Introduction to Web development using Flask

Last Updated : 04 Apr, 2024

Flask is a lightweight and flexible web framework for Python. It's designed to make getting started with web development quick and easy, while still being powerful enough to build complex web applications. Let's understand Flask Python in more Detail

What is Flask?

Flask is an API of Python that allows us to build web applications. It was developed by Armin Ronacher. Flask's framework is more explicit than Django's framework and is also easier to learn because it has less base code to implement a simple web application. Flask Python is based on the WSGI(Web Server Gateway Interface) toolkit and Jinja2 template engine.

Advantages of Flask

1. Flask is a **lightweight** backend framework with minimal dependencies.
2. Flask is **easy to learn** because its simple and intuitive API makes it easy to learn and use for beginners.
3. Flask is a **flexible Framework** because it allows you to customize and extend the framework to suit your needs easily.
4. Flask can be used with **any database** like:- SQL and NoSQL and with **any Frontend Technology** such as React or Angular.
5. Flask is **great for small to medium projects** that do not require the complexity of a large framework.
6. Flask Documentation

Getting Started With Flask

Python3 is required for the installation of the Python Web Framework Flask. You can start by importing Flask from the Flask Python package on any Python IDE. For installation on any environment, you can click on the installation link

given below. To test that if the installation is working, check out the code given below.

Python3

```
from flask import Flask
app = Flask(__name__)   # Flask constructor

# A decorator used to tell the application
# which URL is associated function
@app.route('/')
def hello():
    return 'HELLO'

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

The '/' URL is bound with `hello()` function. When the home page of the webserver is opened in the browser, the output of this function will be rendered accordingly. The Flask Python application is started by calling the `run()` function. The method should be restarted manually for any change in the code. To overcome this, the debug support is enabled so as to track any error.

Python3

```
app.debug = True
app.run()
app.run(debug = True)
```

Build Flask Routes in Python

Nowadays, the web frameworks provide routing technique so that user can remember the URLs. It is useful to access the web page directly without navigating from the Home page. It is done through the following `route()` decorator, to bind the URL to a function.

Python3

```
# decorator to route URL
@app.route('/hello')

# binding to the function of route
def hello_world():
    return 'hello world'
```

If a user visits http://localhost:5000/hello URL, the output of the hello_world() function will be rendered in the browser. The `add_url_rule()` function of an application object can also be used to bind URL with the function as in above example.

Python3

```
def hello_world():
    return 'hello world'

app.add_url_rule('/', 'hello', hello_world)
```

Variables in Flask

The Variables in thePython Web Framework flask is used to build a URL dynamically by adding the variable parts to the rule parameter. This variable part is marked as. It is passed as keyword argument. See the example below

Python3

```
from flask import Flask
app = Flask(__name__)

# routing the decorator function hello_name
@app.route('/hello/<name>')
def hello_name(name):
    return 'Hello %s!' % name

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

Save the above example as hello.py and run from power shell. Next, open the browser and enter the URL http://localhost:5000/hello/GeeksforGeeks.

Output

```
Hello GeeksforGeeks!
```

In the above example, the parameter of route() decorator contains the variable part attached to the URL '/hello' as an argument. Hence, if URL like http://localhost:5000/hello/GeeksforGeeks is entered then 'GeeksforGeeks' will be passed to the hello() function as an argument. In addition to the default string variable part, other data types like int, float, and path(for directory separator channel which can take slash) are also used. The URL rules of Flask Python are based on Werkzeug's routing module. This ensures that the URLs formed are unique and based on precedents laid down by Apache.

