



# Introduction to SQLAlchemy

Data Boot Camp



# Class Objectives

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



Connect to a SQL database with SQLAlchemy.



Perform a SQL query with SQLAlchemy.



Create Python classes and objects.



Use a Python class to model a SQL table.



## Activity: Looking Into SQLAlchemy

In this activity you will break into groups of two or three and research a few questions...

(Instructions sent via Slack.)

**Suggested Time:**  
3 Minutes



# Looking Into SQLAlchemy Instructions

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- Within your group, take a few minutes to research the answers to the following:
  - What is an ORM?
  - What are some of the benefits to using an ORM?
  - What are some of the disadvantages of using an ORM?





**Time's Up!** Let's Review.



# Instructor Demonstration

## Introduction to SQLAlchemy

**SQLAlchemy is a Python library that works across a variety of SQL dialects.**



**Write the query once,  
run it anywhere!**

# SQLAlchemy ORM Is Flexible

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It's possible to query a database using more SQL...

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

...or more Python!

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



# Looking at SQLAlchemy Documentation

Let's take a moment to look at the SQLAlchemy documentation!





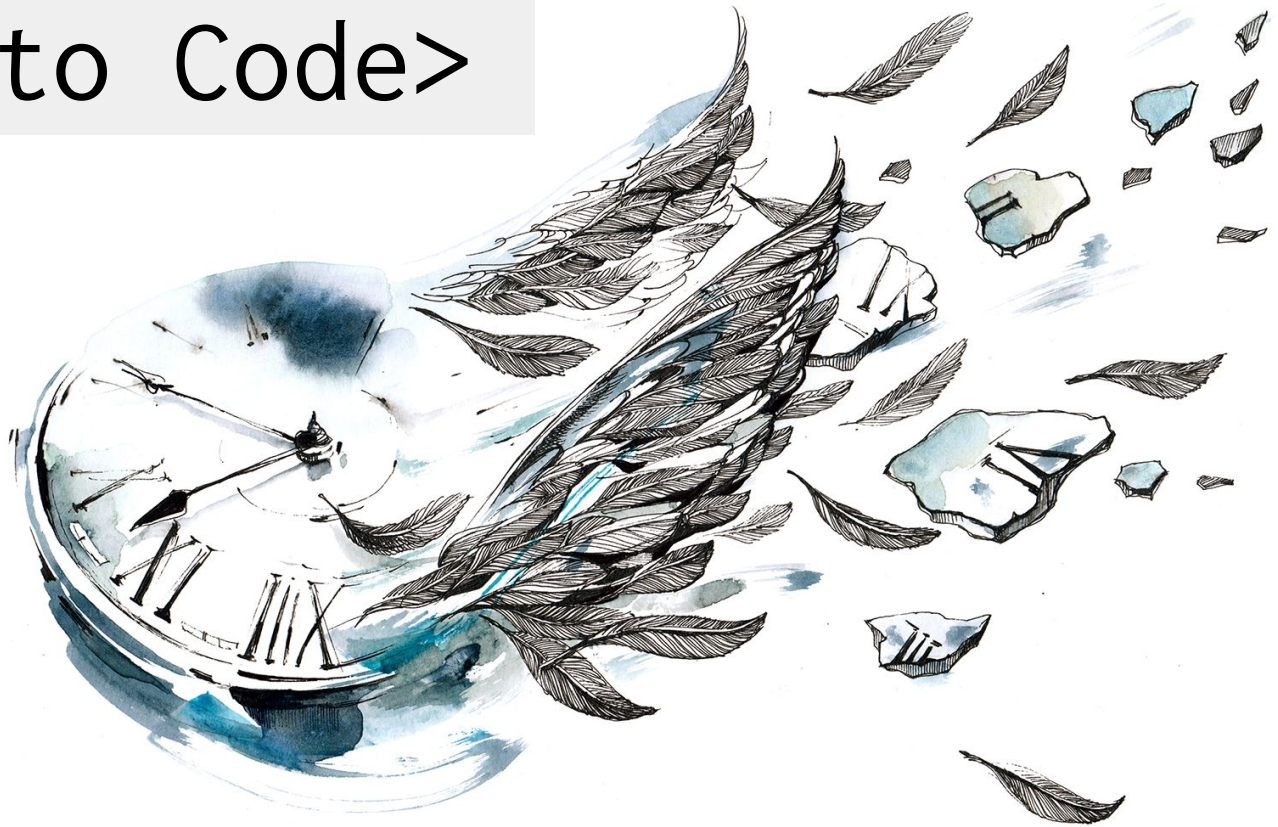
# Instructor Demonstration

## Building a SQLAlchemy Connection

Today we will only be working with one SQL dialect - **SQLite!**



# <Time to Code>





## Activity: Ice Cream Connection

In this activity, you will create, connect and insert data into a new database using SQLAlchemy.

