Experiment – 3: Flask

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Aim: To develop a basic Flask application with multiple routes and demonstrate the handling of GET and POST requests.
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Problem Statement:

Design a Flask web application with the following features:

1. A homepage (/) that provides a welcome message and a link to a contact form.
    - Create routes for the homepage (/), contact form (/contact), and thank-you page (/thank_you).
2. A contact page (/contact) where users can fill out a form with their name and email.
3. Handle the form submission using the POST method and display the submitted data on a thank-you page (/thank_you).
    - On the contact page, create a form to accept user details (name and email).
    - Use the POST method to handle form submission and pass data to the thank-you page
4. Demonstrate the use of GET requests by showing a dynamic welcome message on the homepage when the user accesses it with a query parameter, e.g., /welcome?name=<user_name>.
    - On the homepage (/), use a query parameter (name) to display a personalized welcome message.

Theory:

a. **List some of the core features of Flask**

Flask is a lightweight and flexible web framework for Python, designed to be simple yet powerful. Some of its core features include:

1. Lightweight and Minimalistic – Flask provides only the essential tools for web development and lets developers choose additional libraries as needed.

2. Built-in Development Server & Debugger – Comes with a built-in server for testing applications and a debugger to track errors.

3. Jinja2 Templating Engine – Supports Jinja2 for dynamic HTML generation and template inheritance.

4. URL Routing – Allows easy mapping of URLs to specific functions using decorators (@app.route).

5. WSGI Support – Based on Werkzeug, which provides WSGI (Web Server Gateway Interface) support.

6. RESTful Request Handling – Supports GET, POST, PUT, DELETE, and other HTTP methods for building RESTful APIs.

7. Session and Cookie Management – Supports secure cookies for session management.

8. Extension Support – Can be extended using Flask extensions like Flask-SQLAlchemy (database support), Flask-WTF (forms), and Flask-Login (authentication).

b. **Why do we use Flask(__name__) in Flask?**

The Flask(__name__) statement is used to create a Flask application instance. The __name__ argument is important because:

1. Identifies the Application Module – __name__ refers to the name of the current module (file), which helps Flask locate resources such as templates and static files.

2. Helps in Debugging – It allows Flask to understand where the application is running and enables better debugging.
3. Essential for Routing – Since Flask applications rely on decorators like @app.route(), the app instance needs to be created first.
4. Allows Flask to Locate Files – Flask uses the __name__ variable to determine the root path of the application, making it easier to load templates, static files, and configuration settings.

   Example:

```
from flask import Flask

app = Flask(__name__)  # Creates a Flask application

@app.route('/')
def home():
    return "Hello, Flask!"

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

c. What is Template (Template Inheritance) in Flask?

In Flask, templates allow dynamic content rendering using the Jinja2 templating engine. Template Inheritance is a feature where a base template provides a common structure, and child templates extend it while modifying only specific sections.

Why Use Template Inheritance?

- Avoids code duplication by defining a base template for common elements like headers, footers, and navigation bars.
- Child templates only need to modify or add content to specific blocks, keeping the code clean and modular.

Example of Template Inheritance:

Base Template (base.html)

```
<!DOCTYPE html>
<html>
<head>
   <title>{% block title %}Default Title{% endblock %}</title>
</head>
<body>
   <header>My Website Header</header>
   <div>{% block content %}{% endblock %}</div>
   <footer>My Website Footer</footer>
</body>
</html>
Child Template (home.html)
html
CopyEdit
{% extends "base.html" %}

{% block title %}Home Page{% endblock %}

{% block content %}
   <h1>Welcome to My Website</h1>
   <p>This is the homepage.</p>
{% endblock %}
```

Here, home.html extends base.html, inheriting its structure but modifying the title and content blocks.

d. What methods of HTTP are implemented in Flask.

Flask supports multiple HTTP methods to handle different types of requests in web applications. Some of the common methods include:

1. GET – Used to request data from a server. (Default method if not specified)

```
@app.route('/home', methods=['GET'])
def home():
return "Welcome to Flask!"
```

2. POST – Used to send data to the server (e.g., submitting forms).

