

## Databases Lab – Jan – May 2017 – COE & CED branches – List of Exercises

### **Exercise - 1 (Lab session dated: 03/01/2017 and 10/01/2017)**

Process a file containing student credit details for the given queries.

### **Exercise – 1(Continued...) (Lab session dated: 10/01/2017)**

- 1) Process a file containing student credit details for the given queries.
- 2) Creating schemas for student credits database and executing basic queries.

### **Exercise - 2 (Lab session dated: 17/01/2017)**

Execute basic queries in Company Schema(10 in number) involving only two tables – Employee and Department.

### **Exercise -3 (Lab session dated: 24/01/2017)**

- 1) Create all the tables concerned with the Company Schema given in Navathe text book.
- 2) Execute all queries till 5.1.3(till Keyword “ALL”).

### **Exercise - 4 (Lab session dated: 31/01/2017)**

- 1) Execute all example queries of Company Schema from 5.1.4 till 5.4.2(except joins, keyword “EXCEPT”, “CONTAINS”) in Navathe text book.
- 2) Execute the following queries in SQL over the Company Schema.

### **Queries to be executed**

1. For each department whose average employee salary is more than 30,000, retrieve the department name and the number of employees working for that department.
2. a. Retrieve the number of male employees in each department making more than 30,000.  
b. For each department whose average employee salary is more than 30, 000, retrieve the department name and number of male employees working for that department.

**In SQL, specify the following queries on the company database using the concept of nested queries.**

3. Retrieve the names of all employees who work in the department that has the employee with the highest salary among all employees.
  4. Retrieve the names of employees who make at least \$10,000 more than the employee who is paid the least in the company.
  5. Retrieve the names of all employees in department 5 who work more than 10 hours per week on the Product X project.
  6. List the names of all employees who have a dependent with the same first name as themselves.
  7. Find the names of all employees who are directly supervised by 'Franklin Wong'.
  8. Find the names of employees who work on all the projects controlled by department number 5.
  9. For each project, list the project name and the total hours per week (by all employees) spent on that project.
  10. Retrieve the names of all employees who work on every project.
  11. Retrieve the names of all employees who do not work on any project.
  12. Retrieve the average salary of all female employees.
  13. Find the names and addresses of all employees who work on at least one project located in Houston but whose department has no location in Houston.
  14. List the last names of all department managers who have no dependents.
  15. Display employee names (e'') who are supervised by an e' who is immediately supervised by an employee with lname "XYZ".
  16. Display names of all employees who work on some project controlled by department number 10.
  17. Print all the ssn and the first name of supervisors who supervise atleast 2 projects in ascending order of the number of employee he/she supervise under him/her.
  18. Display all female employee names who also have dependents along with their dependent names.
  19. Display those employees whose salary exceeds the department managers salary that the employee(S) work for.
  20. Display employee names who either work in COE department or supervise an employee working for COE department.
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## Exercise - 5 (Lab session dated: 14/02/2017)

Non – Employee Schema Queries

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**Batch 1: Roll Nos. COE 1 – COE 30**

### 1)University Schema

classroom(building, room\_number, capacity)  
department(dept\_name, building, budget)  
course(course\_id, title, dept\_name, credits)  
instructor(iID, name, dept\_name, salary)  
section(course\_id, sec\_id, semester, year, building, room\_number, time\_slot\_id)  
teaches(iID, course\_id, sec\_id, semester, year)  
student(sID, name, dept\_name, tot\_cred)  
takes(sID, course\_id, sec\_id, semester, year, grade)  
advisor(sID, iID)  
time\_slot(time\_slot\_id, day, start\_time, end\_time)  
prereq(course\_id, prere\_id)

*Write the following queries in SQL, using the university schema. (We suggest you actually run these queries on a database, using the sample data that has been provided on the Web site of the book, db-book.com. Instructions for setting up a database, and loading sample data, are provided on the above Web site.)*

1. Find the titles of courses in the COE department that have 3 credits.
2. Find the highest salary of any instructor.
3. Find all instructors earning the highest salary (there may be more than one with the same salary).
4. Find the maximum enrollment, across all sections, in Autumn 2016.
5. Find the enrollment of each section that was offered in Autumn 2009.
- 6. Find the IDs and names of all students who have not taken any course offering before Spring 2013.**
7. Find the lowest, across all departments, of the per-department maximum salary computed by the preceding query.
8. Create a new course “CS-001”, titled “Weekly Seminar”, with 0 credits.
9. Delete the course CS-001. What will happen if you run this delete statement without first deleting offerings (sections) of this course.