Python3

```python
from flask import Flask
app = Flask(__name__)

@app.route('/blog/<postID>')
def show_blog(postID):
    return 'Blog Number %d' % postID

@app.route('/rev/<revNo>')
def revision(revNo):
    return 'Revision Number %f' % revNo

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

Output

```
Blog Number 555

# Enter this URL in the browser ? http://localhost:5000/rev/1.1
Revision Number: 1.100000
```

Build a URL in Flask

Dynamic Building of the URL for a specific function is done using `url_for()` function. The function accepts the name of the function as first argument, and one or more keyword arguments. See this example

Python3

```python
from flask import Flask, redirect, url_for
app = Flask(__name__)


@app.route('/admin')  # decorator for route(argument) function
def hello_admin():  # binding to hello_admin call
    return 'Hello Admin'


@app.route('/guest/<guest>')
def hello_guest(guest):  # binding to hello_guest call
    return 'Hello %s as Guest' % guest


@app.route('/user/<name>')
def hello_user(name):
    if name == 'admin':  # dynamic binding of URL to function
        return redirect(url_for('hello_admin'))
    else:
        return redirect(url_for('hello_guest', guest=name))


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

To test this, save the above code and run through python shell and then open browser and enter the following URL:-

Input: http://localhost:5000/user/admin
Output: Hello Admin

Input: http://localhost:5000/user/ABC
Output: Hello ABC as Guest

The above code has a function named user(name), accepts the value through input URL. It checks that the received argument matches the 'admin' argument or not. If it matches, then the function hello_admin() is called else the hello_guest() is called.

HTTP method are provided by Flask

Python Web Framework Flask support various HTTP protocols for data retrieval from the specified URL, these can be defined as:-

Method	Description
GET	This is used to send the data in an without encryption of the form to the server.
HEAD	provides response body to the form
POST	Sends the form data to server. Data received by POST method is not cached by server.
PUT	Replaces current representation of target resource with URL.
DELETE	Deletes the target resource of a given URL

Serve Static Files in Flask

A web application often requires a static file such as javascript or a CSS file to render the display of the web page in browser. Usually, the web server is configured to set them, but during development, these files are served as static folder in your package or next to the module. See the example in JavaScript given below:

Python3

```
from flask import Flask, render_template

app = Flask(__name__)

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


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

HTML File (index.html)

This will be inside **Templates** folder which will be sibling of the python file we wrote above

html

```
<html>

<head>
    <script type = "text/javascript"
        src = "{{ url_for('static', filename = 'hello.js') }}" ></script>
</head>

<body>
    <input type = "button" onclick = "sayHello()" value = "Say Hello" />
</body>

</html>
```

JavaScript file (hello.js)

This code will be inside **static** folder which will be sibling of the templates folder.

javascript

```javascript
function sayHello() {
    alert("Hello World")
    }
```

Object Request of Data from a client's web page is send to the server as a global request object. It is then processed by importing the Python Web Framework Flask module. These consist of attributes like Form(containing Key-Value Pair), Args(parsed URL after question mark(?)), Cookies(contain Cookie names and Values), Files(data pertaining to uploaded file) and Method(current request).

Cookies in Flask

A Cookie is a form of text file which is stored on a client's computer, whose purpose is to remember and track data pertaining to client's usage in order to improve the website according to the user's experience and statistic of webpage.

The Request object contains cookie's attribute. It is the dictionary object of all the cookie variables and their corresponding values. It also contains expiry time of itself. In Flask, cookie are set on response object.See the example given below:

Python3

```python
from flask import Flask

app = Flask(__name__)
@app.route('/')

def index():
    return render_template('index.html')
```

HTML code (index.html)

html

```
<html>
<body>

    <form action = "/setcookie" method = "POST">
        <p><h3>Enter userID</h3></p>
        <p><input type = 'text' name = 'nm'/></p>
        <p><input type = 'submit' value = 'Login'/></p>
    </form>

</body>
</html>
```

Add this code to the Python file defined above

Python3

```
@app.route('/setcookie', methods = ['POST', 'GET'])
def setcookie():
if request.method == 'POST':
    user = request.form['nm']
    resp = make_response(render_template('cookie.html'))
    resp.set_cookie('userID', user)
    return resp

@app.route('/getcookie')
def getcookie():
    name = request.cookies.get('userID')
    return '<h1>welcome '+name+'</h1>'
```

HTML code (cookie.html)

html

