

Tutorial – 8

Implement Relational Algebra Expressions for all the queries on University Online Examination Scheduling system

## 1) Display the number of students enrolled for exam 'DBMS'

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1.

$$\begin{aligned} \text{temp1} &\leftarrow \pi_{\text{cid}} (\sigma_{\text{name} = \text{'DBMS'}} (\text{Course})) \\ \text{temp2} &\leftarrow \text{creg} \bowtie_{(\text{creg.cid} = \text{temp1.cid})} \text{temp1} \\ \text{result} &\leftarrow \mathcal{F}_{\text{count}(*), \text{as no\_stud\_dbms}} (\text{temp2}) \end{aligned}$$

select count(\*) as no\_stud\_dbms from creg where cid in (select cid from course where name='dbms');

MySQL Workbench interface showing the execution of a SQL query. The query is: `select count(*) as no_stud_dbms from creg where cid in (select cid from course where name='dbms');`. The result grid shows 1 row with the value 2. The bottom panel shows the execution log with the query and its results.

#	Time	Action	Message	Duration / Fetch
8	10:14:59	select * from fac LIMIT 0, 1000	2 row(s) returned	0.016 sec / 0.000 sec
9	10:15:10	select * from examclass LIMIT 0, 1000	1 row(s) returned	0.000 sec / 0.000 sec
10	10:15:20	select * from examf LIMIT 0, 1000	2 row(s) returned	0.000 sec / 0.000 sec
11	10:15:34	select * from examt LIMIT 0, 1000	7 row(s) returned	0.000 sec / 0.000 sec
12	10:16:19	select count(*) as no_stud_dbms from creg where cid in (select cid from course where name='dbms');	1 row(s) returned	0.016 sec / 0.000 sec

## 2) Show the details of proctors having duty more than 3 times

$$2. \text{ temp1} \leftarrow \pi_{\text{fid}, \text{Count}(*)} (\text{examt})$$

$$\text{result} \leftarrow \pi_{\text{fid}, \text{occurrences}} (\sigma_{\text{occurrences} \geq 3} (\text{temp1}))$$

select \* from fac where fid in (select fid from examt group by fid having count(\*)>=3);

The screenshot shows the MySQL Workbench interface. The SQL editor contains the following query:

```
-- 1
53 select * from creg;
54 -- 3
55 select count(*) as no_stud_dbms from creg where cid in (select cid from course where name='dbms');
56 -- 4
57 select * from fac where fid in (select fid from examt group by fid having count(*)>=3);
```

The Results grid shows the output of the query:

FID	name	address	phone	emgPN
3012	raj	vij	13456	1113
3013	kevin	vij	15515	1115

The Output tab shows the execution log:

#	Time	Action	Message	Duration / Fetch
9	10:15:10	select * from examclass LIMIT 0, 1000	1 row(s) returned	0.000 sec / 0.000 sec
10	10:15:20	select * from examf LIMIT 0, 1000	2 row(s) returned	0.000 sec / 0.000 sec
11	10:15:34	select * from examt LIMIT 0, 1000	7 row(s) returned	0.000 sec / 0.000 sec
12	10:16:19	select count(*) as no_stud_dbms from creg where cid in (select cid from course where n...	1 row(s) returned	0.016 sec / 0.000 sec
13	10:17:01	select * from fac where fid in (select fid from examt group by fid having count(*)>=3) LIM...	2 row(s) returned	0.000 sec / 0.000 sec

## 3) Get the details of faculty working as squad

$$3. \text{ temp1} \leftarrow \pi_{\text{fid}} (\sigma_{\text{staffrole} = \text{'squad'}} (\text{examf}))$$

$$\text{result} \leftarrow \sigma_{\text{true}} (\text{fac} \bowtie_{\text{fac.fid} = \text{temp1.fid}} \text{temp1})$$

select \* from fac where fid in (select fid from examf where staffrole='squad');

MySQL Workbench interface showing a query execution result. The query is:

```
select * from fac where fid in (select fid from examf where staffrole='squad');
```

The result grid shows the following data:

FID	name	address	phone	emgPN
3013	kevin	vty	15515	1115

The Action Output pane shows the execution details:

#	Time	Action	Message	Duration / Fetch
10	10:15:20	select * from examf LIMIT 0, 1000	2 row(s) returned	0.000 sec / 0.000 sec
11	10:15:34	select * from examf LIMIT 0, 1000	7 row(s) returned	0.000 sec / 0.000 sec
12	10:16:19	select count(*) as no_stud_dbms from creg where cid in (select cid from course where name='dbms');	1 row(s) returned	0.016 sec / 0.000 sec
13	10:17:01	select * from fac where fid in (select fid from examf group by fid having count(*)>=3) LIM...	2 row(s) returned	0.000 sec / 0.000 sec
14	10:17:38	select * from fac where fid in (select fid from examf where staffrole='squad') LIMIT 0, 1000	1 row(s) returned	0.000 sec / 0.000 sec

#### 4) Display the details of proctors and squad for exam 'DBMS'

4 temp1  $\leftarrow \pi_{fid} (\sigma_{name='dbms'} (course))$

result  $\leftarrow \sigma_{true} (fac \bowtie_{fac.fid=temp1.fid} temp1)$

select \* from fac where fid in (select fid from examf where CID in (select cid from course where name='DBMS'));

MySQL Workbench interface showing a query execution result. The query is:

```
select * from fac where fid in (select fid from examf where CID in (select cid from course where name='DBMS'));
```

The result grid shows the following data:

FID	name	address	phone	emgPN
3012	raj	vty	13456	1113
3013	kevin	vty	15515	1115

The Action Output pane shows the execution details:

#	Time	Action	Message	Duration / Fetch
13	10:17:01	select * from fac where fid in (select fid from examf group by fid having count(*)>=3) LIM...	2 row(s) returned	0.000 sec / 0.000 sec
14	10:17:38	select * from fac where fid in (select fid from examf where staffrole='squad') LIMIT 0, 1000	1 row(s) returned	0.000 sec / 0.000 sec
15	10:18:00	select * from fac where fid in (select fid from examf where CID=1) LIMIT 0, 1000	2 row(s) returned	0.000 sec / 0.000 sec
16	10:18:22	select * from fac where fid in (select fid from examf where CID in (select cid from course ...	2 row(s) returned	0.000 sec / 0.000 sec
17	10:18:44	select * from fac where fid in (select fid from examf where CID=1) LIMIT 0, 1000	2 row(s) returned	0.000 sec / 0.000 sec

## 5) Show the number of rooms allotted for each course on 'Tuesday'

5  
 $\text{weekday}(\text{dte}) = 1$  (examt)

```
select * from examt where weekday(dte)=1;
```

The screenshot shows the MySQL Workbench interface. The SQL Editor contains the following query:

```
-- 5
59 select * from fac where fid in (select fid from examf where staffrole='squad');
60 -- 6(here the cid of dbms is 1)
61 select * from fac where fid in (select fid from examt where CID in (select cid from course where name='DBMS'));
62 -- 7
63 select * from examt where weekday(dte)=1;
```

The Result Grid shows the following data:

t	CID	examtype	dte	FID
1	1	regular	2020-09-08	3012
2	1	supply	2020-09-08	3012
3	1	detained	2020-09-08	3012
4	1	regular	2020-09-08	3013
5	1	supply	2020-09-08	3013
6	1	detained	2020-09-08	3013

The Output pane shows the execution results:

#	Time	Action	Message	Duration / Fetch
14	10:17:38	select * from fac where fid in (select fid from examf where staffrole='squad') LIMIT 0, 1000	1 row(s) returned	0.000 sec / 0.000 sec
15	10:18:00	select * from fac where fid in (select fid from examt where CID=1) LIMIT 0, 1000	2 row(s) returned	0.000 sec / 0.000 sec
16	10:18:22	select * from fac where fid in (select fid from examt where CID in (select cid from course ...	2 row(s) returned	0.000 sec / 0.000 sec
17	10:18:44	select * from fac where fid in (select fid from examt where CID=1) LIMIT 0, 1000	2 row(s) returned	0.000 sec / 0.000 sec
18	10:20:22	select * from examt where weekday(dte)=1 LIMIT 0, 1000	6 row(s) returned	0.000 sec / 0.000 sec

## 6) Update the exam date of 'OS' which is postponed to 2 days after the scheduled date

6. examt  $\leftarrow \pi_{t, CID, examtype, (\sigma_{t=7}(\text{examt}))}$   
 Date-ADD(dte, Interval 2 day) as dte,  
 fid

```
update examt set dte='2020-09-11' where cid=2 and t=7;
```

```
select * from examt where t=7;
```



The screenshot shows the MySQL Workbench interface. The SQL editor contains the following query:

```

61 • select * from fac where fid in (select fid from examt where CID in (select cid from course where name='DBMS'));
62 -- 7
63 • select * from examt where weekday(dte)=1;
64 -- 8
65 • update examt set dte='2020-09-11' where cid=2 and t=7;
66 • select * from examt where t=7;

