MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Skill Based Mini Project Report

on

University Management System Database Project

Submitted By:

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Submitted to:

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE
GWALIOR - 474005 (MP) est. 1957

Session

JAN-JUNE 2022

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

CERTIFICATE

This is certified that **Prafull Choudhary** (0901CS201085) has submitted the project report titled **University Management System Database Project** under the mentorship of **Ms. Jaimala Jha**, in partial fulfilment of the requirement for the award of degree of Bachelor of Technology in Computer Science and Engineering from Madhav Institute of Technology and Science, Gwalior.

Ms. Jaimala Jha
Faculty Mentor
Assistant Professor
Computer Science and Engineering

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DECLARATION

I hereby declare that the work being presented in this project report, for the partial fulfilment of requirement for the award of the degree of Bachelor of Technology in Computer Science and Engineering at Madhav Institute of Technology & Science, Gwalior is an authenticated and original record of my work under the mentorship of Ms. Jaimala Jha, Assistant Professor, Computer Science and engineering.

I declare that I have not submitted the matter embodied in this report for the award of any degree or diploma anywhere else.

Prafull Choudhary
0901CS201085
2nd Year, IV Sem
Computer Science and Engineering

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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ACKNOWLEDGEMENT

The full semester project has proved to be pivotal to my career. I am thankful to my institute, **Madhav Institute of Technology and Science** to allow me to continue my disciplinary/interdisciplinary project as a curriculum requirement, under the provisions of the Flexible Curriculum Scheme (based on the AICTE Model Curriculum 2018), approved by the Academic Council of the institute. I extend my gratitude to the Director of the institute, **Dr. R. K. Pandit** and Dean Academics, **Dr. Manjaree Pandit** for this.

I would sincerely like to thank my department, **Department of Computer Science and Engineering, for allowing** me to explore this project. I humbly thank **Dr. Manish Dixit**, Professor and Head, Department of Computer Science and Engineering, for her continued support during the course of this engagement, which eased the process and formalities involved.

I am sincerely thankful to my faculty mentors. I am grateful to the guidance of **Ms. Jaimala Jha,** Assistant Professor, Computer Science and Engineering, for her continued support and guidance throughout the project. I am also very thankful to the faculty and staff of the department.

Prafull Choudhary
0901CS201085
2nd Year, IV Sem
Computer Science and Engineering

ABSTRACT

An University Management System is a system that helps universities manage their student data, staff data, and administrative tasks. The system can be used by universities to manage student records, staff records, course information, and other university-related data. A database is an essential part of the University Management System, as it stores and organizes all of the data used by the system. The database project for an University Management System would involve designing and implementing a database to support the system's functions and features. The database should be able to store and organize data efficiently, and should be able to support a variety of queries and reports.

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Chapter 1: INTRODUCTION

University Management Systems (UMS) are systems that help universities manage their student data, staff data, and administrative tasks. These systems can be used to store and organize student records, staff records, course information, and other data related to the university. A database is an essential part of a UMS, as it stores and organizes all of the data used by the system.

The objective of this project is to design and implement a database for a UMS. The database should be able to store and organize data efficiently, and should be able to support a variety of queries and reports. The project will also involve integrating the database with a user interface, such as a web application or a desktop application, to make it easy for users to access and manage the data.

The scope of this project is limited to the design and implementation of the UMS database. It does not include the development of the user interface or the integration of the database with other systems.

The UMS database will be used by universities to store and organize student records, staff records, course information, and other data related to the university. It will be accessed by administrators, staff, and students, and will be used to support a variety of tasks, including student registration, course scheduling, and grade management.

Chapter 2: Literature Review

There has been a significant amount of research on University Management Systems (UMS) in the past decade. Many universities have implemented UMS to improve their administrative processes and streamline their operations. A UMS typically includes a database to store and organize student records, staff records, course information, and other data related to the university.

One of the key challenges in designing a UMS database is ensuring that it is able to store and organize large amounts of data efficiently. It is also important that the database be able to support a variety of queries and reports, as it will be accessed by a wide range of users, including administrators, staff, and students.

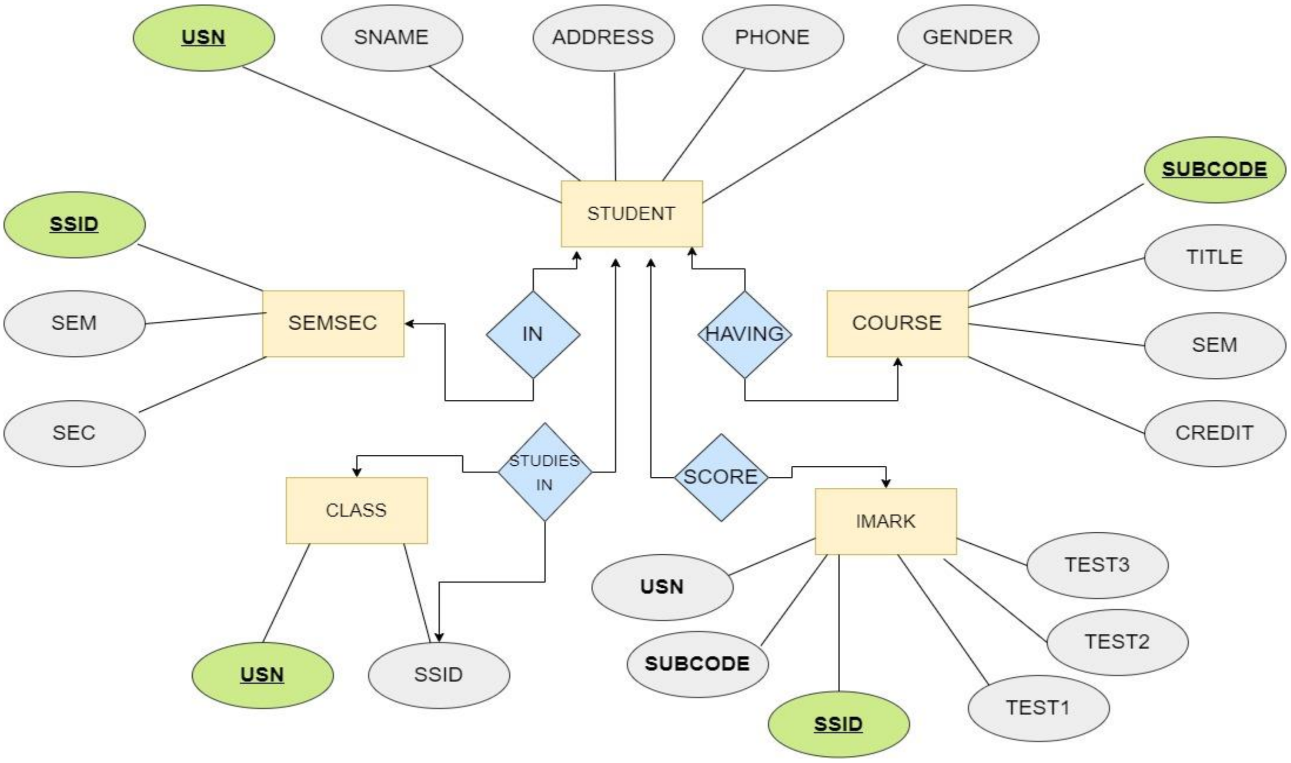
There are several database design principles and best practices that should be considered when designing a UMS database. These include normalization, which involves organizing the data into tables and relationships to reduce redundancy and improve data integrity; indexing, which involves creating special data structures to improve the performance of queries; and data integrity constraints, which ensure that the data in the database is accurate and consistent.

For this project, we will be using a relational database management system (RDBMS) to implement the UMS database. An RDBMS is a software system that is designed to manage and organize data stored in a relational database. We will be using a popular RDBMS, such as MySQL or Oracle, to implement the database.

Chapter 3: Methodology

3.1 Entity-Relationship Diagram (ERD) design

Once the requirements have been gathered, the next step is to design the Entity-Relationship Diagram (ERD) for the database. The ERD is a visual representation of the database that shows the tables and relationships in the database. It is used to design the structure of the database and ensure that it meets the requirements of the system.



In this ERD, the oval shapes represent entities (tables), and the lines connecting the entities represent relationships. The diamonds represent attributes (fields), and the lines connecting the attributes to the entities represent the inclusion of the attributes in the entities.

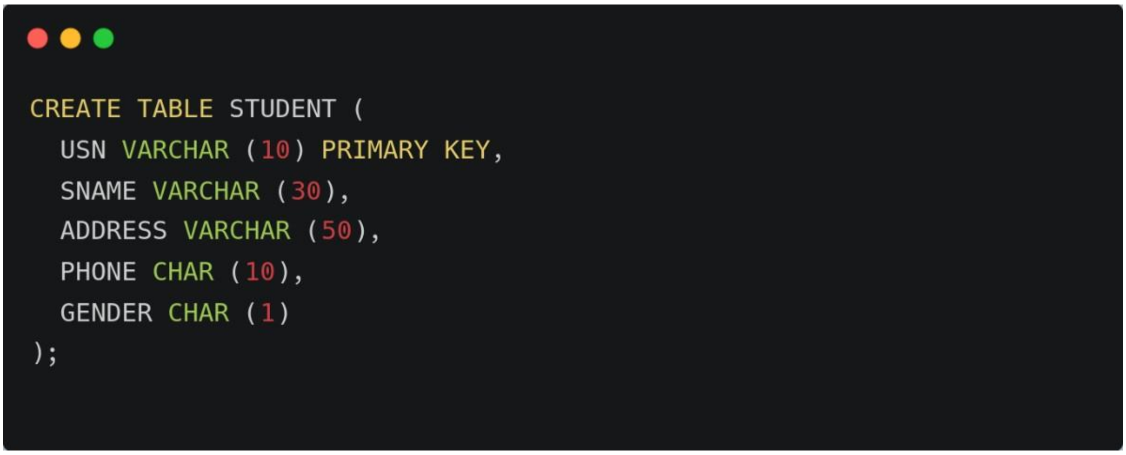
This ERD represents a basic database design for a University Management System. It can be modified and expanded as needed to meet the specific requirements of the system.

3.2 Database implementation

After the ERD has been designed, the next step is to implement the database. This involves creating the database tables and relationships, as well as setting up any necessary data integrity constraints.

