Hands-on Lab: Stored Procedures

Estimated time needed: 10 minutes

In this lab, you will create and execute stored procedures on IBM Db2 using SQL. A stored procedure is a set of SQL statements that are stored and executed on the database server. So instead of sending multiple SQL statements from the client to the server, you encapsulate them in a stored procedure on the server and send one statement from the client to execute them. Also, stored procedures can be useful if you have an SQL query that you write over and over again. You can save it as a stored procedure, and then just call it to execute it. In stored procedures, you can also pass parameters so that a stored procedure can act based on the passed parameter values.

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

Data Used in this Lab

The data used in this lab is internal data. You will be working on the **PETSALE** table.

ID ▲	ANIMAL	SALEPRICE
1	Cat	450.09
2	Dog	666.66
3	Parrot	50.00
4	Hamster	60.60
5	Goldfish	48.48

This lab requires you to have the PETSALE table populated with sample data on Db2. You might have created and populated a PETSALE table in a previous lab. But for this lab, it is recommended you download the `PETSALE-CREATE-v2.sql` script below, upload it to Db2 console and run it. The script will create a new PETSALE table dropping any previous PETSALE table if exists, and will populate it with the required sample data.

- PETSALE-CREATE-v2.sql

Please go through the lab below to learn how to upload and run a script on Db2 console (for this case, you need don't need to know anything else other than how to upload and run a script):

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

Objectives

After completing this lab, you will be able to:

- Create stored procedures
- Execute stored procedures

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

In this exercise, you will create and execute a stored procedure to read data from a table on Db2 using SQL.

1. Make sure you have created and populated the **PETSALE** table following the steps in the **"Data Used in this Lab"** section of this lab.

ID	ANIMAL	SALEPRICE
1	Cat	450.09
2	Dog	666.66
3	Parrot	50.00
4	Hamster	60.60
5	Goldfish	48.48

2.

- You will create a stored procedure routine named **RETRIEVE_ALL**.
- This **RETRIEVE_ALL** routine will contain an SQL query to retrieve all the records from the PETSALE table, so you don't need to write the same query over and over again. You just call the stored procedure routine to execute the query everytime.
- To create the stored procedure routine, copy the code below and paste it to the textbox of the **Run SQL** page. Click **Run all**.

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```
    --#SET TERMINATOR @
    CREATE PROCEDURE RETRIEVE_ALL       -- Name of this stored procedure routine

    LANGUAGE SQL                        -- Language used in this routine
    READS SQL DATA                      -- This routine will only read data from the table

    DYNAMIC RESULT SETS 1               -- Maximum possible number of result-sets to be returned to the caller query