```
@app.route('/submit', methods=['POST'])
def submit():
return "Form Submitted!"
```

3. PUT – Used to update existing data on the server.
   ```
   @app.route('/update', methods=['PUT'])
   def update():
   return "Data Updated!"
   ```

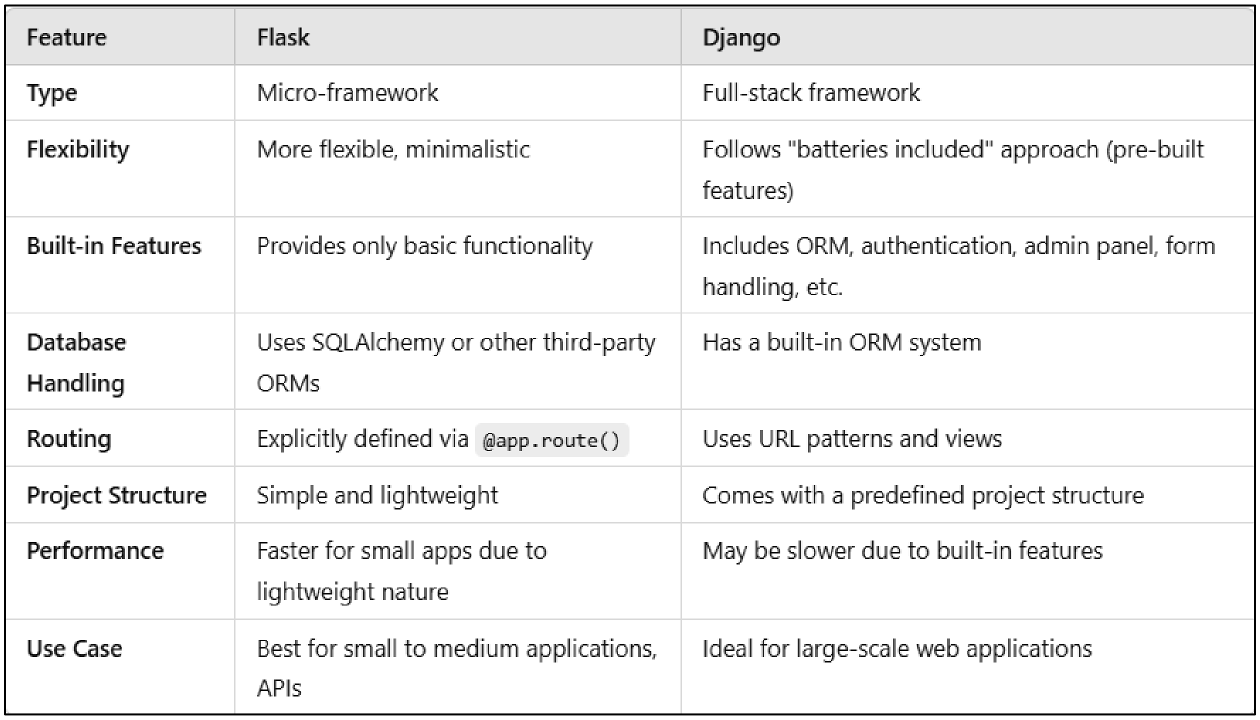
4. DELETE – Used to delete data from the server.
   ```
   @app.route('/delete', methods=['DELETE'])
   def delete():
   return "Data Deleted!"
   ```

5. PATCH – Used to partially update data on the server.

6. HEAD – Similar to GET but only retrieves the headers and not the body.

7. OPTIONS – Used to check the HTTP methods supported by a server.

e. What is difference between Flask and Django framework.



Feature	Flask	Django
Type	Micro-framework	Full-stack framework
Flexibility	More flexible, minimalistic	Follows "batteries included" approach (pre-built features)
Built-in Features	Provides only basic functionality	Includes ORM, authentication, admin panel, form handling, etc.
Database Handling	Uses SQLAlchemy or other third-party ORMs	Has a built-in ORM system
Routing	Explicitly defined via `@app.route()`	Uses URL patterns and views
Project Structure	Simple and lightweight	Comes with a predefined project structure
Performance	Faster for small apps due to lightweight nature	May be slower due to built-in features
Use Case	Best for small to medium applications, APIs	Ideal for large-scale web applications

Output:

- **App.py**

