Maharaja Education Trust (R), Mysuru

Maharaja Institute of Technology Mysore

Belawadi, Sriranga Pattana Taluk, Mandya – 571 477

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Laboratory Manual on

DBMS Laboratory with Mini Project (18CSL58)

Prepared by

Department of Computer Science & Engineering

Vision/ ಆಶಯ

"To be recognized as a premier technical and management institution promoting extensive education fostering research, innovation and entrepreneurial attitude"

ಸಂಶೋಧನೆ, ಆವಿಷ್ಕಾರ ಹಾಗೂ ಉದ್ಯಮಶೀಲತೆಯನ್ನು ಉತ್ತೇಜಿಸುವ ಅಗ್ರಮಾನ್ಯ ತಾಂತ್ರಿಕ ಮತ್ತು ಆಡಳಿತ ವಿಜ್ಞಾನ ಶಿಕ್ಷಣ ಕೇಂದ್ರವಾಗಿ ಗುರುತಿಸಿಕೊಳ್ಳುವುದು.

Mission/ ಧ್ಯೇಯ

- To empower students with indispensable knowledge through dedicated teaching and collaborative learning.
  ಸಮರ್ಪಣಾ ಮನೋಭಾವದ ಬೋಧನೆ ಹಾಗೂ ಸಹಭಾಗಿತ್ವದ ಕಲಿಕಾಕ್ರಮಗಳಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಅತ್ಯತ್ಕೃಷ್ಟ ಜ್ಞಾನಸಂಪನ್ನರಾಗಿಸುವುದು.
- To advance extensive research in science, engineering and management disciplines.
  ವೈಜ್ಞಾನಿಕ, ತಾಂತ್ರಿಕ ಹಾಗೂ ಆಡಳಿತ ವಿಜ್ಞಾನ ವಿಭಾಗಗಳಲ್ಲಿ ವಿಸ್ತೃತ ಸಂಶೋಧನೆಗಳೊಡನೆ ಬೆಳವಣಿಗೆ ಹೊಂದುವುದು.
- To facilitate entrepreneurial skills through effective institute - industry collaboration and interaction with alumni.
  ಉದ್ಯಮ ಕ್ಷೇತಗಳೊಡನೆ ಸಹಯೋಗ, ಸಂಸ್ಥೆಯ ಹಿರಿಯ ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ನಿರಂತರ ಸಂವಹನಗಳಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಉದ್ಯಮಶೀಲತೆಯ ಕೌಶಲ್ಯ ಪಡೆಯಲು ನೆರವಾಗುವುದು.
- To instill the need to uphold ethics in every aspect.
  ಜೀವನದಲ್ಲಿ ನೈತಿಕ ಮೌಲ್ಯಗಳನ್ನು ಅಳವಡಿಸಿಕೊಳ್ಳುವುದರ ಮಹತ್ವದ ಕುರಿತು ಅರಿವು ಮೂಡಿಸುವುದು.
- To mould holistic individuals capable of contributing to the advancement of the society.
  ಸಮಾಜದ ಬೆಳವಣಿಗೆಗೆ ಗಣನೀಯ ಕೊಡುಗೆ ನೀಡಬಲ್ಲ ಪರಿಪೂರ್ಣ ವ್ಯಕ್ತಿತ್ವವುಳ್ಳ ಸಮರ್ಥ ನಾಗರೀಕರನ್ನು ರೂಪಿಸುವುದು.

Maharaja Institute of Technology Mysore

Department of Computer Science and Engineering

Vision

"To be a leading academic department offering computer science and engineering education, fulfilling industrial and societal needs effectively."

Mission

1. To enrich the technical knowledge of students in diversified areas of Computer Science and Engineering by adopting outcome-based approaches.
2. To empower students to be competent professionals maintaining ethicality.
3. To facilitate the development of academia-industry collaboration.
4. To create awareness of entrepreneurship opportunities.

PEO's	Program Educational Objectives Statements
PEO1	Be successful in solving engineering problems associated with computer science and engineering domains.
PEO2	Work collaboratively on multidisciplinary projects and acquire high levels of professionalism backed by ethics.
PEO3	Communicate effectively and exhibit leadership qualities, team spirit necessary for a successful career in either industry, research or entrepreneurship.
PEO4	Continue to learn and advance their career through participation in the activities of professional bodies, obtaining professional certification, pursue of higher education.

PSO's	Program Specific Outcome Statements
PSO1	Apply software engineering practices and strategies in diversified areas of computer science for solving problems using open source environment.
PSO2	Develop suitable algorithms and codes for applications in areas of cognitive technology, computer networks with software engineering principles and practices.

Program Outcomes

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Maharaja Institute of Technology Mysore

Department of Computer Science & Engineering

Course Overview

Subject: DBMS Laboratory with Mini Project **Subject Code: 18CSL58**

A database management system (DBMS) is computer application software that provides a way to manage data. The requirement of modern days is to have an automated system that manages, modifies, and updates data accurately. This is achieved by a DBMS in robust, correct, and non-redundant way. Structured Database Management Systems (DBMS) based on relational and other models have long formed the basis for such databases. Consequently, Oracle, Microsoft SQL Server, Sybase etc. have emerged as leading commercial systems while MySQL, PostgreSQL etc. lead in open source and free domain. The Course allows students to apply the conceptual design model to construct the real-world requirement. Course gives familiarity of Database Concepts were students can analyse the various constraints to populate the database and examine different working concepts of DBMS to infer the most suitable pattern of documentation.

DBMS lab with mini project aims at practicing and achieving this aim by using MySQL. While also gain capability to design database and its hierarchical structure for given real world application.

Course Objectives

The objectives of this course are to make students to learn-

- Foundation knowledge in database concepts, technology, and practice to groom students into well-informed database application developers.
- Strong practice in SQL programming through a variety of database problems.
- Develop database applications using front-end tools and back-end DBMS.

Course Outcomes

COs	Description
18CSL58.1	Demonstrate the Basics Concepts and SQL Queries of Database Management System.
18CSL58.2	Apply the Conceptual Design Model and Database Hierarchical Structure to construct the real-world requirement.
18CSL58.3	Analyze the various constraints to populate the database through SQL Queries.
18CSL58.4	Implement different working concepts of DBMS using SQL Queries.
18CSL58.5	Present the result of database creation and querying process, document it.

Maharaja Institute of Technology Mysore

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Syllabus

Subject: DBMS Laboratory with Mini Project **Subject Code:18CSL58**

Part-A: SQL Programming	
Note: • Design, develop, and implement the specified queries for the following problems using Oracle, MySQL, MS SQL Server, or any other DBMS under LINUX/Windows environment. • Create Schema and insert at least 5 records for each table. Add appropriate database constraints.	
1.	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, Programme_id, No-of_Copies) BOOK_LENDING(Book_id, Programme_id, Card_No, Date_Out, Due_Date) LIBRARY_PROGRAMME(Programme_id, Programme_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 Programme, 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.
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 salesman who had more than one customer. 3. List all the salesman and indicate those who have and do not 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.

