

Hands-on Lab: String Patterns, Sorting and Grouping

Estimated time needed: 35 minutes

In this lab, you will go through some SQL practice problems that will provide hands-on experience with string patterns, sorting result sets and grouping result sets.

Software Used in this Lab

In this lab, you will use an <u>IBM Db2 Database</u>. Db2 is a Relational Database Management System (RDBMS) from IBM, designed to store, analyze and retrieve data efficiently.

To complete this lab you will utilize a Db2 database service on IBM Cloud. If you did not already complete this lab task earlier in this module, you will not yet have access to Db2 on IBM Cloud, and you will need to follow the lab below first:

• Hands-on Lab: Sign up for IBM Cloud, Create Db2 service instance and Get started with the Db2 console

Database Used in this Lab

The database used in this lab is an internal database. You will be working on a sample HR database. This HR database schema consists of 5 tables called **EMPLOYEES**, **JOB_HISTORY**, **JOBS**, **DEPARTMENTS** and **LOCATIONS**. Each table has a few rows of sample data. The following diagram shows the tables for the HR database:

SAMPLE HR DATABASE TABLES

EMPLOYE		10 10 10 10 10				Sunt F	723-14-14-14-14-14-14-14-14-14-14-14-14-14-				2000		0 100	
EMP_ID	F_NAME	L_NAME	SSN	B_DATE		SEX	ADDRESS		JOB_ID	SALAF	RY I	MANAGE	R_ID	DEP_ID
E1001	John	Thomas	123456	1976-0	1-09	М	5631 Rice, C	ak Park,IL	100	100000		30001		2
E1002	Alice	James	123457	1972-0	7-31	F	980 Berry In	, Elgin,IL	200	80000	0 :	30002		5
E1003	Steve	Steve Wells 1		1980-0	08-10 M		291 Springs, Gary,IL		300	50000		30002		5
IOB_HIST	ORY					J	OBS							
EMPL_ID	START_D	START_DATE JO		S_ID DEPT_II		JC	DB_IDENT	JOB_TIT	OB_TITLE		MIN_SALARY		MAX_SALARY	
E1001	2000-01	2000-01-30 100		2		10	00	Sr. Architect		60000		100000		
E1002	2010-08	2010-08-16 20		5		20	00	Sr.SoftwareDeveloper		60000		80000		
E1003	2016-08	2016-08-10 300		5		30	300 Jr.Softv		vareDeveloper		40000		60000	
DEPARTM	IENTS						LOCATIO	ONS						
DEPT_ID_DI	EP DEP_NA	DEP_NAME		MANAGER_ID LOC_			LOCT_ID		DEP_ID_LOC		:			
2	Architec	Architect Group		30001			L0001		2					
5	Softwar	Software Development		30002			L0002		5					
7	Design 1	Design Team		30003			L0003		7					
5	Softwar	Software		30004 L0004										

NOTE: This lab requires you to have all 5 of these tables of the HR database populated with sample data on Db2. If you didn't complete the earlier lab in this module, you won't have the tables above populated with sample data on Db2, so you will need to go through the lab below first:

Hands-on Lab: Create tables using SQL scripts and Load data into tables

Objectives

After completing this lab, you will be able to:

- Simplify a SELECT statement by using string patterns, ranges, or sets of values
- · Sort the result set in either ascending or descending order and identify which column to use for the sorting order
- Eliminate duplicates from a result set and further restrict a result set

NOTE: Make sure that you are using the CSV file and datasets from the same instruction file.

Instructions

When you approach the exercises in this lab, follow the instructions to run the queries on Db2:

- Go to the <u>Resource List</u> of IBM Cloud by logging in where you can find the Db2 service instance that you created in a previous lab under Services section. Click on the <u>Db2-xx service</u>. Next, open the Db2 Console by clicking on <u>Open Console</u> button. Click on the 3-bar menu icon in the top left corner and go to the <u>Run SQL</u> page. The Run SQL tool enables you to run SQL statements.
 - If needed, follow Hands-on Lab: Sign up for IBM Cloud, Create Db2 service instance and Get started with the Db2 console

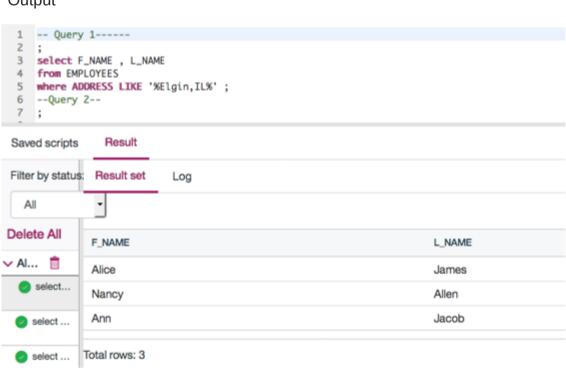
Exercise 1: String Patterns

In this exercise, you will go through some SQL problems on String Patterns.

