

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)
```