

## 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)

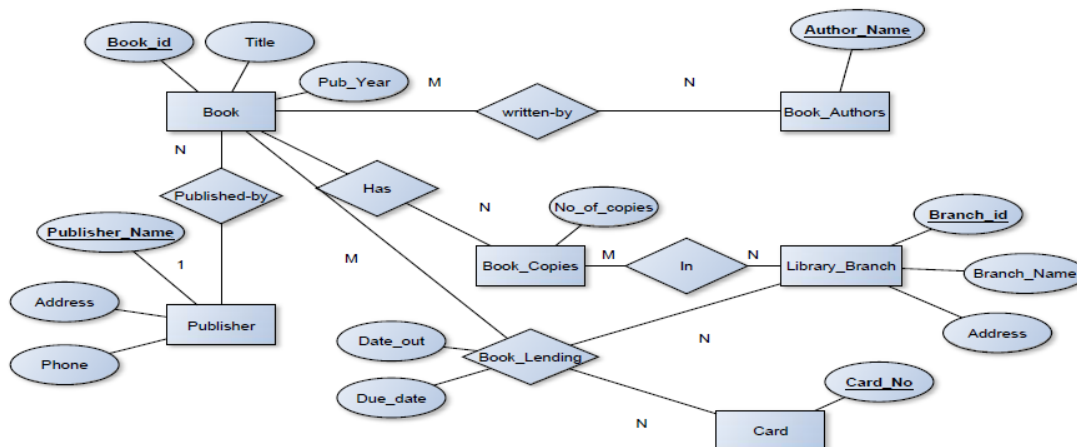
**LIBRARY\_BRANCH** (*Branch\_id*, Branch\_Name, Address)

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.

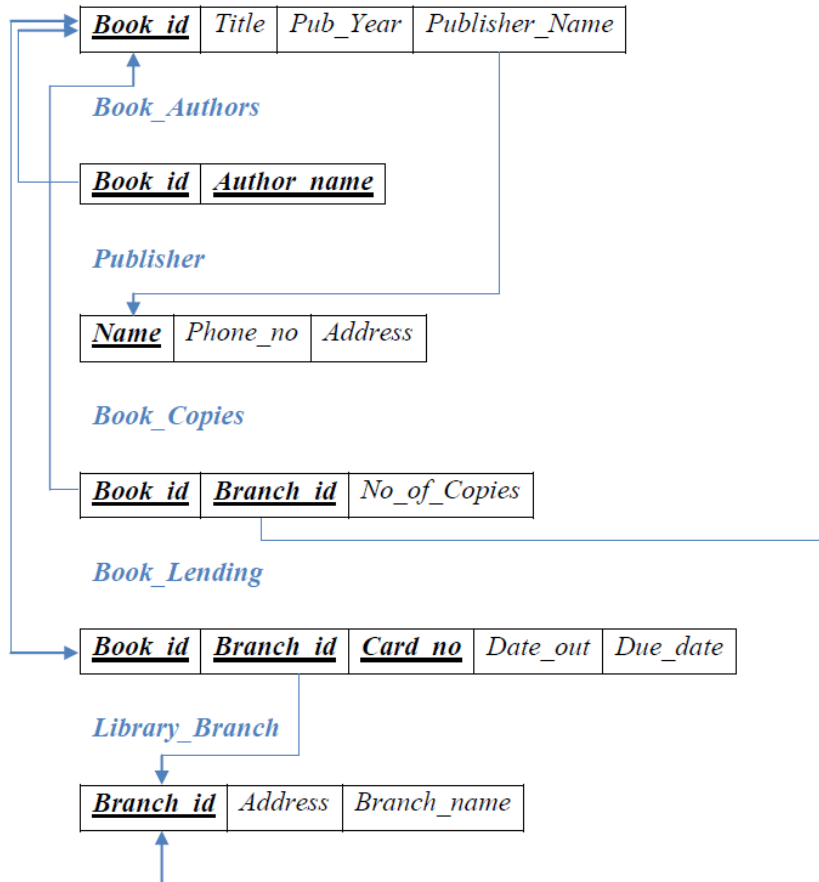
**Solution:**

**Entity-Relationship Diagram**



## Schema Diagram

### *Book*



## Table Creation

```
CREATE TABLE PUBLISHER  
(NAME VARCHAR2 (20) PRIMARY KEY,  
PHONE INTEGER,  
ADDRESS VARCHAR2 (20));
```

```
CREATE TABLE BOOK  
(BOOK_ID INTEGER PRIMARY KEY,  
TITLE VARCHAR2 (20),  
PUB_YEAR VARCHAR2 (20),  
PUBLISHER_NAME REFERENCES PUBLISHER (NAME) ON DELETE CASCADE);
```

```
CREATE TABLE BOOK_AUTHORS
(AUTHOR_NAME VARCHAR2 (20),
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 VARCHAR2 (50),
ADDRESS VARCHAR2 (50));
```

