Retrieval

In this lesson, we will discover how to retrieve objects from the database using the "query" object of the model class.

WE'LL COVER THE FOLLOWING

In the previous lesson, we inserted elements in the database by creating objects of the **models**. In this lesson, we will retrieve these objects from the database using the `SQLAlchemy` **ORM**.

Common methods of retrieval in the `query` object

The `query` object is a member variable of the `Model` class. This object provides us with a method to execute the `SELECT` statement of `SQL`. We can find details on all the methods that can be used on this object in the SQLAlchemy docs.

`query.all()`

This method will retrieve all entries of the Model class on which it is called. A

demonstration is given below.

```
from flask import Flask, render_template
from flask_sqlalchemy import SQLAlchemy

app = Flask(__name__)
app.config['SQLALCHEMY_DATABASE_URI'] = 'sqlite:///example.db'
app.config['SQLALCHEMY_TRACK_MODIFICATIONS'] = False
db = SQLAlchemy(app)

class User(db.Model):
    email = db.Column(db.String, primary_key=True, unique=True, nullable=False)
    password = db.Column(db.String, nullable=False)

db.create_all()
archie = User(email = "archie.andrews@email.com", password = "football4life")
veronica = User(email = "veronica.lodge@email.com", password = "fashiondiva")
db.session.add(archie)
db.session.add(veronica)

try:
    db.session.commit()
except Exception as e:
    db.session.rollback()

print(User.query.all())
```

Retrieval Using "query.all()"

Explanation

- In **lines 14 - 22**, we have performed the steps for insertion in the database (as explained in the previous lesson).
- Then, in **line 24**, we have called the `query.all()` function on the `User` model class.
- We can observe that **all** the objects we inserted have been retrieved and printed on the console.

> **Note:** the `print()` function shows the following output:
>
> ```
> [<User archie.andrews@email.com>, <User veronica.lodge@email.com>]
> ```
>
> This output shows a list of `User` objects. The `email` is also shown because it is the `primary_key` column of the `User` model.

`query.first()`

This method will retrieve the first record of the Model class on which it is called. A demonstration is given below.

```
from flask import Flask, render_template
from flask_sqlalchemy import SQLAlchemy

app = Flask(__name__)
app.config['SQLALCHEMY_DATABASE_URI'] = 'sqlite:///example.db'
app.config['SQLALCHEMY_TRACK_MODIFICATIONS'] = False
db = SQLAlchemy(app)

class User(db.Model):
    email = db.Column(db.String, primary_key=True, unique=True, nullable=False)
    password = db.Column(db.String, nullable=False)

db.create_all()
archie = User(email = "archie.andrews@email.com", password = "football4life")
veronica = User(email = "veronica.lodge@email.com", password = "fashiondiva")
db.session.add(archie)
db.session.add(veronica)

try:
    db.session.commit()
except Exception as e:
    db.session.rollback()

print(User.query.first())
```

Retrieval Using "query.first()"

Explanation

- In the program given above, in **line 24**, we have called the `query.first()` method and printed the output.
- We can observe that the *first* record that we added, in **line 16**, is printed when the function is called.

> 🖉 **Do it yourself:** *reverse* the order of **insertion** for the objects and observe the new output!
> (*Hint: change the order of lines 16 and 17*)

`query.get()`

This method takes one argument: **the value of the `primary_key` column**. The record corresponding to this value will be retrieved from the database. A demonstration is given below:

```
from flask import Flask, render_template
from flask_sqlalchemy import SQLAlchemy

app = Flask(__name__)
app.config['SQLALCHEMY_DATABASE_URI'] = 'sqlite:///example.db'
app.config['SQLALCHEMY_TRACK_MODIFICATIONS'] = False
db = SQLAlchemy(app)

class User(db.Model):
    email = db.Column(db.String, primary_key=True, unique=True, nullable=False)
    password = db.Column(db.String, nullable=False)

db.create_all()
db.session.add(User(email = "archie.andrews@email.com", password = "football4life"))
db.session.add(User(email = "veronica.lodge@email.com", password = "fashiondiva"))

try:
    db.session.commit()
except Excetion as e:
    db.session.rollback()

user = User.query.get("veronica.lodge@email.com")
print(user)
print(user.email)
print(user.password)
```

