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## **NoSQL Database Management Lab**

### **Lab7: University Course Enrollment Data Analytics**

In this lab, you will use the dataset that contains 7 course enrolment data files of a university (course.data, dept.data, enroll.data, major.data, prof.data, section.data and student data) that are given to you.

Please open these files in MS Excel and look at the record values. Understand the relationships between each table.

Write SQL queries for the following statements, execute them and obtain results. Compare the query results by manually checking the records and ensure your SQL query gives you correct result as you expected.

Write SQL queries for the following problems

**Question1.** Print the names of professors who work in departments that have fewer than 50 PhD students.

**SQL> select a.pname,b.dname,num\_phd from prof a,dept b where num\_phd<50;**

PNAME	DNAME	NUM_PHD
-----		
Jones, J.	Computer Sciences	47
Smith, S.	Computer Sciences	47
Brown, S.	Computer Sciences	47
Brian, C.	Computer Sciences	47
Edison, L.	Computer Sciences	47
Bucket, T.	Computer Sciences	47

Robinson, T.	Computer Sciences	47
Clark, E.	Computer Sciences	47
Walter, A.	Computer Sciences	47
Randolph, B.	Computer Sciences	47
Jones, J.	Chemical Engineering	32
Smith, S.	Chemical Engineering	32
Brown, S.	Chemical Engineering	32
Brian, C.	Chemical Engineering	32
Edison, L.	Chemical Engineering	32
Bucket, T.	Chemical Engineering	32
Robinson, T.	Chemical Engineering	32
Clark, E.	Chemical Engineering	32
Walter, A.	Chemical Engineering	32
Randolph, B.	Chemical Engineering	32
Jones, J.	Industrial Engineering	41
Smith, S.	Industrial Engineering	41
Brown, S.	Industrial Engineering	41
Brian, C.	Industrial Engineering	41
Edison, L.	Industrial Engineering	41
Bucket, T.	Industrial Engineering	41
Robinson, T.	Industrial Engineering	41
Clark, E.	Industrial Engineering	41
Walter, A.	Industrial Engineering	41
Randolph, B.	Industrial Engineering	41
Jones, J.	Sanitary Engineering	3
Smith, S.	Sanitary Engineering	3
Brown, S.	Sanitary Engineering	3
Brian, C.	Sanitary Engineering	3
Edison, L.	Sanitary Engineering	3

Bucket, T.	Sanitary Engineering	3
Robinson, T.	Sanitary Engineering	3
Clark, E.	Sanitary Engineering	3
Walter, A.	Sanitary Engineering	3
Randolph, B.	Sanitary Engineering	3

40 rows selected.

**Question 2. Print the names of the students with the lowest GPA.**

**SQL> select sname,gpa from student where gpa=(select min(gpa) from student);**

SNAME	GPA
-----	
Jetplane, Leaving O.	0

**Question3. For each Computer Sciences class, print the class number, section number, and the average gpa of the students enrolled in the class section.**

**SQL> select a.cno,sec\_no,avg(b.gpa) from enroll a,student b where dname='Computer Sciences' and a.sid=b.sid group by dname,cno,sec\_no;**

CNO	SEC_NO	AVG(B.GPA)
-----	-----	-----
302	1	3
726	1	2.64117648
467	1	2.98000002
302	2	3.07499999
701	1	3.28333333

**Question4. Print the names and section numbers of all sections with more than six students enrolled in them.**

**SQL> select a.cno,cname,b.sec\_no,count(b.sid) from course a left join enroll b on a.cno=b.cno group by a.cno,cname,b.sec\_no having count(b.sid)>6;**

CNO

-----

CNAME

-----

SEC\_NO COUNT(B.SID)

-----

302

Intro to Programming

2 8

467

Intro to Data Structures

1 10

CNO

-----

CNAME

-----

SEC\_NO COUNT(B.SID)

-----

310

Intro to Garbage

1 7

462

College Geometry 2

CNO

-----

CNAME

-----

SEC\_NO COUNT(B.SID)

-----

1 9

701

Compiler Construction

1 12

561

CNO

-----

CNAME

-----  
SEC\_NO COUNT(B.SID)

-----

Advanced City Planning

1 13

514

Manpower Utilization

1 9

CNO

-----

CNAME

-----  
SEC\_NO COUNT(B.SID)

-----

561

Advanced Garbage Collection

1 13

365

City Planning

1 8

CNO

-----  
CNAME

-----  
SEC\_NO COUNT(B.SID)

-----  
375

Highway Engineering

1 9

310

Thermodynamics

CNO

-----  
CNAME

-----  
SEC\_NO COUNT(B.SID)

-----  
1 7

302

Intro to Programming

1 10

461

CNO

-----  
CNAME

-----  
SEC\_NO COUNT(B.SID)

-----  
College Geometry 1

1 9

726
Nonlinear Programming
1 17

14 rows selected.