3.	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 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.
4.	Consider the schema for College Database: STUDENT(USN, SName, Address, Phone, Gender) SEMSEC(SSID, Sem, Sec) CLASS(USN, SSID) COURSE(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 Courses. 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.
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). 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.

Part-B: Mini Project

Note:

- Use Java, C#, PHP, Python, or any other similar front-end tool. All applications must be demonstrated on desktop/laptop as a stand-alone or web-based application (Mobile apps on Android/IOS are not permitted.)

For any problem selected Make sure that the application should have five or more tables.

Indicative areas include: health care.

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Subject: DBMS Laboratory with Mini Project **Subject Code: 18CSL58**

BASIC CONCEPTS OF SQL

Introduction to SQL

SQL stands for "Structured Query Language" and can be pronounced as "SQL" or "sequel – (Structured English Query Language)". It is a query language used for accessing and modifying information in the database. IBM first developed SQL in 1970s. Also it is an ANSI/ISO standard. It has become a Standard Universal Language used by most of the relational database management systems (RDBMS). Some of the RDBMS systems are: Oracle, Microsoft SQL server, Sybase etc. Most of these have provided their own implementation thus enhancing its feature and making it a powerful tool. Few of the SQL commands used in SQL programming are SELECT Statement, UPDATE Statement, INSERT INTO Statement, DELETE Statement, WHERE Clause, ORDER BY Clause, GROUP BY Clause, ORDER Clause, Joins, Views, GROUP Functions, Indexes etc.

SQL Commands

SQL commands are instructions used to communicate with the database to perform specific task that work with data. SQL commands can be used not only for searching the database but also to perform various other functions like, for example, you can create tables, add data to tables, or modify data, drop the table, set permissions for users.

CREATE TABLE Statement

The CREATE TABLE Statement is used to create tables to store data. Integrity Constraints like primary key, unique key and foreign key can be defined for the columns while creating the table. The integrity constraints can be defined at column level or table level. The implementation and the syntax of the CREATE Statements differs for different RDBMS.

The Syntax for the CREATE TABLE Statement is:

```
CREATE TABLE
table_name
(column_name1 datatype constraint,
column_name2 datatype,...
column_nameNdatatype);
```

SQL Data Types:

char(size)	Fixed-length character string. Size is specified in parenthesis. Max 255 bytes.
Varchar2(size)	Variable-length character string. Max size is specified in parenthesis.
number(size) or int	Number value with a max number of column digits specified in parenthesis.
Date	Date value in „dd-mon-yy". Eg., "07-jul-2004"
number(size, d) or real	Number value with a maximum number of digits of "size" total, with a maximum number of "d" digits to the right of the decimal.

SQL Integrity Constraints:

Integrity Constraints are used to apply business rules for the database tables.The constraints available in SQL are **Foreign Key, Primary key, Not Null, Unique, Check.**

Constraints can be defined in two ways:

1. The constraints can be specified immediately after the column definition. This is called column-level definition.
2. The constraints can be specified after all the columns are defined. This is called table- level definition.

1) Primary key:

This constraint defines a column or combination of columns which uniquely identifies each row in the table.

Syntax to define a Primary key at column level:

```
Column_namedatatype [CONSTRAINT constraint_name] PRIMARY KEY
```

Syntax to define a Primary key at table level:

```
[CONSTRAINT constraint_name] PRIMARY KEY(column_name1,
column_name2,..)
```

2) Foreign key or Referential Integrity:

This constraint identifies any column referencing the PRIMARY KEY in another table. It establishes a relationship between two columns in the same table or between different tables. For a column to be defined as a Foreign Key, it should be a defined as a Primary Key in the table which it is referring. One or more columns can be defined as foreign key.

Syntax to define a Foreign key at column level:

```
[CONSTRAINT constraint_name] REFERENCES

    referenced_table_name(column_name)
```

3) Not Null Constraint:

This constraint ensures all rows in the table contain a definite value for the column which is specified as not null. Which means a null value is not allowed.

Syntax to define a Not Null constraint:

```
[CONSTRAINT constraint name] NOT NULL
```

4) Unique Key:

This constraint ensures that a column or a group of columns in each row have a distinct value. A column(s) can have a null value but the values cannot be duplicated.

Syntax to define a Unique key at column level:

```
[CONSTRAINT constraint_name] UNIQUE
```

Syntax to define a Unique key at table level:

```
[CONSTRAINT constraint_name] UNIQUE(column_name)
```

5) Check Constraint:

This constraint defines a business rule on a column. All the rows must satisfy this rule. The constraint can be applied for a single column or a group of columns.

Syntax to define a Check constraint:

```
[CONSTRAINT constraint_name] CHECK (condition)
```

ALTER TABLE Statement

The SQL ALTER TABLE command is used to modify the definition structure) of a table by modifying the definition of its columns. The ALTER command is used to perform the following functions.

1) Add, drop, modify table columns
2) Add and drop constraints
3) Enable and Disable constraints

The HAVING clause

The HAVING clause can be used to restrict the display of grouped rows. The result of the grouped query is passed on to the HAVING clause for output filtration.

The INSERT INTO Statement

The INSERT INTO statement is used to insert a new row in a table.

The UPDATE Statement

The UPDATE statement is used to update existing records in a table.

The DELETE Statement

The DELETE statement is used to delete rows in a table. SQL

DELETE

Commit command

Commit command is used to permanently save any transaaction into database

Rollback command

This command restores the database to last commited state. It is also use with savepoint command to jump to a savepoint in a transaction.

Savepoint command

savepoint command is used to temporarily save a transaction so that you can rollback to that point whenever necessary.

LAB EXPERIMENTS

PART A: SQL PROGRAMMING

A. Consider the following schema for a Library Database:

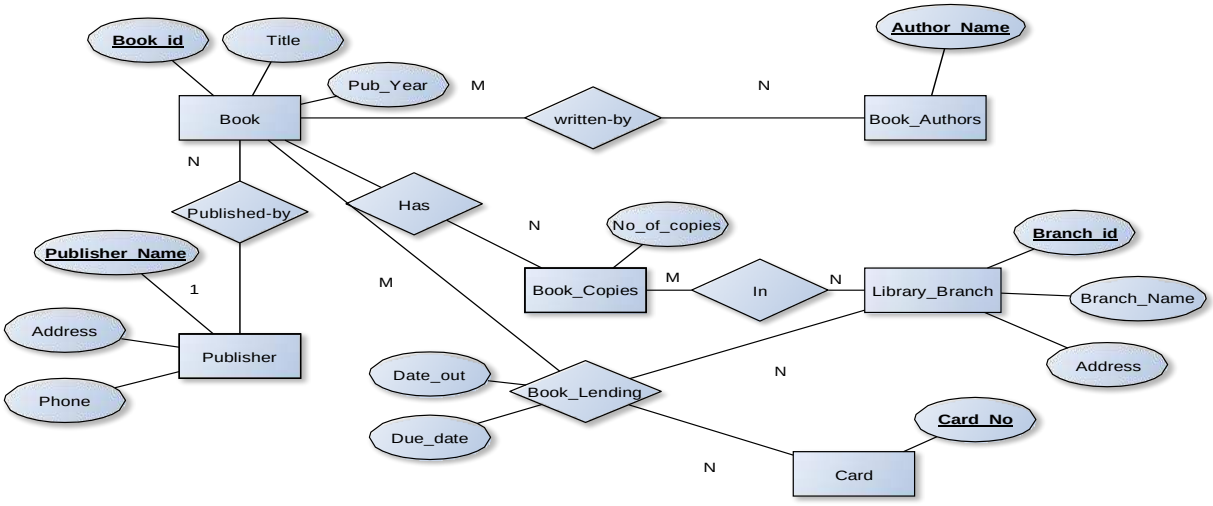
BOOK (*Book_id, Title, Publisher_Name, Pub_Year*)
BOOK_AUTHORS (Book_id, Author_*Name*)
PUBLISHER (*Name, Address, Phone*)
BOOK_COPIES (*Book_id, Branch_id, No-of_Copies*)
BOOK_LENDING (*Book_id, Branch_id, Card_No, Date_Out, Due_Date*) LIBRARY_BRANCH (*Branch_id, Branch_Name, Address*)

