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1. Alter table: add one column `gender` to student table that can take either 'M' or 'F'. Drop the column. Add one column `age` to student table with default value 0.

```
MariaDB [university]> alter table student add column gender varchar(1);
Query OK, 0 rows affected (0.12 sec)
Records: 0 Duplicates: 0 Warnings: 0

MariaDB [university]> alter table student add constraint chk_gender check(gender="M" or gender="F");
Query OK, 0 rows affected (0.00 sec)
Records: 0 Duplicates: 0 Warnings: 0

MariaDB [university]> DESC student;
+-----+-----+-----+-----+-----+-----+
| Field      | Type          | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| ID         | varchar(5)    | NO   | PRI |         |       |
| name       | varchar(20)   | NO   |     | NULL    |       |
| dept_name  | varchar(20)   | YES  | MUL | NULL    |       |
| tot_cred   | decimal(3,0)  | YES  |     | NULL    |       |
| gender     | varchar(1)    | YES  |     | NULL    |       |
+-----+-----+-----+-----+-----+-----+
5 rows in set (0.00 sec)

MariaDB [university]> insert into student values("123","cnn","cse","6","M");
```

```
MariaDB [university]> alter table student drop column gender;
Query OK, 0 rows affected (0.08 sec)
Records: 0 Duplicates: 0 Warnings: 0

MariaDB [university]> alter table student add column age int default 0;
Query OK, 0 rows affected (0.14 sec)
Records: 0 Duplicates: 0 Warnings: 0

MariaDB [university]> desc student;
+-----+-----+-----+-----+-----+-----+
| Field      | Type          | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| ID         | varchar(5)    | NO   | PRI |         |       |
| name       | varchar(20)   | NO   |     | NULL    |       |
| dept_name  | varchar(20)   | YES  | MUL | NULL    |       |
| tot_cred   | decimal(3,0)  | YES  |     | NULL    |       |
| age        | int(11)       | YES  |     | 0       |       |
+-----+-----+-----+-----+-----+-----+
5 rows in set (0.00 sec)

MariaDB [university]> █
```

2. Update table: change age of students to 23 if their department is 'Comp. Sci'.

```
MariaDB [university]> update student set age=23 where dept_name="Comp. Sci.";
Query OK, 4 rows affected (0.03 sec)
Rows matched: 4 Changed: 4 Warnings: 0
```

```
MariaDB [university]> select *from student;
```

ID	name	dept_name	tot_cred	age
00128	Zhang	Comp. Sci.	102	23
12345	Shankar	Comp. Sci.	32	23
19991	Brandt	History	80	0
23121	Chavez	Finance	110	0
44553	Peltier	Physics	56	0
45678	Levy	Physics	46	0
54321	Williams	Comp. Sci.	54	23
55739	Sanchez	Music	38	0
70557	Snow	Physics	0	0
76543	Brown	Comp. Sci.	58	23
76653	Aoi	Elec. Eng.	60	0
98765	Bourikas	Elec. Eng.	98	0
98988	Tanaka	Biology	120	0

13 rows in set (0.00 sec)

3.practice

4. Show instructor table and give the 5 percentage salary hike to the instructors whose salary is less than 70000 and department is either Music or Physics.

```
MariaDB [university]> select *from instructor;
```

ID	name	dept_name	salary
10101	Srinivasan	Comp. Sci.	65000.00
12121	Wu	Finance	90000.00
15151	Mozart	Music	40000.00
22222	Einstein	Physics	95000.00
32343	El Said	History	60000.00
33456	Gold	Physics	87000.00
45565	Katz	Comp. Sci.	75000.00
58583	Califieri	History	62000.00
76543	Sing	Finance	80000.00
76766	Crick	Biology	72000.00
83821	Brandt	Comp. Sci.	92000.00
98345	Kim	Elec. Eng.	80000.00

