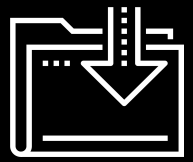
Advanced Usage of the SQLAlchemy ORM

Data Boot Camp

Lesson 10.2



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Class Objectives

By the end of today's class, you will be able to:

- Use the SQLAlchemy ORM to create classes that model tables.
- Perform database CRUD operations by using the SQLAlchemy ORM.
- Reflect existing databases.
- Use the SQLAlchemy Inspector to view table names in the database.
- Plot query results from the ORM.
- Run a t-test to validate differences in means.


WELCOME

Queries

Crafting SQLAlchemy queries is much easier than we might first expect.

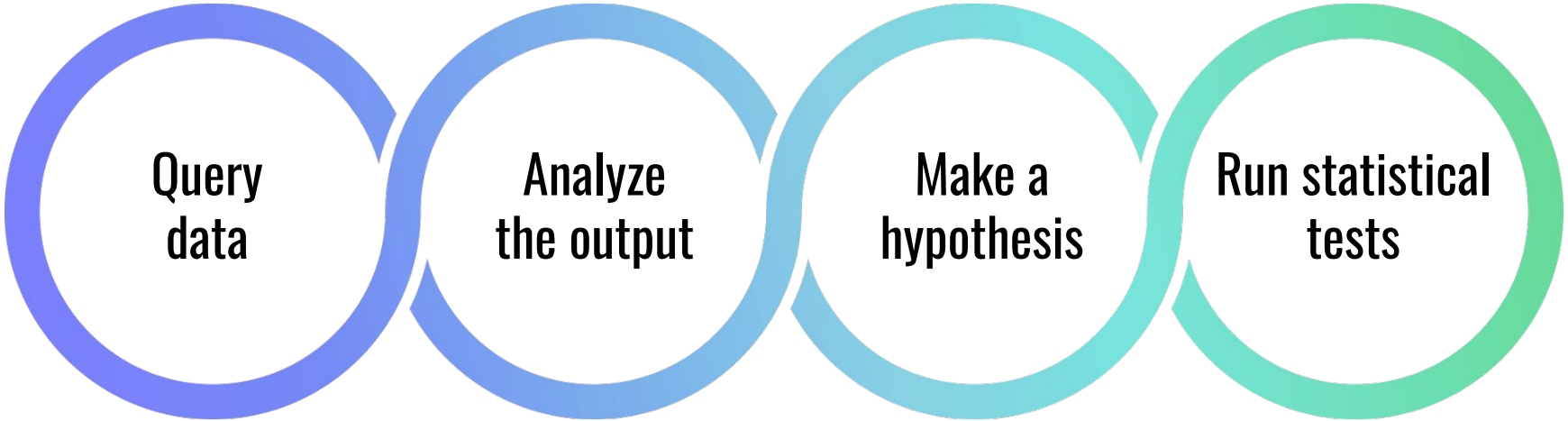
Welcome & SQLAlchemy Queries

To prove this point, we will work with more realistic datasets today. Our first database contains over 1,000 rows of data that can be searched through.

BaseballPlayers								
name_first	**name_last**	**name_given**	**weight**	**height**	**bats**	**throws**	**debut**	**final_game**
David	Aardsma	David Allan	220	75	R	R	2004-04-06	2015-08-23
Hank	Aaron	Henry Louis	180	72	R	R	1954-04-13	1976-10-03
Tommie	Aaron	Tommie Lee	190	75	R	R	1962-04-10	1971-09-26
Don	Aase	Donald William	190	75	R	R	1977-07-26	1990-10-03
Andy	Abad	Fausto Andres	184	73	L	L	2001-09-10	2006-04-13
Fernando	Abad	Fernando Antonio	220	73	L	L	2010-07-28	2015-10-03
John	Abadie	John W.	192	72	R	R	1875-04-26	1875-06-10
Ed	Abbaticchio	Edward James	170	70	R	R	1897-09-04	1910-09-15
Bert	Abbey	Bert Wood	175	71	R	R	1892-06-14	1896-09-23
Charlie	Abbey	Charles S.	169	68	L	L	1893-08-16	1897-08-19

We will demonstrate how SQLAlchemy can be used in conjunction with SciPy to perform analysis on a dataset.