(Instructions sent via Slack.)

**Suggested Time:**  
15 Minutes



# Ice Cream Connection Instructions

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- Use the database path to create a sqlite engine
- Use the engine to select all of the rows and columns from the table `icecreamstore.csv`
- Create a new query that finds the ice cream flavors that cost \$1.25 or greater





**Time's Up!** Let's Review.



# Instructor Demonstration

## SQLAlchemy and Pandas



One of the most  
impressive aspects  
of **SQLAlchemy...**



...is how  
it integrates  
with **Pandas!**

# Pandas integrates with SQLAlchemy

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- Once we connect to our SQL database using SQLAlchemy
- We can query directly using pandas

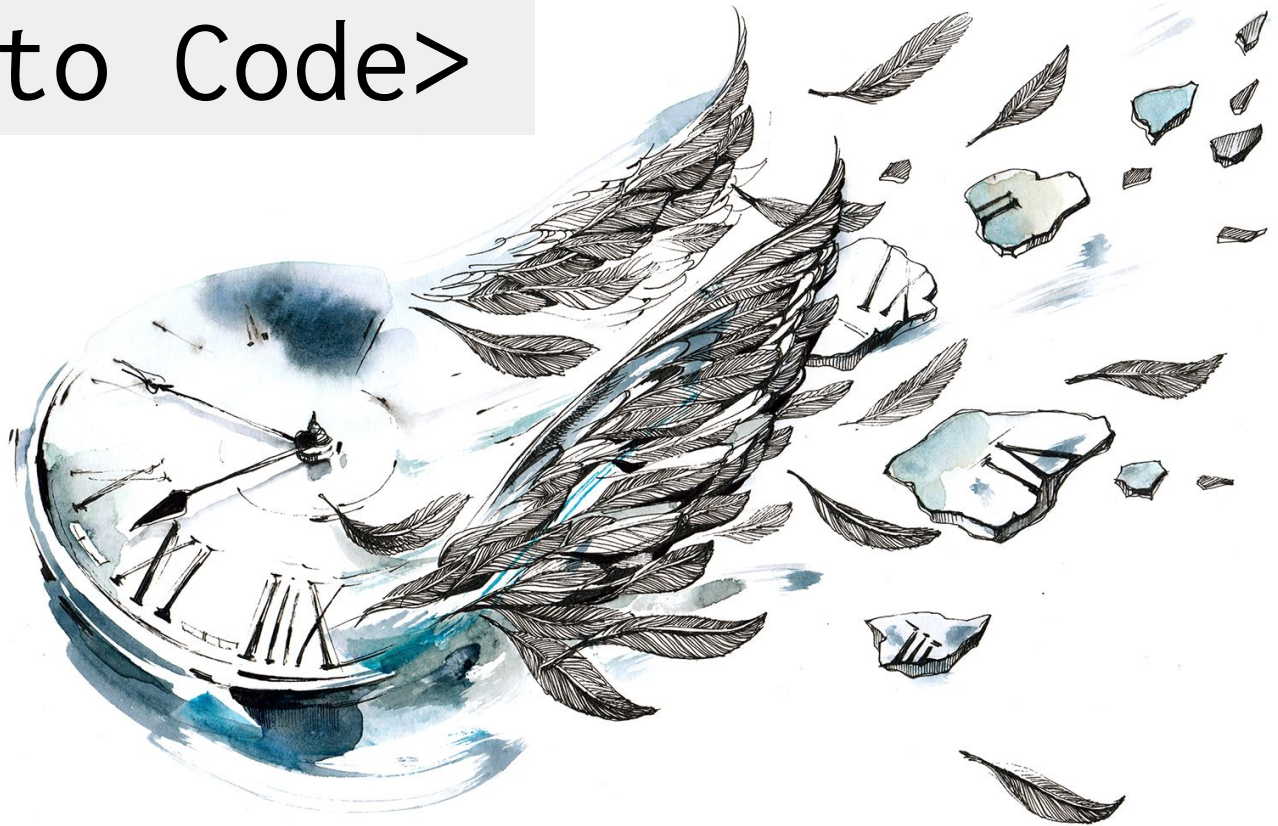
```
# Create Engine
```

```
engine = create_engine(f"sqlite:///{database_path}")  
conn = engine.connect()
```

```
# Query All Records in the the Database
```

```
data = pd.read_sql("SELECT * FROM Census_Data", conn)
```