```
from flask import Flask, render_template, request

app = Flask(__name__)

@app.route('/')
def home():
    name = request.args.get('name', 'Guest')  # Get name from query parameter
    return render_template('home.html', name=name)

@app.route('/contact', methods=['GET', 'POST'])
def contact():
    if request.method == 'POST':
        name = request.form['name']
        email = request.form['email']
        return render_template('thank_you.html', name=name, email=email)
    return render_template('contact.html')

@app.route('/thank_you')
def thank_you():
    return "Thank you for submitting the form!"

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

- **home.html**

```
<!DOCTYPE html>
<html lang="en">
<head>
    <title>Home</title>
    <link rel="stylesheet" href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0/dist/css/bootstrap.min.css">
    <style>
        body {
            background: linear-gradient(to right,rgb(0, 0, 0),rgb(3, 57, 54));
            height: 100vh;
            display: flex;
            align-items: center;
            justify-content: center;
        }
        .container {
            background: white;
            padding: 30px;
            border-radius: 15px;
            box-shadow: 0px 0px 20px rgba(0, 0, 0, 0.1);
            text-align: center;
        }
    </style>
</head>
<body>
    <div class="container">
        <h1 class="text-info">Welcome, {{ name }}!</h1>
        <p class="lead">This is the homepage of our beautiful Flask application.</p>
        <a href="/contact" class="btn btn-outline-info">Go to Contact Form</a>
    </div>
</body>
</html>
```

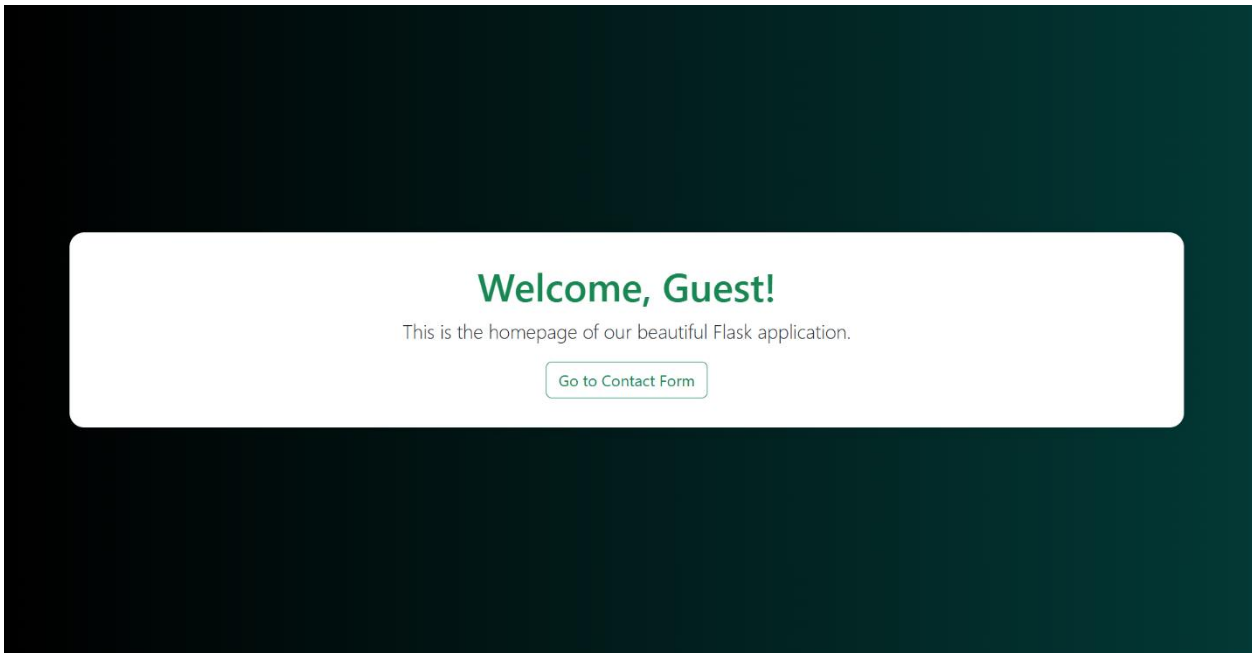
- **contact.html**

```
<!DOCTYPE html>
<html lang="en">
<head>
    <title>Contact</title>
 <link rel="stylesheet"
href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0/dist/css/bootstrap.min.css">
    <style>
        body {
            background: linear-gradient(to right, rgb(0, 0, 0),rgb(3, 57, 54));
            height: 100vh;
            display: flex;
            align-items: center;
            justify-content: center;
        }
        .form-container {
            background: white;
            padding: 40px;
            border-radius: 15px;
            box-shadow: 0px 0px 20px rgba(0, 0, 0, 0.1);
            width: 40%;
        }
    </style>
</head>
<body>
    <div class="form-container">
```

