

## **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 B\_DATE SEX ADDRESS JOB\_ID SALARY MANAGER\_ID DEP\_ID 5631 Rice, OakPark,IL 100 E1001 John **Thomas** 123456 1976-01-09 100000 30001 980 Berry In, Elgin,IL E1002 Alice James 123457 1972-07-31 80000 30002 291 Springs, Gary, IL E1003 Wells 123458 1980-08-10 50000 30002 Steve JOB HISTORY **JOBS** JOB\_IDENT | JOB\_TITLE MAX\_SALARY EMPL\_ID START\_DATE JOBS\_ID DEPT\_ID MIN\_SALARY E1001 2000-01-30 100 60000 Sr. Architect 100000 E1002 200 5 2010-08-16 80000 200 Sr.SoftwareDeveloper 60000 2016-08-10 E1003 300 300 40000 60000 Jr.SoftwareDeveloper **DEPARTMENTS** LOCATIONS DEPT\_ID\_DEP DEP\_NAME MANAGER\_ID LOC\_ID LOCT\_ID DEP\_ID\_LOC L0001 L0001 **Architect Group** L0002 5 Software Development 30002 L0002 L0003 30003 L0003 Design Team

**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

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## **Objectives**

Software

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.
  - 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:

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

<b>~</b>	Query1A select E.F_NAME,E.L_NAME, JH			Run time: <b>0.010 s</b>	
	Result set 1		Search	Q	<b>1</b>
	F_NAME	L_NAME		START_DA	ΤΕ
	Alice James			2001-08-0	01
	Steve	Wells		2001-08-1	16
	Santosh	Kumar		2000-08-2	16
	Ann	Jacob		2016-08-1	16

#### 2. Problem:

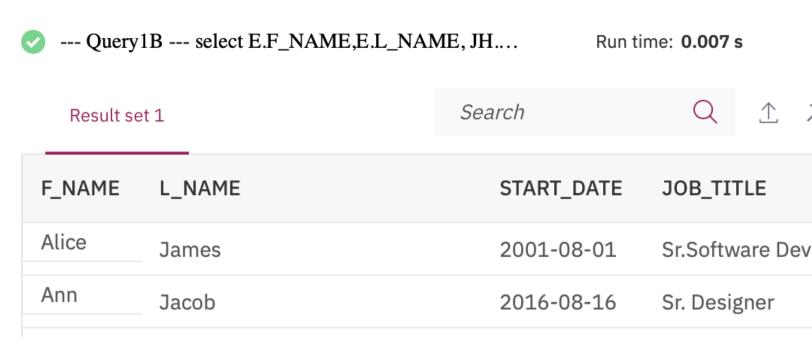
Select the names, job start dates, and job titles of all employees who work for the department number 5.

#### **▼** 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';
```



#### 3. Problem:

Steve

Santosh

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.

Jr.Software Dev

Jr.Software Dev

2001-08-16

2000-08-16

#### **▼** 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;
```

Wells

Kumar



--- Query 2A --- select E.EMP\_ID,E.L\_NAME,E.D...

Run time: **0.004 s** 



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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

#### 4. Problem:

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

#### **▼** Hint

Use a WHERE clause and Left Outer Join operation. Alternatively, you could also use an INNER JOIN.

#### **▼** 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;</pre>
```



EMP_ID 4	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;</pre>
```



### --- Query 2C --- select E.EMP\_ID,E.L\_NAME,E.D...

Run time: **0.002 s** 



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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:

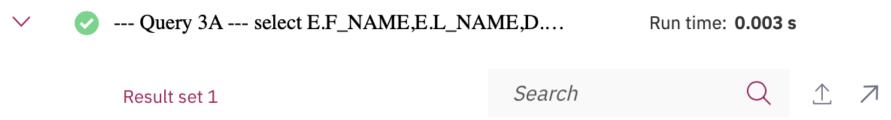
Perform a Full Join on the EMPLOYEES and DEPARTMENT tables and select the First name, Last name and Department name of all employees.

#### **▼** 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



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:

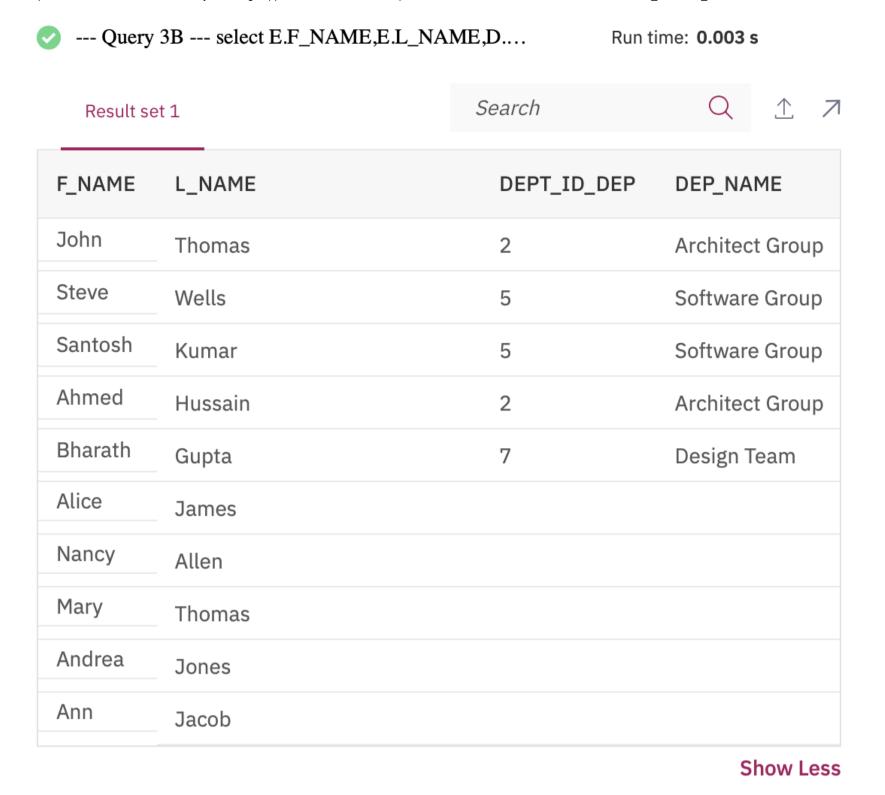
Re-write the previous query but have the result set include all employee names but department id and department names only for male employees.

#### **▼** Hint

Add an AND in Query 3A to filter on male employees in the ON clause. Alternatively, you can also use Left Outer Join.

#### **▼** 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';
```



## 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)

## 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

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