LAB EXPERIMENTS

PART A: SQL PROGRAMMING

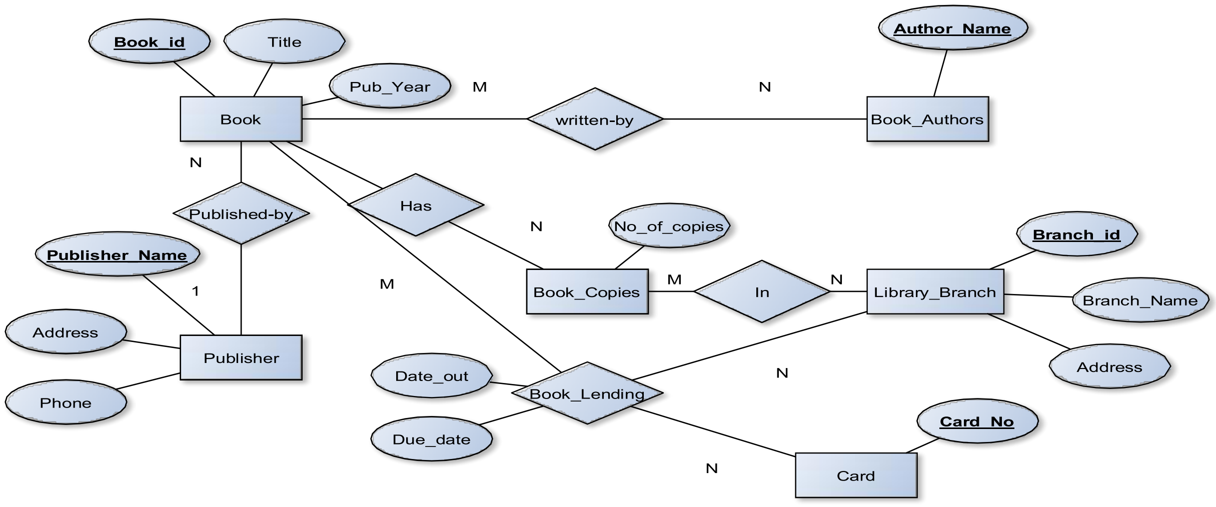
A. Consider the following schema for a Library Database:

BOOK (*Book_id, Title, Publisher_Name, Pub_Year*)
BOOK_AUTHORS (*Book_id, Author_Name*)
PUBLISHER (*Name, Address, Phone*)
BOOK_COPIES (*Book_id, Branch_id, No-of_Copies*)
BOOK_LENDING (*Book_id, Branch_id, Card_No, Date_Out, Due_Date*)
LIBRARY_BRANCH (*Branch_id, Branch_Name, Address*)

Write SQL queries to

1. **Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each branch, etc.**
2. **Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2017 to Jun 2017**
3. **Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation.**
4. **Partition the BOOK table based on year of publication. Demonstrate its working with a simple query.**
5. **Create a view of all books and its number of copies that are currently available in the Library.**

Solution:
Entity-Relationship Diagram



Schema Diagram

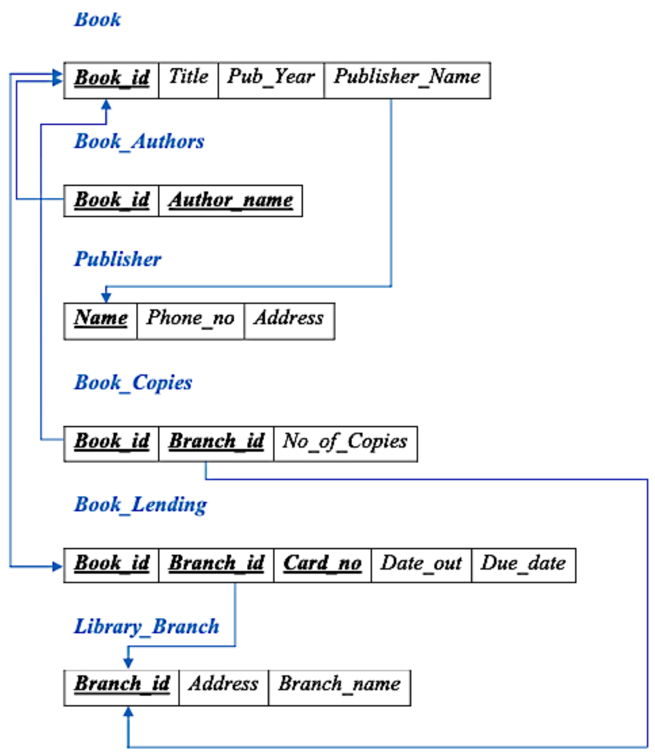


Table Creation

CREATE TABLE PUBLISHER
(
NAME **VARCHAR(20) PRIMARY KEY**,
PHONE **VARCHAR(10),**
ADDRESS **VARCHAR(20)**
);

CREATE TABLE BOOK
(
BOOK_ID **INTEGER PRIMARY KEY**,
TITLE **VARCHAR(20),**
PUB_YEAR **VARCHAR(20),**
PUBLISHER_NAME **varchar(20),**
FOREIGN KEY(PUBLISHER_NAME) **REFERENCES** PUBLISHER(NAME) **ON DELETE CASCADE**
);

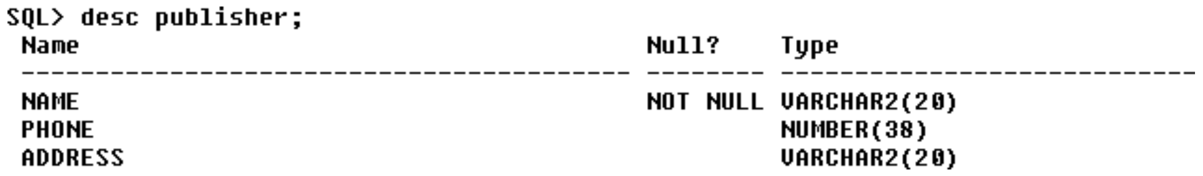
CREATE TABLE BOOK_AUTHORS
(

```
AUTHOR_NAME VARCHAR(20),
BOOK_ID INTEGER ,
FOREIGN KEY(BOOK_ID) REFERENCES BOOK(BOOK_ID) ON DELETE CASCADE,
PRIMARY KEY(BOOK_ID, AUTHOR_NAME)
);

CREATE TABLE LIBRARY_BRANCH
(
BRANCH_ID INTEGER PRIMARY KEY,
BRANCH_NAME VARCHAR(50),
ADDRESS VARCHAR(50)
);

CREATE TABLE BOOK_COPIES
(
NO_OF_COPIES INTEGER,
BOOK_ID INTEGER,
BRANCH_ID INTEGER,
PRIMARY KEY(BOOK_ID, BRANCH_ID),
FOREIGN KEY(BOOK_ID) REFERENCES BOOK (BOOK_ID) ON DELETE CASCADE,
FOREIGN KEY(BRANCH_ID) REFERENCES LIBRARY_BRANCH(BRANCH_ID) ON
DELETE  CASCADE
);

CREATE TABLE CARD
(
CARD_NO INTEGER PRIMARY KEY
);

CREATE TABLE BOOK_LENDING
(
DATE_OUT DATE,
DUE_DATE DATE,
BOOK_ID INTEGER,
BRANCH_ID INTEGER,
CARD_NO INTEGER,
PRIMARY KEY (BOOK_ID, BRANCH_ID, CARD_NO),
FOREIGN KEY(BOOK_ID) REFERENCES BOOK (BOOK_ID) ON DELETE CASCADE,
FOREIGN KEY(BRANCH_ID) REFERENCES LIBRARY_BRANCH(BRANCH_ID) ON
DELETE CASCADE,
FOREIGN KEY(CARD_NO) REFERENCES CARD (CARD_NO) ON DELETE CASCADE
```

);

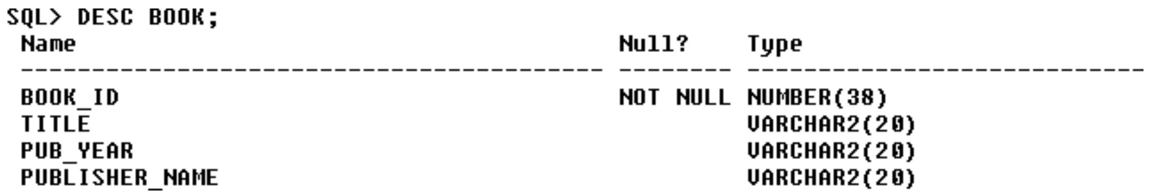
Table Descriptions

DESC PUBLISHER;



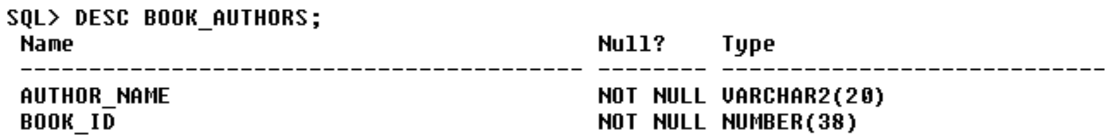
```
SQL> desc publisher;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 NAME                                      NOT NULL VARCHAR2(20)
 PHONE                                              NUMBER(38)
 ADDRESS                                            VARCHAR2(20)
```

DESC BOOK;



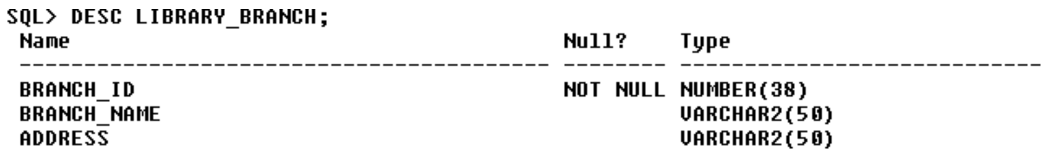
```
SQL> DESC BOOK;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 BOOK_ID                                   NOT NULL NUMBER(38)
 TITLE                                              VARCHAR2(20)
 PUB_YEAR                                           VARCHAR2(20)
 PUBLISHER_NAME                                     VARCHAR2(20)
```

DESC BOOK_AUTHORS;



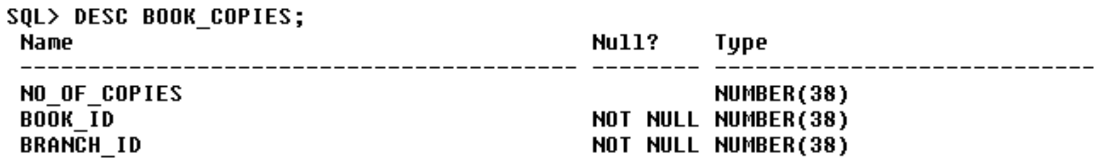
```
SQL> DESC BOOK_AUTHORS;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 AUTHOR_NAME                               NOT NULL VARCHAR2(20)
 BOOK_ID                                   NOT NULL NUMBER(38)
```

DESC LIBRARY_BRANCH;



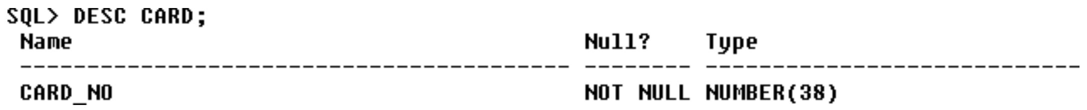
```
SQL> DESC LIBRARY_BRANCH;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 BRANCH_ID                                 NOT NULL NUMBER(38)
 BRANCH_NAME                                        VARCHAR2(50)
 ADDRESS                                            VARCHAR2(50)
```

DESC BOOK_COPIES;



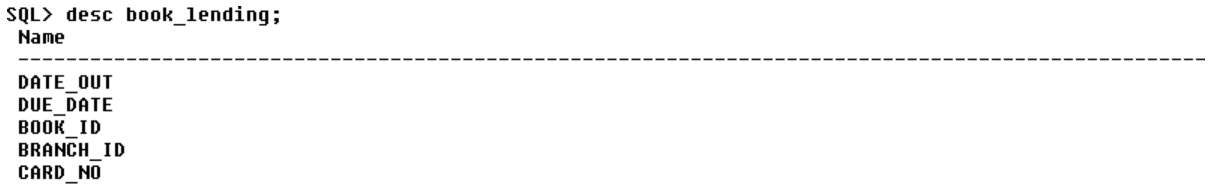
```
SQL> DESC BOOK_COPIES;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 NO_OF_COPIES                                       NUMBER(38)
 BOOK_ID                                   NOT NULL NUMBER(38)
 BRANCH_ID                                 NOT NULL NUMBER(38)
```

DESC CARD;



```
SQL> DESC CARD;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 CARD_NO                                   NOT NULL NUMBER(38)
```

DESC BOOK_LENDING;


```
SQL> desc book_lending;
 Name
 -----------------------------------------------------------------------------------------------------
 DATE_OUT
 DUE_DATE
 BOOK_ID
 BRANCH_ID
 CARD_NO
```

Insertion of Values to Tables

INSERT INTO PUBLISHER VALUES (‘MCGRAW-HILL’, 9989076587, ‘BANGALORE’);
INSERT INTO PUBLISHER VALUES (‘PEARSON’, 9889076565, ‘NEWDELHI’);
INSERT INTO PUBLISHER VALUES (‘RANDOM HOUSE’, 7455679345, ‘HYDRABAD’);
INSERT INTO PUBLISHER VALUES (‘HACHETTE LIVRE’, 8970862340, ‘CHENAI’);
INSERT INTO PUBLISHER VALUES (‘GRUPO PLANETA’, 7756120238, ‘BANGALORE’);

INSERT INTO BOOK VALUES (1,’DBMS’,’JAN-2017’, ‘MCGRAW-HILL’);
INSERT INTO BOOK VALUES (2,’ADBMS’,’JUN-2016’, ‘MCGRAW-HILL’);
INSERT INTO BOOK VALUES (3,’CN’,’SEP-2016’, ‘PEARSON’);
INSERT INTO BOOK VALUES (4,’CG’,’SEP-2015’, ‘GRUPO PLANETA’);
INSERT INTO BOOK VALUES (5,’OS’,’MAY-2016’, ‘PEARSON’);

INSERT INTO BOOK_AUTHORS VALUES (’NAVATHE’, 1);
INSERT INTO BOOK_AUTHORS VALUES (’NAVATHE’, 2);
INSERT INTO BOOK_AUTHORS VALUES (’TANENBAUM’, 3);
INSERT INTO BOOK_AUTHORS VALUES (’EDWARD ANGEL’, 4);
INSERT INTO BOOK_AUTHORS VALUES (’GALVIN’, 5);

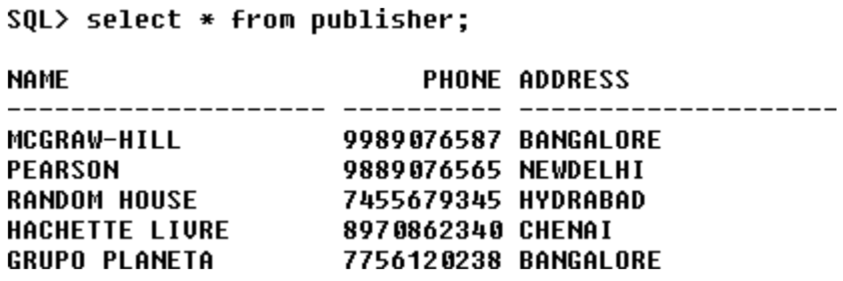
INSERT INTO LIBRARY_BRANCH VALUES (10,’RR NAGAR’,’BANGALORE’);
INSERT INTO LIBRARY_BRANCH VALUES (11,’RNSIT’,’BANGALORE’);
INSERT INTO LIBRARY_BRANCH VALUES (12,’RAJAJI NAGAR’, ’BANGALORE’);
INSERT INTO LIBRARY_BRANCH VALUES (13,’NITTE’,’MANGALORE’);
INSERT INTO LIBRARY_BRANCH VALUES (14,’MANIPAL’,’UDUPI’);

INSERT INTO BOOK_COPIES VALUES (10, 1, 10);
INSERT INTO BOOK_COPIES VALUES (5, 1, 11);
INSERT INTO BOOK_COPIES VALUES (2, 2, 12);
INSERT INTO BOOK_COPIES VALUES (5, 2, 13);
INSERT INTO BOOK_COPIES VALUES (7, 3, 14);
INSERT INTO BOOK_COPIES VALUES (1, 5, 10);
INSERT INTO BOOK_COPIES VALUES (3, 4, 11);

INSERT INTO CARD VALUES (100);
INSERT INTO CARD VALUES (101);
INSERT INTO CARD VALUES (102);
INSERT INTO CARD VALUES (103);
INSERT INTO CARD VALUES (104);

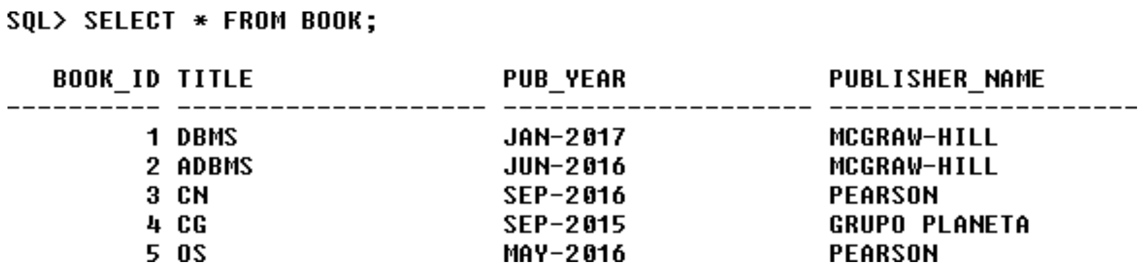
INSERT INTO BOOK_LENDING VALUES (’2017-01-01’,’2017-06-07’, 1, 10, 101);
INSERT INTO BOOK_LENDING VALUES (’2017-01-11’,’2017-03-11’, 3, 14, 101);
INSERT INTO BOOK_LENDING VALUES (’2017-02-21’,’2017-04-21’, 2, 13, 101);
INSERT INTO BOOK_LENDING VALUES (’2017-03-15’,’2017-07-15’, 4, 11, 101);
INSERT INTO BOOK_LENDING VALUES (‘2017-04-12’,’2017-05-12’, 1, 11, 104);

SELECT * FROM PUBLISHER;



