

SQL PROJECT

Student Grade System

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COURSE: MASTER IN DATA SCIENCE AND ANALYTICS WITH AI

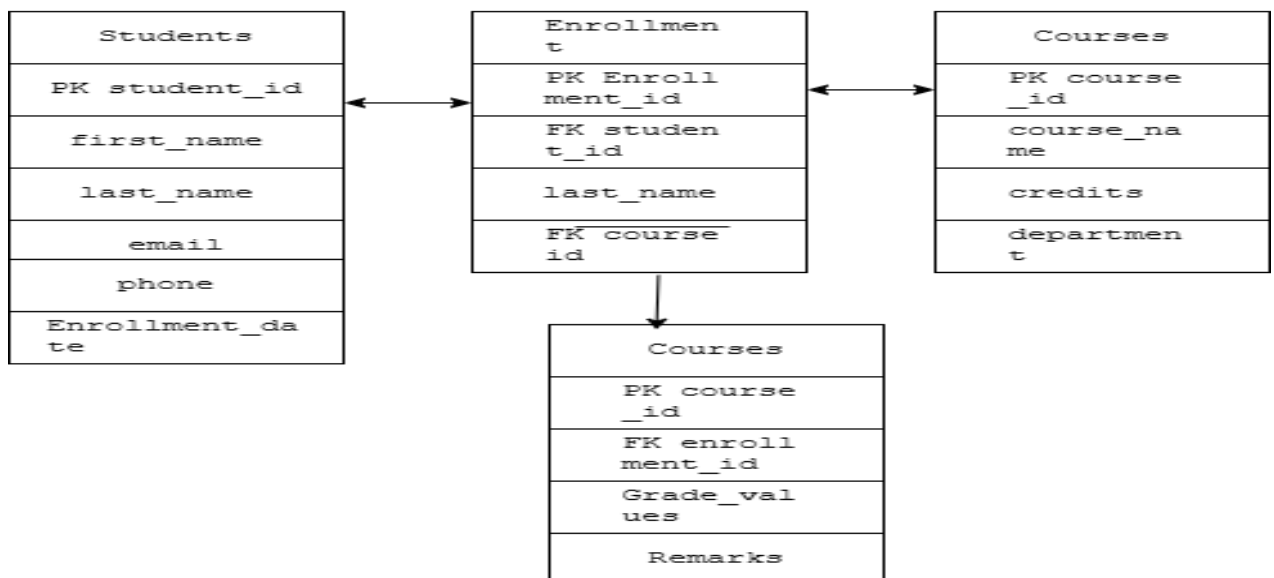
ABOUT DATASET:

Student Grade System that tracks students, courses, enrollments, and grades. Below is a detailed breakdown of the dataset structure, relationships, and sample data.

AVAILABLE TABLES:

- STUDENT
- COURSES
- ENROLLMENTS
- GRADE

EER DIAGRAM:



1. Create database student grade system:

```
MariaDB [(none)]> create database studentgradesytem;  
Query OK, 1 row affected (0.002 sec)
```

2. Drop Databases student grade system:

```
MariaDB [(none)]> drop database studentgradesytem;  
Query OK, 0 rows affected (0.023 sec)  
  
MariaDB [(none)]> show databases;  
+-----+  
| Database |  
+-----+  
| information_schema |  
| mysql |  
| performance_schema |  
| phpmyadmin |  
| test |  
+-----+  
5 rows in set (0.001 sec)  
  
MariaDB [(none)]> create database studentgradesystem;  
Query OK, 1 row affected (0.007 sec)
```

3. Show tables of studentgradesystem:

```
MariaDB [studentgradesystem]> show tables;  
+-----+  
| Tables_in_studentgradesystem |  
+-----+  
| courses |  
| enrollments |  
| grades |  
| students |  
+-----+  
4 rows in set (0.003 sec)
```

DDL (DATA DEFINITION LANGUAGE)

