



AMERICAN INTERNATIONAL UNIVERSITY–BANGLADESH (AIUB)

FACULTY OF SCIENCE & TECHNOLOGY

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Section: G

PROJECT ON

Hospital Management System

Supervised By

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Submitted By

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Introduction

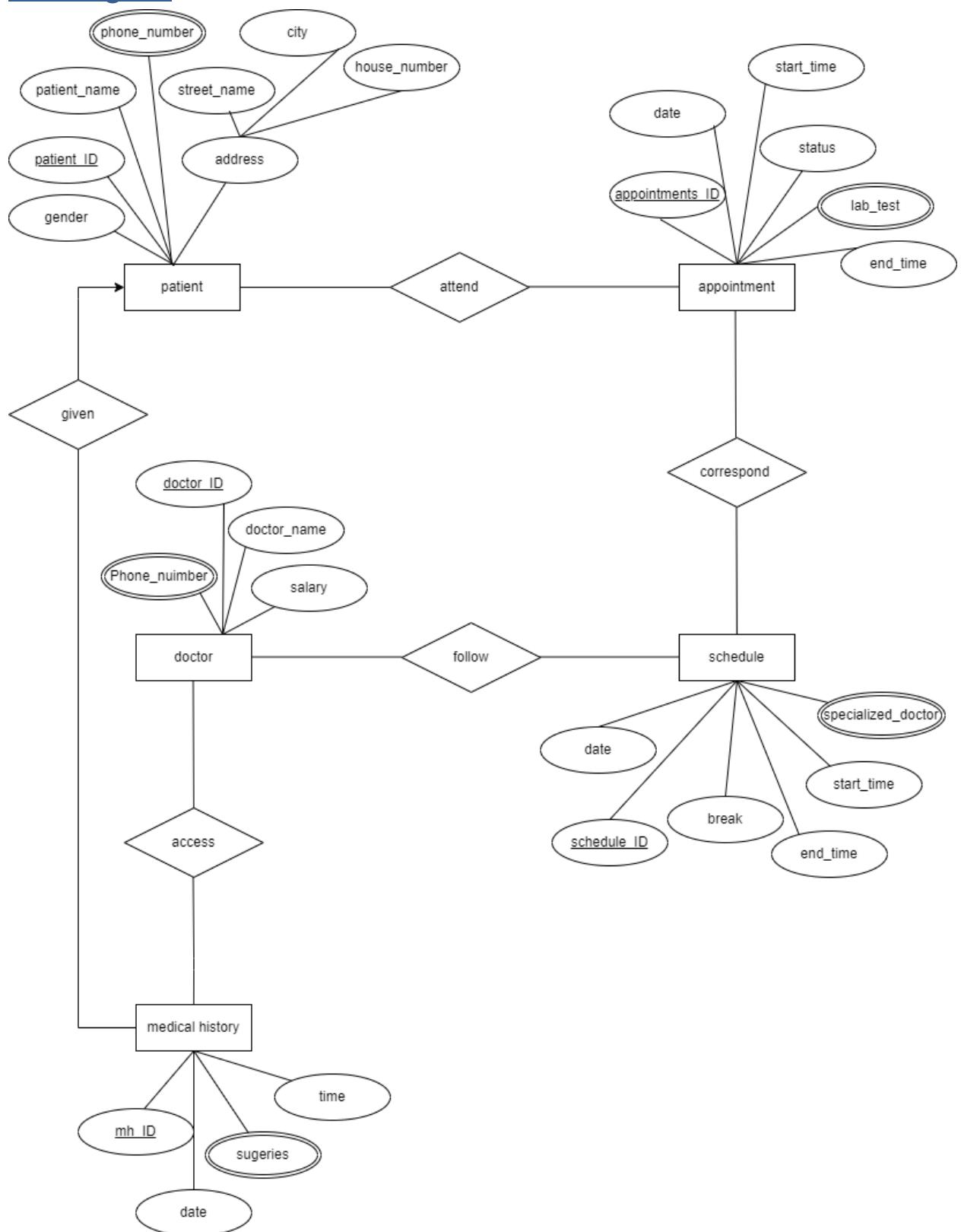
This database project is about creating a database for Hospital Management System. The implementation of this database system in the healthcare sector offers a multitude of advantages, surpassing traditional manual methods of data management. The primary objective of this database project is to establish an efficient and organized system for managing hospital operations. In the area of healthcare, many entities play vital roles in ensuring smooth hospital functioning. These entities include:

- Appointments
- Patients
- Doctors
- Medical History
- Schedule

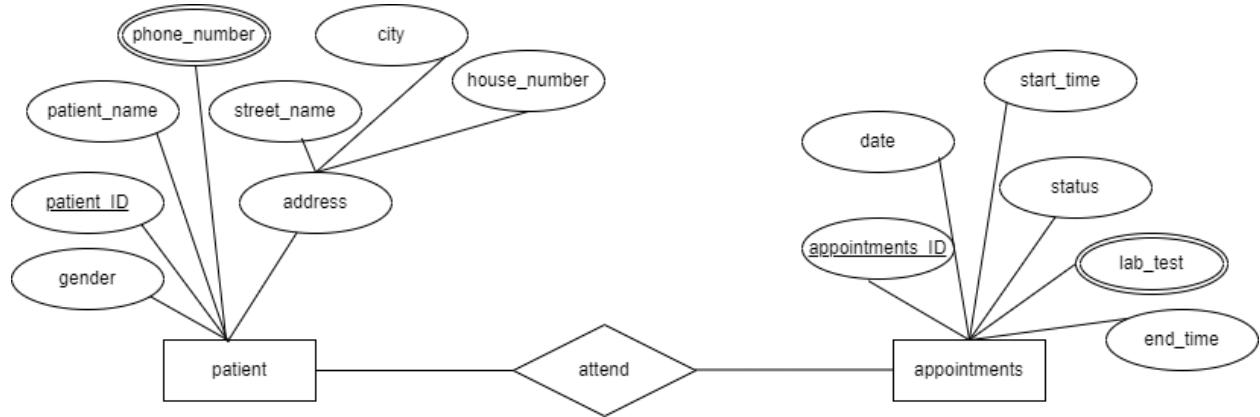
Scenario Description

In a Hospital Management System, patients engage in appointments and attend multiple appointments, while each appointment caters to multiple patients. A patient is identified by the patient ID. The system also stores the patient's name, gender, phone number, and address. A patient's address is composed of house number, street name, and city. Appointments are identified by the appointment ID. Appointment have a status, lab test, date, start time, and end time. Appointments correspond with schedules. Schedules consist of attributes like schedule ID, specialized doctor, date, start time, end time, and break. Doctors must follow the schedules. To identify a doctor, the system stores a doctor ID along with the doctor's name, phone number and salary. Doctors can access and update patients medical histories. A medical history is identified by a medical history ID. The system also stores information about surgeries, time, and date. Medical history is associated with patients.

ER Diagram



Normalization



Relation: Many to Many

UNF: patient_ID, patient_name, phone_number, street_name, city, house_number, gender,

appointment_ID, date, start_time, end_time, lab_test, status

1NF: Multivalued attributes: phone_number, lab_test

patient_ID, patient_name, street_name, city, house_number, gender, appointment_ID, date, start_time, end_time, status

2NF: 1. patient_ID, phone_number

2. appointment_ID, lab_test

3. patient_ID, patient_name, street_name, city, house_number, gender, appointment_ID

4. appointment_ID, date, start_time, end_time, status

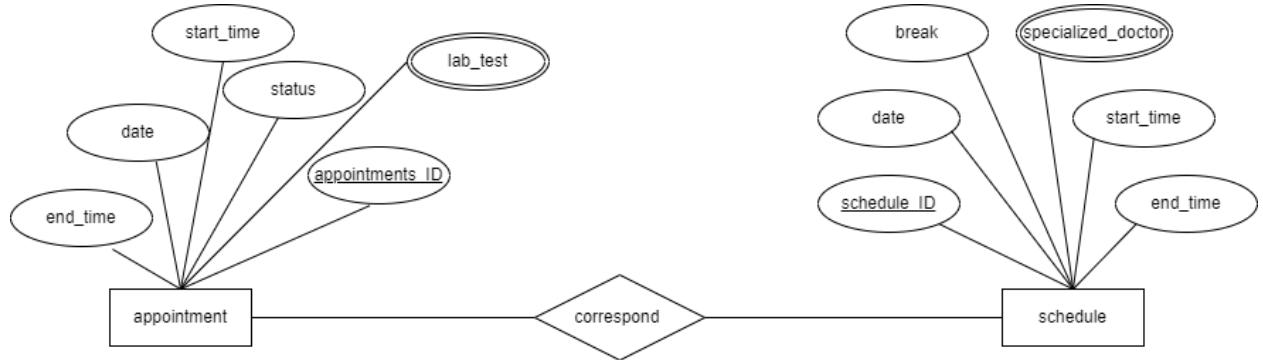
3NF: 1. patient_ID, street_name, city, house_number

2. patient_ID, phone_number

3. appointment_ID, lab_test

4. patient_ID, patient_name, gender, appointment_ID

5. appointment_ID, date, start_time, end_time, status



Relation: Many to Many

UNF: appointment_ID, date, start_time, status, lab_test, end_time, schedule_ID, start_time, end_time, specialized_doctor, date, break

1NF: Multivalued attributes: lab_test, specialized_doctor

appointment_ID, dates, start_time, status, end_time, schedule_ID, start_time, end_time, date, break

2NF: 1. appointment_ID, lab_test

2. schedule_ID, specialized_doctor

3. appointment_ID, date, start_time, status, end_time

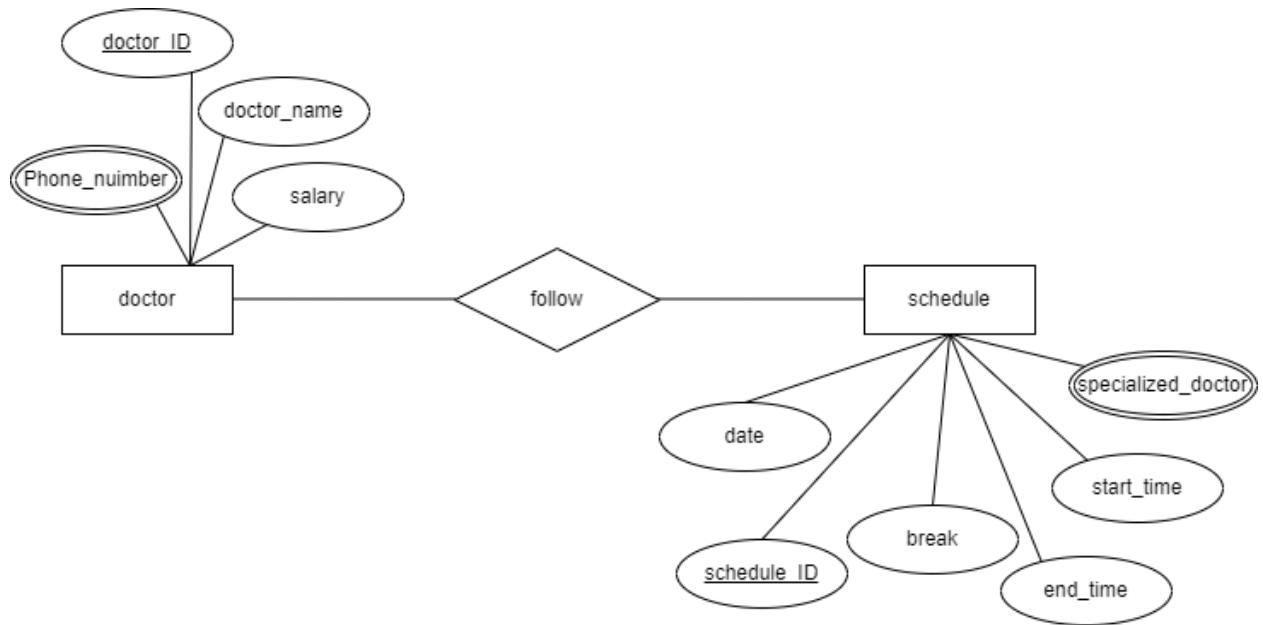
4. schedule_ID, start_time, end_time, date, break, appointment_ID