10. Display the list of all course sections offered in Spring 2015, along with the names of the instructors teaching the section. If a section has more than one instructor, it should appear as many times in the result as it has instructors. If it does not have any instructor, it should still appear in the result with the instructor name set to “-”.
11. Find the instructor ID, name, dept name, and salary for instructors whose salary is greater than \$80,000.
12. Find the names of all instructors in the EDM department together with the course id of all courses they teach.
13. Find the set of all courses taught in the Fall 2016 semester, the Spring 2016 semester, or both.
14. Find the names of all instructors whose department is in the ‘Academics’ building.
15. Find the set of all courses taught in the Fall 2016 semester, or in the Spring 2015 semester, or both.
16. Find the set of all courses taught in the Fall 2014 semester, but not in the Spring 2010 semester.
17. Find the IDs of all students who were taught by an instructor named Einstein; make sure there are no duplicates in the result.
18. Find the names of all students who have taken at least one Comp. Sci. course; make sure there are no duplicate names in the result.
19. For each department, find the maximum salary of instructors in that department. You may assume that every department has at least one instructor.
20. Display a list of all instructors, showing their ID, name, and the number of sections that they have taught. Make sure to show the number of sections as 0 for instructors who have not taught any section. Your query should use an outerjoin, and should not use scalar subqueries.
21. Write the same query as above, but using a scalar subquery, without outerjoin.
22. Find all students who have taken all courses offered in the Biology department.

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## Batch 2: Roll Nos. COE31 – CED 13 + Branch Transfers

### 1)Flight schema

*Flights*(fno: integer, from: string, to: string, distance: integer, Departs:time, arrives:time, price:integer)

*Aircraft*(aid: integer, aname: string, cruisingrange: integer)

*Certified*(eid: integer, aid: integer)

*Employees*(eid: integer, ename: string, salary: integer)

*Note: Every pilot is certified for some aircraft, and only pilots are certified to fly.*

**cruisingrange** means the maximum distance an aircraft can fly without landing say, 10000 miles. Aircraft Id(aid) is the company id of the aircraft e.g. Aircraft(101, Boeing, 1000).

Employess include pilots along with Airlines(Aircraft) staff. Write the following Queries in SQL.

1. Find the names of aircraft such that all pilots certified to operate them earn more than \$80,000.
2. For each pilot who is certified for more than three aircraft, find the eid and the maximum cruisingrange of the aircraft for which she or he is certified.
3. Find the names of pilots whose salary is less than the price of the cheapest route from Los Angeles to Honolulu.
4. For all aircraft with cruisingrange over 1000 miles, find the name of the aircraft and the average salary of all pilots certified for this aircraft.
5. Find the names of pilot/s certified for some Boeing aircraft who drove the maximum distance on all flights departing from Hyderabad.
6. Find the aids of all aircraft that can be used on routes from Los Angeles to Chicago.
7. Identify the routes that can be piloted by every pilot who makes more than \$100,000.
8. Print the enames of pilots who can operate planes with cruisingrange greater than 3000 miles but are not certified on any Boeing aircraft.
9. Compute the difference between the average salary of a pilot and the average salary of all employees (including pilots).
10. Print the name and salary of every nonpilot whose salary is more than the average salary for pilots.
11. Print the names of employees who are certified only on aircrafts with cruising range longer than 1000 miles.