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

```
CREATE TABLE CARD
(CARD_NO INTEGER PRIMARY KEY);
```

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

**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 ('01-JAN-17','01-JUN-17', 1, 10, 101);
INSERT INTO BOOK_LENDING VALUES ('11-JAN-17','11-MAR-17', 3, 14, 101);
INSERT INTO BOOK_LENDING VALUES ('21-FEB-17','21-APR-17', 2, 13, 101);
INSERT INTO BOOK_LENDING VALUES ('15-MAR-17','15-JUL-17', 4, 11, 101);
INSERT INTO BOOK_LENDING VALUES ('12-APR-17','12-MAY-17', 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 LIURE	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	RNS IT	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

1. 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 '01-JAN-2017' AND '01-JUL-2017'
GROUP BY CARD_NO
HAVING COUNT (*)>3;
```

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

2. 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

3. Partition the BOOK table based on year of publication. Demonstrate its working with a simple query.

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



**PUB\_YEAR**

-----

**JAN-2017**

**JUN-2016**

**SEP-2016**

**SEP-2015**

**MAY-2016**

4. 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;
```

<b>BOOK_ID</b>	<b>TITLE</b>	<b>NO_OF_COPIES</b>
1	DBMS	10
1	DBMS	5
2	ADBMS	2
2	ADBMS	5
3	CN	7
5	OS	1
4	CG	3

---

B. Consider the following schema for Order Database:

SALESMAN (*Salesman\_id*, Name, City, Commission)

CUSTOMER (*Customer\_id*, Cust\_Name, City, Grade, Salesman\_id)

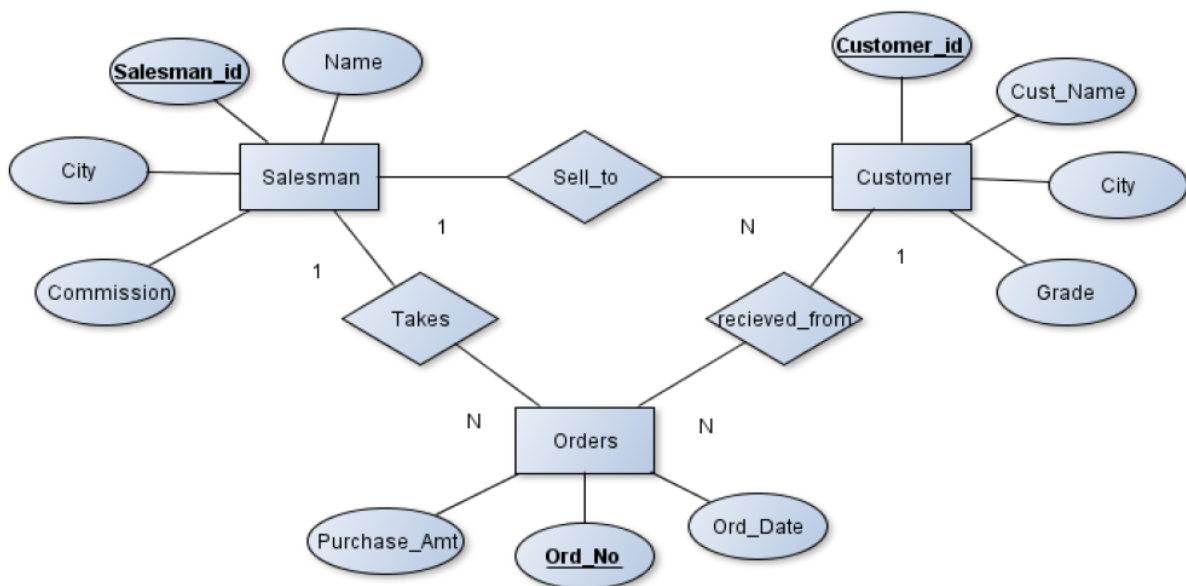
ORDERS (*Ord\_No*, Purchase\_Amt, Ord\_Date, Customer\_id, Salesman\_id)

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.

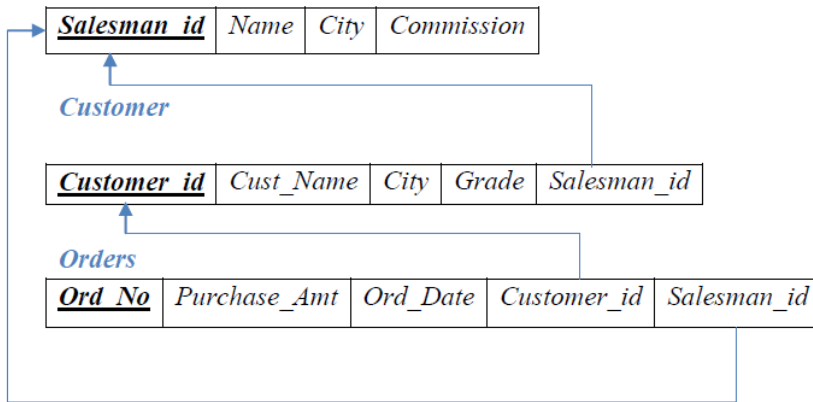
Solution:

Entity-Relationship Diagram



## Schema Diagram

### *Salesman*



## Table Creation

```
CREATE TABLE SALESMAN
(SALESMAN_ID NUMBER (4),
NAME VARCHAR2 (20),
CITY VARCHAR2 (20),
COMMISSION VARCHAR2 (20),
PRIMARY KEY (SALESMAN_ID));
```

```
CREATE TABLE CUSTOMER1
(CUSTOMER_ID NUMBER (4),
CUST_NAME VARCHAR2 (20),
CITY VARCHAR2 (20),
GRADE NUMBER (3),
PRIMARY KEY (CUSTOMER_ID),
SALESMAN_ID REFERENCES SALESMAN (SALESMAN_ID) ON DELETE SET NULL);
```

```
CREATE TABLE ORDERS
(ORD_NO NUMBER (5),
PURCHASE_AMT NUMBER (10, 2),
ORD_DATE DATE,
PRIMARY KEY (ORD_NO),
CUSTOMER_ID REFERENCES CUSTOMER1 (CUSTOMER_ID) ON DELETE CASCADE,
SALESMAN_ID REFERENCES SALESMAN (SALESMAN_ID) ON DELETE CASCADE);
```

## Table Descriptions

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 CUSTOMER1;

```
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)

## Insertion of Values to Tables

```
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', 'HYDRABAD', '15 %');
```

```
INSERT INTO CUSTOMER1 VALUES (10, 'PREETHI', 'BANGALORE', 100, 1000);
```

```
INSERT INTO CUSTOMER1 VALUES (11, 'VIVEK', 'MANGALORE', 300, 1000);
```

```
INSERT INTO CUSTOMER1 VALUES (12, 'BHASKAR', 'CHENNAI', 400, 2000);
```

```
INSERT INTO CUSTOMER1 VALUES (13, 'CHETHAN', 'BANGALORE', 200, 2000);
```

```
INSERT INTO CUSTOMER1 VALUES (14, 'MAMATHA', 'BANGALORE', 400, 3000);
```

```
INSERT INTO ORDERS VALUES (50, 5000, '04-MAY-17', 10, 1000);
```

```
INSERT INTO ORDERS VALUES (51, 450, '20-JAN-17', 10, 2000);
```

```

INSERT INTO ORDERS VALUES (52, 1000, '24-FEB-17', 13, 2000);
INSERT INTO ORDERS VALUES (53, 3500, '13-APR-17', 14, 3000);
INSERT INTO ORDERS VALUES (54, 550, '09-MAR-17', 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 CUSTOMER1;

```

CUSTOMER_ID	CUST_NAME	CITY	GRADE	SALESMAN_ID
10	PREETHI	BANGALORE	100	1000
11	VIJAY	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 CUSTOMER1
GROUP BY GRADE
HAVING GRADE > (SELECT AVG(GRADE)
FROM CUSTOMER1
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 CUSTOMER1
          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, CUSTOMER1
WHERE SALESMAN.CITY = CUSTOMER1.CITY
UNION
SELECT SALESMAN_ID, NAME, 'NO MATCH', COMMISSION
FROM SALESMAN
WHERE NOT CITY = ANY
(SELECT CITY
 FROM CUSTOMER1)
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 order of a day.

```
CREATE VIEW ELITSALESMAN 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);

```