3NF: 1. appointment_ID, lab_test

2. schedule_ID, specialized_doctor

3. appointment_ID, date, start_time, status, end_time, status

4. schedule_ID, start_time, end_time, date, break, appointment_ID



Relation: Many to Many

UNF: doctor_ID, doctor_name, phone_number, salary, schedule_ID, start_time, end_time, specialized_doctor, date, break

1NF: Multivalued attributes: phone_number, specialized_doctor

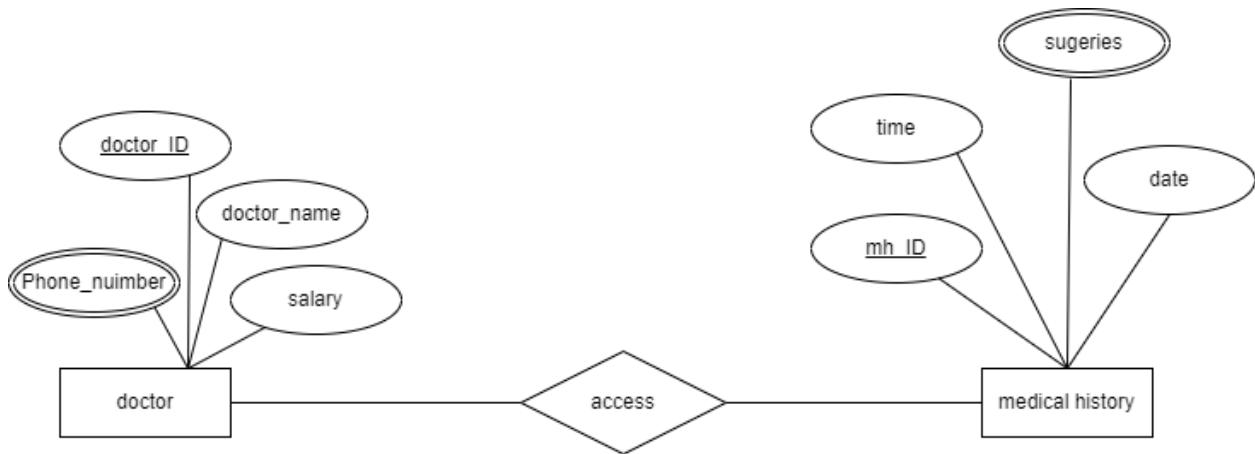
doctor_ID, doctor_name, salary, schedule_ID, start_time, end_time, date, break

2NF: 1. doctor_ID, phone_number

2. schedule_ID, specialized_doctor
3. doctor_ID, doctor_name, salary, schedule_ID
4. schedule_ID, start_time, end_time, date, break

3NF: 1. doctor_ID, phone_number

2. schedule_ID, specialized_doctor
3. doctor_ID, doctor_name, salary, schedule_ID
4. schedule_ID, start_time, end_time, date, break