```

The Results Grid shows the following data:

t	CID	examtype	dte	FID
7	2	regular	2020-09-11	3013

The Action Output pane shows the following results:

#	Time	Action	Message	Duration / Fetch
18	10:20:22	select * from examt where weekday(dte)=1 LIMIT 0, 1000	6 row(s) returned	0.000 sec / 0.000 sec
19	10:20:31	update examt set dte='2020-09-11' where cid=2 and t=7	0 row(s) affected Rows matched: 1 Changed: 0 Warnings: 0	0.000 sec
20	10:20:36	update examt set dte='2020-09-11' where cid=2	Error Code: 1175. You are using safe update mode and you tried to update a table with...	0.000 sec
21	10:21:01	update examt set dte='2020-09-11' where cid=2 and t=7	0 row(s) affected Rows matched: 1 Changed: 0 Warnings: 0	0.000 sec
22	10:21:30	select * from examt where t=7 LIMIT 0, 1000	1 row(s) returned	0.000 sec / 0.000 sec

7) Give the no. of students enrolled in each course department-wise

2.  $\int$  (cregd)  
dept count(\*) as no\_reg

select d.dept,course.name,count(\*)as students\_count from creg c inner join creg d on c.SID=d.sid inner join course on c.cid=course.cid group by d.dept,c.cid;

The screenshot shows the MySQL Workbench interface. The SQL editor contains the following query:

```

66 • select * from examt where t=7;
67 -- 9
68 • insert into creg(SID,CID) values(3,1);
69 • select d.dept,course.name,count(*)as students_count from creg c inner join
70 cregd d on c.SID=d.sid inner join course on c.cid=course.cid group by d.dept,c.cid;
71 -- 10

```

The Results Grid shows the following data:

dept	name	students_count
cse	dbms	1
cse	os	1
ece	dbms	1

The Action Output pane shows the following results:

#	Time	Action	Message	Duration / Fetch
19	10:20:31	update examt set dte='2020-09-11' where cid=2 and t=7	0 row(s) affected Rows matched: 1 Changed: 0 Warnings: 0	0.000 sec
20	10:20:36	update examt set dte='2020-09-11' where cid=2	Error Code: 1175. You are using safe update mode and you tried to update a table with...	0.000 sec
21	10:21:01	update examt set dte='2020-09-11' where cid=2 and t=7	0 row(s) affected Rows matched: 1 Changed: 0 Warnings: 0	0.000 sec
22	10:21:30	select * from examt where t=7 LIMIT 0, 1000	1 row(s) returned	0.000 sec / 0.000 sec
23	10:21:52	select d.dept,course.name,count(*)as students_count from creg c inner join cregd d on...	3 row(s) returned	0.000 sec / 0.000 sec

- 8) Display the course details where the enrolled students are greater than the enrolled students in DBMS

8 temp1 ←  $\sigma_{name='dbms'}(course)$

result ←  $\sigma_{true}(course \bowtie temp1)$

course.  
no.-of-enrolled  
students

>

temp1.  
no.-of-  
enrolled  
students

select \* from creg group by cid having count(\*) > (select count(\*) from creg where cid in (select cid from course where name='DBMS'));

The screenshot shows the MySQL Workbench interface. The SQL Editor contains the following query:

```

67
68 -- values(3,1);
69 -- se, count(*) as students_count from creg c inner join
70 -- inner join course on c.cid=course.cid group by d.dept, c.cid;
71
72 -- by cid having count(*) > (select count(*) from creg where cid in (select cid from course where name='DBMS'));

```

The Results Grid shows the following columns: sno, SID, CID. The first row contains three NULL values.

The Output pane shows the execution log:

#	Time	Action	Message	Duration / Fetch
21	10:21:01	update exant set dte='2020-09-11' where cid=2 and t=7	0 row(s) affected Rows matched: 1 Changed: 0 Warnings: 0	0.000 sec
22	10:21:30	select * from exant where t=7 LIMIT 0, 1000	1 row(s) returned	0.000 sec / 0.000 sec
23	10:21:52	select d.dept, course.name, count(*) as students_count from creg c inner join creg d on ...	3 row(s) returned	0.000 sec / 0.000 sec
24	10:23:00	select * from creg group by cid having count(*) > (select count(*) from creg where cid=1)...	0 row(s) returned	0.000 sec / 0.000 sec
25	10:23:27	select * from creg group by cid having count(*) > (select count(*) from creg where cid in ...	0 row(s) returned	0.000 sec / 0.000 sec