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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
<hr/>		
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
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65	.5	Chemical Engineering
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65	.5	Civil Engineering
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51	0	Mathematics
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65	.5	Computer Sciences
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65	.5	Sanitary Engineering
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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
<hr/>	
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 Calcmyt, 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.