4. Create Table Students, Courses, Enrollments, Grades.

a) Students.

```
MariaDB [studentgradesystem]> CREATE TABLE Students (student_id INT,first_name VARCHAR(50),last_name VARCHAR(50),email VARCHAR(100),phone VARCHAR(15),enrollment_date DATE);
Query OK, 0 rows affected (0.050 sec)

MariaDB [studentgradesystem]> desc students;
+-----+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| student_id | int(11) | YES | | NULL | |
| first_name | varchar(50) | YES | | NULL | |
| last_name | varchar(50) | YES | | NULL | |
| email | varchar(100) | YES | | NULL | |
| phone | varchar(15) | YES | | NULL | |
| enrollment_date | date | YES | | NULL | |
+-----+-----+-----+-----+-----+-----+
6 rows in set (0.068 sec)
```

b) Courses.

```
MariaDB [studentgradesystem]> CREATE TABLE Courses (course_id INT,course_name VARCHAR(100),credits INT ,department VARCHAR(50));
Query OK, 0 rows affected (0.015 sec)

MariaDB [studentgradesystem]> desc courses;
+-----+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| course_id | int(11) | YES | | NULL | |
| course_name | varchar(100) | YES | | NULL | |
| credits | int(11) | YES | | NULL | |
| department | varchar(50) | YES | | NULL | |
+-----+-----+-----+-----+-----+-----+
4 rows in set (0.023 sec)
```

c) Enrollments.

```
MariaDB [studentgradesystem]> CREATE TABLE Enrollments (enrollment_id INT,student_id INT,course_id INT,semester VARCHAR(20));
Query OK, 0 rows affected (0.028 sec)

MariaDB [studentgradesystem]> desc enrollments;
+-----+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| enrollment_id | int(11) | YES | | NULL | |
| student_id | int(11) | YES | | NULL | |
| course_id | int(11) | YES | | NULL | |
| semester | varchar(20) | YES | | NULL | |
+-----+-----+-----+-----+-----+-----+
4 rows in set (0.023 sec)
```

d) Grades.

```
MariaDB [studentgradesystem]> CREATE TABLE Grades (grade_id INT,enrollment_id INT,grade_value VARCHAR(2),remarks VARCHAR(200));
Query OK, 0 rows affected (0.030 sec)

MariaDB [studentgradesystem]> desc grades;
+-----+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| grade_id | int(11) | YES | | NULL | |
| enrollment_id | int(11) | YES | | NULL | |
| grade_value | varchar(2) | YES | | NULL | |
| remarks | varchar(200) | YES | | NULL | |
+-----+-----+-----+-----+-----+-----+
4 rows in set (0.028 sec)
```

5. Drop Table:

```
MariaDB [studentgradesystem]> desc students;
+-----+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| student_id | int(11) | YES | | NULL | |
| first_name | varchar(50) | YES | | NULL | |
| last_name | varchar(50) | YES | | NULL | |
| email | varchar(100) | YES | | NULL | |
| phone | varchar(15) | YES | | NULL | |
| enrollment_date | date | YES | | NULL | |
+-----+-----+-----+-----+-----+-----+
6 rows in set (0.028 sec)

MariaDB [studentgradesystem]> drop table students;
Query OK, 0 rows affected (0.013 sec)

MariaDB [studentgradesystem]> desc students;
ERROR 1146 (42S02): Table 'studentgradesystem.students' doesn't exist
```

6. Alter Table structure:

```
MariaDB [studentgradesystem]> desc students;
+-----+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| student_id | int(11) | NO | PRI | NULL | |
| first_name | varchar(50) | NO | | NULL | |
| last_name | varchar(50) | NO | | NULL | |
| email | varchar(100) | YES | UNI | NULL | |
| phone | varchar(15) | YES | | NULL | |
| enrollment_date | date | NO | | NULL | |
+-----+-----+-----+-----+-----+-----+

MariaDB [studentgradesystem]> alter table students drop constraint email;
Query OK, 0 rows affected (0.058 sec)
Records: 0 Duplicates: 0 Warnings: 0
```

7. Truncate table:

```
MariaDB [studentgradesystem]> truncate table grades;
Query OK, 0 rows affected (0.084 sec)

MariaDB [studentgradesystem]> desc grades;
+-----+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| grade_id | int(11) | NO | PRI | NULL | |
| enrollment_id | int(11) | NO | MUL | NULL | |
| grade_value | varchar(2) | NO | | NULL | |
| remarks | varchar(200) | YES | | NULL | |
+-----+-----+-----+-----+-----+-----+
4 rows in set (0.054 sec)

MariaDB [studentgradesystem]> select*from grades;
Empty set (0.001 sec)
```