```

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

```

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 RAUI          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

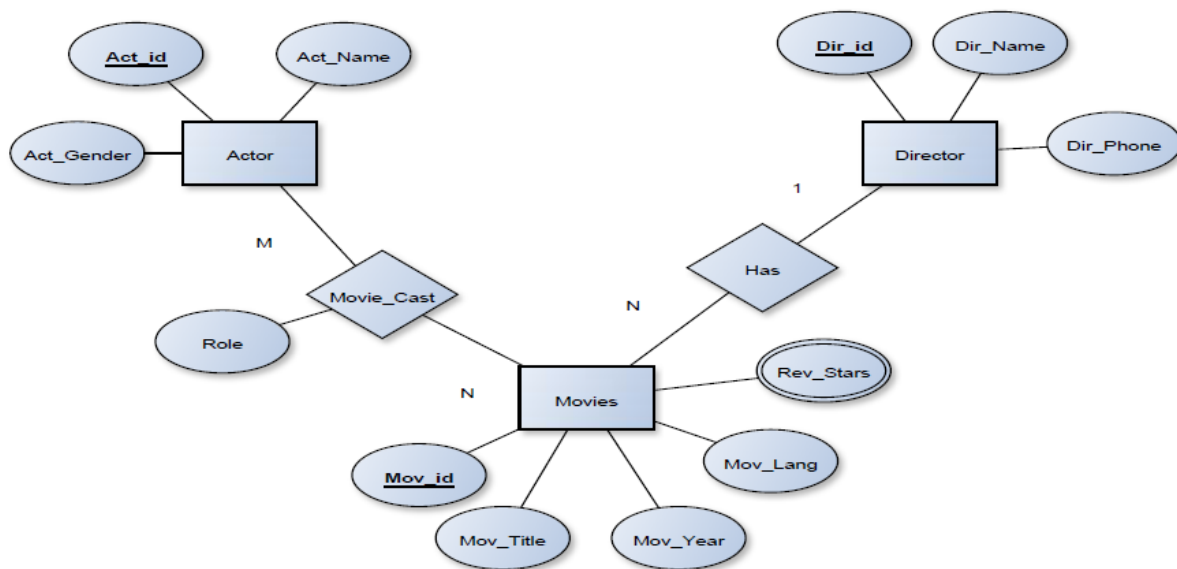
2015 (use JOIN operation).

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

### *Actor*

<u>Act id</u>	Act_Name	Act_Gender
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### *Director*

<u>Dir id</u>	Dir_Name	Dir_Phone
---------------	----------	-----------

### *Movies*

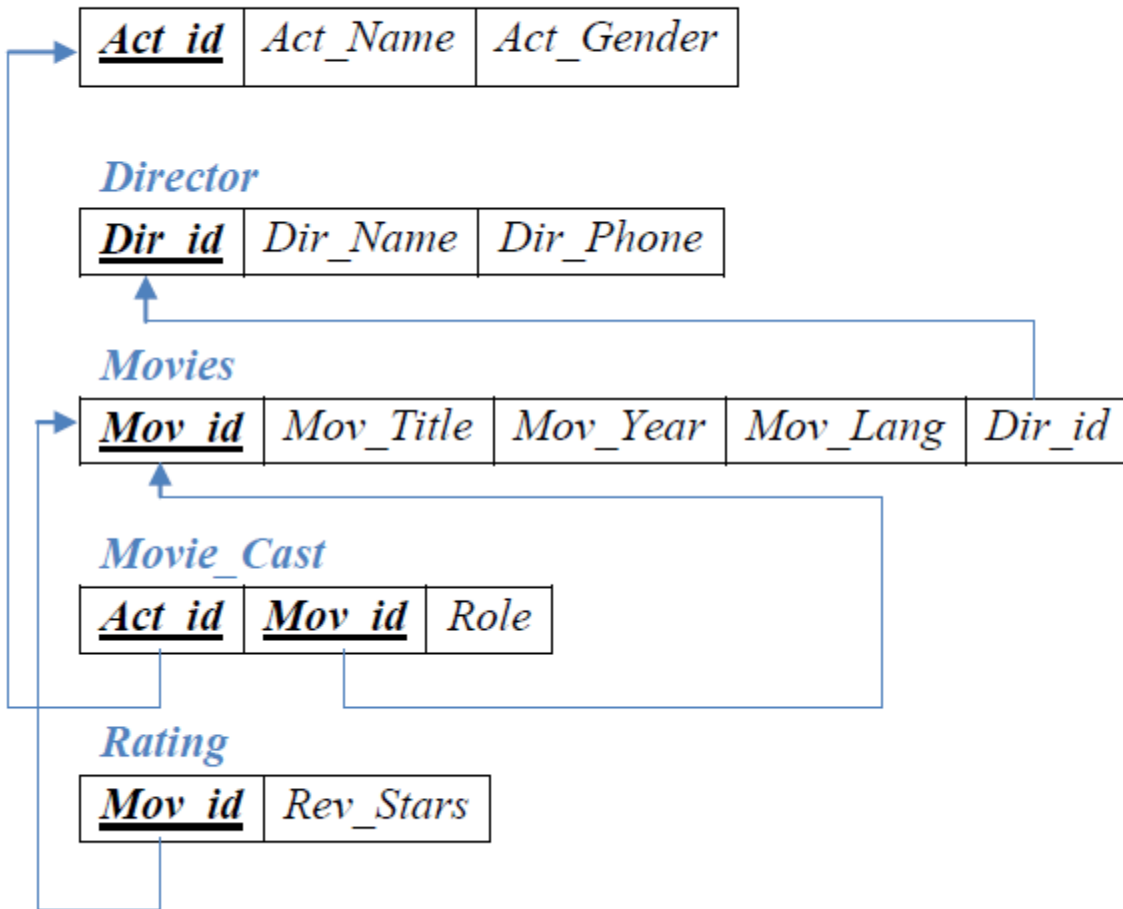
<u>Mov id</u>	Mov_Title	Mov_Year	Mov_Lang	Dir_id
---------------	-----------	----------	----------	--------

### *Movie\_Cast*

<u>Act id</u>	<u>Mov id</u>	Role
---------------	---------------	------

### *Rating*

<u>Mov id</u>	Rev_Stars
---------------	-----------



### Table Creation

