Project Report

Atal Bihari Vajpayee Indian Institute of Information Technology and Management, Gwalior.

DBMS PROJECT

TOPIC: HOSPITAL MANAGEMENT SYSTEM

Submitted by:

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REAL WORLD PROBLEM STATEMENT

A hospital database has been presented in this project which can help the hospital management to maintain and supervise the overall functioning of the hospital.

- Organisational Structure (Departments/Organsation units)
- Position of the employee (Designation/Role) (Salary Grade) and the status of available and occupied jobs
- Personal Info data
- Every Department may have only one Head of Deptt.(HOD)
- Patient’s records are public to his doctor but are private to other officials
- A doctor may supervise at max three nurses.
- The board of members handles the non-medical responsibilites of the hospital like salary distribution, supplies, security, etc.

Entity Sets:

1. **Doctor**
2. **Patient**
3. **Nurse**
4. **Department**
5. **Board of members**
6. **Head of Department(HOD)**

Relationship Sets:

1. **Treats:** One to many from doctor to patient entity set. (Ex. A heart patient consults the cardiologist of the hospital.)

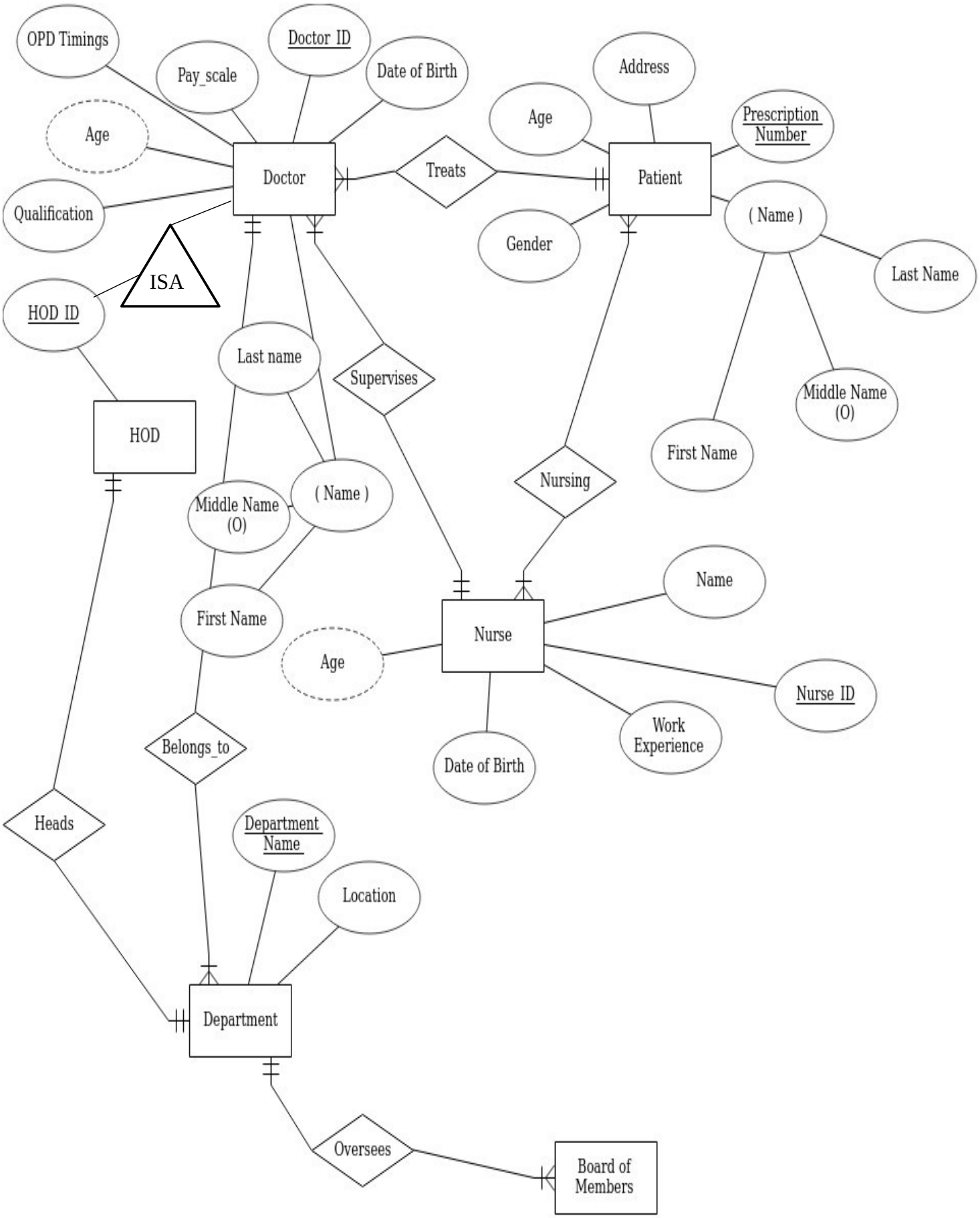
2. **Nursing:** Many to many from nurse to patient entity set. (Ex. More than one nurse monitor progress report of more than one patient.)

3. **Supervises:** One to many from doctor to nurse entity set. (Ex. More than one nurse may work under the supervision of only one doctor.)

4. **Belongs_to:** Many to one from doctor to department entity set. (Ex. Multiple cardiologists belong to the cardiology department of the hospital.)

5. **Heads:** One to one from HOD to Department entity set. (Ex. The HOD of cardiology department would head the cardiology department only.)

6. **Oversees:** Many to one from department to board of members entity set. (Ex. The board of members oversees the managerial affairs of all departments of the hospital.)