Relation: Many to Many

UNF: doctor_ID, doctor_name, phone_number, salary, mh_ID, date, surgeries, time

1NF: Multivalued attributes: phone_number, surgeries

doctor_ID, doctor_name, salary, mh_ID, date, time

2NF: 1. doctor_ID, phone_number

2. mh_ID, surgeries

3. doctor_ID, doctor_name, salary, mh_ID

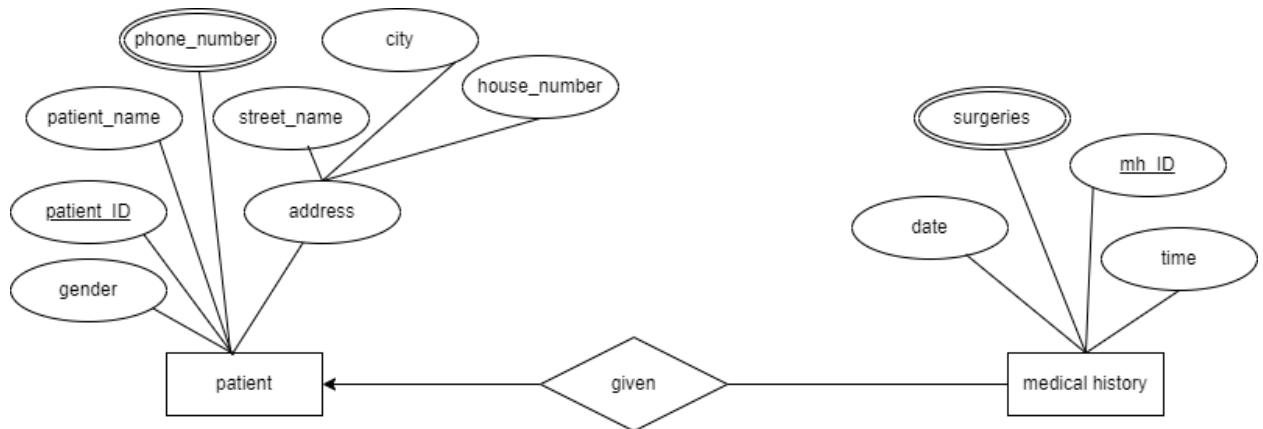
4. mh_ID, date, time

3NF: 1. doctor_ID, phone_number

2. mh_ID, surgeries

3. doctor_ID, doctor_name, salary, mh_ID

4. mh_ID, date, time



Relation: One to Many

UNF: patient_ID, patient_name, phone_number, street_name, city, house_number, gender, mh_ID, date, surgeries, time

1NF: Multivalued attributes: phone_number, surgeries

patient_ID, patient_name, street_name, city, house_number, gender, mh_ID, date, time

2NF: 1. patient_ID, phone_number

2. mh_ID, surgeries

3. patient_ID, patient_name, street_name, city, house_number, gender

4. mh_ID, date, time, patient_ID

3NF: 1. patient_ID, street_name, city, house_number

2. patient_ID, phone_number

3. mh_ID, surgeries

4. patient_ID, patient_name, gender

5. mh_ID, dates, time, patient_ID

Finalization

1. patient_ID, street_name, city, house_number
2. patient_ID, phone_number
3. appointment_ID, lab_test
4. patient_ID, patient_name, gender, appointment_ID
5. appointment_ID, date, start_time, end_time, status
6. appointment_ID, lab_test
7. schedule_ID, specialized_doctor
8. appointment_ID, date, start_time, status, end_time
9. schedule_ID, start_time, end_time, date, break, appointment_ID
10. doctor_ID, phone_number
11. schedule_ID, specialized_doctor
12. doctor_ID, doctor_name, salary, schedule_ID
13. schedule_ID, start_time, end_time, date, break
14. doctor_ID, phone_number
15. mh_ID, surgeries
16. doctor_ID, doctor_name, salary, mh_ID
17. mh_ID, date, time
18. patient_ID, street_name, city, house_number
19. patient_ID, phone_number
20. mh_ID, surgeries
21. patient_ID, patient_name, gender
22. mh_ID, date, time, patient_ID

Optimization

1. patient_ID, street_name, city, house_number
2. patient_ID, phone_number
3. appointment_ID, lab_test
4. patient_ID, patient_name, gender, appointment_ID
5. appointment_ID, date, start_time, end_time, status
6. schedule_ID, specialized_doctor
7. schedule_ID, start_time, end_time, date, break, appointment_ID
8. doctor_ID, phone_number
9. doctor_ID, doctor_name, salary, schedule_ID
10. schedule_ID, start_time, end_time, date, break
11. mh_ID, surgeries
12. doctor_ID, doctor_name, salary, mh_ID
13. mh_ID, date, time
14. patient_ID, patient_name, gender
15. mh_ID, date, time, patient_ID

Table Creation

1. Patient table:

```
create table patient (patient_ID number(5) primary key, street_name varchar2(50), house_number
varchar2(50), city varchar2(100))
```

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
PATIENT	PATIENT_ID	Number	-	5	0	1	-	-	-
	STREET_NAME	Varchar2	50	-	-	-	✓	-	-
	HOUSE NUMBER	Varchar2	50	-	-	-	✓	-	-
	CITY	Varchar2	100	-	-	-	✓	-	-
1 - 4									

2. Patient2 table:

```
create table patient2 (patient_ID number(5) primary key, phone_number varchar2(11))
```

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
PATIENT2	PATIENT_ID	Number	-	5	0	1	-	-	-
	PHONE NUMBER	Varchar2	11	-	-	-	✓	-	-
1 - 2									

3. Appointment table:

```
create table appointment (appointment_ID number(5) primary key, lab_test varchar2(100))
```

desc appointment

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
APPOINTMENT	APPOINTMENT_ID	Number	-	5	0	1	-	-	-
	LAB TEST	Varchar2	100	-	-	-	✓	-	-
1 - 2									

4. Patient_info table:

```
create table patient_info (patient_ID number(5) primary key, patient_name varchar2(50), gender
varchar2(6), appointment_ID number(6))
```

alter table patient_info add constraint cons1 foreign key(appointment_ID) references
appointment(appointment_ID)

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
PATIENT_INFO	PATIENT_ID	Number	-	5	0	1	-	-	-
	PATIENT_NAME	Varchar2	50	-	-	-	✓	-	-
	GENDER	Varchar2	6	-	-	-	✓	-	-
	APPOINTMENT_ID	Number	-	6	0	-	✓	-	-
1 - 4									

5. Appointment_info:

create table appointment_info (appointment_ID number(5) primary key, dates varchar(30), start_time varchar2(30), end_time varchar2(30), status varchar2(30))

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
APPOINTMENT_INFO	APPOINTMNET_ID	Number	-	5	0	1	-	-	-
	DATES	Varchar2	30	-	-	-	✓	-	-
	START_TIME	Varchar2	30	-	-	-	✓	-	-
	END_TIME	Varchar2	30	-	-	-	✓	-	-
	STATUS	Varchar2	30	-	-	-	✓	-	-
1 - 5									