```
CREATE TABLE ACTOR (  
  ACT_ID NUMBER (3),  
  ACT_NAME VARCHAR (20),  
  ACT_GENDER CHAR (1),  
  PRIMARY KEY (ACT_ID));
```

```
CREATE TABLE DIRECTOR (  
  DIR_ID NUMBER (3),  
  DIR_NAME VARCHAR (20),  
  DIR_PHONE NUMBER (10),  
  PRIMARY KEY (DIR_ID));
```

```
CREATE TABLE MOVIES (  
  MOV_ID NUMBER (4),  
  MOV_TITLE VARCHAR (25),  
  MOV_YEAR NUMBER (4),  
  MOV_LANG VARCHAR (12),  
  DIR_ID NUMBER (3),  
  PRIMARY KEY (MOV_ID),  
  FOREIGN KEY (DIR_ID) REFERENCES DIRECTOR (DIR_ID));
```

```
CREATE TABLE MOVIE_CAST (  
  ACT_ID NUMBER (3),  
  MOV_ID NUMBER (4),  
  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 NUMBER (4),  
  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 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)

### Insertion of Values to Tables

```
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

### Queries:

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, 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;
```

<b>MOV_TITLE</b>	<b>MAX(REV_STARS)</b>
<b>AKASH</b>	<b>5</b>
<b>BAHUBALI-1</b>	<b>2</b>
<b>BAHUBALI-2</b>	<b>4</b>
<b>WAR HORSE</b>	<b>4</b>

**5. Update rating of all movies directed by ‘Steven Spielberg’ to 5  
KL**

```
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 = ‘STEVEN SPIELBERG’));
```

```
SQL> SELECT * FROM RATING;
```

<b>MOV_ID</b>	<b>REV_STARS</b>
<b>1001</b>	<b>4</b>
<b>1002</b>	<b>2</b>
<b>1003</b>	<b>5</b>
<b>1004</b>	<b>5</b>

**D. Consider the schema for College Database:**

**STUDENT** (*USN*, *SName*, *Address*, *Phone*, *Gender*)

**SEMSEC** (*SSID*, *Sem*, *Sec*)

**CLASS** (*USN*, *SSID*)

**SUBJECT** (*Subcode*, *Title*, *Sem*, *Credits*)

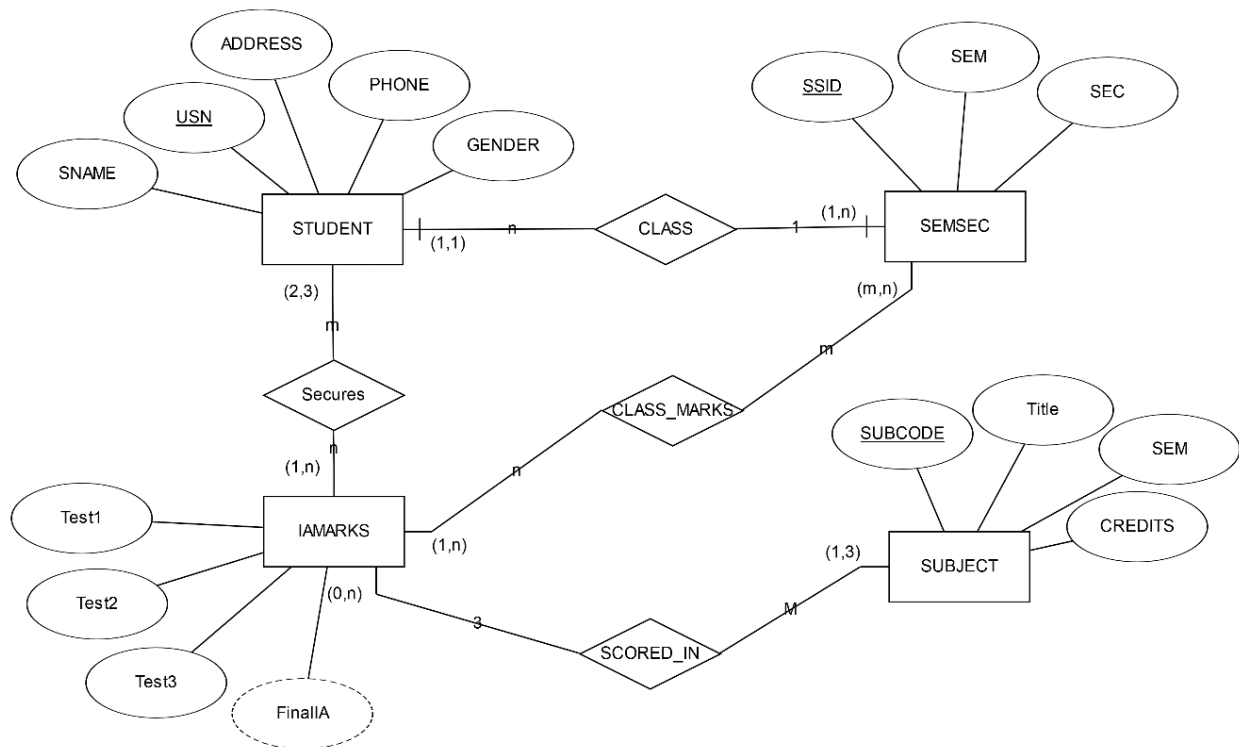
**IAMARKS** (*USN*, *Subcode*, *SSID*, *Test1*, *Test2*, *Test3*, *FinalIA*)

