Lab 2 CS254

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Q1.Build a database of hospital management systems.

PATIENT (p_id, r_id, d_id, p_name, city, contact)

DOCTORS(D_id, p_id, name, salary, specification)

ROOM(r_id, p_id, room_type)

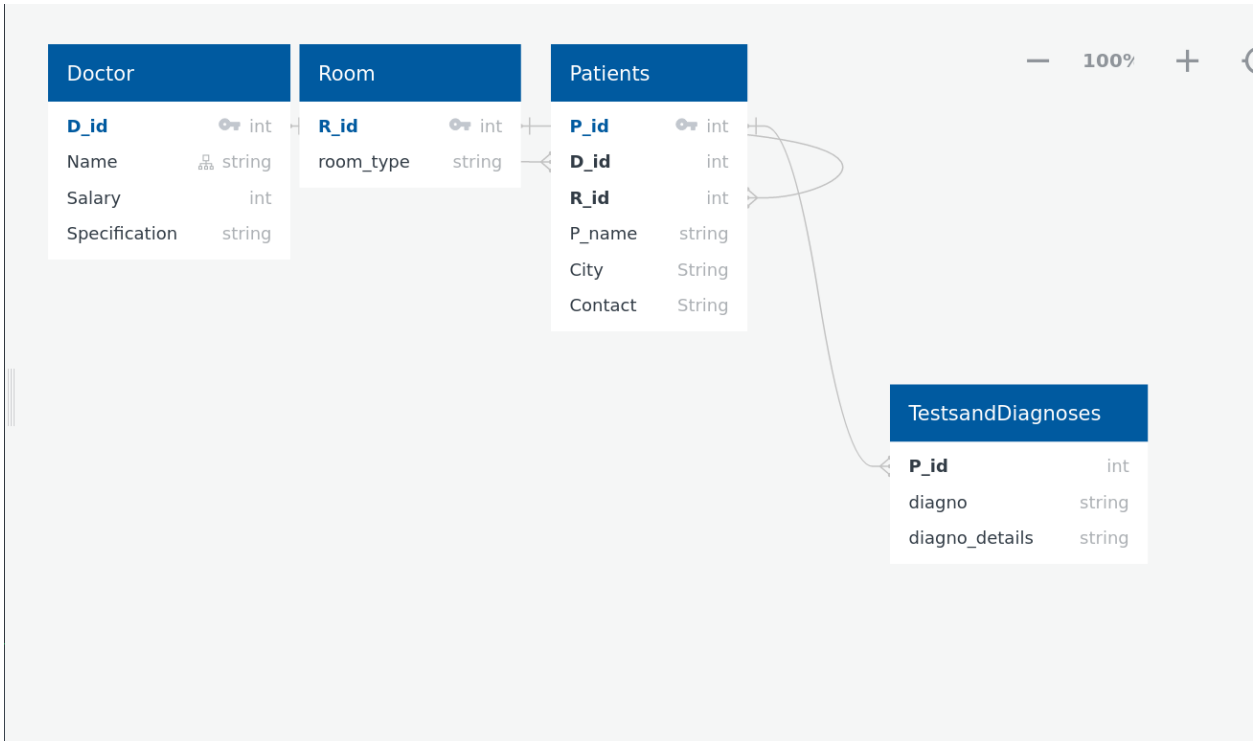
TEST & DIAGNOSIS(p_id, diagno, diag details).

```
-- Creating the Database Schema, containing relations for doctors, patients, rooms andTests & Diagnoses

CREATE TABLE doctors (
d_id numeric(5) PRIMARY KEY,
name varchar(30),
salary decimal(8,2),
specification varchar(10)
);
CREATE TABLE room (
r_id numeric(5) PRIMARY KEY,
room_type varchar(10)
);
CREATE TABLE patient (
p_id numeric(5) PRIMARY KEY,
r_id numeric(5),
d_id numeric(5),
p_name varchar(30),
city varchar(20),
contact varchar(20),
FOREIGN KEY (r_id) REFERENCES room(r_id),
```

```
   FOREIGN KEY (d_id) REFERENCES doctors(d_id)
   );
   CREATE TABLE TestAndDiagnosis (
   p_id numeric(5),
   diagno numeric(5) PRIMARY KEY,
   diagdetails varchar(60),
   FOREIGN KEY (p_id) REFERENCES patient(p_id)
   );

   -- Inserting values into the database

   INSERT INTO room VALUES(1, 'A/C');
   INSERT INTO room VALUES(2, 'Suite');
   INSERT INTO room VALUES(3, 'No A/C');
   INSERT INTO room VALUES(4, 'No A/C');
   INSERT INTO room VALUES(5, 'A/C');

   INSERT INTO doctors VALUES(1, 'Salunke', 25000, 'Derma');
   INSERT INTO doctors VALUES(2, 'Fredricks', 58000, 'Paediatric');
   INSERT INTO doctors VALUES(3, 'Abhijeet', 47000, 'Oncology');INSERT
