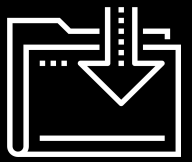
SQLAlchemy ORM

Data Boot Camp



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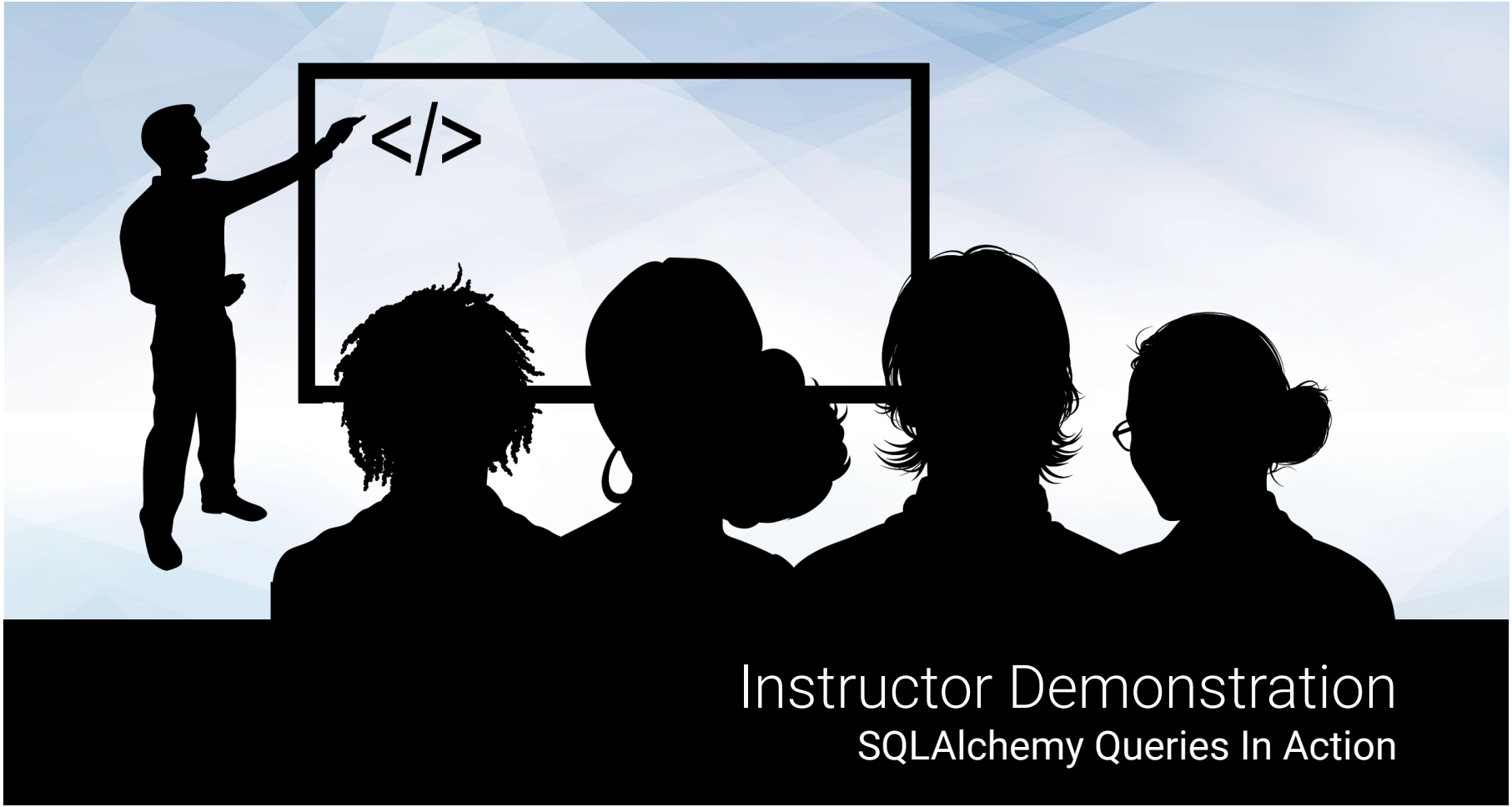
Today’s Goals

By the end of this class, you will:

- Use SQLAlchemy ORM to model tables.
- Perform CRUD with SQLAlchemy.
- Reflect existing databases with SQLAlchemy.
- Plot query results from SQLAlchemy ORM.
- Run a t-test to validate differences in means.