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.

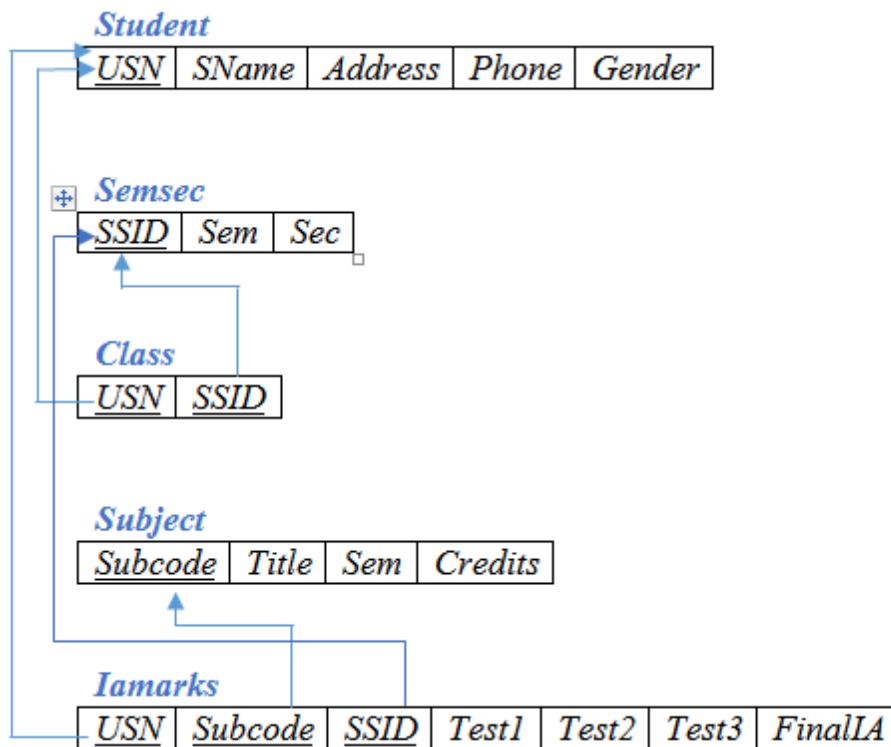
**Solution:**

**Entity - Relationship Diagram**





## Schema Diagram



### Table Creation

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

```
CREATE TABLE SEMSEC (  
SSID VARCHAR (5) PRIMARY KEY,  
SEM NUMBER (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 NUMBER (2),  
CREDITS NUMBER (2),  
PRIMARY KEY (SUBCODE));
```

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

### Table Descriptions

```
DESC STUDENT;
```

```
Name  
-----
```

```
USN  
SNAME  
ADDRESS  
PHONE  
GENDER
```

```
SQL> DESC SEMSEC;
```

```
Name  
-----
```

```
SSID  
SEM  
SEC
```

```
SQL> DESC CLASS;
```

```
Name  
-----
```

```
USN  
SSID
```

```
SQL> DESC SUBJECT1;
```

```
Name
```

```
-----  
SUBCODE  
TITLE  
SEM  
CREDITS  
.
```

```
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);
```

```
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	UINAYAKA	CHIKAMAGALUR	8800880011	M
1RN14CS025	ASMI	BENGALURU	7894737377	F

```
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

```
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.