OPD Timings
Pay_scale
Doctor ID
Date of Birth
Age
Doctor
Qualification
ISA
HOD ID
HOD
Last name
(Name)
Middle Name (O)
First Name
Belongs_to
Heads
Department Name
Location
Department
Oversees
Board of Members
Supervises
Treats
Address
Age
Prescription Number
Patient
(Name)
Gender
Last Name
Middle Name (O)
First Name
Nursing
Name
Nurse
Age
Nurse ID
Work Experience
Date of Birth

INITIAL SCHEMA

(1ST NORMAL FORM) :

- DOCTOR(Doctor ID, OPD Timings, Pay_scale, Date of Birth, Name, Qualification, Age)
- PATIENT(Prescription Number, Age, Address, Name, Gender)
- TREATS(Doctor ID, Prescription Number)
- NURSING(Nurse ID, Prescription Number)
- NURSE(Nurse ID, Name, Work experience, Age, Date of Birth)
- DEPARTMENT(Department Name, Location)
- BELONGS TO(Doctor ID, Depatment Name)
- SUPERVISES(Nurse ID, Doctor ID)
- HOD(HOD_ID)
- HEADS(HOD_ID, Department Name)
- BOARD OF MEMBERS(Member ID, Team)
- OVERSEES(Department Name, Member ID)

FUNCTIONAL DEPENDENCIES:

- DOCTOR Relation:

  F={DOB → Age, Doctor ID → R, (OPD Timings,Qualification) → Pay_Scale}

- PATIENT Relation:

  F={Prescription Number → R}

- TREATS Relation:

  F={Prescription Number → R}
- NURSING Relation:

  F={(Nurse ID, Prescription Number) → R}
- NURSE Relation:

  F={Nurse ID → R, Date of Birth → Age}
- DEPARTMENT Relation:

  F={Department Name → R}
- BELONGS TO Relation:

  F={Doctor ID → R}
- SUPERVISES Relation:

  F={Nurse ID → R}
- HOD Relation:

  F={HOD ID → R}
- HEADS Relation:

  F={HOD ID → R}
- BOARD OF MEMBERS Relation:

  F={Member ID → R}
- OVERSEES Relation:

  F={(Department Name, Member Id) → R}

(2ND NORMAL FORM):

- DOCTOR(Doctor ID, OPD Timings, Pay_scale, Date of Birth, Name, Qualification, Age)
- PATIENT(Prescription Number, Age, Address, Name, Gender)
- TREATS(Doctor ID, Prescription Number)
- NURSING(Nurse ID, Prescription Number)
- NURSE(Nurse ID, Name, Work experience, Age, Date of Birth)
- DEPARTMENT(Department Name, Location)
- BELONGS TO(Doctor ID, Depatment Name)
- SUPERVISES(Nurse ID, Doctor ID)
- HOD(HOD_ID)
- HEADS(HOD_ID, Department Name)
- BOARD OF MEMBERS(Member ID, Team)
- OVERSEES(Department Name, Member ID)

FUNCTIONAL DEPENDENCIES:

- DOCTOR Relation:

  F={DOB → Age, Doctor ID → R, (OPD Timings,Qualification) → Pay_Scale}

- PATIENT Relation:

  F={Prescription Number → R}

- TREATS Relation:

  F={Prescription Number → R}
- NURSING Relation:

  F={(Nurse ID, Prescription Number) → R}
- NURSE Relation:

  F={Nurse ID → R, Date of Birth → Age}
- DEPARTMENT Relation:

  F={Department Name → R}
- BELONGS TO Relation:

  F={Doctor ID → R}
- SUPERVISES Relation:

  F={Nurse ID → R}
- HOD Relation:

  F={HOD ID → R}
- HEADS Relation:

  F={HOD ID → R}
- BOARD OF MEMBERS Relation:

  F={Member ID → R}
- OVERSEES Relation:

  F={(Department Name, Member Id) → R}

(3RD NORMAL FORM):

- DOCTOR_DETAILS(Doctor ID, Date of Birth, Qualification, Name, OPD Timings)
- AGE_TABLE(Date of Birth, Age)
- DOCTOR_PAY(Doctor ID, Qualification, OPD Timings, Payscale)
- PATIENT(Prescription Number, Age, Address, Name, Gender)
- TREATS(Doctor ID, Prescription Number)
- NURSING(Nurse ID, Prescription Number)
- NURSE_DETAILS(Nurse ID, Work Experience, Date of Birth, Name)
- DEPARTMENT(Department Name, Location)
- BELONGS TO(Doctor ID, Depatment Name)
- SUPERVISES(Nurse ID, Doctor ID)
- HOD(HOD_ID)
- HEADS(HOD_ID, Department Name)
- BOARD OF MEMBERS(Member ID, Team)
- OVERSEES(Department Name, Member ID)

FUNCTIONAL DEPENDENCIES:

- DOCTOR_DETAILS Relation:

  F={Doctor ID → R}

- *AGE_TABLE Relation:

  F={Date of Birth → Age}

- DOCTOR_PAY Relation:

  F={Doctor ID → R}
- PATIENT Relation:

  F={Prescription Number → R}
- TREATS Relation:

  F={Prescription Number → R}
- NURSING Relation:

  F={(Nurse ID, Prescription Number) → R}
- NURSE_DETAILS Relation:

  F={Nurse ID → R}
- DEPARTMENT Relation:

  F={Department Name → R}
- BELONGS TO Relation:

  F={Doctor ID → R}
- SUPERVISES Relation:

  F={Nurse ID → R}
- HOD Relation:

  F={HOD ID → R}
- HEADS Relation:

  F={HOD ID → R}
- BOARD OF MEMBERS Relation:

  F={Member ID → R}

- OVERSEES Relation:

  F={(Department Name, Member Id)→R}

VERIFICATION:

- Following are the conditions to verify whether the decomposition is lossless and dependency preserving.
- Let the parent table be R and let R1 and R2 be the decomposed tables.
- Let F be the set of functional dependencies in R and F1 and F2 in R1 and R2 respectively.

