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AIM

To create a Flask application that demonstrates template rendering by dynamically generating HTML content using the `render_template()` function.

PROBLEM STATEMENT

Develop a Flask application that includes:

1. A homepage route (`/`) displaying a welcome message with links to additional pages.
2. A dynamic route (`/user/<username>`) that renders an HTML template with a personalized greeting.
3. Use Jinja2 templating features, such as variables and control structures, to enhance the templates.

Theory

1. What does the render_template() function do in a Flask application?

The `render_template()` function in Flask is used to render HTML templates and return them as responses to client requests. Instead of returning plain text or manually writing HTML inside the Python code, Flask allows the use of separate HTML files stored in the `templates` folder.

Usage Example:

python
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```
from flask import Flask, render_template
```

```
app = Flask(__name__)

@app.route('/')
def home():
    return render_template('index.html')
```

Here, `render_template('index.html')` loads the `index.html` file from the `templates` folder and sends it as a response. This helps in separating logic from presentation, making web applications more organized and maintainable.

Additionally, `render_template()` supports passing dynamic data to templates:

python
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```
@app.route('/user/<name>')
def user(name):
    return render_template('user.html', username=name)
```

In `user.html`, we can access `username` using Jinja2 templating:

html
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```
<p>Hello, {{ username }}!</p>
```

---

2. What is the significance of the templates folder in a Flask project?

The `templates` folder holds all the HTML files used for rendering web pages in a Flask application. Flask automatically looks for template files inside this directory, making it a convention that helps in maintaining a well-structured project.

Key Significance:

1. **Separation of Concerns** – Keeps the HTML structure separate from Python logic, improving code readability.

2. **Easy Management** – All templates are stored in one location, simplifying maintenance.

3. **Supports Jinja2** – Enables the use of dynamic content within HTML files through Jinja2 templating.

4. **Enables Code Reusability** – Common UI components, such as headers and footers, can be stored in separate template files and reused across multiple pages using template inheritance.

Project Structure Example:
bash
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```
/my_flask_app
|—— app.py
|—— /templates
|   |—— index.html
|   |—— user.html
|   |—— base.html
|—— /static
|   |—— styles.css
|   |—— script.js
```

Here, `index.html` and `user.html` are stored inside the `templates` folder and can be rendered using `render_template()`.

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3. What is Jinja2, and how does it integrate with Flask?

Jinja2 is a powerful templating engine used in Flask to generate dynamic HTML content. It allows embedding Python-like expressions inside HTML, making web pages more interactive and adaptable based on user input or backend data.

Integration with Flask:

Flask uses Jinja2 by default when rendering templates through `render_template()`. The syntax includes:

- **Variables** – `{{ variable_name }}`
- **Control Structures** – `{% if condition %} ... {% endif %}`
- **Loops** – `{% for item in list %} ... {% endfor %}`

Example Usage:

Python Code (Flask App)

python
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```
@app.route('/greet/<name>')
def greet(name):
    return render_template('greet.html', username=name)
```

Jinja2 Template (`greet.html`)

html
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```
<!DOCTYPE html>
<html>
<head>
    <title>Greeting</title>
</head>
<body>
    <h1>Hello, {{ username }}!</h1>
</body>
</html>
```

Features of Jinja2 in Flask:

1. **Template Inheritance** – Allows reusing base layouts using `{% extends "base.html" %}` and `{% block content %} ... {% endblock %}`.
2. **Filters** – Modify data output (e.g., `{{ name.upper() }}` converts text to uppercase).
3. **Control Structures** – Supports conditionals and loops for dynamic content.

Jinja2 enhances the flexibility of Flask applications by enabling dynamic content generation within HTML templates.

Implementation of the Flask Application

Step 1: Install Flask (if not already installed)

sh
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```
pip install flask
```

Step 2: Create the Flask Application

`app.py`

python
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```
from flask import Flask, render_template

app = Flask(__name__)

@app.route('/')
def home():
    return render_template('index.html')

@app.route('/user/<username>')
def user(username):
    return render_template('user.html', username=username)

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

Step 3: Create the `templates` folder and add the following files

1. `templates/index.html`

html
CopyEdit
```
<!DOCTYPE html>
<html>
<head>
    <title>Home Page</title>
</head>
<body>
    <h1>Welcome to the Flask Application</h1>
```

```
    <p>Go to <a href="/user/John">User Page</a></p>
</body>
</html>
```

2. `templates/user.html`

html
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```
<!DOCTYPE html>
<html>
<head>
    <title>User Page</title>
</head>
<body>
    <h1>Hello, {{ username }}!</h1>
    <a href="/">Back to Home</a>
</body>
</html>
```

Step 4: Run the Flask Application

Open a terminal in the project directory and run:

sh
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```
python app.py
```

If Flask is correctly set up, you should see:

csharp
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```
* Running on http://127.0.0.1:5000/
```

Visit http://127.0.0.1:5000/ to see the homepage and http://127.0.0.1:5000/user/YourName for a personalized greeting.

