



DATABASE SYSTEMS – ASSIGNMENT 3

Due Date: 15th May, 2022 11:59 PM



Group Members:

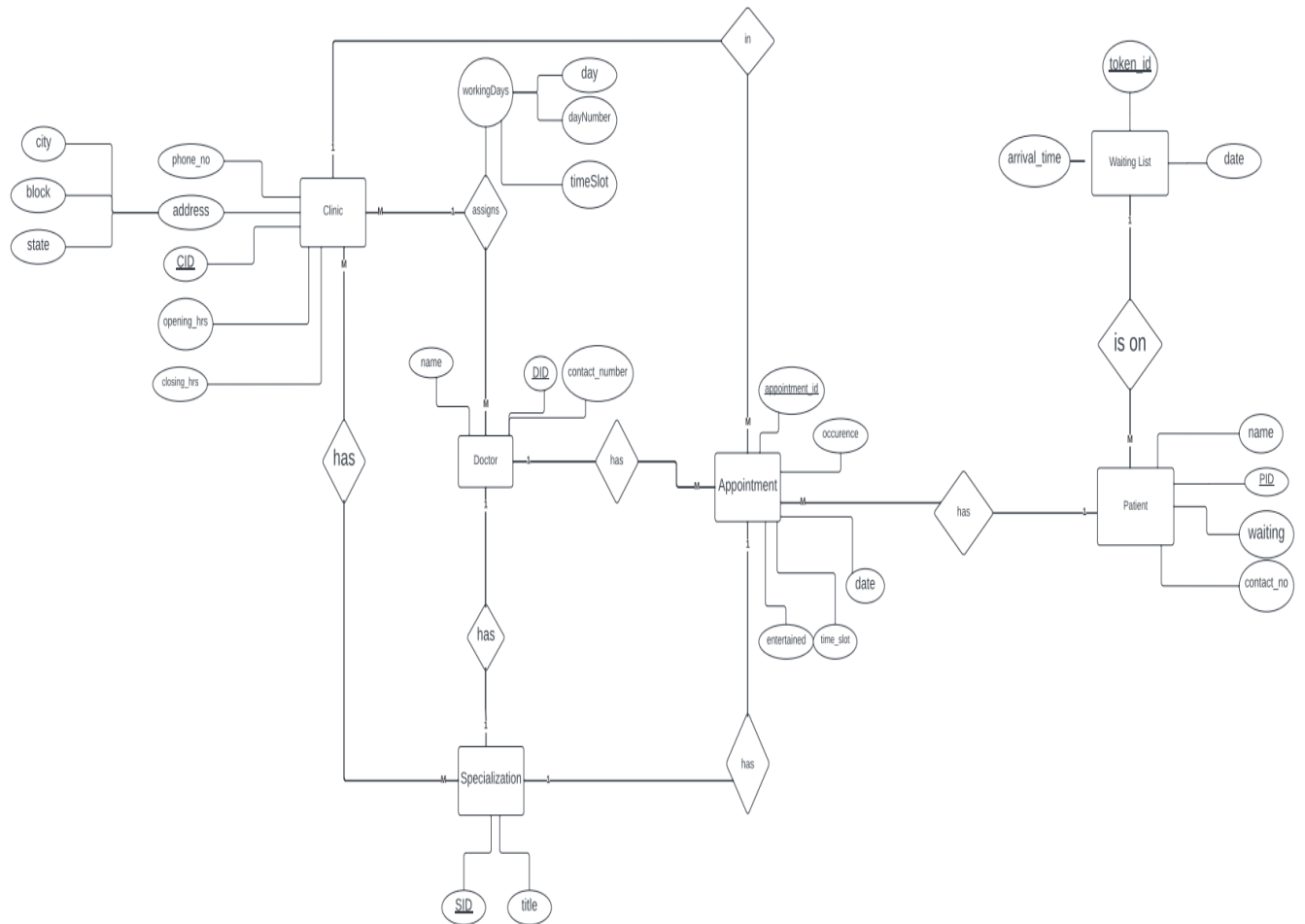
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Section A