SQLAlchemy Queries in Action



For students who are pursuing a career in data science:	*It's important to practice this workflow on your own.*
For students who are not pursuing a career in data science:	*This workflow demonstrates how SQLAlchemy can interface with another common Python library using queried objects.*

Do you recall how to query a database using SQLAlchemy?

SQLAlchemy Queries in Action

There are two basic ways to query a database in SQLAlchemy:

01

with SQL statements

02

with Python objects

In the previous class, we discussed that Python objects are preferred for interacting with a database in SQLAlchemy.

SQLAlchemy Queries in Action

To query a database for all of the records in a specific table, use `session.query()` and pass through the SQLAlchemy class associated with the table as a parameter, as in the following code:

```
# Print all of the player names in the database
players = session.query(BaseballPlayer)
for player in players:
  print(player.name_given)
```

What is a t-test and what is it used for?

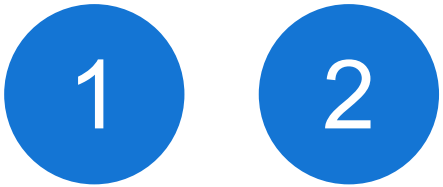
A **t-test** is a statistical test used to determine the likelihood that the difference in the means between two groups is statistically significant.

t-test

There are two types of (two-sample) t-tests:

Paired t-test

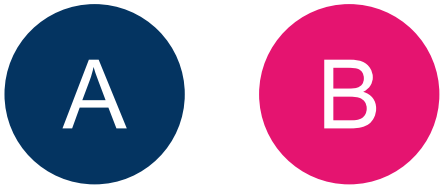
Compares the means of the **same group**.



Example:
Mean blood pressure in patients before and after medication.

Unpaired t-test

Compares the means of **two different groups**.



Example:
The mean annual spending on dining out among Minnesotans versus Texans.

Instructor Demonstration

SQLAlchemy Queries in Action

Questions?

Sunny Hours Search

Activity: Sunny Hours Search

In this activity, you will create a Python script that can search through the provided SQL file of data on hours of sunshine in cities throughout the world.

Suggested Time:

20 Minutes

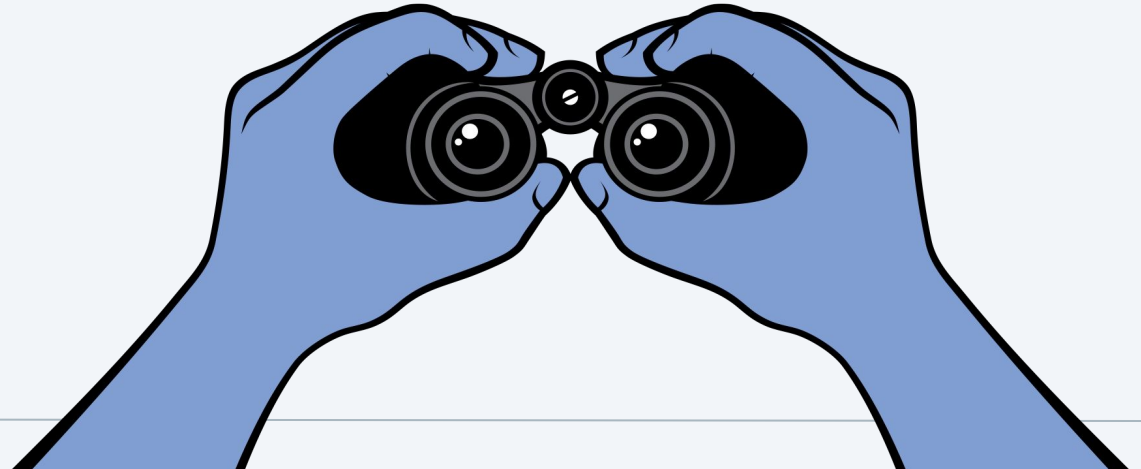
Time's Up! Let's Review.

Questions?

CRUD Database

We have only looked at one-half of CRUD!

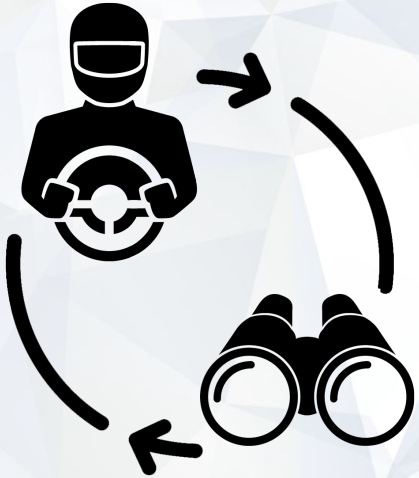
C reate R ead U pdate D elete



Instructor Demonstration

Updating and Deleting Rows

Questions?