Code:

app.py

python

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```
from flask import Flask, render_template


app = Flask(__name__)


@app.route('/')
def home():
    return render_template('index.html')


@app.route('/user/<username>')
def user(username):
    return render_template('user.html', username=username)


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

---

templates/index.html

html

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```
<!DOCTYPE html>

<html lang="en">

<head>

    <meta charset="UTF-8">

    <meta name="viewport" content="width=device-width,
initial-scale=1.0">

    <title>Flask Template Rendering</title>

    <link rel="stylesheet" href="{{ url_for('static',
filename='style.css') }}">

    <link rel="stylesheet"
href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0/dist/css/bootstrap.
min.css">

</head>

<body>

    <div class="container">

        <div class="card">

            <h1>Welcome to My Flask App</h1>

            <p>Explore user pages dynamically!</p>

            <div class="links">

                <a href="{{ url_for('user', username='Gunjan
Chandnani') }}" class="btn btn-custom">Gunjan's Page</a>

                <a href="{{ url_for('user', username='Awantika') }}"
class="btn btn-custom">Awantika's Page</a>

            </div>

        </div>
```

```
    </div>
</body>
</html>
```

---

templates/user.html

html

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```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width,
initial-scale=1.0">
    <title>User Page</title>
    <link rel="stylesheet" href="{{ url_for('static',
filename='style.css') }}">
    <link rel="stylesheet"
href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0/dist/css/bootstrap.
min.css">
</head>
<body>
    <div class="container">
        <div class="card">
```

```
            <h1>Hello, {{ username }}!</h1>

            <p>Welcome to your personalized space.</p>

            <a href="{{ url_for('home') }}" class="btn
btn-custom">Back to Home</a>

        </div>

    </div>

</body>

</html>
```

---

static/style.css

css

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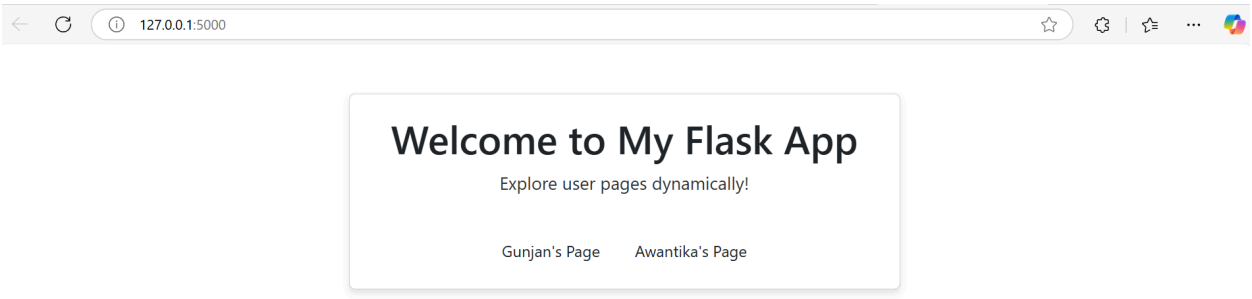
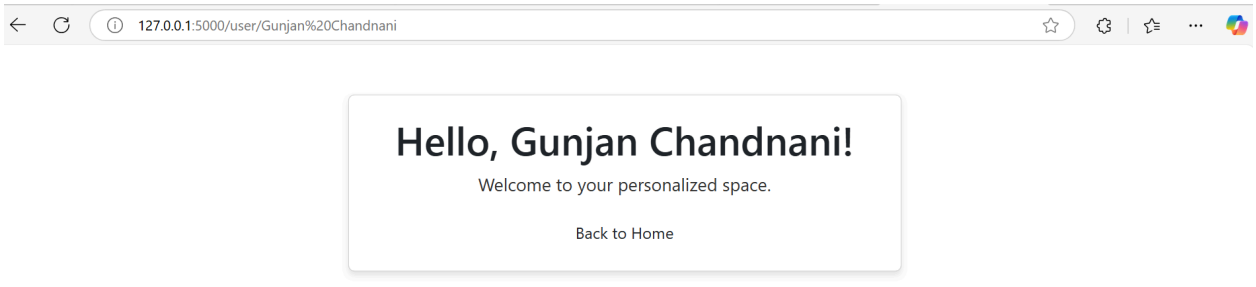
```
body {

    font-family: 'Poppins', sans-serif;

    background-color: #f4f4f4;

    margin: 0;

    padding: 0;

}


.container {

    text-align: center;

    margin-top: 50px;
```