Retrieval Using "query.get()"

Explanation

In **line 22**, the `query.get()` method is called on the `User` model with a parameter. In the `User` model, the `primary_key` column is the `email`. Therefore, the `get()` method looks for an `email` corresponding to the parameter value and fetches the corresponding record. It returns a `NoneType` object if that `email` does not exist.

> **Do it yourself:** call the `query.get()` method on `email` value that does not exist in the database and observe the output!

`query.filter_by()`

The `filter_by()` method is somewhat similar to the `get()` method. They are

The `filter_by()` method is somewhat similar to the `get()` method. They are similar in that `filter_by()` also has the value of columns as parameters. This method is more useful as it can take the value of **multiple** columns as keyword arguments, i.e. the name of these arguments has to be provided. Another difference is that it does not return records. Instead, it returns a `BaseQuery` object.

This object represents the `SQL` query to be executed. Then, we can call `first()` or `all()` on this query to obtain the result(s). A demonstration of this is given below.

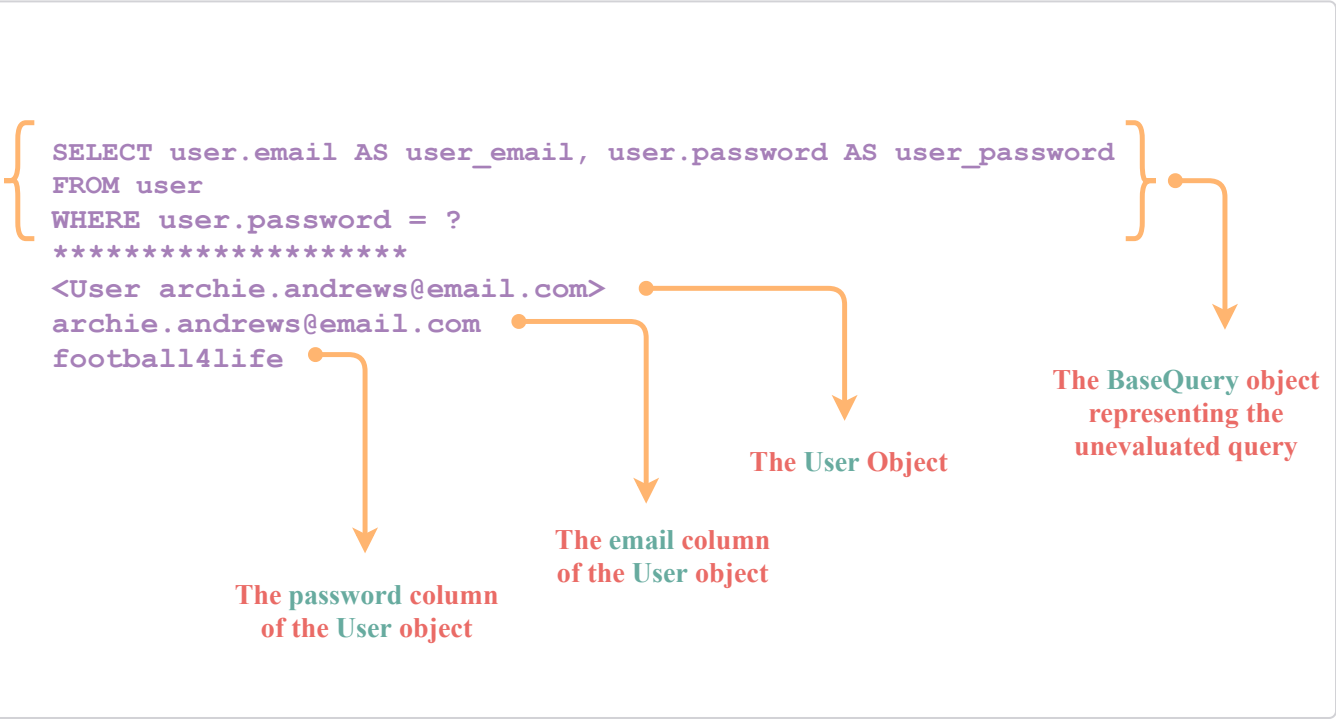
```
from flask import Flask, render_template
from flask_sqlalchemy import SQLAlchemy

app = Flask(__name__)
app.config['SQLALCHEMY_DATABASE_URI'] = 'sqlite:///example.db'
app.config['SQLALCHEMY_TRACK_MODIFICATIONS'] = False
db = SQLAlchemy(app)

class User(db.Model):
    email = db.Column(db.String, primary_key=True, unique=True, nullable=False)
    password = db.Column(db.String, nullable=False)

db.create_all()
db.session.add(User(email = "archie.andrews@email.com", password = "football4life"))
db.session.add(User(email = "veronica.lodge@email.com", password = "fashiondiva"))

try:
    db.session.commit()
except Exception as e:
    db.session.rollback()

user = User.query.filter_by(password = "football4life")
print(user) #Base Query Object
print('*'*20)

## Add first() Method to Retrieve the First Result from Query
user = User.query.filter_by(password = "football4life").first()
print(user)
print(user.email)
print(user.password)
```