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

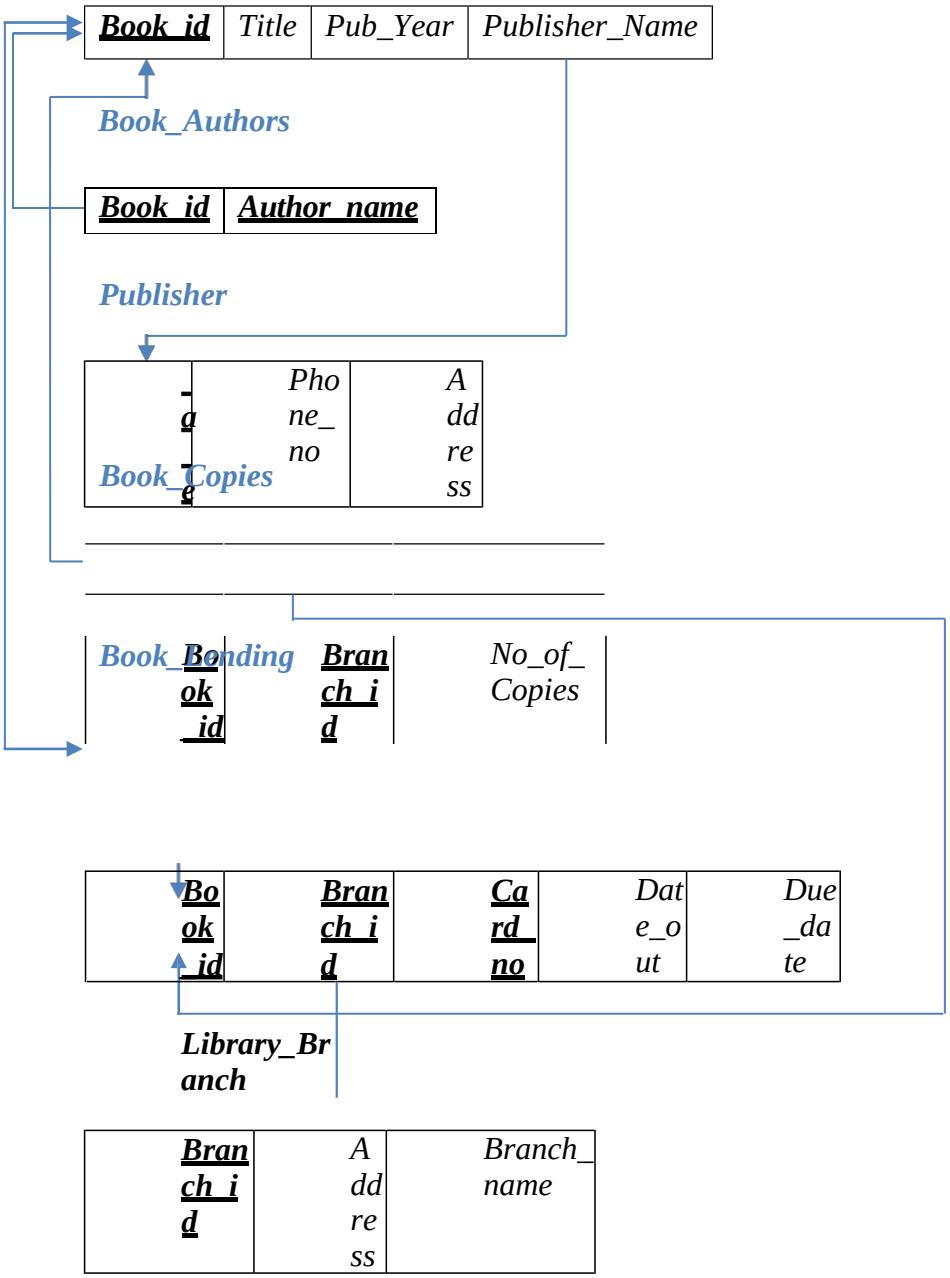


Table Creation

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 LIVRE       8970862340 CHENAI
GRUPO PLANETA        7756120238 BANGALORE
```

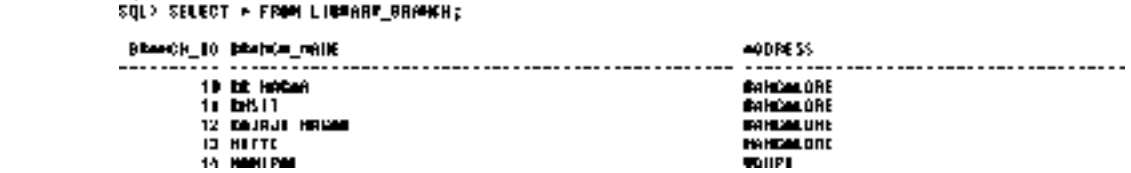
SELECT * FROM BOOK;

```
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;