12 rows in set (0.00 sec)

```

MariaDB [university]> update instructor
    -> set salary=1.05*salary
    -> where salary<70000 and dept_name="Phyics" or dept_name="Music";
Query OK, 1 row affected (0.02 sec)
Rows matched: 1  Changed: 1  Warnings: 0

MariaDB [university]> select *from instructor;
+-----+-----+-----+-----+
| ID    | name      | dept_name | salary |
+-----+-----+-----+-----+
| 10101 | Srinivasan | Comp. Sci. | 65000.00 |
| 12121 | Wu         | Finance   | 90000.00 |
| 15151 | Mozart     | Music      | 42000.00 |
| 22222 | Einstein   | Physics    | 95000.00 |
| 32343 | El Said    | History    | 60000.00 |
| 33456 | Gold       | Physics    | 87000.00 |
| 45565 | Katz        | Comp. Sci. | 75000.00 |
| 58583 | Califieri  | History    | 62000.00 |
| 76543 | Sing       | Finance    | 80000.00 |
| 76766 | Crick      | Biology    | 72000.00 |
| 83821 | Brandt     | Comp. Sci. | 92000.00 |
| 98345 | Kim        | Elec. Eng. | 80000.00 |
+-----+-----+-----+-----+
12 rows in set (0.00 sec)

```

5.practice

6. Show the 6th and 7th highest paid instructors.

```

MariaDB [university]> select name,salary from instructor
    -> order by salary desc
    -> limit 2 offset 5;
+-----+-----+
| name | salary |
+-----+-----+
| Sing | 80000.00 |
| Katz  | 75000.00 |
+-----+-----+
2 rows in set (0.01 sec)

MariaDB [university]> 

```

7. Show the instructors whose department is in Taylor, Watson or Painter;



```
MariaDB [university]> select I. name,D.building from instructor as I,
-> (select building,dept_name from department where building="Taylor" or building="Watson" or building="Painter" ) as D where I.dept_name=D.dept_name;
```

name	building
Srinivasan	Taylor
Wu	Painter
Einstein	Watson
El Said	Painter
Gold	Watson
Katz	Taylor
Califieri	Painter
Sing	Painter
Crick	Watson
Brandt	Taylor
Kim	Taylor

```
11 rows in set (0.00 sec)
```

8. Show the name of the students whose total credit is between 7 and 14. Do not use comparison operators (<,>).

```
MariaDB [university]> select ID,name,tot_cred from student
-> where tot_cred between 50 and 80;
```

ID	name	tot_cred
19991	Brandt	80
44553	Peltier	56
54321	Williams	54
76543	Brown	58
76653	Aoi	60

```
5 rows in set (0.00 sec)
```

9. [P] Show the name of the students whose name starts with B.

10. Show the records of the students whose name starts with B excluding Brown.

```

MariaDB [university]> select name from student where name!="Brown"
-> and name like "B%";
+-----+
| name |
+-----+
| Brandt |
| Bourikas |
+-----+
2 rows in set (0.00 sec)

MariaDB [university]> 

```

11. Show ID, name, courses, and corresponding credits of each student.

```

MariaDB [university]> select S.ID,S.name,S.tot_cred,T.course_id from student as S,
-> (select course_id,ID from takes) as T where S.ID=T.ID;
+-----+-----+-----+-----+
| ID | name | tot_cred | course_id |
+-----+-----+-----+-----+
| 00128 | Zhang | 102 | CS-101 |
| 00128 | Zhang | 102 | CS-347 |
| 12345 | Shankar | 32 | CS-101 |
| 12345 | Shankar | 32 | CS-190 |
| 12345 | Shankar | 32 | CS-315 |
| 12345 | Shankar | 32 | CS-347 |
| 19991 | Brandt | 80 | HIS-351 |
| 23121 | Chavez | 110 | FIN-201 |
+-----+-----+-----+-----+
8 rows in set (0.00 sec)

```

12. Find sum of total credits for all students. [check if table has any null value in total credits and if sum avoids null]

```

MariaDB [university]> select tot_cred from student
-> where tot_cred is null;
Empty set (0.01 sec)

MariaDB [university]> select sum(tot_cred)
-> from student;
+-----+
| sum(tot_cred) |
+-----+
| 854 |
+-----+
1 row in set (0.00 sec)

MariaDB [university]> 

```

13. Find the departments with the maximum budget.

```
MariaDB [university]> select *from department;
```

dept_name	building	budget
Biology	Watson	90000.00
Comp. Sci.	Taylor	100000.00
Elec. Eng.	Taylor	85000.00
Finance	Painter	120000.00
History	Painter	50000.00
Music	Packard	80000.00
Physics	Watson	70000.00

```
7 rows in set (0.01 sec)
```

```
MariaDB [university]> select max(budget)
-> from department;
```

max(budget)
120000.00

```
1 row in set (0.00 sec)
```

```
MariaDB [university]> 
```