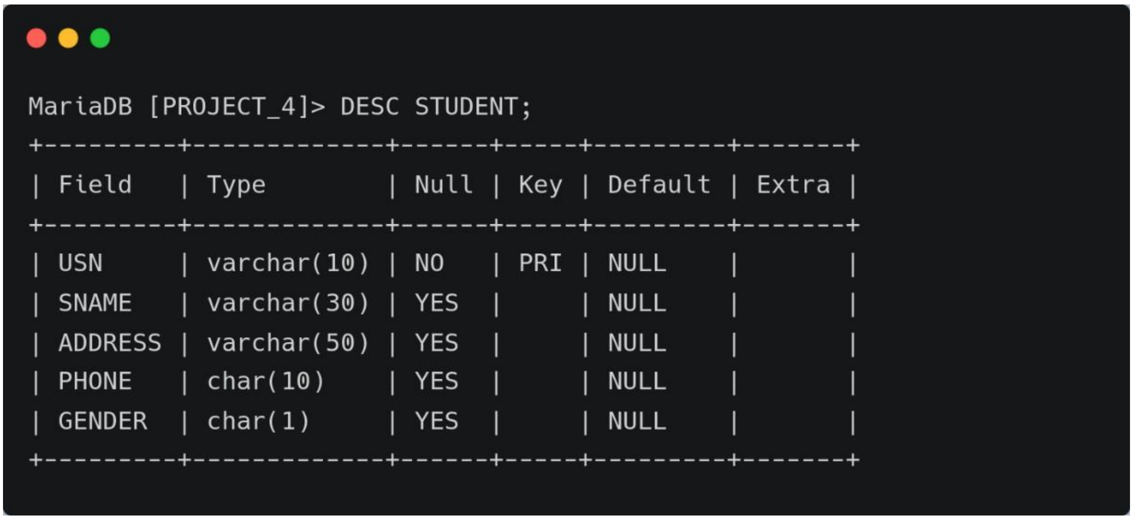
3.2.1 Table Creation

3.2.1.1 STUDENT Table



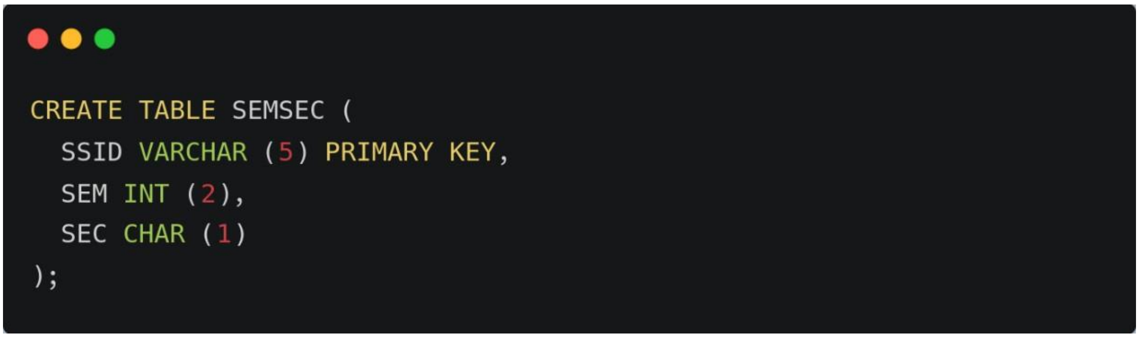
```
CREATE TABLE STUDENT (
  USN VARCHAR (10) PRIMARY KEY,
  SNAME VARCHAR (30),
  ADDRESS VARCHAR (50),
  PHONE CHAR (10),
  GENDER CHAR (1)
);
```

Description of STUDENT Table



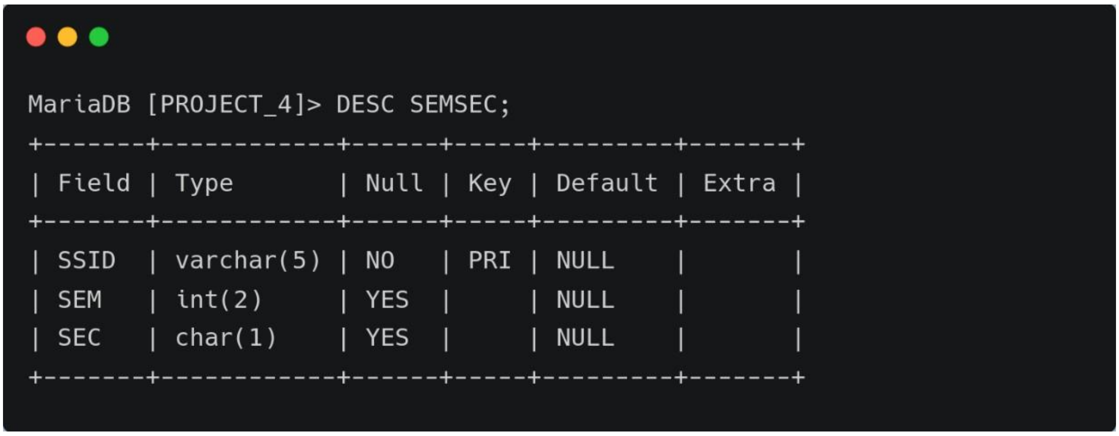
```
MariaDB [PROJECT_4]> DESC STUDENT;
+---------+-------------+------+-----+---------+-------+
| Field   | Type        | Null | Key | Default | Extra |
+---------+-------------+------+-----+---------+-------+
| USN     | varchar(10) | NO   | PRI | NULL    |       |
| SNAME   | varchar(30) | YES  |     | NULL    |       |
| ADDRESS | varchar(50) | YES  |     | NULL    |       |
| PHONE   | char(10)    | YES  |     | NULL    |       |
| GENDER  | char(1)     | YES  |     | NULL    |       |
+---------+-------------+------+-----+---------+-------+
```

3.2.1.2 SEMSEC Table



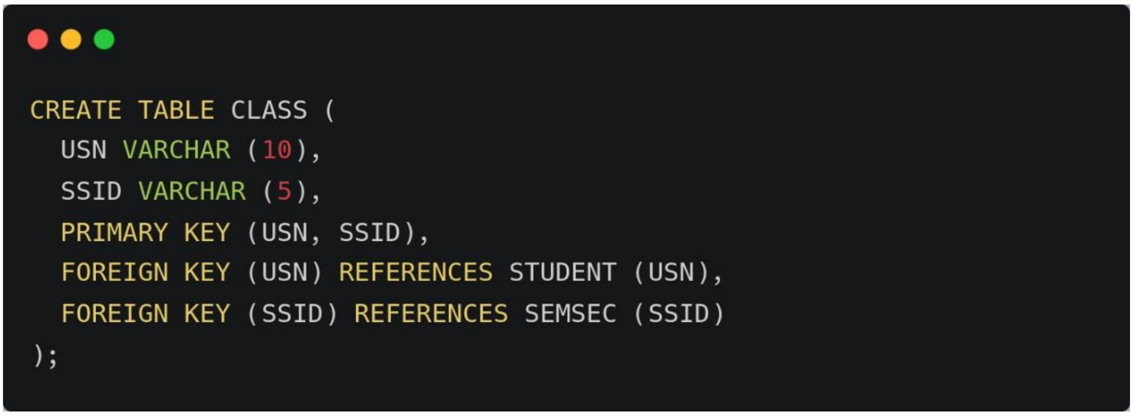
```
CREATE TABLE SEMSEC (
  SSID VARCHAR (5) PRIMARY KEY,
  SEM INT (2),
  SEC CHAR (1)
);
```

Description of SEMSEC Table



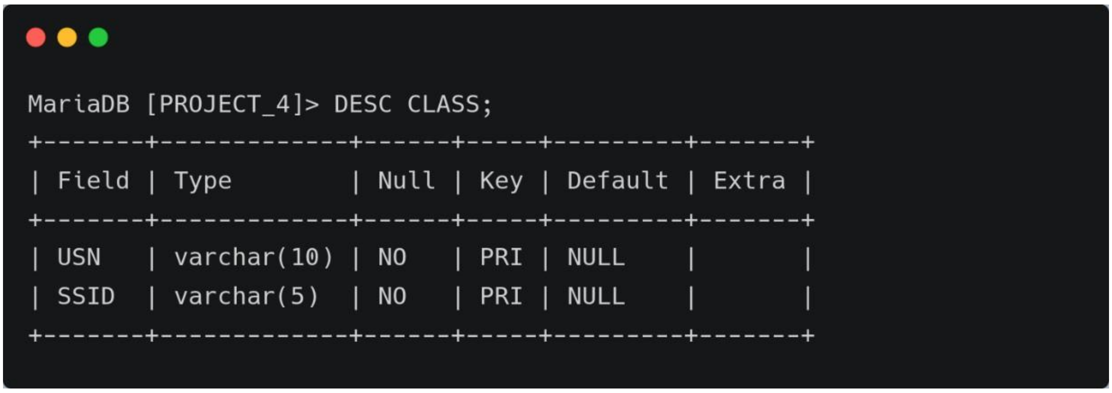
```
MariaDB [PROJECT_4]> DESC SEMSEC;
+-------+------------+------+-----+---------+-------+
| Field | Type       | Null | Key | Default | Extra |
+-------+------------+------+-----+---------+-------+
| SSID  | varchar(5) | NO   | PRI | NULL    |       |
| SEM   | int(2)     | YES  |     | NULL    |       |
| SEC   | char(1)    | YES  |     | NULL    |       |
+-------+------------+------+-----+---------+-------+
```