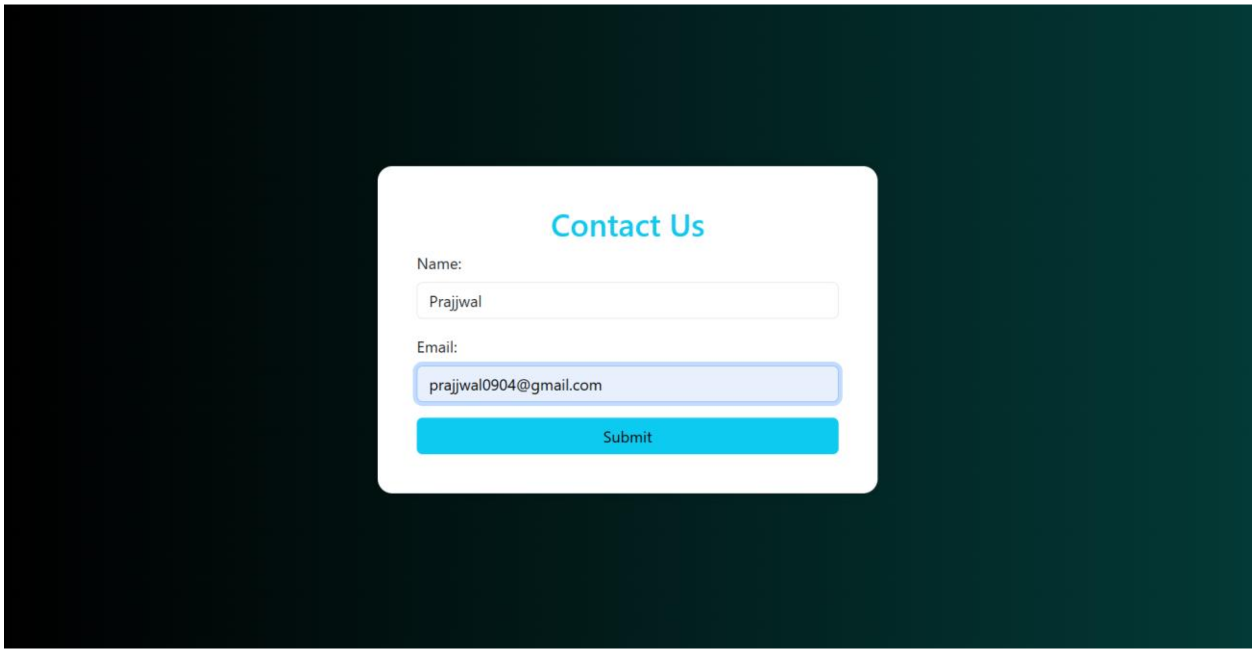
```
          <h2 class="text-center text-info">Contact Us</h2>
          <form method="POST">
              <div class="mb-3">
                  <label class="form-label">Name:</label>
                  <input type="text" name="name" class="form-control" required>
              </div>
              <div class="mb-3">
                  <label class="form-label">Email:</label>
                  <input type="email" name="email" class="form-control" required>
              </div>
              <button type="submit" class="btn btn-info w-100">Submit</button>
          </form>
      </div>
  </body>
  </html>
```