1. Problem:

Retrieve all employees whose address is in Elgin,IL.

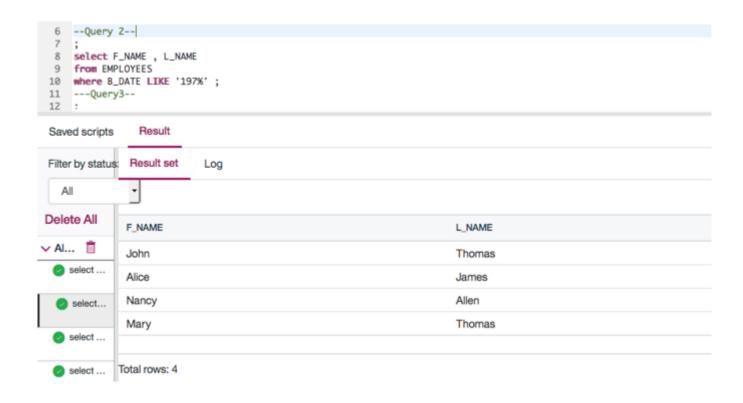
- ► Hint
- ► Solution
- **▼** Output



2. Problem:

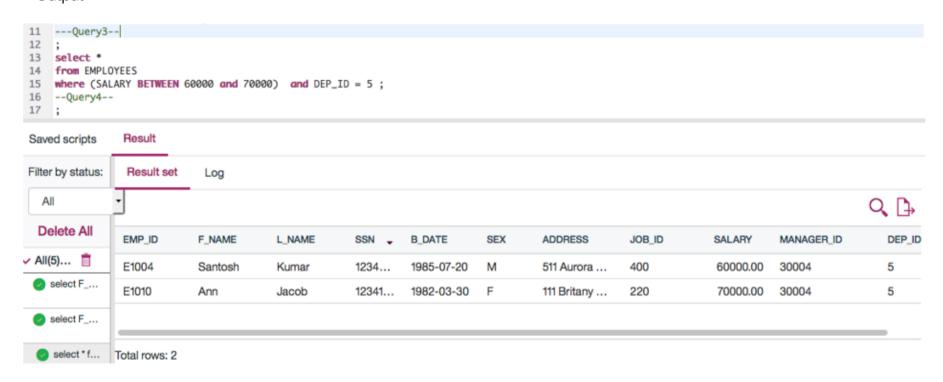
Retrieve all employees who were born during the 1970's.

- ► Hint
- ► Solution
- **▼** Output



Retrieve all employees in department 5 whose salary is between 60000 and 70000.