3.2.1.3 CLASS Table



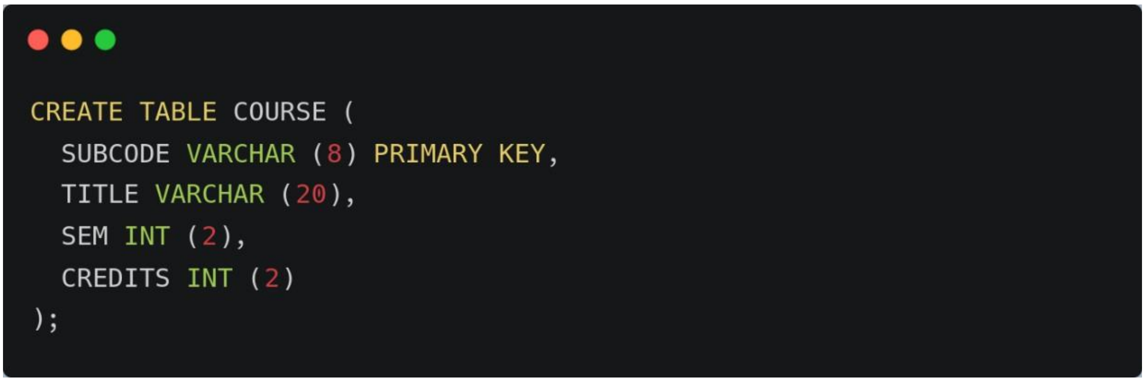
```
CREATE TABLE CLASS (
  USN VARCHAR (10),
  SSID VARCHAR (5),
  PRIMARY KEY (USN, SSID),
  FOREIGN KEY (USN) REFERENCES STUDENT (USN),
  FOREIGN KEY (SSID) REFERENCES SEMSEC (SSID)
);
```

Description of CLASS Table



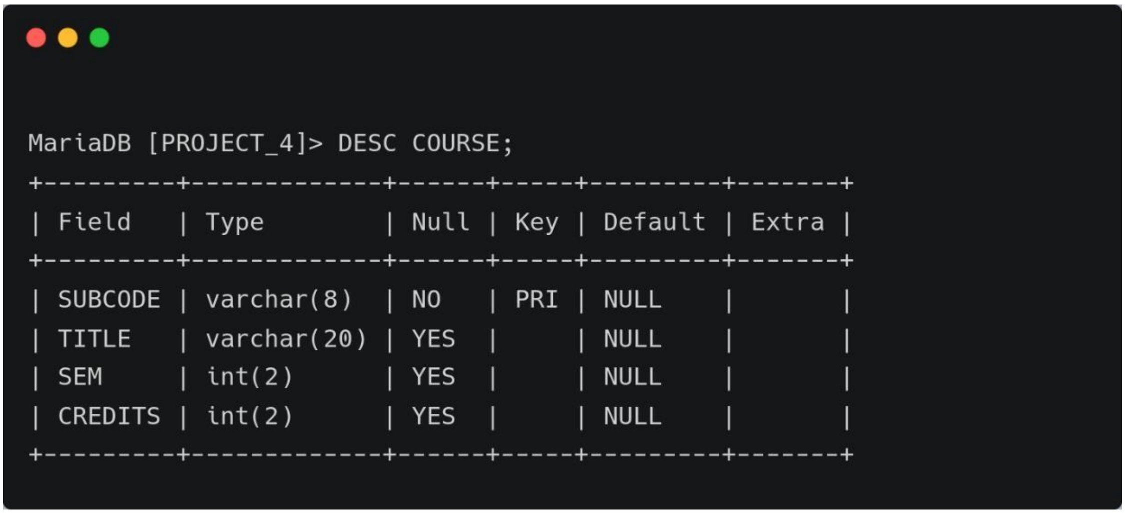
```
MariaDB [PROJECT_4]> DESC CLASS;
+-------+-------------+------+-----+---------+-------+
| Field | Type        | Null | Key | Default | Extra |
+-------+-------------+------+-----+---------+-------+
| USN   | varchar(10) | NO   | PRI | NULL    |       |
| SSID  | varchar(5)  | NO   | PRI | NULL    |       |
+-------+-------------+------+-----+---------+-------+
```

3.2.1.4 COURSE Table



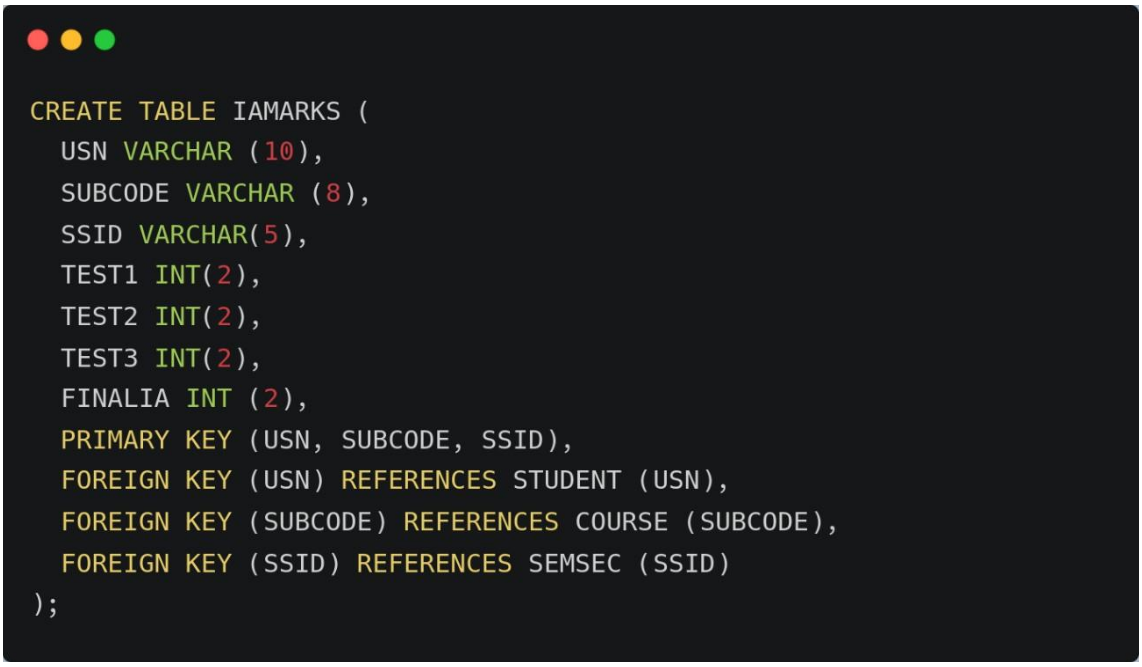
```
CREATE TABLE COURSE (
  SUBCODE VARCHAR (8) PRIMARY KEY,
  TITLE VARCHAR (20),
  SEM INT (2),
  CREDITS INT (2)
);
```

Description of COURSE Table



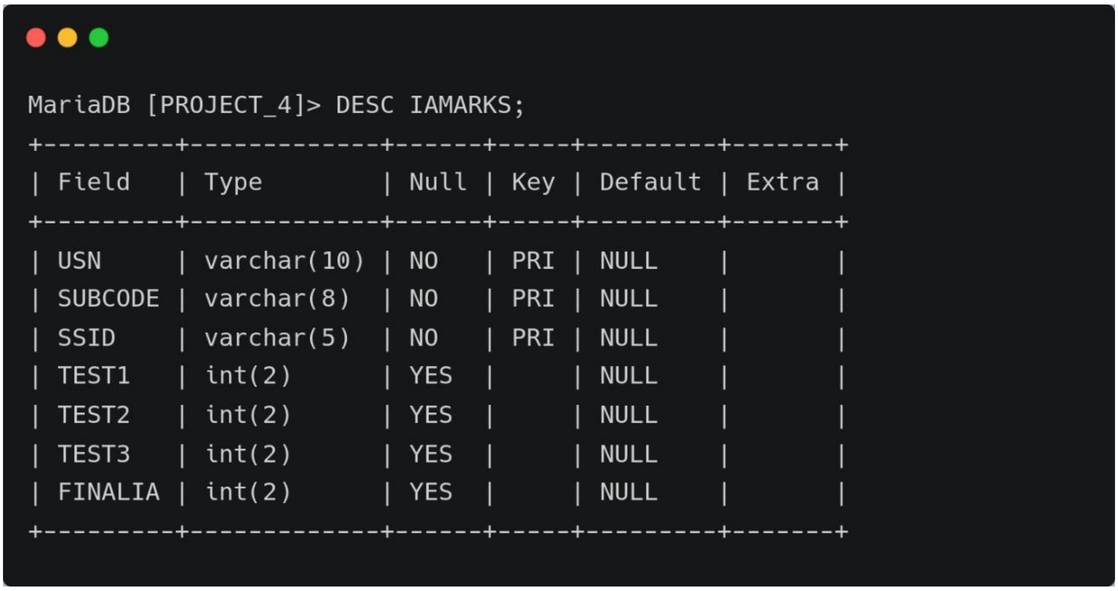
```
MariaDB [PROJECT_4]> DESC COURSE;
+---------+-------------+------+-----+---------+-------+
| Field   | Type        | Null | Key | Default | Extra |
+---------+-------------+------+-----+---------+-------+
| SUBCODE | varchar(8)  | NO   | PRI | NULL    |       |
| TITLE   | varchar(20) | YES  |     | NULL    |       |
| SEM     | int(2)      | YES  |     | NULL    |       |
| CREDITS | int(2)      | YES  |     | NULL    |       |
+---------+-------------+------+-----+---------+-------+
```

3.2.1.5 IAMARKS Table



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

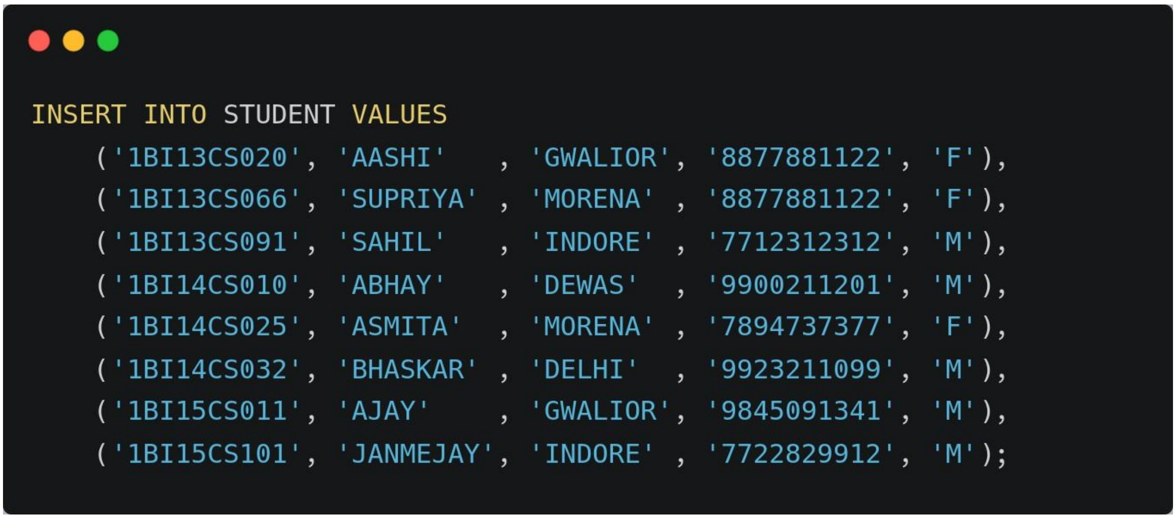
Description of IAMARKS Table



```
MariaDB [PROJECT_4]> DESC IAMARKS;
+---------+-------------+------+-----+---------+-------+
| Field   | Type        | Null | Key | Default | Extra |
+---------+-------------+------+-----+---------+-------+
| USN     | varchar(10) | NO   | PRI | NULL    |       |
| SUBCODE | varchar(8)  | NO   | PRI | NULL    |       |
| SSID    | varchar(5)  | NO   | PRI | NULL    |       |
| TEST1   | int(2)      | YES  |     | NULL    |       |
| TEST2   | int(2)      | YES  |     | NULL    |       |
| TEST3   | int(2)      | YES  |     | NULL    |       |
| FINALIA | int(2)      | YES  |     | NULL    |       |
+---------+-------------+------+-----+---------+-------+
```

