23 CRUD App - Flask & MySQL

- Building a simple CRUD (Create, Read, Update, Delete) application with MySQL

Prerequisites

1. **MySQL**: Ensure MySQL is installed and running
2. **Python**: Install Python and pip
3. **Flask**: Install Flask using `pip install Flask`
4. **Flask-MySQLdb**: Install this package using `pip install flask-mysqldb`

Step-by-Step Guide

```
pip install flask flask-mysqldb
```

1. Set Up the MySQL Database

```
CREATE DATABASE CRUD_APP;
USE CRUD_APP;
```

```
CREATE TABLE users (
    id INT AUTO_INCREMENT PRIMARY KEY,
    name VARCHAR(100) NOT NULL,
    email VARCHAR(100) NOT NULL UNIQUE
);
```

```
mysql> use CRUD_APP;
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
mysql> show tables;
+--------------------+
| Tables_in_CRUD_APP |
+--------------------+
| users              |
+--------------------+
1 row in set (0.00 sec)

mysql> desc users;
+-------+--------------+------+-----+---------+----------------+
| Field | Type         | Null | Key | Default | Extra          |
+-------+--------------+------+-----+---------+----------------+
| id    | int          | NO   | PRI | NULL    | auto_increment |
| name  | varchar(100) | NO   |     | NULL    |                |
| email | varchar(100) | NO   | UNI | NULL    |                |
+-------+--------------+------+-----+---------+----------------+
3 rows in set (0.00 sec)
```

2. Create the Flask Application

- Create a new directory for your project and inside that directory, create a file named `app.py`

```
from flask import Flask, request, jsonify, render_template, redirect,
url_for
from flask_mysqldb import MySQL
```

- **Flask**: This is the main package for creating a Flask web application
- **request**: This module is used to handle incoming requests, such as form data from POST requests
- **jsonify**: This function converts Python dictionaries into JSON responses
- **render_template**: This function renders HTML templates
- **redirect**: This function redirects the user to a different route
- **url_for**: This function helps in building a URL to a specific function
- **MySQL**: This is the Flask extension for connecting to a MySQL database using `flask_mysqldb`

```
app = Flask(__name__)
```

- This is the Flask application instance
- It's the central object that tells Flask how to handle requests and what to do with them

```
# MySQL configurations
app.config['MYSQL_HOST'] = 'localhost'
app.config['MYSQL_USER'] = 'root'
app.config['MYSQL_PASSWORD'] = 'mysql'
app.config['MYSQL_DB'] = 'DEMO'
```

- **app.config**: This dictionary stores configuration variables for the Flask app
  - `MYSQL_HOST`: The hostname where your MySQL server is running
  - `MYSQL_USER`: The MySQL user to connect as
  - `MYSQL_PASSWORD`: The password for the MySQL user
  - `MYSQL_DB`: The database name to use

```
mysql = MySQL(app)
```

- **MySQL(app)**: This initializes the MySQL extension with the given Flask app

```
@app.route('/')
def index():
    cur = mysql.connection.cursor()
    cur.execute('SELECT * FROM users')
    users = cur.fetchall()
    cur.close()
    return render_template('index.html', users=users)
```

- @app.route('/')
  - This decorator registers the URL `/` (the root of the site) to the `index` function
- **mysql.connection.cursor()**
  - creates a new cursor to interact with the database
- **cur.execute('SELECT * FROM users')**
  - executes a SQL query to select all records from the `users` table
- **cur.fetchall()**
  - fetches all the results of the executed query
- **cur.close()**: closes the cursor
- **render_template('index.html', users=users)**
  - renders the `index.html` template, passing the retrieved `users` data to it

```
@app.route('/add', methods=['POST'])
def add_user():
    name = request.form['name']
    email = request.form['email']
    cur = mysql.connection.cursor()
    cur.execute('INSERT INTO users (name, email) VALUES (%s, %s)', (name,
email))
```

```
    mysql.connection.commit()
    cur.close()
    return redirect(url_for('index'))
```

- @app.route('/add', methods=['POST'])
  - This decorator registers the URL `/add` to the `add_user` function and specifies it accepts POST requests
- **request.form['name']**: retrieves the `name` field from the submitted form
- **request.form['email']**: retrieves the `email` field from the submitted form
- **cur.execute('INSERT INTO users (name, email) VALUES (%s, %s)', (name, email))**
  - executes an SQL query to insert a new user into the `users` table
- **mysql.connection.commit()**: commits the current transaction
- **redirect(url_for('index'))**
  - redirects the user to the `index` route after adding the user

```
@app.route('/update/<int:id>', methods=['POST'])
def update_user(id):
    name = request.form['name']
    email = request.form['email']
    cur = mysql.connection.cursor()
    cur.execute('UPDATE users SET name = %s, email = %s WHERE id = %s',
(name, email, id))
    mysql.connection.commit()
    cur.close()
    return redirect(url_for('index'))
```

- @app.route('/update/int:id', methods=['POST'])
  - This decorator registers the URL `/update/<int:id>` to the `update_user` function and specifies it accepts POST requests
  - `<int:id>` is a variable part of the URL that captures the user ID
- **cur.execute('UPDATE users SET name = %s, email = %s WHERE id = %s', (name, email, id))**
  - executes an SQL query to update the user with the given `id`
- **mysql.connection.commit()**: commits the current transaction
- **redirect(url_for('index'))**
  - This redirects the user to the `index` route after updating the user

```
@app.route('/delete/<int:id>')
def delete_user(id):
    cur = mysql.connection.cursor()
    cur.execute('DELETE FROM users WHERE id = %s', (id,))
    mysql.connection.commit()
```

```
    cur.close()
    return redirect(url_for('index'))
```