Instructor Demonstration

SQLAlchemy Queries In Action

Lets Run through a Review!

How can you query a database using SQLAlchemy?

There are two ways to query a database using SQLAlchemy

Using more SQL...

```
data = engine.execute("SELECT * FROM BaseballPlayer")
```

...or more Python!

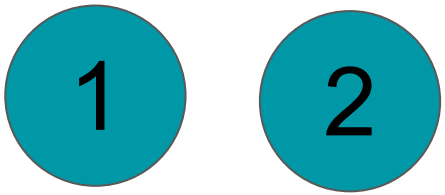
```
players = session.query(BaseballPlayer)
for player in players:
  print(player.name_given)
```

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

A t-test is used to test the difference between means!

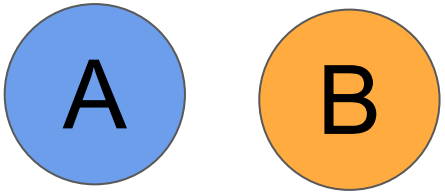
There are two types of (two-sample) t-tests

01 Paired



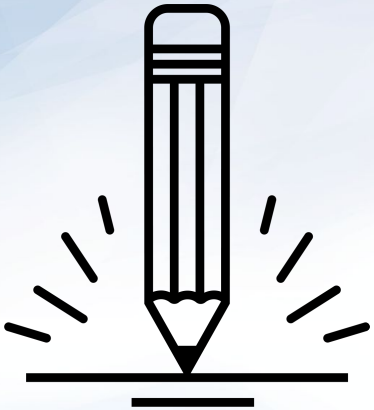
- Compares the means of the **same** group
- Example:
  - Mean blood pressure before and after medication

02 Unpaired



- Compares the means of **different** group
- Example:
  - Cost of restaurant dinners in Minnesota vs. Texas

<Time to Code>



Activity: Sharks Search

In this activity, you will create a Python script that can search through the SQL file of shark attacks provided.