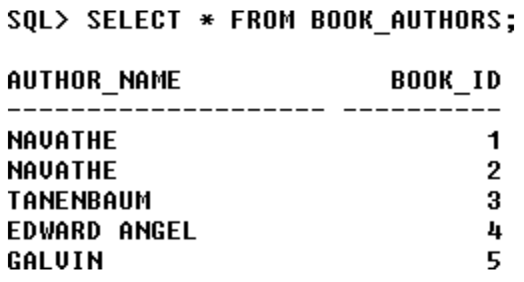
```
SQL> select * from publisher;

NAME                      PHONE ADDRESS
-------------------- ---------- --------------------
MCGRAW-HILL          9989076587 BANGALORE
PEARSON              9889076565 NEWDELHI
RANDOM HOUSE         7455679345 HYDRABAD
HACHETTE LIVRE       8970862340 CHENAI
GRUPO PLANETA        7756120238 BANGALORE
```

SELECT * FROM BOOK;



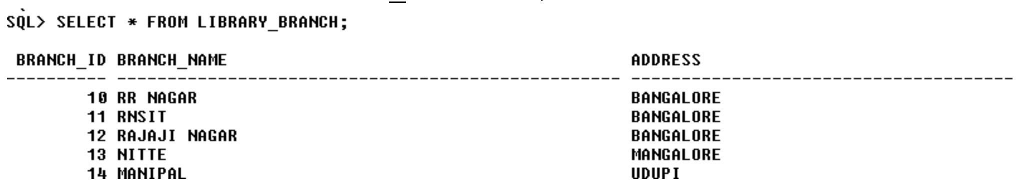
```
SQL> SELECT * FROM BOOK;

   BOOK_ID TITLE                PUB_YEAR             PUBLISHER_NAME
---------- -------------------- -------------------- --------------------
         1 DBMS                 JAN-2017             MCGRAW-HILL
         2 ADBMS                JUN-2016             MCGRAW-HILL
         3 CN                   SEP-2016             PEARSON
         4 CG                   SEP-2015             GRUPO PLANETA
         5 OS                   MAY-2016             PEARSON
```

SELECT * FROM BOOK_AUTHORS;



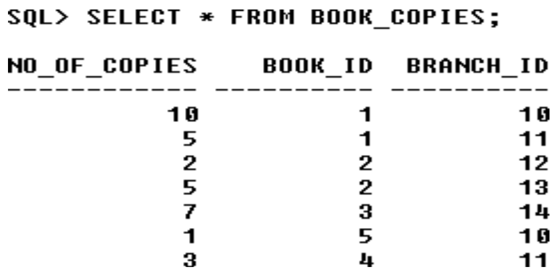
```
SQL> SELECT * FROM BOOK_AUTHORS;

AUTHOR_NAME             BOOK_ID
-------------------- ----------
NAVATHE                       1
NAVATHE                       2
TANENBAUM                     3
EDWARD ANGEL                  4
GALVIN                        5
```

SELECT * FROM LIBRARY_BRANCH;



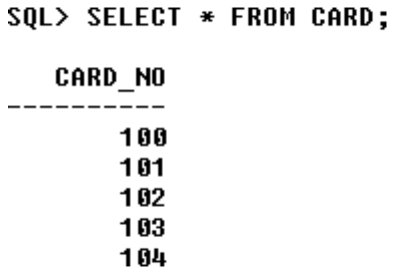
```
SQL> SELECT * FROM LIBRARY_BRANCH;

 BRANCH_ID BRANCH_NAME                                        ADDRESS
---------- -------------------------------------------------- ----------------------------------------
        10 RR NAGAR                                           BANGALORE
        11 RNSIT                                              BANGALORE
        12 RAJAJI NAGAR                                       BANGALORE
        13 NITTE                                              MANGALORE
        14 MANIPAL                                            UDUPI
```

SELECT * FROM BOOK_COPIES;



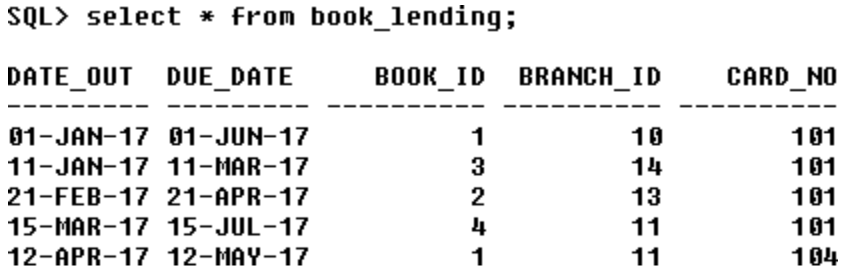
```
SQL> SELECT * FROM BOOK_COPIES;

NO_OF_COPIES    BOOK_ID  BRANCH_ID
------------ ---------- ----------
          10          1         10
           5          1         11
           2          2         12
           5          2         13
           7          3         14
           1          5         10
           3          4         11
```

SELECT * FROM CARD;



```
SQL> SELECT * FROM CARD;

   CARD_NO
----------
       100
       101
       102
       103
       104
```

SELECT * FROM BOOK_LENDING;

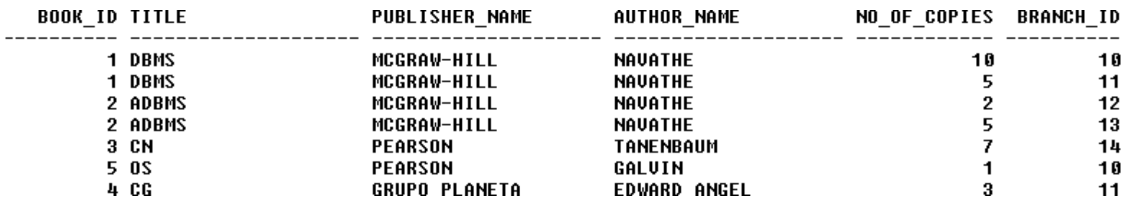


```
SQL> select * from book_lending;

DATE_OUT  DUE_DATE     BOOK_ID  BRANCH_ID    CARD_NO
--------- --------- ---------- ---------- ----------
01-JAN-17 01-JUN-17          1         10        101
11-JAN-17 11-MAR-17          3         14        101
21-FEB-17 21-APR-17          2         13        101
15-MAR-17 15-JUL-17          4         11        101
12-APR-17 12-MAY-17          1         11        104
```

Queries:

1. **Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each branch, etc.**

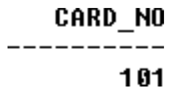
SELECT B.BOOK_ID, B.TITLE, B.PUBLISHER_NAME, A.AUTHOR_NAME, C.NO_OF_COPIES, L.BRANCH_ID
FROM BOOK B, BOOK_AUTHORS A, BOOK_COPIES C, LIBRARY_BRANCH L
WHERE B.BOOK_ID=A.BOOK_ID **AND** B.BOOK_ID=C.BOOK_ID **AND** L.BRANCH_ID =C.BRANCH_ID;



```
   BOOK_ID TITLE                PUBLISHER_NAME       AUTHOR_NAME          NO_OF_COPIES  BRANCH_ID
---------- -------------------- -------------------- -------------------- ------------ ----------
         1 DBMS                 MCGRAW-HILL          NAVATHE                        10         10
         1 DBMS                 MCGRAW-HILL          NAVATHE                         5         11
         2 ADBMS                MCGRAW-HILL          NAVATHE                         2         12
         2 ADBMS                MCGRAW-HILL          NAVATHE                         5         13
         3 CN                   PEARSON              TANENBAUM                       7         14
         5 OS                   PEARSON              GALVIN                          1         10
         4 CG                   GRUPO PLANETA        EDWARD ANGEL                    3         11
```

2. **Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2017 to Jun 2017.**

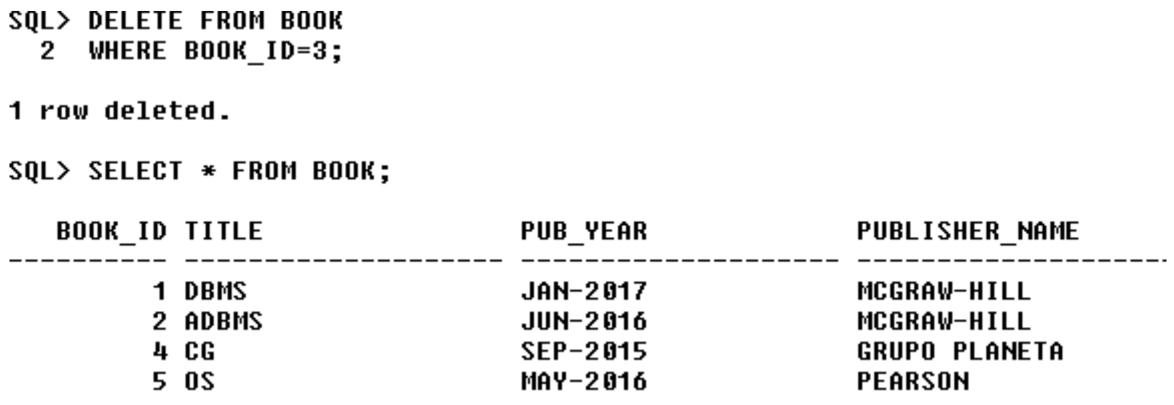
SELECT CARD_NO
FROM BOOK_LENDING
WHERE DATE_OUT **BETWEEN** '2017-JAN-01' **AND** '2017-JUN-30'
GROUP BY CARD_NO
HAVING COUNT (*)>3;



```
   CARD_NO
----------
       101
```

3. **Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation.**

DELETE FROM BOOK
WHERE BOOK_ID=3;

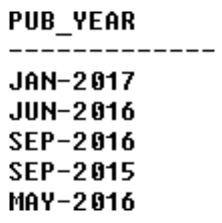


```
SQL> DELETE FROM BOOK
  2  WHERE BOOK_ID=3;

1 row deleted.

SQL> SELECT * FROM BOOK;

   BOOK_ID TITLE                PUB_YEAR             PUBLISHER_NAME
---------- -------------------- -------------------- --------------------
         1 DBMS                 JAN-2017             MCGRAW-HILL
         2 ADBMS                JUN-2016             MCGRAW-HILL
         4 CG                   SEP-2015             GRUPO PLANETA
         5 OS                   MAY-2016             PEARSON
```

.

4. **Partition the BOOK table based on year of publication. Demonstrate its working with asimple query.**

   CREATE VIEW V_PUBLICATION **AS**
   SELECT PUB_YEAR
   FROM BOOK;



```
PUB_YEAR
-------------
JAN-2017
JUN-2016
SEP-2016
SEP-2015
MAY-2016
```

Or

Partitioning can be achieved without splitting tables by physically putting tables on individual disk drives. Partitioning allows tables, indexes, and index-organized tables to be subdivided into smaller pieces, therefore queries that access only a fraction of the data can run faster because there is fewer data to scan. There are two major forms of partitioning :
Horizontal Partitioning : Horizontal partitioning divides table rows into multiple partitions (based on a logic).
Vertical Partitioning : Vertical partitioning divides a table into multiple tables that contain fewer columns.

In MySQL you can partition a table using **CREATE TABLE** or **ALTER TABLE** command.

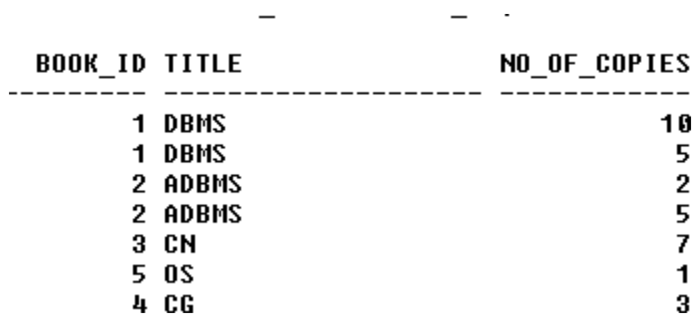
CREATE TABLE BOOKP
(
BOOK_ID **INT NOT NULL** ,
TITLE **VARCHAR(20),**
PUBLISHER_NAME **VARCHAR(20),**
PUB_YEAR **INT**
)
PARTITION BY RANGE (Pub_year)
(**PARTITION** q0 **VALUES LESS THAN** (2015),
PARTITION q1 **VALUES LESS THAN** (2016),
PARTITION q2 **VALUES LESS THAN** (2017)
);

INSERT INTO BOOKP **VALUES** ('801' , 'DBMS','Willey', '2013');
INSERT INTO BOOKP **VALUES** ('802' , 'DS','Pearson', '2014');
INSERT INTO BOOKP **VALUES** ('803' , 'OS','Willey', '2015');
INSERT INTO BOOKP **VALUES** ('804' , 'CG','MC-GRAW-HILL', '2016');

```
SELECT * FROM BOOKP;
+---------+-------+----------------+----------+
| Book_iD | Title | Publisher_name | Pub_yeaR |
+---------+-------+----------------+----------+
|     801 | DBMS  | Willey         |     2013 |
|     802 | DS    | Pearson        |     2014 |
|     803 | OS    | Willey         |     2015 |
|     804 | CG    | MC-GRAW-HILL   |     2016 |
+---------+-------+----------------+----------+
 4 rows in set (0.00 sec)

SELECT * FROM BOOKP PARTITION(Q1);
+---------+-------+----------------+----------+
| Book_iD | Title | Publisher_name | Pub_yeaR |
+---------+-------+----------------+----------+
|     803 | OS    | Willey         |     2015 |
+---------+-------+----------------+----------+
 1 row in set (0.00 sec)

SELECT * FROM BOOKP PARTITION(Q0);
+---------+-------+----------------+----------+
| Book_iD | Title | Publisher_name | Pub_yeaR |
+---------+-------+----------------+----------+
|     801 | DBMS  | Willey         |     2013 |
|     802 | DS    | Pearson        |     2014 |
+---------+-------+----------------+----------+
 2 rows in set (0.00 sec)

SELECT * FROM BOOKP PARTITION(Q2);
+---------+-------+----------------+----------+
| Book_iD | Title | Publisher_name | Pub_yeaR |
+---------+-------+----------------+----------+
|     804 | CG    | MC-GRAW-HILL   |     2016 |
+---------+-------+----------------+----------+
 1 row in set (0.00 sec)
```

5. **Create a view of all books and its number of copies that are currently available in the Library.**

```
CREATE VIEW V_BOOKS AS
SELECT B.BOOK_ID, B.TITLE, C.NO_OF_COPIES
FROM BOOK B, BOOK_COPIES C, LIBRARY_BRANCH L
WHERE B.BOOK_ID=C.BOOK_ID AND C.BRANCH_ID=L.BRANCH_ID;
```



```
  BOOK_ID TITLE                NO_OF_COPIES
--------- -------------------- ------------
        1 DBMS                           10
        1 DBMS                            5
        2 ADBMS                           2
        2 ADBMS                           5
        3 CN                              7
        5 OS                              1
        4 CG                              3
```

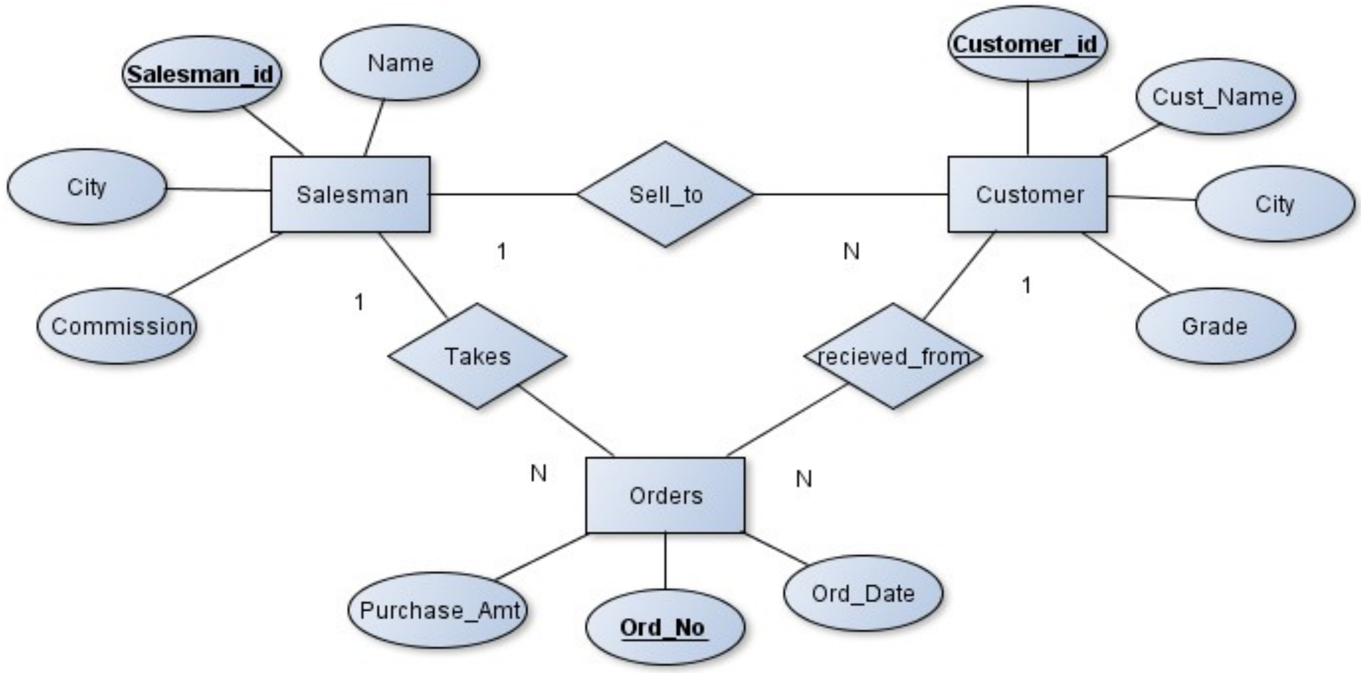
LAB EXPERIMENT 2: Consider the following schema for Order Database:

SALESMAN (*Salesman_id, Name, City, Commission*)
CUSTOMER (*Customer_id, Cust_Name, City, Grade, Salesman_id*)
ORDERS(*Ord_No, Purchase_Amt, Ord_Date, Customer_id, Salesman_id*)
Write SQL queries to

1. **Count the customers with grades above Bangalore's average.**
2. **Find the name and numbers of all salesmen who had more than one customer.**
3. **List all salesmen and indicate those who have and don't have customers in their cities (Use UNION operation.)**
4. **Create a view that finds the salesman who has the customer with the highest order of a day.**
5. **Demonstrate the DELETE operation by removing salesman with id 1000. All his orders must also be deleted.**