    BEGIN

```

```
11.         DECLARE C1 CURSOR              -- CURSOR C1 will handle the result-set by retrieving records row by row from the table
12.         WITH RETURN FOR                -- This routine will return retrieved records as a result-set to the caller query
13.
14.         SELECT * FROM PETSALE;         -- Query to retrieve all the records from the table
15.
16.         OPEN C1;                       -- Keeping the CURSOR C1 open so that result-set can be returned to the caller query
17.
18.     END
19.     @                                  -- Routine termination character
```

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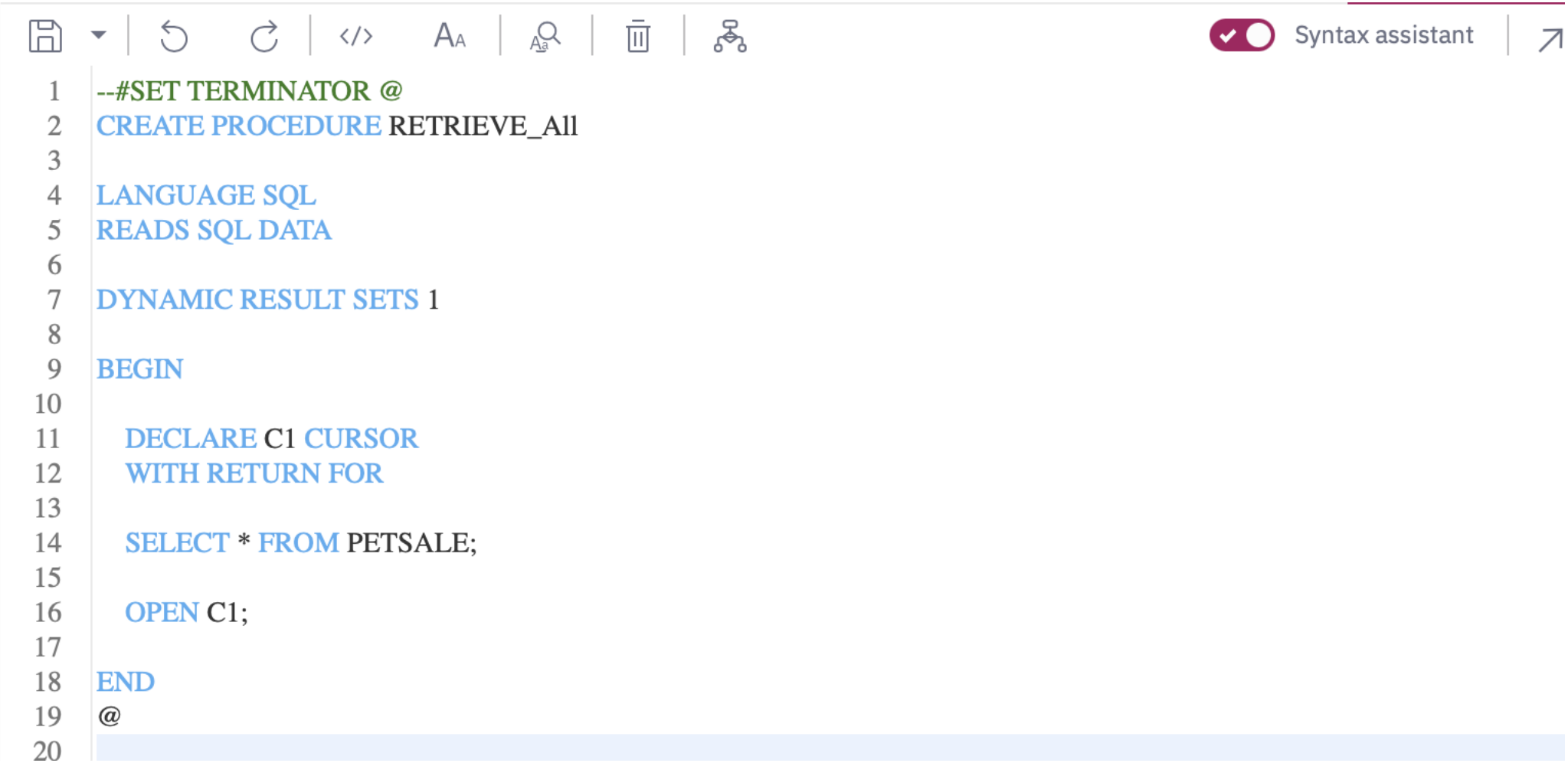

3. To call the RETRIEVE_ALL routine, copy the code below in a **new blank script** and paste it to the textbox of the **Run SQL** page. Click **Run all**. You will have all the records retrieved from the PETSALE table.

```
1. 1
1. CALL RETRIEVE_ALL;      -- Caller query
```

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```
1  CALL RETRIEVE_ALL;
2
3
```

4. You can view the created stored procedure routine RETRIEVE_ALL. Click on the 3-bar menu icon in the top left corner and click **EXPLORE > APPLICATION OBJECTS > Stored Procedures**. Find the procedure routine RETRIEVE_ALL from Procedures by clicking **Select All**. Click on the procedure routine **RETRIEVE_ALL**.