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	RAMATHE	10	10
1	DBMS	MCGRAW-HILL	RAMATHE	5	11
2	ADBMS	MCGRAW-HILL	RAMATHE	2	12
2	ADBMS	MCGRAW-HILL	RAMATHE	5	13
3	CN	PEARSON	TANENBAUM	7	14
5	OS	PEARSON	CALVIN	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;
```

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

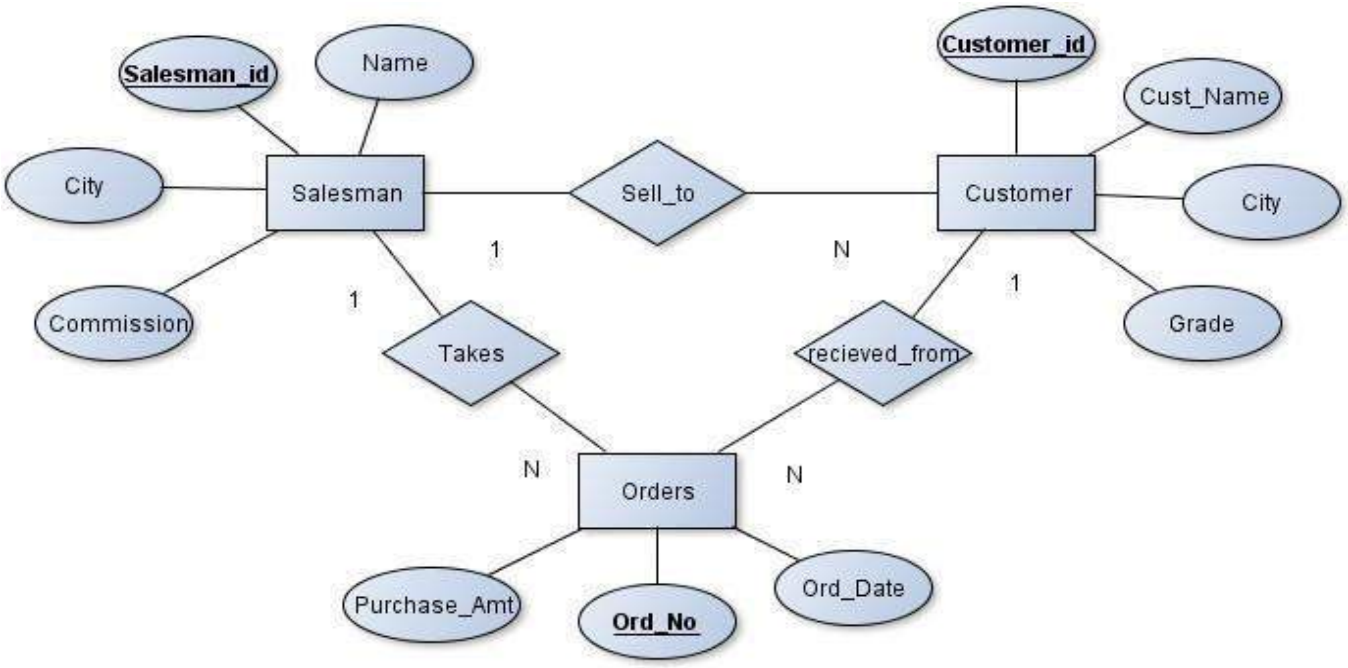
B. Consider the following schema for Order Database:

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

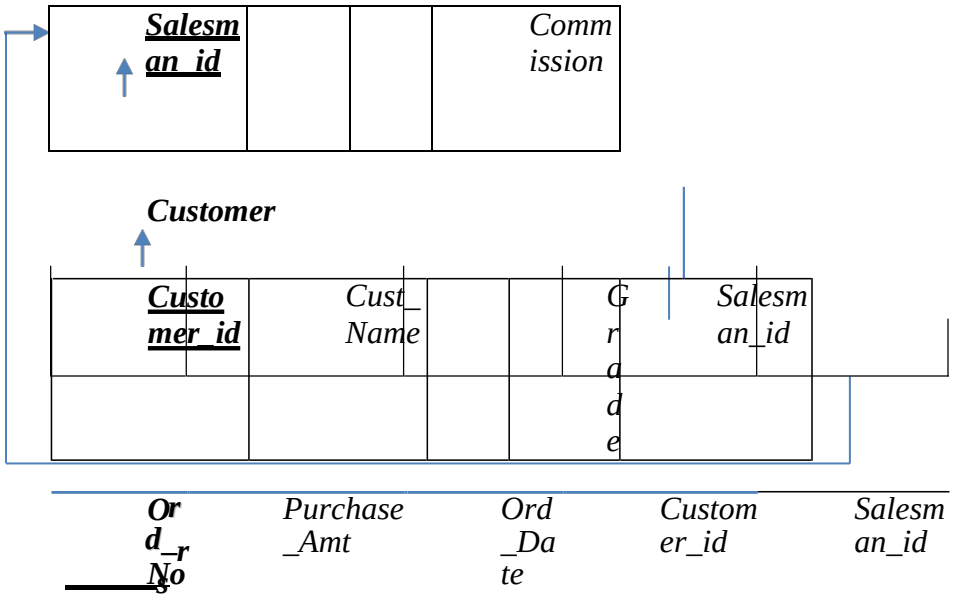


Table Creation

```
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	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
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 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 %
```

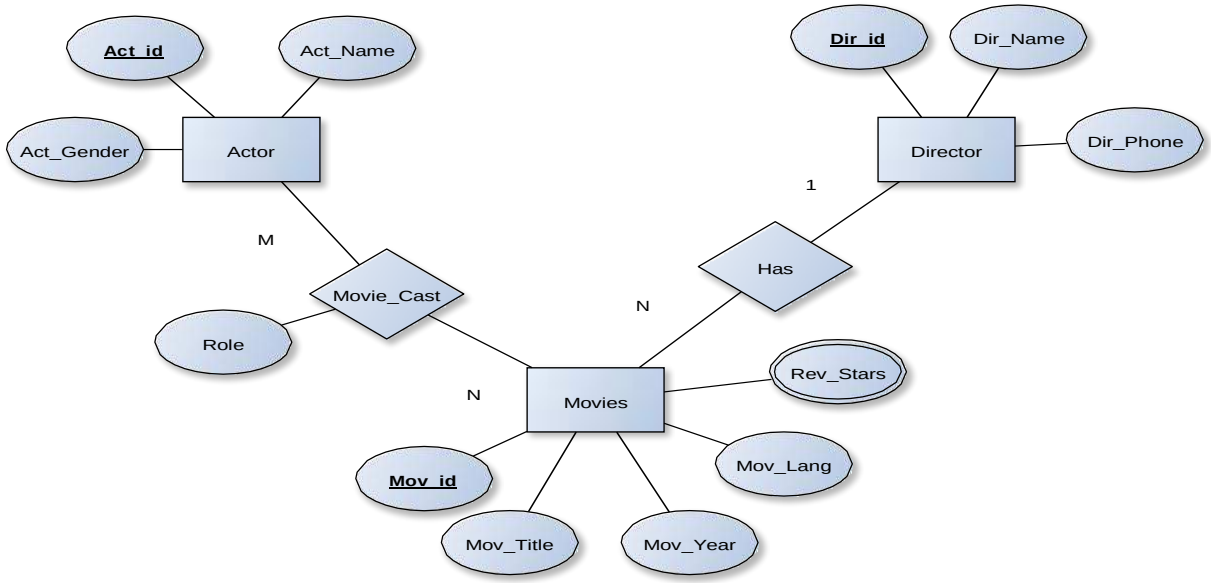
C. Consider the schema for Movie Database:

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

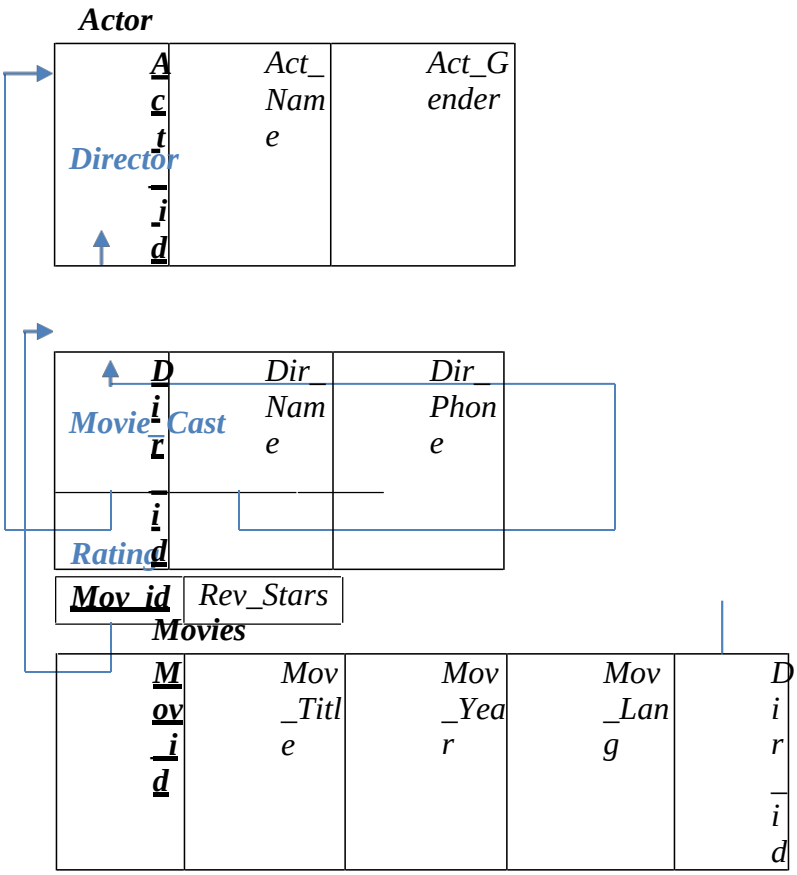


Table Creation

CREATE TABLE ACTOR (
ACT_ID 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 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;
```