14. Find the department with highest average salary paid to the instructors.

```
MariaDB [university]> select dept_name,avg(salary) from instructor group by dept_name desc;
```

dept_name	avg(salary)
Physics	91000.000000
Music	42000.000000
History	61000.000000
Finance	85000.000000
Elec. Eng.	80000.000000
Comp. Sci.	77333.333333
Biology	72000.000000

```
7 rows in set (0.00 sec)
```

```
MariaDB [university]> select dept_name,avg(salary) from instructor
-> group by dept_name desc limit 1;
```

dept_name	avg(salary)
Physics	91000.000000

```
1 row in set (0.00 sec)
```

```
MariaDB [university]> 
```

15. Show name, and salary of instructors in Finance and Biology in descending order of Salary.

```

MariaDB [university]> select name,salary,dept_name from instructor
-> where dept_name="Finance" or dept_name="Biology" group by salary desc;
+-----+-----+-----+
| name  | salary | dept_name |
+-----+-----+-----+
| Wu    | 90000.00 | Finance  |
| Sing  | 80000.00 | Finance  |
| Crick | 72000.00 | Biology  |
+-----+-----+-----+
3 rows in set (0.00 sec)

MariaDB [university]> 

```

16. [B] Find name of instructor whose salary is greater than salary of all instructors belongs to either Biology or History or Finance department.

```

MariaDB [university]> select name, salary from instructor where salary>all
-> (select salary from instructor where dept_name="Biology" or dept_name="History" or dept_name="Finance")
-> order by salary desc;
+-----+-----+
| name  | salary |
+-----+-----+
| Einstein | 95000.00 |
| Brandt  | 92000.00 |
+-----+-----+
2 rows in set (0.00 sec)

MariaDB [university]> 

```

17. Correct the tot\_credit attributes for each tuple in student table such that total credit is



```

MariaDB [university]> update student,
-> (select t1.ID,sum(credits) as sum_cred
-> from (select s.ID,credits from student as s,takes as t,course as c
-> where s.ID=t.ID and t.course_id=c.course_id and t.grade!="F") as t1 group by t1.ID) as t2 set
-> student.tot_cred=t2.sum_cred where student.ID=t2.ID;
Query OK, 4 rows affected (0.02 sec)
Rows matched: 4 Changed: 4 Warnings: 0

MariaDB [university]> select *from student;
+-----+-----+-----+-----+-----+
| ID    | name   | dept_name | tot_cred | age |
+-----+-----+-----+-----+-----+
| 00128 | Zhang  | Comp. Sci. | 7        | 23  |
| 12345 | Shankar | Comp. Sci. | 14       | 23  |
| 19991 | Brandt | History    | 3        | 0   |
| 23121 | Chavez | Finance    | 3        | 0   |
| 44553 | Peltier | Physics    | 56       | 0   |
| 45678 | Levy   | Physics    | 46       | 0   |
| 54321 | Williams | Comp. Sci. | 54       | 23  |
| 55739 | Sanchez | Music      | 38       | 0   |
| 70557 | Snow   | Physics    | 0        | 0   |
| 76543 | Brown  | Comp. Sci. | 58       | 23  |
| 76653 | Aoi    | Elec. Eng. | 60       | 0   |
| 98761 | Raman  | Music      | NULL     | NULL |
| 98765 | Bourikas | Elec. Eng. | 98       | 0   |
| 98988 | Tanaka | Biology    | 120      | 0   |
+-----+-----+-----+-----+-----+
14 rows in set (0.00 sec)

MariaDB [university]>

```

18. Create view of students who are studying in a department with budget more than 80000.

```

MariaDB [university]> create view budget_80000 as
-> (select student.name,department.budget
-> from student,department
-> where student.dept_name=department.dept_name and budget>80000);
Query OK, 0 rows affected (0.04 sec)

MariaDB [university]> select *from budget_80000;
+-----+-----+
| name   | budget |
+-----+-----+
| Tanaka  | 90000.00 |
| Zhang   | 100000.00 |
| Shankar | 100000.00 |
| Williams | 100000.00 |
| Brown   | 100000.00 |
| Aoi     | 85000.00 |
| Bourikas | 85000.00 |
| Chavez  | 120000.00 |
+-----+-----+
8 rows in set (0.01 sec)

MariaDB [university]>