INTO doctors VALUES(4, 'Pradyuman', 86000, 'Surgery');
   INSERT INTO doctors VALUES(5, 'Daya', 97000, 'Dental');

   INSERT INTO patient VALUES(1, 3, 2, 'Ram', 'Bangalore', '8456701234');
   INSERT INTO patient VALUES(2, 2, 5, 'Shyam', 'Mumbai', '9880393302');
   INSERT INTO patient VALUES(3, 5, 2, 'Ramesh', 'Bangalore',
'9900512512');
   INSERT INTO patient VALUES(4, 1, 4, 'Suresh', 'Chennai', '9164169046');
   INSERT INTO patient VALUES(5, 4, 1, 'Mohan', 'Pune', '7325743853');

   INSERT INTO TestAndDiagnosis VALUES(2, 1, 'Root Canal');
   INSERT INTO TestAndDiagnosis VALUES(4, 2, 'Appendisitis');
   INSERT INTO TestAndDiagnosis VALUES(1, 3, 'Headache');
   INSERT INTO TestAndDiagnosis VALUES(5, 4, 'Rashes');
   INSERT INTO TestAndDiagnosis VALUES(3, 5, 'Stomachache');

   -- Selecting data from multiple tables to show the use of primary key
and foreign keys

   SELECT p.p_id, p.p_name, r.room_type, d.name, t.diagdetails
```

```sql
FROM patient p
INNER JOIN room r ON p.r_id = r.r_id
INNER JOIN doctors d ON d.d_id = p.d_id
INNER JOIN testanddiagnosis t ON t.p_id = p.p_id;

-- Showing a violation of adding NULL value to primary key field
INSERT INTO room values (NULL, 'Non A/C');

-- Showing a violation of inserting a duplicate value for primary key
INSERT INTO doctors VALUES(2, 'Bhavan', NULL, 'Ayurveda');

-- Showing a violation of deleting a record when it is used as a
foreign key in a different relation
DELETE FROM patient
WHERE p_id = 1;
```

