

DB0201EN-Week3-1-2-Querying-v4-py

February 6, 2019

Lab: Access DB2 on Cloud using Python

1 Introduction

This notebook illustrates how to access your database instance using Python by following the steps below: 1. Import the `ibm_db` Python library 1. Identify and enter the database connection credentials 1. Create the database connection 1. Create a table 1. Insert data into the table 1. Query data from the table 1. Retrieve the result set into a pandas dataframe 1. Close the database connection

Notice: Please follow the instructions given in the first Lab of this course to Create a database service instance of Db2 on Cloud.

1.1 Task 1: Import the `ibm_db` Python library

The `ibm_db` [API](#) provides a variety of useful Python functions for accessing and manipulating data in an IBM® data server database, including functions for connecting to a database, preparing and issuing SQL statements, fetching rows from result sets, calling stored procedures, committing and rolling back transactions, handling errors, and retrieving metadata.

We import the `ibm_db` library into our Python Application

```
In [1]: import ibm_db
```

When the command above completes, the `ibm_db` library is loaded in your notebook.

1.2 Task 2: Identify the database connection credentials

Connecting to dashDB or DB2 database requires the following information: * Driver Name * Database name * Host DNS name or IP address * Host port * Connection protocol * User ID * User Password

Notice: To obtain credentials please refer to the instructions given in the first Lab of this course
Now enter your database credentials below

Replace the placeholder values in angular brackets <> below with your actual database credentials

e.g. replace "database" with "BLUDB"

```
In [2]: #Replace the placeholder values with your actual Db2 hostname, username, and password:
dsn_hostname = "dashdb-txn-sbox-yp-dal09-04.services.dal.ibmcloud.com" # e.g.: "dashdb-ta
```

```

dsn_uid = "ttk07945"          # e.g. "abc12345"
dsn_pwd = "kk41nf3cg7lr9s-7" # e.g. "7dBZ3wWt9XN6$o0J"
dsn_driver = "{IBM DB2 ODBC DRIVER}"
dsn_database = "BLUDB"        # e.g. "BLUDB"
dsn_port = "50000"            # e.g. "50000"
dsn_protocol = "TCPIP"        # i.e. "TCPIP"

```

1.3 Task 3: Create the database connection

Ibm_db API uses the IBM Data Server Driver for ODBC and CLI APIs to connect to IBM DB2 and Informix.

Create the database connection

```

In [3]: #Create database connection
        #DO NOT MODIFY THIS CELL. Just RUN it with Shift + Enter
        dsn = (
            "DRIVER={0};"
            "DATABASE={1};"
            "HOSTNAME={2};"
            "PORT={3};"
            "PROTOCOL={4};"
            "UID={5};"
            "PWD={6};").format(dsn_driver, dsn_database, dsn_hostname, dsn_port, dsn_protocol, d

        try:
            conn = ibm_db.connect(dsn, "", "")
            print ("Connected to database: ", dsn_database, "as user: ", dsn_uid, "on host: ", d

        except:
            print ("Unable to connect: ", ibm_db.conn_errormsg() )

```

Connected to database: BLUDB as user: ttk07945 on host: dashdb-txn-sbox-yp-dal09-04.services.

1.4 Task 4: Create a table in the database

In this step we will create a table in the database with following details:

```

In [4]: #Lets first drop the table INSTRUCTOR in case it exists from a previous attempt
        dropQuery = "drop table INSTRUCTOR"

        #Now execute the drop statment
        dropStmt = ibm_db.exec_immediate(conn, dropQuery)

```

1.5 Dont worry if you get this error:

If you see an exception/error similar to the following, indicating that INSTRUCTOR is an unde-fined name, that's okay. It just implies that the INSTRUCTOR table does not exist in the table - which would be the case if you had not created it previously.

Exception: [IBM][CLI Driver][DB2/LINUX8664] SQL0204N "ABC12345.INSTRUCTOR" is an undefined name. SQLSTATE=42704 SQLCODE=-204

```
In [6]: #Construct the Create Table DDL statement - replace the ... with rest of the statement
        createQuery = "create table INSTRUCTOR(id INTEGER PRIMARY KEY NOT NULL, fname VARCHAR(20)

        #Now fill in the name of the method and execute the statement
        createStmt = ibm_db.exec_immediate(conn, createQuery)
```

Double-click [here](#) for the solution.

1.6 Task 5: Insert data into the table

In this step we will insert some rows of data into the table.