12. Print the names of employees who are certified only on aircrafts with cruising range shorter than 1000 miles, but on at least two such aircrafts.
13. Print the names of employees who are certified only on aircrafts with cruising range longer than 1000 miles and who are certified on some Boeing aircraft.
14. Find the names of pilots certified for some Boeing aircraft.
15. Find the names of pilots certified for some Boeing aircraft.
16. Find the names of all aircraft that can be used on non-stop flights from Kolkata to Madras.
17. Identify the flights that can be piloted by every pilot whose salary is more than \$100,000.
18. Find the names of pilots who can operate planes with a range greater than 3,000 miles but are not certified on any Boeing aircraft.
19. Find the names of employees who make the highest salary in every airlines.
20. Find the names of employees who make the second highest salary.
21. Find the names of employees who are certified for the largest number of aircraft.
22. Find the names of employees who are certified for exactly three aircrafts.
- 23.** Find the total amount paid to pilots who drove greater than 500,000 miles together across all their journey on the routes from Chennai to Dublin and return route also. You need to consider all direct flights along with the connecting flights as well.
- 24.** Is there a sequence of flights from Chennai to Frankfurt? Each flight in the sequence is required to depart from the city that is the destination of the previous flight; the first flight must leave Chennai, the last flight must reach Frankfurt, and there is no restriction on the number of intermediate flights. Your query must determine whether a sequence of flights from Chennai to Frankfurt exists for any input Flights relation instance.

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### Batch 3: Roll Nos. CED 14 – CED 41

#### 4) Suppliers-Parts-Project database

*Supplier(sno: integer, sname:string, status:integer, city: string)*

*Part(pno:integer, pname:string, color: string, weight:integer, city:string)*

*Project(jno:integer, jname:string, city:string)*

*Spj(sno, pno, jno:integer, qty:number)*

Write the following Queries in SQL.

- 1)Get part numbers for parts that either weigh more than 16 pounds or are supplied by supplier S2, or both.
- 2)Get all supplier-number/part-number/project-number triples such that the indicated supplier, part, and project are all co-located.
- 3)Get all supplier-number/part-number/project-number triples such that no two of the indicated supplier, part, and project are co-located.
- 4)Get part numbers for parts supplied by a supplier in London to a project in London.
- 5)Get part numbers for parts supplied to any project by a supplier in the same city as that project.
- 6)Get project numbers for projects supplied by at least one supplier not in the same city.
- 7)Get all pairs of part numbers such that some supplier supplies both the indicated parts.
- 8)Get the total quantity of part1 supplied by supplier S1.
- 9)For each part being supplied to a project, get the part number, the project number, and the corresponding total quantity.
- 10)Get part names for parts supplied to any project in London.
- 11)Get supplier numbers of suppliers supplying at least one part supplied by at least one supplier who supplies at least one red part.
- 12)Get project numbers for projects supplied with part P1 in an average quantity greater than the greatest quantity in which any part is supplied to project J1.
- 13)Get supplier numbers for suppliers supplying some project with part P1 in a quantity greater than the average shipment quantity of part P1 for that project.
- 14)Get project numbers for parts supplied entirely by Supplier S1.
- 15)Get all pairs of supplier numbers such that the suppliers concerned are co-located. (i.e., located in the same city).

- 16) Get supplier numbers for suppliers who supply at least all those parts supplied by supplier S2.
  - 17) Get the part number and the weight in grams for each part with weight > 10,000 grams.
  - 18) For each shipment, get full shipment details, including total shipment weight.
  - 19) For each supplier, get the supplier number and the total number of parts supplied.
  - 20) Get part numbers for parts that are supplied either by a London supplier or to a London project.
  - 21) Get all pairs of city names such that a supplier located in the first city supplies a part stored in the second city.
  - 22) Get supplier numbers for suppliers who supply the same part to all projects.
  - 23) Get part numbers for parts supplied to any project by a supplier in the same city as that project.
  - 24) Get supplier names for suppliers who supply at least one red part.
  - 25) Get supplier numbers for suppliers with status less than the current maximum status in the Suppliers table.
  - 26) Get supplier names for suppliers who do not supply part P2 using 'exits' keyword. Do the same query using 'in' keyword.
  - 27) Get all pairs of supplier numbers,  $S_x$  and  $S_y$  say, such that  $S_x$  and  $S_y$  supply exactly the same set of parts each.
  - 28) Get supplier-number/part-number pairs such that the indicated supplier does not supply the indicated part.
  - 29) Get a "grouped" version of all shipments showing, for each supplier-number/part-number pair, the corresponding project numbers and quantities in the form of a binary relation.
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### Exercise - 6 (Lab session dated: 18/02/2017)

Simulate *Select* and *Project* commands using the command prompt with necessary arguments with the help of C/C++ programs.