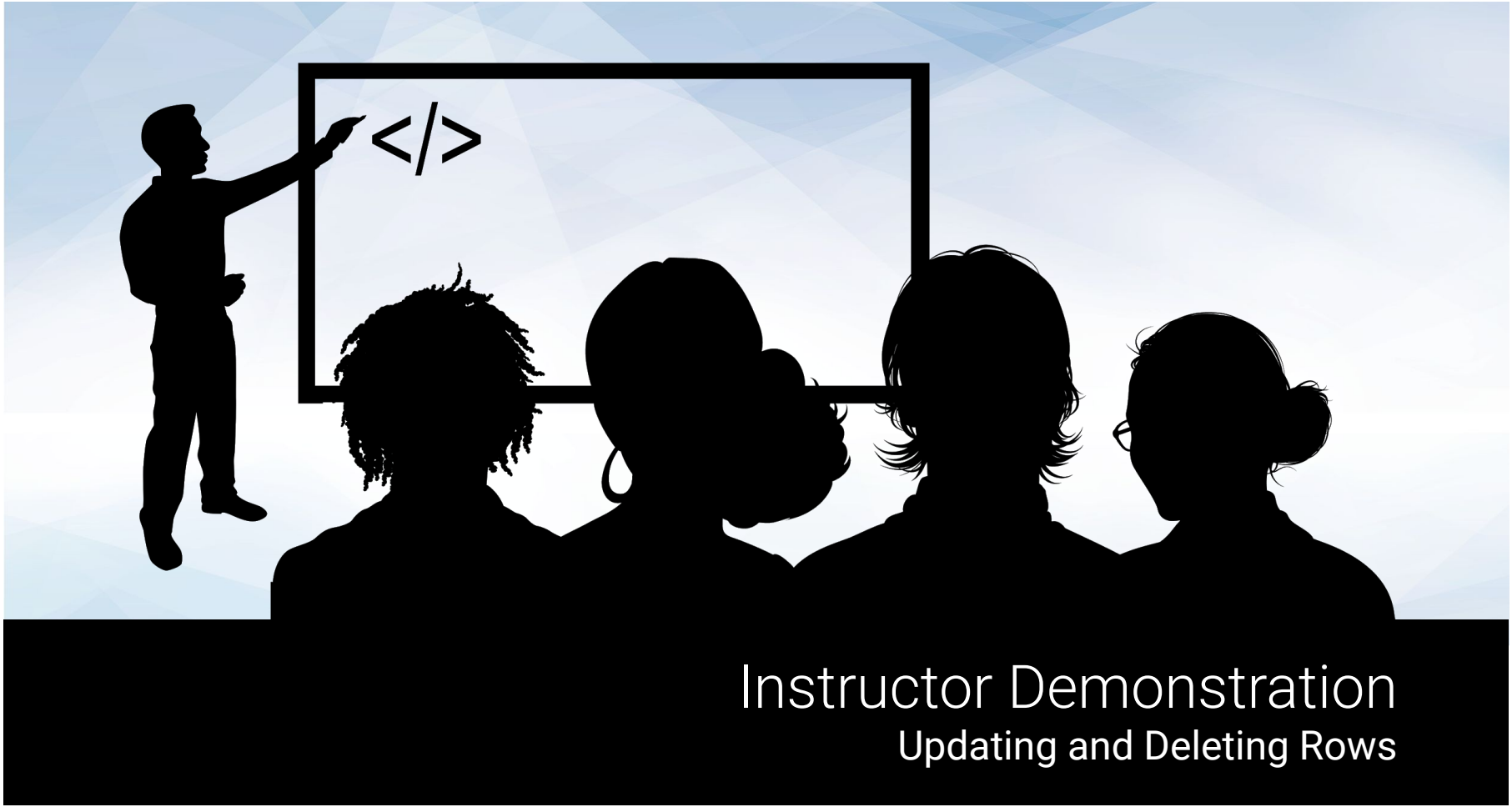
(Instructions sent via Slack.)

Suggested Time:
20 Minutes

Sharks Search Instructions

- Within a Python script, create a Sharks class that will be able to read all of the columns in from the table you created
- Using SQLAlchemy, perform the following queries…
  - Print all locations of shark attacks
  - Find the number of provoked attacks
  - Find the number of attacks in the USA
  - Find the number of attacks in 2017
  - Find the number of attacks while surfing
  - Find the number of fatal shark attacks in 2017 in Australia

Time’s Up! Let’s Review.

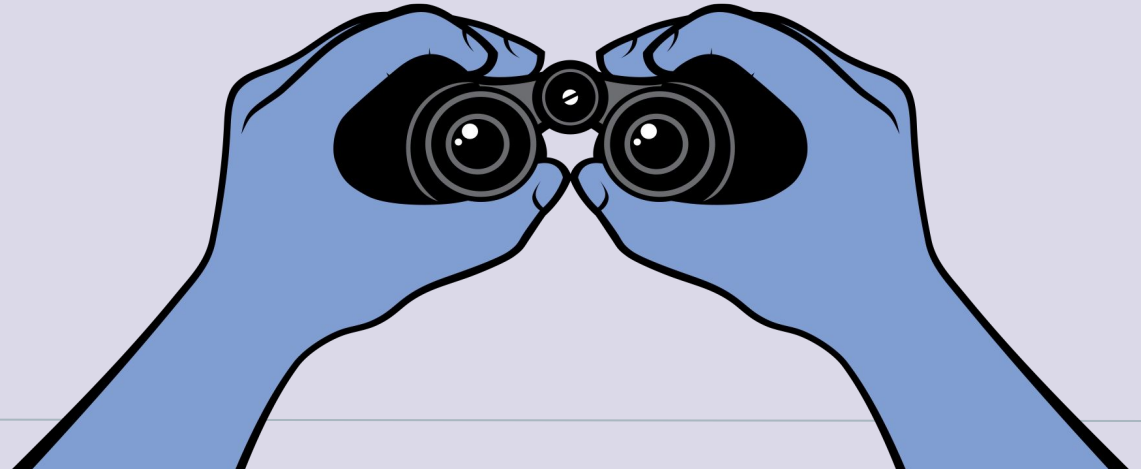


Instructor Demonstration

Updating and Deleting Rows

We have only looked at one-half of CRUD!

