

## Hands-on Lab: Sub-queries and Nested SELECTs

Estimated time needed: 20 minutes

In this lab, you will run through some SQL practice problems that will provide hands-on experience with nested SQL SELECT statements (also known as Sub-queries).

#### How does a typical Nested SELECT statement syntax look?

```
SELECT column_name [, column_name ]
FROM table1 [, table2 ]
WHERE column_name OPERATOR
   (SELECT column_name [, column_name ]
   FROM table1 [, table2 ]
WHERE condition);
```

### Software Used in this Lab

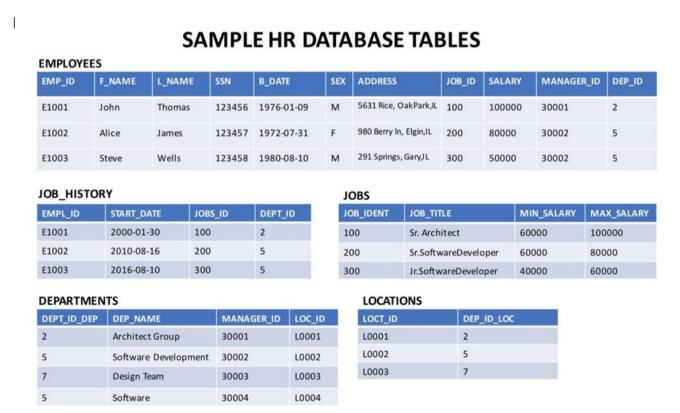
In this lab, you will use an <u>IBM Db2 Database</u>. Db2 is a Relational Database Management System (RDBMS) from IBM, designed to store, analyze and retrieve data efficiently.

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:



**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:

- Write SQL queries that demonstrate the necessity of using sub-queries
- Compose sub-queries in the where clause
- Build Column Expressions (i.e. sub-query in place of a column)
- Write Table Expressions (i.e. sub-query in place of a table)

# **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 **Db2-xx service**. Next, open the Db2 Console by clicking on **Open Console** button. Click on the 3-bar menu icon in the top left corner and go to the **Run SQL** page. The Run SQL tool enables you to run SQL statements.
  - o If needed, follow Hands-on Lab: Sign up for IBM Cloud, Create Db2 service instance and Get started with the Db2 console

### **Exercise:**

1. Problem:

Execute a failing query (i.e. one which gives an error) to retrieve all employees records whose salary is lower than the average salary.

- ▶ Hint
- **▼** Solution

```
select *
from employees
where salary < AVG(salary);</pre>
```

**▼** Output



--- Query 1 --- select \* from employees where salary...

Run time: **0.011 s** 

Status: Failed

#### **Error** message

Invalid use of an aggregate function or OLAP function.. SQLCODE=-120, SQLSTATE=42903, DRIVER=4.26.14

Learn more about this error

#### 2. Problem:

Execute a working query using a sub-select to retrieve all employees records whose salary is lower than the average salary.

Put AVG(SALARY) of the inner SELECT in comparison with SALARY of the outer SELECT.

#### **▼** Solution

#### **▼** Output

✓ Query 2--- select EMP\_ID, F\_NAME, L\_NAME... Run time: 0.001 s

Result set 1	Search	Q	$\triangle$	$\nearrow$
		•		

EMP_ID	F_NAME	L_NAME	SALARY
E1003	Steve	Wells	50000.00
E1004	Santosh	Kumar	60000.00
E1005	Ahmed	Hussain	70000.00
E1007	Mary	Thomas	65000.00
E1008	Bharath	Gupta	65000.00
E1009	Andrea	Jones	70000.00
E1010	Ann	Jacob	70000.00

**Show Less** 

#### 3. Problem:

Execute a failing query (i.e. one which gives an error) to retrieve all employees records with EMP\_ID, SALARY and maximum salary as MAX\_SALARY in every row.

#### **▼** Hint

Use the MAX aggregate function.

#### **▼** Solution

select EMP\_ID, SALARY, MAX(SALARY) AS MAX\_SALARY
from employees;

#### **▼** Output

X(SA... Run time: **0.005** s

Status: Failed

#### **Error** message

An expression starting with "SALARY" specified in a SELECT clause, HAVING clause, or ORDER BY clause is not specified in the GROUP BY clause or it is in a SELECT clause, HAVING clause, or ORDER BY clause with a column function and no GROUP BY clause is specified.. SQLCODE=-119, SQLSTATE=42803, DRIVER=4.26.14

Learn more about this error

#### 4. Problem:

Execute a Column Expression that retrieves all employees records with EMP\_ID, SALARY and maximum salary as MAX\_SALARY in every row.