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

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;

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

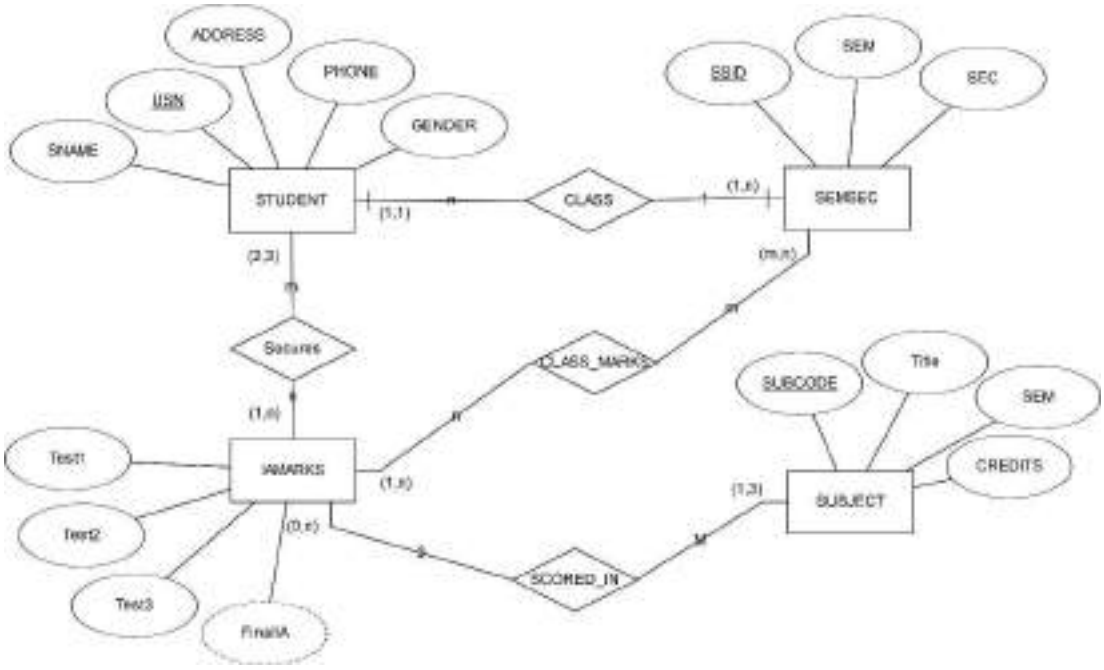
D. Consider the schema for College Database:

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

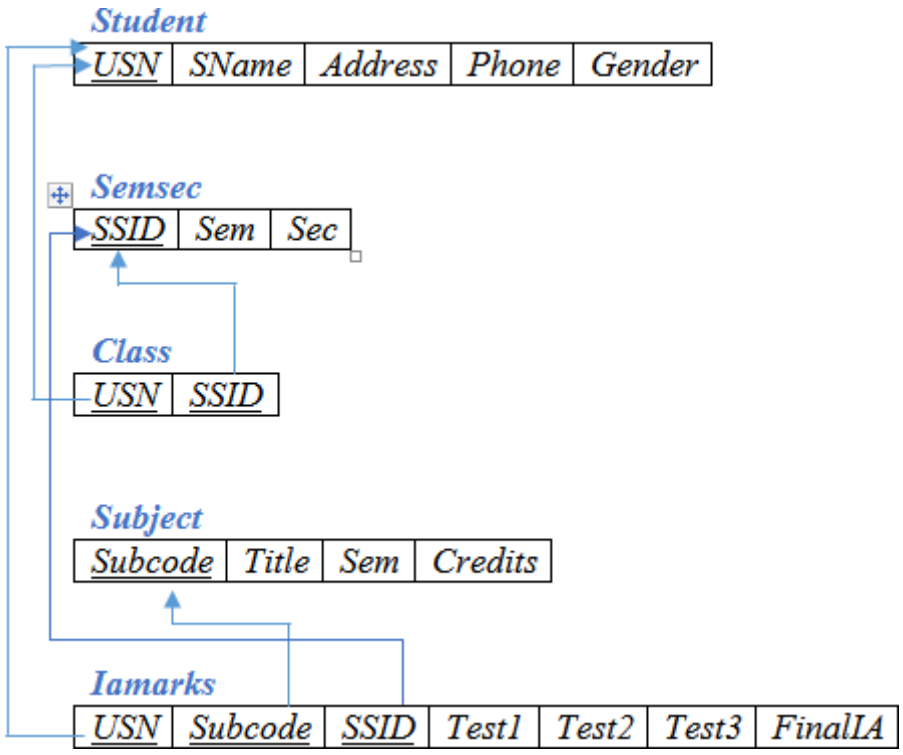


Table Creation

```
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
```

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	

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
1BM15CS091	SAMTOSH	MANGALURU	9912332201	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
WHERES.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:

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:

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 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;
```

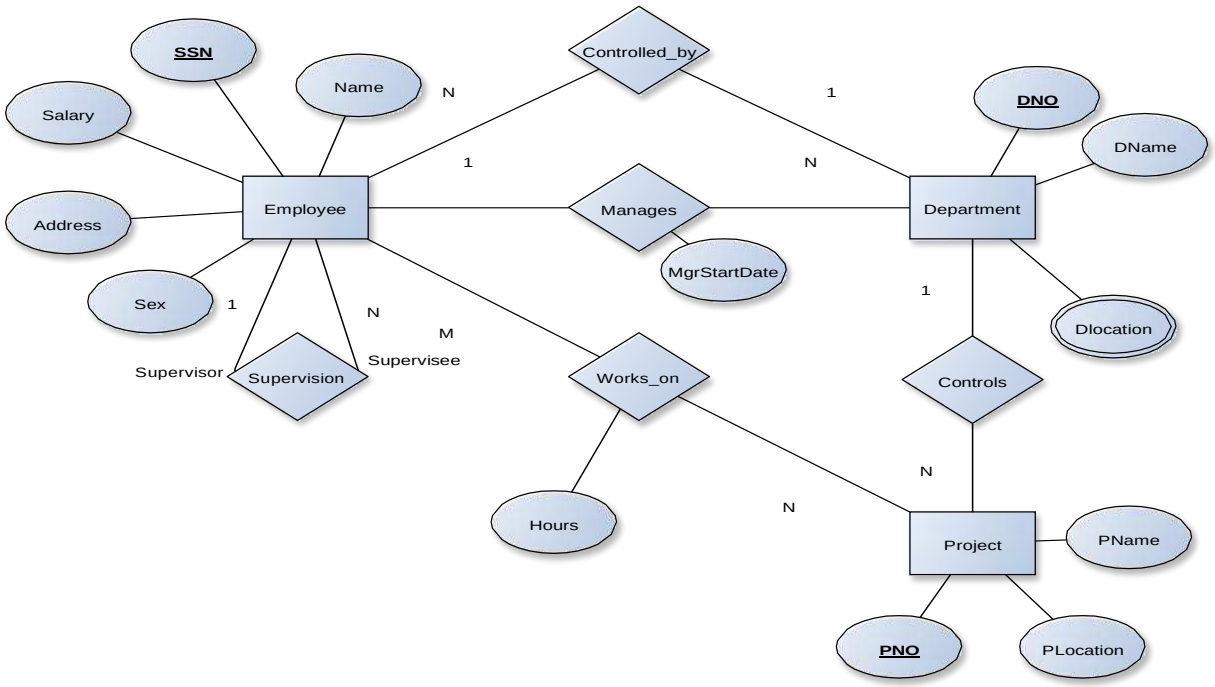
USN	SNAME	ADDRESS	PHONE	G	CAT
1BM18CS091	TEESHa	BENGALUAN	7712312312	F	OutStanding
1BM18CS091	TEESHa	BENGALUAN	7712312312	F	OutStanding
1BM18CS091	TEESHa	BENGALURa	7712312312	F	OutStanding
1AM18CS091	TEESHA	BENGALURa	7712312312	F	OutStanding
1AM18CS091	TEESHA	BENGALURa	7712312312	F	Average

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



Schema Diagram

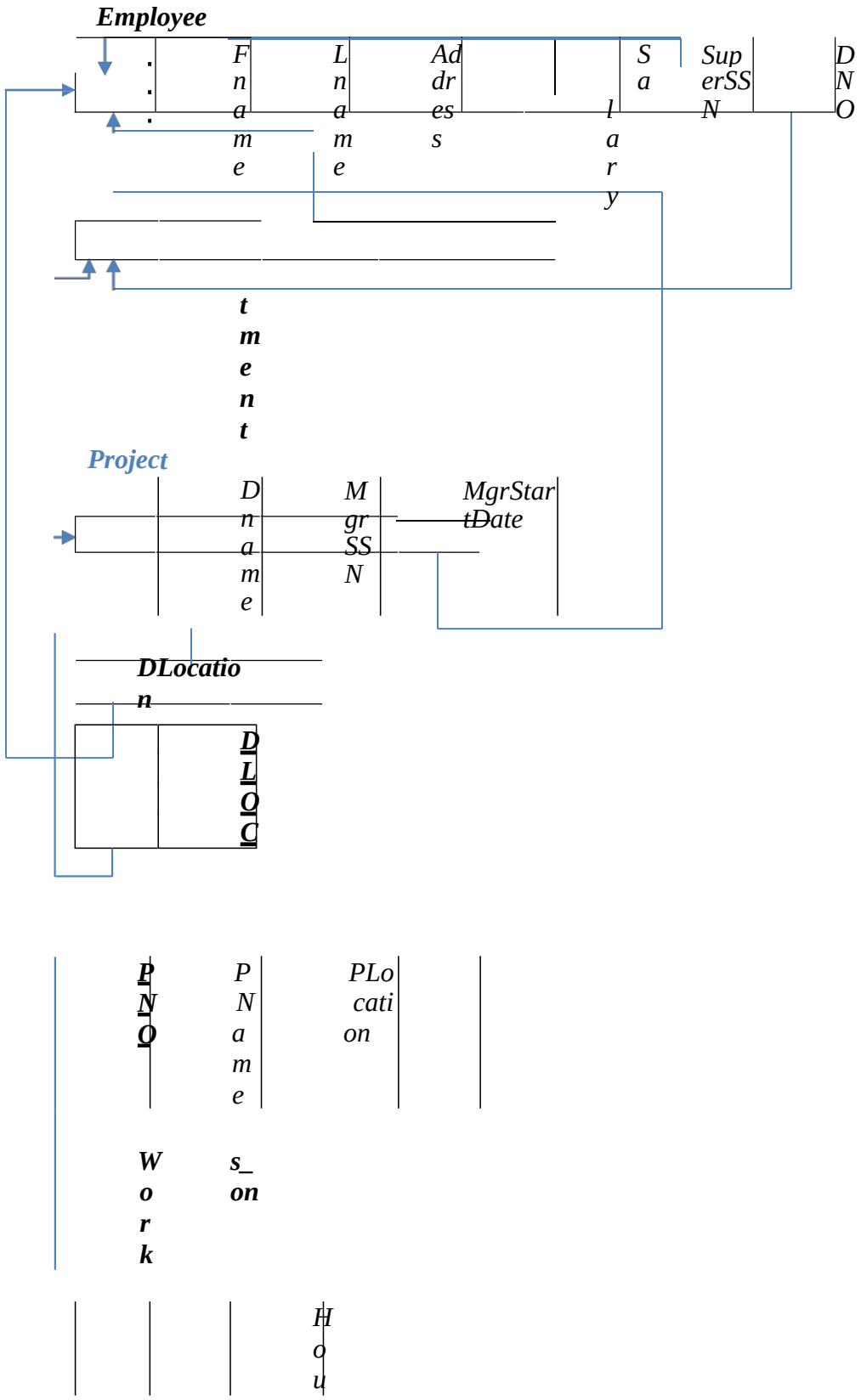


Table Creation

```
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,,,SMARTCITY,,,,,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);
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	HEMANTH	BANKER	BANGALORE	M	700000	RNSCSE02	5
RNSCSE03	EDWARD	SCOTT	MYSORE	M	500000	RNSCSE04	5
RNSCSE04	PAVAN	HEGDE	MANGALORE	M	650000	RNSCSE05	5
RNSCSE05	GIRISH	MALYA	MYSORE	M	450000	RNSCSE04	5
RNSCSE06	MEGA	SH	BANGALORE	F	800000		5
RNSACC01	ANUSHA	K	MANGALORE	F	350000	RNSACC02	1
RNSACC02	SHWETHA	KUMAR	MANGALORE	M	300000		1
RNSISE01	VEENA	N	MYSORE	M	600000		4
RNSIT01	HAREESH	NR	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

Viva Questions with Answers

1. What is SQL?

Structured Query Language

2. What is database?

A database is a logically coherent collection of data with some inherent meaning, representing some aspect of real world and which is designed, built and populated with data for a specific purpose.