Retrieval Using "query.filter_by()"

Explanation

- In **line 22**, the function `filter_by()` is called and the `password` is given as a keyword argument.

- The result of this function is then printed in **line 23**. We can see that it is an `SQL` query having a `WHERE` clause with respect to `user.password`.
- We then call this function at **line 27** again but this time chain the `first()` method at the end.
- The output of this is an object of the `User` model which is the first record satisfying the query conditions. We can observe the printed output in **lines 28 - 30**.



`query.filter()`

The `filter()` and `filter_by()` methods are quite similar and often get confused with one another. However, the `filter()` method takes expressions as parameters. This method takes expressions as parameters. Moreover, these expressions can be applied to the columns of the model or else `ColumnOperators` can also be used. Some of the most commonly used `ColumnOperators` are:

- `contains()`
- `endswith()`
- `startswith()`
- `like()`

Please refer to the `ColumnOperators` documentation for the complete list.

> 📌 **Note:**

1. The `filter()` function does not take keyword arguments. Therefore, the following code will give an error because it should be `User.email` instead of `email`.

```
User.query.filter(email == "veronica.lodge@email.com")
```

2. The correct use of this example is given below:

```
User.query.filter(User.email == "veronica.lodge@email.com")
```

3. As shown in the snippet above, the arguments of the `filter()` function use `==` instead of `=` because it takes **expressions** as parameters.
4. The `filter()` function also returns a `BaseQuery` object, not a record. Therefore, `first()` or `all()` is chained after the query to obtain (a) `User` object(s).