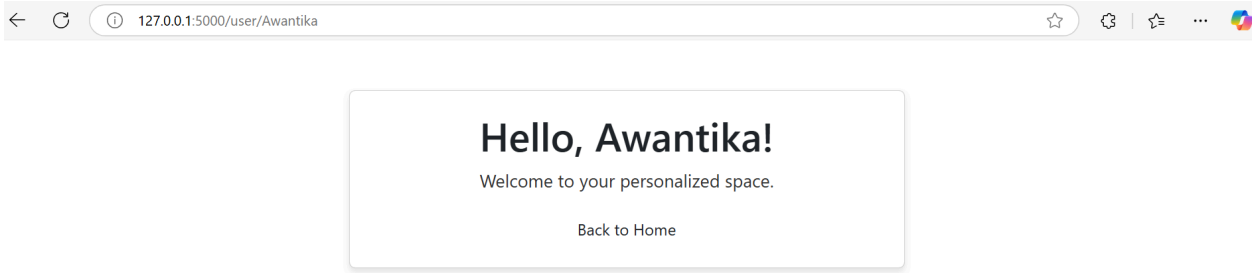
```
}

h1 {
    color: #007bff;
}

p {
    font-size: 18px;
    color: #333;
}

.btn-custom {
    background-color: #007bff;
    color: white;
    padding: 10px 20px;
    text-decoration: none;
    border-radius: 5px;
}

.btn-custom:hover {
    background-color: #0056b3;
}
```

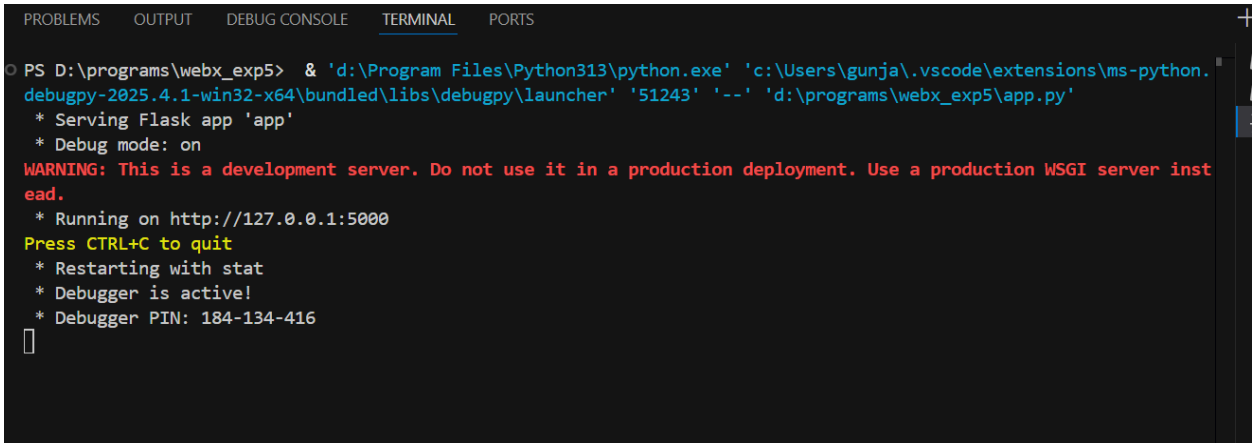
```
.card {
    background: white;
    padding: 20px;
    border-radius: 10px;
    box-shadow: 0px 4px 6px rgba(0, 0, 0, 0.1);
    width: 50%;
    margin: 20px auto;
}

.links {
    display: flex;
    justify-content: center;
    gap: 10px;
    margin-top: 20px;
}
```

Result:




127.0.0.1:5000/user/Gunjan%20Chandnani
Hello, Gunjan Chandnani!
Welcome to your personalized space.
Back to Home


127.0.0.1:5000/user/Awantika
Hello, Awantika!
Welcome to your personalized space.
Back to Home


PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
PS D:\programs\webx_exp5> & 'd:\Program Files\Python313\python.exe' 'c:\Users\gunja\.vscode\extensions\ms-python.debugpy-2025.4.1-win32-x64\bundled\libs\debugpy\launcher' '51243' '--' 'd:\programs\webx_exp5\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: 184-134-416