Create **R**ead **U**pdate **D**elete



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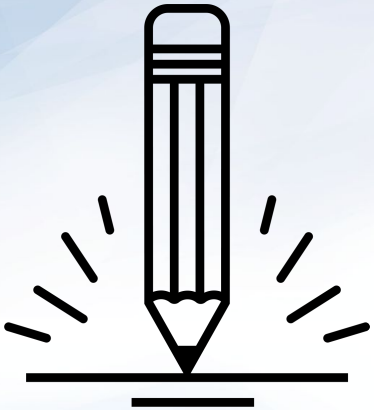


Activity: What a Cruddy Database

In this activity, **you and a partner** will create a new SQLite database for a garbage collection company.

(Instructions sent via Slack.)

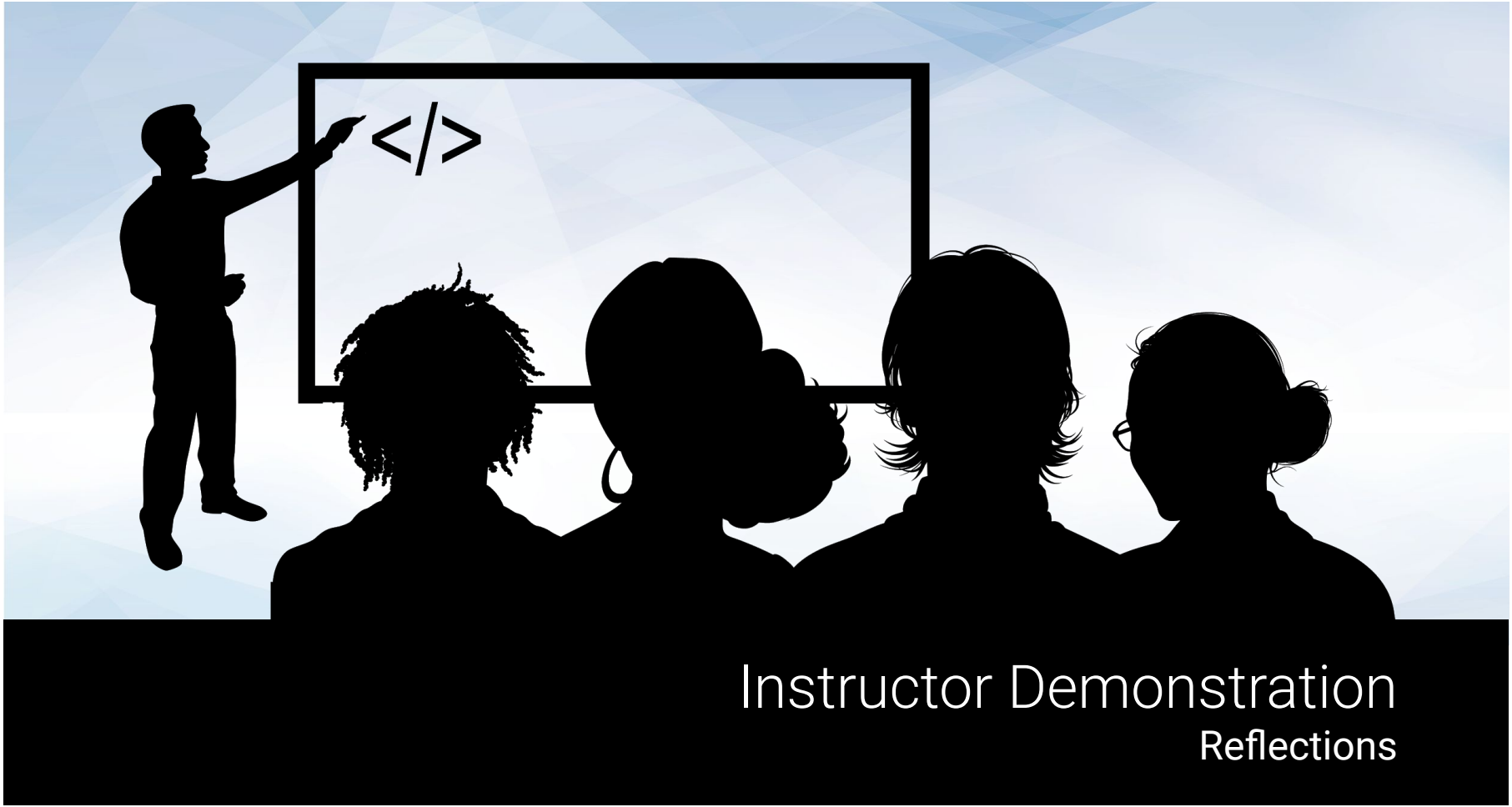
Suggested Time:
20 Minutes

What a Cruddy Database Instructions

- Within the unsolved Python file, create new SQLAlchemy class called Garbage that holds the values outlined in the Readme.md