- ► Hint
- ► Solution
- **▼** Output



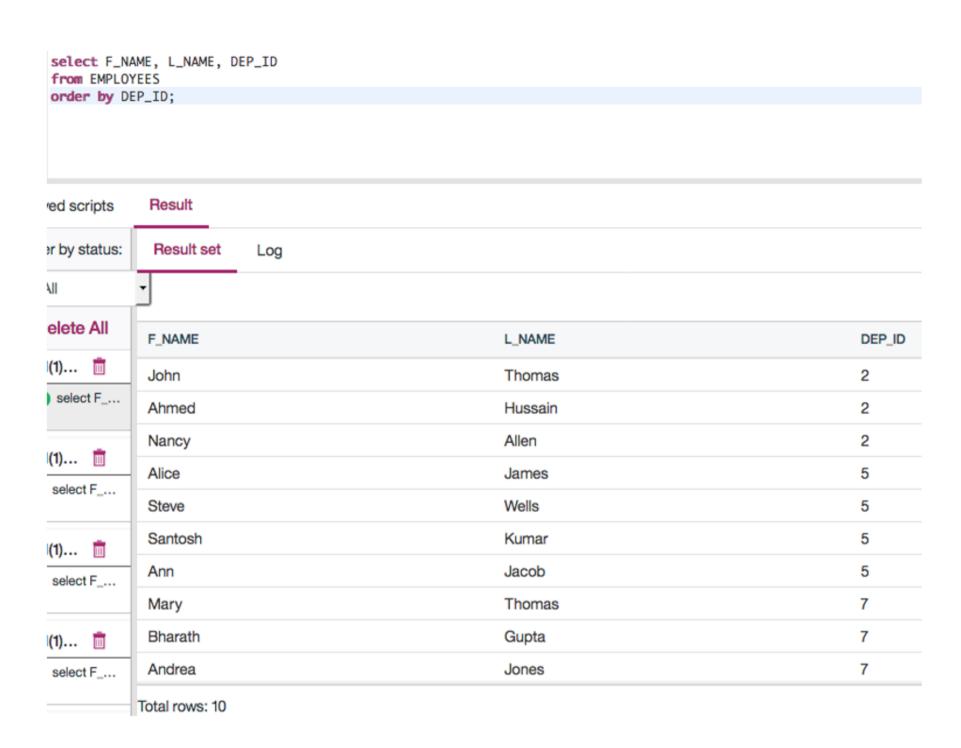
Exercise 2: Sorting

In this exercise, you will go through some SQL problems on Sorting.

1. Problem:

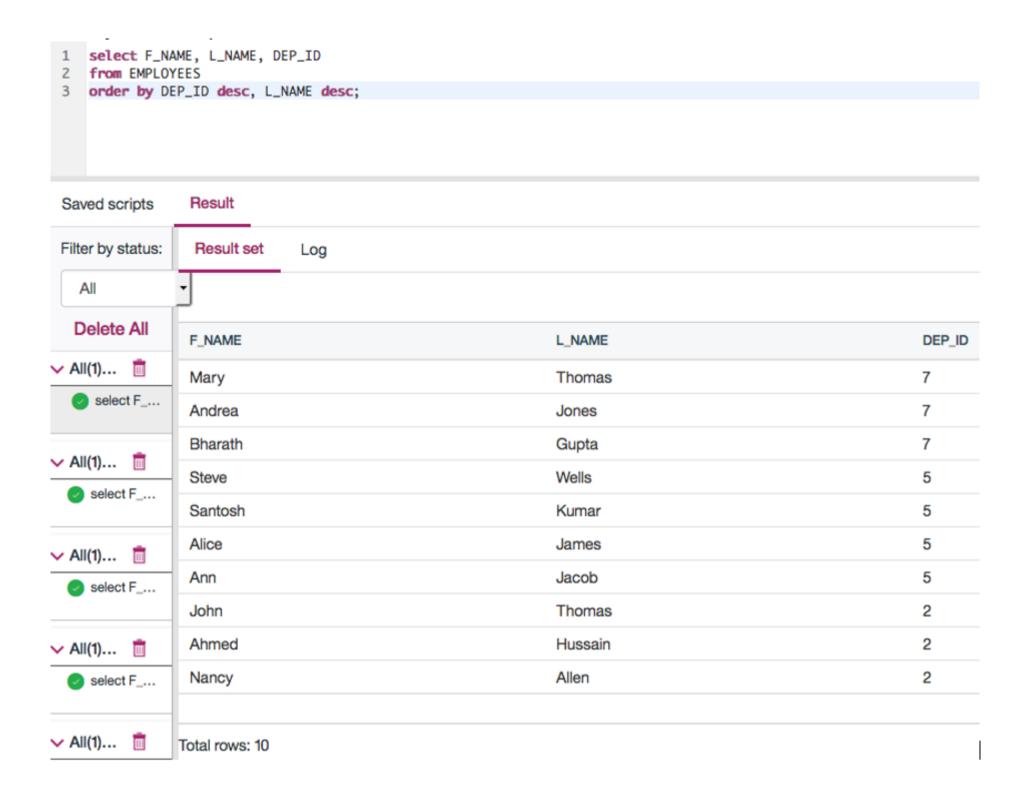
Retrieve a list of employees ordered by department ID.

- ► Hint
- ► Solution
- **▼** Output



Retrieve a list of employees ordered in descending order by department ID and within each department ordered alphabetically in descending order by last name.