8. Rename table:

```
MariaDB [studentgradesystem]> desc student;
```

Field	Type	Null	Key	Default	Extra
student_id	int(11)	NO	PRI	NULL	
first_name	varchar(50)	NO		NULL	
last_name	varchar(50)	NO		NULL	
email	varchar(100)	YES	UNI	NULL	
phone	varchar(15)	YES		NULL	
enrollment_date	date	NO		NULL	

```
6 rows in set (0.058 sec)
```

```
MariaDB [studentgradesystem]> Alter table student rename to students;
```

Query OK, 0 rows affected (0.024 sec)

```
MariaDB [studentgradesystem]> desc students;
```

Field	Type	Null	Key	Default	Extra
student_id	int(11)	NO	PRI	NULL	
first_name	varchar(50)	NO		NULL	
last_name	varchar(50)	NO		NULL	
email	varchar(100)	YES	UNI	NULL	
phone	varchar(15)	YES		NULL	
enrollment_date	date	NO		NULL	

```
6 rows in set (0.056 sec)
```

DML (DATA MANIPULATION LANGUAGE)

9. Insert Into Table Students, Courses, Enrollments, Grades.

a) Students.

```
MariaDB [studentgradesystem]> INSERT INTO Students VALUES (1, 'Rahul', 'Sharma', 'rahul.sharma@example.com', '9876543210', '2023-01-15'), (2, 'Priya', 'Patel', 'priya.patel@example.com', '8765432109', '2023-01-15'), (3, 'Amit', 'Singh', 'amit.singh@example.com', '7654321098', '2023-01-16'), (4, 'Neha', 'Gupta', 'neha.gupta@example.com', '6543210987', '2023-01-17'), (5, 'Vikram', 'Joshi', 'vikram.joshi@example.com', '9432109876', '2023-01-18');
Query OK, 5 rows affected (0.009 sec)
Records: 5 Duplicates: 0 Warnings: 0

MariaDB [studentgradesystem]> select*from students;
+-----+-----+-----+-----+-----+-----+
| student_id | first_name | last_name | email | phone | enrollment_date |
+-----+-----+-----+-----+-----+-----+
| 1 | Rahul | Sharma | rahul.sharma@example.com | 9876543210 | 2023-01-15 |
| 2 | Priya | Patel | priya.patel@example.com | 8765432109 | 2023-01-15 |
| 3 | Amit | Singh | amit.singh@example.com | 7654321098 | 2023-01-16 |
| 4 | Neha | Gupta | neha.gupta@example.com | 6543210987 | 2023-01-17 |
| 5 | Vikram | Joshi | vikram.joshi@example.com | 9432109876 | 2023-01-18 |
+-----+-----+-----+-----+-----+-----+
5 rows in set (0.006 sec)
```

b) Courses.

```
MariaDB [studentgradesystem]> INSERT INTO Courses VALUES(101, 'Mathematics', 4, 'Science'), (102, 'Physics', 4, 'Science'), (103, 'Computer Science', 3, 'Engineering'), (104, 'English Literature', 3, 'Arts'), (105, 'History', 3, 'Arts');
Query OK, 5 rows affected (0.007 sec)
Records: 5 Duplicates: 0 Warnings: 0

MariaDB [studentgradesystem]> select*from courses;
+-----+-----+-----+-----+
| course_id | course_name | credits | department |
+-----+-----+-----+-----+
| 101 | Mathematics | 4 | Science |
| 102 | Physics | 4 | Science |
| 103 | Computer Science | 3 | Engineering |
| 104 | English Literature | 3 | Arts |
| 105 | History | 3 | Arts |
+-----+-----+-----+-----+
5 rows in set (0.000 sec)
```

c) Enrollments.

```
MariaDB [studentgradesystem]> select*from enrollments;
+-----+-----+-----+-----+
| enrollment_id | student_id | course_id | semester |
+-----+-----+-----+-----+
| 1 | 1 | 101 | Fall 2023 |
| 2 | 1 | 103 | Fall 2023 |
| 3 | 2 | 102 | Fall 2023 |
| 4 | 3 | 101 | Fall 2023 |
| 5 | 3 | 104 | Fall 2023 |
| 6 | 4 | 105 | Fall 2023 |
| 7 | 5 | 103 | Fall 2023 |
+-----+-----+-----+-----+
7 rows in set (0.001 sec)
```