```
SQL> 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	OODAD	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

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	

### Queries:

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.**

```

CREATE OR REPLACE PROCEDURE AVGMARKS
IS
CURSOR C_IAMARKS IS
SELECT GREATEST(TEST1,TEST2) AS A, GREATEST(TEST1,TEST3) AS B,
GREATEST(TEST3,TEST2) AS C
FROM IAMARKS
WHERE FINALIA IS NULL
FOR UPDATE;
C_A NUMBER;
C_B NUMBER;
C_C NUMBER;
C_SM NUMBER;
C_AV NUMBER;
BEGIN
OPEN C_IAMARKS;
LOOP
FETCH C_IAMARKS INTO C_A, C_B, C_C;
EXIT WHEN C_IAMARKS%NOTFOUND;
--DBMS_OUTPUT.PUT_LINE(C_A || ' ' || C_B || ' ' || C_C);
IF (C_A != C_B) THEN
C_SM:=C_A+C_B;
ELSE
C_SM:=C_A+C_C;
END IF;
C_AV:=C_SM/2;
--DBMS_OUTPUT.PUT_LINE('SUM = '||C_SM);
--DBMS_OUTPUT.PUT_LINE('AVERAGE = '||C_AV);
UPDATE IAMARKS SET FINALIA=C_AV WHERE CURRENT OF C_IAMARKS;
END LOOP;
CLOSE C_IAMARKS;
END;
/

```

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

```
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:

```
BEGIN  
AVGMARKS;  
END;
```

```
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 8<sup>th</sup> 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

E. Consider the schema for Company Database:

EMPLOYEE (*SSN, Name, Address, Sex, Salary, SuperSSN, DNo*)

DEPARTMENT (*DNo, DName, MgrSSN, MgrStartDate*)

DLOCATION (*DNo, DLoc*)

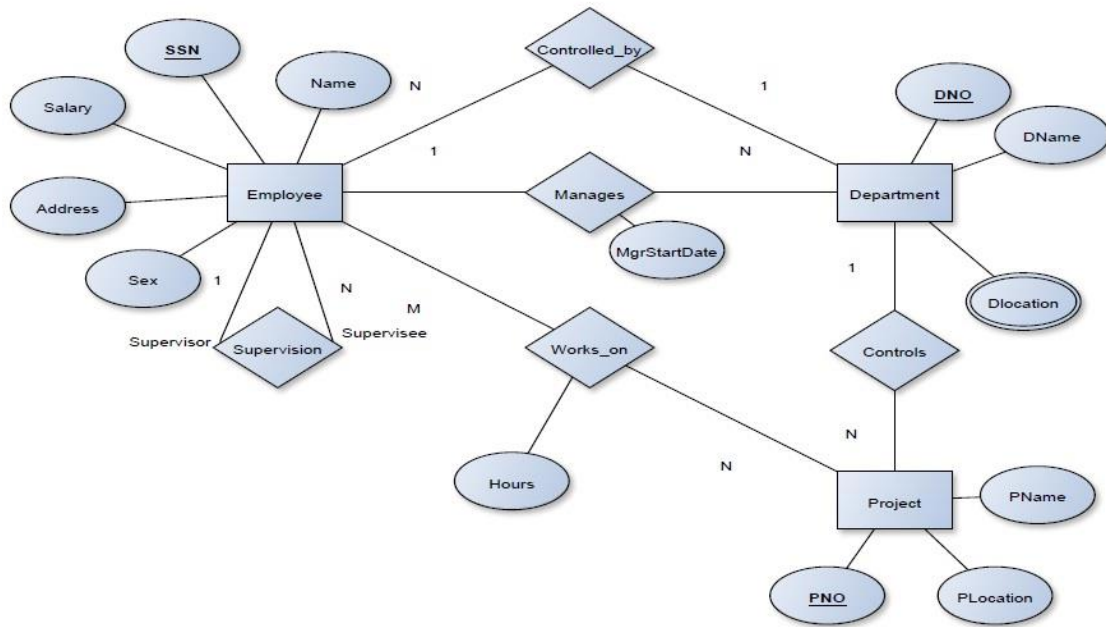
PROJECT (*PNo, PName, PLocation, DNo*)