# <Time to Code>





## Activity: Read All the SQL

In this activity, you query an external server using Pandas and SQLAlchemy to create new dataframes based on US census data.

(Instructions sent via Slack.)

**Suggested Time:**  
10 Minutes



# Read All the SQL Instructions

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- Create an engine to connect to the census database.
- Query all the data from the Census\_Data table and load into pandas.
- Create an engine to connect to the zip database.
- Query all the data from the Zip\_Census table and load in pandas.
- Show the .head() of your newly imported data.





**Time's Up!** Let's Review.



# Instructor Demonstration

## Preview SQLAlchemy with Classes

# SQLAlchemy with Classes

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- SQLAlchemy is not just for making SQL queries in Python
  - It can also **update** a SQL database using Python classes
- Python classes are traditionally used to bundle data and functions together
  - In SQLAlchemy they are used to define structures

```
# Create Dog and Cat Classes
# -----
class Dog(Base):
    __tablename__ = 'dog'
    id = Column(Integer, primary_key=True)
    name = Column(String(255))
    color = Column(String(255))
    age = Column(Integer)

class Cat(Base):
    __tablename__ = 'cat'
    id = Column(Integer, primary_key=True)
    name = Column(String(255))
    color = Column(String(255))
    age = Column(Integer)
```



# <Time to Code>





Countdown timer

**15:00**

(with alarm)



# Instructor Demonstration

## A Schooling on Classes

# Time For a Crash Course in Programming!

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- Object oriented programming
  - Style of coding based around “objects”
- Objects may contain:
  - Attributes (data)
  - Methods (functions)
- Python is an object oriented programming language
  - Classes are used to interact and create objects
  - Makes code more reproducible/ adaptable



# <Time to Code>





## Activity: Surfer Class

In this activity, you will work on creating your own classes in Python.

(Instructions sent via Slack.)

**Suggested Time:**  
15 Minutes



# Surfer Class Instructions

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- Create a class Surfer and initialize it with name, hometown, and rank instance variables.
- Create an instance of a surfer.
- Then print the name, hometown and rank of your surfer object.

## **Bonus:**

- Create a while loop that will allow you to continuously create new instances of surfers using input().
- Keep the loop going until the user specifies otherwise.