**Input:**

**Select:** Filename.txt, A condition to retrieve a tuple.

**Project:** Filename.txt, A condition to retrieve a column.

### Exercise - 7 (Lab session dated: 28/02/2017)

#### Some other keyword based Queries in MySQL – Dated 28/2/17

*On the Company Relational Schema, execute the following queries.*

1. Display all odd numbered alternate records from 'Employee' table.
2. Display all even numbered alternate records from 'Employee' table.
3. Find the year from the given date.
4. Find year from birth date when the date is a VARCHAR column instead of the proper DATE data type.
5. Select first 3 characters of first name.
6. Check whether date passed to Query is the date of a given format or not.
7. Find duplicate rows in a table of your choice.
8. Delete the duplicate records retrieved using the above query without using a temporary table.
9. Delete the duplicate records retrieved using the above query using a temporary table.
10. Extract the 3<sup>rd</sup> maximum salary. Also find  $n^{\text{th}}$  max salary.
11. How to get first 3 max salaries. Also find first  $n$  max salaries.
12. Find the size of the SCHEMA/USER.
13. Display year, month, day as separate attributes from employee's date of birth.
14. Display the current time.
15. Retrieve the date part of the date or datetime expression.
16. Given a date, retrieve the next day's date.
17. Get position of 'a' in name 'Sundar Pitchai' from employee table.
18. Get fname from employee table after removing white spaces from left side.

19. Get length of fname from employee table.
20. Get fname from employee table after replacing 'o' with '\*'.
21. Get fname and lname as a single attribute from employee table separated by a '\_'.
22. Find all employee records containing the word "Jai", regardless of whether it was stored as JAI, Jai, or jai.
23. Find the number of employees according to the gender whose DOB is between 05/01/1980 to 31/12/2016.
24. Retrieve the mysql username and password.
25. Find all the employee first name/s whose name consists of three or more words.
26. Get employee details from employee table whose first name ends with 'n' and name contains 4 letters.
27. Get employee details from employee table whose joining month is "January".
28. Get database date.
29. Fetch data that are common in two query results.
30. Get first names of employees who has '\*' in last\_name.
31. Find department from dept table after replacing special character with a white space.
32. Retrieve the number of employees joined with respect to a particular year and a particular month from employee table.
33. Extract characters within a specified range of length from department field.
34. Convert the name of the employee to lowercase and then as uppercase.
35. Select FIRST *n* records from a department table.
36. Select LAST *n* records from a department table.
37. Select first name from employee table which contain only numbers.
38. Get fname, lname from employee table as separate rows.
39. Create an empty table *emptem* with the same structure as *emp*.
40. If there are two tables *emp1* and *emp2*, and both have common records. Fetch all the records, but common records only once?
41. Extract only common records from two tables *emp1* and *emp2*?
42. Retrieve all records of *emp1* those should not present in *emp2*?
43. Returns the default (current) database name.
44. Retrieve the current MySQL user name and host name.

45. Find the string that tells the MySQL server version.
46. Perform Bitwise OR, Bitwise XOR and Bitwise AND.
47. Find rows that contain at least one of the two words 'mysql', 'oracle'.
48. Find the difference between two dates and print in terms of the number of days.
49. Add one day to the current date.
50. Add two hours and 5000 minutes to the current date and print the new date.
51. Find the floor and ceil values of a floating point number. Also operate on the power, log, modulus, round off and truncate functions.
52. In a string attribute of the company schema, match the following using ***regular expression***.
  - a) Beginning of the string.
  - b) Match any character (including carriage return and newline).
  - c) Match the end of a string.
  - d) Any sequence of zero or more characters.
  - e) Either of the sequences *xy* or *abc*.
53. Compare two strings and print the value 'yes' if they are equal, else 'no'.
54. Simulate the "IF... ELSE" construct in Mysql for a mark and grade setup.
55. Use IFNULL to check whether an mathematical expression gives a NULL value or not.
56. Grant all the access privileges to a user.

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