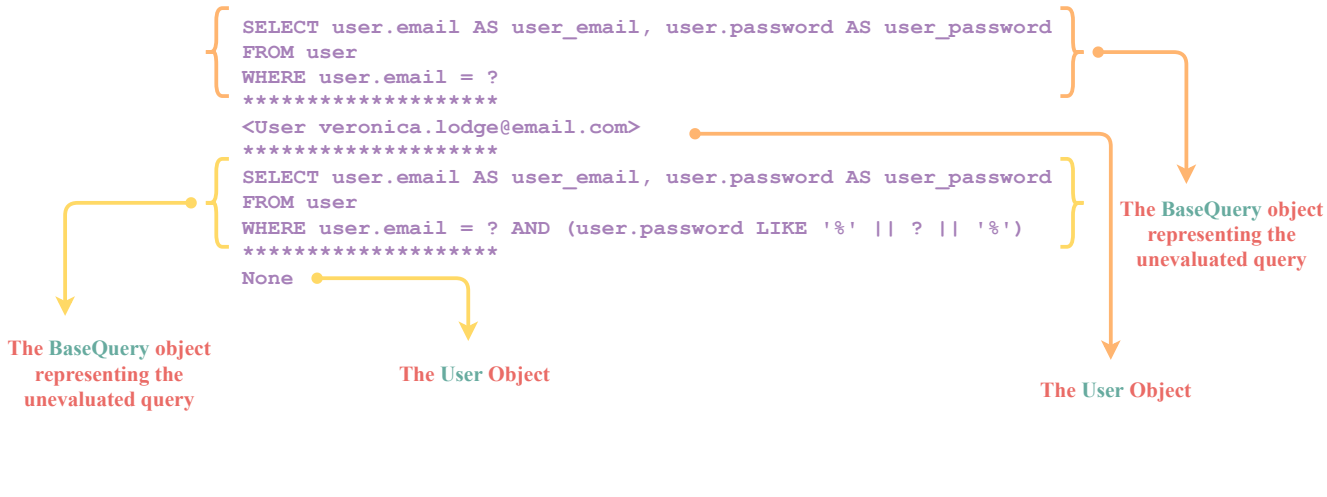
```
from flask import Flask, render_template
from flask_sqlalchemy import SQLAlchemy

app = Flask(__name__)
app.config['SQLALCHEMY_DATABASE_URI'] = 'sqlite:///example.db'
app.config['SQLALCHEMY_TRACK_MODIFICATIONS'] = False
db = SQLAlchemy(app)

class User(db.Model):
    email = db.Column(db.String, primary_key=True, unique=True, nullable=False)
    password = db.Column(db.String, nullable=False)

db.create_all()
db.session.add(User(email = "archie.andrews@email.com", password = "football4life"))
db.session.add(User(email = "veronica.lodge@email.com", password = "fashiondiva"))

try:
    db.session.commit()
except Exception as e:
    db.session.rollback()

user = User.query.filter(User.email == "veronica.lodge@email.com")
print(user) #Base Query Object
print('*'*20)

# Add first() Method to Retrieve the First Result from Query
user = User.query.filter(User.email == "veronica.lodge@email.com").first()
print(user)
print('*'*20)

# A Query with Multiple Expressions
```

```
# A Query with Multiple Expressions
user = User.query.filter(User.email == "archie.andrews@email.com", User.password.contains("ar
print(user)

print('*'*20)
print(user.first())
```

Retrieval Using "query.filter()"

Explanation

1. In **line 22**, we call the `filter()` function comparing the values for `User.email`. Then, we print the `BaseQuery` object returned from **line 23**. Moreover, we can observe from the output that the `SQL` query contains a `WHERE` clause on the `user.email` value as well.
2. We then again call this function in **line 27** but this time chain the `first()` method at the end and observe the output printed in **line 28**.
3. In **line 32**, we have a query with multiple arguments: `User.email` and `User.password`. We can observe the output through the `print` statement in **line 33** that the output from the `SQL` query contains a `WHERE` clause on the `user.email` as well as `user.password`.
4. Notice that we used the `endswith()` method from the `ColumnOperators` class on the `User.password` column.



Quick Quiz!

Q

You are given the following **model** class:

```
class Student(db.Model):
    roll_number = db.Column(db.Integer, primary_key = True, u
nique = True)
    name = db.Column(db.String, nullable = False)
    batch = db.Column(db.String, nullable = False)
```

Which of these queries will return all elements of the `Student` model having the `batch` column equal to `"2015"` and a `name` that ends with `"ah"`.

COMPLETED 0%

1 of 1

In the next lesson, we will learn how to **update** and **delete** data from the database.