CS3550 - DBMS I

Assignment 1 (SQL Queries)

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CS22BTECH11055

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1 Find the top-3 instructors who have have taught most number of distinct courses from :

1.1 Across all departments :

```
select i.id as instructor_id,i.name as instructor_name,count(distinct
      t.course_id) as number_courses
from instructor i
join teaches t on i.id = t.id
group by i.id
order by count(distinct t.course_id) desc limit 3;
```

```
 instructor_id | instructor_name | number_courses
---------------+-----------------+----------------
 22591         | DAgostino       |             11
 6569          | Mingoz          |              8
 99052         | Dale            |              8
(3 rows)
```

1.2 Statistics department :

```
select i.id as instructor_id,i.name as instructor_name,count(distinct
    t.course_id) as number_courses
from instructor i
join teaches t on i.id = t.id and i.dept_name = 'Statistics'
group by i.id
order by count(distinct t.course_id) desc limit 3;
```

```
 instructor_id | instructor_name | number_courses
---------------+-----------------+----------------
 28400         | Atanassov       |              2
 90643         | Choll           |              1
(2 rows)
```

2 Print teaching record of the instructor who has the highest salary, showing the instructor department name, course identifier, course title, section number, semester, year and total enrollment. Sort your result by course_id, year, semester in ascending order :

```
        select i.dept_name as department,c.course_id,c.title,t1.sec_id,t1.
            semester,t1.year,count(t2.id) as total_enrollments
        from instructor i
        join teaches t1 on i.id = t1.id and i.id = (select id from instructor
                                                    order by salary desc limit 1)
        join course c on t1.course_id = c.course_id
        join takes t2 on c.course_id = t2.course_id
        group by i.dept_name,c.course_id,c.title,t1.sec_id,t1.semester,t1.
            year
        order by c.course_id,t1.year;
```

```
 department | course_id |          title           | sec_id | semester | year | total_enrollments
------------+-----------+--------------------------+--------+----------+------+-------------------
 Pol. Sci.  | 545       | International Practicum | 1      | Fall     | 2001 |               306
 Pol. Sci.  | 581       | Calculus                 | 1      | Spring   | 2005 |               313
 Pol. Sci.  | 591       | Shakespeare              | 1      | Spring   | 2005 |               291
(3 rows)
```

3 Print history of the course with course_id = 362. For each offering of the course, print course id, course title, course department name, instructor name, number of registered students, section id, semester, year and timetable slot. Sort your result by year in descending order :

```
        select c.course_id, c.title, c.dept_name, i.name as instructor_name,
            number_registered, t1.sec_id, t1.semester, t1.year, s.time_slot_id
        from course c
        join teaches t1 on c.course_id = t1.course_id
        join (select course_id, year, semester, count(id) as
            number_registered
                from takes
                group by course_id, year, semester) as take
        on (take.course_id = c.course_id and take.semester = t1.semester and
            take.year = t1.year)
        join instructor i on i.id = t1.id
        join section s on (c.course_id = s.course_id and t1.sec_id = s.sec_id
             and t1.semester = s.semester and t1.year = s.year)
        where c.course_id = '362'
        order by t1.year desc;
```

```
 course_id |      title       | dept_name | instructor_name | number_registered | sec_id | semester | year | time_slot_id
-----------+------------------+-----------+-----------------+-------------------+--------+----------+------+--------------
 362       | Embedded Systems | Finance   | Mingoz          |               322 | 3      | Spring   | 2008 | L
 362       | Embedded Systems | Finance   | Mingoz          |               320 | 2      | Fall     | 2006 | A
 362       | Embedded Systems | Finance   | Mingoz          |               338 | 1      | Fall     | 2005 | I
(3 rows)
```

4 For the course_id 319 that was offered in 2003, find the count of out of department student registration :

```
        select count(t.id) as out_of_dept_registered from
        takes t join
        student s on t.id = s.id and t.course_id = '319' and t.year = '2003'
                where s.dept_name <> (select dept_name
                from course
                where course_id = '319');
```

```
 out_of_dept_registered
------------------------
                    304
(1 row)
```

5 Find top-3 students who have registered for the highest number of course credits. Order by total credits and name. Print student id, name, department and total credits (Compute it from the takes and course tables. Do not use tot_credit in the student table) :

```
        select s.id,s.name,s.dept_name,sum(c.credits) as total from student s
        join takes t on s.id = t.id
        join course c on t.course_id = c.course_id
        group by s.id
        order by total desc,s.name limit 3;
```

```
  id   |  name   | dept_name | total
-------+---------+-----------+-------
 12078 | Knutson | Languages |    93
 90448 | Godfrey | English   |    90
 44551 | Nguyen  | Astronomy |    90
(3 rows)
```