The INSTRUCTOR table we created in the previous step contains 3 rows of data:

We will start by inserting just the first row of data, i.e. for instructor Rav Ahuja

```
In [9]: #Construct the query - replace ... with the insert statement
        insertQuery = "INSERT into INSTRUCTOR values(1,'Rav','Ahuja','TORONTO', 'CA');"

        #execute the insert statement
        insertStmt = ibm_db.exec_immediate(conn, insertQuery)
```

Double-click [here](#) for the solution.

Now use a single query to insert the remaining two rows of data

```
In [12]: #replace ... with the insert statement that inserts the remaining two rows of data
        insertQuery2 = "INSERT into INSTRUCTOR values(2,'Raul','Chong','Markham','CA'), (3,'Him"

        #execute the statement
        insertStmt2 = ibm_db.exec_immediate(conn, insertQuery2)
```

Double-click [here](#) for the solution.

1.7 Task 6: Query data in the table

In this step we will retrieve data we inserted into the INSTRUCTOR table.

```
In [15]: #Construct the query that retrieves all rows from the INSTRUCTOR table
        selectQuery = "select * from INSTRUCTOR"

        #Execute the statement
        selectStmt = ibm_db.exec_immediate(conn, selectQuery)

        #Fetch the Dictionary (for the first row only) - replace ... with your code
        ibm_db.fetch_both(selectStmt)
```

```
Out[15]: {'ID': 1,
          0: 1,
          'FNAME': 'Rav',
          1: 'Rav',
          'LNAME': 'Ahuja',
          2: 'Ahuja',
          'CITY': 'TORONTO',
          3: 'TORONTO',
          'CCODE': 'CA',
          4: 'CA'}
```

Double-click [here](#) for the solution.

```
In [20]: #Fetch the rest of the rows and print the ID and FNAME for those rows
while ibm_db.fetch_row(selectStmt) != False:
    print (" ID:", ibm_db.result(selectStmt, 0), " FNAME:", ibm_db.result(selectStmt,
```

Double-click [here](#) for the solution.

Bonus: now write and execute an update statement that changes the Rav's CITY to MOOSE-TOWN

```
In [32]: #Enter your code below
insertQuery3 = "UPDATE INSTRUCTOR set CITY = 'MOOSETOWN' where FNAME = 'Rav'"

#execute the statement
insertStmt3 = ibm_db.exec_immediate(conn, insertQuery3)

validate = "select * from INSTRUCTOR"
validatestmt = ibm_db.exec_immediate(conn, validate)
ibm_db.fetch_both(validatestmt)
```

```
Out[32]: {'ID': 1,
          0: 1,
          'FNAME': 'Rav',
          1: 'Rav',
          'LNAME': 'Ahuja',
          2: 'Ahuja',
          'CITY': 'MOOSETOWN',
          3: 'MOOSETOWN',
          'CCODE': 'CA',
          4: 'CA'}
```

Double-click [here](#) for the solution.

1.8 Task 7: Retrieve data into Pandas

In this step we will retrieve the contents of the INSTRUCTOR table into a Pandas dataframe

```
In [33]: import pandas
import ibm_db_dbi
```

```
In [34]: #connection for pandas
pconn = ibm_db_dbi.Connection(conn)

In [35]: #query statement to retrieve all rows in INSTRUCTOR table
selectQuery = "select * from INSTRUCTOR"

#retrieve the query results into a pandas dataframe
pdf = pandas.read_sql(selectQuery, pconn)

#print just the LNAME for first row in the pandas data frame
pdf.LNAME[0]
```

```
Out[35]: 'Ahuja'
```

```
In [36]: #print the entire data frame
pdf
```

```
Out[36]:
```

	ID	FNAME	LNAME	CITY	CCODE
0	1	Rav	Ahuja	MOOSETOWN	CA
1	2	Raul	Chong	Markham	CA
2	3	Hima	Vasudevan	Chicago	US

Once the data is in a Pandas dataframe, you can do the typical pandas operations on it.

For example you can use the shape method to see how many rows and columns are in the dataframe

```
In [37]: pdf.shape
```

```
Out[37]: (3, 5)
```

1.9 Task 8: Close the Connection

We free all resources by closing the connection. Remember that it is always important to close connections so that we can avoid unused connections taking up resources.

```
In [38]: ibm_db.close(conn)
```

```
Out[38]: True
```

1.10 Summary

In this tutorial you established a connection to a database instance of DB2 Warehouse on Cloud from a Python notebook using `ibm_db` API. Then created a table and insert a few rows of data into it. Then queried the data. You also retrieved the data into a pandas dataframe.

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```
In [ ]:
```