```

19. Insert a new student information in student table ID is 98761, name is 'Raman' and dept\_name is 'Music'.



```

MariaDB [university]> insert into student
  -> values("98761","Raman","Music",null,null);
Query OK, 1 row affected (0.02 sec)

MariaDB [university]> select *from student;
+-----+-----+-----+-----+-----+
| ID    | name  | dept_name | tot_cred | age  |
+-----+-----+-----+-----+-----+
| 00128 | Zhang | Comp. Sci. | 102      | 23   |
| 12345 | Shankar | Comp. Sci. | 32       | 23   |
| 19991 | Brandt | History    | 80       | 0    |
| 23121 | Chavez | Finance    | 110      | 0    |
| 44553 | Peltier | Physics    | 56       | 0    |
| 45678 | Levy   | Physics    | 46       | 0    |
| 54321 | Williams | Comp. Sci. | 54       | 23   |
| 55739 | Sanchez | Music      | 38       | 0    |
| 70557 | Snow   | Physics    | 0        | 0    |
| 76543 | Brown  | Comp. Sci. | 58       | 23   |
| 76653 | Aoi    | Elec. Eng. | 60       | 0    |
| 98761 | Raman  | Music      | NULL     | NULL |
| 98765 | Bourikas | Elec. Eng. | 98       | 0    |
| 98988 | Tanaka | Biology    | 120      | 0    |
+-----+-----+-----+-----+-----+
14 rows in set (0.00 sec)

```

20. Create a view containing tot\_cred attributes of students.

```
MariaDB [university]> create view student_cred
-> as select name,tot_cred from student;
Query OK, 0 rows affected (0.02 sec)
```

```
MariaDB [university]> select *from student_cred;
```

name	tot_cred
Zhang	102
Shankar	32
Brandt	80
Chavez	110
Peltier	56
Levy	46
Williams	54
Sanchez	38
Snow	0
Brown	58
Aoi	60
Raman	NULL
Bourikas	98
Tanaka	120

14 rows in set (0.00 sec)

21. [P] Find out number of tuple present in that view . Does COUNT avoid NULL ?
22. Create view stud\_dept\_budg containing students, department names and budgets where students are studying in a department with budget more than 80000.

```
MariaDB [university]> create view stud_dept_budg as
-> (select student.name,department.dept_name,department.budget
-> from student,department
-> where student.dept_name=department.dept_name and budget>80000);
Query OK, 0 rows affected (0.04 sec)
```

```
MariaDB [university]> select *from stud_dept_budg;
```

name	dept_name	budget
Tanaka	Biology	90000.00
Zhang	Comp. Sci.	100000.00
Shankar	Comp. Sci.	100000.00
Williams	Comp. Sci.	100000.00
Brown	Comp. Sci.	100000.00
Aoi	Elec. Eng.	85000.00
Bourikas	Elec. Eng.	85000.00
Chavez	Finance	120000.00

8 rows in set (0.00 sec)

23. Decrease the budget of the Biology department by 10000.

```
MariaDB [university]> select *from department;
+-----+-----+-----+
| dept_name | building | budget |
+-----+-----+-----+
| Biology   | Watson   | 90000.00 |
| Comp. Sci. | Taylor   | 100000.00 |
| Elec. Eng. | Taylor   | 85000.00 |
| Finance    | Painter   | 120000.00 |
| History    | Painter   | 50000.00 |
| Music      | Packard   | 80000.00 |
| Physics    | Watson    | 70000.00 |
+-----+-----+-----+
7 rows in set (0.00 sec)

MariaDB [university]> update department
-> set budget=budget-10000
-> where dept_name="Biology";
Query OK, 1 row affected (0.02 sec)
Rows matched: 1  Changed: 1  Warnings: 0

MariaDB [university]> select *from department;
+-----+-----+-----+
| dept_name | building | budget |
+-----+-----+-----+
| Biology   | Watson   | 80000.00 |
| Comp. Sci. | Taylor   | 100000.00 |
| Elec. Eng. | Taylor   | 85000.00 |
| Finance    | Painter   | 120000.00 |
| History    | Painter   | 50000.00 |
| Music      | Packard   | 80000.00 |
| Physics    | Watson    | 70000.00 |
+-----+-----+-----+
7 rows in set (0.00 sec)

MariaDB [university]> 
```

24. Show the content of stud\_dept\_budg.



```
MariaDB [university]> select *from stud_dept_budg;
```

name	dept_name	budget
Zhang	Comp. Sci.	100000.00
Shankar	Comp. Sci.	100000.00
Williams	Comp. Sci.	100000.00
Brown	Comp. Sci.	100000.00
Aoi	Elec. Eng.	85000.00
Bourikas	Elec. Eng.	85000.00
Chavez	Finance	120000.00

```
7 rows in set (0.00 sec)
```

```
MariaDB [university]>
```