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STORED PROCEDURES

Filter by schema name or procedure name

Schemas

- [x] Select All
- New implicit schema
- [x] AUDIT *2 procedures*
- [x] ZJH17769 *2 procedures*
- [x] DB2INST1 *1 procedure*
- [x] ERRORSCHEMA *0 procedure*
- [x] SQL74605 *0 procedure*
- [x] ST_INFORMTN_SCHEMA *0 procedure*

Procedures

NAME	SCHEMA
CONNECT_CHE...	DB2INST1
LOAD	AUDIT
RETRIEVE_ALL	ZJH17769
UPDATE	AUDIT
UPDATE_SALEP...	ZJH17769

5. If you wish to drop the stored procedure routine RETRIEVE_ALL, copy the code below and paste it to the textbox of the **Run SQL** page. Click **Run all**.

```
1. 1
2. 2
3. 3
1. DROP PROCEDURE RETRIEVE_ALL;
2.
3. CALL RETRIEVE_ALL;
```

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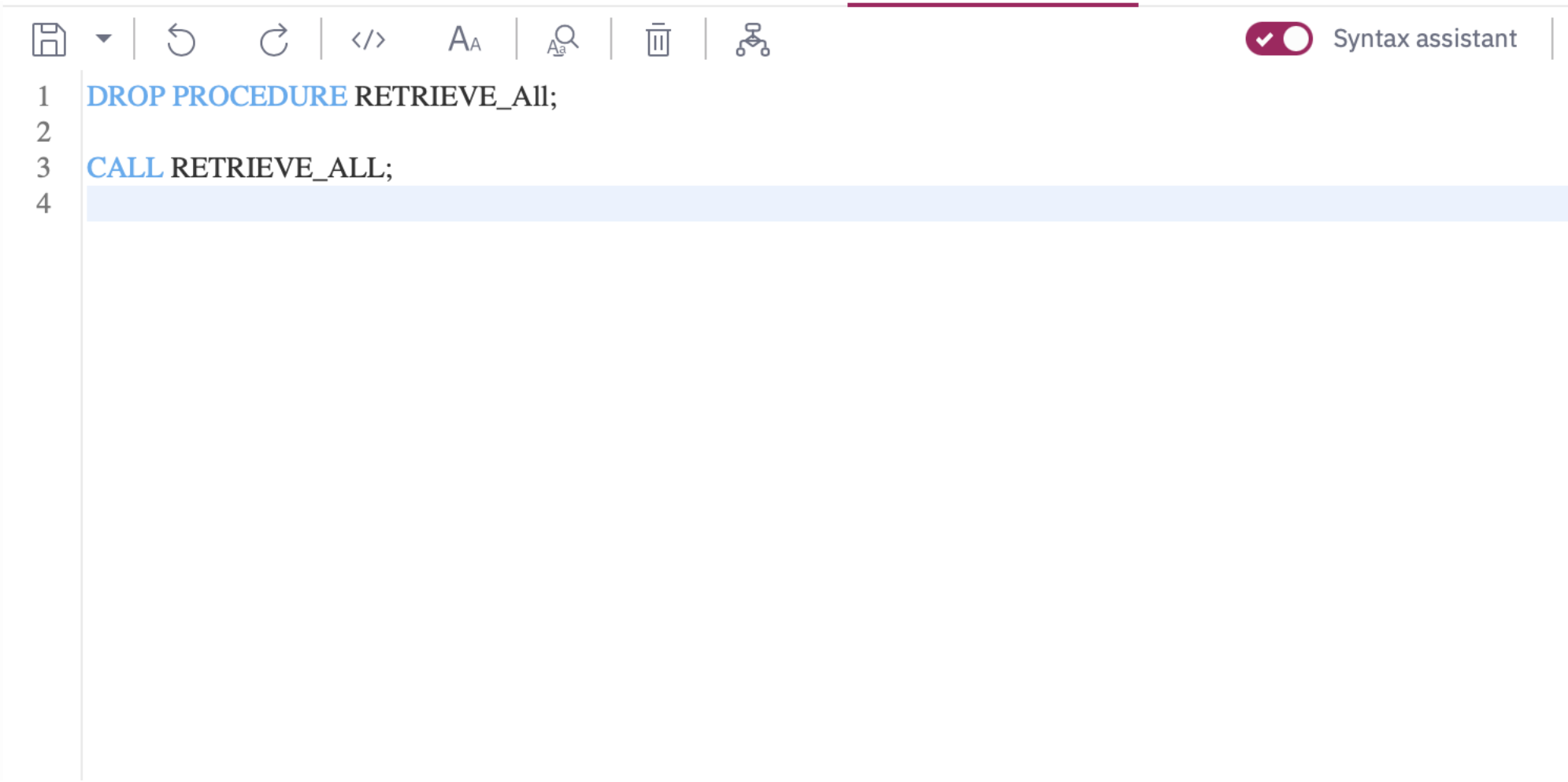

