Lab Manual for Introduction to Database Systems

Lab-05

SQL Group by and Having Clause

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Lab 5: SQL Group by and Having Clause

1. Introduction

In this lab you will learn the basic understanding of group by and having clause. The GROUP BY clause groups records into summary rows, returns one records for each group, also involves aggregates: COUNT, MAX, SUM, AVG, etc., can group by one or more columns. HAVING clause filters the records that work on summarized GROUP BY results. HAVING applies to summarized group records, whereas WHERE applies to individual records. Only the groups that meet the HAVING criteria will be returned. HAVING requires that a GROUP BY clause is present. WHERE and HAVING can be in the same query.

Relevant Lecture Material

a) Text Book: Java: Text Book: Database Systems, A practical approach to design, implementation and management by Thomas Connolly, Carolyn Begg, Addison Wesley
, Fifth Edition,
   1. Read URL:
      i. https://www.guru99.com/group-by.html

2. Activity Time boxing

Table 1: Activity Time Boxing

Task No.	Activity Name	Activity time	Total Time
6.3	Walkthrough Tasks	30mins	60mins
7	Practice tasks	20 to 30mins for each task	50mins
8	Evaluation Task	40mins for all assigned task	40mins

3. Objective of the experiment

- To get basic understanding of Having Clause.
- To understand the basic concept of Group by clause

4. Concept Map

6.1.1. GROUP BY Clause

The GROUP BY clause allows you to *collapse* multiple records with a common value into groups.

- The GROUP BY clause groups records into summary rows.
- GROUP BY returns one records for each group.
- GROUP BY typically also involves aggregates: COUNT, MAX, SUM, AVG, etc.
- GROUP BY can group by one or more columns.

Syntax:

```
SELECT column-names
      FROM table-name
WHERE condition
GROUP BY column-names
ORDER BY column-names
```

For example: We want to show the total number of employees in each department, so for this the query is written some how like this:

Select department_id, COUNT(employee_id) from employees group by department_id

GROUP BY by itself is not meaningful. It is used together with GROUP BY aggregate functions (such as COUNT (), AVG (), SUM ()) to produce group summary.

6.1.2. HAVING clause

HAVING is similar to WHERE, but it can operate on the GROUP BY aggregate functions; whereas WHERE operates only on columns.

- HAVING filters records that work on summarized GROUP BY results.
- HAVING applies to summarized group records, whereas WHERE applies to individual records.
- Only the groups that meet the HAVING criteria will be returned.
- HAVING requires that a GROUP BY clause is present.
- WHERE and HAVING can be in the same query.

Syntax:

```
SELECT column-names
  FROM table-name
 WHERE condition
 GROUP BY column-names
HAVING condition
 ORDER BY column-names
```

For example: We want to show the department_id, which contain more than 10 employees, so for this the query is written some how like this:

Select department_id, COUNT(employee_id) from employees group by department_id having COUNT(employee_id)>10

Both Examples are executed in walkthrough Section.

5. Homework before Lab

You must solve the following problems at home before the lab.

5.1. Problem Solution Modeling

After reading the reference material mentioned in the introduction, now you are ready to perform homework assigned to you.

5.1.1. Problem description:

Describe the GROUP BY and HAVING clause and its purpose. You must create at least 10 examples of group by and having clause other than your practice tasks, submit to lab teacher in hard form.

6. Procedure& Tools

6.1. Tools

In this section tools installation and setup is defined.

6.2. Setting-up and Setting up XAMPP (MySQL, Apache) [Expected time = 5mins]

Refer to Lab 1 sec 6.2.

6.3. Walkthrough Task [Expected time = 30mins]

This task is designed to guide you towards the use of GROUP BY and HAVING clause.