a.) SCHEMA DIAGRAM



b.) DEMONSTRATING USE OF PRIMARY AND FOREIGN KEY, Tables and columns

```
-- Selecting data from multiple tables to show the use of primary key and foreign keys

SELECT p.p_id, p.p_name, r.room_type, d.name, t.diagdetails
FROM patient p
INNER JOIN room r ON p.r_id = r.r_id
INNER JOIN doctors d ON d.d_id = p.d_id
INNER JOIN TestAndDiagnosis t ON t.p_id = p.p_id;
```

STDIN

Input for the program (Optional)

Output:

```
p_id    p_name  room_type       name    diagdetails
1       Ram     No A/C  Fredricks       Headache
2       Shyam   Suite   Daya    Root Canal
3       Ramesh  A/C     Fredricks       Stomachache
4       Suresh  A/C     Pradyuman       Appendisitis
5       Mohan   No A/C  Salunke Rashes
```

c.) VIOLATIONS

1. Domain constraint :

Domain constraint gets violated only when a given value to the attribute does not appear in the corresponding domain or in case it is not of the appropriate Datatype.

```
-- Showing a violation of Domain Integrity
INSERT INTO room VALUES("ABC", 'A/C');
```

Input for the program (Optional)

Output:

```
ERROR 1366 (HY000) at line 76: Incorrect decimal value: 'ABC'
```

2. Entity Integrity constraint :

On inserting NULL values to any part of the primary key of a new tuple in the relation can cause violation of the Entity integrity constraint.

```
-- Showing a violation of adding NULL value to primary key field
INSERT INTO room values (NULL, 'Non A/C');
```

Input for the program (Optional)

Output:

```
ERROR 1048 (23000) at line 81: Column 'r_id' cannot be null
```

3. Key Constraints :

On inserting a value in the new tuple of a relation which is already existing in

another tuple of the same relation, can cause violation of Key Constraints.

```
-- Showing a violation of inserting a duplicate value for primary key
INSERT INTO doctors VALUES(2, 'Bhavan', NULL, 'Ayurveda');
```

```
Output:
ERROR 1062 (23000) at line 83: Duplicate entry '2' for key 'd
```

4. Referential integrity :

On inserting a value in the foreign key of relation 1, for which there is no corresponding value in the Primary key which is referred to in relation 2, in such case Referential integrity is violated.

```
-- Showing a violation of deleting a record when it is used as a foreign key in a different relat
DELETE FROM patient
WHERE p_id = 1;
```

```
Output:
ERROR 1451 (23000) at line 81: Cannot delete or update a parent
```

ERROR 1451 (23000) at line 81: Cannot delete or update a parent row: a foreign key constraint fails (`db_3xsfet7yr`.`TestAndDiagnosis`, CONSTRAINT `TestAndDiagnosis_ibfk_1` FOREIGN KEY (`p_id`) REFERENCES `patient` (`p_id`)

Q2.Build a Department database which consist of following information:

Student (Rollno, Name, Dob, Gender, Doa, Bcode);

Branch (Bcode, Bname, Dno);

Department (Dno, Dname);

Course (Ccode, Cname, Credits, Dno);

Branch_Course (Bcode, Ccode, Semester);

Enrolls (Rollno, Ccode, Grade);

```
create table department
(Dno int primary key,
Dname varchar(50));

create table branch
(Bcode int primary key,
BName varchar(50),
Dno int references department(Dno));

create table course(Ccode varchar(8) primary key,
Cname varchar(50),
credits int,
Dno int references department(Dno));

create table Branch_course
(Bcode int references branch(Bcode),
Ccode varchar(8) references course(Ccode),
semester int,
primary key(Bcode,Ccode));

create table student
(rollno int primary key auto_increment,
name varchar(30) not null,
dob date,
gender char(1),
doa date,
Bcode int references branch(Bcode),
check (gender in ('M','F','T')));

create table Enrolls (rollno int references student(rollno),
Ccode varchar(8) references course(Ccode),
Sess varchar(10),
grade char(1),
primary key(rollno,Ccode,Sess),
check(grade in('A','B','C','D','E','U','S'))
);

insert INTO department values
(1,'Physics'),
```