- Create a connection and a session before adding a few items into the SQLite database crafted.
- Update the values within at least two of the rows added to the table.
- Delete the row with the lowest weight from the table.
- Print out all of the data within the database.

Time’s Up! Let’s Review.

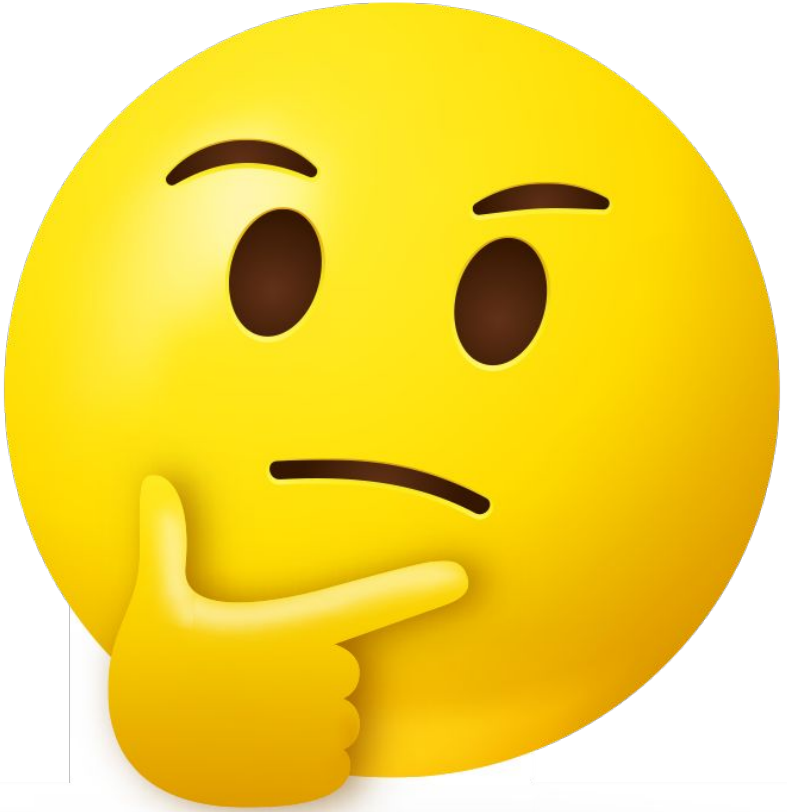
Break



Instructor Demonstration

Reflections

But how can we analyze databases that already exist?



SQLAlchemy provides tools for creating **ORM classes** for an existing database!