LOSSLESS DECOMPOSITION:

- Attributes(R1) U Attributes(R2) = Attributes(R)
- Attributes(R1) ∩ Attributes(R2) ≠ ϕ
- Attributes(R1) ∩ Attributes(R2) →Attributes(R1/R2)

DEPENDENCY PRESERVING:

F1 U F2 = F

NOTE: In the above pages, R represents the whole relation and in AGE_TABLE, Age is a derived attribute.

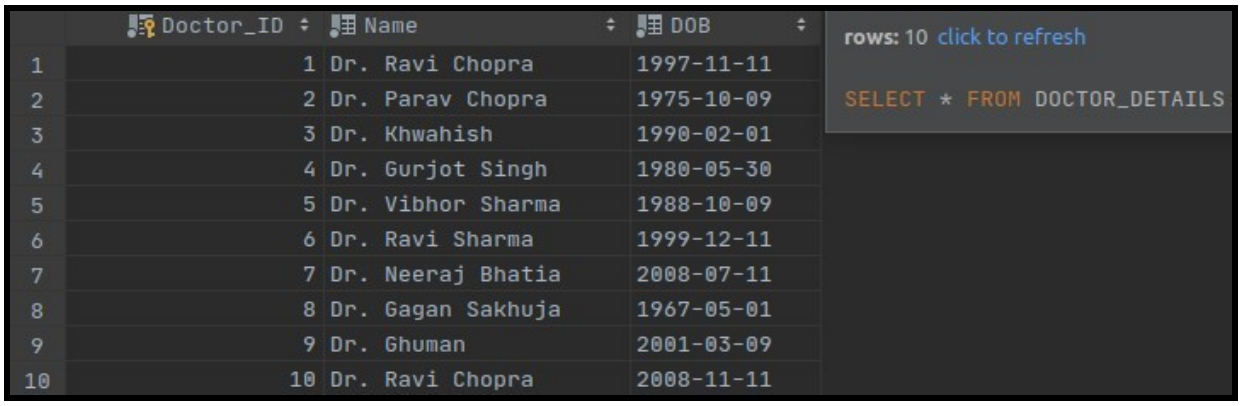
NOTE: Some changes were made in the ER Model and Relational Model while writing the database.

These are listed below:

- Work experience was changed to year_of_joining in NURSE_DETAILS,
- COVID was added as an attribute in PATIENT

SQL QUERIES:

- All the tables have been shown:
  - DOCTOR_DETAILS:



	Doctor_ID	Name	DOB
1	1	Dr. Ravi Chopra	1997-11-11
2	2	Dr. Parav Chopra	1975-10-09
3	3	Dr. Khwahish	1990-02-01
4	4	Dr. Gurjot Singh	1980-05-30
5	5	Dr. Vibhor Sharma	1988-10-09
6	6	Dr. Ravi Sharma	1999-12-11
7	7	Dr. Neeraj Bhatia	2008-07-11
8	8	Dr. Gagan Sakhuja	1967-05-01
9	9	Dr. Ghuman	2001-03-09
10	10	Dr. Ravi Chopra	2008-11-11

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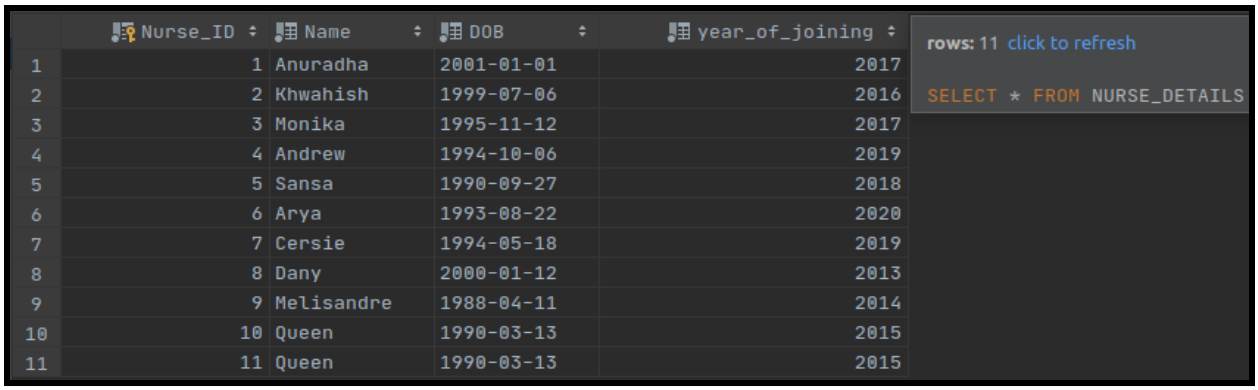
```
SELECT * FROM DOCTOR_DETAILS
```

  - NURSE_DETAILS:

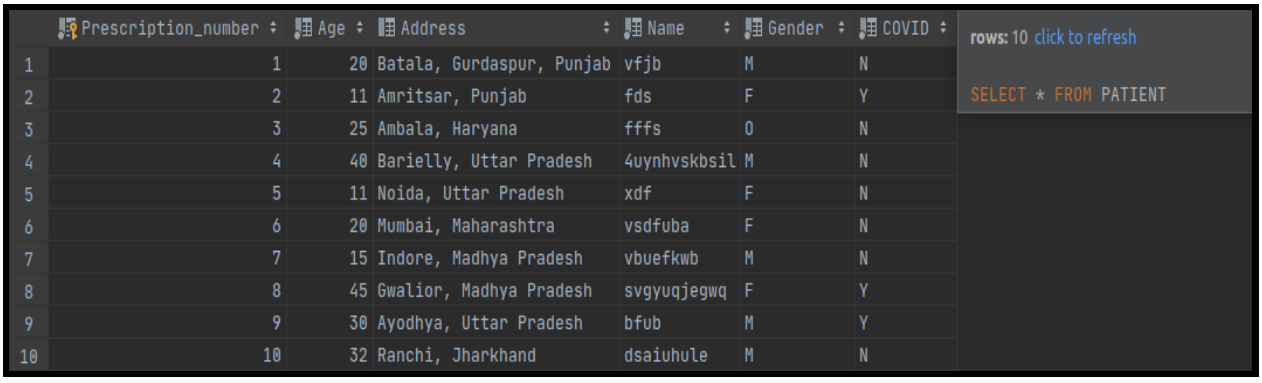


	Nurse_ID	Name	DOB	year_of_joining
1	1	Anuradha	2001-01-01	2017
2	2	Khwahish	1999-07-06	2016
3	3	Monika	1995-11-12	2017
4	4	Andrew	1994-10-06	2019
5	5	Sansa	1990-09-27	2018
6	6	Arya	1993-08-22	2020
7	7	Cersie	1994-05-18	2019
8	8	Dany	2000-01-12	2013
9	9	Melisandre	1988-04-11	2014
10	10	Queen	1990-03-13	2015
11	11	Queen	1990-03-13	2015

rows: 11 click to refresh

```
SELECT * FROM NURSE_DETAILS
```

  - PATIENT:



	Prescription_number	Age	Address	Name	Gender	COVID
1	1	20	Batala, Gurdaspur, Punjab	vfjb	M	N
2	2	11	Amritsar, Punjab	fds	F	Y
3	3	25	Ambala, Haryana	fffs	O	N
4	4	40	Barielly, Uttar Pradesh	4uynhvskbsil	M	N
5	5	11	Noida, Uttar Pradesh	xdf	F	N
6	6	20	Mumbai, Maharashtra	vsdfuba	F	N
7	7	15	Indore, Madhya Pradesh	vbuefkwb	M	N
8	8	45	Gwalior, Madhya Pradesh	svgyuqjegwq	F	Y
9	9	30	Ayodhya, Uttar Pradesh	bfub	M	Y
10	10	32	Ranchi, Jharkhand	dsaiuhule	M	N

rows: 10 click to refresh

```
SELECT * FROM PATIENT
```

- DOCTOR_PAY:

	DOCTOR_ID	Qualification	OPD_Timings	Pay_scale
1	1	M.B.B.S. Child	2:00PM-4:00PM	50000
2	2	M.D. Heart	1:00PM-3:00PM	55000
3	3	M.B.B.S. Eye	4:00PM-6:00PM	60000
4	4	M.S. ENT	9:00AM-11:00AM	80000
5	5	M.B.B.S Child.	2:00PM-4:00PM	120000
6	6	M.B.B.S. Eye	12:00PM-3:00PM	124000
7	7	B.M.B.S Psychiatrist	4:00PM-5:00PM	750000
8	8	M.B.B.S. Skin	2:00PM-4:00PM	950000
9	9	B.D.S. Dental	2:00PM-4:00PM	100000
10	10	B.H.M.S. Homeopathy	2:00PM-4:00PM	130000

rows: 10 click to refresh

```
SELECT * FROM DOCTOR_PAY
```

- TREATS:

	Doctor_ID	Prescription_number
1	1	3
2	1	5
3	1	10
4	2	6
5	4	2
6	4	4
7	4	9
8	6	1
9	8	8
10	10	7

rows: 10 click to refresh

```
SELECT * FROM TREATS
```

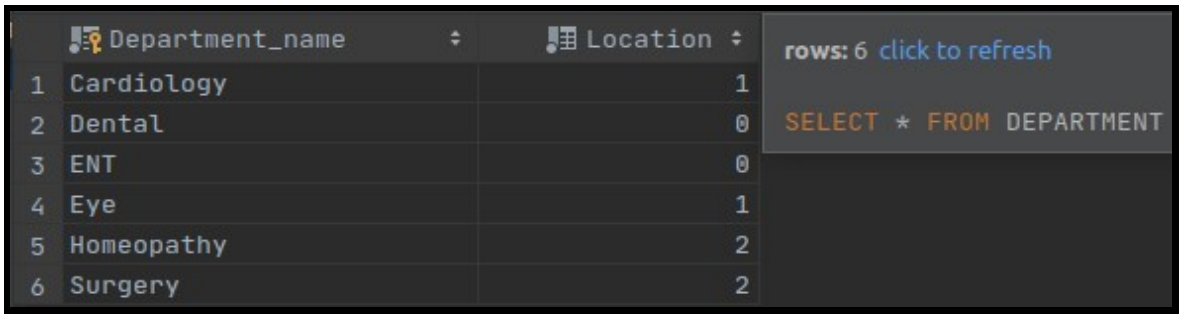
- NURSING:

	Nurse_ID	Prescription_number
1	1	1
2	2	1
3	7	1
4	2	2
5	4	2
6	9	2
7	5	3
8	6	4
9	1	5
10	3	6
11	7	7
12	8	8
13	9	9
14	10	9
15	10	10

rows: 15 click to refresh

```
SELECT * FROM NURSING
```

- DEPARTMENT:

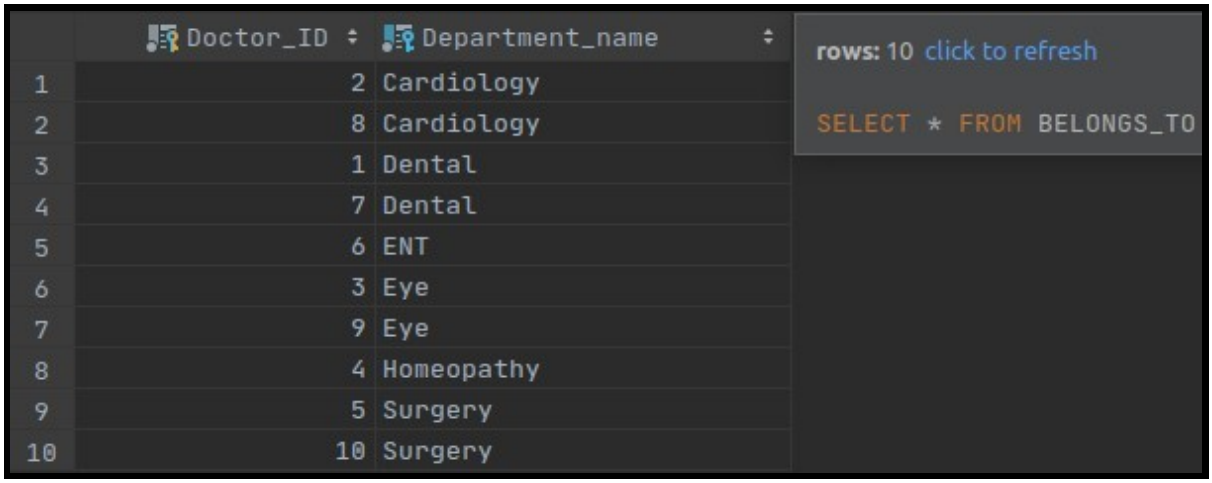


	Department_name	Location
1	Cardiology	1
2	Dental	0
3	ENT	0
4	Eye	1
5	Homeopathy	2
6	Surgery	2

rows: 6 click to refresh

```
SELECT * FROM DEPARTMENT
```

- BELONGS_TO:



	Doctor_ID	Department_name
1	2	Cardiology
2	8	Cardiology
3	1	Dental
4	7	Dental
5	6	ENT
6	3	Eye
7	9	Eye
8	4	Homeopathy
9	5	Surgery
10	10	Surgery

rows: 10 click to refresh

```
SELECT * FROM BELONGS_TO
```

- SUPERVISES:

	Nurse_ID	Doctor_ID
1	1	1
2	2	3
3	3	5
4	4	6
5	5	7
6	7	8
7	6	9
8	8	10
9	9	10
10	10	10

rows: 10 click to refresh

```
SELECT * FROM SUPERVISES
```

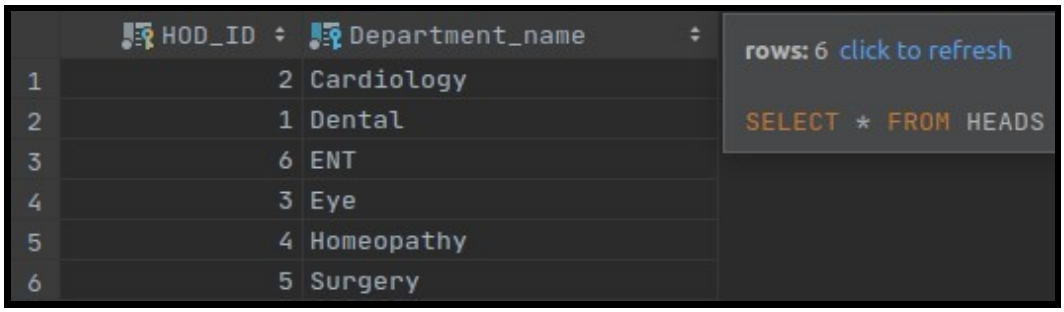
- HOD:

	HOD_ID
1	1
2	2
3	3
4	4
5	5
6	6

rows: 6 click to refresh

```
SELECT * FROM HOD
```

- HEADS:

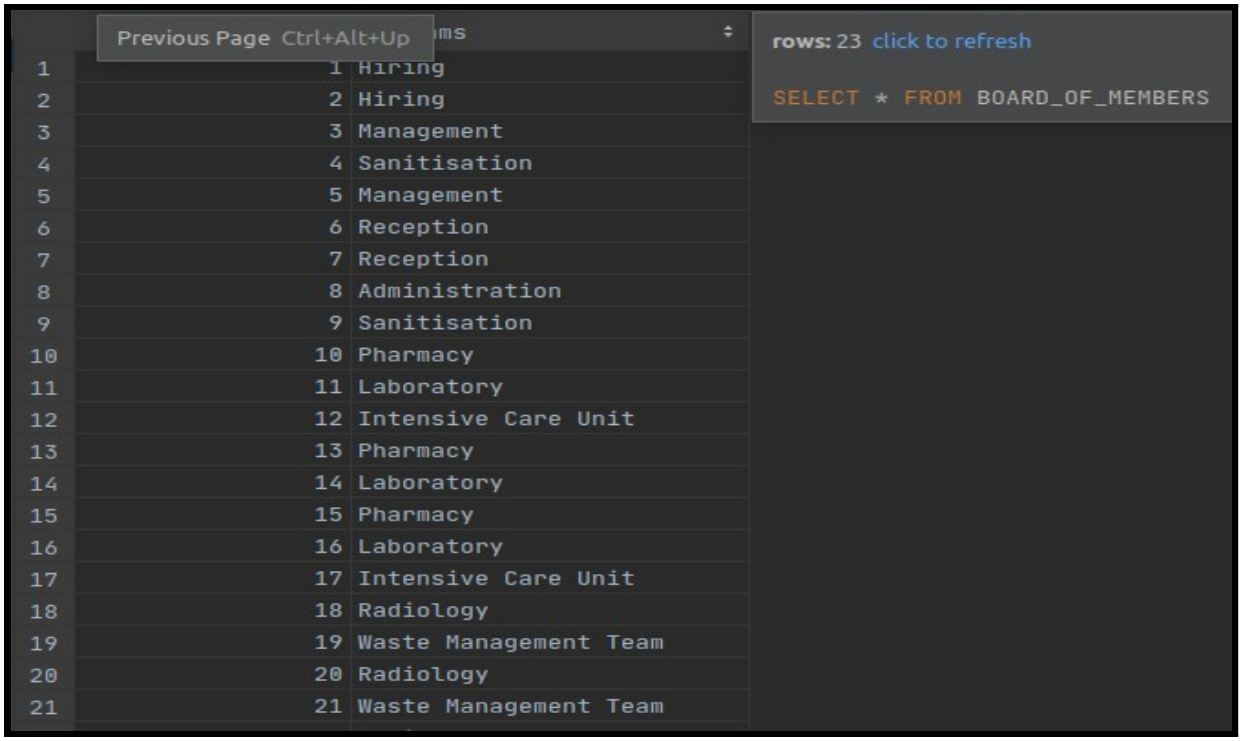


	HOD_ID	Department_name
1	2	Cardiology
2	1	Dental
3	6	ENT
4	3	Eye
5	4	Homeopathy
6	5	Surgery

rows: 6 click to refresh

```
SELECT * FROM HEADS
```

- BOARD_OF_MEMBERS:



Previous Page Ctrl+Alt+Up

		ms
1	1	Hiring
2	2	Hiring
3	3	Management
4	4	Sanitisation
5	5	Management
6	6	Reception
7	7	Reception
8	8	Administration
9	9	Sanitisation
10	10	Pharmacy
11	11	Laboratory
12	12	Intensive Care Unit
13	13	Pharmacy
14	14	Laboratory
15	15	Pharmacy
16	16	Laboratory
17	17	Intensive Care Unit
18	18	Radiology
19	19	Waste Management Team
20	20	Radiology
21	21	Waste Management Team

rows: 23 click to refresh

```
SELECT * FROM BOARD_OF_MEMBERS
```

- OVERSEES:

	Department_name	Member_ID
1	Cardiology	2
2	Cardiology	7
3	Cardiology	15
4	Cardiology	20
5	Dental	1
6	Dental	9
7	Dental	14
8	Dental	22
9	ENT	6
10	ENT	8
11	ENT	11
12	ENT	19
13	ENT	21
14	Eye	3
15	Eye	10
16	Eye	16
17	Eye	23
18	Homeopathy	4
19	Homeopathy	12
20	Homeopathy	17
21	Surgery	5

rows: 23 click to refresh

```
SELECT * FROM Oversees
```

1. Requirements of a doctor:

- To get his/her patient details:

	Name	Age	Gender	Prescription_number	COVID
1	fffs	25	0	3	N
2	xdf	11	F	5	N
3	dsaiuhule	32	M	10	N

rows: 3 click to refresh

```
SELECT Name, Age, Gender, PATIENT.Prescription_number, COVID
FROM PATIENT,TREATS
WHERE TREATS.Doctor_ID=1
AND PATIENT.Prescription_number=TREATS.Prescription_number ;
```

- To get details of Nurses working under him/her:

	Name	Work_Experience
1	Cersie	1

rows: 1 click to refresh

```
SELECT Name, (YEAR(CURDATE())-year_of_joining) AS Work_Experience
FROM NURSE_DETAILS, SUPERVISES
WHERE SUPERVISES.Doctor_ID=8
AND SUPERVISES.Nurse_ID=NURSE_DETAILS.Nurse_ID
```

- To get location of his/her deptt.:

	Floor_Number
1	1

rows: 1 click to refresh

```
SELECT Location AS Floor_Number
FROM DEPARTMENT, BELONGS_TO
WHERE BELONGS_TO.Doctor_ID=3
AND DEPARTMENT.Department_name=BELONGS_TO.Department_name
```

- To get HOD's Name of his/her deptt.:

	Name
1	Dr. Khwahish

rows: 1 click to refresh

```
SELECT Name FROM DOCTOR_DETAILS,BELONGS_TO, HEADS
WHERE BELONGS_TO.Doctor_ID=9
AND BELONGS_TO.Department_name=HEADS.Department_name
AND DOCTOR_DETAILS.Doctor_ID=HEADS.HOD_ID
```

2. Requirements of a patient:

- To get his/her doctor's details:

	Name	OPD_TIMINGS
1	Dr. Ravi Chopra	2:00PM-4:00PM

rows: 1 click to refresh

```
SELECT Name, OPD_TIMINGS
FROM DOCTOR_DETAILS, DOCTOR_PAY, TREATS
WHERE TREATS.Prescription_number=3
AND TREATS.Doctor_ID=DOCTOR_DETAILS.Doctor_ID
AND DOCTOR_PAY.DOCTOR_ID=DOCTOR_DETAILS.Doctor_ID
```