Solution:

Entity-Relationship Diagram



Schema Diagram

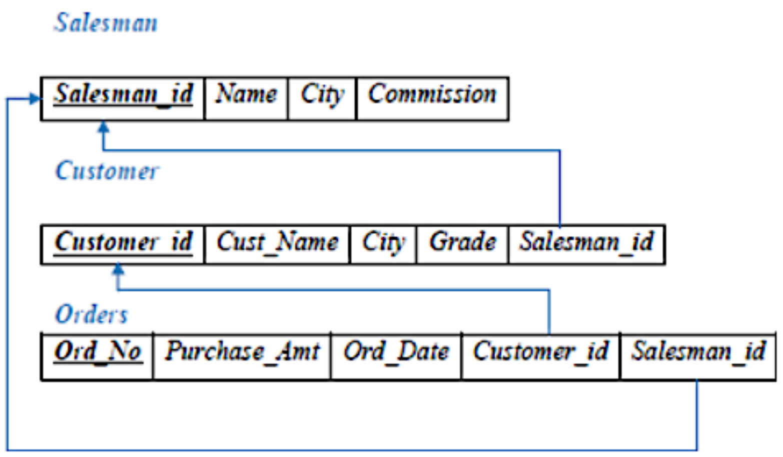


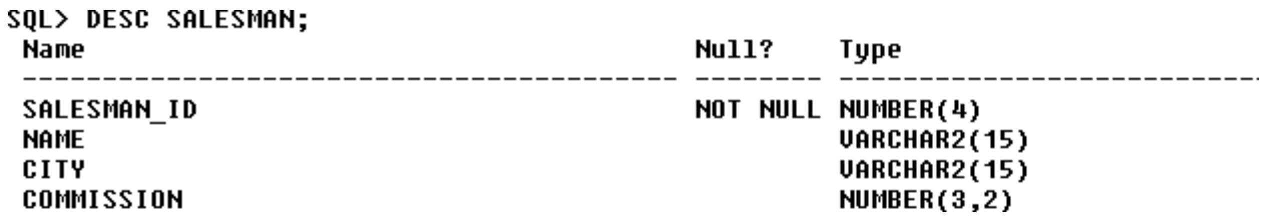
Table Creation

```
CREATE TABLE SALESMAN
(
SALESMAN_ID  INT,
NAME VARCHAR(20),
CITY VARCHAR(20),
COMMISSION VARCHAR(20),
PRIMARY KEY(SALESMAN_ID)
);

CREATE TABLE CUSTOMER
(
CUSTOMER_ID  INT,
CUST_NAME VARCHAR(20),
CITY VARCHAR(20),
GRADE INT,
SALESMAN_ID INT,
PRIMARY KEY(CUSTOMER_ID),
FOREIGN KEY(SALESMAN_ID)  REFERENCES SALESMAN (SALESMAN_ID) ON DELETE SET
NULL);

CREATE TABLE ORDERS
(
ORD_NO INT,
PURCHASE_AMT DECIMAL(10,2),
ORD_DATE DATE,
CUSTOMER_ID INT,
SALESMAN_ID INT,
PRIMARY KEY (ORD_NO),
```

FOREIGN KEY(CUSTOMER_ID) **REFERENCES** CUSTOMER (CUSTOMER_ID) **ON DELETE CASCADE**,
FOREIGN KEY(SALESMAN_ID) **REFERENCES** SALESMAN (SALESMAN_ID) **ON DELETE CASCADE**
);

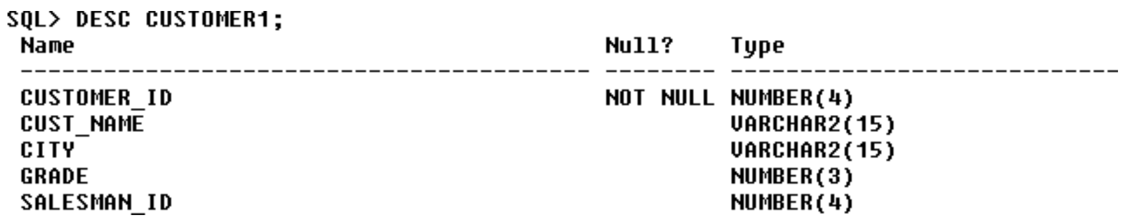
<u>Table Descriptions</u>

DESC SALESMAN;



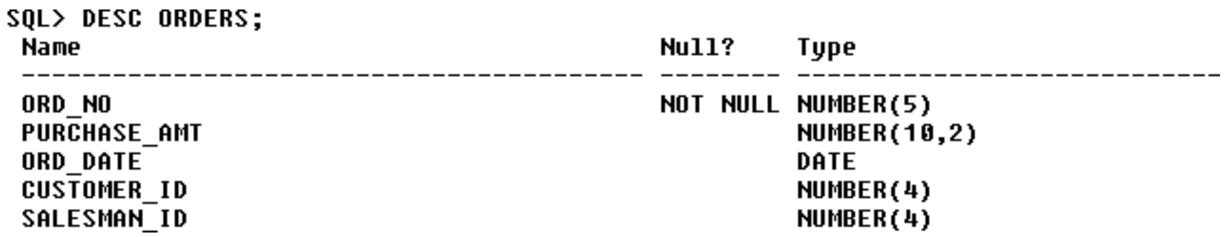
```
SQL> DESC SALESMAN;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 SALESMAN_ID                               NOT NULL NUMBER(4)
 NAME                                               VARCHAR2(15)
 CITY                                               VARCHAR2(15)
 COMMISSION                                         NUMBER(3,2)
```

DESC CUSTOMER;



```
SQL> DESC CUSTOMER1;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 CUSTOMER_ID                               NOT NULL NUMBER(4)
 CUST_NAME                                          VARCHAR2(15)
 CITY                                               VARCHAR2(15)
 GRADE                                              NUMBER(3)
 SALESMAN_ID                                        NUMBER(4)
```

DESC ORDERS;

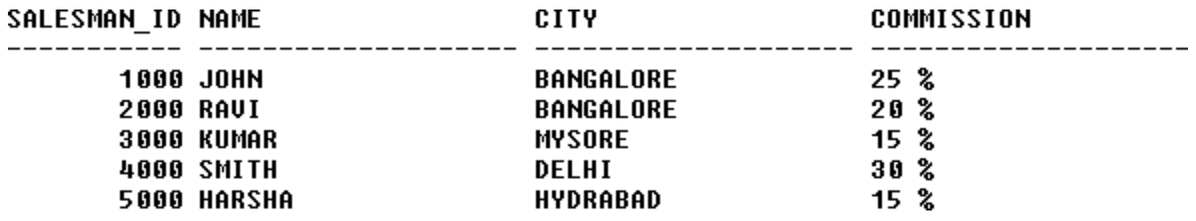


```
SQL> DESC ORDERS;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 ORD_NO                                    NOT NULL NUMBER(5)
 PURCHASE_AMT                                       NUMBER(10,2)
 ORD_DATE                                           DATE
 CUSTOMER_ID                                        NUMBER(4)
 SALESMAN_ID                                        NUMBER(4)
```

<u>Insertion of Values to Tables</u>

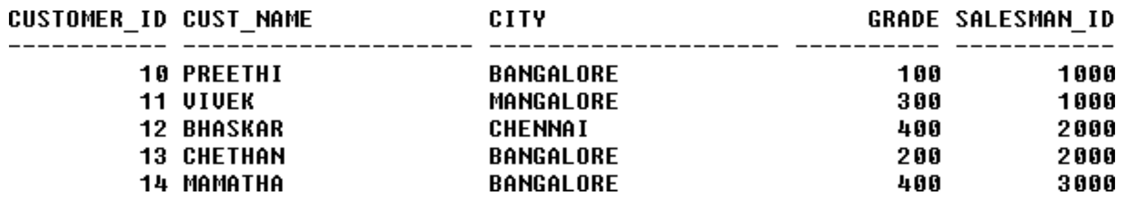
INSERT INTO SALESMAN VALUES (1000, ‘JOHN’,’BANGALORE’,’25 %’);
INSERT INTO SALESMAN VALUES (2000, ‘RAVI’,’BANGALORE’,’20 %’);
INSERT INTO SALESMAN VALUES (3000, ‘KUMAR’,’MYSORE’,’15 %’);
INSERT INTO SALESMAN VALUES (4000, ‘SMITH’,’DELHI’,’30 %’);
INSERT INTO SALESMAN VALUES (5000, ‘HARSHA’,’HYDERABAD’,’15 %’);

```
INSERT INTO CUSTOMER VALUES (10, ‘PREETHI’,’BANGALORE’, 100, 1000);
INSERT INTO CUSTOMER VALUES (11, ‘VIVEK’,’MANGALORE’, 300, 1000);
INSERT INTO CUSTOMER VALUES (12, ‘BHASKAR’,’CHENNAI’, 400, 2000);
INSERT INTO CUSTOMER VALUES (13, ‘CHETHAN’,’BANGALORE’, 200, 2000);
INSERT INTO CUSTOMER VALUES (14, ‘MAMATHA’,’BANGALORE’, 400, 3000);

INSERT INTO ORDERS VALUES (50, 5000, ‘2017-05-04’, 10, 1000);
INSERT INTO ORDERS VALUES (51, 450, ‘2017-01-20’, 10, 2000);
INSERT INTO ORDERS VALUES (52, 1000, ‘2017-02-24’, 13, 2000);
INSERT INTO ORDERS VALUES (53, 3500, ‘2017-04-13’, 14, 3000);
INSERT INTO ORDERS VALUES (54, 550, ‘2017-03-09’, 12, 2000);

SELECT * FROM SALESMAN;
```



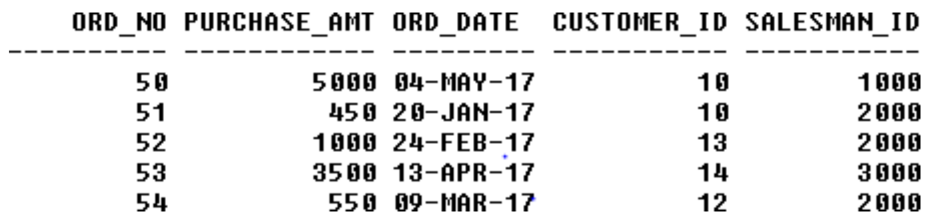
```
SALESMAN_ID NAME                 CITY                 COMMISSION
----------- -------------------- -------------------- --------------------
       1000 JOHN                 BANGALORE            25 %
       2000 RAVI                 BANGALORE            20 %
       3000 KUMAR                MYSORE               15 %
       4000 SMITH                DELHI                30 %
       5000 HARSHA               HYDRABAD             15 %
```

```
SELECT * FROM CUSTOMER;
```



```
CUSTOMER_ID CUST_NAME            CITY                      GRADE SALESMAN_ID
----------- -------------------- -------------------- ---------- -----------
         10 PREETHI              BANGALORE                   100        1000
         11 VIVEK                MANGALORE                   300        1000
         12 BHASKAR              CHENNAI                     400        2000
         13 CHETHAN              BANGALORE                   200        2000
         14 MAMATHA              BANGALORE                   400        3000
```

```
SELECT * FROM ORDERS;
```

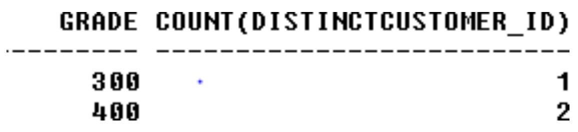


```
    ORD_NO PURCHASE_AMT ORD_DATE  CUSTOMER_ID SALESMAN_ID
---------- ------------ --------- ----------- -----------
        50         5000 04-MAY-17          10        1000
        51          450 20-JAN-17          10        2000
        52         1000 24-FEB-17          13        2000
        53         3500 13-APR-17          14        3000
        54          550 09-MAR-17          12        2000
```

Queries:

1. **Count the customers with grades above Bangalore's average.**

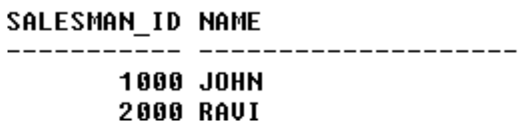
```
SELECT GRADE, COUNT (DISTINCT CUSTOMER_ID)
FROM CUSTOMER
GROUP BY GRADE
HAVING GRADE > (SELECT AVG(GRADE)
FROM CUSTOMER
WHERE CITY='BANGALORE');
```



```
   GRADE COUNT(DISTINCTCUSTOMER_ID)
-------- --------------------------
     300                          1
     400                          2
```

2. **Find the name and numbers of all salesmen who had more than one customer.**

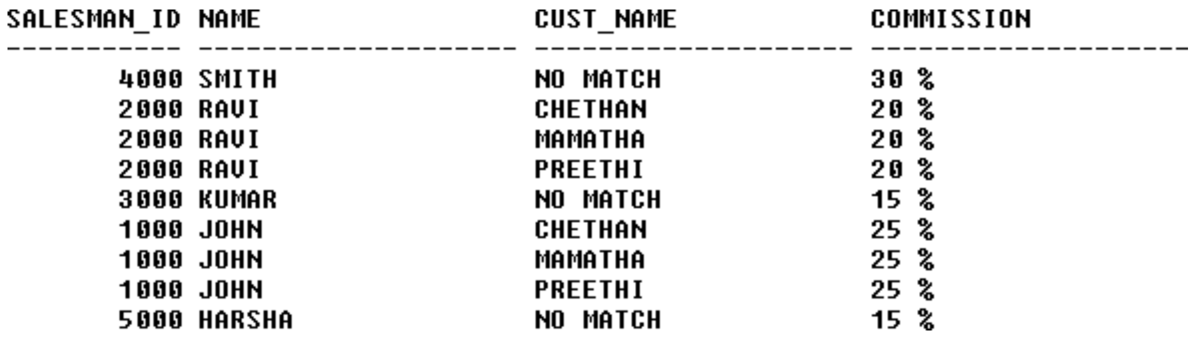
```
SELECT SALESMAN_ID, NAME
FROM SALESMAN A
WHERE 1 < (SELECT COUNT (*)
              FROM CUSTOMER
              WHERE SALESMAN_ID=A.SALESMAN_ID);
```



```
SALESMAN_ID NAME
----------- --------------------
       1000 JOHN
       2000 RAVI
```

3. **List all salesmen and indicate those who have and don't have customers in their cities (Use UNION operation.)**

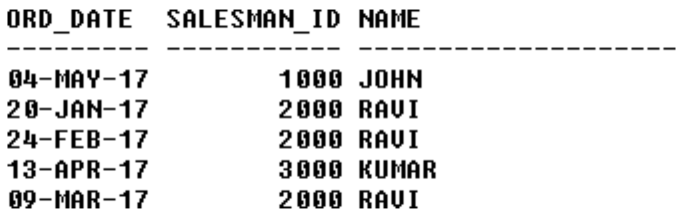
```
SELECT SALESMAN.SALESMAN_ID, NAME, CUST_NAME, COMMISSION
FROM SALESMAN, CUSTOMER
WHERE SALESMAN.CITY = CUSTOMER.CITY
UNION
SELECT SALESMAN_ID, NAME, 'NO MATCH', COMMISSION
FROM SALESMAN
WHERE CITY  NOT IN(SELECT CITY
                FROM CUSTOMER)
                ORDER BY 2 DESC;
```



```
SALESMAN_ID NAME                 CUST_NAME            COMMISSION
----------- -------------------- -------------------- --------------------
       4000 SMITH                NO MATCH             30 %
       2000 RAVI                 CHETHAN              20 %
       2000 RAVI                 MAMATHA              20 %
       2000 RAVI                 PREETHI              20 %
       3000 KUMAR                NO MATCH             15 %
       1000 JOHN                 CHETHAN              25 %
       1000 JOHN                 MAMATHA              25 %
       1000 JOHN                 PREETHI              25 %
       5000 HARSHA               NO MATCH             15 %
```

4. **Create a view that finds the salesman who has the customer with the highest orderof a day.**

```
CREATE VIEW MAXSALES_VIEW AS
SELECT B.ORD_DATE, A.SALESMAN_ID, A.NAME
FROM SALESMAN A, ORDERS B
WHERE A.SALESMAN_ID = B.SALESMAN_ID
AND B.PURCHASE_AMT=(SELECT MAX (PURCHASE_AMT)
                    FROM ORDERS C
                    WHERE C.ORD_DATE = B.ORD_DATE);

SELECT * FROM MAXSALES_VIEW;
```



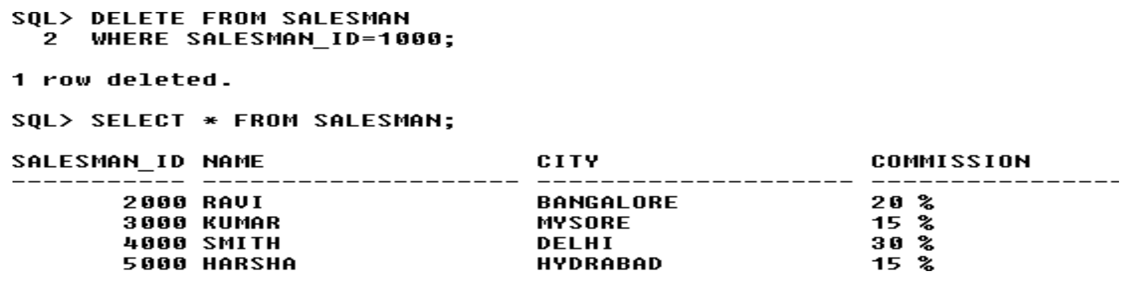
```
ORD_DATE  SALESMAN_ID NAME
--------- ----------- --------------------
04-MAY-17        1000 JOHN
20-JAN-17        2000 RAVI
24-FEB-17        2000 RAVI
13-APR-17        3000 KUMAR
09-MAR-17        2000 RAVI
```

5 **Demonstrate the DELETE operation by removing salesman with id 1000. All his orders must also be deleted.**

Use ON DELETE CASCADE at the end of foreign key definitions while creating child table orders and then execute the following:

Use ON DELETE SET NULL at the end of foreign key definitions while creating child table customers and then executes the following:

```
DELETE FROM SALESMAN
WHERE SALESMAN_ID=1000;
```



```
SQL> DELETE FROM SALESMAN
  2  WHERE SALESMAN_ID=1000;

1 row deleted.

SQL> SELECT * FROM SALESMAN;

SALESMAN_ID NAME                 CITY                 COMMISSION
----------- -------------------- -------------------- ---------------
       2000 RAVI                 BANGALORE            20 %
       3000 KUMAR                MYSORE               15 %
       4000 SMITH                DELHI                30 %
       5000 HARSHA               HYDRABAD             15 %
```

