

## SQL: Aggregate Functions

1) Find the total number of students in the database

```
MariaDB [batchd]> select count(sid) from Student;
+-----+
| count(sid) |
+-----+
|          11 |
+-----+
1 row in set (0.001 sec)
```

2) Find the total number of colleges in 'Goa' state

```
MariaDB [batchd]> select count(cname) from College where state="Goa";
+-----+
| count(cname) |
+-----+
|              3 |
+-----+
1 row in set (0.001 sec)
```

3) Find the total number of colleges in 'Goa' state with enrollment greater than 1000

```
MariaDB [batchd]> select count(cname) from College where state="Goa"
-> and enrollment>1000;
+-----+
| count(cname) |
+-----+
|              2 |
+-----+
1 row in set (0.001 sec)
```

4) Retrieve the number of students with gpa>3.6

```
MariaDB [batchd]> select count(sid) from Student where gpa>3.6;
+-----+
| count(sid) |
+-----+
|           9 |
+-----+
1 row in set (0.001 sec)
```

5) retrieve the total number of applicants for 'CS'major.

```
MariaDB [batchd]> select count(sid) from Apply where major='Computer Science';
+-----+
| count(sid) |
+-----+
|           2 |
+-----+
1 row in set (0.001 sec)
```

6) Find the maximum and minimum grade obtained by any student in the db

```
MariaDB [batchd]> select max(grade), min(grade) from Taken;
+-----+-----+
| max(grade) | min(grade) |
+-----+-----+
| AA        | 10        |
+-----+-----+
1 row in set (0.001 sec)
```

7) Retrieve the total number of books prescribed for the course titled 'DBMS'

```
MariaDB [batchd]> select count(book_isbn) from BookAdoption join Course on
-> BookAdoption.courseid=Course.courseid where title='DBMS';
+-----+
| count(book_isbn) |
+-----+
| 4 |
+-----+
1 row in set (0.001 sec)
```

8) Retrieve the maximum and minimum grade obtained for the course 'DBMS'

```
MariaDB [batchd]> select max(grade), min(grade) from Taken join Course on
-> Taken.courseid=Course.courseid where title='DBMS';
+-----+-----+
| max(grade) | min(grade) |
+-----+-----+
| 8          | 7          |
+-----+-----+
1 row in set (0.001 sec)
```

9) Find the total number of credits completed by the student 'AAA'

```
MariaDB [batchd]> select sum(credits) from Course join Taken on
-> Course.courseid=Taken.courseid join Student on Taken.sid=Student.sid
-> where sname='John Smith';
+-----+
| sum(credits) |
+-----+
| 4 |
+-----+
1 row in set (0.001 sec)
```

10) Find out the count of courses which are offered by the institute but not taken by any student.

```
MariaDB [batchd]> select count(courseid) from Course where courseid not in
-> (select courseid from Taken);
+-----+
| count(courseid) |
+-----+
| 2 |
+-----+
1 row in set (0.001 sec)
```

11) Retrieve the number of students who were born in December

```
MariaDB [batchd]> select count(sid) from Student where month(bdate)=12;
+-----+
| count(sid) |
+-----+
|          1 |
+-----+
1 row in set (0.001 sec)
```

12) Find the total enrollment in the state of Goa

```
MariaDB [batchd]> select sum(enrollment) from College where state='Goa';
+-----+
| sum(enrollment) |
+-----+
|           9450 |
+-----+
1 row in set (0.001 sec)
```

13) Find the total & average credits for the 'CS' department

```
MariaDB [batchd]> select sum(credits), avg(credits) from Course where dept_name='CS';
+-----+-----+
| sum(credits) | avg(credits) |
+-----+-----+
|          12 |        3.0000 |
+-----+-----+
1 row in set (0.001 sec)
```

14) Find out the number of books authored by 'Korth'

```
MariaDB [batchd]> select count(book_isbn) from Textbook where author='Korth';
+-----+
| count(book_isbn) |
+-----+
|                2 |
+-----+
1 row in set (0.001 sec)
```

15) Find out the total number of courses offered by the 'CS' dept.

```
MariaDB [batchd]> select count(courseid) from Course where dept_name='CS';
+-----+
| count(courseid) |
+-----+
|                4 |
+-----+
1 row in set (0.001 sec)
```

## SQL: Nested Queries

1) Find the count of courses which are offered by the institute but not taken by any student.

```
MariaDB [batchd]> select cname, count(courseid) from Course where courseid not in
-> (select distinct courseid from Taken) group by cname;
+-----+-----+
| cname | count(courseid) |
+-----+-----+
| BITS  |                1 |
| GEC   |                1 |
+-----+-----+
2 rows in set (0.001 sec)
```

2) Retrieve the titles of the books not adopted by any course.

```
MariaDB [batchd]> select book_title from Textbook where book_isbn not in (select distinct book_isbn from BookAdoption);
+-----+
| book_title |
+-----+
| Fundamentals of Illuminat |
| Lighting Design and Illum |
+-----+
2 rows in set (0.001 sec)
```