6 Find the distinct set of courses that were not offered during 2003 and 2004. Print the course id and title. Sort your result by course id in ascending order :

```
        select c.course_id,c.title
        from course c
        where course_id not in (select course_id
                                from teaches
                                where year = '2003' or year = '2004')
        order by course_id;
```

course_id	title
101	Diffusion and Phase Transformation
105	Image Processing
123	Differential Equations
127	Thermodynamics
130	Differential Geometry
133	Antidisestablishmentarianism in Modern America
137	Manufacturing
139	Number Theory
158	Elastic Structures
169	Marine Mammals
190	Romantic Literature
192	Drama
195	Numerical Methods
200	The Music of the Ramones
209	International Trade
224	International Finance
227	Elastic Structures
235	International Trade
236	Design and Analysis of Algorithms
237	Surfing
238	The Music of Donovan
239	The Music of the Ramones
241	Biostatistics
242	Rock and Roll
254	Security
258	Colloid and Surface Chemistry
265	Thermal Physics
267	Hydraulics
270	Music of the 90s
272	Geology
274	Corporate Law
275	Romantic Literature
276	Game Design
278	Greek Tragedy
284	Topology
292	Electron Microscopy
304	Music 2 New for your Instructor
313	International Trade
318	Geology
324	Ponzi Schemes
318	Geology
324	Ponzi Schemes
328	Composition and Literature
334	International Trade
337	Differential Geometry
338	Graph Theory
340	Corporate Law
341	Quantum Mechanics
344	Quantum Mechanics
345	Race Car Driving
348	Compiler Design
349	Networking
352	Compiler Design
353	Operating Systems
359	Game Programming
362	Embedded Systems
366	Computational Biology
371	Milton
376	Cost Accounting
377	Differential Geometry
391	Virology
392	Recursive Function Theory
393	Aerodynamics
394	C Programming
396	C Programming
399	RPG Programming
403	Immunology
407	Industrial Organization
411	Music of the 80s
415	Numerical Methods
416	Data Mining
426	Video Gaming
436	Stream Processing
442	Strength of Materials
443	Journalism
445	Biostatistics
451	Database System Concepts
456	Hebrew
457	Systems Software
458	The Renaissance
461	Physical Chemistry
468	Fractal Geometry
461	Physical Chemistry
468	Fractal Geometry
476	International Communication
482	FOCAL Programming
486	Accounting
487	Physical Chemistry
489	Journalism
493	Music of the 50s
494	Automobile Mechanics
496	Aquatic Chemistry
500	Networking
539	International Finance
544	Differential Geometry
545	International Practicum
546	Creative Writing
549	Banking and Finance
558	Environmental Law
559	Martian History
561	The Music of Donovan
577	The Music of Dave Edmunds
580	The Music of Dave Edmunds
581	Calculus
582	Marine Mammals
584	Computability Theory
586	Image Processing
591	Shakespeare
594	Cognitive Psychology
598	Number Theory
604	UNIX System Programmming
608	Electron Microscopy
612	Mobile Computing
618	Thermodynamics
626	Multimedia Design
628	Existentialism
630	Religion
631	Plasma Physics
634	Astronomy
647	Service-Oriented Architectures
656	Groups and Rings
659	Geology
663	Geology
664	Elastic Structures
656	Groups and Rings
659	Geology
663	Geology
664	Elastic Structures
668	Groups and Rings
679	The Beatles
680	Electricity and Magnetism
681	Medieval Civilization or Lack Thereof
692	Cat Herding
694	Optics
696	Heat Transfer
702	Arabic
704	Marine Mammals
716	Medieval Civilization or Lack Thereof
730	Quantum Mechanics
731	The Music of Donovan
761	Existentialism
762	The Monkeys
769	Logic
770	European History
774	Game Programming
780	Geology
781	Compiler Design
787	C Programming
791	Operating Systems
792	Image Processing
793	Decison Support Systems
804	Introduction to Burglary
805	Composition and Literature
810	Mobile Computing
814	Compiler Design
818	Environmental Law
820	Assembly Language Programming
830	Sensor Networks
841	Fractal Geometry
843	Environmental Law
852	World History
857	UNIX System Programmming
858	Sailing
864	Heat Transfer
867	The IBM 360 Architecture
875	Bioinformatics

```
792       | Image Processing
793       | Decison Support Systems
804       | Introduction to Burglary
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810       | Mobile Computing
814       | Compiler Design
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820       | Assembly Language Programming
830       | Sensor Networks
841       | Fractal Geometry
843       | Environmental Law
852       | World History
857       | UNIX System Programmming
858       | Sailing
864       | Heat Transfer
867       | The IBM 360 Architecture
875       | Bioinformatics
877       | Composition and Literature
887       | Latin
893       | Systems Software
897       | How to Succeed in Business Without Really Trying
898       | Petroleum Engineering
902       | Existentialism
919       | Computability Theory
922       | Microeconomics
927       | Differential Geometry
947       | Real-Time Database Systems
949       | Japanese
958       | Fiction Writing
959       | Bacteriology
960       | Tort Law
962       | Animal Behavior
963       | Groups and Rings
966       | Sanitary Engineering
969       | The Monkeys
972       | Greek Tragedy
983       | Virology
984       | Music of the 50s
991       | Transaction Processing
998       | Immunology
(181 rows)
```