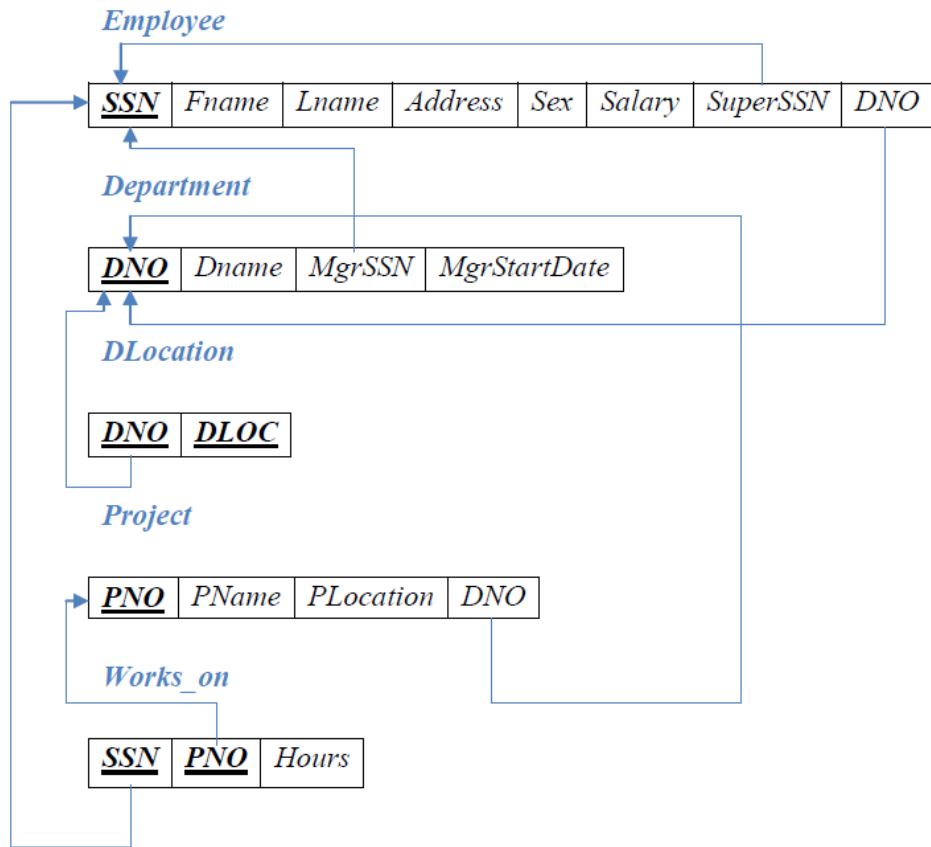
WORKS\_ON (*SSN, PNo, Hours*)

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





## Table Creation

```
CREATE TABLE DEPARTMENT  
(DNO VARCHAR2 (20) PRIMARY KEY,  
DNAME VARCHAR2 (20),  
MGRSTARTDATE DATE);
```

```
CREATE TABLE EMPLOYEE  
(SSN VARCHAR2 (20) PRIMARY KEY,  
FNAME VARCHAR2 (20),  
LNAME VARCHAR2 (20),  
ADDRESS VARCHAR2 (20),  
SEX CHAR (1),  
SALARY INTEGER,  
SUPERSSN REFERENCES EMPLOYEE (SSN),  
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 MGRSSN REFERENCES EMPLOYEE (SSN);
```

```
CREATE TABLE DLOCATION  
(DLOC VARCHAR2 (20),  
DNO REFERENCES DEPARTMENT (DNO),  
PRIMARY KEY (DNO, DLOC));
```

```
CREATE TABLE PROJECT  
(PNO INTEGER PRIMARY KEY,
```



```
PNAME VARCHAR2 (20),
PLOCATION VARCHAR2 (20),
DNO REFERENCES DEPARTMENT (DNO));
CREATE TABLE WORKS_ON
(HOURS NUMBER (2),
SSN REFERENCES EMPLOYEE (SSN),
PNO REFERENCES PROJECT(PNO),
PRIMARY KEY (SSN, 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

### Insertion of values to tables

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','01-JAN-01','RNSACC02');
```

```
INSERT INTO DEPARTMENT VALUES ('2','IT','01-AUG-16','RNSIT01');
```

```
INSERT INTO DEPARTMENT VALUES ('3','ECE','01-JUN-08','RNSECE01');
```

```
INSERT INTO DEPARTMENT VALUES ('4','ISE','01-AUG-15','RNSISE01');
```

```
INSERT INTO DEPARTMENT VALUES ('5','CSE','01-JUN-02','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 (4, 'RNSCSE01', 100);
```

```
INSERT INTO WORKS_ON VALUES (6, 'RNSCSE01', 101);
```

```
INSERT INTO WORKS_ON VALUES (8, 'RNSCSE01', 102);
```

Prepared by Prof. Guru Prasad and Prof. Suresh Chimkode

```

INSERT INTO WORKS_ON VALUES (10, 'RNSCSE02', 100);
INSERT INTO WORKS_ON VALUES (3, 'RNSCSE04', 100);
INSERT INTO WORKS_ON VALUES (4, 'RNSCSE05', 101);
INSERT INTO WORKS_ON VALUES (5, 'RNSCSE06', 102);
INSERT INTO WORKS_ON VALUES (6, 'RNSCSE03', 102);
INSERT INTO WORKS_ON VALUES (7, 'RNSECE01', 103);
INSERT INTO WORKS_ON VALUES (5, 'RNSACC01', 104);
INSERT INTO WORKS_ON VALUES (6, 'RNSACC02', 105);
INSERT INTO WORKS_ON VALUES (4, 'RNSISE01', 106);
INSERT INTO WORKS_ON VALUES (10, 'RNSIT01', 107);

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

### Queries:

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 E.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 E1.SSN=W.SSN
AND E1.LNAME='SCOTT');

```

```

      PNO
-----
      100
      101
      102
      103
      104
      105
      106
      107

```

**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') MINUS (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