- **thank_you.html**

```
<!DOCTYPE html>
<html lang="en">
<head>
           <title>Thank You</title>
<link rel="stylesheet"
href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0/dist/css/bootstrap.min.css">
    <style>
        body {
            background: linear-gradient(to right,rgb(0, 0, 0),rgb(3, 57, 54));
            height: 100vh;
            display: flex;
            align-items: center;
            justify-content: center;
        }
        .thank-you-box {
            background: white;
            padding: 30px;
            border-radius: 15px;
            box-shadow: 0px 0px 20px rgba(0, 0, 0, 0.1);
            text-align: center;
        }
    </style>
</head>
<body>
    <div class="thank-you-box">
        <h2 class="text-success">Thank You, {{ name }}!</h2>
        <p class="lead">We have received your email: <strong>{{ email
}}</strong></p>
        <a href="/" class="btn btn-outline-success">Go Back Home</a>
    </div>
</body>
</html>
```

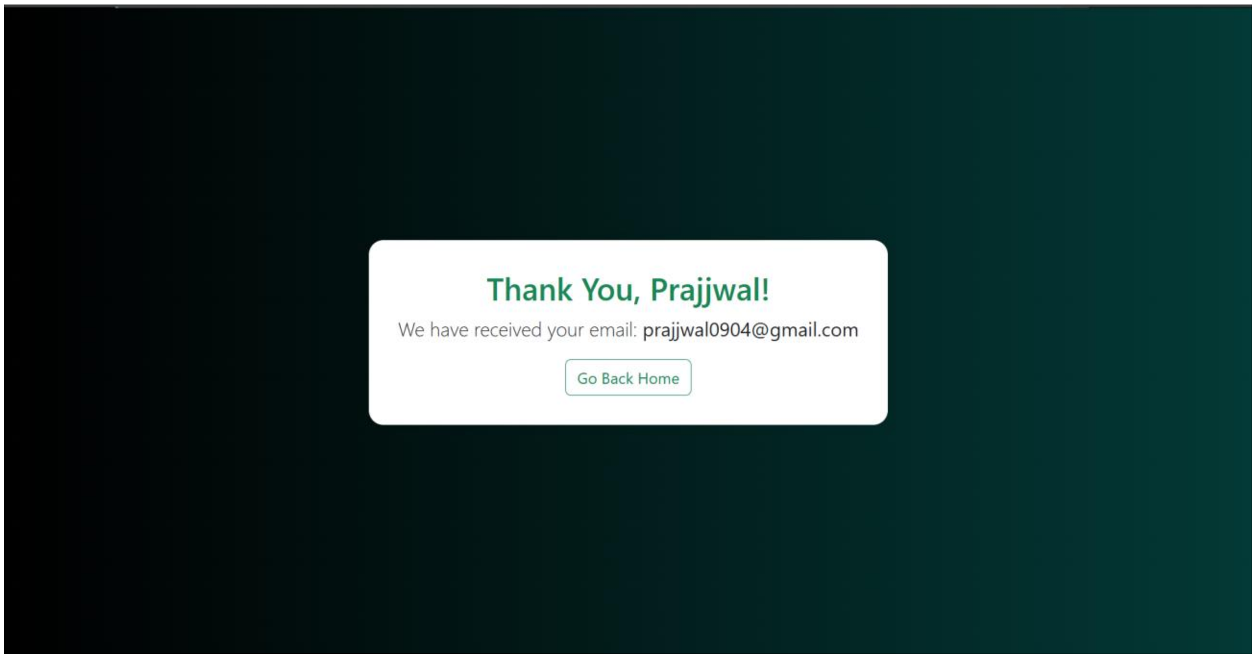

Welcome, Guest!

This is the homepage of our beautiful Flask application.


Contact Us

Name: Prajjwal

Email: prajjwal0904@gmail.com



Thank You, Prajjwal!
We have received your email: prajjwal0904@gmail.com
Go Back Home