3. What is DBMS?

It is a collection of programs that enables user to create and maintain a database. In other words it is general-purpose software that provides the users with the processes of defining, constructing and manipulating the database for various applications.

4. What is a Database system?

The database and DBMS software together is called as Database system.

5. Advantages of DBMS?

- Redundancy is controlled.
- Unauthorized access is restricted.
- Providing multiple user interfaces.
- Enforcing integrity constraints.
- Providing backup and recovery.

6. Disadvantage in File Processing System?

- Data redundancy & inconsistency.
- Difficult in accessing data.
- Data isolation.
- Data integrity.
- Concurrent access is not possible.
- Security Problems.

7. Describe the three levels of data abstraction?

There are three levels of abstraction:

- Physical level: The lowest level of abstraction describes how data are stored.
- Logical level*:* The next higher level of abstraction, describes what data are stored in database and what relationship among those data.

- View level:The highest level of abstraction describes only part of entire database.

8. Define the "integrity rules"

There are two Integrity rules.

- Entity Integrity:States that ―Primary key cannot have NULL value‖
- Referential Integrity:States that ―Foreign Key can be either a NULL value or should be Primary Key value of other relation.

9. What is extension and intension?

Extension - It is the number of tuples present in a table at any instance. This is time dependent.

Intension -It is a constant value that gives the name, structure of table and the constraints laid on it.

10. What is Data Independence?

Data independence means that ―the application is independent of the storage structure and access strategy of data‖. In other words, The ability to modify the schema definition in one level should not affect the schema definition in the next higher level.

Two types of Data Independence:

- Physical Data Independence: Modification in physical level should not affect the logical level.
- Logical Data Independence: Modification in logical level should affect the view level.

NOTE: Logical Data Independence is more difficult to achieve

11. What is a view? How it is related to data independence?

A view may be thought of as a virtual table, that is, a table that does not really exist in its own right but is instead derived from one or more underlying base table. In other words, there is no stored file that direct represents the view instead a definition of view is stored in data dictionary.

Growth and restructuring of base tables is not reflected in views. Thus the view can insulate users from the effects of restructuring and growth in the database. Hence accounts for logical data independence.

12. What is Data Model?

A collection of conceptual tools for describing data, data relationships data semantics and constraints.

13. What is E-R model?

This data model is based on real world that consists of basic objects called entities and of relationship among these objects. Entities are described in a database by a set of attributes.

14. What is Object Oriented model?

This model is based on collection of objects. An object contains values stored in instance variables within the object. An object also contains bodies of code that operate on the object. These bodies of code are called methods. Objects that contain same types of values and the same methods are grouped together into classes.

15. What is an Entity?

It is an 'object' in the real world with an independent existence.

16. What is an Entity type?

It is a collection (set) of entities that have same attributes.

17. What is an Entity set?

It is a collection of all entities of particular entity type in the database.

18. What is an Extension of entity type?

The collections of entities of a particular entity type are grouped together into an entity set.

19. What is an attribute?

It is a particular property, which describes the entity.

20. What is a Relation Schema and a Relation?

A relation Schema denoted by R(A1, A2, …, An) is made up of the relation name R and the list of attributes A_i that it contains. A relation is defined as a set of tuples. Let r be the relation which contains set tuples (t1, t2, t3, ...,tn). Each tuple is an ordered list of n-values t=(v1,v2, ..., vn).

21. What is degree of a Relation?

It is the number of attribute of its relation schema.

22. What is Relationship?

It is an association among two or more entities.

23. What is Relationship set?

The collection (or set) of similar relationships.

24. What is Relationship type?

Relationship type defines a set of associations or a relationship set among a given set of entity types.

25. What is degree of Relationship type?

It is the number of entity type participating.

26. What is DDL (Data Definition Language)?

A data base schema is specified by a set of definitions expressed by a special language called DDL.

27. What is VDL (View Definition Language)?

It specifies user views and their mappings to the conceptual schema.

28. What is SDL (Storage Definition Language)?

This language is to specify the internal schema. This language may specify the mapping between two schemas.

29. What is Data Storage - Definition Language?

The storage structures and access methods used by database system are specified by a set of definition in a special type of DDL called data storage- definition language.

30. What is DML (Data Manipulation Language)?

This language that enable user to access or manipulate data as organized by appropriate data model.

- Procedural DML or Low level: DML requires a user to specify what data are needed and how to get those data.
- Non-Procedural DML or High level: DML requires a user to specify what data are needed without specifying how to get those data.

31. What is DML Compiler?

It translates DML statements in a query language into low-level instruction that the query evaluation engine can understand.

32. What is Relational Algebra?

It is a procedural query language. It consists of a set of operations that take one or two relations as input and produce a new relation.

33. What is Relational Calculus?

It is an applied predicate calculus specifically tailored for relational databases proposed by E.F. Codd. E.g. of languages based on it are DSL, ALPHA, QUEL.

34. What is normalization?

It is a process of analyzing the given relation schemas based on their Functional Dependencies (FDs) and primary key to achieve the properties

- Minimizing redundancy
- Minimizing insertion, deletion and update anomalies.

35. What is Functional Dependency?

A Functional dependency is denoted by X Y between two sets of attributes X and Y that are subsets of R specifies a constraint on the possible tuple that can form a relation state r of R. The constraint is for any two tuples t1 and t2 in r if t1[X] = t2[X] then they have t1[Y] = t2[Y]. This means the value of X component of a tuple uniquely determines the value of component Y.

36. When is a functional dependency F said to be minimal?

- Every dependency in F has a single attribute for its right hand side.
- We cannot replace any dependency X A in F with a dependency Y A where Y is a proper subset of X and still have a set of dependency that is equivalent to F.
- We cannot remove any dependency from F and still have set of dependency that is equivalent to F.

37. What is Multivalued dependency?

Multivalued dependency denoted by X→Y specified on relation schema R, where X and Y are both subsets of R, specifies the following constraint on any relation r of R: if two tuples t1 and t2 exist in r such that t1[X] = t2[X] then t3 and t4 should also exist in r with the following properties

- t3[x] = t4[X] = t1[X] = t2[X]
- t3[Y] = t1[Y] and t4[Y] = t2[Y]
- t3[Z] = t2[Z] and t4[Z] = t1[Z]

where [Z = (R-(X U Y))]

38. What is Lossless join property?

It guarantees that the spurious tuple generation does not occur with respect to relation schemas after decomposition.