6. Schedule table:

create table schedule (schedule_ID number(5) primary key, specialized_doctor varchar2(100))

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
SCHEDULE	SCHEDULE_ID	Number	-	5	0	1	-	-	-
	SPECIALIZED_DOCTOR	Varchar2	100	-	-	-	✓	-	-
1 - 2									

7. Schedule_info table:

create table schedule_info (schedule_ID number(5) primary key, dates varchar(30), start_time varchar2(30), end_time varchar2(30), break varchar2(30), appointment_ID number(5))

alter table schedule_info add constraint cons2 foreign key(appointment_ID) references appointment(appointment_ID)

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
SCHEDULE_INFO	SCHEDULE_ID	Number	-	5	0	1	-	-	-
	DATES	Varchar2	30	-	-	-	✓	-	-
	START_TIME	Varchar2	30	-	-	-	✓	-	-
	END_TIME	Varchar2	30	-	-	-	✓	-	-
	BREAK	Varchar2	30	-	-	-	✓	-	-
	APPOINTMENT_ID	Number	-	5	0	-	✓	-	-
1 - 6									

8. Doctor table:

create table doctor (doctor_ID number(5) primary key, phone_number varchar(11))

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
DOCTOR	DOCTOR_ID	Number	-	5	0	1	-	-	-
	PHONE_NUMBER	Varchar2	11	-	-	-	✓	-	-
1 - 2									

9. Doctor_info table:

```
create table doctor_info (doctor_id number(5) primary key, doctor_name varchar2(100), salary number(10,5), schedule_ID number(5))
```

```
alter table doctor_info add constraint cons3 foreign key(schedule_ID) references schedule(schedule_ID)
```

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
DOCTOR_INFO	DOCTOR_ID	Number	-	5	0	1	-	-	-
	DOCTOR_NAME	Varchar2	100	-	-	-	✓	-	-
	SALARY	Number	-	10	5	-	✓	-	-
	SCHEDULE_ID	Number	-	5	0	-	✓	-	-
1 - 4									

10. Schedule2 table:

```
create table schedule2 (schedule_ID number(5) primary key, dates varchar(30), start_time varchar2(30), end_time varchar2(30), break varchar2(30))
```

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
SCHEDULE2	SCHEDULE_ID	Number	-	5	0	1	-	-	-
	DATES	Varchar2	30	-	-	-	✓	-	-
	START_TIME	Varchar2	30	-	-	-	✓	-	-
	END_TIME	Varchar2	30	-	-	-	✓	-	-
	BREAK	Varchar2	30	-	-	-	✓	-	-
1 - 5									

11. Medical_history table:

```
create table medical_history (mh_ID number(5) primary key, surgeries varchar2(100))
```

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
MEDICAL_HISTORY	MH_ID	Number	-	5	0	1	-	-	-
	SURGERIES	Varchar2	100	-	-	-	✓	-	-
1 - 2									

12. Doctor_info2 table:

```
create table doctor_info2 (doctor_id number(5) primary key, doctor_name varchar2(100), salary number(10,5), mh_ID number(5))
```

```
alter table doctor_info2 add constraint cons4 foreign key(mh_ID) references medical_history(mh_ID)
```

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
DOCTOR_INFO2	DOCTOR_ID	Number	-	5	0	1	-	-	-
	DOCTOR_NAME	Varchar2	100	-	-	-	✓	-	-
	SALARY	Number	-	10	5	-	✓	-	-
	MH_ID	Number	-	5	0	-	✓	-	-
1 - 4									

13. Medical_info table:

```
create table medical_info (mh_ID number(5) primary key, dates varchar2(50), time varchar2(50))
```

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
MEDICAL_INFO	MH_ID	Number	-	5	0	1	-	-	-
	DATES	Varchar2	50	-	-	-	✓	-	-
	TIME	Varchar2	50	-	-	-	✓	-	-
1 - 3									

14. Patient_info2 table:

```
create table patient_info2 (patient_ID number(5) primary key, patient_name varchar2(50), gender varchar2(6))
```

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
PATIENT_INFO2	PATIENT_ID	Number	-	5	0	1	-	-	-
	PATIENT_NAME	Varchar2	50	-	-	-	✓	-	-
	GENDER	Varchar2	6	-	-	-	✓	-	-
1 - 3									

15. Medical_info2 table:

```
create table medical_info2 (mh_ID number(5) primary key, dates varchar(50), patient_ID number(5))
```

```
alter table medical_info2 add constraint cons5 foreign key(patient_ID) references patient(patient_ID)
```

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
MEDICAL_INFO2	MH_ID	Number	-	5	0	1	-	-	-
	DATES	Varchar2	50	-	-	-	✓	-	-
	PATIENT_ID	Number	-	5	0	-	✓	-	-
1 - 3									

Data Insertion

Data for Patient table:

1. insert into patient values (11, 'Main Street', '123', 'Badda')
2. insert into patient values (22, 'Elm Avenue', '456', 'Rangpur')
3. insert into patient values (33, 'Oak Lane', '784', 'Gulshan')
4. insert into patient values (44, 'Cedar Road', '101', 'Rampura')
5. insert into patient values (55, 'main street', '202', 'Dhanmondi')

PATIENT_ID	STREET_NAME	HOUSE_NUMBER	CITY
33	Oak Lane	784	Gulshan
44	Cedar Road	101	Rampura
11	Main Street	123	Badda
22	Elm Avenue	456	Rangpur
55	main street	202	Dhanmondi

Data for Patient2 table:

1. insert into patient2 values (11,'01760987782')
2. insert into patient2 values (22,'01543218921')
3. insert into patient2 values (33,'01314926107')
4. insert into patient2 values (44, '01761251078')
5. insert into patient2 values (55, '01825925421')

PATIENT_ID	PHONE_NUMBER
11	01760987782
22	01543218921
33	01314926107
44	01761251078
55	01825925421

Data for Appointment table:

1. insert into appointment values(1 , 'Blood Test')
2. insert into appointment values(2, 'X-Ray')
3. insert into appointment values(3, 'MRI')
4. insert into appointment values(4, 'Ultrasound')
5. insert into appointment values(5, 'ECO')

APPOINTMENT_ID	LAB_TEST
1	Blood Test
2	X-Ray
3	MRI
4	Ultrasound
5	ECO

Data for Patient_info table:

1. insert into Patient_info values (11, 'Abid Ali', 'Male', 1)
2. insert into Patient_info values (22, 'Ammena Islam', 'Female', 2)
3. insert into Patient_info values (33, 'Tahin Khan', 'Male', 3)
4. insert into Patient_info values (44, 'Zoya Ahmed', 'Female', 4)
5. insert into Patient_info values (55, 'Zubaer Hamza', 'Male', 5)

PATIENT_ID	PATIENT_NAME	GENDER	APPOINTMENT_ID
11	Abid Ali	Male	1
22	Ammena Islam	Female	2
33	Tahin Khan	Male	3
44	Zoya Ahmed	Female	4
55	Zubaer Hamza	Male	5

Data for Appointment_info:

1. insert into appointment_info values (1, '25-08-2023', '9:00AM', '10:00AM', 'Scheduled')
2. insert into appointment_info values (2, '28-08-2023', '11:30AM', '12:30AM', 'Scheduled')
3. insert into appointment_info values (3, '27-08-2023', '02:AM', '03:15AM', 'Canceled')
4. insert into appointment_info values (4, '29-08-2023', '10:45AM', '11:45AM', 'Scheduled')
5. insert into appointment_info values (5, '01-09-2023', '09:00AM', '10:00AM', 'Scheduled')

APPOINTMNET_ID	DATES	START_TIME	END_TIME	STATUS
1	25-08-2023	9:00AM	10:00AM	Scheduled
2	28-08-2023	11:30AM	12:30AM	Scheduled
3	27-08-2023	02:AM	03:15AM	Canceled
4	29-08-2023	10:45AM	11:45AM	Scheduled
5	01-09-2023	09:00AM	10:00AM	Scheduled

Data for Schedule table:

1. insert into schedule values (01, 'Dr. Smith (Cardiologist)')
2. insert into schedule values (02, 'Dr. Zafar (Orthopedic Surgeon)')
3. insert into schedule values (03, 'Dr. Wilson (Dermatologist)')
4. insert into schedule values (04, 'Dr. Ahmed (Pediatrician)')
5. insert into schedule values (05, 'Dr. Shaila (Gynecologist)')

SCHEDULE_ID	SPECIALIZED_DOCTOR
1	Dr. Smith (Cardiologist)
2	Dr. Zafar (Orthopedic Surgren)
3	Dr. Wilson (Dermatologist)
4	Dr. Ahmed (Pediatrician)
5	Dr. Shaila (Gynecologist)

Data for Schedule_info table:

1. insert into schedule_info values (01, '25-08-2023', '8:00AM', '12:00AM', '10:00-10:15', 1)
2. insert into schedule_info values (02, '26-08-2023', '09:30AM', '02:30AM', '102:00-12:45', 2)
3. insert into schedule_info values (03, '27-08-2023', '8:00AM', '11:00AM', '10:10-10:35', 3)
4. insert into schedule_info values (04, '29-08-2023', '10:00AM', '01:00AM', '12:00-12:15', 4)
5. insert into schedule_info values (05, '01-08-2023', '8:30AM', '12:30AM', '11:00-11:15', 5)

SCHEDULE_ID	DATES	START_TIME	END_TIME	BREAK	APPOINTMENT_ID
1	25-08-2023	8:00AM	12:00AM	10:00-10:15	1
2	26-08-2023	09:30AM	02:30AM	102:00-12:45	2
3	27-08-2023	8:00AM	11:00AM	10:10-10:35	3
4	29-08-2023	10:00AM	01:00AM	12:00-12:15	4
5	01-08-2023	8:30AM	12:30AM	11:00-11:15	5

Data for Doctor table:

1. insert into doctor values (21, '01812045678')
2. insert into doctor values (22, '01912355678')
3. insert into doctor values (23, '01712567845')
4. insert into doctor values (24, '01942355678')
5. insert into doctor values (25, '01315896251')

DOCTOR_ID	PHONE_NUMBER
21	01812045678
22	01912355678
23	01712567845
24	01942355678
25	01315896251

Data for Doctor_info table:

1. insert into doctor_info values (21, 'Dr. Smith', 75000.00, 01)
2. insert into doctor_info values (22, 'Dr. Zafar', 80000.00, 02)
3. insert into doctor_info values (23, 'Dr. Wilson', 70000.00, 03)
4. insert into doctor_info values (24, 'Dr. Ahmed', 90000.00, 04)
5. insert into doctor_info values (25, 'Dr. Shaila', 85000.00, 05)

DOCTOR_ID	DOCTOR_NAME	SALARY	SCHEDULE_ID
23	Dr. Wilson	70000	3
21	Dr. Smith	75000	1
22	Dr. Zafar	80000	2
25	Dr. Shaila	85000	5
24	Dr. Ahmed	90000	4

Data for Schedule2 table:

1. insert into schedule2 values (01, '25-08-2023', '8:00AM', '12:00AM', '10:00-10:15')
2. insert into schedule2 values (02, '26-08-2023', '09:30AM', '02:30AM', '102:00-12:45')
3. insert into schedule2 values (03, '27-08-2023', '8:00AM', '11:00AM', '10:10-10:35')
4. insert into schedule2 values (04, '29-08-2023', '10:00AM', '01:00AM', '12:00-12:15')
5. insert into schedule2 values (05, '01-08-2023', '8:30AM', '12:30AM', '11:00-11:15')

SCHEDULE_ID	DATES	START_TIME	END_TIME	BREAK
1	25-08-2023	8:00AM	12:00AM	10:00-10:15
2	26-08-2023	09:30AM	02:30AM	102:00-12:45
3	27-08-2023	8:00AM	11:00AM	10:10-10:35
4	29-08-2023	10:00AM	01:00AM	12:00-12:15
5	01-08-2023	8:30AM	12:30AM	11:00-11:15

Data for Medical_history table:

1. insert into medical_history values (1, 'Appendectomy in 2010')
2. insert into medical_history values (2, 'Knee surgery in 2015, Gallbladder removal in 2018')
3. insert into medical_history values (3, 'None')
4. insert into medical_history values (4, 'Appendectomy in 2008, Heart bypass surgery in 2017')
5. insert into medical_history values (5, 'Hip replacement surgery in 2019')

MH_ID	SURGERIES
1	Appendectomy in 2010
2	Knee surgery in 2015, Gallbladder removal in 2018
3	None
4	Appendectomy in 2008, Heart bypass surgery in 2017
5	Hip replacement surgery in 2019

Data for doctor_info2 table:

1. insert into doctor_info2 values (21, 'Dr. Smith ', 75000.00, 1)
2. insert into doctor_info2 values (22, 'Dr. Zafar ', 80000.00, 2)
3. insert into doctor_info2 values (23, 'Dr. Wilson ', 70000.00, 3)
4. insert into doctor_info2 values (24, 'Dr. Ahmed ', 90000.00, 4)
5. insert into doctor_info2 values (25, 'Dr. Shaila ', 85000.00, 5)

DOCTOR_ID	DOCTOR_NAME	SALARY	MH_ID
21	Dr. Smith	75000	1
22	Dr. Zafar	80000	2
23	Dr. Wilson	70000	3
24	Dr. Ahmed	90000	4
25	Dr. Shaila	85000	5

Data for medical_info:

1. insert into medical_info values (1, '15-8-2023', '09:30AM')
2. insert into medical_info values (2, '25-7-2023', '02:20AM')
3. insert into medical_info values (3, '05-8-2023', '10:45AM')
4. insert into medical_info values (4, '10-8-2023', '08:30AM')
5. insert into medical_info values (5, '28-7-2023', '03:30AM')

MH_ID	DATES	TIME
1	15-8-2023	09:30AM
2	25-7-2023	02:20AM
3	05-8-2023	10:45AM
4	10-8-2023	08:30AM
5	28-7-2023	03:30AM

Data for patient_info2:

1. insert into patient_info2 values (11, 'Abid Ali', 'Male')
2. insert into patient_info2 values (22, 'Ammena Islam', 'Female')
3. insert into patient_info2 values (33, 'Tahin Khan', 'Male')
4. insert into patient_info2 values (44, 'Zoya Ahmed', 'Female')
5. insert into patient_info2 values (55, 'Zubaer Hamza', 'Male')

PATIENT_ID	PATIENT_NAME	GENDER
11	Abid Ali	Male
22	Ammena Islam	Female
33	Tahin Khan	Male
44	Zoya Ahmed	Female
55	Zubaer Hamza	Male

Data for medical_info2 table:

1. insert into medical_info2 values (1, '15-8-2023', 11)
2. insert into medical_info2 values (2, '25-7-2023', 22)
3. insert into medical_info2 values (3, '05-8-2023', 33)
4. insert into medical_info2 values (4, '10-8-2023', 44)
5. insert into medical_info2 values (5, '28-7-2023', 55)

MH_ID	DATES	PATIENT_ID
1	15-8-2023	11
2	25-7-2023	22
3	05-8-2023	33
4	10-8-2023	44
5	28-7-2023	55

Query Writing

Single-row function

Question: Write a query to find the total number of doctors in the hospital.

Answer: SELECT COUNT (*) AS total_doctors
FROM doctor_info;

TOTAL_DOCTORS
5

Question: Retrieve the patient's address (concatenated street_name and house_number) for a specific patient with patient_ID 33.

Answer: SELECT street_name || ' ' || house_number AS address
FROM patient
WHERE patient_ID = 33;

ADDRESS
Oak Lane 784

Group function

Question: Find the latest date for each break time in the schedule for a particular event.

Answer: SELECT MAX(dates)
FROM schedule2
GROUP BY break;

MAX(DATES)
25-08-2023
29-08-2023
26-08-2023
27-08-2023
01-08-2023

Question: Calculate the average salary of doctors in the hospital.

Answer: SELECT AVG(salary) AS average_salary

```
FROM doctor_info;
```

AVERAGE_SALARY
80000

Single-Row Subquery

Question: Retrieve the name of the doctor who has the highest salary in the hospital.

Answer:

```
SELECT doctor_name
```

```
FROM doctor_info
```

```
WHERE salary = (SELECT MAX(salary)
```

```
        FROM doctor_info);
```

DOCTOR_NAME
Dr. Ahmed

Multiple-Row Subquery

Question: Find the names of patients who have had more than one appointment.