Exercise 2

In this exercise, you will create and execute a stored procedure to write/modify data in a table on Db2 using SQL.

1. Make sure you have created and populated the **PETSALE** table following the steps in the **"Data Used in this Lab"** section of this lab.

ID ▲	ANIMAL	SALEPRICE
1	Cat	450.09
2	Dog	666.66
3	Parrot	50.00
4	Hamster	60.60
5	Goldfish	48.48

2.

- You will create a stored procedure routine named **UPDATE_SALEPRICE** with parameters **Animal_ID** and **Animal_Health**.
- This **UPDATE_SALEPRICE** routine will contain SQL queries to update the sale price of the animals in the PETSALE table depending on their health conditions, **BAD** or **WORSE**.
- This procedure routine will take animal ID and health conditon as parameters which will be used to update the sale price of animal in the PETSALE table by an amount depending on their health condition. Suppose -
- For animal with ID XX having BAD health condition, the sale price will be reduced further by 25%.
- For animal with ID YY having WORSE health condition, the sale price will be reduced further by 50%.
- For animal with ID ZZ having other health condition, the sale price won't change.
- To create the stored procedure routine, copy the code below and paste it to the textbox of the **Run SQL** page. Click **Run all**.

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27. 27
28. 28
```

```
 1.     --#SET TERMINATOR @
 2.     CREATE PROCEDURE UPDATE_SALEPRICE (
 3.         IN Animal_ID INTEGER, IN Animal_Health VARCHAR(5) )     -- ( { IN/OUT type } { parameter-name } { data-type }, ... )
 4.
 5.     LANGUAGE SQL                                               -- Language used in this routine
 6.     MODIFIES SQL DATA                                          -- This routine will only write/modify data in the table
 7.
 8.     BEGIN
 9.
10.         IF Animal_Health = 'BAD' THEN                          -- Start of conditional statement
11.             UPDATE PETSALE
12.             SET SALEPRICE = SALEPRICE - (SALEPRICE * 0.25)
13.             WHERE ID = Animal_ID;
14.
15.         ELSEIF Animal_Health = 'WORSE' THEN
16.             UPDATE PETSALE
17.             SET SALEPRICE = SALEPRICE - (SALEPRICE * 0.5)
18.             WHERE ID = Animal_ID;
19.
20.         ELSE
21.             UPDATE PETSALE
22.             SET SALEPRICE = SALEPRICE
23.             WHERE ID = Animal_ID;
24.
25.         END IF;                                                -- End of conditional statement
26.
27.     END
28.     @                                                          -- Routine termination character
```

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Syntax assistant

```
--#SET TERMINATOR @
CREATE PROCEDURE UPDATE_SALEPRICE (
   IN Animal_ID INTEGER, IN Animal_Health VARCHAR(5) )

LANGUAGE SQL
MODIFIES SQL DATA

BEGIN

   IF Animal_Health = 'BAD' THEN
      UPDATE PETSALE
      SET SALEPRICE = SALEPRICE - (SALEPRICE * 0.25)
      WHERE ID = Animal_ID;

   ELSEIF Animal_Health = 'WORSE' THEN
      UPDATE PETSALE
      SET SALEPRICE = SALEPRICE - (SALEPRICE * 0.5)
      WHERE ID = Animal_ID;

   ELSE
      UPDATE PETSALE
      SET SALEPRICE = SALEPRICE
      WHERE ID = Animal_ID;

   END IF;

END
@
```

3. Let's call the UPDATE_SALEPRICE routine. We want to update the sale price of animal with ID **1** having **BAD** health condition in the PETSALE table. Copy the code below in a **new blank script** and paste it to the textbox of the **Run SQL** page. Click **Run all**. You will have all the records retrieved from the PETSALE table.

