Hands-on Lab: Working with Multiple Tables

Estimated time needed: 30 minutes

In this lab, you will through some SQL practice problems that will provide hands-on experience with SQL queries that access multiple tables. You will be:

- Accessing Multiple Tables with Sub-Queries
- Accessing Multiple Tables with Implicit Joins

How does an Implicit version of CROSS JOIN (also known as Cartesian Join) statement syntax look?

```
SELECT column_name(s)
FROM table1, table2;
```

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How does an Implicit version of INNER JOIN statement syntax look?

```
SELECT column_name(s)
FROM table1, table2
WHERE table1.column_name = table2.column_name;
```

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Software Used in this Lab

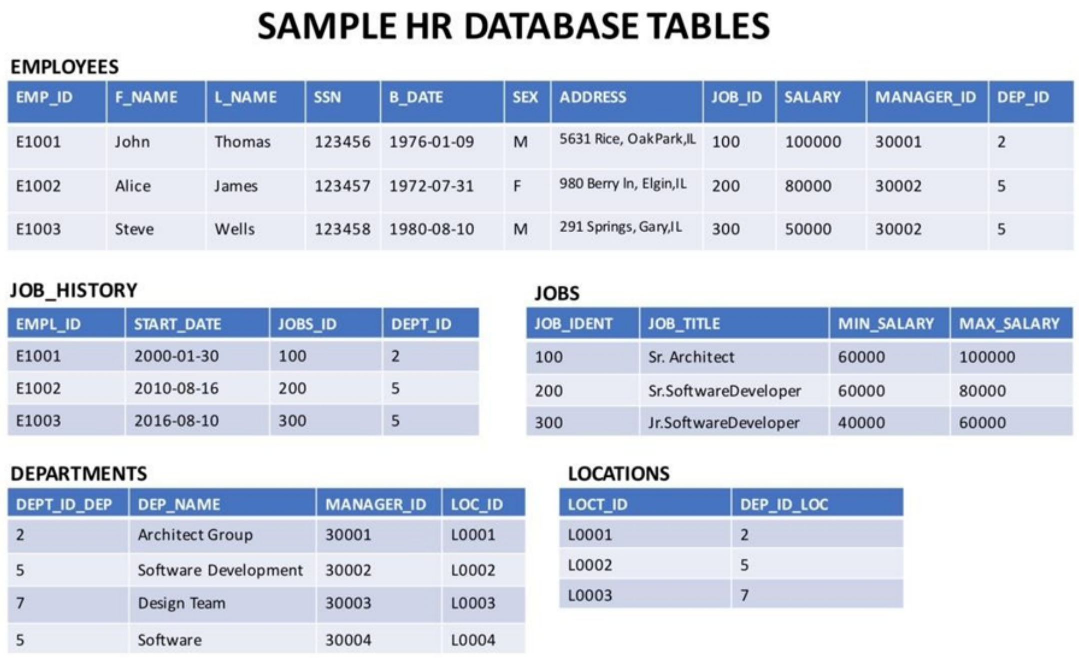
In this lab, you will use IBM Db2 Database. Db2 is a Relational Database Management System (RDBMS) from IBM, designed to store, analyze and retrieve the data efficiently.

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

EMPLOYEES

EMP_ID	F_NAME	L_NAME	SSN	B_DATE	SEX	ADDRESS	JOB_ID	SALARY	MANAGER_ID	DEP_ID
E1001	John	Thomas	123456	1976-01-09	M	5631 Rice, OakPark,IL	100	100000	30001	2
E1002	Alice	James	123457	1972-07-31	F	980 Berry ln, Elgin,IL	200	80000	30002	5
E1003	Steve	Wells	123458	1980-08-10	M	291 Springs, Gary,IL	300	50000	30002	5

JOB_HISTORY

EMPL_ID	START_DATE	JOBS_ID	DEPT_ID
E1001	2000-01-30	100	2
E1002	2010-08-16	200	5
E1003	2016-08-10	300	5

JOBS

JOB_IDENT	JOB_TITLE	MIN_SALARY	MAX_SALARY
100	Sr. Architect	60000	100000
200	Sr.SoftwareDeveloper	60000	80000
300	Jr.SoftwareDeveloper	40000	60000