Answer:

```
SELECT patient_name
```

```
FROM patient_info
```

```
WHERE patient_ID IN (
```

```
        SELECT patient_ID
```

```
        FROM appointment_info
```

```
        GROUP BY patient_ID
```

```
        HAVING COUNT(*) > 1
```

```
);
```

PATIENT_NAME
Abid Ali
Ammena Islam
Tahin Khan
Zoya Ahmed
Zubaer Hamza

Joining

Question: List the names of patients, their respective attending doctors, and the appointment dates for each patient's appointment.

Answer: `SELECT p.patient_name, d.doctor_name, ai.dates
FROM patient_info p, doctor_info d, appointment_info ai
WHERE p.appointment_ID = d.schedule_ID;`

PATIENT_NAME	DOCTOR_NAME	DATES
Abid Ali	Dr. Smith	25-08-2023
Abid Ali	Dr. Smith	28-08-2023
Abid Ali	Dr. Smith	27-08-2023
Abid Ali	Dr. Smith	29-08-2023
Abid Ali	Dr. Smith	01-09-2023
Ammena Islam	Dr. Zafar	25-08-2023
Ammena Islam	Dr. Zafar	28-08-2023
Ammena Islam	Dr. Zafar	27-08-2023
Ammena Islam	Dr. Zafar	29-08-2023
Ammena Islam	Dr. Zafar	01-09-2023
Tahin Khan	Dr. Wilson	25-08-2023
Tahin Khan	Dr. Wilson	28-08-2023
Tahin Khan	Dr. Wilson	27-08-2023
Tahin Khan	Dr. Wilson	29-08-2023
Tahin Khan	Dr. Wilson	01-09-2023
Zoya Ahmed	Dr. Ahmed	25-08-2023
Zoya Ahmed	Dr. Ahmed	28-08-2023
Zoya Ahmed	Dr. Ahmed	27-08-2023
Zoya Ahmed	Dr. Ahmed	29-08-2023
Zoya Ahmed	Dr. Ahmed	01-09-2023
Zubaer Hamza	Dr. Shaila	25-08-2023
Zubaer Hamza	Dr. Shaila	28-08-2023
Zubaer Hamza	Dr. Shaila	27-08-2023
Zubaer Hamza	Dr. Shaila	29-08-2023
Zubaer Hamza	Dr. Shaila	01-09-2023

Question: List surgeries from medical history and the names of the doctors who may have performed those surgeries, including cases where there is no direct match between patients and surgeries.

Answer: `SELECT mh.surgeries, d.doctor_name`

FROM patient_info p, medical_history mh, doctor_info d

WHERE p.patient_ID(+) = mh.mh_ID;

SURGERIES	DOCTOR_NAME
Appendectomy in 2010	Dr. Wilson
Appendectomy in 2010	Dr. Smith
Appendectomy in 2010	Dr. Zafar
Appendectomy in 2010	Dr. Shaila
Appendectomy in 2010	Dr. Ahmed
Knee surgery in 2015, Gallbladder removal in 2018	Dr. Wilson
Knee surgery in 2015, Gallbladder removal in 2018	Dr. Smith
Knee surgery in 2015, Gallbladder removal in 2018	Dr. Zafar
Knee surgery in 2015, Gallbladder removal in 2018	Dr. Shaila
Knee surgery in 2015, Gallbladder removal in 2018	Dr. Ahmed
None	Dr. Wilson
None	Dr. Smith
None	Dr. Zafar
None	Dr. Shaila
None	Dr. Ahmed
Appendectomy in 2008, Heart bypass surgery in 2017	Dr. Wilson
Appendectomy in 2008, Heart bypass surgery in 2017	Dr. Smith
Appendectomy in 2008, Heart bypass surgery in 2017	Dr. Zafar
Appendectomy in 2008, Heart bypass surgery in 2017	Dr. Shaila
Appendectomy in 2008, Heart bypass surgery in 2017	Dr. Ahmed
Hip replacement surgery in 2019	Dr. Wilson
Hip replacement surgery in 2019	Dr. Smith
Hip replacement surgery in 2019	Dr. Zafar
Hip replacement surgery in 2019	Dr. Shaila
Hip replacement surgery in 2019	Dr. Ahmed

View

Question: Create view of patient_info table with patient_name and gender.

Answer: CREATE VIEW patient_infow20

AS SELECT patient_name, gender

FROM patient_info;

SELECT *

```
FROM patient_infovw20;
```

PATIENT_NAME	GENDER
Abid Ali	Male
Ammena Islam	Female
Tahin Khan	Male
Zoya Ahmed	Female
Zubaer Hamza	Male

Question: Create view of appointment_info table with dates, start_time and status.

```
Answer: CREATE VIEW appointmentvw50
```

```
AS SELECT dates, start_time, status
```

```
FROM appointment_info;
```

```
SELECT *
```

```
FROM appointmentvw50;
```

DATES	START_TIME	STATUS
25-08-2023	9:00AM	Scheduled
28-08-2023	11:30AM	Scheduled
27-08-2023	02:AM	Canceled
29-08-2023	10:45AM	Scheduled
01-09-2023	09:00AM	Scheduled

Conclusion

In conclusion, creating a hospital management system database brings several benefits for effective data management in the healthcare sector. The implemented database effectively organizes and stores information about appointments, patients, doctors, medical histories, and schedules. By following normalization principles, we ensured data integrity and reduced unnecessary duplication. We demonstrated the database's functionality through tasks like creating tables, inserting data, and writing queries. Overall, this project improves operational efficiency, aids decision-making, and proves valuable to the healthcare sector.