Completed

Figure 4.3.3.1

Incomplete Appointment Report

SortMonth	AppointmentMonth	Appointment_ID	Patient_ID	Appointment_Status
202401	January	Number of incomplete appointment in this month		2
		PLM8901	AJH6792	Incomplete
		PPO4567	AIU7598	Incomplete
202402	February	Number of incomplete appointment in this month		4
		PHJ6789	ABW7776	Incomplete
		PMN6789	AJN1591	Incomplete
		PNO0123	ATR1620	Incomplete
		PVW0123	AJC3298	Incomplete
202403	March	Number of incomplete appointment in this month		1
		PYZ2345	AFT8524	Incomplete
202404	April	Number of incomplete appointment in this month		1
		PED8901	AJC3298	Incomplete
202405	May	Number of incomplete appointment in this month		2
		PRS2345	AYE5566	Incomplete
		PWX8901	AJH6792	Incomplete
202406	June	Number of incomplete appointment in this month		1
		PST6789	AUG5737	Incomplete
202407	July	Number of incomplete appointment in this month		4
		PBC0123	ASI2474	Incomplete
		PEF7890	AXK1120	Incomplete
		PGH6789	ADI4883	Incomplete
		PUQ0123	ASH4493	Incomplete
202408	August	Number of incomplete appointment in this month		1
		PXY8901	AJJ0736	Incomplete
202410	October	Number of incomplete appointment in this month		2
		PCD9012	AQT8811	Incomplete
		PQR4567	ASH4493	Incomplete
202411	November	Number of incomplete appointment in this month		1
		PPO0123	AJC3298	Incomplete

Figure 4.3.3.2

SortMonth	AppointmentMonth	Appointment_ID	Patient_ID	Appointment_Status
202412	December	Number of incomplete appointment in this month		3
		PAB1234	AOV3565	Incomplete
		PRS8901	ATR1620	Incomplete
		PUQ6789	ATR1620	Incomplete

Figure 4.3.3.3

Cancelled Appointment Report

SortMonth	AppointmentMonth	Appointment_ID	Patient_ID	Appointment_Status
202403	March	Number of cancelled appointment in this month:		1
		PBC5678	ATV6108	Cancelled
202407	July	Number of cancelled appointment in this month:		1
		PLM2345	AJJ0736	Cancelled
202410	October	Number of cancelled appointment in this month:		1
		PST2345	AYE5566	Cancelled
202411	November	Number of cancelled appointment in this month:		2
		PJK4567	ASH4493	Cancelled
		PMN2345	ATR1620	Cancelled

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Figure 4.3.3.4

CHAPTER 5 CONCLUSION

5.1 System Weaknesses

Explanation:

Security Issues

The system currently exhibits inadequate database protection, making it vulnerable to security breaches and hacking attempts. This can lead to the theft of sensitive patient information, disruptions to clinic management operations, and damage to the clinic's reputation. Potential threats include SQL injection, cross-site scripting (XSS), and weaknesses in authentication and authorization mechanisms. Additionally, the system is at risk of being compromised by Denial

of Service (DoS) or Distributed Denial of Service (DDoS) attacks, which could result in system outages and interruptions in service.

Training and Support Issues

The system lacks comprehensive training materials and support resources for clinic staff and doctors. The absence of instructional guides and FAQs limits the efficiency of system usage and negatively impacts the user experience. Without proper training and support, users may struggle to navigate the system effectively, resulting in decreased productivity and potential errors.

Backup and Recovery Procedure Issues

The system is deficient in robust backup and recovery procedures, exposing it to significant risk of data loss due to hardware or software failures, or other unforeseen issues. In the event of a system failure, the clinic may face challenges in recovering crucial data, which could have serious implications for ongoing operations and patient care.

Accessibility Issues

The system does not offer adequate accessibility options, which can hinder users with visual impairments, cognitive disabilities, language barriers, or limited technological proficiency. The lack of accessibility features can make it difficult for these individuals to effectively use the system, reducing overall usability and potentially excluding some users from fully benefiting from its functionalities.

5.2 Future Improvements

Increase the Security Level of the Database

To enhance database security, it is crucial to implement robust protective measures. Regular security assessments should be conducted to identify and address system vulnerabilities. Encrypting sensitive information will help prevent unauthorized access and data breaches. Establishing a firewall will guard against hacking attempts, while monitoring database traffic and maintaining a blacklist can help counteract Denial of Service (DoS) and Distributed Denial of Service (DDoS) attacks.

Provide Adequate Training and Support

We will implement a comprehensive training program for clinic staff, ensuring they are proficient in using and managing the system. This training will be conducted periodically to keep staff updated on system functionalities and best practices. Additionally, we will create a communication platform to facilitate troubleshooting and support between clinic staff and users. To assist users, we will provide detailed step-by-step manuals and a Frequently Asked Questions (FAQ) section to address common issues and queries.

Establish Backup and Recovery Procedures

To mitigate data loss risks, routine backups should be performed and stored in multiple locations, such as external hard drives or cloud storage. Regular testing of backup and recovery procedures is essential to ensure data integrity and availability. Clinic staff will receive periodic training on backup and recovery processes to maintain preparedness and effectiveness in the event of data loss.

Implement Accessibility Features and Accommodations

To improve system accessibility, we will gather feedback from users through periodic surveys regarding their experience with the system. This feedback will be categorized, analyzed, and used to generate reports that inform system updates. Enhancing the system's accessibility features based on user feedback will help eliminate barriers and improve overall usability. Additionally, we will monitor the effectiveness of these features and make continuous improvements as needed.