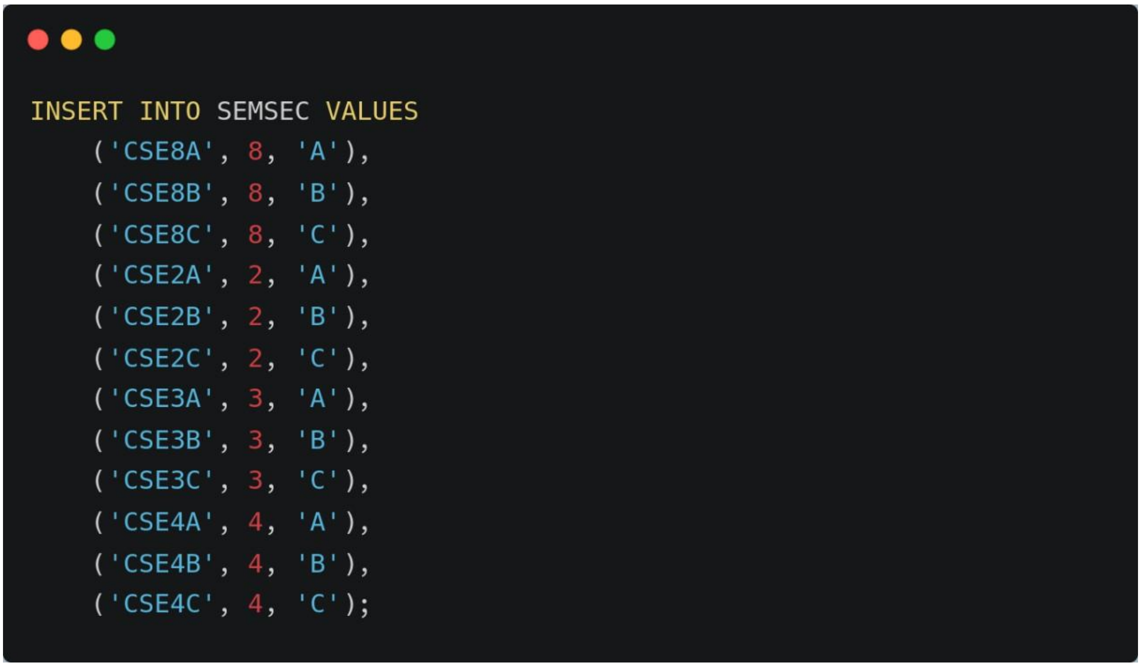
3.2.2 Value Insertion

3.2.2.1 Insertion into STUDENT Table



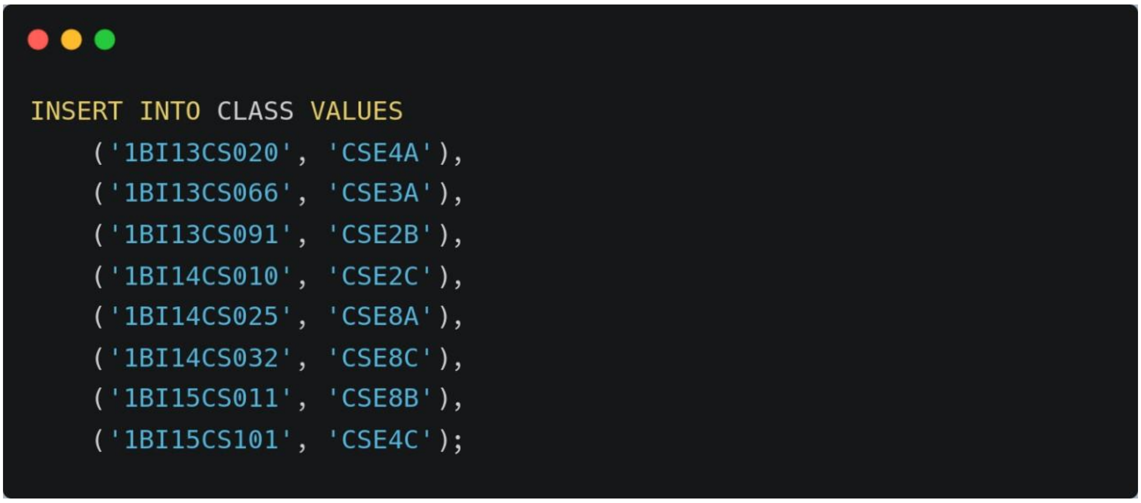
```
INSERT INTO STUDENT VALUES
    ('1BI13CS020', 'AASHI'   , 'GWALIOR', '8877881122', 'F'),
    ('1BI13CS066', 'SUPRIYA' , 'MORENA' , '8877881122', 'F'),
    ('1BI13CS091', 'SAHIL'   , 'INDORE' , '7712312312', 'M'),
    ('1BI14CS010', 'ABHAY'   , 'DEWAS'  , '9900211201', 'M'),
    ('1BI14CS025', 'ASMITA'  , 'MORENA' , '7894737377', 'F'),
    ('1BI14CS032', 'BHASKAR' , 'DELHI'  , '9923211099', 'M'),
    ('1BI15CS011', 'AJAY'    , 'GWALIOR', '9845091341', 'M'),
    ('1BI15CS101', 'JANMEJAY', 'INDORE' , '7722829912', 'M');
```

3.2.2.2 Insertion into SEMSEC



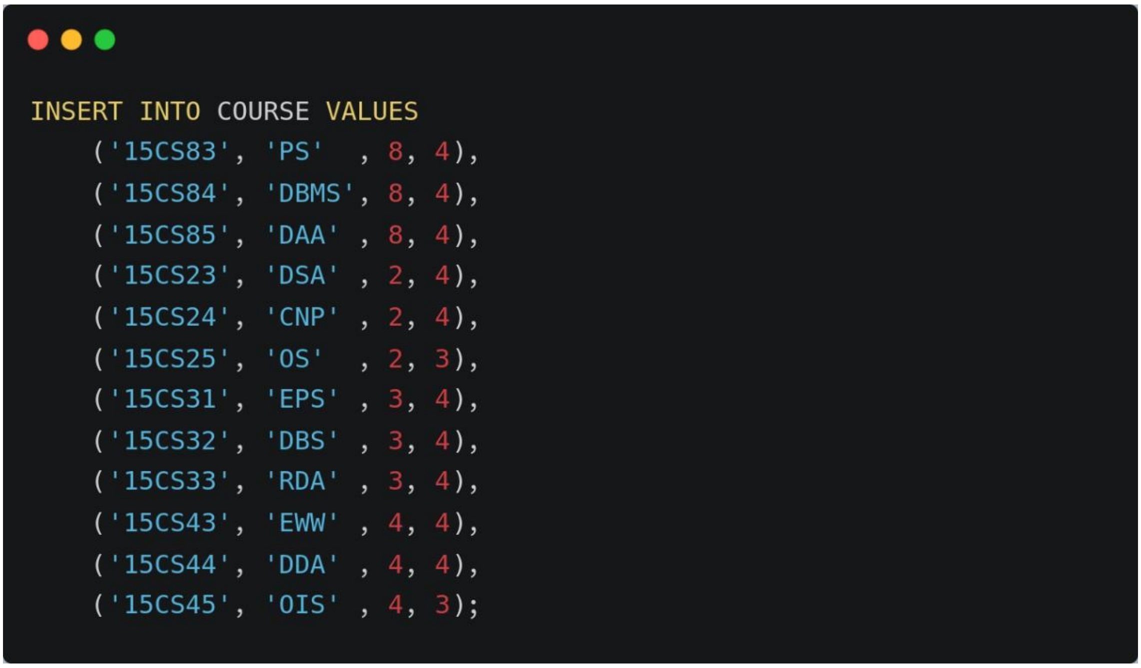
```
INSERT INTO SEMSEC VALUES
    ('CSE8A', 8, 'A'),
    ('CSE8B', 8, 'B'),
    ('CSE8C', 8, 'C'),
    ('CSE2A', 2, 'A'),
    ('CSE2B', 2, 'B'),
    ('CSE2C', 2, 'C'),
    ('CSE3A', 3, 'A'),
    ('CSE3B', 3, 'B'),
    ('CSE3C', 3, 'C'),
    ('CSE4A', 4, 'A'),
    ('CSE4B', 4, 'B'),
    ('CSE4C', 4, 'C');
```