ASSIGNMENT 3 – HEALTHCARE SCHEDULING

■ ERD Diagram



▪ Relational Database Schema

- Doctor(Doc_ID, Specialization_ID, Name, Phone_Number)
- Patient(PAT_ID, Name, Phone_Number, Waiting_list)
- Clinic(Clinic_ID, open_hour, close_hour, city, state, Street, Phone_Number)
- Assignment(Clinic_ID, Time_Slot, Working_days, DayNum)
- Specialization(SPEC_ID, Title)
- Appointment(APOINT_ID, DOC_ID, Patient_ID, Clinic_ID, Spec_ID, entertained, recurrence, Time_Slot, Date)
- Waiting_List(Ticket, Patient_Id, Arrival_Time, date)
- Working_Days(dayNum , day)

TABLE CREATION

```
create database LastAss
use LastAss
```

```
create table specialization
(
    SPEC_ID int not null,
    Title varchar(255) not null,
    Primary key(SPEC_ID)
);
```

```
create table Doctor
(
    DOC_ID int Not Null,
    Name varchar(255) not null,
    contact_number varchar(50),
    Specialization_ID int not null,
    Primary key(DOC_ID),
    foreign key(Specialization_ID) references specialization(SPEC_ID)
);
```

```
create table patient
(
```

```
        PAT_ID int Not Null,  
        Name varchar(255) not null,  
        Phone_number varchar(50),  
        Waiting_list varchar(255) not null,  
        primary Key(PAT_ID)  
);
```

```
create table clinic  
(  
    Clinic_ID int not null,  
    States varchar(255),  
    City varchar(255),  
    Street varchar(255),  
    Phone_number varchar(255) not null,  
    Open_hour time,  
    Close_hour time,  
    Primary Key(Clinic_ID)  
);
```

```
create table appointments  
(  
    APOINT_ID int not null,  
    Recurrence varchar(255),  
    Time_slot varchar(255),  
    date varchar(255),  
    Entertained varchar(255),  
    Patient_ID int not null,  
    Clinic_ID int not null,  
    Doctor_ID int not null,  
    SPID int not null  
    foreign key(Patient_ID) references patient(PAT_ID),  
    foreign key(Clinic_ID) references clinic(Clinic_ID),  
    foreign key(Doctor_ID) references doctor(DOC_ID),  
    foreign key(SPID) references specialization(SPEC_ID),  
    Primary key(APOINT_ID),  
);
```

```
create table waitingList  
(  
    Ticket int not null,  
    Arrival_time time,  
    Date date,  
    Patient_ID int not null,  
    foreign key(Patient_ID) references patient(PAT_ID),  
);
```

```
create table assignment
```

```

(
    Clinic_ID int not null,
    Doc_ID int not null,
    Time_slot varchar(50),
    Working_day varchar(50),
    foreign key(Clinic_ID) references clinic(Clinic_ID),
    foreign key(Doc_ID) references doctor(DOC_ID)
);

create table Working_days
(
    DayNum int not null,
    primary key(DayNum),
    Day varchar(20) not null
);

create table AAssignment
(
    Clinic_ID int not null,
    Doc_ID int not null,
    Time_slot varchar(50),
    DayNumber int not null,
    foreign key(DayNumber) references Working_days(DayNum),
    foreign key(Clinic_ID) references clinic(Clinic_ID),
    foreign key(Doc_ID) references doctor(Doc_ID),
);

```

DATA INSERTION

insert into specialization values

```

(1, 'Radiology'),
(2, 'Cardiology'),
(3, 'Oncology'),
(4, 'Surgery')

```

insert into Doctor values

```

(101, 'AHMED' , '092-22981' , 1),
(102, 'SHAYAAN' , '092-22982' , 4),
(103, 'DAYAAN' , '092-22983' , 3),
(104, 'HISHAAM' , '092-22984' , 1),
(105, 'HAMMAD' , '092-22985' , 4),
(106, 'RAHEEM' , '092-22986' , 3),