```
<html>
    <body>
        <a href="/getcookie">Click me to get Cookie</a>
</body>
</html>
```

Run the above application and visit link on Browser http://localhost:5000/ The form is set to '/setcookie' and function set contains a Cookie name userID that will be rendered to another webpage. The 'cookie.html' contains hyperlink to another view function getcookie(), which displays the value in browser.

Sessions in Flask

In Session, the data is stored on Server. It can be defined as a time interval in which the client logs into a server until the user logs out. The data in between them are held in a temporary folder on the Server. Each user is assigned with a specific

Session ID

The Session object is a dictionary that contains the key-value pair of the variables associated with the session. A SECRET_KEY is used to store the encrypted data on the cookie.

Example

```
Session[key] = value   // stores the session value
Session.pop(key, None)  // releases a session variable
```

Other Important Flask Functions

`redirect`

It is used to return the response of an object and redirects the user to another target location with specified status code.

```
Syntax: Flask.redirect(location, statuscode, response)
```

//location is used to redirect to the desired URL //statuscode sends header value, default 302 //response is used to initiate response.

abort

It is used to handle the error in the code.

Syntax: `Flask.abort(code)`

The code parameter can take the following values to handle the error accordingly:

- **400** – For Bad Request
- **401** – For Unauthenticated
- **403** – For Forbidden request
- **404** – For Not Found
- **406** – For Not acceptable
- **425** – For Unsupported Media
- **429** – Too many Requests

File-Uploading in Flask

File Uploading in Python Web Framework Flask is very easy. It needs an HTML form with enctype attribute and URL handler, that fetches file and saves the object to the desired location. Files are temporary stored on server and then on the desired location. The HTML Syntax that handle the uploading URL is :

```
form action="http://localhost:5000/uploader" method="POST"
enctype="multipart/form-data"
```

And following Python with Flask Code is:

Python3

```
from flask import Flask, render_template, request
from werkzeug import secure_filename

app = Flask(__name__)

@app.route('/upload')
def upload_file():
    return render_template('upload.html')

@app.route('/uploader', methods=['GET', 'POST'])
def upload_file():
    if request.method == 'POST':
      f = request.files['file']
```

```
        f.save(secure_filename(f.filename))
        return 'file uploaded successfully'

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

Sending Form Data to the HTML File of Server

A Form in HTML is used to collect the information of required entries which are then forwarded and stored on the server. These can be requested to read or modify the form. The Python with flask provides this facility by using the URL rule. In the given example below, the '/' URL renders a web page(student.html) which has a form. The data filled in it is posted to the '/result' URL which triggers the result() function. The results() function collects form data present in request.form in a dictionary object and sends it for rendering to result.html.

Python3

```
from flask import Flask, render_template, request

app = Flask(__name__)

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

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

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

HTML Code (result.html)

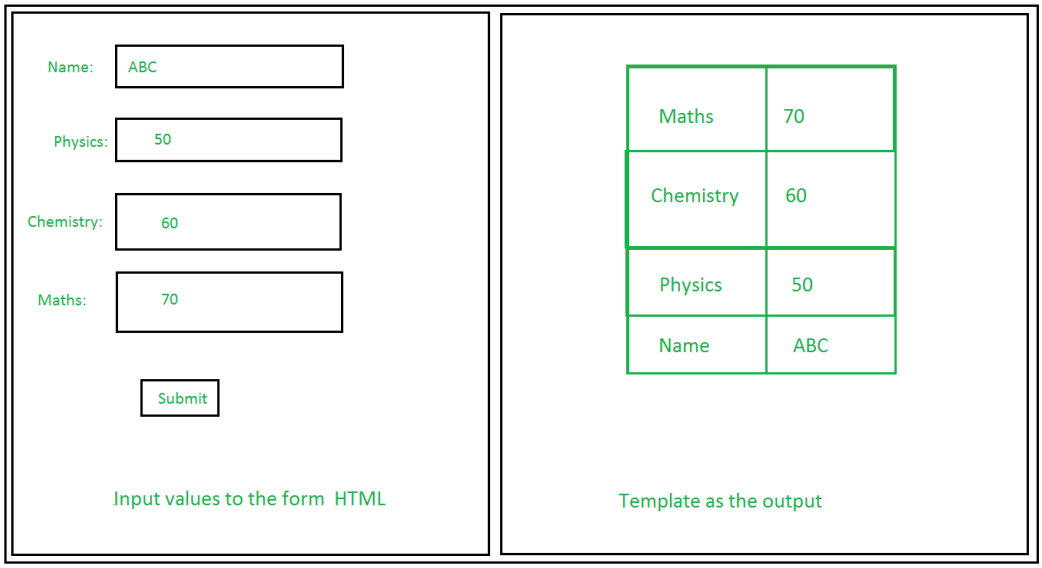
HTML