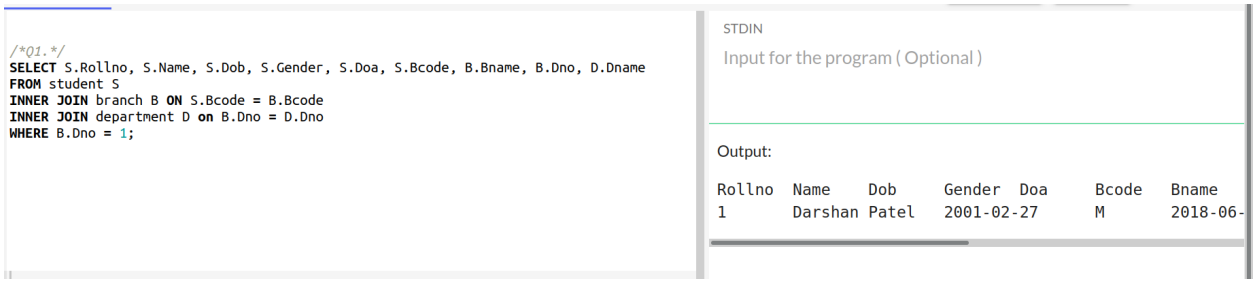
```
(2,'Mathematics'),
(3,'Humanities'),
(4,'Computer Science'),
(5,'Electronics'),
(6,'Mechanical Engineering'),
(7,'Civil Engineering');

insert into branch values
(1,'Modern Physics',1),
(2,'Algebra',2),
(3,'Applied Mathematics',2),
(4,'Mathematical Analysis',2),
(5,'Social Science',3),
(6,'Linguistics',3),
(7,'Data structures & Algorithms',4),
(8,'Computer Science',4),
(9,'Digital Electronics',5),
(10,'Power Electronics',5),
(11,'Circuit Design',5),
(12,'Integrated Circuits',5),
(13,'Mechanical Engineering',6),
(14,'Information Technology',4),
(15,'Civil Engineering',7);

insert into course values
('PHY101','Waves and Electromagnetics',4,1),
('PHY201','Quantum Physics',3,1),
('MA101','Linear Algebra',4,2),
('MA201','Discrete Mathematics',4,2),
('MA301','Probability and Statistics',4,2),
('MA401','Numerical Techniques',4,2),
('HS101','Spoken and written',2,3),
('HS201','Science,Technology and society',2,3),
('HS301','Technical Writing',2,3),
('CS101','Introduction to Programming',4,4),
('CS201','Data structures',4,4),
('CS301','Design and analysis of Algorithms',4,4),
('CS302','Introduction to Object Oriented Programming',4,4),
('CS401','Database Management Systems',4,4),
('CS402','Design and analysis of Algorithms',4,4),
```

```
('CS403','Operating Systems',4,4),
('EC401','Computer Organization and Architecture',4,4),
('EC101','Basic Electronics Circuits',4,5),
('EC201','Basic Electrical Engineering',4,5),
('EC301','Digital Logic Design',4,5),
('EC601','Digital IC Design',4,5);

insert INTO Branch_course VALUES
(1,'PHY101',1),
(1,'PHY 201',2),
(2,'MA101',1),
(3,'MA201',2),
(3,'MA301',3),
(4,'MA401',4),
(6,'HS101',1),
(5,'HS201',2),
(6,'HS301',3),
(8,'CS101',1),
(7,'CS201',2),
(7,'CS301',3),
(8,'CS302',3),
(8,'CS401',4),
(8,'CS402',4),
(8,'CS403',4),
(11,'EC401',4),
(9,'EC101',1),
(10,'EC201',2),
(11,'EC301',3),
(12,'EC601',6),
(13,'CS101',1),
(14,'CS101',1),
(15,'CS101',1);


INSERT INTO student VALUES
( 1, 'Darshan Patel' , '2001-02-27', 'M', '2018-06-24', 1),
( 2, 'Yash Patel' , '2000-11-13', 'M', '2018-06-25', 2),

( 3, 'Neel Patel' , '2000-06-19', 'M', '2018-06-24', 3),
```

```
( 4, 'Ramesh Kaushik' , '2001-10-13', 'M', '2018-06-25', 4),

( 5, 'Keavy Tomlinson', '2000-05-19', 'F', '2018-06-24', 5),

( 6, 'Catrin Dotson' , '2000-06-17', 'F', '2018-06-25', 6),

( 7, 'Ravina Churill' , '2001-07-14', 'F', '2018-06-24', 7),

( 8, 'Jackson Nairn' , '2000-08-02', 'M', '2018-06-25', 8),

( 9,'Branden Mohammed', '1999-09-19', 'M', '2018-06-24', 9),

( 10, 'Zhane Bailey' , '1998-10-14', 'F', '2018-06-25', 10),

( 11, 'Myron Tanner' , '1999-11-24', 'M', '2018-06-24', 11),

( 12, 'Aine Moreno' , '1997-12-24', 'F', '2018-06-25', 12);


insert into Enrolls values
(1,'PHY101','AU2018','A'),
(2,'MA101','AU2018','A'),
(3,'MA201','WIN2018','A'),
(3,'MA301','AU2019','A'),
(7,'CS301','AU2019','U'),
(8,'CS302','AU2019','S'),
(8,'CS401','WIN2019','S'),
(8,'CS402','WIN2019','S'),
(8,'CS403','WIN2019','S'),
(10,'EC201','WIN2018','B');
```