- @app.route('/delete/int:id')
  - This decorator registers the URL `/delete/<int:id>` to the `delete_user` function
  - `<int:id>` is a variable part of the URL that captures the user ID
- **cur.execute('DELETE FROM users WHERE id = %s', (id,))**
  - executes an SQL query to delete the user with the given `id`
- **mysql.connection.commit()**: commits the current transaction
- **redirect(url_for('index'))**
  - This redirects the user to the `index` route after deleting the user

```
if __name__ == '__main__':
    app.run(debug=True)
```

- **if name == 'main'**
  - This ensures the app runs only if the script is executed directly (not imported as a module)
- **app.run(debug=True)**
  - This runs the Flask development server in debug mode, which provides useful error messages and auto-reloads the server on code changes

3. Create HTML Templates

- Create a folder named `templates` in the same directory as `app.py`. Inside this folder, create a file named `index.html`

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Simple CRUD App</title>
</head>
<body>
    <h1>Users</h1>
    <form action="/add" method="POST">
        <input type="text" name="name" placeholder="Name" required>
        <input type="email" name="email" placeholder="Email" required>
        <button type="submit">Add User</button>
    </form>
```

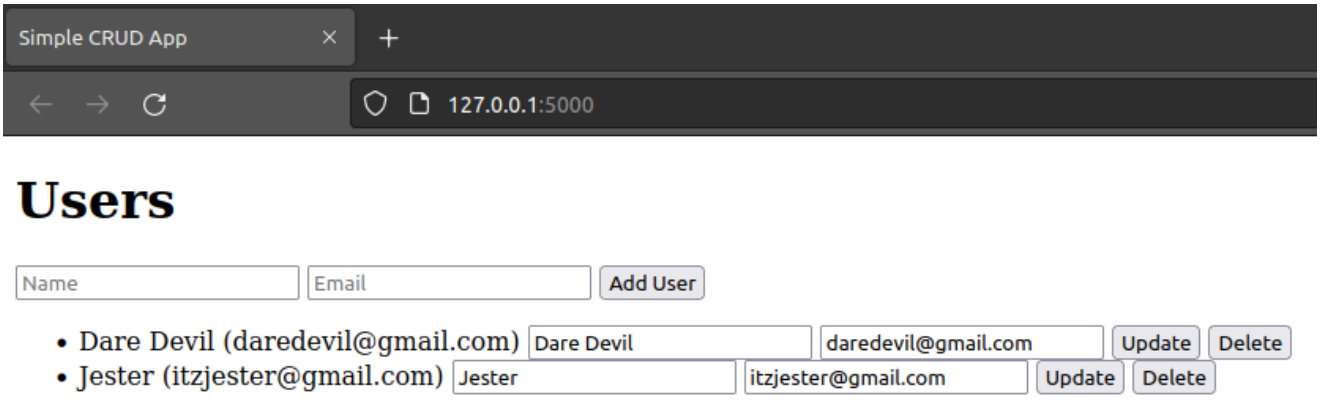
```
    <ul>
        {% for user in users %}
        <li>
            {{ user[1] }} ({{ user[2] }})
            <form action="/update/{{ user[0] }}" method="POST"
style="display:inline;">
                <input type="text" name="name" placeholder="Name" value="
{{ user[1] }}" required>
                <input type="email" name="email" placeholder="Email"
value="{{ user[2] }}" required>
                <button type="submit">Update</button>
            </form>
            <form action="/delete/{{ user[0] }}" method="POST"
style="display:inline;">
                <button type="submit">Delete</button>
            </form>
        </li>
        {% endfor %}
    </ul>
</body>
</html>
```

4. Run the Application

- You should be able to access the application at `http://localhost:5000`

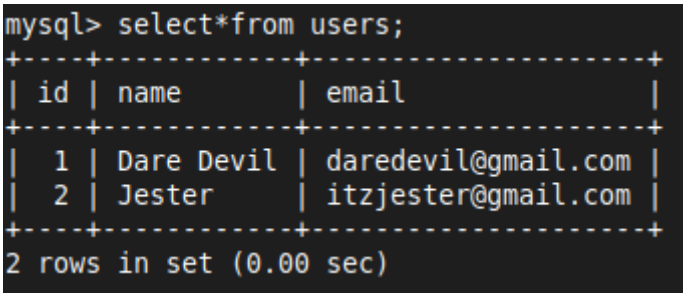
```
python3 app.py
```

```
(.venv) deadpool@daredevil:~/Desktop/DBMS-MySQL-Solutions/08 PROJECT/CRUD APP 1$ python3 app.py
 * Serving Flask app 'app'
 * Debug mode: on
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
 * Running on http://127.0.0.1:5000
Press CTRL+C to quit
 * Restarting with stat
 * Debugger is active!
 * Debugger PIN: 394-872-889
```



5. Verify the Result

```
SELECT*FROM users;
```



```
mysql> select*from users;
+----+------------+---------------------+
| id | name       | email               |
+----+------------+---------------------+
|  1 | Dare Devil | daredevil@gmail.com |
|  2 | Jester     | itzjester@gmail.com |
+----+------------+---------------------+
2 rows in set (0.00 sec)
```