```

(107, 'UZAIR', '092-22987', 2)

insert into patient values

(19, 'HAMZA', '090-12300', 'No'),
(20, 'HASAN', '090-12401', 'No'),
(21, 'TALHA', '090-12502', 'No'),
(22, 'TAHA', '090-12603', 'No'),
(23, 'RIMSHA', '090-12704', 'No'),
(24, 'AREEBA', '090-12805', 'No'),
(25, 'EEMAN', '090-12906', 'No'),
(26, 'AIZAA', '090-13007', 'No'),
(27, 'MANAAL', '090-13108', 'No')

insert into clinic values

(99, 'PUNJAB', 'LAHORE', 'A', '000-67123', '09:00AM', '10:00PM'),
(98, 'SINDH', 'KARACHI', 'G', '000-67124', '10:00AM', '11:00PM'),
(97, 'PUNJAB', 'SIALKOT', 'G', '000-67125', '08:00AM', '10:00PM'),
(96, 'PUNJAB', 'MULTAN', 'F', '000-67126', '09:00AM', '09:00PM'),
(95, 'KPK', 'PESHAWAR', 'E', '000-67127', '11:00AM', '10:00PM')

insert into appointments values

(111, 'Daily', '11:00AM', '12-3-2022', 'NO', 19, 99, 101, 1),

(112, 'Monthly', '12:00AM', '12-3-2022', 'NO', 20, 98, 102, 2),
(113, 'Weekly', '10:00AM', '12-3-2022', 'NO', 21, 97, 103, 3),
(114, 'Daily', '12:00PM', '12-3-2022', 'NO', 22, 96, 104, 4),
(115, 'Monthly', '1:00PM', '12-3-2022', 'NO', 23, 95, 105, 1),
(116, 'Weekly', '11:00AM', '15-3-2022', 'NO', 24, 99, 106, 2),
(117, 'Daily', '12:00AM', '15-3-2022', 'NO', 25, 98, 107, 3),
(118, 'Monthly', '10:00AM', '15-3-2022', 'NO', 26, 97, 101, 4),
(119, 'Weekly', '11:00AM', '15-3-2022', 'NO', 27, 96, 102, 1),
(120, 'Daily', '11:00AM', '12-4-2022', 'NO', 19, 95, 102, 2),
(121, 'Weekly', '10:00AM', '12-4-2022', 'NO', 20, 99, 103, 3),
(122, 'Daily', '12:00PM', '12-4-2022', 'NO', 21, 98, 104, 4),
(123, 'Monthly', '1:00PM', '12-4-2022', 'NO', 22, 97, 105, 1),
(124, 'Monthly', '9:00AM', '22-3-2022', 'NO', 23, 96, 106, 2),
(125, 'Weekly', '10:00AM', '22-3-2022', 'NO', 24, 95, 107, 3),

```
(126, 'Daily', '10:00AM', '22-3-2022','NO',25,99,101,4),
(127, 'Monthly', '11:00AM', '22-3-2022','NO',26,98,102,1),
(128, 'Weekly', '10:00AM', '22-3-2022','NO',27,97,103,2),
(129, 'Weekly', '09:00AM', '22-4-2022','NO',19,96,104,3),
(130, 'Daily', '11:00AM', '17-4-2022','NO',20,95,105,4),
(131, 'Monthly', '11:00AM', '17-4-2022','NO',21,99,106,1),
(132, 'Daily', '2:00PM', '17-4-2022','NO',22,98,107,2),
(133, 'Monthly', '1:00PM', '17-4-2022','NO',23,97,101,3),
(134, 'Daily', '4:00PM', '11-5-2022','NO',24,96,102,4),
(135, 'Weekly', '11:00AM', '11-5-2022','NO',25,95,103,1),
(136, 'Daily', '11:00AM', '11-5-2022','NO',26,99,104,2),
(137, 'Monthly', '11:00AM', '11-5-2022','NO',27,98,105,3),
(138, 'Daily', '2:00PM', '11-5-2022','NO',19,97,106,4),
(139, 'Weekly', '3:00PM', '29-5-2022','NO',20,96,107,1),
(140, 'Monthly', '11:00AM', '29-5-2022','NO',21,95,101,2),
(141, 'Monthly', '12:00PM', '29-5-2022','NO',22,99,102,3),
(142, 'Weekly', '11:00AM', '29-5-2022','NO',23,98,103,4),
(143, 'Daily', '5:00PM', '29-5-2022','NO',24,97,104,1),
(144, 'Weekly', '8:00PM', '29-5-2022','NO',25,96,105,2),
(145, 'Monthly', '4:00PM', '29-5-2022','NO',26,95,106,3),
(146, 'Weekly', '12:00PM', '29-5-2022','NO',27,99,107,4)
```