3.2.2.3 Insertion into CLASS



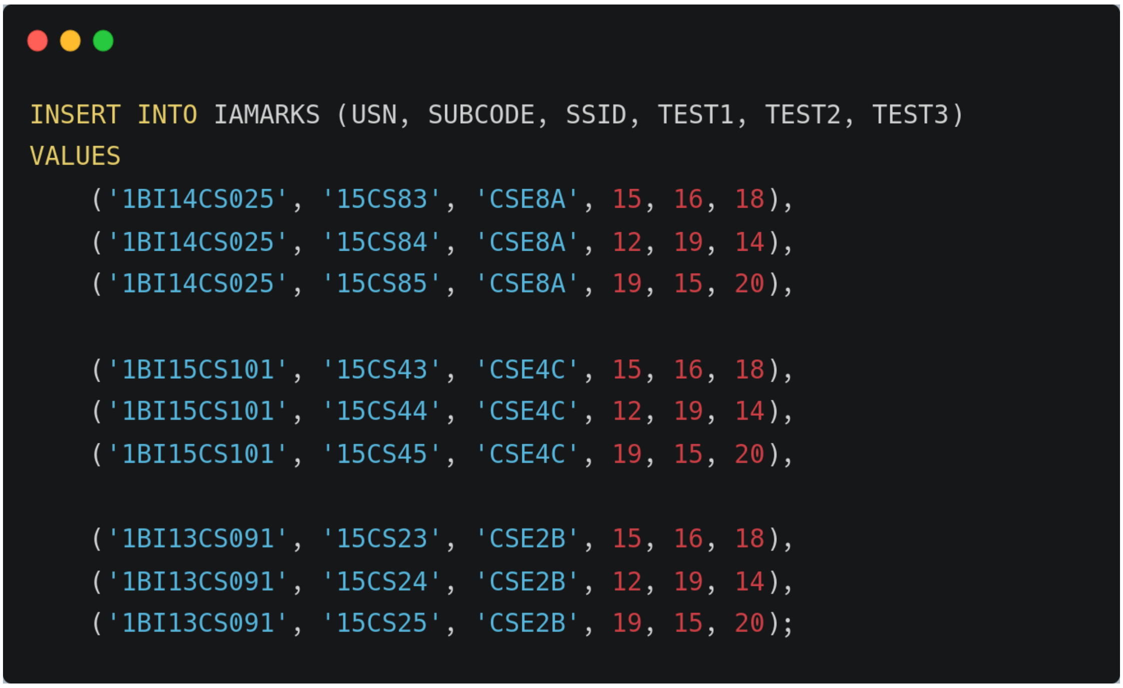
```sql
INSERT INTO CLASS VALUES
    ('1BI13CS020', 'CSE4A'),
    ('1BI13CS066', 'CSE3A'),
    ('1BI13CS091', 'CSE2B'),
    ('1BI14CS010', 'CSE2C'),
    ('1BI14CS025', 'CSE8A'),
    ('1BI14CS032', 'CSE8C'),
    ('1BI15CS011', 'CSE8B'),
    ('1BI15CS101', 'CSE4C');
```

3.2.2.4 Insertion into COURSE



```sql
INSERT INTO COURSE VALUES
    ('15CS83', 'PS'  , 8, 4),
    ('15CS84', 'DBMS', 8, 4),
    ('15CS85', 'DAA' , 8, 4),
    ('15CS23', 'DSA' , 2, 4),
    ('15CS24', 'CNP' , 2, 4),
    ('15CS25', 'OS'  , 2, 3),
    ('15CS31', 'EPS' , 3, 4),
    ('15CS32', 'DBS' , 3, 4),
    ('15CS33', 'RDA' , 3, 4),
    ('15CS43', 'EWW' , 4, 4),
    ('15CS44', 'DDA' , 4, 4),
    ('15CS45', 'OIS' , 4, 3);
```

3.2.2.5 Insertion into IAMARKS



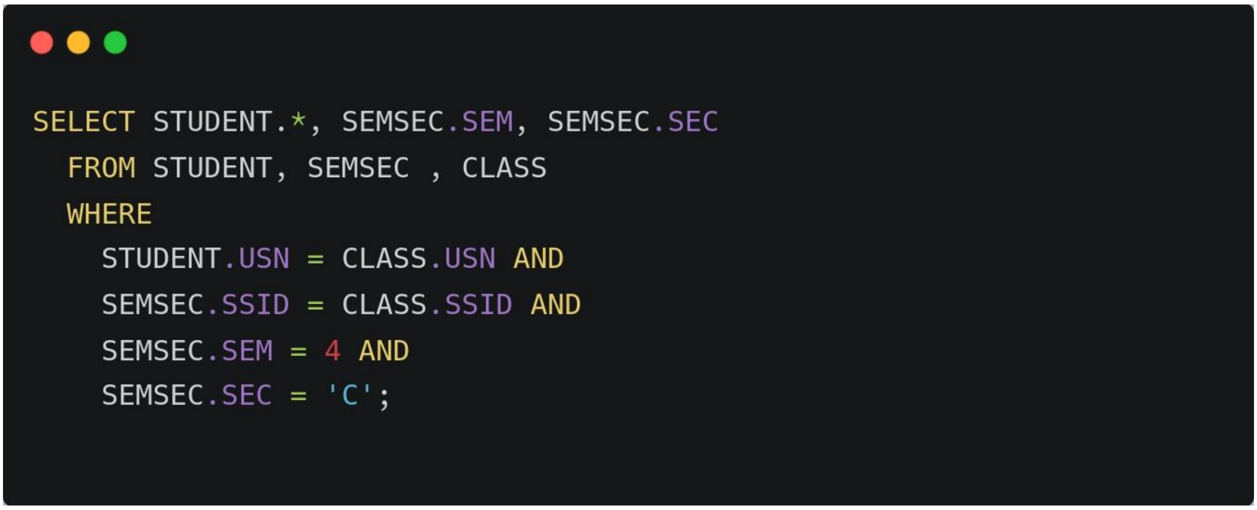
```sql
INSERT INTO IAMARKS (USN, SUBCODE, SSID, TEST1, TEST2, TEST3)
VALUES
    ('1BI14CS025', '15CS83', 'CSE8A', 15, 16, 18),
    ('1BI14CS025', '15CS84', 'CSE8A', 12, 19, 14),
    ('1BI14CS025', '15CS85', 'CSE8A', 19, 15, 20),

    ('1BI15CS101', '15CS43', 'CSE4C', 15, 16, 18),
    ('1BI15CS101', '15CS44', 'CSE4C', 12, 19, 14),
    ('1BI15CS101', '15CS45', 'CSE4C', 19, 15, 20),

    ('1BI13CS091', '15CS23', 'CSE2B', 15, 16, 18),
    ('1BI13CS091', '15CS24', 'CSE2B', 12, 19, 14),
    ('1BI13CS091', '15CS25', 'CSE2B', 19, 15, 20);
```

Chapter 4: Results

Database Queries

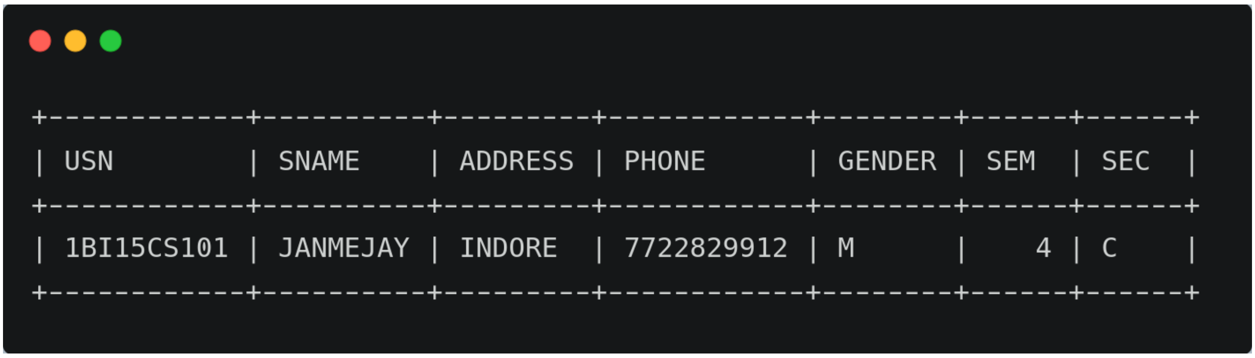
4.1 List all the student details studying in fourth semester ‘C’ section.

Query:



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

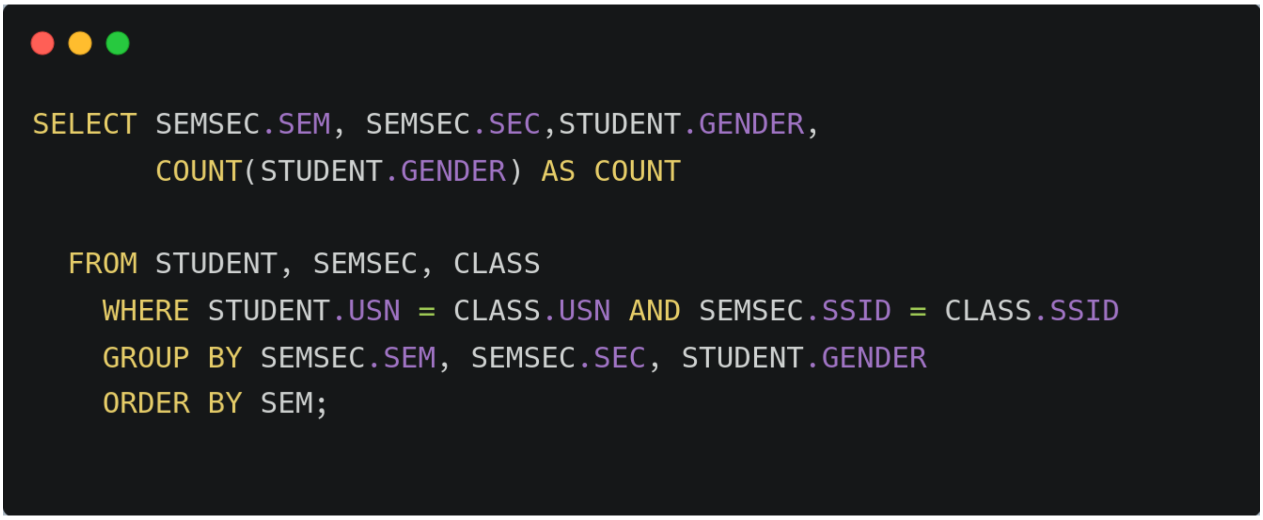
Output:



```
+------------+----------+---------+------------+--------+------+------+
| USN        | SNAME    | ADDRESS | PHONE      | GENDER | SEM  | SEC  |
+------------+----------+---------+------------+--------+------+------+
| 1BI15CS101 | JANMEJAY | INDORE  | 7722829912 | M      |    4 | C    |
+------------+----------+---------+------------+--------+------+------+
```

