Hands-on Lab: Joins

Estimated time needed: 25 minutes

In this lab, you will run through some SQL practice problems that will provide hands-on experience with the different kinds of join operations.

How does a CROSS JOIN (also known as Cartesian Join) statement syntax look?

```
SELECT column_name(s)
FROM table1
CROSS JOIN table2;
```

How does an INNER JOIN statement syntax look?

```
SELECT column_name(s)
FROM table1
INNER JOIN table2
ON table1.column_name = table2.column_name;
WHERE condition;
```

How does a LEFT OUTER JOIN statement syntax look?

```
SELECT column_name(s)
FROM table1
LEFT OUTER JOIN table2
ON table1.column_name = table2.column_name
WHERE condition;
```

How does a RIGHT OUTER JOIN statement syntax look?

```
SELECT column_name(s)
FROM table1
RIGHT OUTER JOIN table2
ON table1.column_name = table2.column_name
WHERE condition;
```

How does a FULL OUTER JOIN statement syntax look?

```
SELECT column_name(s)
FROM table1
FULL OUTER JOIN table2
ON table1.column_name = table2.column_name
WHERE condition;
```

How does a SELF JOIN statement syntax look?

```
SELECT column_name(s)
FROM table1 T1, table1 T2
WHERE condition;
```

Software Used in this Lab

In this lab, you will use an [IBM Db2 Database](#). 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

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 In, 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:

- Perform different kinds of join operations

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](#)
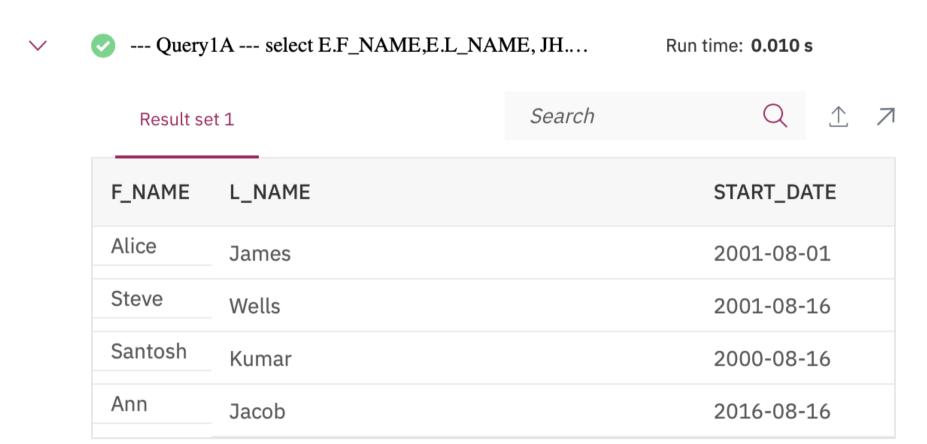
Exercise

1. Problem:

> *Select the names and job start dates of all employees who work for the department number 5.*

▼ Hint

> Use the Inner join operation with the EMPLOYEES table as the left table and the JOB_HISTORY table as the right table.

▼ Solution

```
select E.F_NAME,E.L_NAME, JH.START_DATE
from EMPLOYEES as E
INNER JOIN JOB_HISTORY as JH on E.EMP_ID=JH.EMPL_ID
where E.DEP_ID ='5';
```

▼ Output

--- Query1A --- select E.F_NAME,E.L_NAME, JH....   Run time: **0.010 s**

Result set 1   Search

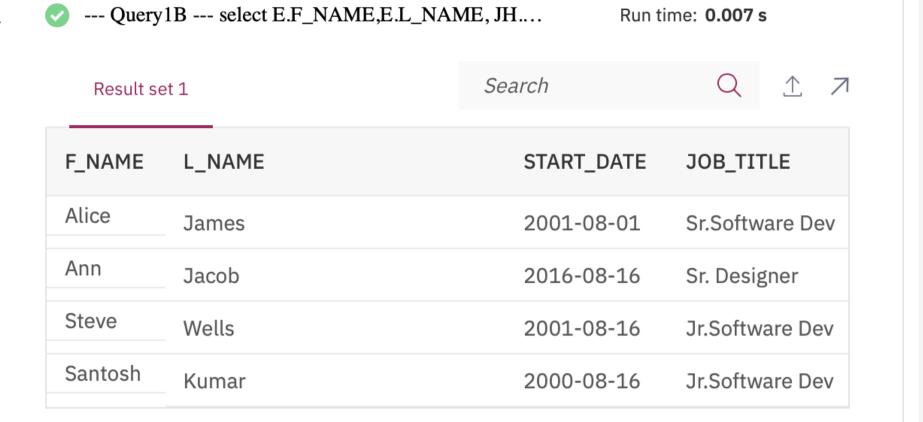| F_NAME	L_NAME	START_DATE
Alice	James	2001-08-01
Steve	Wells	2001-08-16
Santosh	Kumar	2000-08-16
Ann	Jacob	2016-08-16

2. Problem:

> *Select the names, job start dates, and job titles of all employees who work for the department number 5.*

▼ Hint

> Perform an INNER JOIN with 3 tables – EMPLOYEES, JOB_HISTORY, JOBS.

