- **Databases and SQL for Data Science with Python**
- **Getting Started with SQL**

- Welcome to SQL for Data Science

- **2 min Video** ❌

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- Introduction to Databases

- **2 min** ❌

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- **You can now describe what is SQL,**
  - **what is data,**
  - **what is a database, and**
  - **what is a relational database.**
  - **RDBMS stands for Relational Database Management System,**
  - **list five basic SQL commands**
    - to create a table,
    - insert data to populate the table,
    - select data from the table,
    - update data in the table, and
    - delete data from the table

- SELECT statement

- **3 min Video** ❌

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- **In this video, we will learn about**
  - retrieving data from a relational database table by selecting columns of a table.
- able to retrieve data from a relational database table,
- Define the use of a predicate,

- identify the syntax of the SELECT statement using the WHERE clause, and list the comparison operators supported by a relational database management system

- **SELECT statement Examples : Reading**
- general syntax of SELECT statements is:
- **select COLUMN1, COLUMN2, ... from TABLE1 ;**
- To retrieve all columns from the COUNTRY table we could use "*" instead of specifying individual column names:
- **select * from COUNTRY ;**
- The WHERE clause can be added to your query to filter results or get specific rows of data. To retrieve data for all rows in the COUNTRY table where the ID is less than 5:
- **select * from COUNTRY where ID < 5 ;**
- **In case of character based columns the values of the predicates in the where clause need to be enclosed in single quotes.**
- To retrieve the data for the country with country code "CA" we would issue:
- **select * from COUNTRY where CCODE = 'CA'**

- Hands-on Lab: Simple SELECT Statements
- practice the basics of SQL SELECT Statements using a SQL practice tool called Datasette in the Skills Network Lab environment

- Instructions Link
- https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-DB0201EN-SkillsNetwork/labs/Labs_Coursera_V5/labs/Lab%20-%20Basics%20of%20SQL%20SELECT%20Statement/instructional-labs.md.html
- Or same PDF
- **Hands-on Lab : Basics of SQL SELECT Statement PDF**

- Lab custom Location
- https://labs.cognitiveclass.ai/tools/datasette/-/sn
- Labs directed location
- https://labs.cognitiveclass.ai/tools/datasette/?datasette_path=%2F-%2Fadd-datasets%2F%3Fpath%3D%2Fresources%2Fdatasette%2Fcoursera%2FDB0201EN%2Flab1%2FSanFranciscoFilmLocations.sqlite&md_instructions_url=https%3A%2F%2Fcf-courses-data.s3.us.cloud-object-

[storage.appdomain.cloud%2FIBMDeveloperSkillsNetwork-DB0201EN-SkillsNetwork%2Flabs%2FLabs_Coursera_V5%2Flabs%2FLab%2520-%2520Basics%2520of%2520SQL%2520SELECT%2520Statement%2Finstructional-labs.md&lti=true]()

- COUNT , DISTINCT, LIMIT
- Video 2 min ❌
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- In this video, we'll briefly present a few useful expressions that are used with select statements
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- In this video we looked at some useful expressions that are used with select statements, namely **COUNT, DISTINCT, & LIMIT** built-in functions

- **Hands-on Lab: COUNT, DISTINCT, LIMIT**
- Instructions
- [https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-DB0201EN-SkillsNetwork/labs/Labs_Coursera_V5/labs/Lab%20-%20COUNT%20-%20DISTINCT%20-%20LIMIT/instructional-labs.md.html]()

- **INSERT statement**
- Video 2 min ❌
- (✅
- we will learn about populating a relational database table. At the end of this video, you'll be able to identify the syntax of the INSERT statement and explain two methods to add rows to a table
- ✅)
- Now you can identify the syntax of the INSERT statement, and explain the two methods to add rows to a table. One row at a time or multiple rows.

- **UPDATE and DELETE Statements**
- **Video 3 min**
- **(** ✅
- we will learn about altering and deleting data in a relational database table. At the end of this lesson, you will be able to identify the syntax of the UPDATE statement and DELETE statement and explain the importance of the WHERE clause in these statements

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- Now you can identify the syntax of the UPDATE statement and DELETE statement and explain the importance of the WHERE clause in these statements
- **Hands-on Lab: INSERT, UPDATE, and DELETE PDF**
  - https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-DB0201EN-SkillsNetwork/labs/Labs_Coursera_V5/labs/Lab%20-%20INSERT%20-%20UPDATE%20-%20DELETE/instructional-labs.md.html
  - **SUMMARY AND HIGHLIGHTS**
  - You can use Data Manipulation Language (DML) statements to read and modify data.
  - The search condition of the WHERE clause uses a predicate to refine the search.
  - COUNT, DISTINCT, and LIMIT are expressions that are used with SELECT statements.
  - INSERT, UPDATE, and DELETE are DML statements for populating and changing tables
  - **Practice Quiz**
  - covered
  - **Graded Quiz : Basic SQL**
  - Covered
  - End of Week 1

  - **Week 2 : Introduction to Relational Databases and Tables**
  - **Relational Database Concepts**
  - **Video 5 min** ❌

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- In this video, we will learn about
- different types of models,
- how we use models to map data to tables, and
- define relationships between tables.
- At the end of this lesson, you will be able to **explain the advantage of the relational model**
  - *Logical*
  - *physical data independence and*
  - *storage independence*
- **Entities :**
  - Entities are independent objects which can have multiple characteristics called attributes
- explain **how the entity name and attributes map to a relational database table**
  - *When mapping to a relational database, entities are represented as tables and attributes map to columns*
- describe the **difference between an entity and an attribute**,
- identify some **commonly used data types**, and
- Common data types include characters such as char and VAR

char, numbers such as integer and decimal, and timestamps including date and time.