d) Grades.

```
MariaDB [studentgradesystem]> select*from grades;
+-----+-----+-----+-----+
| grade_id | enrollment_id | grade_value | remarks |
+-----+-----+-----+-----+
| 1 | 1 | A | Excellent performance |
| 2 | 2 | B+ | Good work |
| 3 | 3 | A- | Very good |
| 4 | 4 | B | Satisfactory |
| 5 | 5 | C+ | Needs improvement |
| 6 | 6 | A | Outstanding |
| 7 | 7 | B- | Can do better |
+-----+-----+-----+-----+
7 rows in set (0.001 sec)
```

10. Update data within a table.

```
MariaDB [studentgradesystem]> select*from courses;
+-----+-----+-----+-----+
| course_id | course_name | credits | department |
+-----+-----+-----+-----+
| 101 | Mathematics | 4 | Science |
| 102 | Physics | 4 | Science |
| 103 | Computer Science | 3 | Engineering |
| 104 | English Literature | 3 | Arts |
| 105 | History | 3 | Arts |
+-----+-----+-----+-----+
5 rows in set (0.000 sec)

MariaDB [studentgradesystem]> UPDATE Courses SET Course_name="Biology" where course_id=101;
Query OK, 1 row affected (0.008 sec)
Rows matched: 1 Changed: 1 Warnings: 0

MariaDB [studentgradesystem]> select*from courses;
+-----+-----+-----+-----+
| course_id | course_name | credits | department |
+-----+-----+-----+-----+
| 101 | Biology | 4 | Science |
| 102 | Physics | 4 | Science |
| 103 | Computer Science | 3 | Engineering |
| 104 | English Literature | 3 | Arts |
| 105 | History | 3 | Arts |
+-----+-----+-----+-----+
5 rows in set (0.000 sec)
```

11. Delete table rows.

```
MariaDB [studentgradesystem]> select*from students
-> ;
+-----+-----+-----+-----+-----+-----+
| student_id | first_name | last_name | email | phone | enrollment_date |
+-----+-----+-----+-----+-----+-----+
| 1 | Rahul | Sharma | rahul.sharma@example.com | 9876543210 | 2023-01-15 |
| 2 | Priya | Patel | priya.patel@example.com | 8765432109 | 2023-01-15 |
| 3 | Amit | Singh | amit.singh@example.com | 7654321098 | 2023-01-16 |
| 4 | Neha | Gupta | neha.gupta@example.com | 6543210987 | 2023-01-17 |
+-----+-----+-----+-----+-----+-----+
4 rows in set (0.001 sec)

MariaDB [studentgradesystem]> DELETE FROM Students where student_id=3;
Query OK, 1 row affected (0.003 sec)

MariaDB [studentgradesystem]> select*from students;
+-----+-----+-----+-----+-----+-----+
| student_id | first_name | last_name | email | phone | enrollment_date |
+-----+-----+-----+-----+-----+-----+
| 1 | Rahul | Sharma | rahul.sharma@example.com | 9876543210 | 2023-01-15 |
| 2 | Priya | Patel | priya.patel@example.com | 8765432109 | 2023-01-15 |
| 4 | Neha | Gupta | neha.gupta@example.com | 6543210987 | 2023-01-17 |
+-----+-----+-----+-----+-----+-----+
3 rows in set (0.000 sec)
```

DQL (DATA QUERY LANGUAGE)

12. Select to retrieve data from the database

```
MariaDB [studentgradesystem]> select*from students;
```

student_id	first_name	last_name	email	phone	enrollment_date
1	Rahul	Sharma	rahul.sharma@example.com	9876543210	2023-01-15
2	Priya	Patel	priya.patel@example.com	8765432109	2023-01-15
3	Amit	Singh	amit.singh@example.com	7654321098	2023-01-16
4	Neha	Gupta	neha.gupta@example.com	6543210987	2023-01-17
5	Vikram	Joshi	vikram.joshi@example.com	9432109876	2023-01-18

```
5 rows in set (0.006 sec)
```

CONSTRAINT - Means Applying Rules on Column.