a.) Print the details of students who are from the same department.

```
SELECT S.Rollno, S.Name, S.Dob, S.Gender, S.Doa, S.Bcode, B.Bname, B.Dno,
D.Dname
FROM student S
INNER JOIN branch B ON S.Bcode = B.Bcode
INNER JOIN department D on B.Dno = D.Dno
WHERE B.Dno = 1;
```



```
/*01.*/
SELECT S.Rollno, S.Name, S.Dob, S.Gender, S.Doa, S.Bcode, B.Bname, B.Dno, D.Dname
FROM student S
INNER JOIN branch B ON S.Bcode = B.Bcode
INNER JOIN department D on B.Dno = D.Dno
WHERE B.Dno = 1;
```

STDIN

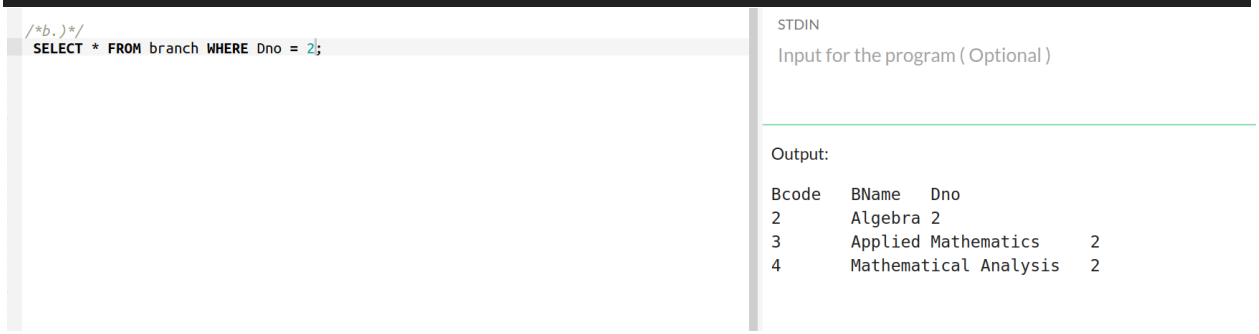
Input for the program (Optional)

Output:

```
Rollno  Name    Dob     Gender  Doa     Bcode   Bname
1       Darshan Patel   2001-02-27      M       2018-06-
```

b.)Get the details of branches under a particular Department.

```
SELECT * FROM branch WHERE Dno = 2;
```



```
/*b.)*/
SELECT * FROM branch WHERE Dno = 2;
```

STDIN

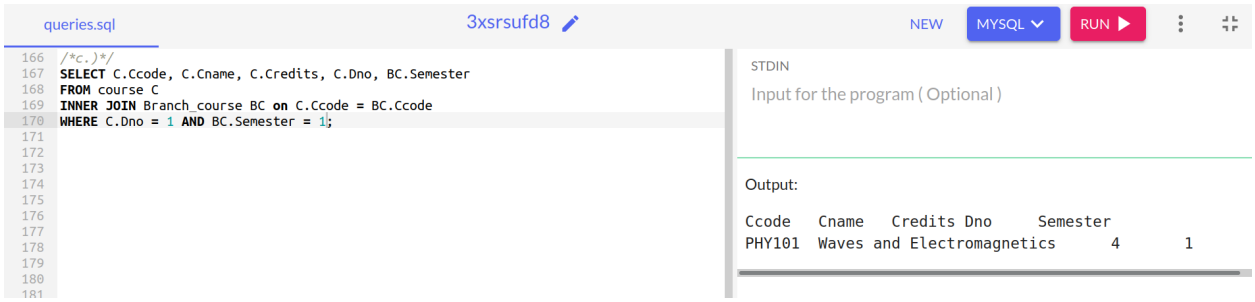
Input for the program (Optional)

Output:

```
Bcode   BName   Dno
2       Algebra 2
3       Applied Mathematics     2
4       Mathematical Analysis   2
```