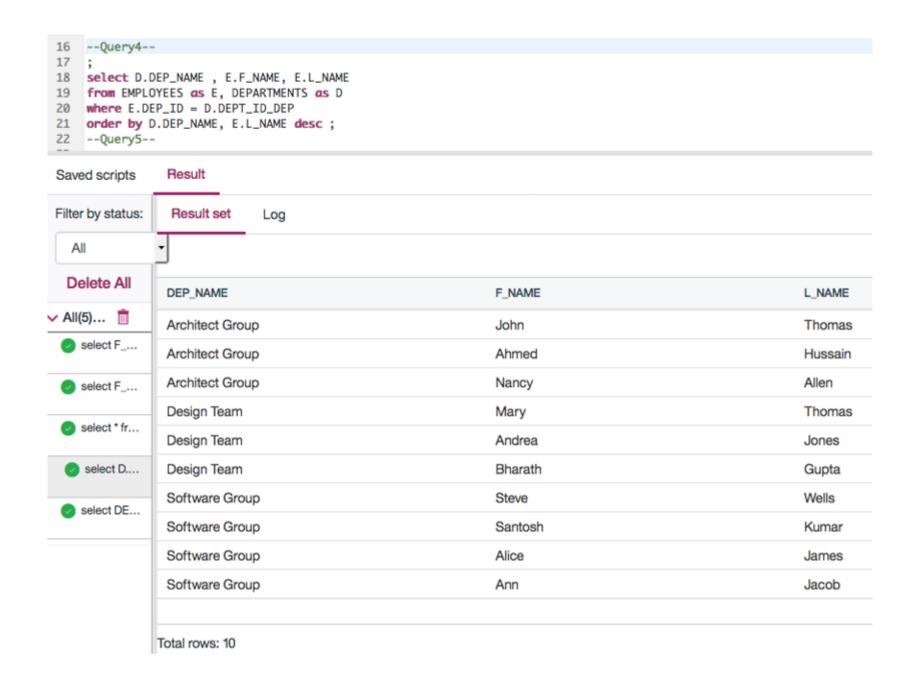
- ► Hint
- ▶ Solution
- **▼** Output



3. (Optional) Problem:

In SQL problem 2 (Exercise 2 Problem 2), use department name instead of department ID. Retrieve a list of employees ordered by department name, and within each department ordered alphabetically in descending order by last name.

- ► Hint
- ► Solution
- **▼** Output



Exercise 3: Grouping

In this exercise, you will go through some SQL problems on Grouping.

NOTE: The SQL problems in this exercise involve usage of SQL Aggregate functions AVG and COUNT. COUNT has been covered earlier. AVG is a function that can be used to calculate the Average or Mean of all values of a specified column in the result set. For example, to retrieve the average salary for all employees in the EMPLOYEES table, issue the query: SELECT_AVG(SALARY) FROM EMPLOYEES;. You will learn more about AVG and other aggregate functions later in the lecture **Built-in Database Functions**.

1. Problem:

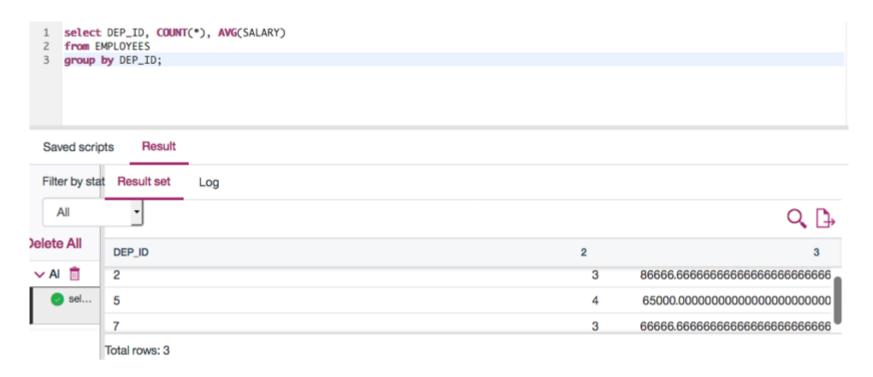
For each department ID retrieve the number of employees in the department.