C. Consider the schema for Movie Database:

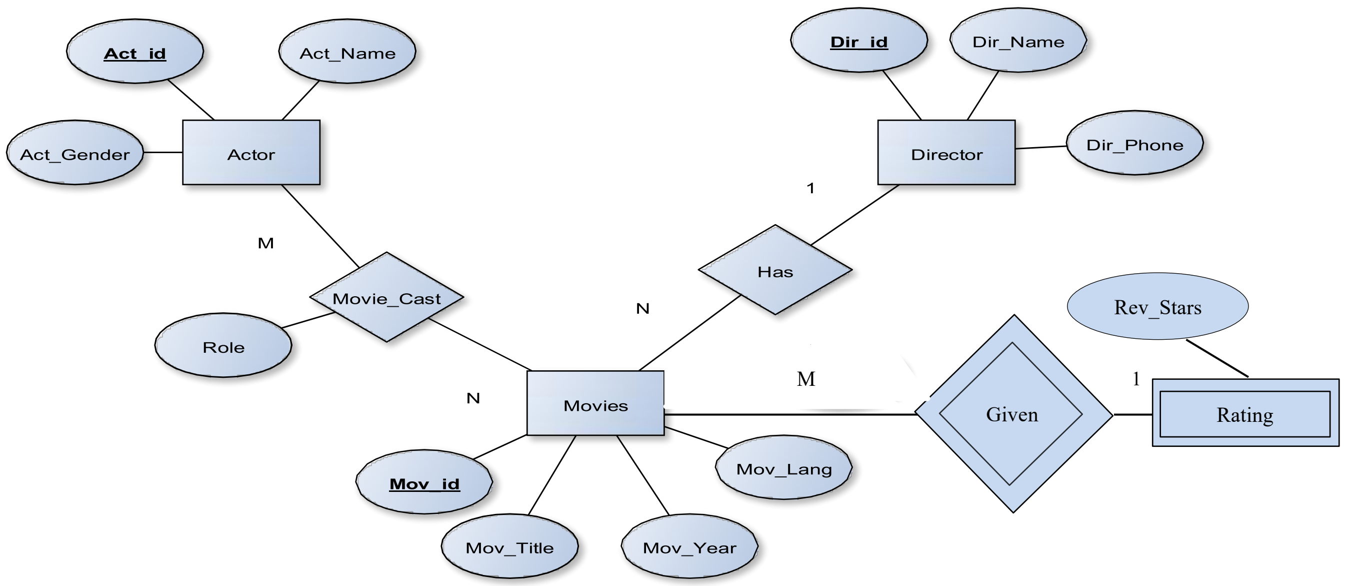
ACTOR (*Act_id*, *Act_Name, Act_Gender*)
DIRECTOR (*Dir_id*, *Dir_Name, Dir_Phone*)
MOVIES (*Mov_id*, *Mov_Title, Mov_Year, Mov_Lang, Dir_id*)
MOVIE_CAST (*Act_id*, *Mov_id*, *Role*)
RATING (*Mov_id*, *Rev_Stars*)

Write SQL queries to

1. **List the titles of all movies directed by 'Hitchcock'.**
2. **Find the movie names where one or more actors acted in two or more movies.**
3. **List all actors who acted in a movie before 2000 and also in a movie after 2015 (use JOIN operation).**
4. **Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title.**
5. **Update rating of all movies directed by 'Steven Spielberg' to 5.**

Solution:

Entity-Relationship Diagram



Schema Diagram

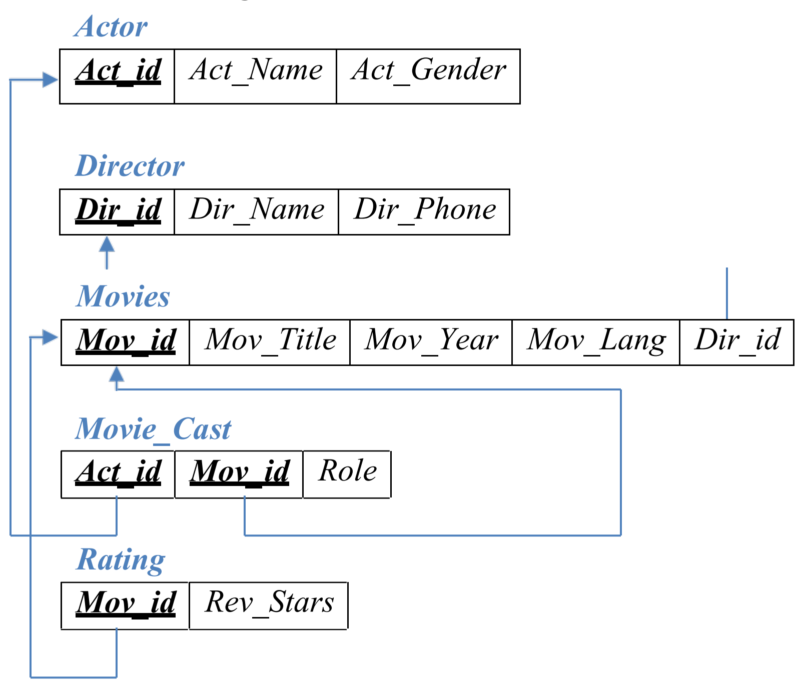
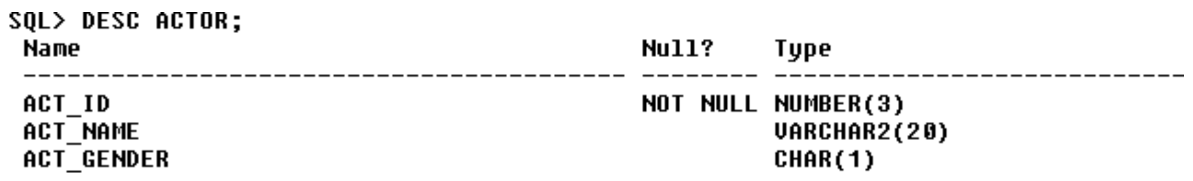


Table Creation

```
CREATE TABLE ACTOR
(
ACT_ID INT,
ACT_NAME INT,
ACT_GENDER CHAR(1),
PRIMARY KEY (ACT_ID)
);

CREATE TABLE DIRECTOR
(
DIR_ID INT,
DIR_NAME VARCHAR(20),
DIR_PHONE  VARCHAR(10),
PRIMARY KEY (DIR_ID)
);

CREATE TABLE MOVIES
(
MOV_ID INT,
MOV_TITLE  VARCHAR(25),
MOV_YEAR  INT,
MOV_LANG  VARCHAR(12),
DIR_ID INT,
PRIMARY KEY (MOV_ID),
FOREIGN KEY (DIR_ID) REFERENCES DIRECTOR (DIR_ID)
);

CREATE TABLE MOVIE_CAST
 (
ACT_ID INT,
MOV_ID  INT,
ROLE  VARCHAR(10),
PRIMARY KEY(ACT_ID, MOV_ID),
FOREIGN KEY(ACT_ID) REFERENCES ACTOR (ACT_ID),
FOREIGN KEY(MOV_ID) REFERENCES MOVIES (MOV_ID)
);

CREATE TABLE RATING
(
MOV_ID INT,
REV_STARS VARCHAR(25),
PRIMARY KEY(MOV_ID),
FOREIGN KEY(MOV_ID) REFERENCES MOVIES (MOV_ID)
);
```

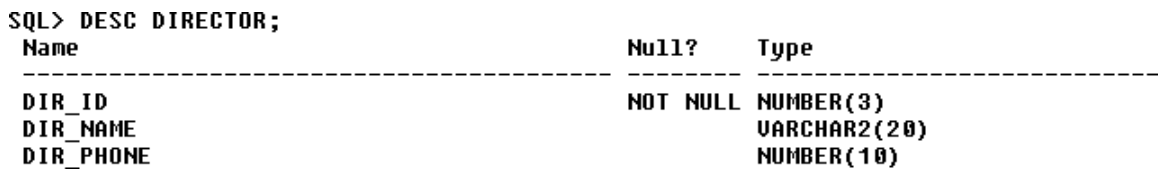
Table Descriptions

DESC ACTOR;



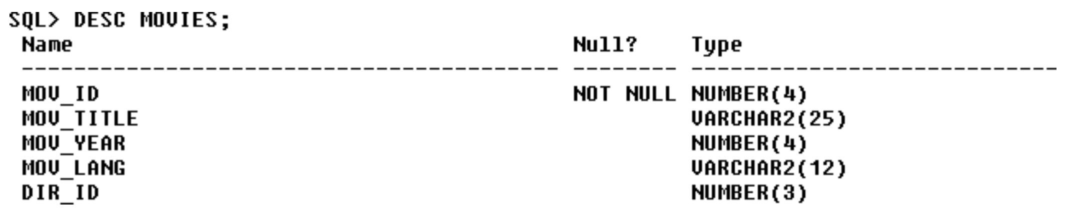
```
SQL> DESC ACTOR;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 ACT_ID                                    NOT NULL NUMBER(3)
 ACT_NAME                                           VARCHAR2(20)
 ACT_GENDER                                         CHAR(1)
```

DESC DIRECTOR;



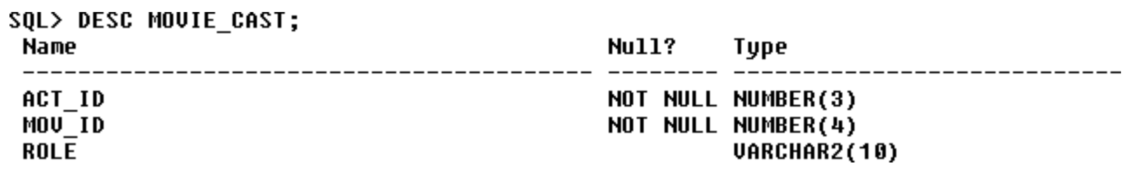
```
SQL> DESC DIRECTOR;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 DIR_ID                                    NOT NULL NUMBER(3)
 DIR_NAME                                           VARCHAR2(20)
 DIR_PHONE                                          NUMBER(10)
```

DESC MOVIES;



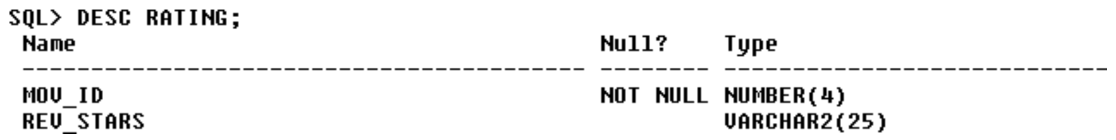
```
SQL> DESC MOVIES;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 MOV_ID                                    NOT NULL NUMBER(4)
 MOV_TITLE                                          VARCHAR2(25)
 MOV_YEAR                                           NUMBER(4)
 MOV_LANG                                           VARCHAR2(12)
 DIR_ID                                             NUMBER(3)
```

DESC MOVIE_CAST;



```
SQL> DESC MOVIE_CAST;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 ACT_ID                                    NOT NULL NUMBER(3)
 MOV_ID                                    NOT NULL NUMBER(4)
 ROLE                                               VARCHAR2(10)
```

DESC RATING;



```
SQL> DESC RATING;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 MOV_ID                                    NOT NULL NUMBER(4)
 REV_STARS                                          VARCHAR2(25)
```

<u>Insertion of Values to Tables</u>

INSERT INTO ACTOR VALUES (301,'ANUSHKA','F');
INSERT INTO ACTOR VALUES (302,'PRABHAS','M');
INSERT INTO ACTOR VALUES (303,'PUNITH','M');
INSERT INTO ACTOR VALUES (304,'JERMY','M');

INSERT INTO DIRECTOR VALUES (60,'RAJAMOULI', 8751611001);
INSERT INTO DIRECTOR VALUES (61,'HITCHCOCK', 7766138911);
INSERT INTO DIRECTOR VALUES (62,'FARAN', 9986776531);
INSERT INTO DIRECTOR VALUES (63,'STEVEN SPIELBERG', 8989776530);

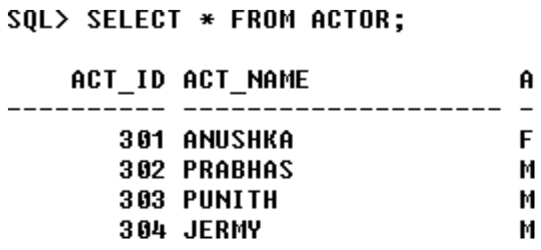
INSERT INTO MOVIES VALUES (1001,'BAHUBALI-2', 2017, 'TELAGU', 60);
INSERT INTO MOVIES VALUES (1002,'BAHUBALI-1', 2015, 'TELAGU', 60);
INSERT INTO MOVIES VALUES (1003,'AKASH', 2008, 'KANNADA', 61);
INSERT INTO MOVIES VALUES (1004,'WAR HORSE', 2011, 'ENGLISH', 63);

INSERT INTO MOVIE_CAST VALUES (301, 1002, 'HEROINE');
INSERT INTO MOVIE_CAST VALUES (301, 1001, 'HEROINE');
INSERT INTO MOVIE_CAST VALUES (303, 1003, 'HERO');
INSERT INTO MOVIE_CAST VALUES (303, 1002, 'GUEST');
INSERT INTO MOVIE_CAST VALUES (304, 1004, 'HERO');

INSERT INTO RATING VALUES (1001, 4);
INSERT INTO RATING VALUES (1002, 2);

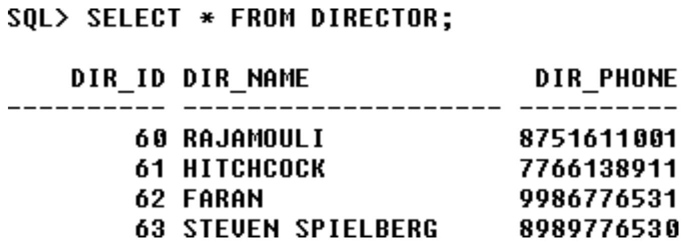
INSERT INTO RATING VALUES (1003, 5);
INSERT INTO RATING VALUES (1004, 4);

SELECT * FROM ACTOR;



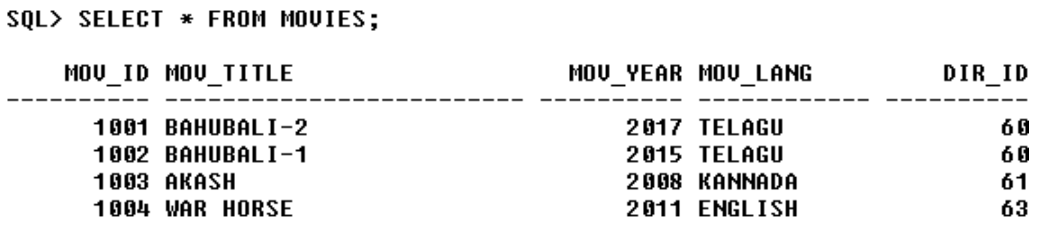
```
SQL> SELECT * FROM ACTOR;

    ACT_ID ACT_NAME             A
---------- -------------------- -
       301 ANUSHKA              F
       302 PRABHAS              M
       303 PUNITH               M
       304 JERMY                M
```

SELECT * FROM DIRECTOR;



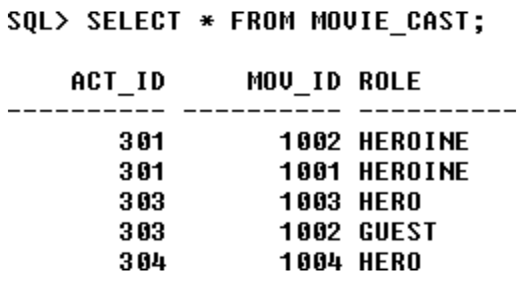
```
SQL> SELECT * FROM DIRECTOR;

    DIR_ID DIR_NAME              DIR_PHONE
---------- -------------------- ----------
        60 RAJAMOULI            8751611001
        61 HITCHCOCK            7766138911
        62 FARAN                9986776531
        63 STEVEN SPIELBERG     8989776530
```

SELECT * FROM MOVIES;



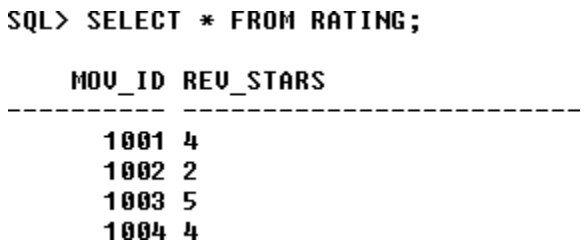
```
SQL> SELECT * FROM MOVIES;

    MOV_ID MOV_TITLE                   MOV_YEAR MOV_LANG        DIR_ID
---------- ------------------------- ---------- ------------ ----------
      1001 BAHUBALI-2                      2017 TELAGU               60
      1002 BAHUBALI-1                      2015 TELAGU               60
      1003 AKASH                           2008 KANNADA              61
      1004 WAR HORSE                       2011 ENGLISH              63
```

SELECT * FROM MOVIE_CAST;



```
SQL> SELECT * FROM MOVIE_CAST;

    ACT_ID     MOV_ID ROLE
---------- ---------- ----------
       301       1002 HEROINE
       301       1001 HEROINE
       303       1003 HERO
       303       1002 GUEST
       304       1004 HERO
```

SELECT * FROM RATING;

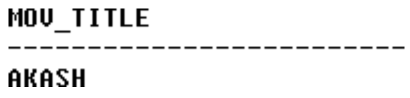


```
SQL> SELECT * FROM RATING;

    MOV_ID REV_STARS
---------- ------------------------
      1001 4
      1002 2
      1003 5
      1004 4
```

<u>Queries:</u>

1. **List the titles of all movies directed by 'Hitchcock'.**

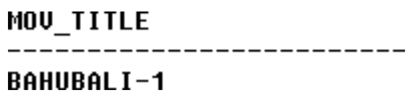
```
SELECT MOV_TITLE
FROM MOVIES
WHERE DIR_ID IN (   SELECT DIR_ID
                    FROM DIRECTOR
                    WHERE DIR_NAME = 'HITCHCOCK');
```



```
MOV_TITLE
------------------------
AKASH
```