Looking at our Reflection

```
# Python SQL toolkit and Object Relational Mapper
import sqlalchemy
from sqlalchemy.ext.automap import automap_base
from sqlalchemy.orm import Session
from sqlalchemy import create_engine
```

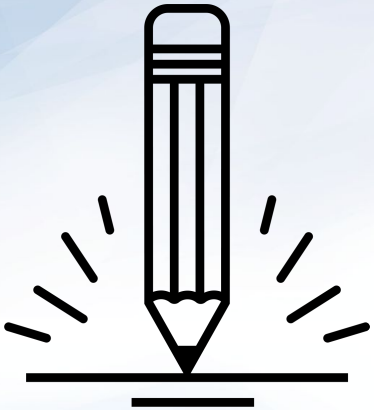
```
# Create engine using the `demographics.sqlite` database file
engine = create_engine("sqlite:///../Resources/dow.sqlite")
```

```
# Declare a Base using `automap_base()`
Base = automap_base()
```

```
# Use the Base class to reflect the database tables
Base.prepare(engine, reflect=True)
```

```
# Print all of the classes mapped to the Base
Base.classes.keys()
```

<Time to Code>



Activity: Reflecting on SQL

In this activity, you will practice your ability to reflect existing databases using SQLAlchemy and a SQLite table focused upon demographic data.

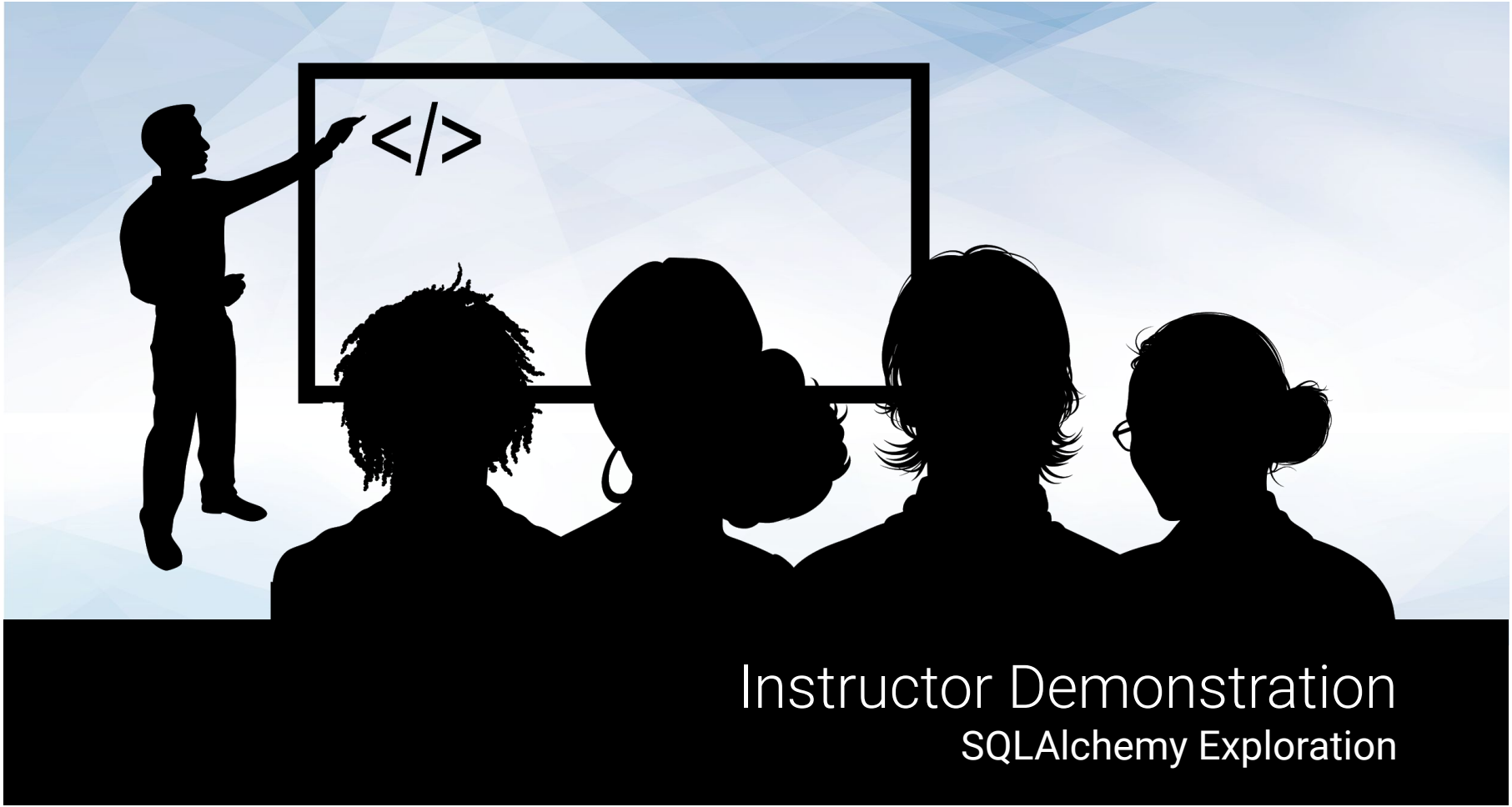
(Instructions sent via Slack.)