```
1
2
3
4
5
CALL RETRIEVE_ALL;

CALL UPDATE_SALEPRICE(1, 'BAD');        -- Caller query

CALL RETRIEVE_ALL;
```

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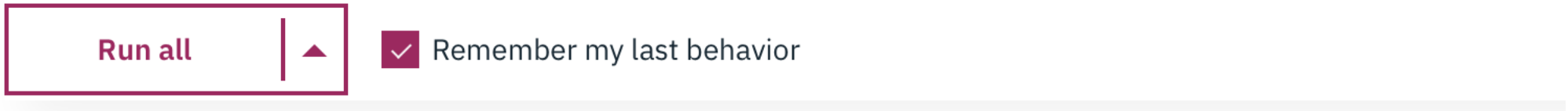
Syntax assistant

```
1  CALL RETRIEVE_ALL;
2
3  CALL UPDATE_SALEPRICE(1, 'BAD');
4
5  CALL RETRIEVE_ALL;
6
```



4. Let's call the UPDATE_SALEPRICE routine once again. We want to update the sale price of animal with ID **3** having **WORSE** health condition in the PETSALE table. Copy the code below and paste it to the textbox of the **Run SQL** page. Click **Run all**. You will have all the records retrieved from the PETSALE table.

```
1
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CALL RETRIEVE_ALL;

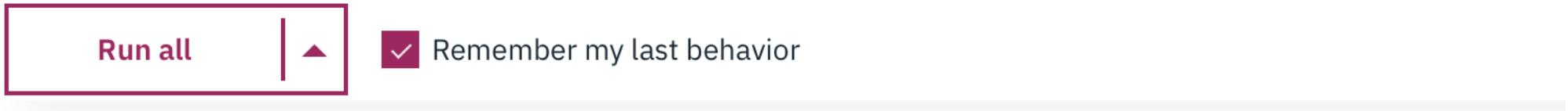
CALL UPDATE_SALEPRICE(3, 'WORSE');      -- Caller query

CALL RETRIEVE_ALL;
```

Copied!

Syntax assistant

```
1  CALL RETRIEVE_ALL;
2
3  CALL UPDATE_SALEPRICE(3, 'WORSE');
4
5  CALL RETRIEVE_ALL;
6
```



5. You can view the created stored procedure routine UPDATE_SALEPRICE. Click on the 3-bar menu icon in the top left corner and click **EXPLORE > APPLICATION OBJECTS > Stored Procedures**. Find the procedure routine UPDATE_SALEPRICE from Procedures by clicking **Select All**. Click on the procedure routine **UPDATE_SALEPRICE**.

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STORED PROCEDURES

Filter by schema name or procedure name

Schemas

- [x] Select All
- [x] AUDIT *2 procedures*
- [x] ZJH17769 *2 procedures*
- [x] DB2INST1 *1 procedure*
- [x] ERRORSCHEMA *0 procedure*
- [x] SQL74605 *0 procedure*
- [x] ST_INFORMTN_SCHEMA *0 procedure*

New implicit schema

Procedures

NAME	SCHEMA
CONNECT_CHE...	DB2INST1
LOAD	AUDIT
RETRIEVE_ALL	ZJH17769
UPDATE	AUDIT
UPDATE_SALEP...	ZJH17769

6. If you wish to drop the stored procedure routine UPDATE_SALEPRICE, copy the code below and paste it to the textbox of the **Run SQL** page. Click **Run all**.