- ► Hint
- Solution

```
▼ Output
  select DEP_ID, COUNT(*)
  from EMPLOYEES
  group by DEP_ID;
ved scripts
                Result
er by status:
              Result set
                             Log
All
lete All
             DEP_ID
J... 🛅
             2
                                                                                                                                           3
select...
             5
                                                                                                                                            4
             7
                                                                                                                                           3
J...
select ...
           Total rows: 3
```

For each department retrieve the number of employees in the department, and the average employee salary in the department.

- ► Hint
- ► Solution
- **▼** Output



3. Problem:

Label the computed columns in the result set of SQL problem 2 (Exercise 3 Problem 2) as NUM_EMPLOYEES and AVG_SALARY.

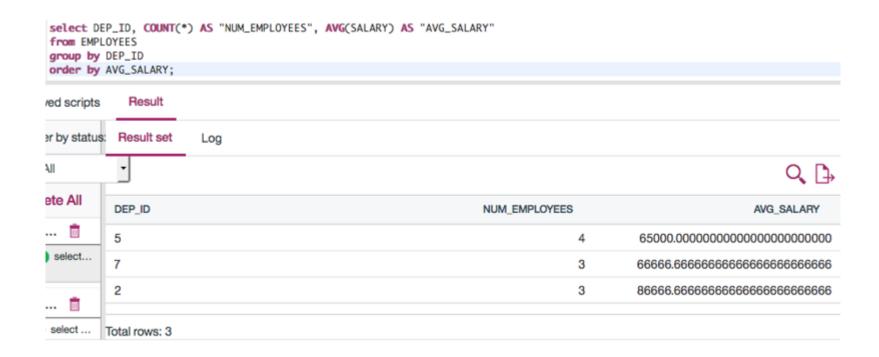
- ▶ Hint
- ▶ Solution▼ Output
- select DEP_ID, COUNT(*) AS "NUM_EMPLOYEES", AVG(SALARY) AS "AVG_SALARY" from EMPLOYEES group by DEP_ID; Result ed scripts er by status: Result set Log Q D. VII. ete All DEP_ID NUM_EMPLOYEES AVG_SALARY ... 2 3 86666.66666666666666666666 select... 4 7 3 66666.66666666666666666666

4. Problem:

select ... Total rows: 3

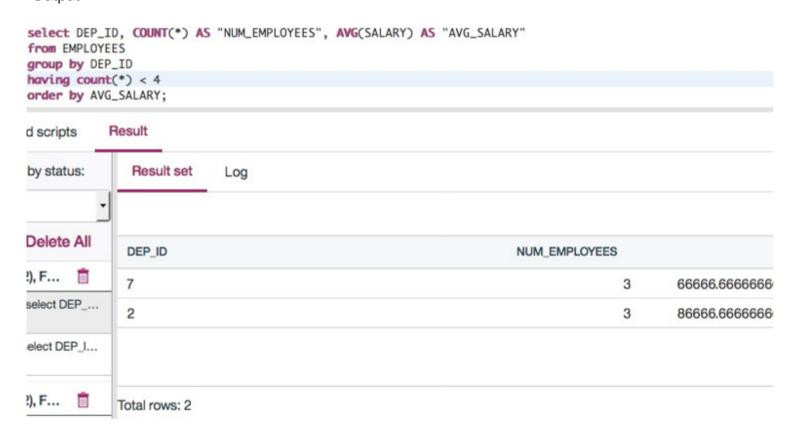
In SQL problem 3 (Exercise 3 Problem 3), order the result set by Average Salary..

- ► Hint
- ► Solution
- **▼** Output



In SQL problem 4 (Exercise 3 Problem 4), limit the result to departments with fewer than 4 employees.

- ► Hint
- ► Solution
- **▼** Output



Solution Script

If you would like to run all the solution queries of the SQL problems of this lab with a script, download the script below. Upload the script to the Db2 console and run. Follow <u>Hands-on Lab</u>: <u>Create tables using SQL scripts and Load data into tables</u> on how to upload a script to Db2 console and run it.

• <u>StringPattern-Sorting-Grouping_Solution_Script.sql</u>

Congratulations! You have completed this lab, and you are ready for the next topic.

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Other Contributor(s)

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Changelog

Date	Version	Changed by	Change Description
2020-12-24	2.1	Steve Ryan	ID Reviewed
2020-12-08	2.0	Sandip Saha Joy	Created revised version from DB0201EN
2020	1.0	Rav Ahuja	Created initial version

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