13. Primary Key Constraint:

```
MariaDB [studentgradesystem]> desc students;
```

Field	Type	Null	Key	Default	Extra
student_id	int(11)	NO		NULL	
first_name	varchar(50)	YES		NULL	
last_name	varchar(50)	YES		NULL	
email	varchar(100)	YES		NULL	
phone	varchar(15)	YES		NULL	
enrollment_date	date	YES		NULL	

```
6 rows in set (0.062 sec)
```

```
MariaDB [studentgradesystem]> alter table students Add Primary key(student_id);
Query OK, 0 rows affected (0.063 sec)
Records: 0 Duplicates: 0 Warnings: 0
```

```
MariaDB [studentgradesystem]> desc students;
```

Field	Type	Null	Key	Default	Extra
student_id	int(11)	NO	PRI	NULL	
first_name	varchar(50)	YES		NULL	
last_name	varchar(50)	YES		NULL	
email	varchar(100)	YES		NULL	
phone	varchar(15)	YES		NULL	
enrollment_date	date	YES		NULL	

```
6 rows in set (0.019 sec)
```

14. Foreign Key Constraint:

```
MariaDB [studentgradesystem]> alter table enrollments add foreign key(student_id) references students(student_id);
Query OK, 0 rows affected (0.070 sec)
Records: 0 Duplicates: 0 Warnings: 0
```

```
MariaDB [studentgradesystem]> desc enrollments;
```

Field	Type	Null	Key	Default	Extra
enrollment_id	int(11)	YES		NULL	
student_id	int(11)	YES	MUL	NULL	
course_id	int(11)	YES		NULL	
semester	varchar(20)	YES		NULL	

```
4 rows in set (0.058 sec)
```


15. Unique Constraint:

```
MariaDB [studentgradesystem]> desc students;
```

Field	Type	Null	Key	Default	Extra
student_id	int(11)	NO	PRI	NULL	
first_name	varchar(50)	YES		NULL	
last_name	varchar(50)	YES		NULL	
email	varchar(100)	YES		NULL	
phone	varchar(15)	YES		NULL	
enrollment_date	date	YES		NULL	

```
6 rows in set (0.058 sec)
```

```
MariaDB [studentgradesystem]> ALTER TABLE Students ADD UNIQUE (email);
Query OK, 0 rows affected (0.057 sec)
Records: 0 Duplicates: 0 Warnings: 0
```

```
MariaDB [studentgradesystem]> desc students;
```

Field	Type	Null	Key	Default	Extra
student_id	int(11)	NO	PRI	NULL	
first_name	varchar(50)	YES		NULL	
last_name	varchar(50)	YES		NULL	
email	varchar(100)	YES	UNI	NULL	
phone	varchar(15)	YES		NULL	
enrollment_date	date	YES		NULL	

```
6 rows in set (0.058 sec)
```

16. Not Null Constraint:

```
MariaDB [studentgradesystem]> desc enrollments;
```

Field	Type	Null	Key	Default	Extra
enrollment_id	int(11)	YES		NULL	
student_id	int(11)	YES	MUL	NULL	
course_id	int(11)	YES		NULL	
semester	varchar(20)	YES		NULL	

```
4 rows in set (0.061 sec)
```

```
MariaDB [studentgradesystem]> ALTER TABLE enrollments modify column course_id int NOT NULL;
Query OK, 0 rows affected (0.113 sec)
Records: 0 Duplicates: 0 Warnings: 0
```

```
MariaDB [studentgradesystem]> desc enrollments;
```

Field	Type	Null	Key	Default	Extra
enrollment_id	int(11)	YES		NULL	
student_id	int(11)	YES	MUL	NULL	
course_id	int(11)	NO		NULL	
semester	varchar(20)	YES		NULL	

```
4 rows in set (0.056 sec)
```

17. Null Constraint:

```
MariaDB [studentgradesystem]> desc enrollments;
+-----+-----+-----+-----+-----+-----+
| Field          | Type      | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| enrollment_id  | int(11)    | YES  |     | NULL     |       |
| student_id     | int(11)    | YES  | MUL | NULL     |       |
| course_id      | int(11)    | NO   |     | NULL     |       |
| semester       | varchar(20)| YES  |     | NULL     |       |
+-----+-----+-----+-----+-----+-----+
4 rows in set (0.062 sec)
```

```
MariaDB [studentgradesystem]> ALTER TABLE enrollments modify course_id int NULL;
Query OK, 0 rows affected (0.088 sec)
Records: 0 Duplicates: 0 Warnings: 0
```

```
MariaDB [studentgradesystem]> desc enrollments;
+-----+-----+-----+-----+-----+-----+
| Field          | Type      | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| enrollment_id  | int(11)    | YES  |     | NULL     |       |
| student_id     | int(11)    | YES  | MUL | NULL     |       |
| course_id      | int(11)    | YES  |     | NULL     |       |
| semester       | varchar(20)| YES  |     | NULL     |       |
+-----+-----+-----+-----+-----+-----+
4 rows in set (0.061 sec)
```