- describe the **function of primary keys**.
  - *primary key uniquely identifies a specific row in a table and prevents duplication of data*

- **How to create a Database instance on Cloud**
- **Video 5 min** ❌
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- () ✅
- This video will cover the key concepts around databases in the Cloud.
- **Hands-on Lab: Sign up for IBM Cloud, Create Db2 service instance and Get started with the Db2 console**
- https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-DB0201EN-SkillsNetwork/labs/Labs_Coursera_V5/labs/Lab%20-%20Sign%20up%20for%20IBM%20Cloud%20-%20Create%20Db2%20service%20instance%20-%20Get%20started%20with%20the%20Db2%20console/instructional-labs.md.html?origin=www.coursera.org
- Home page link
- https://bs2ipcul0apon0jufi80lite.db2.cloud.ibm.com/crn%3Av1%3Abluemix%3Apublic%3Adashdb-for-transactions%3Aeu-gb%3Aa%2Fc76780f889ac44debe7287505d038c8f%3A91b0dfab-ed4a-4d72-8504-e3c5ca22db58%3A%3A/console/index.html#sql/editor/launch

- **Types of SQL statements (DDL Vs DML)**
- Video 2 min ❌
- (
- At the end of the video, you will be able to distinguish between data definition language statements and data manipulation language statements.
-)
- DDL or Data Definition Language statements are used for defining or changing objects in a database such as tables. And DML or Data Manipulation Language statements are used for manipulating or working with data in tables
- **CREATE TABLE STATEMENTS**
- Video 4 min ❌

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- At the end of this video, you will be able to explain how the entity name and attributes are used to create a relational database table.
-)
- CREATE is a DDL statement for creating Entities or tables in a database
- The CREATE TABLE statement includes definition of attributes of columns in the table,
  - including Names of columns;
  - Datatypes of columns; and
  - other Optional values if required such as the Primary Key constraint.
  - **ALTER , DROP & TRUNCATE tables**
  - Video 4 min ❌

  - (
  - Describe the ALTER TABLE, DROP TABLE, and TRUNCATE statements.
  -
  - Explain the syntax.
  - Use the statements in queries.
  -)
  - The ALTER TABLE statement changes the structure of an existing table, for example, to add, modify, or drop columns. The DROP TABLE statement deletes an existing table. The TRUNCATE TABLE statement deletes all rows of data in a table

  - **Reading: Examples to CREATE and DROP tables**
  - **PDF**
  - https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-DB0201EN-SkillsNetwork/labs/Module%202/DB0201-l2%20_M2_CREATE_DROP.md.html?origin=www.coursera.org

- **Hands-on Lab : CREATE, ALTER , TRUNCATE , DROP**
  - https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-DB0201EN-SkillsNetwork/labs/Labs_Coursera_V5/labs/Lab%20-%20CREATE%20-%20ALTER%20-%20TRUNCATE%20-%20DROP/instructional-labs.md.html?origin=www.coursera.org
- **Hands-on Lab: Create and Load Tables using SQL Scripts PDF**
- https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-DB0201EN-SkillsNetwork/labs/Labs_Coursera_V5/labs/Lab%20-%20Create%20tables%20using%20SQL%20scripts%20and%20Load%

20data%20into%20tables/instructional-labs.md.html?origin=www.coursera.org

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- **Summary and Highlights**
- A database is a repository of data that provides functionality for adding, modifying, and querying the data.
- SQL is a language used to query or retrieve data from a relational dat abase.
- The Relational Model is the most used data model for databases because it allows for data independence.
- The primary key of a relational table uniquely identifies each tuple or row, preventing duplication of data and providing a way of defining relationships between tables.
- SQL statements fall into two different categories: Data Definition Language (DDL) statements and Data Manipulation Language (DML) statements.
- **Practice Quiz**
  - Covered
- **Graded Quiz: Relational DB Concepts and Tables**
- Covered
- End of Week 2

- **Week 3 : Intermediate SQL**
- **Refining Your Results**
- **Using String Patterns and Ranges**
- Video 4 min ❌

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- welcome to **retrieving data with SELECT statements string patterns**.
- In this video, we will learn about some **advanced techniques in retrieving data from a relational database table**.
- At the end of this lesson, you will be able to describe how to **simplify a SELECT statement by using string patterns, ranges or sets of values**

- **Sorting Result Sets**
- **Video 2 min** ❌

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- we will learn about some advanced techniques in retrieving data from a relational database table and sorting how the result set displays. At the end of this lesson, you will be able to describe how to sort the result set by either ascending or descending order and explain how to indicate which column to use for the sorting order

- **Grouping Result Sets**
- Video 3 min ❌

- ( )
- we will learn about some advanced techniques in retrieving data from a relational database table, and sorting, and grouping how the results set displays. At the end of this lesson, you will be able to explain how to eliminate duplicates from a result set and describe how to further restrict a result set.