- To get his/her deptt. Location:

	Location
1	0

rows: 1 click to refresh

```
SELECT Location FROM DEPARTMENT, TREATS, BELONGS_TO
WHERE TREATS.Prescription_number=3
AND TREATS.Doctor_ID=BELONGS_TO.Doctor_ID
AND BELONGS_TO.Department_name=DEPARTMENT.Department_name
```

3. Requirements of a Nurse:

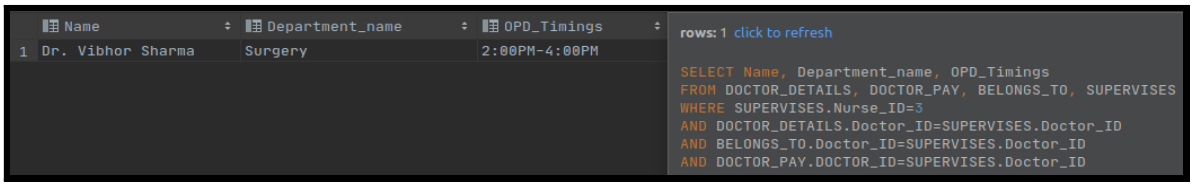
- To get his/her patients' details:

	Name	Prescription_number	Age
1	vfjb	1	20
2	fds	2	11

rows: 2 click to refresh

```
SELECT Name, PATIENT.Prescription_number, Age
FROM PATIENT, NURSING
WHERE NURSING.Nurse_ID=2
AND PATIENT.Prescription_number=NURSING.Prescription_number
```

- To get doctor's details who supervises her:



	Name	Department_name	OPD_Timings
1	Dr. Vibhor Sharma	Surgery	2:00PM-4:00PM

rows: 1 click to refresh

```
SELECT Name, Department_name, OPD_Timings
FROM DOCTOR_DETAILS, DOCTOR_PAY, BELONGS_TO, SUPERVISES
WHERE SUPERVISES.Nurse_ID=3
AND DOCTOR_DETAILS.Doctor_ID=SUPERVISES.Doctor_ID
AND BELONGS_TO.Doctor_ID=SUPERVISES.Doctor_ID
AND DOCTOR_PAY.DOCTOR_ID=SUPERVISES.Doctor_ID
```

4. Requirements of BOARD_OF_MEMBERS:

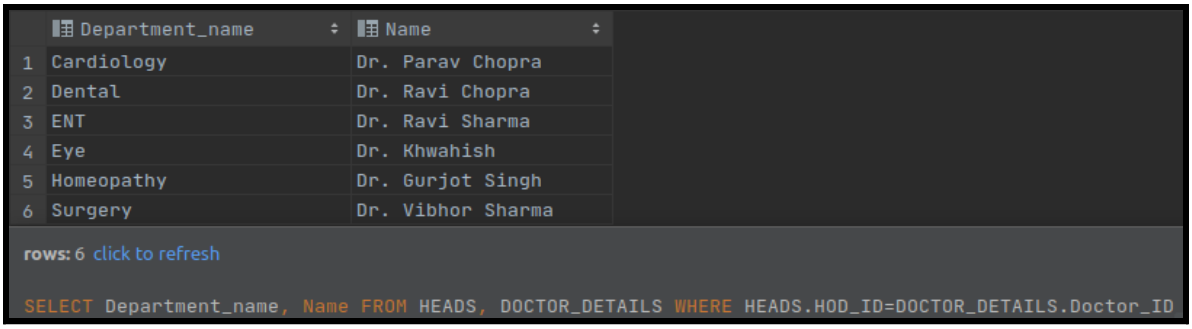
- To get ID of members of a particular team:

	Member_ID
1	18
2	20
3	22

rows: 3 click to refresh

```
SELECT Member_ID FROM BOARD_OF_MEMBERS WHERE Teams='Radiology'
```

- To get list of HODs of all departments:



	Department_name	Name
1	Cardiology	Dr. Parav Chopra
2	Dental	Dr. Ravi Chopra
3	ENT	Dr. Ravi Sharma
4	Eye	Dr. Khwahish
5	Homeopathy	Dr. Gurjot Singh
6	Surgery	Dr. Vibhor Sharma

rows: 6 click to refresh

```
SELECT Department_name, Name FROM HEADS, DOCTOR_DETAILS WHERE HEADS.HOD_ID=DOCTOR_DETAILS.Doctor_ID
```

- To get complete details of all doctors:

	DOCTOR_DETAILS.Doctor_ID	Name	DOB	DOCTOR_PAY.DOCTOR_ID	Qualification	OPD_Timings	Pay_scale
1	1	Dr. Ravi Chopra	1997-11-11	1	M.B.B.S. Child	2:00PM-4:00PM	50000
2	2	Dr. Parav Chopra	1975-10-09	2	M.D. Heart	1:00PM-3:00PM	55000
3	3	Dr. Khwahish	1990-02-01	3	M.B.B.S. Eye	4:00PM-6:00PM	60000
4	4	Dr. Gurjot Singh	1980-05-30	4	M.S. ENT	9:00AM-11:00AM	80000
5	5	Dr. Vibhor Sharma	1988-10-09	5	M.B.B.S Child.	2:00PM-4:00PM	120000
6	6	Dr. Ravi Sharma	1999-12-11	6	M.B.B.S. Eye	12:00PM-3:00PM	124000
7	7	Dr. Neeraj Bhatia	2008-07-11	7	B.M.B.S Psychiatrist	4:00PM-5:00PM	750000
8	8	Dr. Gagan Sakhuja	1967-05-01	8	M.B.B.S. Skin	2:00PM-4:00PM	950000
9	9	Dr. Ghuman	2001-03-09	9	B.D.S. Dental	2:00PM-4:00PM	100000
10	10	Dr. Ravi Chopra	2008-11-11	10	B.H.M.S. Homeopathy	2:00PM-4:00PM	130000

BELONGS_TO.Doctor_ID	Department_name
1	Dental
2	Cardiology
3	Eye
4	Homeopathy
5	Surgery
6	ENT
7	Dental
8	Cardiology
9	Eye
10	Surgery

The table has been cut in between due to lack of space.