18. Default Constraint:

```
MariaDB [studentgradesystem]> desc enrollments;
+-----+-----+-----+-----+-----+-----+
| Field          | Type      | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| enrollment_id  | int(11)    | YES  |     | NULL     |       |
| student_id     | int(11)    | YES  | MUL | NULL     |       |
| course_id      | int(11)    | YES  |     | NULL     |       |
| semester       | varchar(20)| YES  |     | NULL     |       |
+-----+-----+-----+-----+-----+-----+
4 rows in set (0.062 sec)
```

```
MariaDB [studentgradesystem]> ALTER TABLE enrollments modify column course_id int NOT NULL default(1);
Query OK, 0 rows affected (0.096 sec)
Records: 0 Duplicates: 0 Warnings: 0
```

```
MariaDB [studentgradesystem]> desc enrollments;
+-----+-----+-----+-----+-----+-----+
| Field          | Type      | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| enrollment_id  | int(11)    | YES  |     | NULL     |       |
| student_id     | int(11)    | YES  | MUL | NULL     |       |
| course_id      | int(11)    | NO   |     | 1         |       |
| semester       | varchar(20)| YES  |     | NULL     |       |
+-----+-----+-----+-----+-----+-----+
4 rows in set (0.019 sec)
```

CLAUSE IN SQL

19. Select Clause:

```
MariaDB [studentgradesystem]> SELECT course_name, credits FROM Courses;
```

course_name	credits
Mathematics	4
Physics	4
Computer Science	3
English Literature	3
History	3

```
5 rows in set (0.001 sec)
```

20. From Clause:

```
MariaDB [studentgradesystem]> SELECT course_name, credits FROM Courses;
```

course_name	credits
Mathematics	4
Physics	4
Computer Science	3
English Literature	3
History	3

```
5 rows in set (0.001 sec)
```

21. Where Clause:

```
MariaDB [studentgradesystem]> select*from courses where department="Engineering";
```

course_id	course_name	credits	department
103	Computer Science	3	Engineering

```
1 row in set (0.001 sec)
```

22. Having Clause:

```
MariaDB [studentgradesystem]> SELECT student_id FROM Enrollments GROUP BY student_id HAVING COUNT(*) >= 2;
```

student_id
1
3

```
2 rows in set (0.001 sec)
```

23. Group By Clause:

```
MariaDB [studentgradesystem]> SELECT grade_value, COUNT(*) FROM Grades GROUP BY grade_value;
```

grade_value	COUNT(*)
A	2
A-	1
B	1
B+	1
B-	1
C+	1

```
6 rows in set (0.001 sec)
```

24. Order By Clause:

```
MariaDB [studentgradesystem]> select course_id from enrollments order by course_id;
+-----+
| course_id |
+-----+
|         101 |
|         101 |
|         102 |
|         103 |
|         103 |
|         104 |
|         105 |
+-----+
7 rows in set (0.000 sec)
```

25. Distinct Clause:

```
MariaDB [studentgradesystem]> select distinct course_id from enrollments order by course_id;
+-----+
| course_id |
+-----+
|         101 |
|         102 |
|         103 |
|         104 |
|         105 |
+-----+
5 rows in set (0.001 sec)
```

26. Limit Clause:

```
MariaDB [studentgradesystem]> select * from courses limit 2;
+-----+-----+-----+-----+
| course_id | course_name | credits | department |
+-----+-----+-----+-----+
|         101 | Mathematics |         4 | Science    |
|         102 | Physics     |         4 | Science    |
+-----+-----+-----+-----+
2 rows in set (0.001 sec)
```