2. **Find the movie names where one or more actors acted in two or more movies.**

```
SELECT  MOV_TITLE
FROM   MOVIES M, MOVIE_CAST MV
WHERE  M.MOV_ID=MV.MOV_ID AND ACT_ID IN (SELECT ACT_ID
                                          FROM MOVIE_CAST
                                          GROUP BY ACT_ID
                                    HAVING COUNT (ACT_ID)>1)
GROUP BY MOV_TITLE
HAVING COUNT (*)>1;
```



```
MOV_TITLE
------------------------
BAHUBALI-1
```

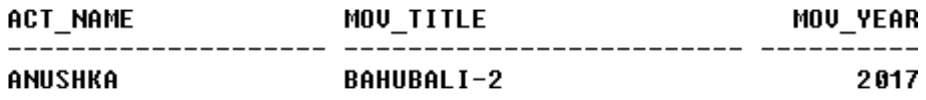
3. **List all actors who acted in a movie before 2000 and also in a movie after 2015 (use JOIN operation).**

```
SELECT ACT_NAME, MOV_TITLE, MOV_YEAR
```

```
FROM ACTOR A
JOIN MOVIE_CAST C
        ON A.ACT_ID=C.ACT_ID
JOIN MOVIES  M
        ON C.MOV_ID=M.MOV_ID
WHERE M.MOV_YEAR NOT BETWEEN 2000 AND 2015;
```

OR

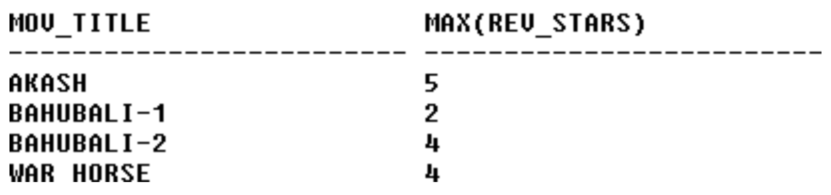
```
SELECT A.ACT_NAME, C.MOV_TITLE, C.MOV_YEAR
FROM ACTOR A, MOVIE_CAST B, MOVIES C
WHERE A.ACT_ID=B.ACT_ID AND B.MOV_ID=C.MOV_ID
AND C.MOV_YEAR NOT BETWEEN 2000 AND 2015;
```



```
ACT_NAME             MOV_TITLE                   MOV_YEAR
-------------------- ------------------------- ----------
ANUSHKA              BAHUBALI-2                      2017
```

4. **Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title.**

```
SELECT MOV_TITLE, MAX (REV_STARS)
FROM MOVIES
INNER JOIN RATING USING (MOV_ID)
GROUP BY MOV_TITLE
HAVING MAX (REV_STARS)>0
ORDER BY MOV_TITLE;
```

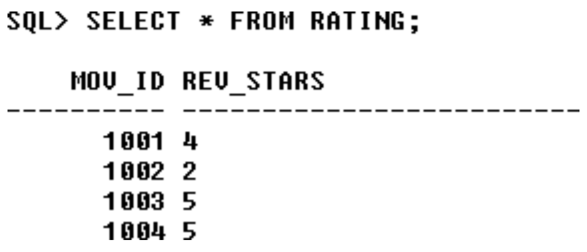


```
MOV_TITLE                 MAX(REV_STARS)
------------------------- -------------------------
AKASH                     5
BAHUBALI-1                2
BAHUBALI-2                4
WAR HORSE                 4
```

5. **Update rating of all movies directed by 'Steven Spielberg' to 5**

```
UPDATE RATING
```

```
SET REV_STARS=5
WHERE MOV_ID IN (SELECT MOV_ID
                 FROM MOVIES
                 WHERE DIR_ID IN (SELECT DIR_ID
                                  FROM DIRECTOR
                                 WHERE DIR_NAME = ‘STEVENSPIELBERG’));
```



```
SQL> SELECT * FROM RATING;

    MOV_ID REV_STARS
---------- -------------------------
      1001 4
      1002 2
      1003 5
      1004 5
```

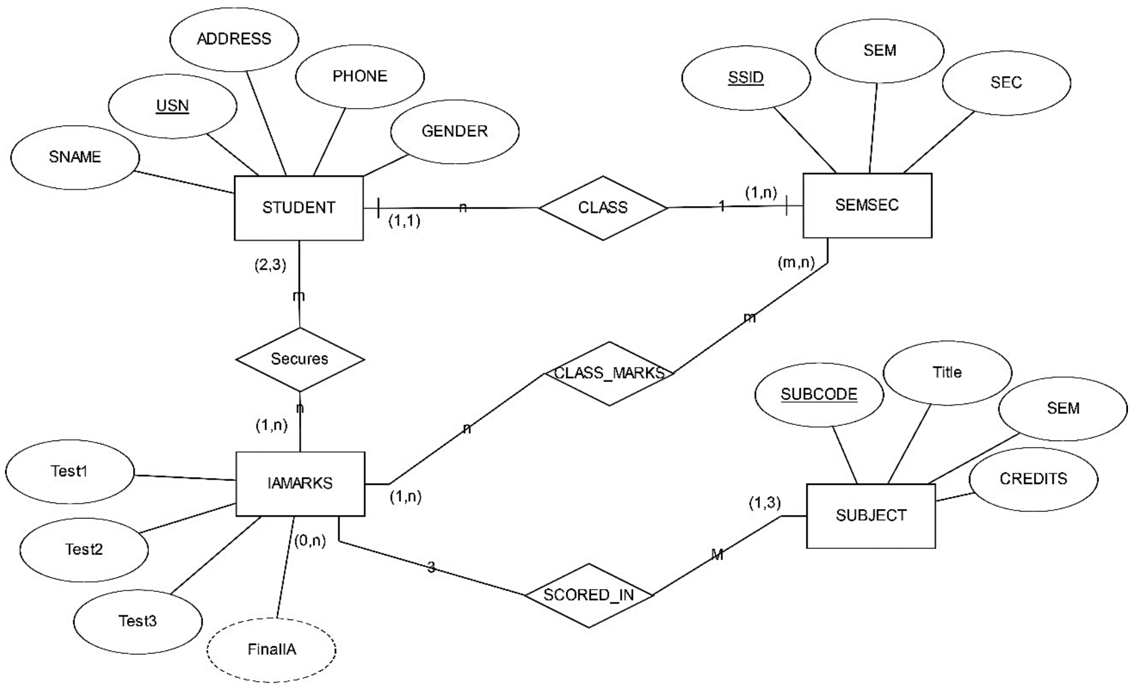
D. Consider the schema for College Database:

STUDENT (*<u>USN</u>, SName, Address, Phone, Gender*)
SEMSEC (*<u>SSID</u>, Sem, Sec*)
CLASS (*<u>USN</u>, SSID*)
SUBJECT (*<u>Subcode</u>, Title, Sem, Credits*)
IAMARKS (*<u>USN</u>, <u>Subcode</u>, <u>SSID</u>, Test1, Test2, Test3, FinalIA*)
Write SQL queries to

1. **List all the student details studying in fourth semester 'C' section.**
2. **Compute the total number of male and female students in each semester and in each section.**
3. **Create a view of Test1 marks of student USN '1BI15CS101' in all subjects.**
4. **Calculate the FinalIA (average of best two test marks) and update the corresponding table for all students.**
5. **Categorize students based on the following criterion:**
   If FinalIA = 17 to 20 then CAT = 'Outstanding'
   If FinalIA = 12 to 16 then CAT = 'Average'
   If FinalIA< 12 then CAT = 'Weak'
   Give these details only for 8th semester A, B, and C section students.

<u>Solution:</u>

<u>Entity - Relationship Diagram</u>



Schema Diagram

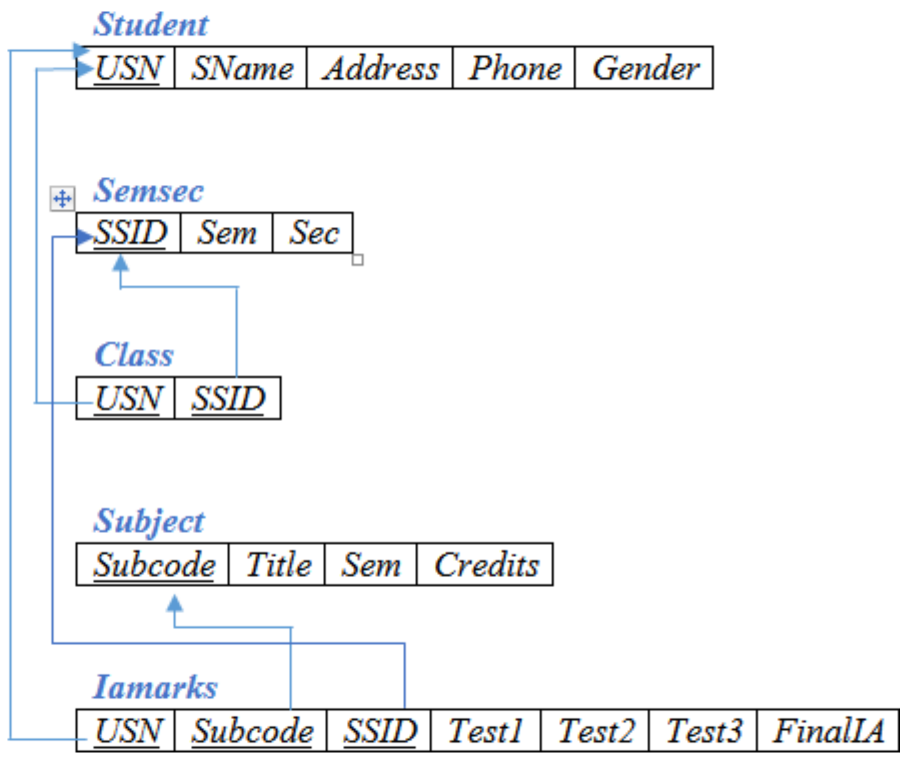


Table Creation

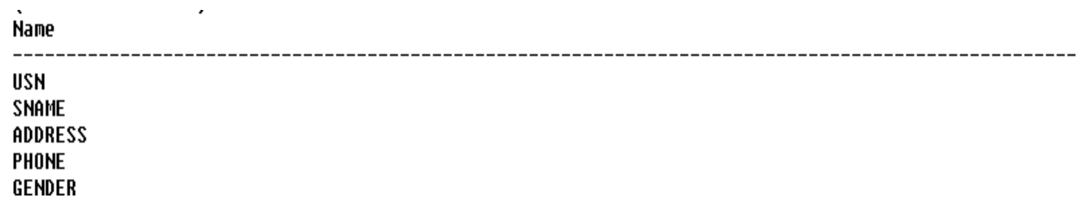
```
CREATE TABLE STUDENT
 (
 USN VARCHAR (10) PRIMARY KEY,
 SNAME VARCHAR (25),
 ADDRESS VARCHAR (25),
 PHONE VARCHAR(10),
 GENDER CHAR (1)
 );

CREATE TABLE SEMSEC
(
SSID VARCHAR (5) PRIMARY KEY,
SEM INTEGER(2),
SEC CHAR (1)
);

CREATE TABLE CLASS
(USN VARCHAR (10),
SSID VARCHAR (5),
PRIMARY KEY (USN, SSID),
FOREIGN KEY(USN) REFERENCES STUDENT (USN),
FOREIGN KEY(SSID) REFERENCES SEMSEC (SSID));
```

```
CREATE TABLE SUBJECT (
SUBCODE  VARCHAR (8),
TITLE VARCHAR (20),
SEM  INTEGER(2),
CREDITS INTEGER(2),
PRIMARY KEY (SUBCODE)
);
```

```
 CREATE TABLE IAMARKS
 (
 USN VARCHAR(10),
 SUBCODE VARCHAR (8),
 SSID VARCHAR(5),
 TEST1 INT(2),
 TEST2 INT(2),
 TEST3 INT(2),
 FINALIA INT(2),
 PRIMARY KEY (USN, SUBCODE, SSID),
 FOREIGN KEY(USN) REFERENCES STUDENT (USN),
 FOREIGN KEY (SUBCODE) REFERENCES SUBJECT (SUBCODE),
 FOREIGN KEY (SSID) REFERENCES SEMSEC (SSID)
 );
```

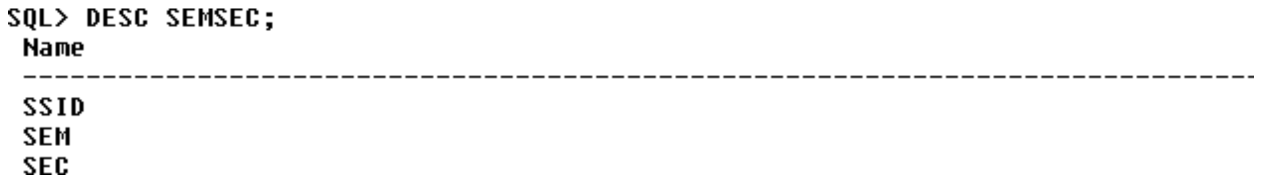
<u>Table Descriptions</u>

DESC STUDENT;



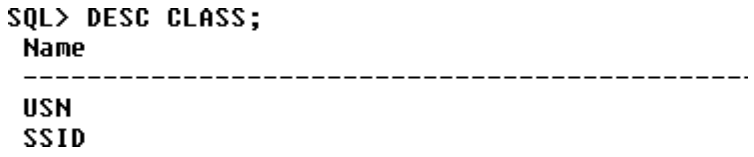
```
Name
-----------------------------------------------------------------------------------------------------
USN
SNAME
ADDRESS
PHONE
GENDER
```

DESC SEMSEC;



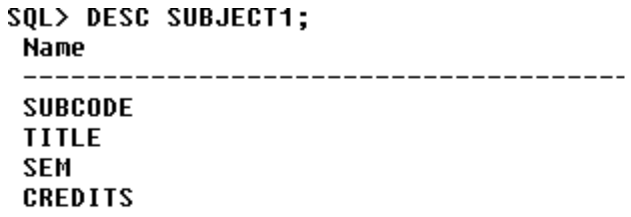
```
SQL> DESC SEMSEC;
 Name
 -------------------------------------------------------------------------------
 SSID
 SEM
 SEC
```

DESC CLASS;



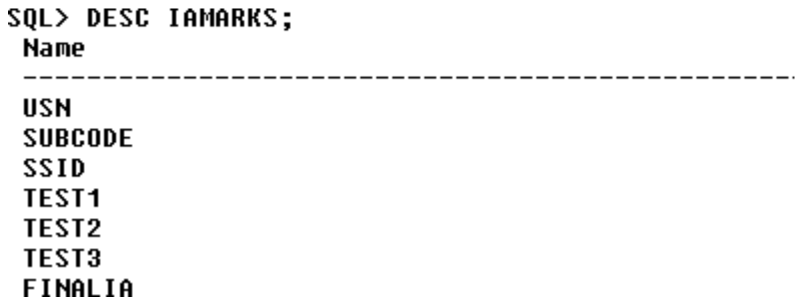
```
SQL> DESC CLASS;
 Name
 -----------------------------------------------
 USN
 SSID
```

DESC SUBJECT;



```
SQL> DESC SUBJECT1;
 Name
 ----------------------------------------
 SUBCODE
 TITLE
 SEM
 CREDITS
```

DESC IAMARKS;



```
SQL> DESC IAMARKS;
 Name
 --------------------------------------------------
 USN
 SUBCODE
 SSID
 TEST1
 TEST2
 TEST3
 FINALIA
```

Insertion of values to tables

INSERT INTO STUDENT VALUES ('1RN13CS020','AKSHAY','BELAGAVI',8877881122,'M');
INSERT INTO STUDENT VALUES ('1RN13CS062','SANDHYA','BENGALURU',7722829912,'F');
INSERT INTO STUDENT VALUES ('1RN13CS091','TEESHA','BENGALURU',7712312312,'F');
INSERT INTO STUDENT VALUES ('1RN13CS066','SUPRIYA','MANGALURU',8877881122,'F');
INSERT INTO STUDENTVALUES ('1RN14CS010','ABHAY','BENGALURU',9900211201,'M');
INSERT INTO STUDENT VALUES ('1RN14CS032','BHASKAR','BENGALURU',9923211099,'M');
INSERT INTO STUDENTVALUES ('1RN14CS025','ASMI','BENGALURU', 7894737377,'F');
INSERT INTO STUDENT VALUES ('1RN15CS011','AJAY','TUMKUR', 9845091341,'M');