DEPARTMENTS

DEPT_ID_DEP	DEP_NAME	MANAGER_ID	LOC_ID
2	Architect Group	30001	L0001
5	Software Development	30002	L0002
7	Design Team	30003	L0003
5	Software	30004	L0004

LOCATIONS

LOCT_ID	DEP_ID_LOC
L0001	2
L0002	5
L0003	7

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 access more than one table
- Compose queries that access multiple tables using a nested statement in the WHERE clause
- Build queries with multiple tables in the FROM clause
- Write Implicit Join queries with join criteria specified in the WHERE clause
- Specify aliases for table names and qualify column names with table aliases

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 Resource List 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.
    - If needed, follow Hands-on Lab : Sign up for IBM Cloud, Create Db2 service instance and Get started with the Db2 console

Exercise 1: Accessing Multiple Tables with Sub-Queries

1. Problem:

    Retrieve only the EMPLOYEES records that correspond to jobs in the JOBS table.

    ▼ Solution

    ```
    select * from employees where JOB_ID IN (select JOB_IDENT from jobs);
    ```

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    ▶ Output

2. Problem:

    Retrieve only the list of employees whose JOB_TITLE is Jr. Designer.

    ▼ Solution

    ```
    select * from employees where JOB_ID IN (select JOB_IDENT from jobs where JOB_TITLE= 'Jr. Designer');
    ```

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    ▶ Output

3. Problem:

    Retrieve JOB information and who earn more than $70,000.

    ▼ Solution

    ```
    select JOB_TITLE, MIN_SALARY,MAX_SALARY,JOB_IDENT from jobs where JOB_IDENT IN (select JOB_ID from employees where SALARY > 70000 );
    ```

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    ▶ Output

4. Problem:

    Retrieve JOB information and whose birth year is after 1976.

    ▼ Solution

```
select JOB_TITLE, MIN_SALARY,MAX_SALARY,JOB_IDENT from jobs where JOB_IDENT IN (select JOB_ID from employees where YEAR(B_DATE)>1976 );
```

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▶ Output

5. Problem:

   Retrieve JOB information for female employees whose birth year is after 1976.

   ▼ Solution

   ```
   select JOB_TITLE, MIN_SALARY,MAX_SALARY,JOB_IDENT from jobs where JOB_IDENT IN (select JOB_ID from employees where YEAR(B_DATE)>1976 and SEX='F' );
   ```

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   ▶ Output

Exercise 2: Accessing Multiple Tables with Implicit Joins

1. Problem:

   Perform an implicit cartesian/cross join between EMPLOYEES and JOBS tables.

   ▼ Solution

   ```
   select * from employees, jobs;
   ```

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   ▶ Output

2. Problem:

   Retrieve only the EMPLOYEES records that correspond to jobs in the JOBS table.

   ▼ Solution

   ```
   select * from employees, jobs where employees.JOB_ID = jobs.JOB_IDENT;
   ```

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   ▶ Output

3. Problem:

   Redo the previous query, using shorter aliases for table names.

   ▼ Solution

```
select * from employees E, jobs J where E.JOB_ID = J.JOB_IDENT;
```

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▶ Output

4. Problem:

   Redo the previous query, but retrieve only the Employee ID, Employee Name and Job Title.

   ▼ Solution

   ```
   select EMP_ID,F_NAME,L_NAME, JOB_TITLE from employees E, jobs J where E.JOB_ID = J.JOB_IDENT;
   ```

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   ▶ Output

5. Problem:

   Redo the previous query, but specify the fully qualified column names with aliases in the SELECT clause.

   ▼ Solution

   ```
   select E.EMP_ID,E.F_NAME,E.L_NAME, J.JOB_TITLE from employees E, jobs J where E.JOB_ID = J.JOB_IDENT;
   ```

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   ▶ 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 Hands-on Lab : Create tables using SQL scripts and Load data into tables on how to upload a script to Db2 console and run it.

- MultipleTables_Solution_Script.sql

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

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Changelog

Date	Version	Changed by	Change Description
2023-05-10	2.3	Eric Hao & Vladislav Boyko	Updated Page Frames
2022-01-20	2.2	Malika	Updated Exercise 1 problem statement 3,4 and 5
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