NOSQL DATABASE MANAGEMENT

Lab7: University Course Enrollment Data Analytics

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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

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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

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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)

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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)

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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)

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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)

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1 7
302

Intro to Programming

1 10

461

CNO

CNAME

SEC_NO COUNT(B.SID)

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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

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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

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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

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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

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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

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

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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.