- **Hands-on Lab : String Patterns, Sorting & Grouping**
- https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-DB0201EN-SkillsNetwork/labs/Labs_Coursera_V5/labs/Lab%20-%20String%20Patterns%20-%20Sorting%20-%20Grouping/instructional-labs.md.html?origin=www.coursera.org
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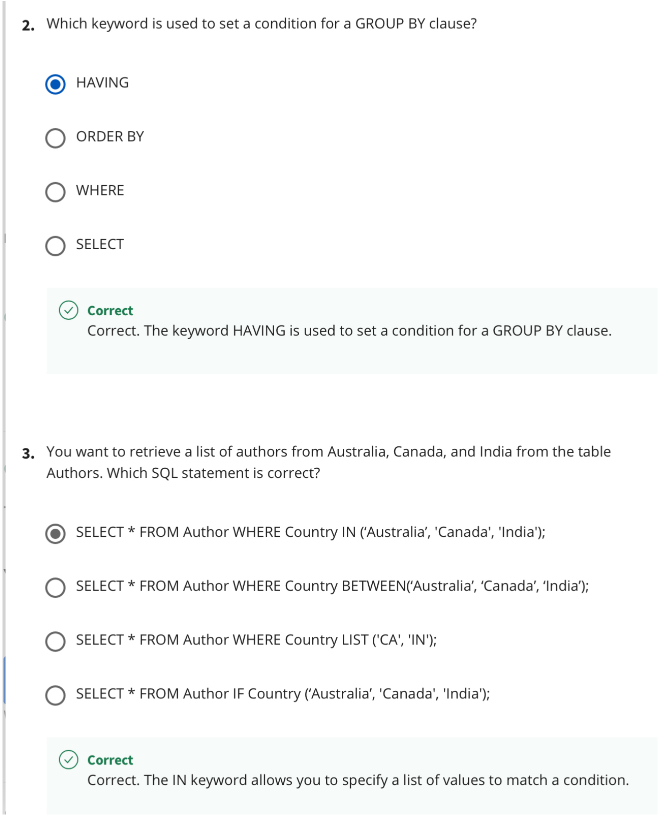
- **Summary & Highlights**
- You can use the WHERE clause to refine your query results.
- You can use the wildcard character (%) as a substitute for unknown characters in a pattern.
- BETWEEN ... AND ... to specify a range of numbers.
- You can sort query results into ascending or descending order, using the ORDER BY clause to specify the column to sort on.
- You can group query results by using the GROUP BY clause.

- **Practice Quiz**



2. Which keyword is used to set a condition for a GROUP BY clause?

● HAVING

○ ORDER BY

○ WHERE

○ SELECT

✓ **Correct**
Correct. The keyword HAVING is used to set a condition for a GROUP BY clause.

3. You want to retrieve a list of authors from Australia, Canada, and India from the table Authors. Which SQL statement is correct?

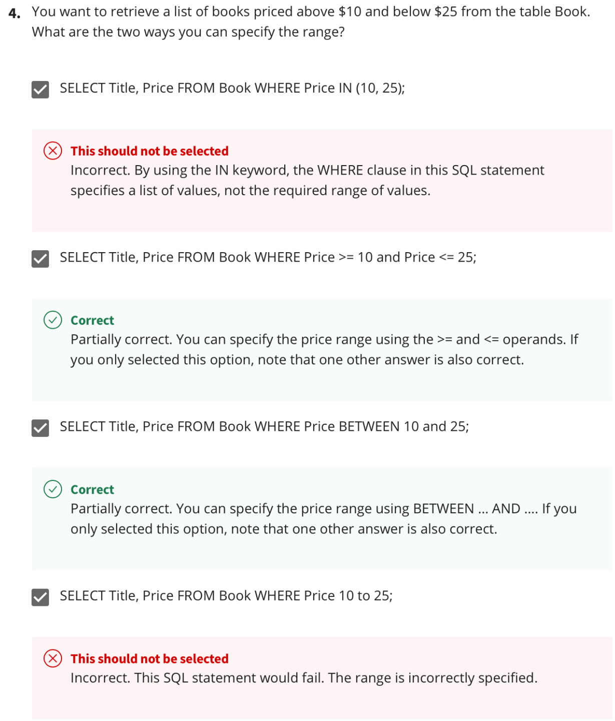
● SELECT * FROM Author WHERE Country IN (‘Australia’, 'Canada', 'India');

○ SELECT * FROM Author WHERE Country BETWEEN(‘Australia’, ‘Canada’, ‘India’);

○ SELECT * FROM Author WHERE Country LIST ('CA', 'IN');

○ SELECT * FROM Author IF Country (‘Australia’, 'Canada', 'India');

✓ **Correct**
Correct. The IN keyword allows you to specify a list of values to match a condition.



4. You want to retrieve a list of books priced above $10 and below $25 from the table Book. What are the two ways you can specify the range?