**▼** Hint

Use the SELECT (which retrieves MAX(SALARY)) as a column of the other SELECT.

#### **▼** Solution

select EMP\_ID, SALARY, ( select MAX(SALARY) from employees ) AS MAX\_SALARY
from employees;

**▼** Output

Result set 1

Search

Run time: **0.001 s** 





EMP_ID	SALARY	MAX_SALARY
E1001	100000.00	100000.00
E1002	80000.00	100000.00
E1003	50000.00	100000.00
E1004	60000.00	100000.00
E1005	70000.00	100000.00
E1006	90000.00	100000.00
E1007	65000.00	100000.00
E1008	65000.00	100000.00
E1009	70000.00	100000.00
E1010	70000.00	100000.00

**Show Less** 

#### 5. Problem:

Execute a Table Expression for the EMPLOYEES table that excludes columns with sensitive employee data (i.e. does not include columns: SSN, B\_DATE, SEX, ADDRESS, SALARY).

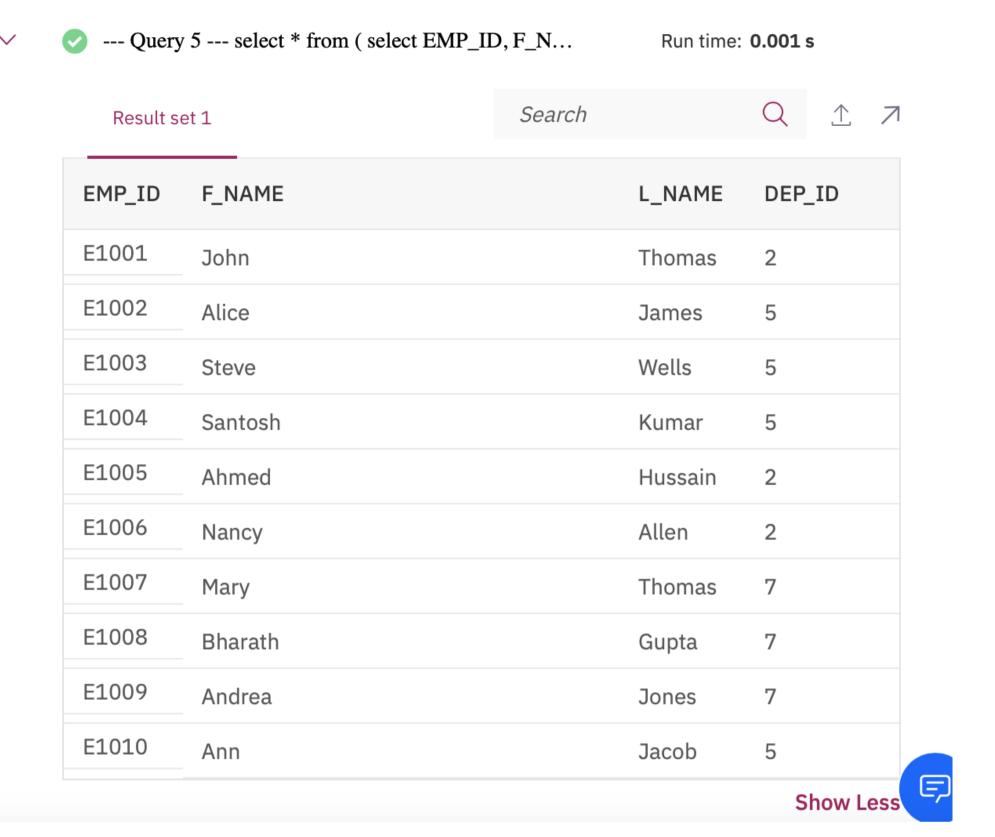
#### **▼** Hint

Use a SELECT (which retrieves non-sensitive employee data) after FROM of the other SELECT.

#### **▼** Solution

select \* from ( select EMP\_ID, F\_NAME, L\_NAME, DEP\_ID from employees) AS EMP4ALL;

**▼** Output



# **Solution Script**

If you would like to run all the solution queries of the SQL problems in this lab with a script, download the script below. Upload the script to the Db2 console and run it. 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.

• SubQueries Solution Script.sql

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

# Author(s)

- Rav Ahuja
- Sandip Saha Joy

# Other Contributor(s)

•

# Changelog

Date	Version	Changed by	Change Description
2020-12-25	2.1	Steve Ryan	ID Reviewed
2020-12-10	2.0	Sandip Saha Joy	Created revised version from DB0201EN
2020	1.0	Rav Ahuja	Created initial version

© IBM Corporation 2020. All rights reserved.