▼ Solution

```
select E.F_NAME,E.L_NAME, JH.START_DATE, J.JOB_TITLE
from EMPLOYEES as E
INNER JOIN JOB_HISTORY as JH on E.EMP_ID=JH.EMPL_ID
INNER JOIN JOBS as J on E.JOB_ID=J.JOB_IDENT
where E.DEP_ID ='5';
```

▼ Output

	Result set 1	Search	🔍 ↑ ↗

F_NAME	L_NAME	START_DATE	JOB_TITLE
Alice	James	2001-08-01	Sr.Software Dev
Ann	Jacob	2016-08-16	Sr. Designer
Steve	Wells	2001-08-16	Jr.Software Dev
Santosh	Kumar	2000-08-16	Jr.Software Dev

3. Problem:

Perform a Left Outer Join on the EMPLOYEES and DEPARTMENT tables and select employee id, last name, department id and department name for all employees.

▼ Hint

Use the Left Outer Join operation with the EMPLOYEES table as the left table and the DEPARTMENTS table as the right table.

▼ Solution

```
select E.EMP_ID,E.L_NAME,E.DEP_ID,D.DEP_NAME
from EMPLOYEES AS E
LEFT OUTER JOIN DEPARTMENTS AS D ON E.DEP_ID=D.DEPT_ID_DEP;
```

▼ Output

Result set 1   Search

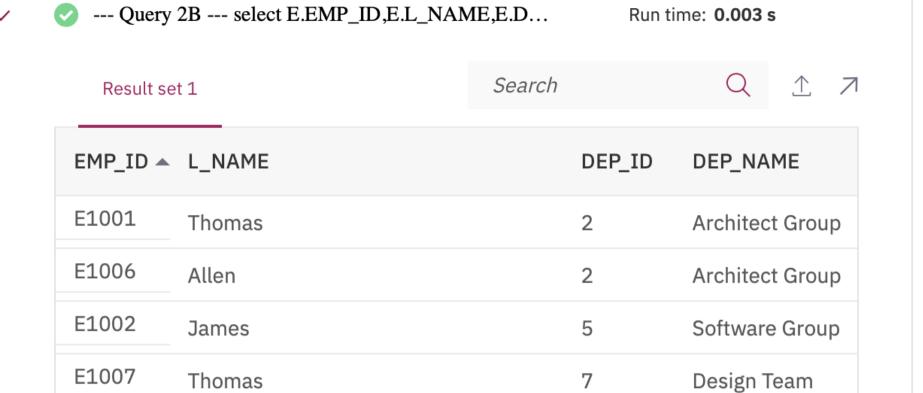| EMP_ID	L_NAME	DEP_ID	DEP_NAME
E1001	Thomas	2	Architect Group
E1006	Allen	2	Architect Group
E1005	Hussain	2	Architect Group
E1002	James	5	Software Group
E1010	Jacob	5	Software Group
E1004	Kumar	5	Software Group
E1003	Wells	5	Software Group
E1007	Thomas	7	Design Team
E1009	Jones	7	Design Team
E1008	Gupta	7	Design Team

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4. Problem:

> Re-write the previous query but limit the result set to include only the rows for employees born before 1980.

▶ Hint

▼ Solution

```
select E.EMP_ID,E.L_NAME,E.DEP_ID,D.DEP_NAME
from EMPLOYEES AS E
LEFT OUTER JOIN DEPARTMENTS AS D ON E.DEP_ID=D.DEPT_ID_DEP
where YEAR(E.B_DATE) < 1980;
```

▼ Output

Result set 1

EMP_ID ▲	L_NAME	DEP_ID	DEP_NAME
E1001	Thomas	2	Architect Group
E1006	Allen	2	Architect Group
E1002	James	5	Software Group
E1007	Thomas	7	Design Team

5. Problem:

> Re-write the previous query but have the result set include all the employees but department names for only the employees who were born before 1980.

▼ Hint

> Use an AND in the LEFT OUTER JOIN clause.

▼ Solution

```
select E.EMP_ID,E.L_NAME,E.DEP_ID,D.DEP_NAME
from EMPLOYEES AS E
LEFT OUTER JOIN DEPARTMENTS AS D ON E.DEP_ID=D.DEPT_ID_DEP
AND YEAR(E.B_DATE) < 1980;
```

▼ Output

Result set 1 | Search

EMP_ID	L_NAME	DEP_ID	DEP_NAME
E1001	Thomas	2	Architect Group
E1002	James	5	Software Group
E1003	Wells	5	
E1004	Kumar	5	
E1005	Hussain	2	
E1006	Allen	2	Architect Group
E1007	Thomas	7	Design Team
E1008	Gupta	7	
E1009	Jones	7	
E1010	Jacob	5	

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6. Problem:

Perform a Full Join on the EMPLOYEES and DEPARTMENT tables and select the First name, Last name and Department name of all employees.