☑ SELECT Title, Price FROM Book WHERE Price IN (10, 25);

⊗ **This should not be selected**
Incorrect. By using the IN keyword, the WHERE clause in this SQL statement specifies a list of values, not the required range of values.

☑ SELECT Title, Price FROM Book WHERE Price >= 10 and Price <= 25;

✓ **Correct**
Partially correct. You can specify the price range using the >= and <= operands. If you only selected this option, note that one other answer is also correct.

☑ SELECT Title, Price FROM Book WHERE Price BETWEEN 10 and 25;

✓ **Correct**
Partially correct. You can specify the price range using BETWEEN ... AND .... If you only selected this option, note that one other answer is also correct.

☑ SELECT Title, Price FROM Book WHERE Price 10 to 25;

⊗ **This should not be selected**
Incorrect. This SQL statement would fail. The range is incorrectly specified.

Graded Quiz

• Functions, Multiple Tables, and Sub-queries

•Built-in Database Functions

•6 min Video ❌

- ( )
- we'll go over SQL functions built into the database
- we looked at some built-in SQL aggregate functions, such as sum, minimum, maximum, and average We also looked at scalar and string functions, such as round, lowercase, and uppercase
- **Date and Time Built in Functions**
- 2 min Video ❌

- ( )
- we'll go over date and time SQL functions built into the database

- we looked at different types of built in SQL functions for working with dates and times
- **Hands on Labs : Built in Functions**
-
- https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-DB0201EN-SkillsNetwork/labs/Labs_Coursera_V5/labs/Lab%20-%20Built-in%20functions%20/Hands-on_Lab__Built-in_Functions.md.html?origin=www.coursera.org

- **Sub-Queries and Nested Selects**
- **Video 4 min** ❌

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- learn how to write sub-queries or nested selects statements.
- You also learned to use sub-queries in the WHERE clause, in the list of columns and in the FROM clause

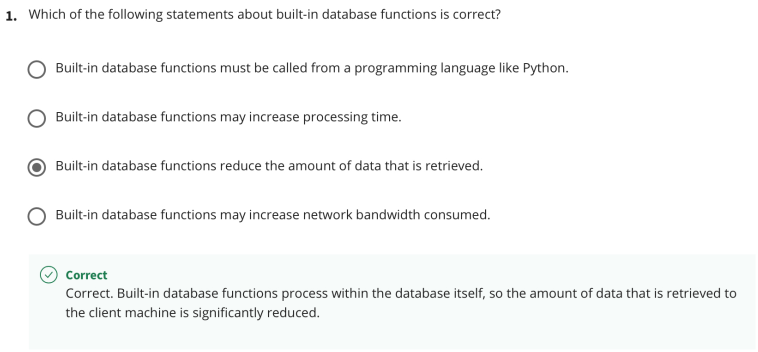
- **Hands-on Lab: Sub-queries and Nested SELECTs PDF**
- https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-DB0201EN-SkillsNetwork/labs/Labs_Coursera_V5/labs/Lab%20-%20Sub-queries%20and%20Nested%20SELECTs%20/instructional-labs.md.html?origin=www.coursera.org

- **Working with Multiple tables**
- Video 6 min ❌

- ( )
- In this video, you will learn how to write queries that access more than one table
- In this lesson, we have shown you how to work with multiple tables using sub-queries and implicit joins

- **Summary and Highlights**
- Most databases come with built-in functions that you can use in SQL statements to perform operations on data within the database itself.
- When you work with large datasets, you may save time by using built-in functions rather than first retrieving the data into your application and then executing functions on the retrieved data.

- You can use sub-queries to form more powerful queries than otherwise.
- You can use a sub-select expression to evaluate some built-in aggregate functions like the average function.
- Derived tables or table expressions are sub-queries where the outer query uses the results of the sub-query as a data source.
- **Practice Quiz**



1. Which of the following statements about built-in database functions is correct?

○ Built-in database functions must be called from a programming language like Python.

○ Built-in database functions may increase processing time.

● Built-in database functions reduce the amount of data that is retrieved.

○ Built-in database functions may increase network bandwidth consumed.

✓ Correct

Correct. Built-in database functions process within the database itself, so the amount of data that is retrieved to the client machine is significantly reduced.

Module Quiz

2.A DEPARTMENTS table contains DEP_NAME, and DEPT_ID_DEP columns and an EMPLOYEES table contains columns called F_NAME and DEP_ID. We want to retrieve the Department Name for each Employee. Which of the following queries will correctly accomplish this?

1 point

SELECT E.F_NAME, D.DEP_NAME FROM EMPLOYEES, DEPARTMENTS

SELECT D.F_NAME, E.DEP_NAME FROM EMPLOYEES E, DEPARTMENTS D WHERE DEPT_ID_DEP = DEP_ID

SELECT F_NAME, DEP_NAME FROM EMPLOYEES, DEPARTMENTS

WHERE DEPT_ID_DEP = DEP_ID ✅

SELECT F_NAME, DEP_NAME FROM EMPLOYEES E, DEPARTMENTS D WHERE E.DEPT_ID_DEP = D.DEP_ID

- **Accessing databases using Python**

- **How to access databases using Python**
- **Video 6 min** ❌

- ( )
- in this video you will learn how to access databases using Python
- Databases are powerful tools for data scientists
- After completing this module,
- you'll be able to
- explain the basic concepts related to using Python to connect to databases.
- Then you'll create tables, load data and query data using SQL from Jupyter Notebooks,
- and finally, analyze the data.
- In the lab assignments,
- you will learn how to create an instance in the Cloud, connect to a database, query data from the database using SQL, and analyze the data using Python.

