CS246: Database Management Systems Lab

Lab # 13 (1 Questions, 61 Marks)
Lab session: AL1
Held on: 08-Apr-2024 (Mon)
Lab Timings: 14:00 to 17:00 Hours Pages: 3
Submission time: 16:45 Hrs, 08-Apr-2024
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1. This lab theme is centered around section 5.5 Advanced aggregate functions of the text book *Database System Concepts* Abraham Silberschatz, Henry F Korth & S. Sudarshan.

2. Manual pages for window functions is attached

Question 1: (61 points)

Using `MySQL` perform the following tasks:

Task 01 (1 mark) Create a database named *week13*

Task 02 (4 marks) Perform the following

1. Create `employees` table with the following description

column #	name	data type	constraint
1	`eid`	`int`	primary key
2	`ename`	`char(50)`	None
3	`dept`	`char(50)`	None
4	`salary`	`decimal(10,0)`	None
5	`gender`	`char(1)`	{M, F}

2. Populate the table employees with the data given in the file `employees.csv`. Use `INSERT` statements.
3. Create `languages` table with the following description

column #	name	data type	constraint
1	`ename`	`char(50)`	`primary key`
2	`speaks`	`char(50)`	`primary key`

4. Populate the table languages with the data given in the file `employee-languages.csv`. Use `INSERT` statements.

Task 03 (9 marks) Perform the following:

1. (3 marks) Write SQL without using `rank()` function for the query: `Which department(s) has/have the fewest employees?`. That is you should obtain `dept` and number of employees in that `dept`.
2. (6 marks) Write SQL using `rank()` function for the above query.
   Hint: COUNT employees and order by count

Task 04 (9 marks) Perform the following:

1. (3 marks) Write SQL without using `rank()` `Who speaks the most languages?`
2. (6 marks) Write SQL using `rank()` for the above query. Obtain employee name and number of languages this employee speaks.
   Hint: COUNT languages and order by count.

Task 05 (9 marks) Perform the following:

1. (3 marks) Write SQL query without using `rank(), dense_rank(), over(), window()` functions for the query: `Which gender has the highest average Salary?`. List the gender and corresponding average salary.
2. (6 marks) Write SQL using `rank(), dense_rank(), over(), window()` functions for the above query.
   Hint: order by average salary

Task 06 (9 marks) Perform the following:

1. (3 marks) Write SQL query for `List the Marketing employees with the two highest Salaries`. List name of the employee and corresponding salary.
2. (6 marks) Write SQL query for `Which employees have the highest Salary for their gender?`
3. In the above two queries, you must make use of `rank(), over(), partition by, order by` functions

Task 07 (2 marks) Perform the following:

1. Create `students` table with the following description

column #	name	data type	constraint
1	`sid`	`int`	primary key
2	`sname`	`char(50)`	None
3	`marks`	`int`	None
4	`gender`	`char(6)`	{Male, Female}
5	`department`	`char(11)`	{CSE, Mathematics}

2. Populate the table employees with the data given in the file `students-marks.csv`. Use several `INSERT` statements.

Task 08 (18 marks) Perform the following:

1. (2 marks) Assign rank to each student according to obtained marks using `rank(), over()` functions. List `sid, marks` and `rank`.
2. (2 marks) Assign department-wise rank to each student according to obtained marks using `rank(), over(), partition by` functions. List `sid, department, marks, rank`.
3. (2 marks) Assign gender-wise rank to each student according to obtained marks using `rank(), over(), partition by` functions. List `sid, gender, marks, rank`.
4. (2 marks) Assign department-wise, gender-wise rank to each student according obtained marks using `rank(), over(), partition by` functions. List `sid, department, gender, rank`.

5. (2 marks) Assign rank to each student using `dense_rank(), over()` functions. You should print both rank and dense rank obtained by student. List `sid, department, gender, rank, dense_rank`
6. (4 marks) Obtain the name and marks of the student who got
   (a) the fist highest mark
   (b) 100^{th} highest mark
   (c) 200^{th} highest mark
   (d) the last highest mark

   using `first_value, last_value, nth_value` functions
7. (4 marks) Write a SQL query to retrieve the following information for each student:
   (a) Name of the student (name)
   (b) Marks obtained by the student (marks)
   (c) Marks obtained by the previous student (based on marks) within the same department (previous_marks)
   (d) Marks obtained by the next student (based on marks) within the same department (next_marks)

   using `lag, lead` functions