7 Find the courses that were offered for the first time most recently in terms of year. Print the course id, title, instructor, year. Sort your result by course id in ascending order. [Find the most recent year when a course was offered for the first time. If there are more than one course offered that year for the first time, then print all of them.] :

```sql
select c.course_id,c.title,i.name,t.year
from course c
join teaches t on t.course_id = c.course_id and c.course_id in (
   select course_id
        from teaches
        group by course_id
        having min(year) = (select max(year) from teaches))
        join instructor i on t.id = i.id
        order by c.course_id;
```

```
 course_id |            title             |   name    | year
-----------+------------------------------+-----------+------
 270       | Music of the 90s             | Sakurai   | 2010
 313       | International Trade          | Morris    | 2010
 415       | Numerical Methods            | Valtchev  | 2010
 476       | International Communication  | Romero    | 2010
 493       | Music of the 50s             | Mahmoud   | 2010
 679       | The Beatles                  | Luo       | 2010
 692       | Cat Herding                  | Tung      | 2010
 843       | Environmental Law            | Lembr     | 2010
(8 rows)
```

8 Find all the courses whose title has more than 15 characters and have a 'sys' as substring in the title. Consider case insensitive matching. 'sys', 'Sys', etc are all fine. Print the course id and title. Sort result by course id :

```
1        select course_id as id,title
2        from course where length(title) > 15 and lower(title) like '%sys%'
3        order by course_id;
```

```
 id  |           title
-----+---------------------------
 353 | Operating Systems
 362 | Embedded Systems
 451 | Database System Concepts
 457 | Systems Software
 604 | UNIX System Programmming
 791 | Operating Systems
 793 | Decison Support Systems
 857 | UNIX System Programmming
 893 | Systems Software
 947 | Real-Time Database Systems
(10 rows)
```

9 Find the department that offers the highest average salary to instructors :

```
1        select dept_name,avg(salary) as average_salary
2        from instructor
3        group by dept_name
4        order by avg(salary) desc limit 1;
```

```
 dept_name |   average_salary
-----------+--------------------
 Physics   | 114576.900000000000
(1 row)
```

10 Find all instructors who taught at most once in 2003. (Didn't teach any course in 2003 or taught just one course in 2003). Print instructor id, name and department. Sort your result by instructor id :

```
select i.id,i.name,i.dept_name
from instructor i
left join teaches t on i.id = t.id and t.year = '2003'
group by i.id
having count(t.course_id) <= 1
order by i.id;
```

id	name	dept_name
14365	Lembr	Accounting
15347	Bawa	Athletics
16807	Yazdi	Athletics
19368	Wieland	Pol. Sci.
25946	Liley	Languages
28097	Kean	English
28400	Atanassov	Statistics
31955	Moreira	Accounting
3199	Gustafsson	Elec. Eng.
3335	Bourrier	Comp. Sci.
34175	Bondi	Comp. Sci.
35579	Soisalon-Soininen	Psychology
36897	Morris	Marketing
37687	Arias	Statistics
4034	Murata	Athletics
41930	Tung	Athletics
4233	Luo	English
42782	Vicentino	Elec. Eng.
43779	Romero	Astronomy
48507	Lent	Mech. Eng.
48570	Sarkar	Pol. Sci.
50330	Shuming	Physics
50885	Konstantinides	Languages
52647	Bancilhon	Pol. Sci.
57180	Hau	Accounting
58558	Dusserre	Marketing
59795	Desyl	Languages
63287	Jaekel	Athletics
63395	McKinnon	Cybernetics
64871	Gutierrez	Statistics
6569	Mingoz	Finance
65931	Pimenta	Cybernetics
72553	Yin	English
73623	Sullivan	Elec. Eng.
74420	Voronina	Physics
74426	Kenje	Marketing
77346	Mahmoud	Geology
78699	Pingr	Statistics
79653	Levine	Elec. Eng.
80759	Queiroz	Biology

```
 80759 | Queiroz          | Biology
 81991 | Valtchev         | Biology
 90376 | Bietzk           | Cybernetics
 90643 | Choll            | Statistics
 95030 | Arinb            | Statistics
 95709 | Sakurai          | English
 96895 | Mird             | Marketing
 97302 | Bertolino        | Mech. Eng.
(47 rows)
```

11 Note :

The queries below are for reference only(they may not work on the terminal because of changes made for presentation). Please use the queries in the CS22BTECH11055_query.sql for verification.