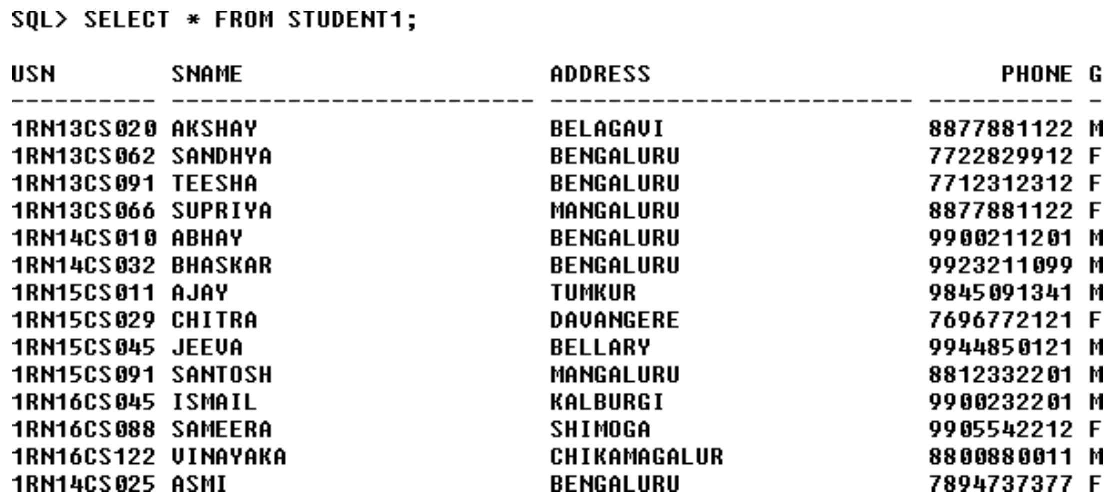
```
INSERT INTO STUDENT VALUES ('1RN15CS029','CHITRA','DAVANGERE',7696772121,'F');
INSERT INTO STUDENT VALUES ('1RN15CS045','JEEVA','BELLARY', 9944850121,'M');
INSERT INTO STUDENT VALUES ('1RN15CS091','SANTOSH','MANGALURU', 8812332201,'M');
INSERT INTO STUDENT VALUES ('1RN16CS045','ISMAIL','KALBURGI',9900232201,'M');
INSERT INTO STUDENT VALUES ('1RN16CS088','SAMEERA','SHIMOGA',9905542212,'F');
INSERT INTO STUDENT VALUES ('1RN16CS122','VINAYAKA','CHIKAMAGALUR',8800880011,'M');

INSERT INTO SEMSEC VALUES ('CSE8A', 8,'A');
INSERT INTO SEMSEC VALUES (‘CSE8B', 8,'B');
INSERT INTO SEMSEC VALUES (‘CSE8C’, 8,’C’);

INSERT INTO SEMSEC VALUES ('CSE7A', 7,’A’);
INSERT INTO SEMSEC VALUES (‘CSE7B’, 7,'B’);
INSERT INTO SEMSEC VALUES ('CSE7C', 7,'C');

INSERT INTO SEMSEC VALUES (‘CSE6A', 6,'A');
INSERT INTO SEMSEC VALUES (‘CSE6B’, 6,’B’);
INSERT INTO SEMSEC VALUES ('CSE6C’, 6,’C’);

INSERT INTO SEMSEC VALUES (‘CSE5A’, 5,'A’);
INSERT INTO SEMSEC VALUES ('CSE5B', 5,'B');
INSERT INTO SEMSEC VALUES (‘CSE5C', 5,'C');

INSERT INTO SEMSEC VALUES (‘CSE4A’, 4,’A’);
INSERT INTO SEMSEC VALUES ('CSE4B', 4,’B’);
INSERT INTO SEMSEC VALUES (‘CSE4C’, 4,'C’);

INSERT INTO SEMSEC VALUES ('CSE3A', 3,'A');
INSERT INTO SEMSEC VALUES (‘CSE3B', 3,'B');
INSERT INTO SEMSEC VALUES (‘CSE3C’, 3,’C’);

INSERT INTO SEMSEC VALUES ('CSE2A', 2,’A’);
INSERT INTO SEMSEC VALUES (‘CSE2B’, 2,'B’);
INSERT INTO SEMSEC VALUES ('CSE2C', 2,'C');
INSERT INTO SEMSEC VALUES (‘CSE1A', 1,'A');
INSERT INTO SEMSEC VALUES (‘CSE1B’, 1,’B’);
INSERT INTO SEMSEC VALUES ('CSE1C', 1,’C’);

INSERT INTO CLASS VALUES (‘1RN13CS020’,’CSE8A’);
INSERT INTO CLASS VALUES (‘1RN13CS062’,’CSE8A’);
INSERT INTO CLASS VALUES (‘1RN13CS066’,’CSE8B’);
INSERT INTO CLASS VALUES (‘1RN13CS091’,’CSE8C’);

INSERT INTO CLASS VALUES (‘1RN14CS010’,’CSE7A’);
INSERT INTO CLASS VALUES (‘1RN14CS025’,’CSE7A’);
INSERT INTO CLASS VALUES (‘1RN14CS032’,’CSE7A’);

INSERT INTO CLASS VALUES (‘1RN15CS011’,’CSE4A’);
INSERT INTO CLASS VALUES (‘1RN15CS029’,’CSE4A’);
INSERT INTO CLASS VALUES (‘1RN15CS045’,’CSE4B’);
INSERT INTO CLASS VALUES (‘1RN15CS091’,’CSE4C’);

INSERT INTO CLASS VALUES (‘1RN16CS045’,’CSE3A’);
INSERT INTO CLASS VALUES (‘1RN16CS088’,’CSE3B’);
INSERT INTO CLASS VALUES (‘1RN16CS122’,’CSE3C’);

INSERT INTO SUBJECT VALUES ('10CS81','ACA', 8, 4);
INSERT INTO SUBJECT VALUES ('10CS82','SSM', 8, 4);
INSERT INTO SUBJECT VALUES ('10CS83','NM', 8, 4);
INSERT INTO SUBJECT VALUES ('10CS84','CC', 8, 4);
INSERT INTO SUBJECT VALUES ('10CS85','PW', 8, 4);

INSERT INTO SUBJECT VALUES ('10CS71','OOAD', 7, 4);
INSERT INTO SUBJECT VALUES ('10CS72','ECS', 7, 4);
INSERT INTO SUBJECT VALUES ('10CS73','PTW', 7, 4);
INSERT INTO SUBJECT VALUES ('10CS74','DWDM', 7, 4);
INSERT INTO SUBJECT VALUES (‘10CS75','JAVA', 7, 4);
INSERT INTO SUBJECT VALUES ('10CS76','SAN', 7, 4);

INSERT INTO SUBJECT VALUES ('15CS51', 'ME', 5, 4);
INSERT INTO SUBJECT VALUES ('15CS52','CN', 5, 4);
INSERT INTO SUBJECT VALUES ('15CS53','DBMS', 5, 4);
INSERT INTO SUBJECT VALUES ('15CS54','ATC', 5, 4);
INSERT INTO SUBJECT VALUES ('15CS55','JAVA', 5, 3);
INSERT INTO SUBJECT VALUES ('15CS56','AI', 5, 3);
```

INSERT INTO SUBJECT VALUES ('15CS41','M4', 4, 4);
INSERT INTO SUBJECT VALUES ('15CS42','SE', 4, 4);
INSERT INTO SUBJECT VALUES ('15CS43','DAA', 4, 4);
INSERT INTO SUBJECT VALUES ('15CS44','MPMC', 4, 4);
INSERT INTO SUBJECT VALUES ('15CS45','OOC', 4, 3);
INSERT INTO SUBJECT VALUES ('15CS46','DC', 4, 3);

INSERT INTO SUBJECT VALUES ('15CS31','M3', 3, 4);
INSERT INTO SUBJECT VALUES ('15CS32','ADE', 3, 4);
INSERT INTO SUBJECT VALUES ('15CS33','DSA', 3, 4);
INSERT INTO SUBJECT VALUES ('15CS34','CO', 3, 4);
INSERT INTO SUBJECT VALUES ('15CS35','USP', 3, 3);
INSERT INTO SUBJECT VALUES ('15CS36','DMS', 3, 3);

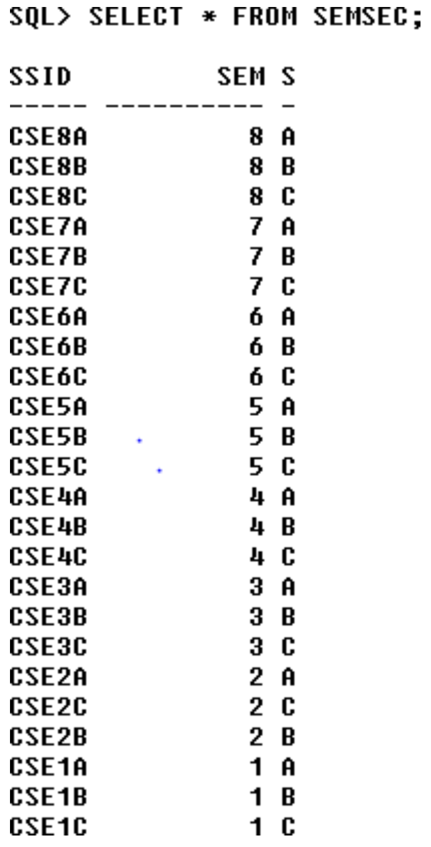
INSERT INTO IAMARKS (USN, SUBCODE, SSID, TEST1, TEST2, TEST3) VALUES ('1RN13CS091','10CS81','CSE8C', 15, 16, 18);
INSERT INTO IAMARKS (USN, SUBCODE, SSID, TEST1, TEST2, TEST3) VALUES ('1RN13CS091','10CS82','CSE8C', 12, 19, 14);
INSERT INTO IAMARKS (USN, SUBCODE, SSID, TEST1, TEST2, TEST3) VALUES ('1RN13CS091','10CS83','CSE8C', 19, 15, 20);
INSERT INTO IAMARKS (USN, SUBCODE, SSID, TEST1, TEST2, TEST3) VALUES ('1RN13CS091','10CS84','CSE8C', 20, 16, 19);
INSERT INTO IAMARKS (USN, SUBCODE, SSID, TEST1, TEST2, TEST3) VALUES ('1RN13CS091','10CS85','CSE8C', 15, 15, 12);

SELECT * FROM STUDENT;



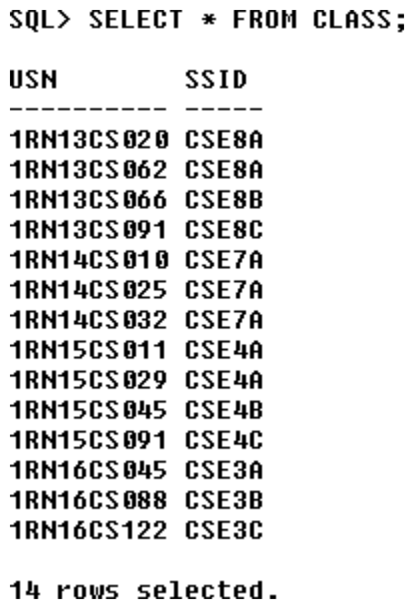
```
SQL> SELECT * FROM STUDENT1;

USN        SNAME                     ADDRESS                        PHONE G
---------- ------------------------- ------------------------- ---------- -
1RN13CS020 AKSHAY                    BELAGAVI                  8877881122 M
1RN13CS062 SANDHYA                   BENGALURU                 7722829912 F
1RN13CS091 TEESHA                    BENGALURU                 7712312312 F
1RN13CS066 SUPRIYA                   MANGALURU                 8877881122 F
1RN14CS010 ABHAY                     BENGALURU                 9900211201 M
1RN14CS032 BHASKAR                   BENGALURU                 9923211099 M
1RN15CS011 AJAY                      TUMKUR                    9845091341 M
1RN15CS029 CHITRA                    DAVANGERE                 7696772121 F
1RN15CS045 JEEVA                     BELLARY                   9944850121 M
1RN15CS091 SANTOSH                   MANGALURU                 8812332201 M
1RN16CS045 ISMAIL                    KALBURGI                  9900232201 M
1RN16CS088 SAMEERA                   SHIMOGA                   9905542212 F
1RN16CS122 VINAYAKA                  CHIKAMAGALUR              8800880011 M
1RN14CS025 ASMI                      BENGALURU                 7894737377 F
```

SELECT * FROM SEMSEC;



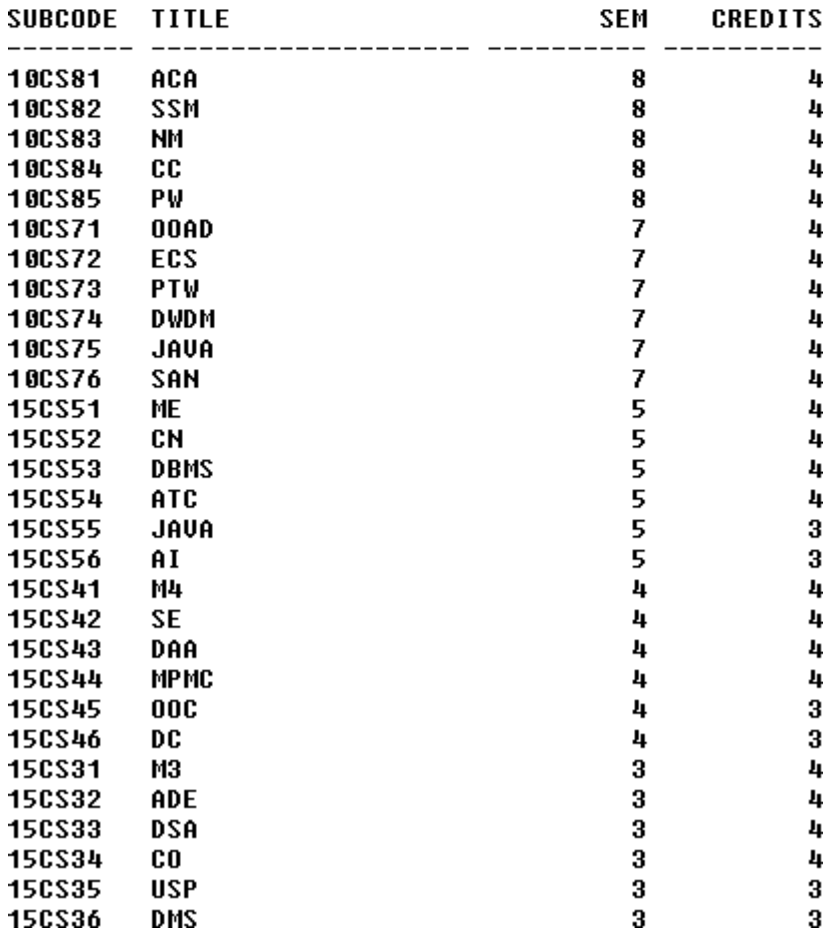
```
SQL> SELECT * FROM SEMSEC;

SSID         SEM S
----- ---------- -
CSE8A          8 A
CSE8B          8 B
CSE8C          8 C
CSE7A          7 A
CSE7B          7 B
CSE7C          7 C
CSE6A          6 A
CSE6B          6 B
CSE6C          6 C
CSE5A          5 A
CSE5B          5 B
CSE5C          5 C
CSE4A          4 A
CSE4B          4 B
CSE4C          4 C
CSE3A          3 A
CSE3B          3 B
CSE3C          3 C
CSE2A          2 A
CSE2C          2 C
CSE2B          2 B
CSE1A          1 A
CSE1B          1 B
CSE1C          1 C
```

SELECT * FROM CLASS;



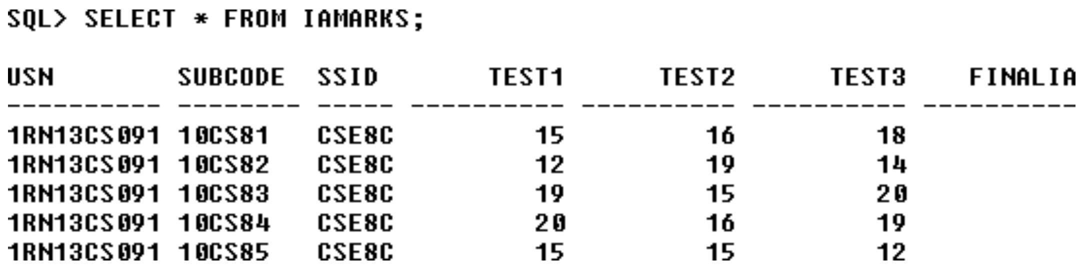
```
SQL> SELECT * FROM CLASS;

USN        SSID
---------- -----
1RN13CS020 CSE8A
1RN13CS062 CSE8A
1RN13CS066 CSE8B
1RN13CS091 CSE8C
1RN14CS010 CSE7A
1RN14CS025 CSE7A
1RN14CS032 CSE7A
1RN15CS011 CSE4A
1RN15CS029 CSE4A
1RN15CS045 CSE4B
1RN15CS091 CSE4C
1RN16CS045 CSE3A
1RN16CS088 CSE3B
1RN16CS122 CSE3C

14 rows selected.
```

SELECT * FROM SUBJECT;



```
SUBCODE  TITLE                       SEM    CREDITS
-------- -------------------- ---------- ----------
10CS81   ACA                           8          4
10CS82   SSM                           8          4
10CS83   NM                            8          4
10CS84   CC                            8          4
10CS85   PW                            8          4
10CS71   OOAD                          7          4
10CS72   ECS                           7          4
10CS73   PTW                           7          4
10CS74   DWDM                          7          4
10CS75   JAVA                          7          4
10CS76   SAN                           7          4
15CS51   ME                            5          4
15CS52   CN                            5          4
15CS53   DBMS                          5          4
15CS54   ATC                           5          4
15CS55   JAVA                          5          3
15CS56   AI                            5          3
15CS41   M4                            4          4
15CS42   SE                            4          4
15CS43   DAA                           4          4
15CS44   MPMC                          4          4
15CS45   OOC                           4          3
15CS46   DC                            4          3
15CS31   M3                            3          4
15CS32   ADE                           3          4
15CS33   DSA                           3          4
15CS34   CO                            3          4
15CS35   USP                           3          3
15CS36   DMS                           3          3
```

SELECT * FROM IAMARKS;



```
SQL> SELECT * FROM IAMARKS;

USN        SUBCODE  SSID       TEST1      TEST2      TEST3    FINALIA
---------- -------- ----- ---------- ---------- ---------- ----------
1RN13CS091 10CS81   CSE8C         15         16         18
1RN13CS091 10CS82   CSE8C         12         19         14
1RN13CS091 10CS83   CSE8C         19         15         20
1RN13CS091 10CS84   CSE8C         20         16         19
1RN13CS091 10CS85   CSE8C         15         15         12
```

<u>**Queries:**</u>

1. **List all the student details studying in fourth semester 'C' section.**

SELECT S.*, SS.SEM, SS.SEC
FROM STUDENT S, SEMSEC SS, CLASS C
WHERE S.USN = C.USN **AND** SS.SSID = C.SSID **AND** SS.SEM = 4 **AND** SS.Sec='C';

```
USN        SNAME                     ADDRESS                        PHONE G        SEM S
---------- ------------------------- ------------------------- ---------- - ---------- -
1RN15CS091 SANTOSH                   MANGALURU                 8812332201 M          4 C
```

2. **Compute the total number of male and female students in each semester and in each section.**

SELECT SS.SEM, SS.SEC, S.GENDER, **COUNT** (S.GENDER) **AS** COUNT
FROM STUDENT S, SEMSEC SS, CLASS C
WHERE S.USN = C.USN **AND** SS.SSID = C.SSID
GROUP BY SS.SEM, SS.SEC, S.GENDER
ORDER BY SEM;

```
       SEM S G      COUNT
---------- - - ----------
         3 A M          1
         3 B F          1
         3 C M          1
         4 A F          1
         4 A M          1
         4 B M          1
         4 C M          1
         7 A F          1
         7 A M          2
         8 A F          1
         8 A M          1
         8 B F          1
         8 C F          1
```

3. **Create a view of Test1 marks of student USN '1BI15CS101' in all subjects.**
CREATE VIEW STU_TEST1_MARKS_VIEW
AS
SELECT TEST1, SUBCODE
FROM IAMARKS
WHERE USN = '1RN13CS091';

```
     TEST1 SUBCODE
---------- --------
        15 10CS81
        12 10CS82
        19 10CS83
        20 10CS84
        15 10CS85
```