6.4. GROUP BY Clause

Show the total number of employees in each department

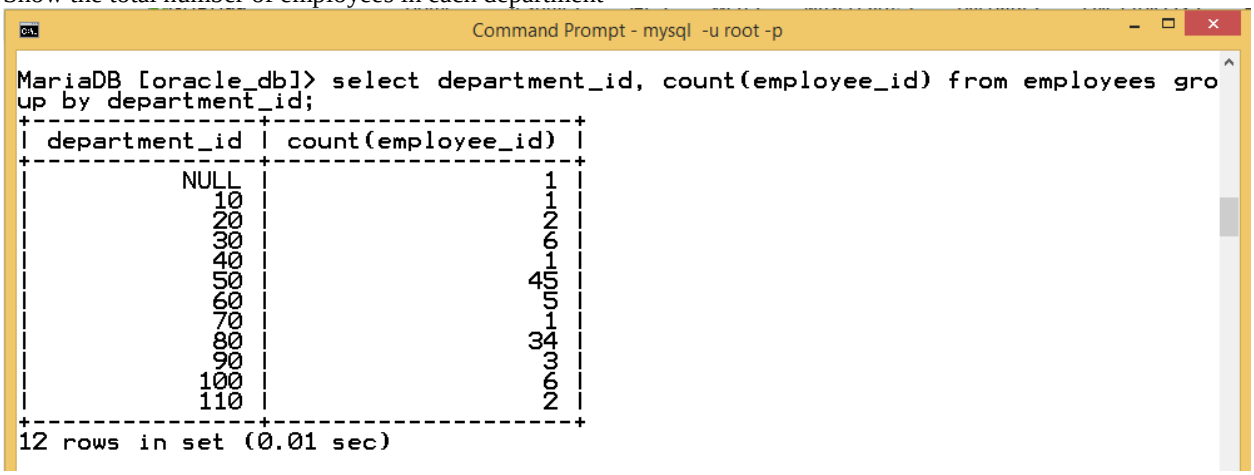
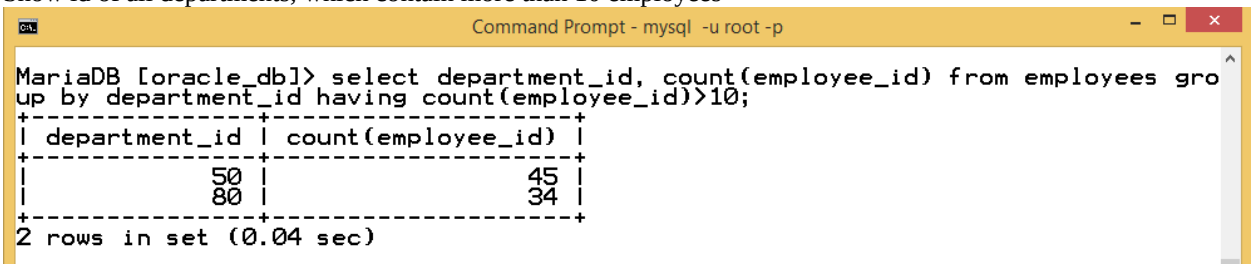