39. What is 1 NF (Normal Form)?

The domain of attribute must include only atomic (simple, indivisible) values.

40. What is Fully Functional dependency?

It is based on concept of full functional dependency. A functional dependency X→Y is fully functional dependency if removal of any attribute A from X means that the dependency does not hold any more.

41. What is 2NF?

A relation schema R is in 2NF if it is in 1NF and every non-prime attribute A in R is fully functionally dependent on primary key.

42. What is 3NF?

A relation schema R is in 3NF if it is in 2NF and for every FD X→A either of the following is true

- X is a Super-key of R.
- A is a prime attribute of R.

In other words, if every non prime attribute is non-transitively dependent on primary key.

43. What is BCNF (Boyce-Codd Normal Form)?

A relation schema R is in BCNF if it is in 3NF and satisfies additional constraints that for every FD X→A, X must be a candidate key.

44. What is 4NF?

A relation schema R is said to be in 4NF if for every Multivalued dependency X → Y that holds over R, one of following is true

- X is subset or equal to (or) XY = R.
- X is a super key.

45. What is 5NF?

A Relation schema R is said to be 5NF if for every join dependency {R1, R2, ...,Rn} that holds R, one the following is true

- Ri = R for some i.
- The join dependency is implied by the set of FD, over R in which the left side is key of R.

46. What is meant by query optimization?

The phase that identifies an efficient execution plan for evaluating a query that has the least estimated cost is referred to as query optimization.

47. What is database Trigger?

A database trigger is a PL/SQL block that can defined to automatically execute for insert, update, and delete statements against a table. The trigger can e defined to execute once for the entire statement or once for every row that is inserted, updated, or deleted. For any one table, there are twelve events for which you can define database triggers. A database trigger can call database procedures that are also written in PL/SQL.

48. What are stored-procedures? And what are the advantages of using them.

Stored procedures are database objects that perform a user defined operation. A stored procedure can have a set of compound SQL statements. A stored procedure executes the SQL commands and returns the result to the client. Stored procedures are used to reduce network traffic.

SQL Questions:

1. Which is the subset of SQL commands used to manipulate Oracle Database structures, including tables?

Data Definition Language (DDL)

2. **What operator performs pattern matching?**

   LIKE operator

3. **What operator tests column for the absence of data?**

   IS NULL operator

4. **Which command executes the contents of a specified file?**

   START <filename> or @<filename>

5. **What is the parameter substitution symbol used with INSERT INTO command?**

   &

6. **Which command displays the SQL command in the SQL buffer, and then executes it?**

   RUN

7. **What are the wildcards used for pattern matching?**

   For single character substitution and % for multi-character substitution

8. **State true or false. EXISTS, SOME, ANY are operators in SQL.**

   True

9. **State true or false. !=, <>, ^= all denote the same operation.**

   True

10. **What are the privileges that can be granted on a table by a user to others?**

    Insert, update, delete, select, references, index, execute, alter, all

11. **What command is used to get back the privileges offered by the GRANT command?**

    REVOKE

12. **Which system tables contain information on privileges granted and privileges obtained?**

    USER_TAB_PRIVS_MADE, USER_TAB_PRIVS_RECD

13. **Which system table contains information on constraints on all the tables created?**

    USER_CONSTRAINTS

14. **TRUNCATE TABLE EMP;**

    DELETE FROM EMP;

    Will the outputs of the above two commands differ?

Both will result in deleting all the rows in the table EMP.

15. What the difference is between TRUNCATE and DELETE commands?

TRUNCATE is a DDL command whereas DELETE is a DML command. Hence DELETE operation can be rolled back, but TRUNCATE operation cannot be rolled back. WHERE clause can be used with DELETE and not with TRUNCATE.

16. What command is used to create a table by copying the structure of another table?

Answer:

CREATE TABLE AS SELECT command

Explanation:

To copy only the structure, the WHERE clause of the SELECT command should contain a FALSE statement as in the following.

CREATE TABLE NEWTABLE AS SELECT * FROM EXISTINGTABLE WHERE 1=2;

If the WHERE condition is true, then all the rows or rows satisfying the condition will be copied to the new table.

17. What will be the output of the following query?

SELECT REPLACE (TRANSLATE(LTRIM(RTRIM('!! ATHEN !!','!'), '!'), 'AN', '**'),'*','TROUBLE') FROM DUAL;

TROUBLETHETROUBLE

18. What will be the output of the following query?

SELECT DECODE(TRANSLATE('A','1234567890','1111111111'), '1','YES', 'NO');

Answer : NO

Explanation :

The query checks whether a given string is a numerical digit.

19. What does the following query do?

SELECT SAL + NVL(COMM,0) FROM EMP;

This displays the total salary of all employees. The null values in the commission column will be replaced by 0 and added to salary.

20. Which date function is used to find the difference between two dates?

MONTHS_BETWEEN

21. Why does the following command give a compilation error?

DROP TABLE &TABLE_NAME;

Variable names should start with an alphabet. Here the table name starts with an '&' symbol.

22.What is the advantage of specifying WITH GRANT OPTION in the GRANT command?

The privilege receiver can further grant the privileges he/she has obtained from the owner to any other user.

23. What is the use of the DROP option in the ALTER TABLE command?

It is used to drop constraints specified on the table.

24.What is the value of 'comm' and 'sal' after executing the following query if the initial value of 'sal' is 10000?

*UPDATE EMP SET SAL = SAL + 1000, COMM = SAL*0.1;*

sal = 11000, comm = 1000

25. What is the use of CASCADE CONSTRAINTS?

When this clause is used with the DROP command, a parent table can be dropped even when a child table exists.

Maharaja Institute of Technology Mysore

Department of Computer Science & Engineering

DO's & DONT's

PARTYUSH LABORATORY

1. **General Lab Guidelines:**
   - Maintain laboratory etiquettes during the laboratory sessions.
   - Do not wander around or distract other students or interfere with the conduction of the experiments of other students.
   - Keep the laboratory clean, do not eat, drink or chew gum in the laboratory.
2. **DO'S**
   - Sign the log book when you enter/leave the laboratory.
   - Read the hand out/procedure before starting the experiment. If you do not understand the procedure, clarify with the concerned staff.
   - Report any problem in system (if any) to the person in-charge.
   - After the lab session, shut down the computers.
   - All students in the laboratory should follow the directions given by staff/lab technical staff.
3. **DON'TS**
   - Do not insert metal objects such as pins, needle or clips into the computer casing. They may cause fire.
   - Do not open any irrelevant websites in labs.
   - Do not use flash drive on laboratory computers without the consent of lab instructor.
   - Do not upload, delete or alter any software/ system files on laboratory computers.
   - Students are not allowed to work in laboratory alone or without presence of the teaching staff/ instructor.
   - Do not change the system settings and keyboard keys.
   - Do not damage any hardware.