Suggested Time:
15 Minutes

Reflecting on SQL Instructions

- Create engine using the demographics.sqlite database file
- Declare a Base using automap_base() and use this new Base class to reflect the database's tables
- Assign the demographics table/class to a variable called Demographics
- Create a session and use this session to query the Demographics table and display the first five locations

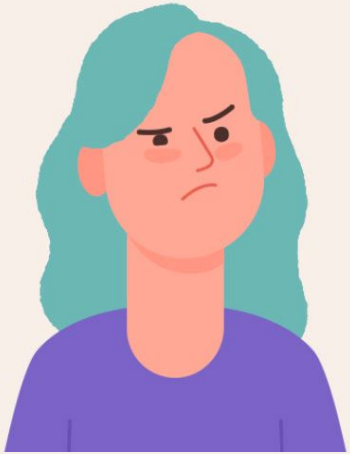
Time’s Up! Let’s Review.



Instructor Demonstration

SQLAlchemy Exploration

Reflecting on Reflections



- Reflecting using SQLAlchemy does not provide users with information on what is being stored
- The creators of SQLAlchemy understood this
  - They also created an inspector tool
- Inspector is used to look up tables, columns and datatypes.

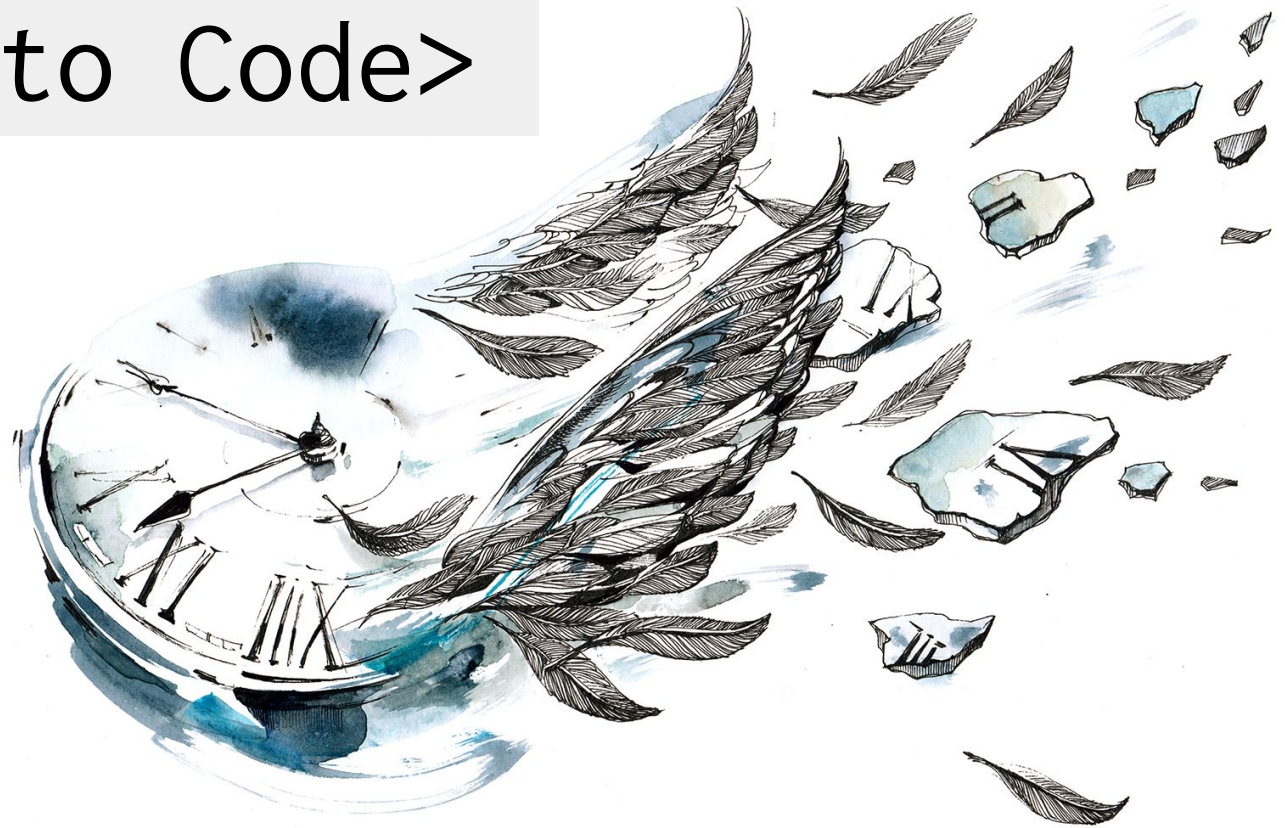
```
import sqlalchemy
from sqlalchemy.ext.automap import automap_base
from sqlalchemy.orm import Session
from sqlalchemy import create_engine, inspect
```