3) Which is the course with maximum 'AA' grade

```
MariaDB [batchd]> select courseid, count(grade) as cnt from Taken where grade="AA"
-> group by courseid having cnt=(select max(cnt) from (select count(grade) as cnt
-> from Taken where grade="AA" group by courseid) as temp);
+-----+-----+
| courseid | cnt |
+-----+-----+
|         3 |    1 |
|         4 |    1 |
+-----+-----+
2 rows in set (0.001 sec)
```

4) Find the course with maximum books prescribed

```
MariaDB [batchd]> select courseid, count(book_isbn) as cnt from BookAdoption group by courseid having
-> cnt=(select max(cnt) from (select count(book_isbn) as cnt from BookAdoption group by
-> courseid) as temp);
+-----+-----+
| courseid | cnt |
+-----+-----+
|         2 |    4 |
+-----+-----+
1 row in set (0.001 sec)
```

5) Find the department with the highest average credits.

```
MariaDB [batchd]> select dept_name, avg(credits) as average_cred from Course group by dept_name
-> having average_cred=(select max(average_cred) from (select avg(credits) as average_cred
-> from Course) as temp);
+-----+-----+
| dept_name | average_cred |
+-----+-----+
| CS        |          3.0000 |
| Mechanical |          3.0000 |
+-----+-----+
2 rows in set (0.002 sec)
```

6) Find the student who has applied to maximum no. of colleges & the decision is yes in all the cases.

```
MariaDB [batchd]> select sid, count(cname) as cnt from Apply where decision='Y' group by sid
-> having cnt=(select max(cnt) from (select count(cname) as cnt from Apply where
-> decision='Y' group by sid) as temp);
+-----+-----+
| sid | cnt |
+-----+-----+
| 101 | 2 |
+-----+-----+
1 row in set (0.001 sec)
```

7) Find the student with maximum GPA

```
MariaDB [batchd]> select sid, gpa from Student where gpa=(select max(gpa) from Student);
+-----+-----+
| sid | gpa |
+-----+-----+
| 105 | 9.10 |
+-----+-----+
1 row in set (0.001 sec)
```

9) Find the student who has applied to all the colleges in the Goa state

```
MariaDB [batchd]> select sid, count(Apply.cname) as cnt from Apply join College on
-> Apply.cname = College.cname where state="Goa" group by sid having cnt=
-> (select count(College.cname) as cnt from College where state="Goa");
+-----+-----+
| sid | cnt |
+-----+-----+
| 104 | 3 |
+-----+-----+
1 row in set (0.001 sec)
```

10) Find out the name of the student if any who has got the same grades in all their common subjects as 'John Smith'

```
MariaDB [batchd]> select S2.sname from Student S2 where S2.sname!='John Smith' and
-> not exists (select * from Taken T1 join Taken T2 on T1.courseid=T2.courseid
-> where T1.sid=(select sid from Student where sname='John Smith') and
-> T2.sid=S2.sid and T1.grade!=T2.grade);
+-----+
| sname |
+-----+
| Ishita |
| Rohan |
| Sneha |
| Vedant |
| Kunal |
| Meera |
| Yusuf |
| Vaishnavi |
+-----+
8 rows in set (0.001 sec)
```

11) For each course find the student with the maximum grade.

```
MariaDB [batchd]> select T1.* from Taken T1 where grade=(select max(grade) from Taken T2 where T2.courseid=T1.courseid);
```

sid	courseid	grade
101	1	9
102	2	8
104	4	AA
105	5	8
106	1	9
108	3	AA

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

## SQL Views and Temporary tables

1) Create a view containing the information about all students belonging to CS department along with the various courses they have taken. check if view is updatable.

create view CS\_Stud as select Student.sid, sname, Course.courseid, title from Student join Taken on Student.sid=Taken.sid join Course on Taken.courseid=Course.courseid where dept\_name='CS';

2) Create a view to store the number of students applied to each college and check if the view is updatable

```
MariaDB [batchd]> create view College_Appl as select cname, count(distinct sid) from Apply group by cname;
Query OK, 0 rows affected (0.401 sec)

MariaDB [batchd]> select * from College_Appl;
+-----+-----+
| cname | count(distinct sid) |
+-----+-----+
| BITS  | 4 |
| GEC   | 3 |
| IIT   | 2 |
| NIT   | 3 |
| PCCE  | 3 |
+-----+-----+
5 rows in set (0.092 sec)
```