▼ Hint

Use the Full Outer Join operation with the EMPLOYEES table as the left table and the DEPARTMENTS table as the right table.

▼ Solution

```
select E.F_NAME,E.L_NAME,D.DEP_NAME
from EMPLOYEES AS E
FULL OUTER JOIN DEPARTMENTS AS D ON E.DEP_ID=D.DEPT_ID_DEP;
```

▼ Output

Result set 1

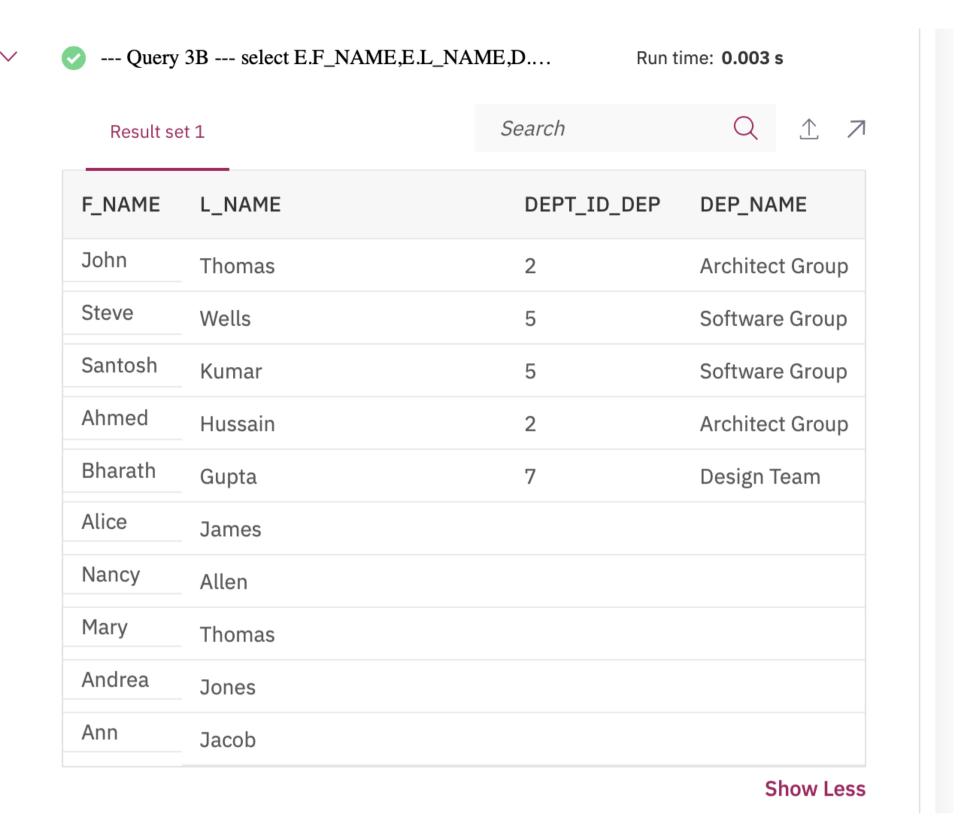| F_NAME	L_NAME	DEP_NAME
John	Thomas	Architect Group
Alice	James	Software Group
Steve	Wells	Software Group
Santosh	Kumar	Software Group
Ahmed	Hussain	Architect Group
Nancy	Allen	Architect Group
Mary	Thomas	Design Team
Bharath	Gupta	Design Team
Andrea	Jones	Design Team
Ann	Jacob	Software Group

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7. Problem:

> Re-write the previous query but have the result set include all employee names but department id and department names only for male employees.

▶ Hint

▼ Solution

```
select E.F_NAME,E.L_NAME,D.DEPT_ID_DEP, D.DEP_NAME
from EMPLOYEES AS E
FULL OUTER JOIN DEPARTMENTS AS D ON E.DEP_ID=D.DEPT_ID_DEP AND E.SEX = 'M';
```

▼ Output

⌄ ✓ --- Query 3B --- select E.F_NAME,E.L_NAME,D....   Run time: **0.003 s**

Result set 1   Search 🔍 ⬆ ↗

F_NAME	L_NAME	DEPT_ID_DEP	DEP_NAME
John	Thomas	2	Architect Group
Steve	Wells	5	Software Group
Santosh	Kumar	5	Software Group
Ahmed	Hussain	2	Architect Group
Bharath	Gupta	7	Design Team
Alice	James		
Nancy	Allen		
Mary	Thomas		
Andrea	Jones		
Ann	Jacob		

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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.

- JOIN_Solution_Script.sql

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

Author(s)

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Other Contributor(s)

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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