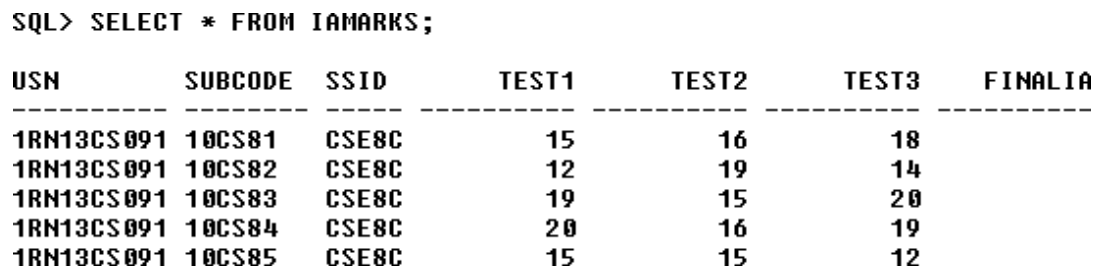
4. Calculate the FinalIA (average of best two test marks) and update the corresponding table for all students.

```
DELIMITER  //


CREATE  PROCEDURE AVGMARKS( )

BEGIN

DECLARE C_A INTEGER;
DECLARE C_B   INTEGER;
DECLARE C_C   INTEGER;
DECLARE C_SM INTEGER;
DECLARE C_AV  INTEGER;
DECLARE C_USN VARCHAR(10);
DECLARE C_SUBCODE VARCHAR(10);
DECLARE C_SSID VARCHAR(10);

DECLARE C_IAMARKS CURSOR  FOR
SELECT GREATEST(TEST1,TEST2) AS A,   GREATEST(TEST1,TEST3) AS B,
GREATEST(TEST3,TEST2) AS C, USN, SUBCODE, SSID
FROM IAMARKS
WHERE FINALIA IS NULL
FOR UPDATE;


OPEN C_IAMARKS;
LOOP
FETCH C_IAMARKS INTO  C_A, C_B, C_C, C_USN, C_SUBCODE, C_SSID;
IF(C_A != C_B) THEN
            SET C_SM=C_A+C_B;
ELSE
          SET C_SM=C_A+C_C;
 END IF;

 SET C_AV=C_SM/2;

UPDATE  IAMARKS SET FINALIA=C_AV
WHERE USN=C_USN AND SUBCODE= C_SUBCODE AND SSID= C_SSID;

END LOOP;
CLOSE C_IAMARKS;
END
```

//

Note: Before execution of PL/SQL procedure, IAMARKS table contents are:

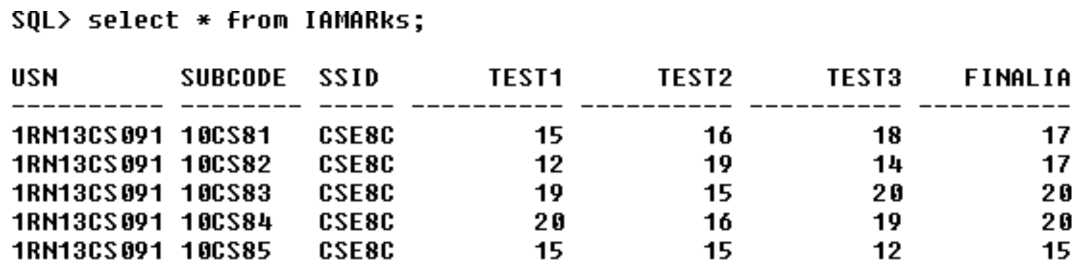
SELECT * FROM IAMARKS;



```
SQL> SELECT * FROM IAMARKS;

USN        SUBCODE  SSID       TEST1      TEST2      TEST3    FINALIA
---------- -------- ----- ---------- ---------- ---------- ----------
1RN13CS091 10CS81   CSE8C         15         16         18
1RN13CS091 10CS82   CSE8C         12         19         14
1RN13CS091 10CS83   CSE8C         19         15         20
1RN13CS091 10CS84   CSE8C         20         16         19
1RN13CS091 10CS85   CSE8C         15         15         12
```

Below SQL code is to invoke the PL/SQL stored procedure from the command line:

DELIMITER ;
CALL AVGMARKS();



```
SQL> select * from IAMARks;

USN        SUBCODE  SSID       TEST1      TEST2      TEST3    FINALIA
---------- -------- ----- ---------- ---------- ---------- ----------
1RN13CS091 10CS81   CSE8C         15         16         18         17
1RN13CS091 10CS82   CSE8C         12         19         14         17
1RN13CS091 10CS83   CSE8C         19         15         20         20
1RN13CS091 10CS84   CSE8C         20         16         19         20
1RN13CS091 10CS85   CSE8C         15         15         12         15
```

5. Categorize students based on the following criterion:
If FinalIA = 17 to 20 then CAT = ‘Outstanding’
If FinalIA = 12 to 16 then CAT = ‘Average’
If FinalIA< 12 then CAT = ‘Weak’
Give these details only for 8th semester A, B, and C section students.

```
SELECT
    S.USN,S.SNAME,S.ADDRESS,S.PHONE,S.GENDER,
    (CASE
      WHEN IA.FINALIA BETWEEN 17 AND 20 THEN 'OUTSTANDING'
      WHEN IA.FINALIA BETWEEN 12 AND 16 THEN 'AVERAGE' ELSE
      'WEAK'
    END) AS CAT
FROM STUDENT S, SEMSEC SS, IAMARKS IA, SUBJECT SUB
WHERE S.USN = IA.USN AND  SS.SSID = IA.SSID AND SUB.SUBCODE = IA.SUBCODE AND
SUB.SEM = 8;
```

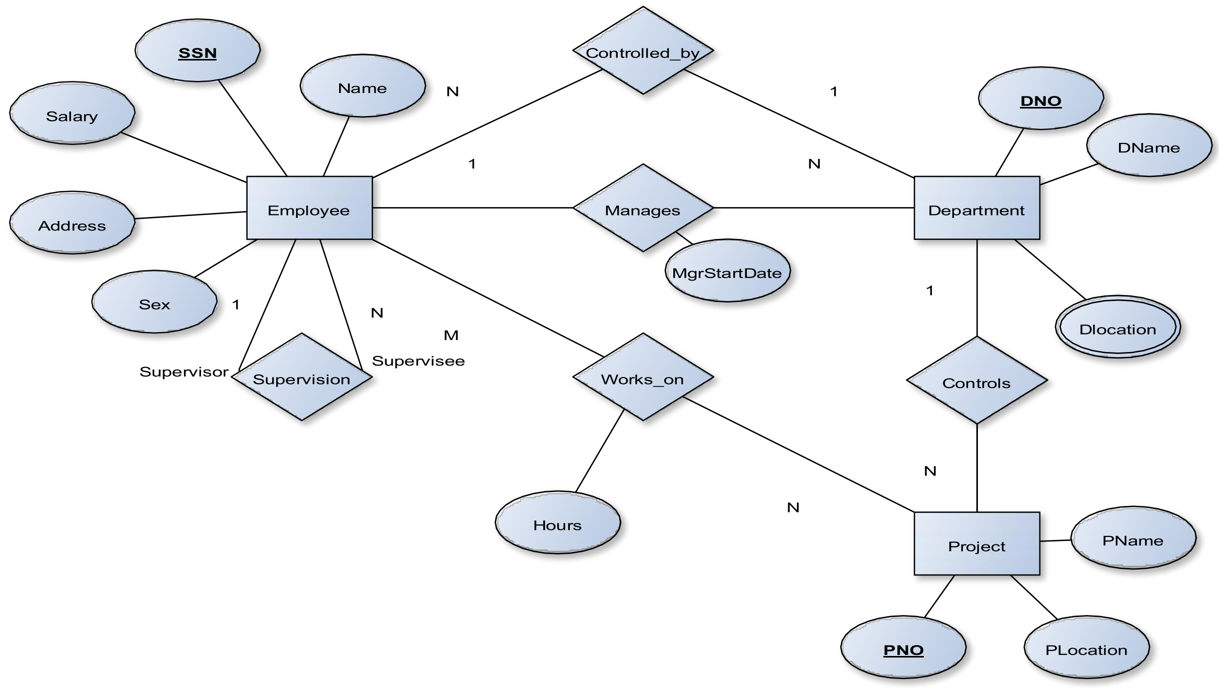
```
USN        SNAME                     ADDRESS                        PHONE G CAT
---------- ------------------------- ------------------------- ---------- - -----------
1RN13CS091 TEESHA                    BENGALURU                 7712312312 F OutStanding
1RN13CS091 TEESHA                    BENGALURU                 7712312312 F OutStanding
1RN13CS091 TEESHA                    BENGALURU                 7712312312 F OutStanding
1RN13CS091 TEESHA                    BENGALURU                 7712312312 F OutStanding
1RN13CS091 TEESHA                    BENGALURU                 7712312312 F Average
```

5. Consider the schema for Company Database:

EMPLOYEE (*SSN, Name, Address, Sex, Salary, SuperSSN, DNo*)
DEPARTMENT (*DNo, DName, MgrSSN, MgrStartDate*)
DLOCATION (*DNo,DLoc*)
PROJECT (*PNo, PName, PLocation, DNo*)
WORKS_ON (*SSN, PNo, Hours*)
Write SQL queries to

1. **Make a list of all project numbers for projects that involve an employee whose last name is 'Scott', either as a worker or as a manager of the department that controls the project.**
2. **Show the resulting salaries if every employee working on the 'IoT' project is given a 10 percent raise.**
3. **Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department**
4. **Retrieve the name of each employee who works on all the projects controlled by department number 5 (use NOT EXISTS operator). For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than Rs. 6,00,000.**

Entity-Relationship Diagram



Schema Diagram

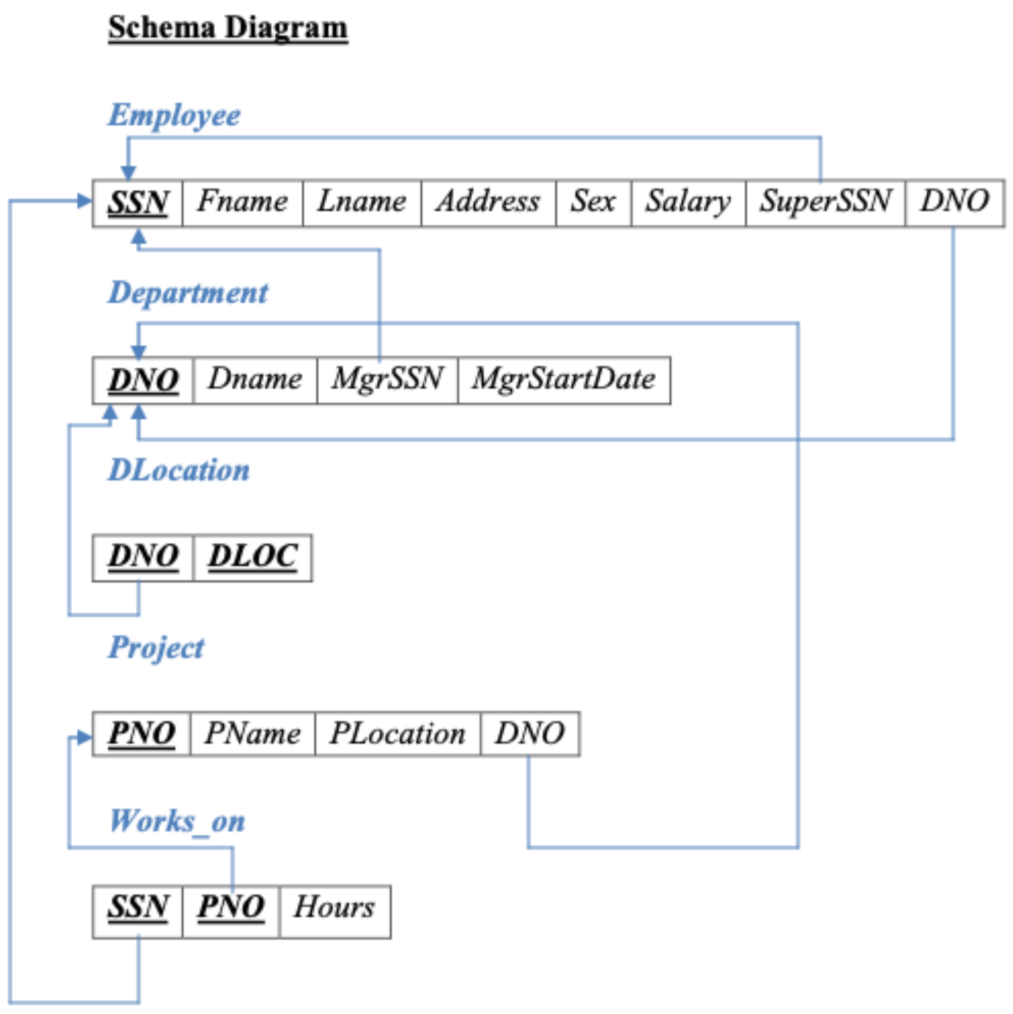


Table Creation

CREATE TABLE DEPARTMENT
(
DNO **VARCHAR(20) PRIMARY KEY,**
DNAME **VARCHAR(20),**
MGRSTARTDATE **DATE**
);

CREATE TABLE EMPLOYEE
(
SSN **VARCHAR(20) PRIMARY KEY,**
FNAME **VARCHAR(20),**
LNAME **VARCHAR(20),**
ADDRESS **VARCHAR(20),**
SEX **CHAR(1),**

```
SALARY INTEGER,
DNo VARCHAR(20),
FOREIGN KEY(SUPERSSN )REFERENCES EMPLOYEE (SSN),
FOREIGN KEY(DNO) REFERENCES DEPARTMENT (DNO));
```

NOTE: Once DEPARTMENT and EMPLOYEE tables are created we must alter department table to add foreign constraint MGRSSN using sql command

```
ALTER TABLE DEPARTMENT
ADD FOREIGN KEY(MGRSSN) REFERENCES EMPLOYEE (SSN);
```

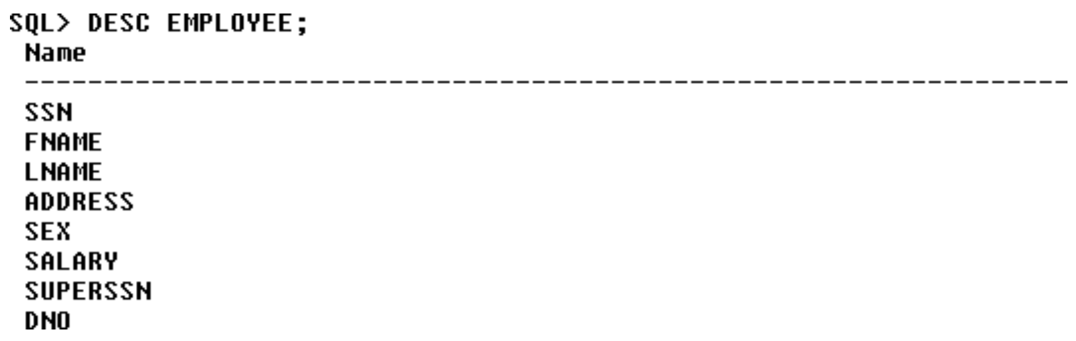
```
CREATE TABLE DLOCATION
(
DNo VARCHAR(20),
DLOC VARCHAR(20),
FOREIGN KEY(DNO) REFERENCES DEPARTMENT (DNO),
PRIMARY KEY (DNO, DLOC)
);
```

```
CREATE TABLE PROJECT
(
PNO INTEGER PRIMARY KEY,
PNAME VARCHAR(20),
PLOCATION VARCHAR(20),
DNo VARCHAR(20),
FOREIGN KEY(DNO ) REFERENCES DEPARTMENT (DNO)
);
```

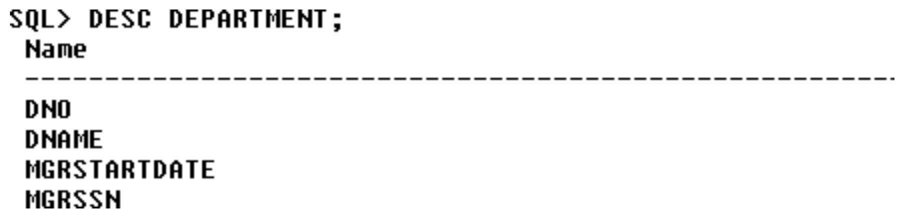
```
CREATE TABLE WORKS_ON
(
SSN VARCHAR(20),
PNO INTEGER,
HOURS INTEGER(2),
PRIMARY KEY (SSN, PNO),
FOREIGN KEY(SSN) REFERENCES EMPLOYEE (SSN),
FOREIGN KEY(PNO) REFERENCES PROJECT(PNO)
);
```

__Table Descriptions__

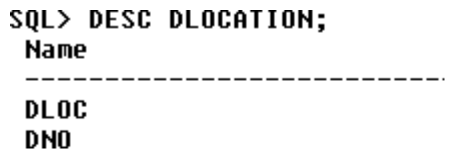
```
DESC EMPLOYEE;
```


```
SQL> DESC EMPLOYEE;
 Name
 -----------------------------------------------------------------
 SSN
 FNAME
 LNAME
 ADDRESS
 SEX
 SALARY
 SUPERSSN
 DNO
```

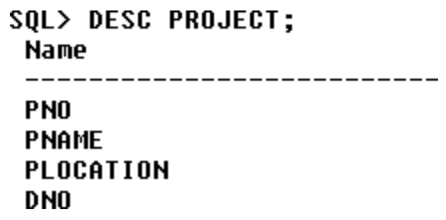
DESC DEPARTMENT;


```
SQL> DESC DEPARTMENT;
 Name
 -------------------------------------------------------
 DNO
 DNAME
 MGRSTARTDATE
 MGRSSN
```

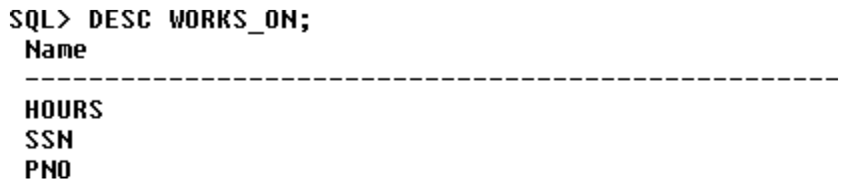
DESC DLOCATION;


```
SQL> DESC DLOCATION;
 Name
 --------------------------
 DLOC
 DNO
```