- You will be able to explain the basic concepts related to connecting a Python application to a database.
- Describe SQL APIs as well as list some of the proprietary APIs used by popular SQL-based DBMS systems.

- **Write Code using DB-API**
- Video 5 min. ❌

- After completing this video, you will be able to explain the basic concepts related to the Python DB-API and database cursors. And also write code using DB-APIs.

- **Connecting to a database using ibm_db API**
- Video 2 min ❌

- After completing this lesson, you will be able to understand the ibm_db API, as well as the credentials required to connect to a database using Python. We will also demonstrate how to connect to an IBM DB2 database using Python code written on a Jupyter notebook.

- **Lab: Create Database Credentials**
- **PDF**
- https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-DB0201EN-SkillsNetwork/labs/Module%205/LAB-0v6_Create_Database_Credentials.md.html?origin=www.coursera.org
- **Db2 - i4**
- **Service credentials**

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}
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- **Summary of service credentials**
-
- **Db2-i4**
-
- "**password**": "D58DZMkh7aJxaOBr"
-
- "**username**": "yhg97202"
-
- "**database**": "bludb",
-
- "**hostname**": "55fbc997-9266-4331-afd3-888b05e734c0.bs2io90l08kqb1od8lcg.databases.appdomain.cloud"
-
- "**port**": 31929

- **Hands-on Lab: Connecting to a database instance**
- ipynb
- https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-DB0201EN-SkillsNetwork/labs/Module%205/DB0201EN-Week3-1-1-Connecting.ipynb
- **Creating tables, loading data and querying data**
- **Video** ❌

- ()
- welcome to creating tables, loading data, and querying data
- After completing this lesson, you will be able to understand basic concepts related to creating tables, loading data, and querying data using Python, as well as demonstrate an example of how to perform these tasks using the IBM DB2 on Cloud database and Jupyter notebooks.

- **Hands-on Lab: Creating tables, inserting and querying Data**
- **ipynb**
- https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-DB0201EN-SkillsNetwork/labs/Module%205/DB0201EN-Week3-1-2-Querying.ipynb

- **Introducing SQL Magic**
- **PDF**
- https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-DB0201EN-SkillsNetwork/labs/Module%203/IntroducingSQLMagic.md.html?origin=www.coursera.org

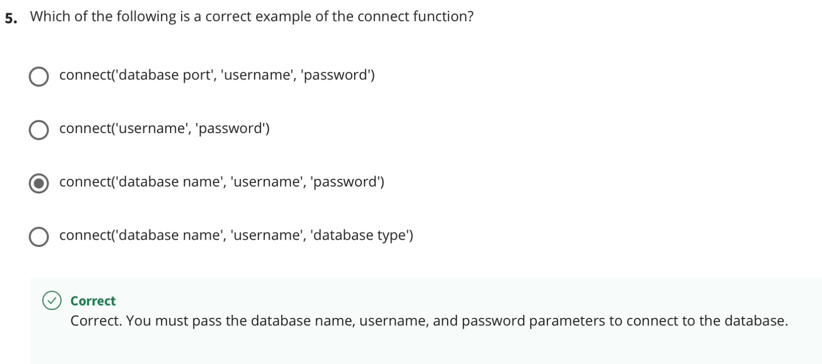
- **Hands-on Tutorial: Accessing Databases with SQL magic**
- ipynb
- **DB0201EN-Week3-1-3-SQLmagic-v3-py.ipynb**
- https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-DB0201EN-SkillsNetwork/labs/Module%205/DB0201EN-Week3-1-3-SQLmagic.ipynb
- **Analysing Data With Python**
- Video 9 min ❌
- ()
- After completing this video, you will be able to understand basic concepts related to performing exploratory analysis on data. We will demonstrate an example of how to store data using the IBM Db2 on Cloud database, and then use Python to do some basic data analysis on this data. In this video, we will be using the McDonald's menu nutritional facts data for popular menu items at McDonald's, while using Python to perform basic exploratory analysis.
- Now that you know how to do basic exploratory data analysis using Pandas and visualization tools, proceed to the labs in this module where you can practice the concepts learned

- **Hands-on Lab: Analyzing a real World Data Set**
- https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-DB0201EN-SkillsNetwork/labs/Module%205/DB0201EN-Week3-1-4-Analyzing.ipynb

- **Summary and Highlights**
  - You can access a database from a language like Python by using the appropriate API. Examples include ibm_db API for IBM DB2, psycopg2 for ProstgreSQL, and dblib API for SQL Server.
  - DB-API is Python's standard API for accessing relational databases. It allows you to write a single program that works with multiple kinds of relational databases instead of

writing a separate program for each one.