insert into assignment values

```
(99, 101, '8:00AM', 'Monday'),
(98, 102, '8:00AM', 'Monday'),
(97, 103, '9:00AM', 'Monday'),
(96, 104, '9:00AM', 'Tuesday'),
(95, 105, '8:00AM', 'Tuesday'),
(99, 106, '10:00AM', 'Wednesday'),
(98, 107, '11:00AM', 'Wednesday'),
(97, 101, '3:00PM', 'Wednesday'),
(96, 102, '8:00AM', 'Wednesday'),
(95, 103, '8:00AM', 'Wednesday'),
(99, 104, '9:00AM', 'Friday'),
(98, 105, '10:00AM', 'Friday'),
(97, 106, '2:00PM', 'Friday'),
(96, 107, '4:00PM', 'Friday')
```

insert into Working_days
values

```
(1, 'Monday'),  
(2, 'Tuesday'),  
(3, 'Wednesday'),  
(4, 'Thursday'),  
(5, 'Friday'),  
(6, 'Saturday')
```

insert into assignment values

```
(99, 101, '11:00AM', 1),  
(98, 102, '11:00AM', 1),  
(97, 103, '10:00AM', 2),  
(96, 104, '10:00AM', 1),  
(95, 105, '12:00PM', 3),  
(99, 106, '10:00AM', 4),  
(98, 107, '11:00AM', 4),  
(97, 101, '3:00PM', 2),  
(96, 102, '8:00PM', 5),  
(95, 103, '8:00PM', 5),  
(99, 104, '12:00PM', 3),  
(98, 105, '10:00AM', 1),  
(97, 106, '2:00PM', 2),  
(96, 107, '4:00PM', 2)
```

SQL QUERRIES

-- Query no. 1

```
select p.Name ,a.Recurrence , a.date  
from appointments A
```

```
JOIN patient P  
on A.Patient_ID = P.PAT_ID
```

```
where a.Clinic_ID = 95 and a.entertained='NO'
```

-- Query no. 2

```
select P.Name , A.Recurrence , A.date, S.title
```


from appointments A

JOIN patient P
on A.Patient_ID = P.PAT_ID

join specialization S
on S.SPEC_ID = A.SPID

where a.SPID = 2 and a.entertained='NO'

-- Query no. 3

select P.Name, A.Recurrence, A.date, D.Name
from appointments A

JOIN patient P
on A.Patient_ID = P.PAT_ID

JOIN Doctor D
on D.DOC_ID = A.Doctor_ID

where A.Doctor_ID in (101,102,103)

order by Doctor_ID

-- Query no. 4

select A.APOINT_ID, D.Name,P.Name, A.Clinic_ID, A.time_slot
from appointments A

join assignment Ass
on A.time_slot = Ass.time_slot and A.Clinic_ID = Ass.Clinic_ID and A.Doctor_ID = Ass.Doc_ID

join doctor D
on D.DOC_ID = A.Doctor_ID

join patient P

on P.PAT_ID = A.Patient_ID

where A.time_slot in('11:00PM','1:00PM','11:00AM')

-- Query no. 5

Select D.Name, A.Clinic_ID, D.Specialization_ID, A.time_slot, A.dayNumber
from Doctor D

join AAssignment A
on D.DOC_ID = A.Doc_ID

join Doctor D1
on D.Specialization_ID = D1.Specialization_ID

join AAssignment A1
on A.Time_slot = A1.Time_slot

where A.DayNumber = A1.DayNumber and D.DOC_ID != D1.DOC_ID and A.Time_slot = A1.Time_slot and
D.Specialization_ID = D1.Specialization_ID

group by d.Name, A.Clinic_ID, D.Specialization_ID, A.Time_slot, A.DayNumber
order by DayNumber

-- Query no. 6

Select D.Name, D.DOC_ID
from Doctor D

where DOC_ID in
(

select top 3 A.Doctor_ID
from appointments A
group by A.Doctor_ID
order by count(A.Doctor_ID) asc

)