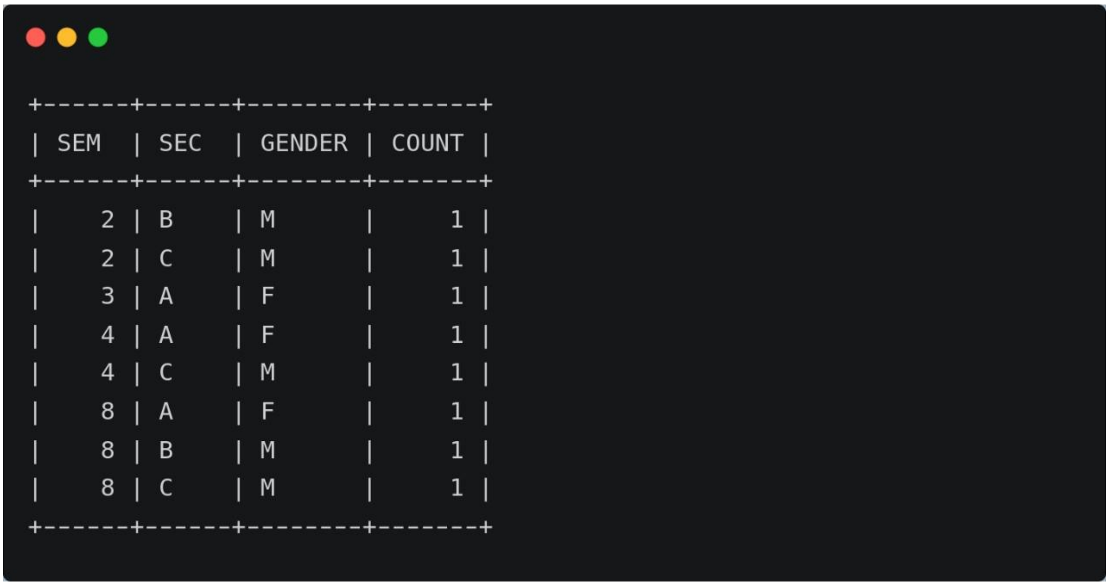
4.2 Compute the total number of male and female students in each semester and in each section.

Query:



```
SELECT SEMSEC.SEM, SEMSEC.SEC,STUDENT.GENDER,
       COUNT(STUDENT.GENDER) AS COUNT

  FROM STUDENT, SEMSEC, CLASS
    WHERE STUDENT.USN = CLASS.USN AND SEMSEC.SSID = CLASS.SSID
    GROUP BY SEMSEC.SEM, SEMSEC.SEC, STUDENT.GENDER
    ORDER BY SEM;
```

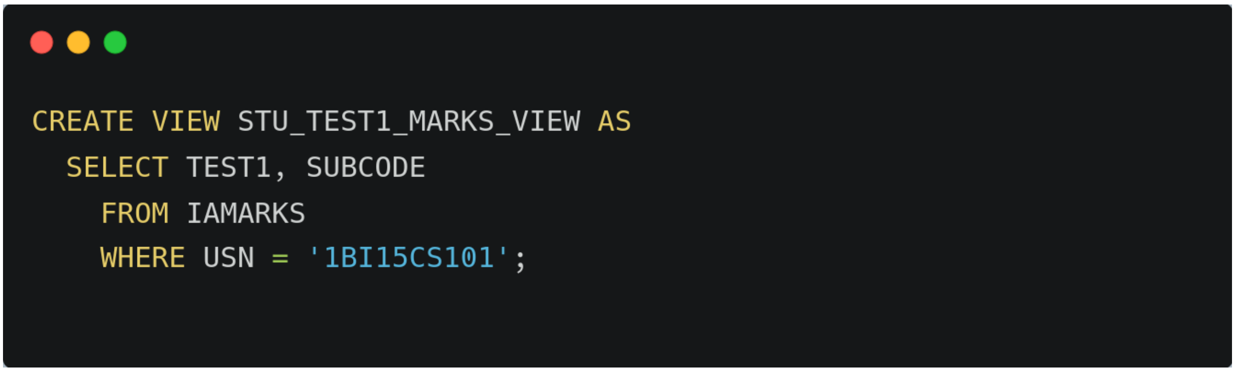
Output:



```
+------+------+--------+-------+
| SEM  | SEC  | GENDER | COUNT |
+------+------+--------+-------+
|    2 | B    | M      |     1 |
|    2 | C    | M      |     1 |
|    3 | A    | F      |     1 |
|    4 | A    | F      |     1 |
|    4 | C    | M      |     1 |
|    8 | A    | F      |     1 |
|    8 | B    | M      |     1 |
|    8 | C    | M      |     1 |
+------+------+--------+-------+
```

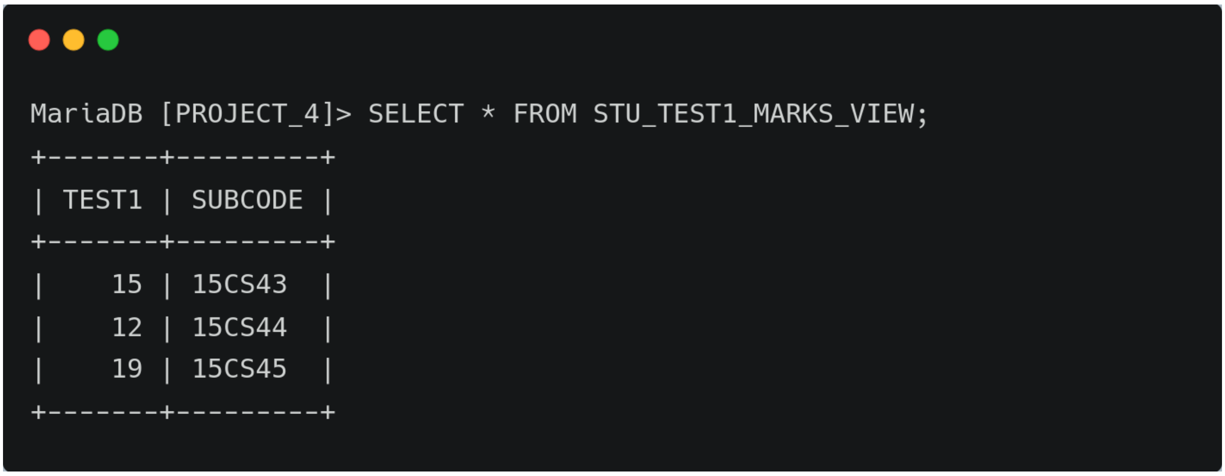
4.3 Create a view of Test1 marks of student USN ‘1BI15CS101’ in all Courses.

Query:



```
CREATE VIEW STU_TEST1_MARKS_VIEW AS
  SELECT TEST1, SUBCODE
    FROM IAMARKS
    WHERE USN = '1BI15CS101';
```

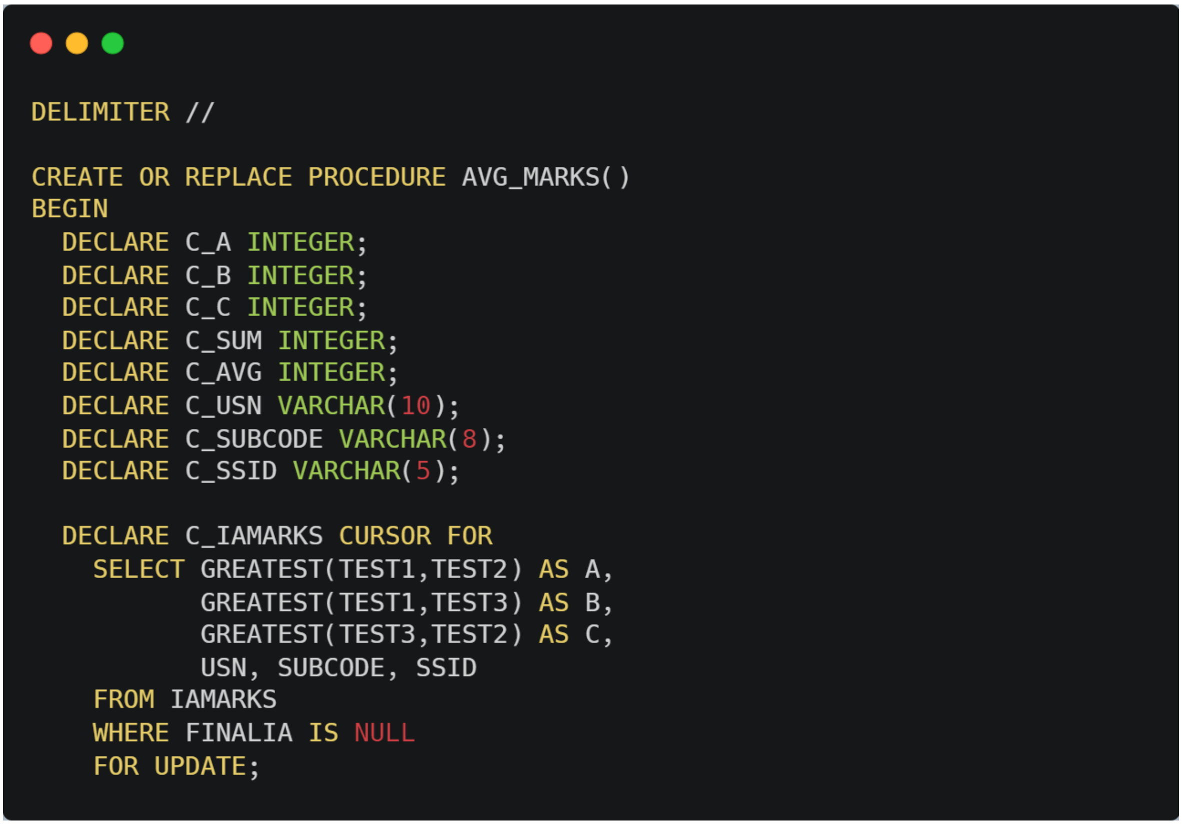
Output From SELECT * FROM STU_TEST1_MARKS_VIEW;:



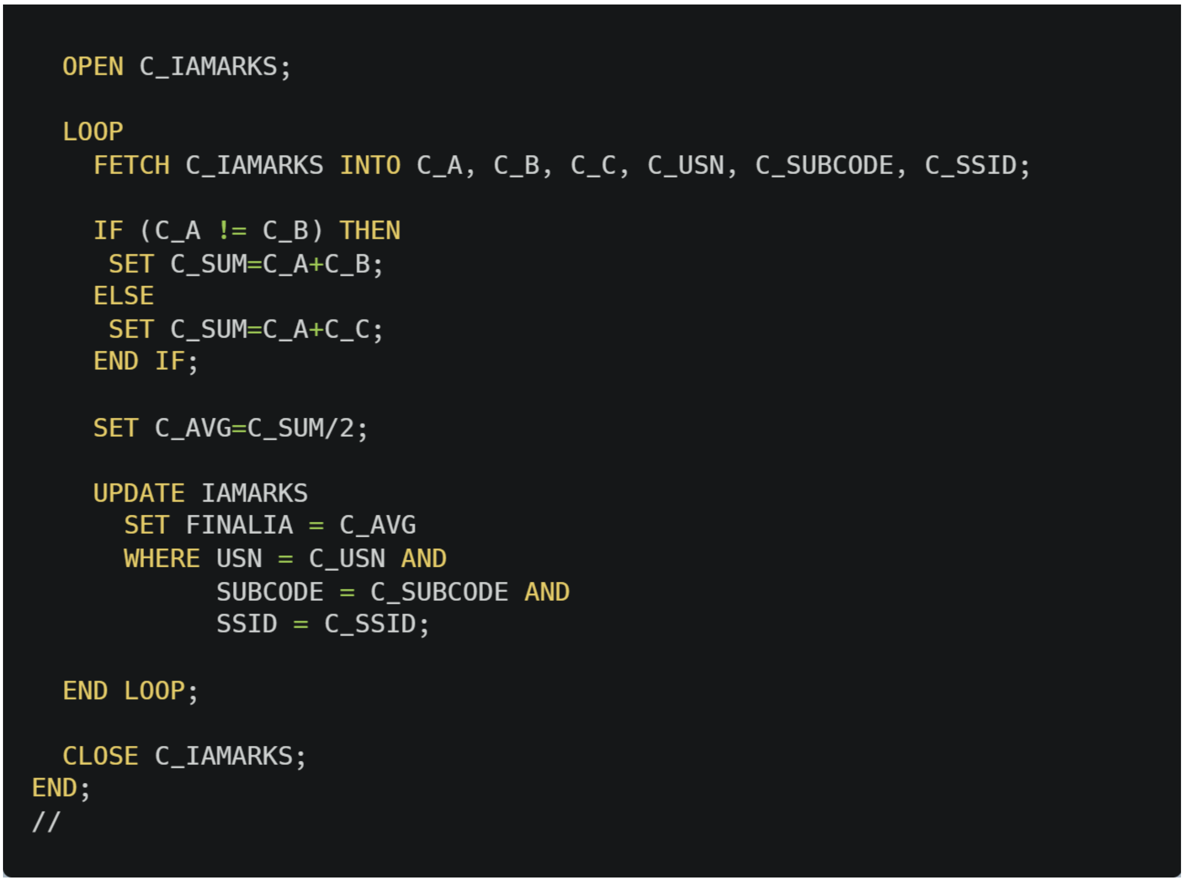
```
MariaDB [PROJECT_4]> SELECT * FROM STU_TEST1_MARKS_VIEW;
+-------+---------+
| TEST1 | SUBCODE |
+-------+---------+
|    15 | 15CS43  |
|    12 | 15CS44  |
|    19 | 15CS45  |
+-------+---------+
```

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

- **Creating Procedure for Average Calculation:**

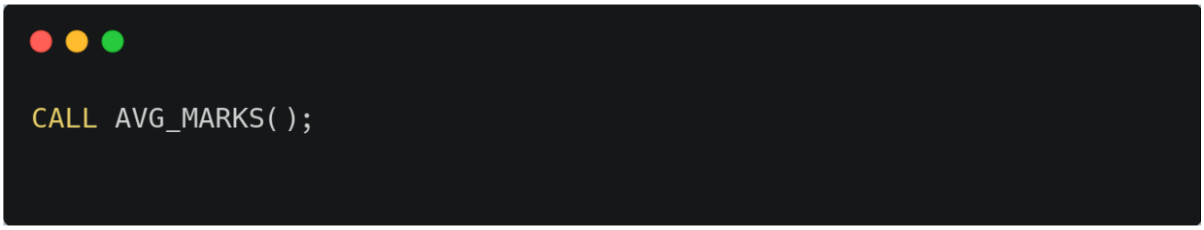


```
DELIMITER //

CREATE OR REPLACE PROCEDURE AVG_MARKS()
BEGIN
  DECLARE C_A INTEGER;
  DECLARE C_B INTEGER;
  DECLARE C_C INTEGER;
  DECLARE C_SUM INTEGER;
  DECLARE C_AVG INTEGER;
  DECLARE C_USN VARCHAR(10);
  DECLARE C_SUBCODE VARCHAR(8);
  DECLARE C_SSID VARCHAR(5);

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



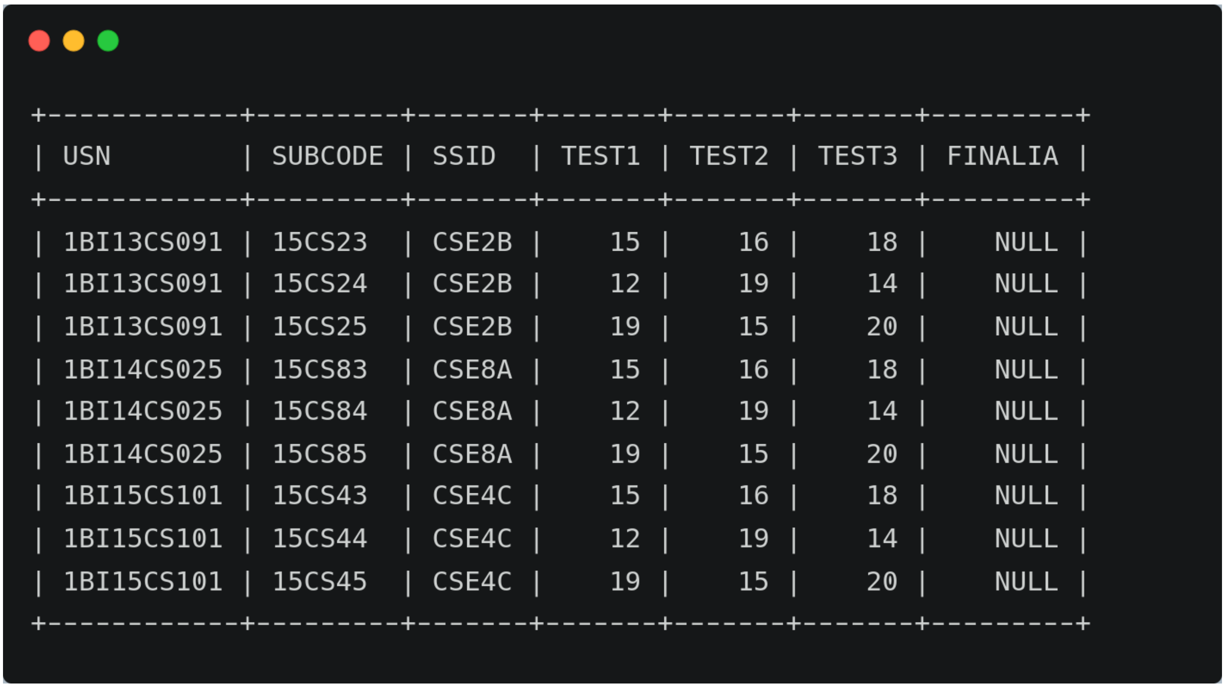
```
  OPEN C_IAMARKS;

  LOOP
    FETCH C_IAMARKS INTO C_A, C_B, C_C, C_USN, C_SUBCODE, C_SSID;

    IF (C_A != C_B) THEN
     SET C_SUM=C_A+C_B;
    ELSE
     SET C_SUM=C_A+C_C;
    END IF;

    SET C_AVG=C_SUM/2;

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

  END LOOP;

  CLOSE C_IAMARKS;
END;
//
```

- **Calling Created Procedure:**



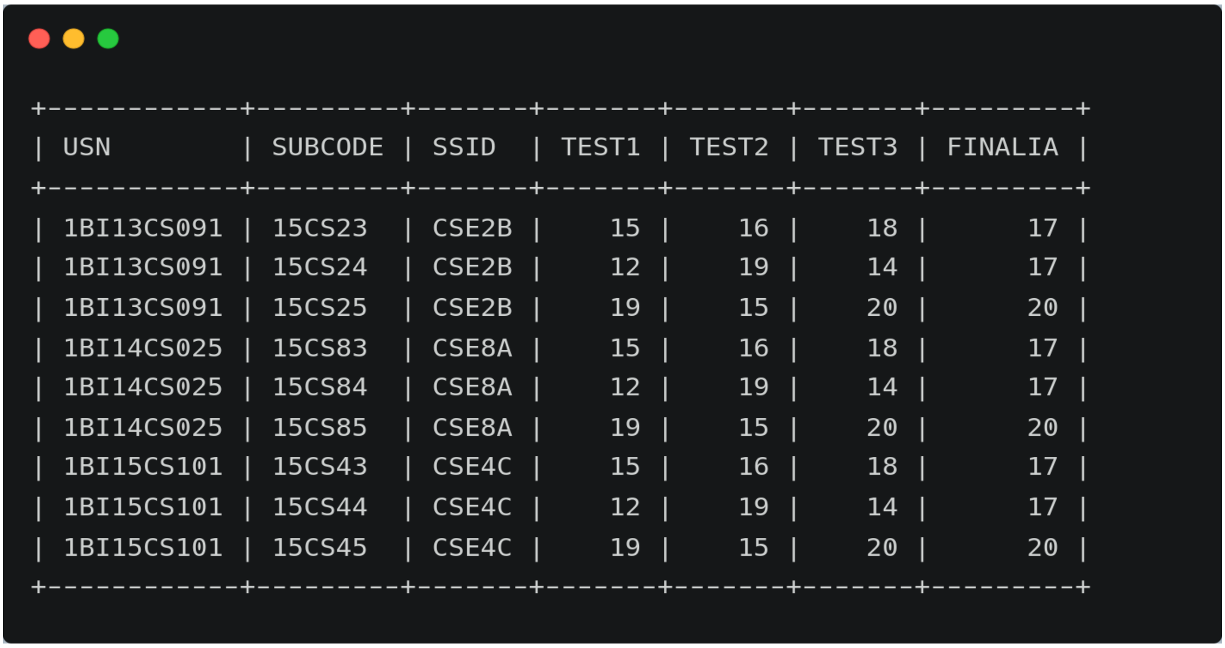
```
CALL AVG_MARKS();
```

- **SELECT * FROM IAMARKS (BEFORE CALLING AVG_MARKS()):**