- The DB_API connect constructor creates a connection to the database and returns a Connection Object, which is then used by the various connection methods.
- The connection methods are:
- The **cursor()** method, which returns a new cursor object using the connection.
- The **commit()** method, which is used to commit any pending transaction to the database.
- The **rollback()** method, which causes the database to roll-back to the start of any pending transaction.
- The **close()** method, which is used to close a database connection.
- You can use SQL Magic commands to execute queries more easily from Jupyter Notebooks.
- Magic commands have the general format %sql select * from tablename.
- Cell magics start with a double %% (percent) sign and apply to the entire cell.
- Line magics start with a single % (percent) sign and apply to a particular line in a cell.
- **Practice Quiz**



5. Which of the following is a correct example of the connect function?

○ connect('database port', 'username', 'password')

○ connect('username', 'password')

● connect('database name', 'username', 'password')

○ connect('database name', 'username', 'database type')

Correct
Correct. You must pass the database name, username, and password parameters to connect to the database.

- **Graded Quiz**
- End of week 4

- **Assignment Preparation: Working with real-world data sets and built-in SQL functions**

- **Working with Real World datasets**
- **8 min Video** ❌

- ()
- In this video, we'll give you a few hints and tips for working with Real World Data-sets
- In this video we looked at some considerations and tips for working with real-world datasets
- **Getting Table and Column Details**
- 4 min video ❌

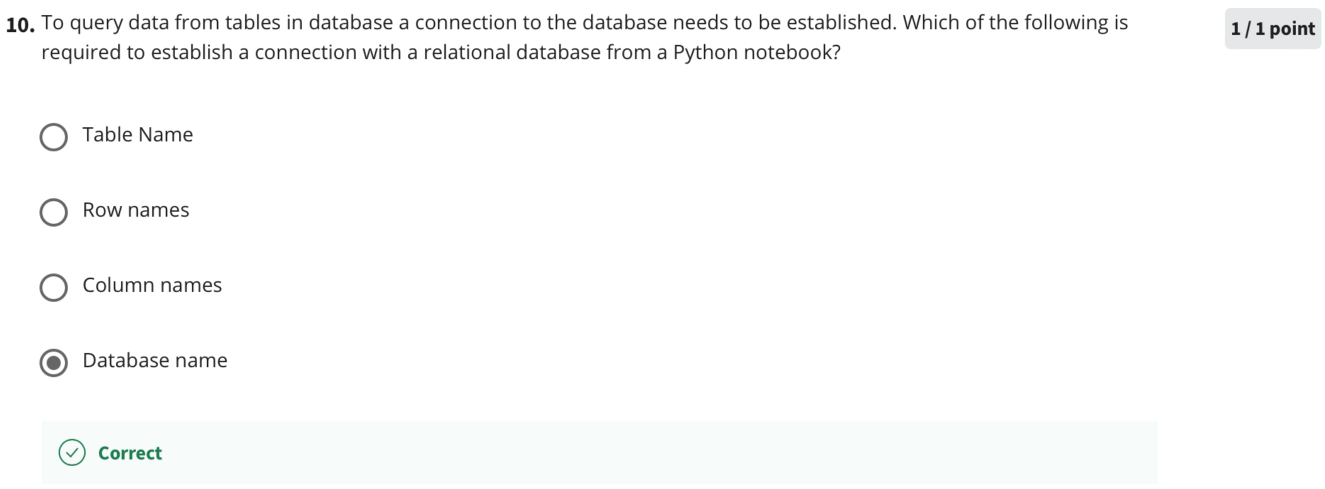
•()
•In this video, we'll look at how to get information about tables and their columns in a database
•In this video, we saw how to retrieve table and column information

- **Loading Data**
- https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-DB0201EN-SkillsNetwork/labs/FinalModule_SKO/Reading_Loading_Data.md.html?origin=www.coursera.org

- **Hands-on Lab: Practice Querying Real World Datasets**
- https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-DB0201EN-SkillsNetwork/labs/FinalModule_Coursera_V5/DB0201EN-Week4-1-1-RealDataPractice-v5.ipynb

- **Instructions for Peer-graded assignment**
- PDF
- https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-DB0201EN-SkillsNetwork/labs/FinalModule_Coursera_V5/Instructions_for_Peer_Graded_Assignment.md.html?origin=www.coursera.org
-
-

- **Final Exam**
- **End of week 5**



10. To query data from tables in database a connection to the database needs to be established. Which of the following is required to establish a connection with a relational database from a Python notebook?

1 / 1 point

○ Table Name

○ Row names

○ Column names

● Database name

✓ **Correct**

- Congratulations on completing this Databases and SQL for Data Science with Python course! We hope you enjoyed it.

- This course is part of:

  - IBM Data Analyst Professional Certificate
  - Applied Data Science Specialization
  - IBM Data Science Professional Certificate
  - IBM Data Engineering Foundations Specialization
  - IBM Data Engineering Professional Certificate

- Those of you following a Data Engineering track must also complete the **Honors module in this course. It contains information on more advanced SQL techniques that will be useful to you as a Data Engineer.**

- As a next step, you can explore other courses in these programs, starting with:

- Data Engineering and Data Analytics tracks: [Data Analysis with Python]
- Data Engineering track: NoSQL Fundamentals

- **Week 6**
- **Bonus Module: Advanced SQL for Data Engineering (Honors)**

- **About this Honors module**

- This module covers some advanced SQL techniques that will be useful for Data Engineers. If you are following the Data Engineering track, you must complete this module.
- This module is optional for those of you following the Data Science or Data Analyst tracks. If you choose to complete it, you will be awarded an Honors level certificate.
- In this module, you will learn how to form more powerful queries by using advanced techniques like views, transactions, stored procedures, and joins.