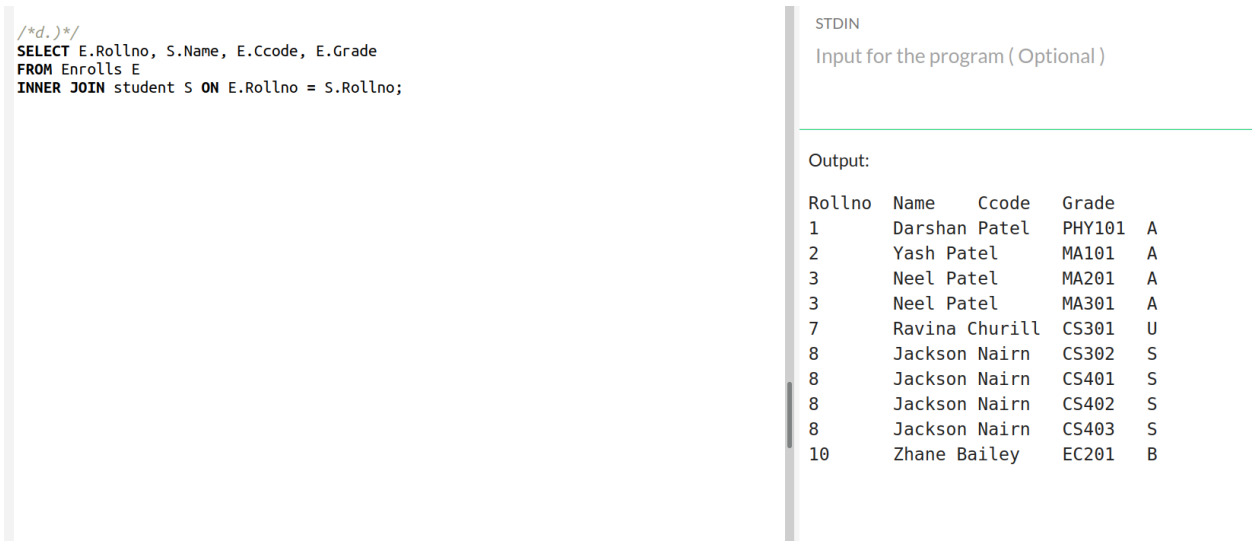
c.) Print the names of courses offered in a particular department in a particular semester.

```
SELECT C.Ccode, C.Cname, C.Credits, C.Dno, BC.Semester
FROM course C
INNER JOIN Branch_course BC on C.Ccode = BC.Ccode
WHERE C.Dno = 1 AND BC.Semester = 1;
```



d.)Print the students roll no, Name and grades.

```
SELECT E.Rollno, S.Name, E.Ccode, E.Grade
FROM Enrolls E
INNER JOIN student S ON E.Rollno = S.Rollno;
```



e.)Print the details of students who are enrolled for different courses.

```
SELECT E.Rollno, S.Name, E.Ccode, E.Grade
FROM Enrolls E
INNER JOIN student S ON E.Rollno = S.Rollno;
```

```sql
/*e.)*/
SELECT E.Rollno, S.Name, S.Dob, S.Gender, S.Doa, E.Ccode, C.Cname, C.Credits, E.Grade
FROM Enrolls E
INNER JOIN student S ON E.Rollno = S.Rollno
INNER JOIN course C ON E.Ccode = C.Ccode;
```

STDIN

Input for the program (Optional)

Output:

Rollno	Name	Dob	Gender	Doa	Ccode	Cname
1	Darshan Patel	2001-02-27	M		2018-06-	
2	Yash Patel	2000-11-13	M		2018-06-	
3	Neel Patel	2000-06-19	M		2018-06-	
3	Neel Patel	2000-06-19	M		2018-06-	
7	Ravina Churill	2001-07-14	F		2018-06-	
8	Jackson Nairn	2000-08-02	M		2018-06-	
8	Jackson Nairn	2000-08-02	M		2018-06-	
8	Jackson Nairn	2000-08-02	M		2018-06-	
8	Jackson Nairn	2000-08-02	M		2018-06-	
10	Zhane Bailey	1998-10-14	F		2018-06-	