-----Extra Queries-----

-- Query no. 7

-- Query to fetch all the clinics that has maximum/specific opening hours

```
select Clinic_ID, concat(Street,', ',city,', ',states) as 'Address',Phone_number
from clinic
where open_hour='09:00AM' and close_hour='10:00PM'
```

-- Query no. 8

--Query to fetch all the heart assignments

```
select A.APOINT_ID, A.Clinic_ID, A.date
from appointments A
join specialization S
on A.SPID = S.SPEC_ID
where S.title = 'Surgery'
```

-- Query no. 9

-- Query to fetch the specialty who has highest number of doctors

```
select *
from specialization
where SPEC_ID = (select top 1 specialization_ID from Doctor group by Specialization_ID order by
count(Specialization_ID) desc)
```

-- Query no. 10

--Query to fetch patients who appointments are entertained

```
select * from assignment
```

```
select D.Name, C.Clinic_ID, S.title, WD.Day, A.time_slot
```

```
from doctor D

join AAssignment A
on A.Doc_ID = D.DOC_ID

join clinic C
on A.Clinic_ID = C.Clinic_ID

join Working_days WD
on WD.DayNum = a.DayNumber

join specialization S
on d.Specialization_ID = S.SPEC_ID

where WD.Day = 'Monday'
```

```
-- Query no. 11
--Query to get the assignment of doctor on Monday on a specific clinic with there speciality
```

```
select P.PAT_ID ,P.Name,p.Phone_number, A.APOINT_ID, A.date
from patient P
join appointments A
on P.PAT_ID = A.Patient_ID
where A.Recurrence = 'Daily' and entertained = 'NO'
```

**RELATIONAL ALEGBRA QUERIES
ON THE PAGE BELOW**

DATABASE ASSIGNMENT 3

RELATIONAL ALGEBRA QUERRIES

// Query 1

- $\pi_{p.name, a.recurrence, a.date}$
 $\sigma_{a.clinic.id = 95 \text{ and } a.entertained = 'No'}$
 $(p \bowtie_{a.appointments \bowtie a.patient-id = p.pat-id} p \bowtie patient)$.

• Query 2

- $\pi_{p.name, a.recurrence, a.date, s.title}$
 $\sigma_{a.spid = 2 \text{ AND } a.entertained = 'No'}$
 $(p \bowtie_{a.appointments \bowtie a.patient-id = p.pat-id}$
 $p \bowtie_{patient \bowtie s.spec-id = a.spid}$
 $p \bowtie s \text{ specialization})$.

• Query 3

$\pi_{doctor-id}$

- $\pi_{p.name, a.recurrence, a.date, d.name}$
 $\sigma_{a.doctor-id = 101 \text{ OR } a.doctor-id = 102}$
 $\text{OR } a.doctor-id = 103$
 $(p \bowtie_{a.appointments \bowtie a.patient-id = p.pat-id}$
 $p \bowtie_{patient \bowtie d.doc-id = a.doctor-id}$
 $p \bowtie d \text{ doctor})$

• Query 4

π a.apoint_id, d.name, p.name, a.clinic_id,
a.time_slot

σ a.time_slot = "11:00PM" OR

a.time_slot = "1:00PM" OR

a.time_slot = "11:00AM"

(p a appointments \bowtie a.time_slot =
ass.time_slot

AND a.clinic_id = ass.clinic_id

AND a.doctor_id = ass.doc_id

p ass assignment \bowtie d.doc_id =
a.doctor_id

p d doctor \bowtie p.pat_id = a.patient_id
p p patient)

Query 5 and 6 x

• Additional Queries:

• Query 8:

π a.apoint_id, a.clinic_id, a.date

σ s.title = "Surgery"

(p a appointment \bowtie a.spid =
s.spec_id

p s specialization)

• Query 9 :

π cid, block, erf, stake, contact-number
 (σ opening-hour = ~~8AM~~ '8AM'
 \wedge closing-hour = '5PM'
 (clinic))

• Query 10

π patient.PID, patient.name, patient-contact-number,
 appointment.APID, appointment.date
 (σ appointment.occurrence = 'once' \wedge
 entertained = 'yes'
 (Appointments \bowtie
 patient.PID,
 appointment.patient-ID
 (patient))