DESC PROJECT;


```
SQL> DESC PROJECT;
 Name
 --------------------------
 PNO
 PNAME
 PLOCATION
 DNO
```

DESC WORKS_ON;


```
SQL> DESC WORKS_ON;
 Name
 --------------------------------------------------
 HOURS
 SSN
 PNO
```

<u>Insertion of values to tables</u>

INSERT INTO EMPLOYEE (SSN, FNAME, LNAME, ADDRESS, SEX, SALARY) VALUES (‘RNSECE01’,’JOHN’,’SCOTT’,’BANGALORE’,’M’, 450000);
INSERT INTO EMPLOYEE (SSN, FNAME, LNAME, ADDRESS, SEX, SALARY) VALUES (‘RNSCSE01’,’JAMES’,’SMITH’,’BANGALORE’,’M’, 500000);
INSERT INTO EMPLOYEE (SSN, FNAME, LNAME, ADDRESS, SEX, SALARY) VALUES (‘RNSCSE02’,’HEARN’,’BAKER’,’BANGALORE’,’M’, 700000);

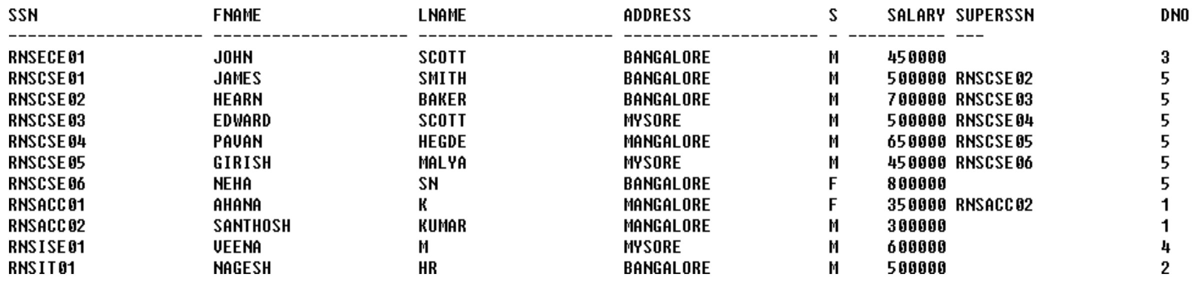
```
INSERT INTO EMPLOYEE (SSN, FNAME, LNAME, ADDRESS, SEX, SALARY) VALUES
('RNSCSE03','EDWARD','SCOTT','MYSORE','M', 500000);
INSERT INTO EMPLOYEE (SSN, FNAME, LNAME, ADDRESS, SEX, SALARY) VALUES
('RNSCSE04','PAVAN','HEGDE','MANGALORE','M', 650000);
INSERT INTO EMPLOYEE (SSN, FNAME, LNAME, ADDRESS, SEX, SALARY) VALUES
('RNSCSE05','GIRISH','MALYA','MYSORE','M', 450000);
INSERT INTO EMPLOYEE (SSN, FNAME, LNAME, ADDRESS, SEX, SALARY) VALUES
('RNSCSE06','NEHA','SN','BANGALORE','F', 800000);
INSERT INTO EMPLOYEE (SSN, FNAME, LNAME, ADDRESS, SEX, SALARY) VALUES
('RNSACC01','AHANA','K','MANGALORE','F', 350000);
INSERT INTO EMPLOYEE (SSN, FNAME, LNAME, ADDRESS, SEX, SALARY) VALUES
('RNSACC02','SANTHOSH','KUMAR','MANGALORE','M', 300000);
INSERT INTO EMPLOYEE (SSN, FNAME, LNAME, ADDRESS, SEX, SALARY) VALUES
('RNSISE01','VEENA','M','MYSORE','M', 600000);
INSERT INTO EMPLOYEE (SSN, FNAME, LNAME, ADDRESS, SEX, SALARY) VALUES
('RNSIT01','NAGESH','HR','BANGALORE','M', 500000);

INSERT INTO DEPARTMENT VALUES ('1','ACCOUNTS','2001-01-01','RNSACC02');
INSERT INTO DEPARTMENT VALUES ('2','IT','2006-08-01','RNSIT01');
INSERT INTO DEPARTMENT VALUES ('3','ECE','2008-06-01','RNSECE01');
INSERT INTO DEPARTMENT VALUES ('4','ISE','2015-AUG-01','RNSISE01');
INSERT INTO DEPARTMENT VALUES ('5','CSE','2002-JUN-01','RNSCSE05');
```

Note: update entries of employee table to fill missing fields SUPERSSN and DNO

```
UPDATE EMPLOYEE SET
SUPERSSN=NULL, DNO='3'
WHERE SSN='RNSECE01';

UPDATE EMPLOYEE SET
SUPERSSN='RNSCSE02', DNO='5'
WHERE SSN='RNSCSE01';

UPDATE EMPLOYEE SET
SUPERSSN='RNSCSE03', DNO='5'
WHERE SSN='RNSCSE02';

UPDATE EMPLOYEE SET
SUPERSSN='RNSCSE04', DNO='5'
WHERE SSN='RNSCSE03';

UPDATE EMPLOYEE SET
DNO='5', SUPERSSN='RNSCSE05'
WHERE SSN='RNSCSE04';
```

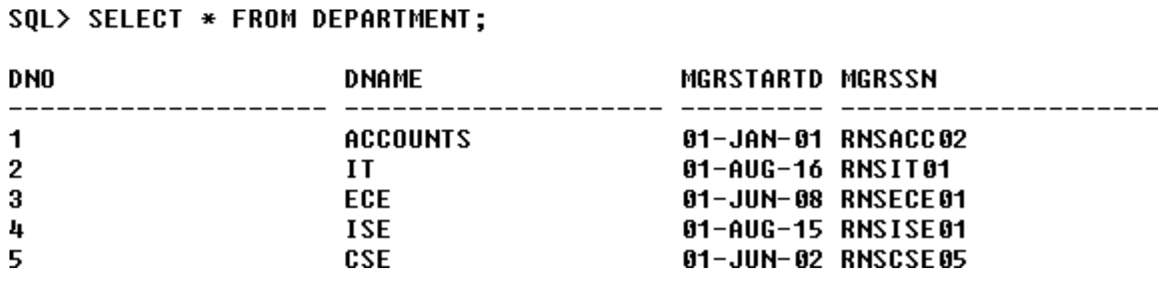
```
UPDATE EMPLOYEE SET
DNO='5', SUPERSSN='RNSCSE06'
WHERE SSN='RNSCSE05';

UPDATE EMPLOYEE SET
DNO='5', SUPERSSN=NULL
WHERE SSN='RNSCSE06';

UPDATE EMPLOYEE SET
DNO='1', SUPERSSN='RNSACC02'
WHERE SSN='RNSACC01';

UPDATE EMPLOYEE SET
DNO='1', SUPERSSN=NULL
WHERE SSN='RNSACC02';

UPDATE EMPLOYEE SET
DNO='4', SUPERSSN=NULL
WHERE SSN='RNSISE01';

UPDATE EMPLOYEE SET
DNO='2', SUPERSSN=NULL
WHERE SSN='RNSIT01';

INSERT INTO DLOCATION VALUES ('BANGALORE', '1');
INSERT INTO DLOCATION VALUES ('BANGALORE', '2');
INSERT INTO DLOCATION VALUES ('BANGALORE', '3');
INSERT INTO DLOCATION VALUES ('MANGALORE', '4');
INSERT INTO DLOCATION VALUES ('MANGALORE', '5');

INSERT INTO PROJECT VALUES (100,'IOT','BANGALORE','5');
INSERT INTO PROJECT VALUES (101,'CLOUD','BANGALORE','5');
INSERT INTO PROJECT VALUES (102,'BIGDATA','BANGALORE','5');
INSERT INTO PROJECT VALUES (103,'SENSORS','BANGALORE','3');
INSERT INTO PROJECT VALUES (104,'BANK MANAGEMENT','BANGALORE','1');
INSERT INTO PROJECT VALUES (105,'SALARY MANAGEMENT','BANGALORE','1');
INSERT INTO PROJECT VALUES (106,'OPENSTACK','BANGALORE','4');
INSERT INTO PROJECT VALUES (107,'SMART CITY','BANGALORE','2');
INSERT INTO WORKS_ON VALUES ('RNSCSE01', 100,4);
INSERT INTO WORKS_ON VALUES ('RNSCSE01', 101,6);
INSERT INTO WORKS_ON VALUES ('RNSCSE01', 102,8);
INSERT INTO WORKS_ON VALUES ('RNSCSE02', 100,10);
INSERT INTO WORKS_ON VALUES ('RNSCSE04', 100,3);
INSERT INTO WORKS_ON VALUES ('RNSCSE05', 101,4);
INSERT INTO WORKS_ON VALUES ('RNSCSE06', 102,5);
INSERT INTO WORKS_ON VALUES ('RNSCSE03', 102,6);
INSERT INTO WORKS_ON VALUES ('RNSECE01', 103,7);
INSERT INTO WORKS_ON VALUES ('RNSACC01', 104,5);
INSERT INTO WORKS_ON VALUES ('RNSACC02', 105,6);
INSERT INTO WORKS_ON VALUES ('RNSISE01', 106,4);
INSERT INTO WORKS_ON VALUES ('RNSIT01', 107,10);
```

SELECT * FROM EMPLOYEE;



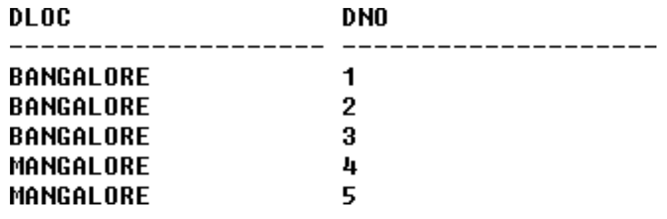
```
SSN                  FNAME                LNAME                ADDRESS              S     SALARY SUPERSSN             DNO
-------------------- -------------------- -------------------- -------------------- - ---------- ---
RNSECE01             JOHN                 SCOTT                BANGALORE            M     450000                      3
RNSCSE01             JAMES                SMITH                BANGALORE            M     500000 RNSCSE02             5
RNSCSE02             HEARN                BAKER                BANGALORE            M     700000 RNSCSE03             5
RNSCSE03             EDWARD               SCOTT                MYSORE               M     500000 RNSCSE04             5
RNSCSE04             PAVAN                HEGDE                MANGALORE            M     650000 RNSCSE05             5
RNSCSE05             GIRISH               MALYA                MYSORE               M     450000 RNSCSE06             5
RNSCSE06             NEHA                 SN                   BANGALORE            F     800000                      5
RNSACC01             AHANA                K                    MANGALORE            F     350000 RNSACC02             1
RNSACC02             SANTHOSH             KUMAR                MANGALORE            M     300000                      1
RNSISE01             VEENA                M                    MYSORE               M     600000                      4
RNSIT01              NAGESH               HR                   BANGALORE            M     500000                      2
```

SELECT * FROM DEPARTMENT;



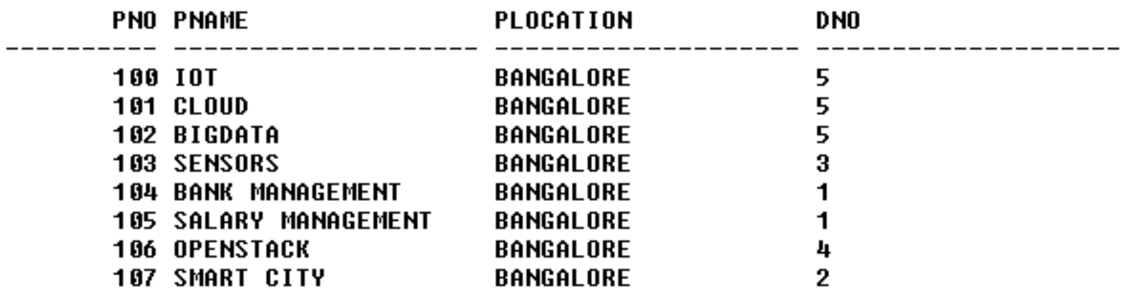
```
SQL> SELECT * FROM DEPARTMENT;

DNO                  DNAME                MGRSTARTD MGRSSN
-------------------- -------------------- --------- --------------------
1                    ACCOUNTS             01-JAN-01 RNSACC02
2                    IT                   01-AUG-16 RNSIT01
3                    ECE                  01-JUN-08 RNSECE01
4                    ISE                  01-AUG-15 RNSISE01
5                    CSE                  01-JUN-02 RNSCSE05
```

SELECT * FROM DLOCATION;



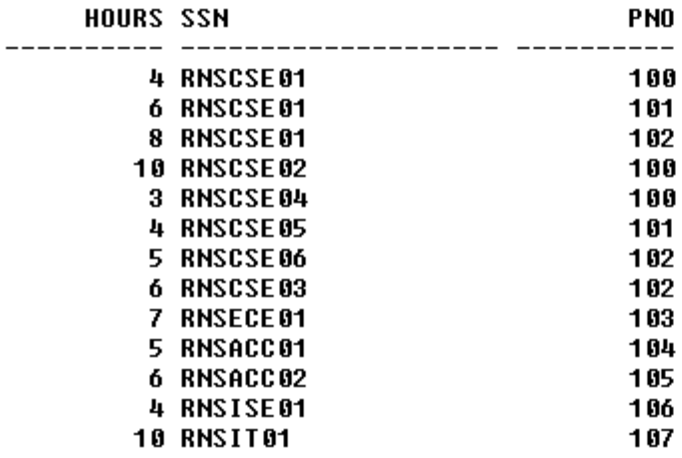
```
DLOC                 DNO
-------------------- --------------------
BANGALORE            1
BANGALORE            2
BANGALORE            3
MANGALORE            4
MANGALORE            5
```

SELECT * FROM PROJECT;



```
       PNO PNAME                PLOCATION            DNO
---------- -------------------- -------------------- --------------------
       100 IOT                  BANGALORE            5
       101 CLOUD                BANGALORE            5
       102 BIGDATA              BANGALORE            5
       103 SENSORS              BANGALORE            3
       104 BANK MANAGEMENT      BANGALORE            1
       105 SALARY MANAGEMENT    BANGALORE            1
       106 OPENSTACK            BANGALORE            4
       107 SMART CITY           BANGALORE            2
```

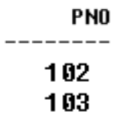
SELECT * FROM WORKS_ON;



```
     HOURS SSN                         PNO
---------- -------------------- ----------
         4 RNSCSE01                    100
         6 RNSCSE01                    101
         8 RNSCSE01                    102
        10 RNSCSE02                    100
         3 RNSCSE04                    100
         4 RNSCSE05                    101
         5 RNSCSE06                    102
         6 RNSCSE03                    102
         7 RNSECE01                    103
         5 RNSACC01                    104
         6 RNSACC02                    105
         4 RNSISE01                    106
        10 RNSIT01                     107
```

1. **Make a list of all project numbers for projects that involve an employee whose last name is 'Scott', either as a worker or as a manager of the department that controls the project.**

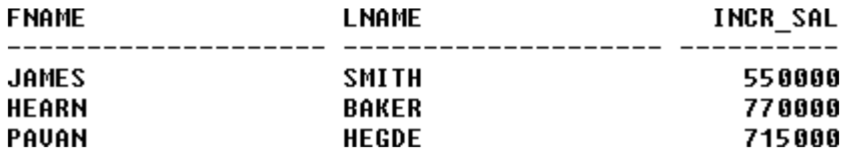
```
(
SELECT DISTINCT P.PNO
FROM PROJECT P, DEPARTMENT D, EMPLOYEE E
WHERE P.DNO=D.DNO AND D.MGRSSN=E.SSN AND E.LNAME='SCOTT' )
UNION
(
SELECT DISTINCT P1.PNO
FROM PROJECT P1, WORKS_ON W, EMPLOYEE E1
WHERE P1.PNO=W.PNO AND W.SSN=E1.SSN AND E1.LNAME='SCOTT'
);
```



```
     PNO
--------
     102
     103
```

2. **Show the resulting salaries if every employee working on the 'IoT' project is given a 10 percent raise.**

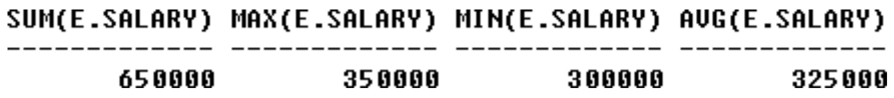
```
SELECT E.FNAME, E.LNAME, 1.1*E.SALARY AS INCR_SAL
FROM EMPLOYEE E, WORKS_ON W, PROJECT P
WHERE E.SSN=W.SSN AND W.PNO=P.PNO AND P.PNAME='IOT';
```



```
FNAME                LNAME                  INCR_SAL
-------------------- -------------------- ----------
JAMES                SMITH                    550000
HEARN                BAKER                    770000
PAVAN                HEGDE                    715000
```

3. **Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department**

```
SELECT SUM(E.SALARY), MAX(E.SALARY), MIN(E.SALARY), AVG(E.SALARY)
FROM EMPLOYEE E, DEPARTMENT D
WHERE E.DNO=D.DNO AND D.DNAME='ACCOUNTS';
```



```
SUM(E.SALARY) MAX(E.SALARY) MIN(E.SALARY) AVG(E.SALARY)
------------- ------------- ------------- -------------
       650000        350000        300000        325000
```

4. **Retrieve the name of each employee who works on all the projects Controlled by department number 5 (use NOT EXISTS operator).**

```
SELECT E.FNAME, E.LNAME
FROM EMPLOYEE E
 WHERE NOT EXISTS (  SELECT PNO
                      FROM PROJECT
                     WHERE DNO='5' AND
```

PNO **NOT IN** (**SELECT** PNO
FROM WORKS_ON
WHERE E.SSN=SSN));

```
FNAME                LNAME
-------------------- --------------------
JAMES                SMITH
```

5. **For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than Rs. 6, 00,000.**

SELECT D.DNO, **COUNT(*)**
FROM DEPARTMENT D, EMPLOYEE E
WHERE D.DNO=E.DNO **AND** E.SALARY>600000 **AND** D.DNO **IN**
(
SELECT E1.DNO
FROM EMPLOYEE E1
GROUP BY E1.DNO
HAVING COUNT (*)>5
)
GROUP BY D.DNO;

```
DNO                    COUNT(*)
-------------------- ----------
5                             3
```