```
+------------+---------+-------+-------+-------+-------+---------+
| USN        | SUBCODE | SSID  | TEST1 | TEST2 | TEST3 | FINALIA |
+------------+---------+-------+-------+-------+-------+---------+
| 1BI13CS091 | 15CS23  | CSE2B |    15 |    16 |    18 |    NULL |
| 1BI13CS091 | 15CS24  | CSE2B |    12 |    19 |    14 |    NULL |
| 1BI13CS091 | 15CS25  | CSE2B |    19 |    15 |    20 |    NULL |
| 1BI14CS025 | 15CS83  | CSE8A |    15 |    16 |    18 |    NULL |
| 1BI14CS025 | 15CS84  | CSE8A |    12 |    19 |    14 |    NULL |
| 1BI14CS025 | 15CS85  | CSE8A |    19 |    15 |    20 |    NULL |
| 1BI15CS101 | 15CS43  | CSE4C |    15 |    16 |    18 |    NULL |
| 1BI15CS101 | 15CS44  | CSE4C |    12 |    19 |    14 |    NULL |
| 1BI15CS101 | 15CS45  | CSE4C |    19 |    15 |    20 |    NULL |
+------------+---------+-------+-------+-------+-------+---------+
```

- **SELECT * FROM IAMARKS (AFTER CALLING AVG_MARKS()):**



```
+------------+---------+-------+-------+-------+-------+---------+
| USN        | SUBCODE | SSID  | TEST1 | TEST2 | TEST3 | FINALIA |
+------------+---------+-------+-------+-------+-------+---------+
| 1BI13CS091 | 15CS23  | CSE2B |    15 |    16 |    18 |      17 |
| 1BI13CS091 | 15CS24  | CSE2B |    12 |    19 |    14 |      17 |
| 1BI13CS091 | 15CS25  | CSE2B |    19 |    15 |    20 |      20 |
| 1BI14CS025 | 15CS83  | CSE8A |    15 |    16 |    18 |      17 |
| 1BI14CS025 | 15CS84  | CSE8A |    12 |    19 |    14 |      17 |
| 1BI14CS025 | 15CS85  | CSE8A |    19 |    15 |    20 |      20 |
| 1BI15CS101 | 15CS43  | CSE4C |    15 |    16 |    18 |      17 |
| 1BI15CS101 | 15CS44  | CSE4C |    12 |    19 |    14 |      17 |
| 1BI15CS101 | 15CS45  | CSE4C |    19 |    15 |    20 |      20 |
+------------+---------+-------+-------+-------+-------+---------+
```

4.5 Categorize students based on the following criterion:

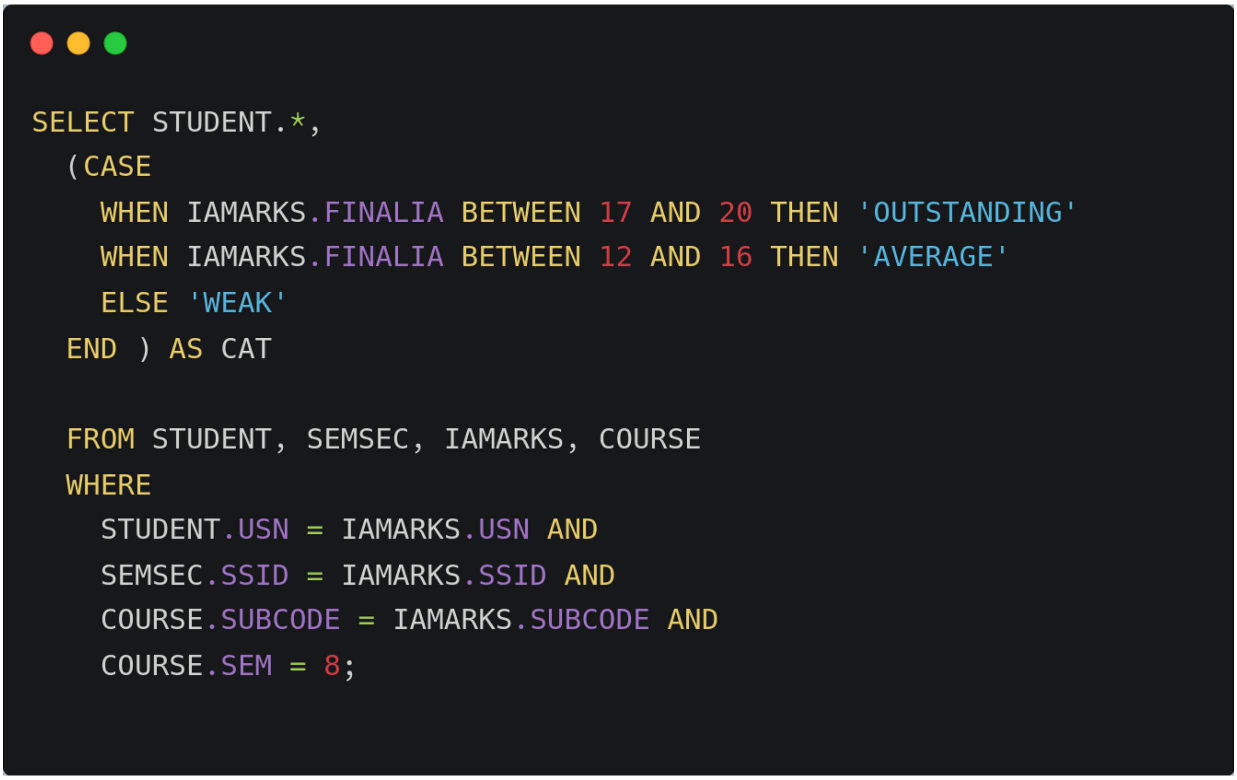
If FinalIA = 17 to 20 then CAT = ‘Outstanding’

If FinalIA = 12 to 16 then CAT = ‘Average’

If FinalIA < 12 then CAT = ‘Weak’

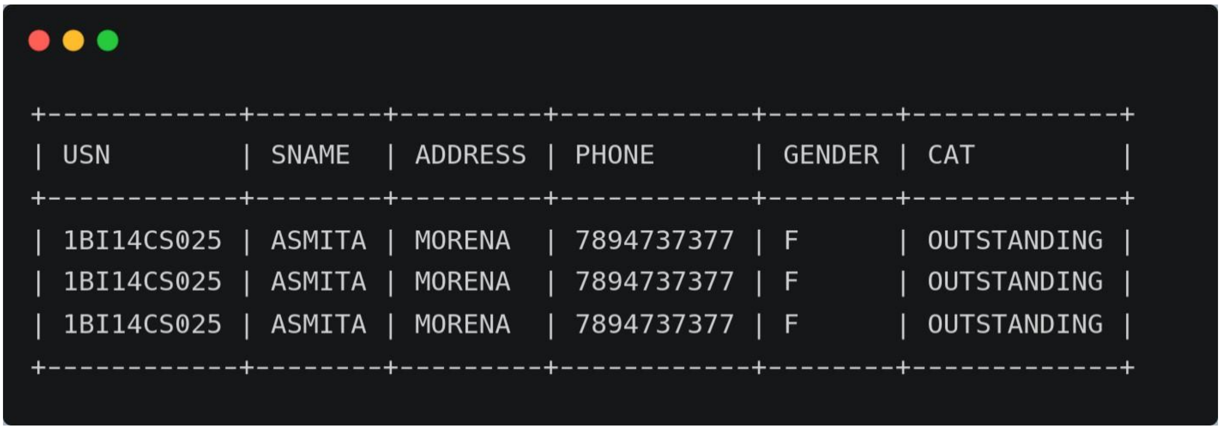
Give these details only for 8th semester A, B, and C section students.

Query:



```
SELECT STUDENT.*,
  (CASE
    WHEN IAMARKS.FINALIA BETWEEN 17 AND 20 THEN 'OUTSTANDING'
    WHEN IAMARKS.FINALIA BETWEEN 12 AND 16 THEN 'AVERAGE'
    ELSE 'WEAK'
  END ) AS CAT

  FROM STUDENT, SEMSEC, IAMARKS, COURSE
  WHERE
    STUDENT.USN = IAMARKS.USN AND
    SEMSEC.SSID = IAMARKS.SSID AND
    COURSE.SUBCODE = IAMARKS.SUBCODE AND
    COURSE.SEM = 8;
```

Output:



```
+------------+--------+---------+------------+--------+-------------+
| USN        | SNAME  | ADDRESS | PHONE      | GENDER | CAT         |
+------------+--------+---------+------------+--------+-------------+
| 1BI14CS025 | ASMITA | MORENA  | 7894737377 | F      | OUTSTANDING |
| 1BI14CS025 | ASMITA | MORENA  | 7894737377 | F      | OUTSTANDING |
| 1BI14CS025 | ASMITA | MORENA  | 7894737377 | F      | OUTSTANDING |
+------------+--------+---------+------------+--------+-------------+
```

Chapter 5: Conclusion

The University Management System Database Project was successful in achieving its objectives. The database was designed and implemented according to the requirements gathered from stakeholders, and was able to store and organize the data efficiently. The database was also able to support a variety of queries and reports.

The UMS database has had a number of benefits for the university. It has improved efficiency by automating many of the administrative tasks involved in managing the university, and has resulted in cost savings for the university. The database has also improved the security of the data by storing it in a central location and protecting it from unauthorized access. Additionally, the database has improved the accuracy of the data, which has led to better decision-making and improved services for students and staff.

In conclusion, the University Management System Database Project has been a success, and the UMS database has had a number of positive impacts on the university. The database will continue to be an important part of the University Management System, and will be updated and maintained as needed to meet the changing needs of the university.

Overall, the University Management System Database Project has been a success, and the UMS database has had a positive impact on the university. The database will continue to be an important part of the University Management System, and will be updated and maintained as needed to meet the changing needs of the university.

References

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