```
<!doctype html>
<html>
<body>

    <table border = 1>
        {% for key, value in result.items() %}

            <tr>
            <th> {{ key }} </th>
            <td> {{ value }} </td>
            </tr>

        {% endfor %}
    </table>

</body>
</html>
```

HTML Code (student.html)

html

```
<html>
<body>

    <form action = "http://localhost:5000/result" method = "POST">
        <p>Name <input type = "text" name = "Name" /></p>
        <p>Physics <input type = "text" name = "Physics" /></p>
        <p>Chemistry <input type = "text" name = "chemistry" /></p>
        <p>Maths <input type ="text" name = "Maths" /></p>
        <p><input type = "submit" value = "submit" /></p>
    </form>
</body>
</html>
```



Alert messages in Flask

It can be defined as a pop-up or a dialog box that appears on the web-page or like alert in JavaScript, which are used to inform the user. This in flask can be done by using the method flash() in Flask. It passes the message to the next template.

Syntax: `flash(message, category)`

message is actual text to be displayed and **category** is optional which is to render any error or info.

Example

Python3

```
from flask import Flask
app = Flask(__name__)

# /login display login form


@app.route('/login', methods=['GET', 'POST'])
# login function verify username and password
def login():
    error = None

    if request.method == 'POST':
        if request.form['username'] != 'admin' or \
```

```
                request.form['password'] != 'admin':
            error = 'Invalid username or password. Please try again !'
        else:

            # flashes on successful login
            flash('You were successfully logged in')
            return redirect(url_for('index'))
    return render_template('login.html', error=error)
```


K karti...

Previous Article

Flask Tutorial

Next Article

Differences Between Django vs Flask

Similar Reads

Documenting Flask Endpoint using Flask-Autodoc

Documentation of endpoints is an essential task in web development and being able to apply it in different frameworks is always a utility. This article discusses...

4 min read

Minify HTML in Flask using Flask-Minify

Flask offers HTML rendering as output, it is usually desired that the output HTML should be concise and it serves the purpose as well. In this article, we would...

12 min read

How to use Flask-Session in Python Flask ?

Flask Session - Flask-Session is an extension for Flask that supports Server-side Session to your application.The Session is the time between the client logs in to...

4 min read

How to Integrate Flask-Admin and Flask-Login

In order to merge the admin and login pages, we can utilize a short form or any other login method that only requires the username and password. This is know...

8 min read

Flask URL Helper Function - Flask url_for()

In this article, we are going to learn about the flask url_for() function of the flask URL helper in Python. Flask is a straightforward, speedy, scalable library, used f...

11 min read

How to Build a Web App using Flask and SQLite in Python

Python-based Flask is a microweb framework. Typically, a micro-framework has little to no dependencies on outside frameworks. Despite being a micro...

4 min read

Create Cricket Score API using Web Scraping in Flask

Cricket is one of the famous outdoor sport played worldwide. There are very few APIs providing live scoreboards and none of them are free to use. Using any of...

6 min read

Flask Development Server

What is Flask? Flask is a micro-web-framework based on python. Micro-framework is normally a framework with little to no external dependencies on...

3 min read

Deploying a TensorFlow 2.1 CNN model on the web with Flask

When starting to learn Machine Learning, one of the biggest issues people face is deploying whatever they make to the web for easier demonstration/use. This...

4 min read

How To Use Web Forms in a Flask Application

A web framework called Flask provides modules for making straightforward web applications in Python. It was created using the WSGI tools and the Jinja2...

5 min read

Article Tags : Python

Practice Tags : python

Commerce CS Subjects

World GK