```
1. 1
1. DROP PROCEDURE UPDATE_SALEPRICE;
```

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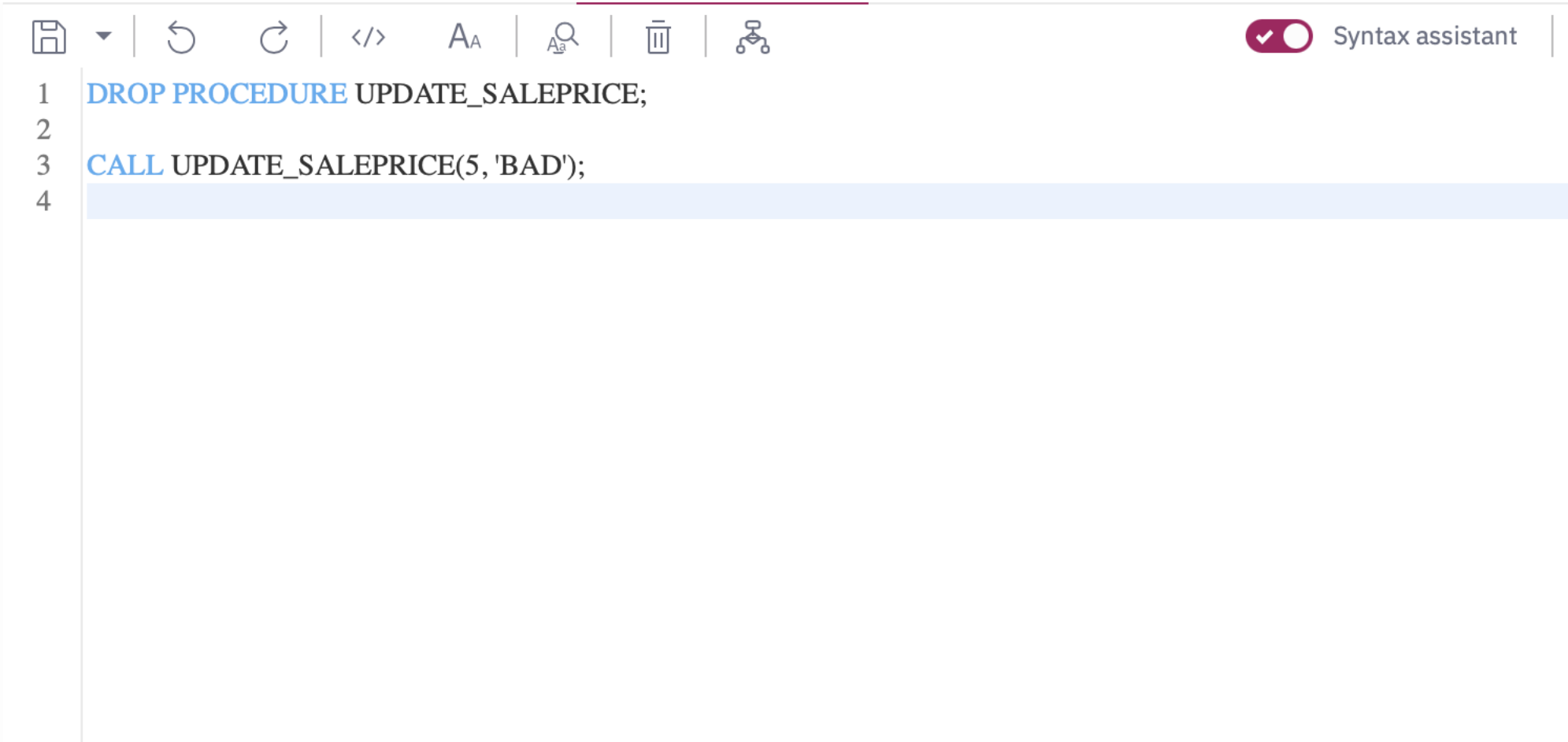

Congratulations! You have completed this lab, and you are ready for the next topic.

Author(s)

- Sandip Saha Joy

Other Contributor(s)

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Changelog

Date	Version	Changed by	Change Description
2023-05-10	1.2	Eric Hao & Vladislav Boyko	Updated Page Frames
2020-12-25	1.1	Steve Ryan	ID Reviewed
2020-12-14	1.0	Sandip Saha Joy	Created initial version