5. Other queries:

- To get ages of doctors:

	Age	Name
1	23	Dr. Ravi Chopra
2	45	Dr. Parav Chopra
3	30	Dr. Khwahish
4	40	Dr. Gurjot Singh
5	32	Dr. Vibhor Sharma
6	21	Dr. Ravi Sharma
7	12	Dr. Neeraj Bhatia
8	53	Dr. Gagan Sakhuja
9	19	Dr. Ghuman
10	12	Dr. Ravi Chopra

rows: 10 click to refresh

```
SELECT YEAR(CURDATE())-YEAR(DOB) AS Age, Name FROM DOCTOR_DETAILS
```

- To get ages of all nurses:

	Age	Name
1	19	Anuradha
2	21	Khwahish
3	25	Monika
4	26	Andrew
5	30	Sansa
6	27	Arya
7	26	Cersie
8	20	Dany
9	32	Melisandre
10	30	Queen
11	30	Queen

rows: 11 click to refresh

```
SELECT YEAR(CURDATE())-YEAR(DOB) AS Age, Name FROM NURSE_DETAILS
```

- To get number of doctors:

	`COUNT(*)`
1	10

rows: 1 click to refresh

```
SELECT COUNT(*) FROM DOCTOR_DETAILS
```

- To get number of nurses:

	`COUNT(*)`
1	11

rows: 1 click to refresh

```
SELECT COUNT(*) FROM NURSE_DETAILS
```

- To get number of patients:

	`COUNT(*)`
1	10

rows: 1 click to refresh

```
SELECT COUNT(*) FROM PATIENT
```

- To get list of COVID-19 patients:

	Prescription_number	Age	Address	Name	Gender	COVID
1	2	11	Amritsar, Punjab	fds	F	Y
2	8	45	Gwalior, Madhya Pradesh	svgyuqjegwq	F	Y
3	9	30	Ayodhya, Uttar Pradesh	bfub	M	Y

rows: 3 click to refresh

```
SELECT * FROM PATIENT WHERE COVID='Y'
```

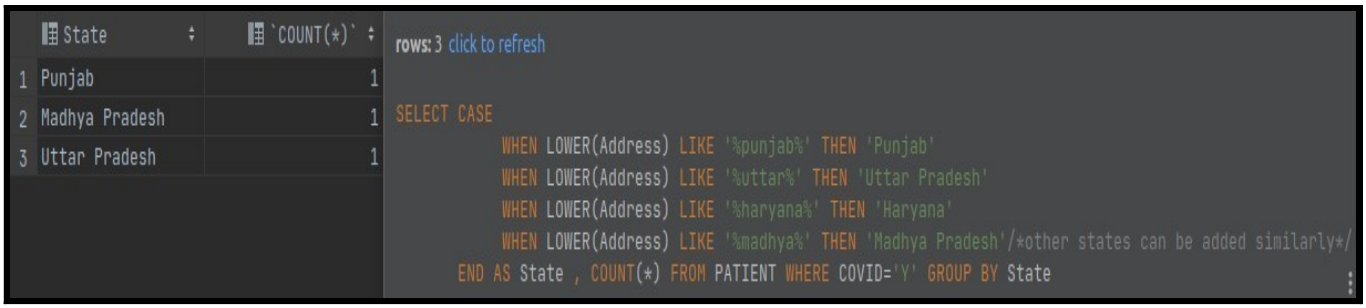
- To get list of doctors treating COVID-19 patients(We assume taht only ENT doctors are treating them):

	DOCTOR_DETAILS.Doctor_ID	Name	DOB	BELONGS_TO.Doctor_ID	Department_name
1	6	Dr. Ravi Sharma	1999-12-11	6	ENT

rows: 1 click to refresh

```
SELECT * FROM DOCTOR_DETAILS, BELONGS_TO
WHERE BELONGS_TO.Department_name='ENT'
AND BELONGS_TO.Doctor_ID=DOCTOR_DETAILS.Doctor_ID
```

- To get Count of COVID-19 patients state-wise:



	State	`COUNT(*)`
1	Punjab	1
2	Madhya Pradesh	1
3	Uttar Pradesh	1

rows: 3 click to refresh

```
SELECT CASE
          WHEN LOWER(Address) LIKE '%punjab%' THEN 'Punjab'
          WHEN LOWER(Address) LIKE '%uttar%' THEN 'Uttar Pradesh'
          WHEN LOWER(Address) LIKE '%haryana%' THEN 'Haryana'
          WHEN LOWER(Address) LIKE '%madhya%' THEN 'Madhya Pradesh'/*other states can be added similarly*/
      END AS State , COUNT(*) FROM PATIENT WHERE COVID='Y' GROUP BY State
```

Github:

https://github.com/ravichopra0107/DBS_PROJECT

Website:

https://hospital-setu.herokuapp.com