**Question5. Print the name(s) and sid(s) of the student(s) enrolled in the most sections.**

**SQL> select sname,sid from student where sid in (select sid from enroll group by sid having count(\*)>=all(select count(\*) from enroll group by sid));**

SNAME	SID
-----	
Hamilton, S.	29

**Question6. Print the names of departments that have one or more majors who are under 18 year old.**

**SQL> select s.sid,m.dname from student s, major m where s.sid=m.sid and s.age<18;**

SID DNAME
-----
82 Industrial Engineering
90 Mathematics

**Question7. Print the names and majors of students who are taking one of the College Geometr courses.**

**SQL> select e.sid,m.sid, m.dname from enroll e inner join major m on e.sid=m.sid where e.cno in (461,462);**

SID	SID DNAME
-----	-----------

```

-----
4      4 Computer Sciences
14     14 Computer Sciences
17     17 Computer Sciences
18     18 Computer Sciences
19     19 Computer Sciences
26     26 Chemical Engineering
28     28 Chemical Engineering
35     35 Chemical Engineering
37     37 Civil Engineering
40     40 Civil Engineering
53     53 Civil Engineering
55     55 Civil Engineering
59     59 Civil Engineering
90     90 Mathematics
91     91 Mathematics
94     94 Mathematics
101    101 Mathematics
102    102 Mathematics

```

18 rows selected.

**Question8. For those departments that have no major taking a College Geometry course print the department name and the number of PhD students in the department.**

**SQL> select dname,num\_phd from dept where not exists(select 1 from course where course.dname=dept.dname and course.cname like '%collegegeometry%');**

```

DNAME          NUM_PHD
-----
Industrial Engineering    41
Chemical Engineering     32
Mathematics              129

```



Computer Sciences	47
Sanitary Engineering	3
Civil Engineering	88

6 rows selected.

**Question9. Print the names of students who are taking both a Computer Sciences course and a Mathematics course.**

**SQL> select s.sid,s.sname from student s inner join enroll e on s.sid=e.sid where e.dname='Computer Sciences' and e.dname='Mathematics';**

no rows selected

**Question10. Print the age difference between the oldest and the youngest Computer Sciences major**

**SQL> select max(s.age)-min(s.age) as age\_difference from student s inner join major m on m.sid=s.sid where m.dname='Computer Sciences';**

AGE_DIFFERENCE
-----

38

**Question11. For each department that has one or more majors with a GPA under 1.0, print the name of the department and the average GPA of its majors.**

**SQL> select s.sid,avg(gpa),e.dname from student s, enroll e where gpa<1 group by s.sid,e.dname;**

SID	AVG(GPA)	DNAME
-----	-----	-----
65	.5	Chemical Engineering
65	.5	Civil Engineering
51	0	Mathematics
65	.5	Computer Sciences
65	.5	Sanitary Engineering
80	.200000003	Computer Sciences

80	.200000003	Mathematics
80	.200000003	Industrial Engineering
19	.699999988	Computer Sciences
51	0	Chemical Engineering
80	.200000003	Chemical Engineering
51	0	Industrial Engineering
80	.200000003	Civil Engineering
19	.699999988	Chemical Engineering
65	.5	Industrial Engineering
80	.200000003	Sanitary Engineering
19	.699999988	Industrial Engineering
51	0	Sanitary Engineering
65	.5	Mathematics

19	.699999988	Civil Engineering
19	.699999988	Mathematics
19	.699999988	Sanitary Engineering
51	0	Computer Sciences
51	0	Civil Engineering

24 rows selected.

**Question12. Print the ids, names and GPAs of the students who are currently taking all the Civil Engineering courses.**

**select e.sid,s.sname, gpa from student s right outer join enroll e on s.sid=e.sid where e.dname='Civil Engineering' group by e.sid,s.sname,gpa order by gpa;**

SID	SNAME	GPA
81	Smith, Ike Z.	1.10000002
18	Gooch	1.39999998
47	Roger, Blotter N.	1.89999998
9	Smith, Joyce A.	2

61 Kennedy, Ed	2.29999995
34 Kasten, Norman L.	2.5
60 Calcmity, J.	2.5999999
66 Altenhaus, Stuart	2.79999995
29 Hamilton, S.	2.79999995
36 Burroughs, Susan S.	3
70 Caucutt, B.	3
54 Maximillian	3
76 Zorhoff, C.	3
23 Bomber, C.	3.20000005
96 Birch, M.	3.5
85 Mayer, N.	3.5
33 Chao, Tsechih	3.5999999
74 Andrus, J.	3.70000005
79 Evert, Chris	3.9000001
32 Liu, Huihusan	3.9000001
3 Zeene, Ben N.	3.9000001
64 Fred, Edwin B.	4
48 Natividad, A.	4
73 Quarnty, G.	4

24 rows selected.