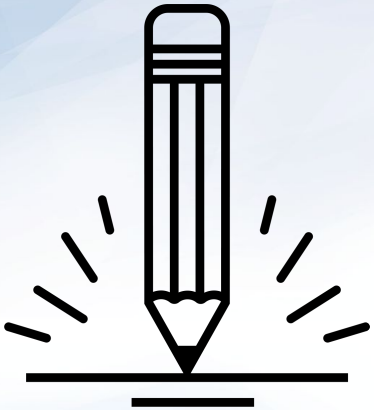
```
# Create the connection engine
engine = create_engine("sqlite:///../Resources/database.sqlite")
```

```
# Create the inspector and connect it to the engine
inspector = inspect(engine)
```

```
# Collect the names of tables within the database
inspector.get_table_names()
```

<Time to Code>





Activity: Salary Exploration

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

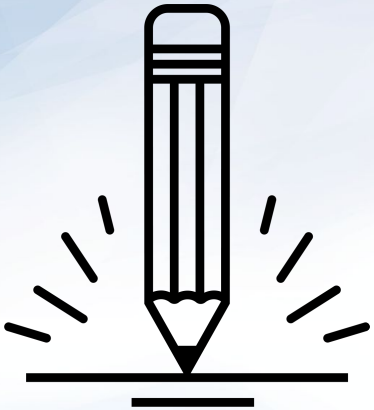
(Instructions sent via Slack.)

Suggested Time:
15 Minutes

Salary Exploration Instructions

- Using the attached SQLite file, use an inspector to collect the following information...
- The names of all of the tables within the database.
- The column names and data types for the Salaries table.

Time’s Up! Let’s Review.



Activity: Emoji Plotting

In this activity, you will will join forces to create a plot based upon the data stored within a SQLite database.

(Instructions sent via Slack.)

Suggested Time:
15 Minutes

Emoji Plotting Instructions

- Use the inspector to explore the database and print out the table names stored within it.
- Using the inspector, print out the column names and types for each of the tables contained within the SQLite file.
- Reflect the database into a SQLAlchemy class and start a session that can be used to query the database.
- Using Matplotlib, create a horizontal bar chart and plot the emoji score in descending order. Use emoji_char as the y-axis labels and plot only the top 10 emojis ranked by score
- Create the same kind of chart using Pandas to plot the data instead of Matplotlib.

Time’s Up! Let’s Review.