- **Views, Stored Procedures, and Transactions**

- **Views**
- Video 3 min. ❌

- ()
- After watching this video, you will be able to: Define a view Describe when to use a view Explain the syntax for creating a view

- **Hands on Labs : Using Views**
- **PDF**
- https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-DB0201EN-SkillsNetwork/labs/Labs_Coursera_V5/labs/Lab%20-%20Using%20Views/instructional-labs.md.html?origin=www.coursera.org

- **STORED PROCEDURES**
- Video 3 min ❌
-
-
-
-
-
-
-

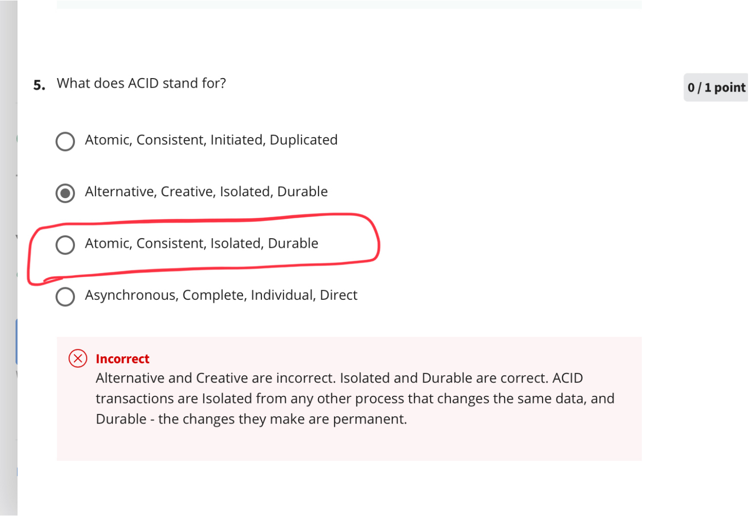
- ()
- After watching this video, you will be able to: Explain what a stored procedure is List the benefits of using stored procedures Describe how to create and use a stored procedure
- In this video, you learned that: Stored procedures are a set of SQL statements that execute on the server
- Stored procedures offer many benefits over sending SQL statements to the server
- You can use stored procedures in dynamic SQL statements and external applications

- **Hands on Labs : Stored Procedures**
- https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-DB0201EN-SkillsNetwork/labs/Labs_Coursera_V5/labs/Lab%20-%20Stored%20Procedures/instructional-labs.md.html?origin=www.coursera.org

- **ACID Transactions**
- Video 3 min ❌

- ()
- Welcome to ACID transactions. After watching this video, you will be able to:
- Explain what an ACID transaction is
- Give an example of an ACID transaction
- Describe commits and rollbacks
- In this video, you learned that:
- A transaction represents a complete unit of work, which can be one or more SQL statements.
- An ACID transaction is one where all the SQL statements must complete successfully or none at all.
- This ensures the database is always in a consistent state.
- ACID stands for Atomic, Consistent, Isolated, Durable.
- SQL commands BEGIN, COMMIT, and ROLLBACK are used to manage ACID transactions.
- SQL commands can be called from languages like C, R and Python.

- **Hands-on Lab: Committing and rolling back a transaction**
- https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-DB0201EN-SkillsNetwork/labs/Labs_Coursera_V5/labs/Lab%20-%20Committing%20and%20Rolling%20back%20a%20Transaction/instructional-labs.md.html?origin=www.coursera.org



5. What does ACID stand for?

0 / 1 point

○ Atomic, Consistent, Initiated, Duplicated

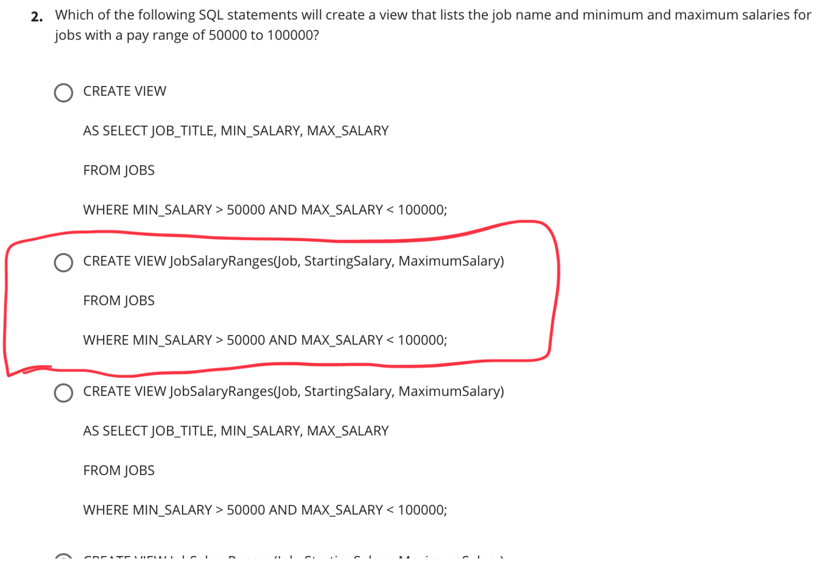
● Alternative, Creative, Isolated, Durable

○ [✓ Atomic, Consistent, Isolated, Durable]

○ Asynchronous, Complete, Individual, Direct

Incorrect
Alternative and Creative are incorrect. Isolated and Durable are correct. ACID transactions are Isolated from any other process that changes the same data, and Durable - the changes they make are permanent.