AGGREGATE FUNCTION

27. Count:

```
MariaDB [studentgradesystem]> SELECT COUNT(*) AS total_students FROM Students;
+-----+
| total_students |
+-----+
|                5 |
+-----+
1 row in set (0.008 sec)
```

28. Sum:

```
MariaDB [studentgradesystem]> select sum(credits) from courses where department="science";
+-----+
| sum(credits) |
+-----+
|              8 |
+-----+
1 row in set (0.001 sec)
```

29. Average:

```
MariaDB [studentgradesystem]> select avg(credits) from courses where department="science";
+-----+
| avg(credits) |
+-----+
|          4.0000 |
+-----+
1 row in set (0.001 sec)
```

30. Maximum:

```
MariaDB [studentgradesystem]> SELECT Max(grade_value) FROM Grades;
+-----+
| Max(grade_value) |
+-----+
| C+                |
+-----+
1 row in set (0.000 sec)
```

31. Minimum:

```
MariaDB [studentgradesystem]> SELECT MIN(grade_value) FROM Grades;
+-----+
| MIN(grade_value) |
+-----+
| A                |
+-----+
1 row in set (0.000 sec)
```

OPERATORS

32. IN:

```
MariaDB [studentgradesystem]> select*from courses where department IN("Science","Arts");
```

course_id	course_name	credits	department
101	Mathematics	4	Science
102	Physics	4	Science
104	English Literature	3	Arts
105	History	3	Arts

```
4 rows in set (0.001 sec)
```

33. NOT IN:

```
MariaDB [studentgradesystem]> select*from Courses where department NOT IN("Science");
```

course_id	course_name	credits	department
103	Computer Science	3	Engineering
104	English Literature	3	Arts
105	History	3	Arts

```
3 rows in set (0.001 sec)
```

34. BETWEEN:

```
MariaDB [studentgradesystem]> SELECT * FROM Courses WHERE course_id BETWEEN 101 AND 103;
```

course_id	course_name	credits	department
101	Mathematics	4	Science
102	Physics	4	Science
103	Computer Science	3	Engineering

```
3 rows in set (0.008 sec)
```

35. LIKE:

```
MariaDB [studentgradesystem]> SELECT COUNT(*) FROM Students WHERE email LIKE '%@gmail.com';
```

COUNT(*)
0

```
1 row in set (0.000 sec)
```

36. AND:

```
MariaDB [studentgradesystem]> select*from courses where credits=3 and department="arts";
```

course_id	course_name	credits	department
104	English Literature	3	Arts
105	History	3	Arts

```
2 rows in set (0.001 sec)
```

37. OR:

```
MariaDB [studentgradesystem]> select*from courses where department="science" or department="arts";
```

course_id	course_name	credits	department
101	Mathematics	4	Science
102	Physics	4	Science
104	English Literature	3	Arts
105	History	3	Arts

```
4 rows in set (0.001 sec)
```

JOINS

38. Self Join:

```
MariaDB [studentgradesystem]> SELECT s1.first_name AS student1, s2.first_name AS student2, s1.enrollment_date
-> FROM Students s1
-> JOIN Students s2 ON s1.enrollment_date = s2.enrollment_date
-> WHERE s1.student_id < s2.student_id;
+-----+-----+-----+
| student1 | student2 | enrollment_date |
+-----+-----+-----+
| Rahul    | Priya    | 2023-01-15      |
+-----+-----+-----+
1 row in set (0.001 sec)
```

39. Inner join:

```
MariaDB [studentgradesystem]> SELECT c.course_name, COUNT(*) AS students
-> FROM Courses c
-> INNER JOIN Enrollments e ON c.course_id = e.course_id
-> GROUP BY c.course_name;
+-----+-----+
| course_name | students |
+-----+-----+
| Computer Science | 2 |
| English Literature | 1 |
| History | 1 |
| Mathematics | 2 |
| Physics | 1 |
+-----+-----+
5 rows in set (0.001 sec)
```

40. Left join:

```
MariaDB [studentgradesystem]> SELECT s.first_name, s.last_name, g.grade_value
-> FROM Students s
-> LEFT JOIN Enrollments e ON s.student_id = e.student_id
-> LEFT JOIN Grades g ON e.enrollment_id = g.enrollment_id;
+-----+-----+-----+
| first_name | last_name | grade_value |
+-----+-----+-----+
| Rahul      | Sharma    | A            |
| Rahul      | Sharma    | B+           |
| Priya      | Patel     | A-           |
| Amit       | Singh     | B            |
| Amit       | Singh     | C+           |
| Neha       | Gupta     | A            |
| Vikram     | Joshi     | B-           |
+-----+-----+-----+
7 rows in set (0.001 sec)
```