3) Create a view for every course and display the courseid, course title, credits, dept offering that course various textbooks used for that course, their authors and check if the view is updatable.

```
MariaDB [batchd]> create view Course_Text as select C.courseid, title, credits, dept_name,
-> T.book_isbn, book_title, author from Course C join BookAdoption B on
-> C.courseid=B.courseid join Textbook T on B.book_isbn=T.book_isbn;
Query OK, 0 rows affected (0.367 sec)

MariaDB [batchd]> select * from Course_Text;
+-----+-----+-----+-----+-----+-----+-----+
| courseid | title | credits | dept_name | book_isbn | book_title | author |
+-----+-----+-----+-----+-----+-----+-----+
| 1 | OS | 4 | CS | 1002 | Operating System Concepts | Silbersch |
| 1 | OS | 4 | CS | 1005 | Data Structures | Sahni |
| 1 | OS | 4 | CS | 1006 | Algorithms | Cormen |
| 2 | DBMS | 3 | CS | 1001 | Database System Concepts | Korth |
| 2 | DBMS | 3 | CS | 1004 | Computer Networks | Tanenbaum |
| 2 | DBMS | 3 | CS | 1006 | Algorithms | Cormen |
| 2 | DBMS | 3 | CS | 1007 | DBMS | Korth |
| 3 | WT | 3 | CS | 1003 | Web Technologies | Schneider |
| 3 | WT | 3 | CS | 1007 | DBMS | Korth |
| 3 | WT | 3 | CS | 1008 | Internet Security | Stallings |
| 4 | GT | 2 | CS | 1009 | Graph Theory | Bondy |
| 4 | GT | 2 | CS | 1010 | Cryptography | Menezes |
| 5 | ISOH | 3 | Mechanical | 1001 | Database System Concepts | Korth |
| 5 | ISOH | 3 | Mechanical | 1002 | Operating System Concepts | Silbersch |
| 5 | ISOH | 3 | Mechanical | 1004 | Computer Networks | Tanenbaum |
+-----+-----+-----+-----+-----+-----+-----+
15 rows in set (0.004 sec)
```

4) Using the view created above, create another view to store the no. of textbooks adopted for every course.

```
MariaDB [batchd]> create view Course_TextC as select courseid, title, count(distinct book_isbn)
-> from Course_Text group by courseid, title;
Query OK, 0 rows affected (0.398 sec)

MariaDB [batchd]> select * from Course_TextC;
```

courseid	title	count(distinct book_isbn)
1	OS	3
2	DBMS	4
3	WT	3
4	GT	2
5	ISOH	3

```
5 rows in set (0.003 sec)
```

5) Using the view created in question 4 create another view to store the no. of authors per textbook.

```
MariaDB [batchd]> create view Text_AuthC as select book_isbn, book_title, count(distinct author) from Course_Text group by book_isbn;
Query OK, 0 rows affected (0.390 sec)

MariaDB [batchd]> select * from Text_AuthC;
```

book_isbn	book_title	count(distinct author)
1001	Database System Concepts	1
1002	Operating System Concepts	1
1003	Web Technologies	1
1004	Computer Networks	1
1005	Data Structures	1
1006	Algorithms	1
1007	DBMS	1
1008	Internet Security	1
1009	Graph Theory	1
1010	Cryptography	1

```
10 rows in set (0.097 sec)
```

6) Create a temporary table to store the details of colleges located at Goa along with student applied to those colleges.

```
MariaDB [batchd]> create temporary table GCollege as select Student.sid, sname, College.cname, state from Apply
-> join College on Apply.cname=College.cname join Student on Apply.sid=Student.sid where state="Goa";
Query OK, 10 rows affected (0.111 sec)
Records: 10 Duplicates: 0 Warnings: 0

MariaDB [batchd]> select * from GCollege;
```

sid	sname	cname	state
102	Ishita	BITS	Goa
103	Rohan	BITS	Goa
104	Sneha	BITS	Goa
106	Ananya	BITS	Goa
101	Aarav	GEC	Goa
104	Sneha	GEC	Goa
107	Kunal	GEC	Goa
101	Aarav	PCCE	Goa
104	Sneha	PCCE	Goa
106	Ananya	PCCE	Goa

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

7) Using the temporary table above find the students applied to all colleges at Goa.

```
MariaDB [batchd]> select sid, sname, count(distinct cname) from GCollege group by sid having
-> count(distinct cname)=(select count(cname) from College where state="Goa");
+-----+-----+-----+
| sid | sname | count(distinct cname) |
+-----+-----+-----+
| 104 | Sneha | 3 |
+-----+-----+-----+
1 row in set (0.001 sec)
```

8) Using the views created above answer the following questions

1. Find the course with maximum no. of textbooks prescribed for it.

```
MariaDB [batchD]> select courseid, title, count(distinct book_isbn) as total_books from Course_Text group by courseid,
-> title having count(distinct book_isbn) = (select max(book_count) from (select count(distinct book_isbn)
-> as book_count from Course_Text group by courseid) as temp);
+-----+-----+-----+
| courseid | title | total_books |
+-----+-----+-----+
| 2 | DBMS | 4 |
+-----+-----+-----+
1 row in set (0.002 sec)
```

2. Find the textbook with more than two authors.

```
MariaDB [batchD]> select book_isbn, book_title, count(distinct author) as total_authors from Course_Text
-> group by book_isbn, book_title having count(distinct author) > 2;
Empty set (0.001 sec)
```

3. Find the course with credits greater than average credits offered by the dept.

```
MariaDB [batchD]> select courseid, title, credits, dept_name from Course where credits >
-> (select avg(credits) from Course where dept_name = Course.dept_name);
+-----+-----+-----+-----+
| courseid | title | credits | dept_name |
+-----+-----+-----+-----+
| 1 | OS | 4 | CS |
| 7 | Illumination | 4 | Electronics |
+-----+-----+-----+-----+
2 rows in set (0.001 sec)
```