• Query 11 :

π p.pat-id, p.name, p.phone-number,
 a.point-id, a.date
 σ a.recurrence = 'Daily' AND entertained = 'No'
 (p \bowtie patient \bowtie p.pat-id =
 a.patient-id
 p \bowtie appointments)

RESULTS OF QUERIES (IN ORDER)

	Name	Recurrence	date
1	RIMSHA	Monthly	12-3-2022
2	HAMZA	Daily	12-4-2022
3	AREEBA	Weekly	22-3-2022
4	HASAN	Daily	17-4-2022
5	EEMAN	Weekly	11-5-2022
6	TALHA	Monthly	29-5-2022
7	AIZAA	Monthly	29-5-2022

	Name	Recurrence	date	title
1	HASAN	Monthly	12-3-2022	Cardiology
2	AREEBA	Weekly	15-3-2022	Cardiology
3	HAMZA	Daily	12-4-2022	Cardiology
4	RIMSHA	Monthly	22-3-2022	Cardiology
5	MANAAL	Weekly	22-3-2022	Cardiology
6	TAHA	Daily	17-4-2022	Cardiology
7	AIZAA	Daily	11-5-2022	Cardiology
8	TALHA	Monthly	29-5-2022	Cardiology
9	EEMAN	Weekly	29-5-2022	Cardiology

	Name	Recurrence	date	Name
1	HAMZA	Daily	12-3-2022	AHMED
2	AIZAA	Monthly	15-3-2022	AHMED
3	EEMAN	Daily	22-3-2022	AHMED
4	RIMSHA	Monthly	17-4-2022	AHMED
5	TALHA	Monthly	29-5-2022	AHMED
6	HASAN	Monthly	12-3-2022	SHAYAAN
7	MANAAL	Weekly	15-3-2022	SHAYAAN
8	HAMZA	Daily	12-4-2022	SHAYAAN
9	AIZAA	Monthly	22-3-2022	SHAYAAN
10	AREEBA	Daily	11-5-2022	SHAYAAN
11	TAHA	Monthly	29-5-2022	SHAYAAN
12	TALHA	Weekly	12-3-2022	DAYAAN
13	HASAN	Weekly	12-4-2022	DAYAAN
14	MANAAL	Weekly	22-3-2022	DAYAAN
15	EEMAN	Weekly	11-5-2022	DAYAAN
16	RIMSHA	Weekly	29-5-2022	DAYAAN

	APOINT_ID	Name	Name	Clinic_ID	time_slot
1	111	AHMED	HAMZA	99	11:00AM
2	127	SHAYAAN	AIZAA	98	11:00AM

Name	Clinic_ID	Specialization_ID	time_slot	dayNumber
------	-----------	-------------------	-----------	-----------

	Name	DOC_ID
1	AHMED	101
2	HISHAAM	104
3	DAYAAN	103

	Clinic_ID	Address	Phone_number
1	99	A, LAHORE, PUNJAB	000-67123

	APOINT_ID	Clinic_ID	date
1	114	96	12-3-2022
2	118	97	15-3-2022
3	122	98	12-4-2022
4	126	99	22-3-2022
5	130	95	17-4-2022
6	134	96	11-5-2022
7	138	97	11-5-2022
8	142	98	29-5-2022
9	146	99	29-5-2022

	SPEC_ID	Title
1	1	Radiology

Name	Clinic_ID	title	Day	time_slot
------	-----------	-------	-----	-----------

	PAT_ID	Name	Phone_number	APOINT_ID	date
1	19	HAMZA	090-12300	111	12-3-2022
2	22	TAHA	090-12603	114	12-3-2022
3	25	EEMAN	090-12906	117	15-3-2022
4	19	HAMZA	090-12300	120	12-4-2022
5	21	TALHA	090-12502	122	12-4-2022
6	25	EEMAN	090-12906	126	22-3-2022
7	20	HASAN	090-12401	130	17-4-2022
8	22	TAHA	090-12603	132	17-4-2022
9	24	AREEBA	090-12805	134	11-5-2022
10	26	AIZAA	090-13007	136	11-5-2022
11	19	HAMZA	090-12300	138	11-5-2022
12	24	AREEBA	090-12805	143	29-5-2022