National University of Sciences and Technology (NUST)
School of Electrical Engineering and Computer Science

Department of Computing

Laboratory Manual 05:

Grouping & Aggregation in SQL

CS-220: Database Systems

Fall 2017

Class: BS(CS)-6B

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Timings:1415-1700

Introduction

- SQL DDL (Data Definition Language) commands are used to create and modify the databases. Data Manipulation Language (DML) commands are used to query the databases.

Objectives

After performing this lab students should be able to:

1. Create tables in SQL using DDL commands.
2. Perform DML operations on created tables.

Tools/Software Requirement

- MySQL Community Server 5.6
- MySQL Workbench 6.1

Description

Aggregate Functions
The functions are used to summarize information from multiple tuples into a single-tuple summary. Well known built-in aggregate functions are COUNT, SUM, MAX, MIN, and AVG.

Grouping – Group By clause:
It creates subgroups of tuples before summarizing. Grouping is based on grouping attribute(s).

HAVING clause
It provides a condition on the summary information, i.e. grouping.

Note: Aggregate functions can be used in the SELECT clause or in a HAVING clause.

Given the following **database schema**:

Student (snum: integer, sname: char(30), major: char(25), level: char(2), age: integer)

Faculty (fid: integer, fname: char(30), deptid: integer)

Class (cname: char(40), meets_at: char(20), room: char(10), fid: integer | fid REFS Faculty.fid)

Enrolled (snum: integer, cname: char(40) | snum REFS student.snum, cname REFS class.name)

1. **Find the numbers of class rooms.**
```
select COUNT(*) from class
```

2. **Find student strength in each class**.
```
select c.cname, COUNT(*)
from class c, enrolled e
where c.cname = e.cname
group by c.cname
```

3. **Find the class names, and their rooms of all classes that have five or more students enrolled in it.**
```
Select C.cname, C.room
From class C, enrolled E
Where C.cname = E.cname
Group by E.cname
Having COUNT (*) >= 5
```

Lab Task

Write SQL expressions for each of the following queries and execute them:

1. Find average age of students.

2. Find the average age of student in course: 'Organic Chemistry'.

3. Find eldest student.

4. Find youngest student in 'Electrical Engineering' major.

5. Find eldest student in each level.

6. Find average age of students in each level

7. Find the number of distinct class rooms

8. Find the strength of students in each major.

9. Find strength of students in course: 'Urban Economics'

10. Find the number of courses for student: 'Karen Scott'.

11. Print the level and the average age of students for that level for all levels except 'JR'.

12. For each faculty member that has taught classes only in room R128, print the faculty

13. Find the names of all classes and their enrollment strength that have enrollment greater than 2.

14. Find the names and strength of classes taught by 'Ivana Teach'.

15. Find the number of faculty members that teach to class 'database Systems'.

16. Find the names, strength of faculty members for each class.

17. Find the age of youngest student in 'Database Systems' class.

18. Find the number of classes that occurred in the same room.

19. Find the name and strength of students taught by each faculty member.

20. Find the age of eldest student in the class taught by 'Ivana Teach'.

Deliverables

1. Complete your lab tasks in SQL workbench and submit a word file in with queries along with the screenshots of the results to all the questions attempted. Upload it on LMS. The marking will be based on viva/lab task submitted.