**Time's Up!** Let's Review.





# Instructor Demonstration

## A Method to the Classes

# Adding Methods to Python Classes is Easy as 1, 2, 3!

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1. Define the function using `def`
2. Provide a name and list of parameters
3. Use `class.method()` to run the method in your script!

```
# Define the Expert class
class Expert():

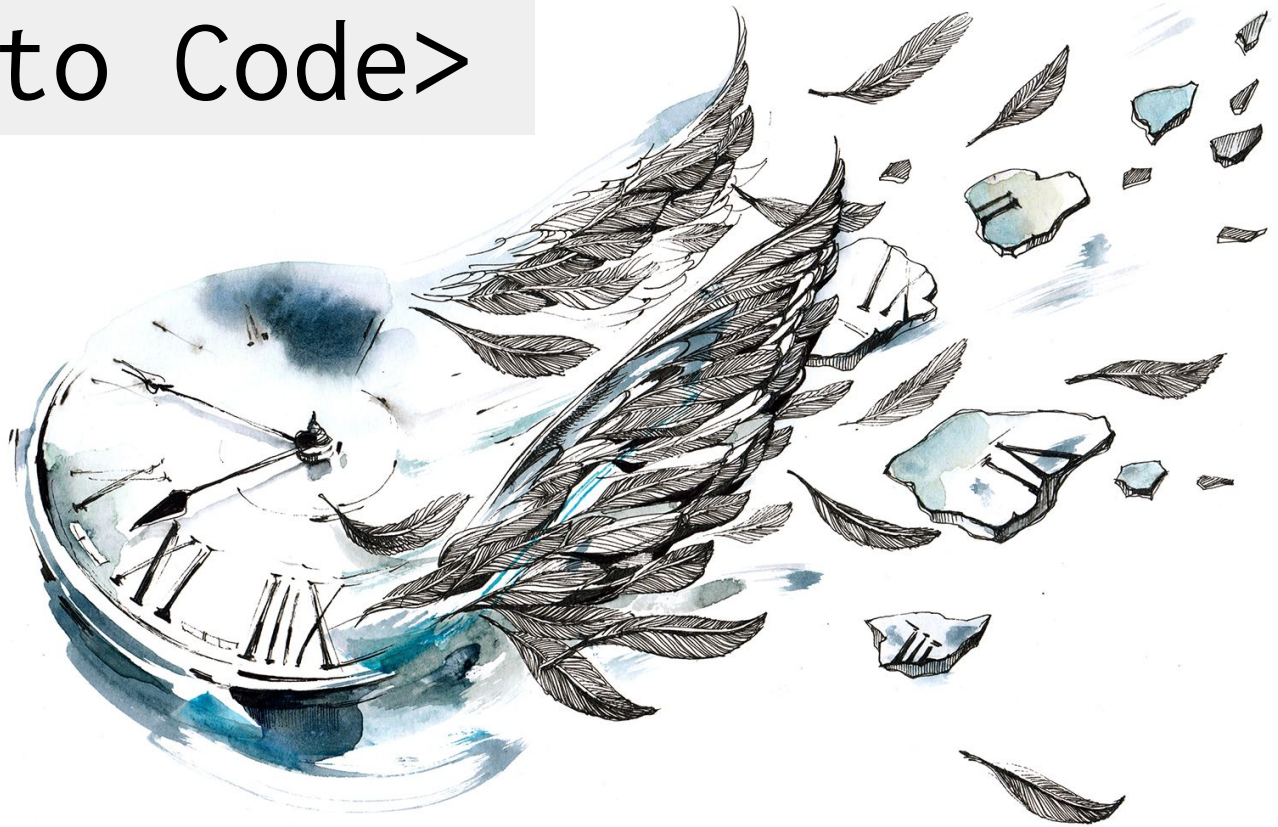
    # A required function to initialize the class object
    def __init__(self, name):
        self.name = name

    # A method that takes another object as its argument
    def boast(self, obj):

        # Print out Expert object's name
        print("Hi. My name is", self.name)

        # Print out the name of the Film class object
        print("I know a lot about", obj.name)
        print("It is", obj.length, "minutes long")
        print("It was released in", obj.release_year)
        print("It is in", obj.language)
```

# <Time to Code>





## Activity: Surfer Class Extended

In this activity, you will be reworking your Surfer script from earlier as you add in methods to perform specific tasks.

(Instructions sent via Slack.)

**Suggested Time:**  
10 Minutes



# Surfer Class Extended Instructions

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- Create a Surfer class that has name, hometown, rank, and wipeouts instance variables.
- Create a method called speak that prints "Hangs loose, bruh!"
- Create a method called biography that prints the surfer's name and hometown.
- Create a method called cheer that will print "I totally rock man, no wipeouts!" if the surfer has no wipeouts. Otherwise, it prints 'Bummer bruh, keep on keeping on!'.
- Create two surfers that print out all their info and run all the methods.





**Time's Up!** Let's Review.



## Everyone Do: Back to the SQL

In this activity, we will bring all of our SQLAlchemy concepts together and remake the pets database using classes.

(Instructions sent via Slack.)

**Suggested Time:**  
20 Minutes



# <Time to Code>







## Activity: Surfing SQL

In this final activity, you will test your SQLAlchemy skills and update your Surfer database.

(Instructions sent via Slack.)

**Suggested Time:**  
20 Minutes



# Surfing SQL Instructions

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- Modify the Surfer class created during the previous activity so that it will function with SQLAlchemy.
- Create a new class called Board which will function with SQLAlchemy and has the following parameters...
- Pull a list of all of the surfers and surfboards already inside the database
- Push a new surfer and surfboard to the tables on the database





**Time's Up!** Let's Review.