Figure 1: GROUP BY Clause

6.5. Having Clause

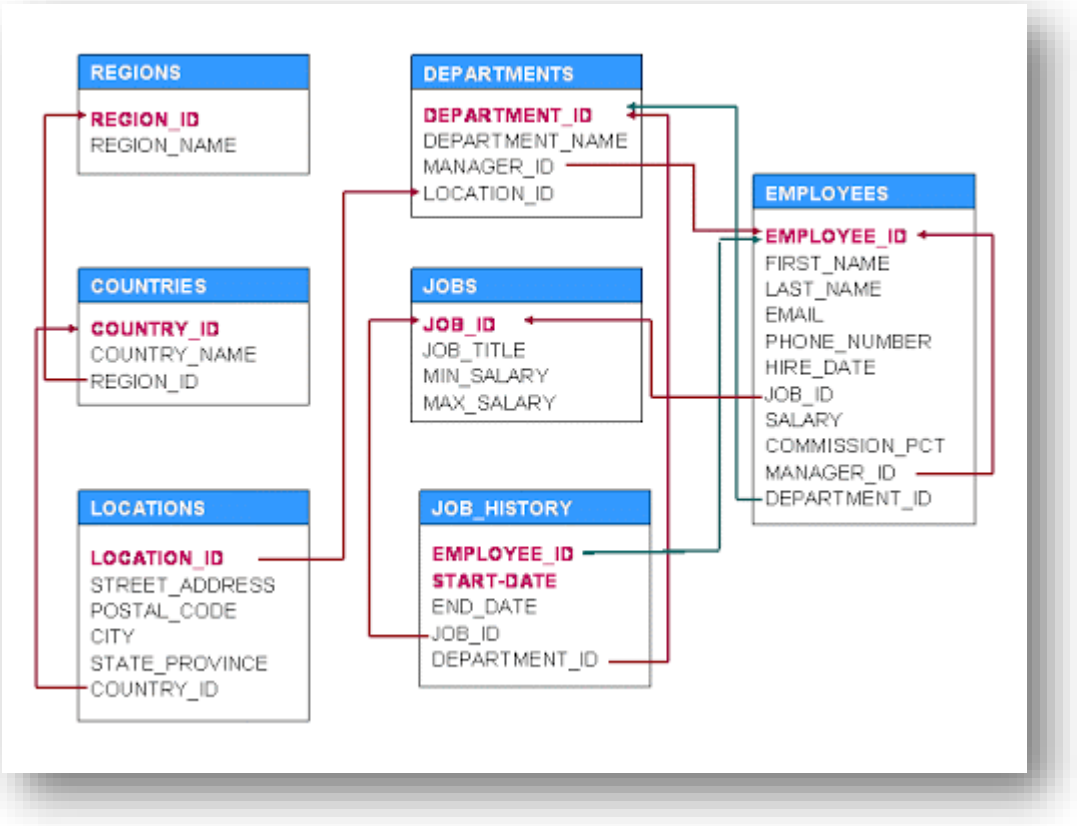
Show id of all departments, which contain more than 10 employees



3Figure 2: HAVING Clause

7. Practice Tasks

This section will provide more practice exercises which you need to finish during the lab. You need to finish the tasks in the required time. When you finish them, put these tasks in the following folder:
\\fs\assignments$\



7.1. Practice Task 1 *[Expected time = 40mins]*

Consider the above given schema and write down following SQL queries.

1. Display the highest, lowest, sum and average salary of all employees. Label the columns Maximum, Minimum, Sum and Average respectively.
2. Modify the first query to display the highest, lowest, sum and average salary for each job.
3. Modify the first query to display the highest, lowest, sum and average salary against each department.
4. Show all department Id whose average salary exceeds 5000.
5. Display all department Id whose total salary is in the range of 5000 to 50,000
6. Write a query to display the number of employees with the same job.
7. Display the manager id and the salary of the lowest and highest paid employee for that manager.
8. Display country id of countries in which total number of cities are 5 or more.
9. Display all job_id and job_title of all those jobs whose minimum salary is same.
10. Display region _id in which the total number of counties is greater than 5.

8. Evaluation Task (Unseen) [Expected time = 60mins for two tasks]

The lab instructor will give you unseen task depending upon the progress of the class.

9. Evaluation criteria

The evaluation criteria for this lab will be based on the completion of the following tasks. Each task is assigned the marks percentage which will be evaluated by the instructor in the lab whether the student has finished the complete/partial task(s).

Table 3: Evaluation of the Lab

Sr. No.	Task No	Description	Marks
1	6	Procedures and Tools	05
2	7	Practice tasks and Testing	15
3	8	Evaluation Tasks (Unseen)	80

10. Further Reading

This section provides the references to further polish your skills.

10.1. Text Book

Database Systems, A practical approach to design, implementation and management by Thomas Connolly, Carolyn Begg, Addison Wesley , Fifth Edition,

10.2. Slides

The slides and reading material can be accessed from the folder of the class instructor available at \\fs\lectures$\

11. REFERENCES:

11.1. SQL-99 Complete, Really, by Peter Gulutzan & Trudy Pelzer.

- More examples for the SELECT command: http://dev.mysql.com/doc/mysql/en/select.html
- MySQL operators: http://dev.mysql.com/doc/mysql/en/non-typed_operators.html
- Built-in functions: http://dev.mysql.com/doc/mysql/en/functions.html
- Joining tables: http://www.melonfire.com/community/columns/trog/article.php?id=148
- Using subqeries: http://www.melonfire.com/community/columns/trog/article.php?id=204
- Using subqeries: http://www.melonfire.com/community/columns/trog/article.php?id=204