- **Summary and Highlights**
  - Views are a dynamic mechanism for presenting data from one or more tables.A transaction represents a complete unit of work, which can be one or more SQL statements.
  - An ACID transaction is one where all the SQL statements must complete successfully, or none at all.
  - A stored procedure is a set of SQL statements that are stored and executed on the database server, allowing you to send one statement as an alternative to sending multiple statements.
  - You can write stored procedures in many different languages like SQL PL, PL/SQL, Java, and C.



2. Which of the following SQL statements will create a view that lists the job name and minimum and maximum salaries for jobs with a pay range of 50000 to 100000?

○ CREATE VIEW

AS SELECT JOB_TITLE, MIN_SALARY, MAX_SALARY

FROM JOBS

WHERE MIN_SALARY > 50000 AND MAX_SALARY < 100000;

○ [✓ CREATE VIEW JobSalaryRanges(Job, StartingSalary, MaximumSalary)

FROM JOBS

WHERE MIN_SALARY > 50000 AND MAX_SALARY < 100000;]

○ CREATE VIEW JobSalaryRanges(Job, StartingSalary, MaximumSalary)

AS SELECT JOB_TITLE, MIN_SALARY, MAX_SALARY

FROM JOBS

WHERE MIN_SALARY > 50000 AND MAX_SALARY < 100000;

○ CREATE VIEW JobSalaryRanges(Job, StartingSalary, MaximumSalary)

- **JOIN STATEMENTS**
- Join Overview
- Video 4 min
- ❌
- ()
- After watching this video, you will be able to:
- Define the join operator
- Explain the role of primary keys and foreign keys in a join operation
- List different types of join operators

- You can use the JOIN operator to combine rows from two or more tables
- The tables being joined are related by a common column, which is usually the primary key of one table, and appears as a foreign key in the other table
- There are two types of joins; inner joins and outer joins.

- **Inner Join**
- Video 2 min ❌
- (
- After watching this video, you will be able to:
- Describe inner joins
- Explain when to use an inner join
- Describe the syntax of the INNER JOIN statement
- In this video, you learned that:
- Inner joins return only the rows from the tables that have matching value in a common column, usually the primary key of one table that exists as a foreign key in the second table.
- Rows from joined tables that do not have a matching value do not appear in the result.

- **Outer Join**
- Video 5 min ❌

- After watching this video, you will be able to:
- Describe left outer joins, right outer joins, and full outer joins
- Explain when to use each type of outer join
- Describe the syntax of the OUTER JOIN statement

- There are many varieties of outer join that you can use to refine your result set.
- Left outer joins return all rows from the left table, and all the rows form the right table that match that an inner join would return and all the rows in the first table that do not have a match in the second table.
- Right outer joins return all the rows that an inner join would return and all the rows in the second table that do not have a match in the first table.
- Full outer joins return all matching rows from both tables and all the rows from both tables that don’t have a match.

- **Hands-on Lab: Joins**
- https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-DB0201EN-SkillsNetwork/labs/Labs_Coursera_V5/labs/Lab%20-%20Joins/instructional-labs.md.html?origin=www.coursera.org

- **Summary and Highlights**
  - A join combines the rows from two or more tables based on a relationship between certain columns in these tables.
  - To combine data from three or more different tables, you simply add new joins to the SQL statement.
  - There are two types of table joins: inner join and outer join; and three types of outer joins: left outer join, right outer join, and full outer join.
  - The most common type of join is the inner join, which matches the results from two tables and returns only the rows that match.
  - You can use an alias as shorthand for a table or column name.
  - You can use a self-join to compare rows within the same table.
  - **Practice Quiz**
  - Covered

- Honors Assignment
- Optional Honors Content
- **Quiz and Assignment for Advanced SQL**
- **Graded Quiz: Views, Stored Procedures and Transactions**
- **Done**
- **Graded Quiz: JOIN operations**
- **Done**
- **Honours : Practice Hands-on Lab: Joins**
- https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-DB0201EN-SkillsNetwork/labs/BonusModule_Coursera_v5/Hands-on-lab-Joins.md.html?origin=www.coursera.org
- **Final Project: Advanced SQL Techniques**
- https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-DB0201EN-SkillsNetwork/labs/BonusModule_Coursera_v5/FinalProject_BonusModule.md.html?origin=www.coursera.org
- ***Honors Peer-graded Assignment: Advanced SQL for Data Engineers***
- https://www.coursera.org/learn/sql-data-science/peer/k4iwx/advanced-sql-for-data-engineers/submit
-