Pair Programming Activity:

CRUD Database

In this activity, you will be tasked with creating a new SQLite database for travel destinations.

You will need to create a table, add rows into the table, update values in rows, and, finally, delete a row from the database.

Suggested Time:

20 Minutes

Time's Up! Let's Review.

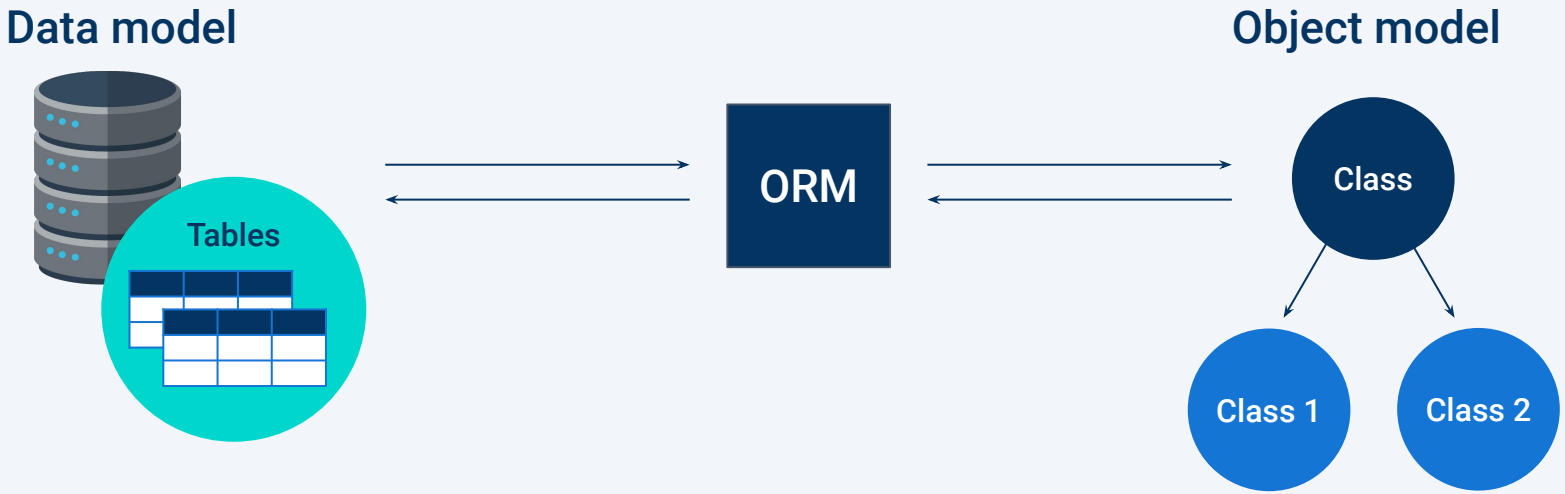

Break

Reflecting on SQL

How can we analyze databases that already exist?

Reflecting on SQL

SQLAlchemy provides tools to create ORM classes for an existing database!



Instructor Demonstration

Reflections

Reflections

Reflecting an existing database is a simple four-step process:

01 Import `automap_base` from the SQLAlchemy library.

02 Create an `engine` against the existing database that should be reflected.

03 Create a `Base` by calling `Base = automap_base()`.

04 Call `Base.prepare` with the `engine` from Step 2, and `reflect=True` as its parameters.

Questions?

Activity: Reflecting on SQL

In this activity, you will practice how to reflect existing databases using SQLAlchemy and a SQLite table with demographic data.

Suggested Time:

20 Minutes

Time's Up! Let's Review.

Questions?

Salary Exploration

The **inspector tool** allows SQLAlchemy developers to look through a connected database and explore its contents.

SQLAlchemy Exploration

The inspector is primarily used to look up:

- Tables
- Columns
- Data types

To look up specific values stored in a table, queries should be used.

Questions?

Instructor Demonstration

SQLAlchemy Inspection

Activity: Salary Exploration

In this activity, you will create an inspector and search through a SQLite database of San Francisco salaries.

Suggested Time:

20 Minutes

Time's Up! Let's Review.

Questions?