41. Right Join:

```
MariaDB [studentgradesystem]> SELECT DISTINCT c.department, c.course_name
-> FROM Courses c
-> RIGHT JOIN Enrollments e ON c.course_id = e.course_id;
```

department	course_name
Science	Mathematics
Science	Physics
Engineering	Computer Science
Arts	English Literature
Arts	History

5 rows in set (0.001 sec)

42. Cross join:

```
MariaDB [studentgradesystem]> SELECT s.first_name, c.course_name
-> FROM Students s
-> CROSS JOIN Courses c
-> WHERE c.department = 'Science';
```

first_name	course_name
Rahul	Mathematics
Priya	Mathematics
Amit	Mathematics
Neha	Mathematics
Vikram	Mathematics
Rahul	Physics
Priya	Physics
Amit	Physics
Neha	Physics
Vikram	Physics

10 rows in set (0.001 sec)

43. Subquery:

```
MariaDB [studentgradesystem]> SELECT first_name, last_name FROM Students WHERE student_id IN (SELECT student_id FROM Enrollments WHERE course_id IN (SELECT
course_id FROM Courses WHERE department='Science'));
```

first_name	last_name
Rahul	Sharma
Priya	Patel
Amit	Singh

3 rows in set (0.001 sec)

44. View:

```
MariaDB [studentgradesystem]> CREATE VIEW StudentEnrollments AS
-> SELECT s.first_name, s.last_name, c.course_name
-> FROM Students s
-> JOIN Enrollments e ON s.student_id = e.student_id
-> JOIN Courses c ON e.course_id = c.course_id;
```

Query OK, 0 rows affected (0.045 sec)

```
MariaDB [studentgradesystem]> Select*From StudentEnrollments;
```

first_name	last_name	course_name
Rahul	Sharma	Mathematics
Rahul	Sharma	Computer Science
Priya	Patel	Physics
Amit	Singh	Mathematics
Amit	Singh	English Literature
Neha	Gupta	History
Vikram	Joshi	Computer Science

7 rows in set (0.002 sec)

45. DateDifference:

```
MariaDB [studentgradesystem]> SELECT DATEDIFF('2023-01-18','2023-01-15') AS DateDiff;
```

DateDiff
3

1 row in set (0.000 sec)

46. Upper:

```
MariaDB [studentgradesystem]> select upper(first_name) from students;
```

upper(first_name)
RAHUL
PRIYA
AMIT
NEHA
VIKRAM

5 rows in set (0.000 sec)

47. Lower:

```
MariaDB [studentgradesystem]> select lower(first_name) from students;
```

lower(first_name)
rahul
priya
amit
neha
vikram

5 rows in set (0.000 sec)

48. Concat:

```
MariaDB [studentgradesystem]> select concat(first_name," ",last_name) from students;
+-----+
| concat(first_name," ",last_name) |
+-----+
| Rahul Sharma                     |
| Priya Patel                      |
| Amit Singh                       |
| Neha Gupta                       |
| Vikram Joshi                     |
+-----+
5 rows in set (0.000 sec)
```

49. Aliases:

```
MariaDB [studentgradesystem]> select course_name as courses from courses;
+-----+
| courses |
+-----+
| Biology |
| Physics |
| Computer Science |
| English Literature |
| History |
+-----+
5 rows in set (0.000 sec)
```

50. Case:

```
MariaDB [studentgradesystem]> select first_name,email,phone
-> from students
-> order by
-> (case
-> when email is null then phone
->
-> else first_name
-> end);
+-----+-----+-----+
| first_name | email | phone |
+-----+-----+-----+
| Amit | amit.singh@example.com | 7654321098 |
| Neha | neha.gupta@example.com | 6543210987 |
| Priya | priya.patel@example.com | 8765432109 |
| Rahul | rahul.sharma@example.com | 9876543210 |
| Vikram | vikram.joshi@example.com | 9432109876 |
+-----+-----+-----+
5 rows in set (0.088 sec)
```

