# CGI PPROGRAMMING IN PYTHON

What is CGI?

The Common Gateway Interface, or CGI, is a set of standards that define how information is exchanged between the web server and a custom script.

The CGI specs are currently maintained by the NCSA **(National Center for Supercomputing Applications)**.

Understanding CGI (Common Gateway Interface) and How It Works

- Initial Request:
  - When you click on a hyperlink to visit a webpage (URL), your web browser communicates with an HTTP web server.
  - It asks the server for the specific webpage you want to see (URL or filename).
- Server Action:
  - The web server examines the URL you requested and looks for the corresponding file.
  - If it finds the file, it sends it back to your browser.
  - If the file is not found, the server sends an error message indicating that the requested file doesn't exist.
- Browser's Response:
  - Your web browser takes the response from the server.
  - It displays the received file if it exists or shows you the error message.
- CGI implementations:
  - HTTP servers can be set up to do something different. When a file in a specific directory is requested:
    - Instead of sending back the file, the server runs it as a program.
    - Whatever this program produces is then sent back to your browser for display.
  - This feature is known as Common Gateway Interface (CGI), and the programs it uses are called CGI scripts.
- CGI Scripts Variety:
  - CGI programs can be created using different programming languages, like Python, PERL, Shell Scripting, C, or C++.
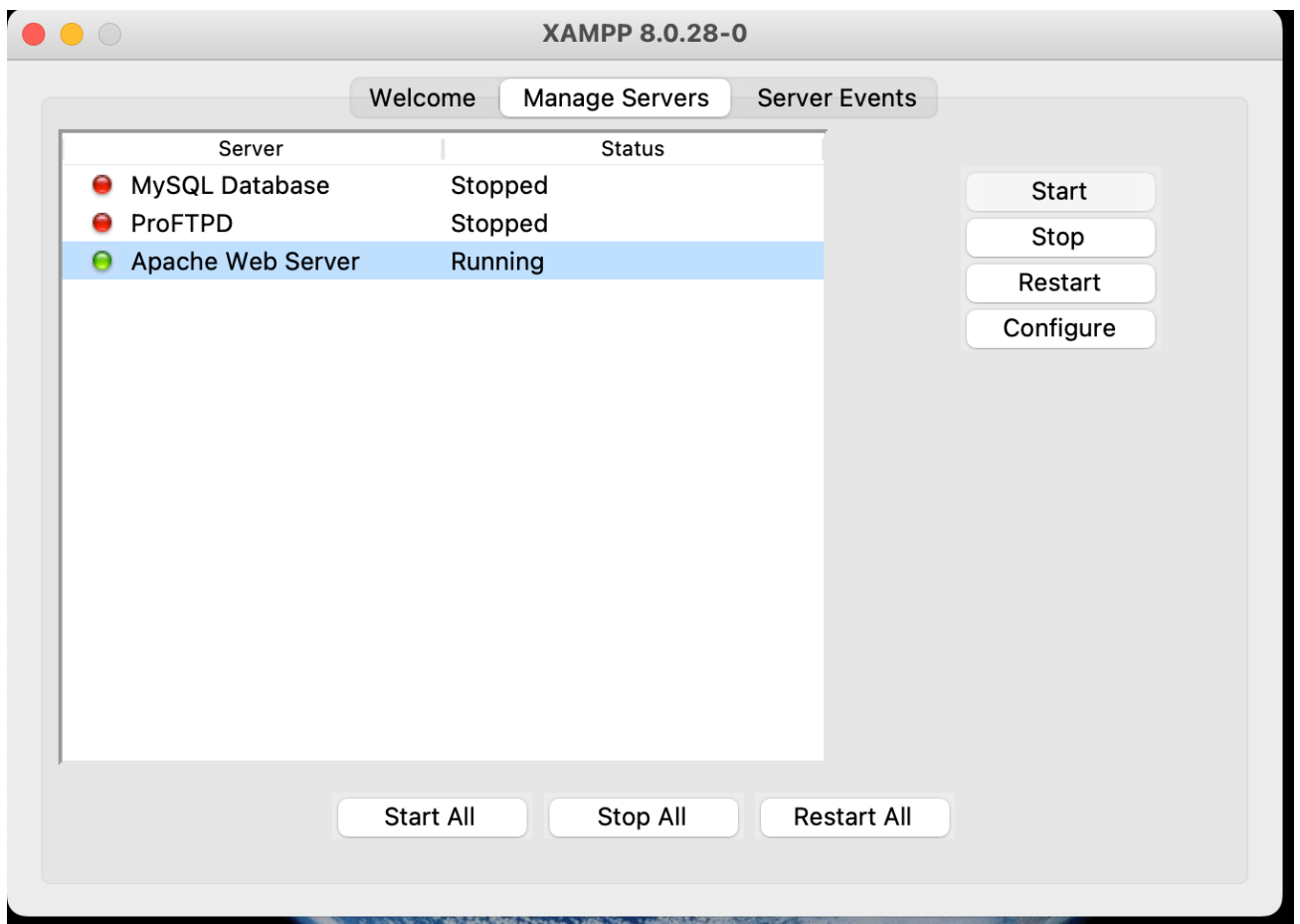
CGI Architecture Diagram

HTTP Protocol
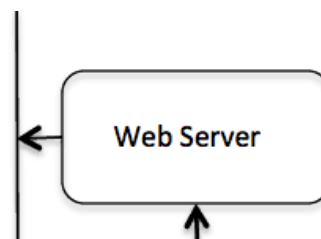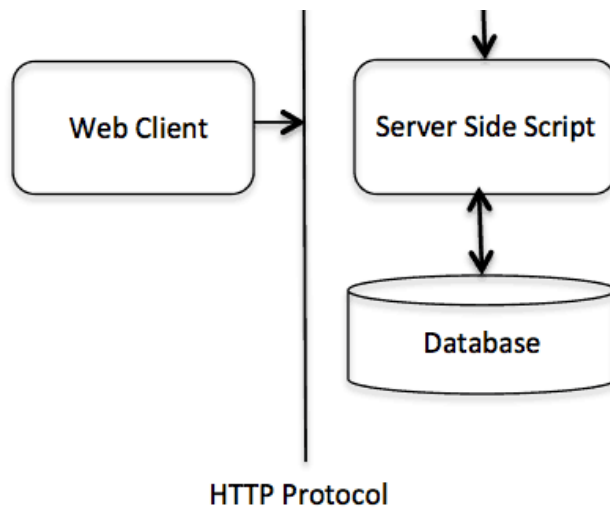
Requirements and Step by Step procedures for Run CGI Scripts
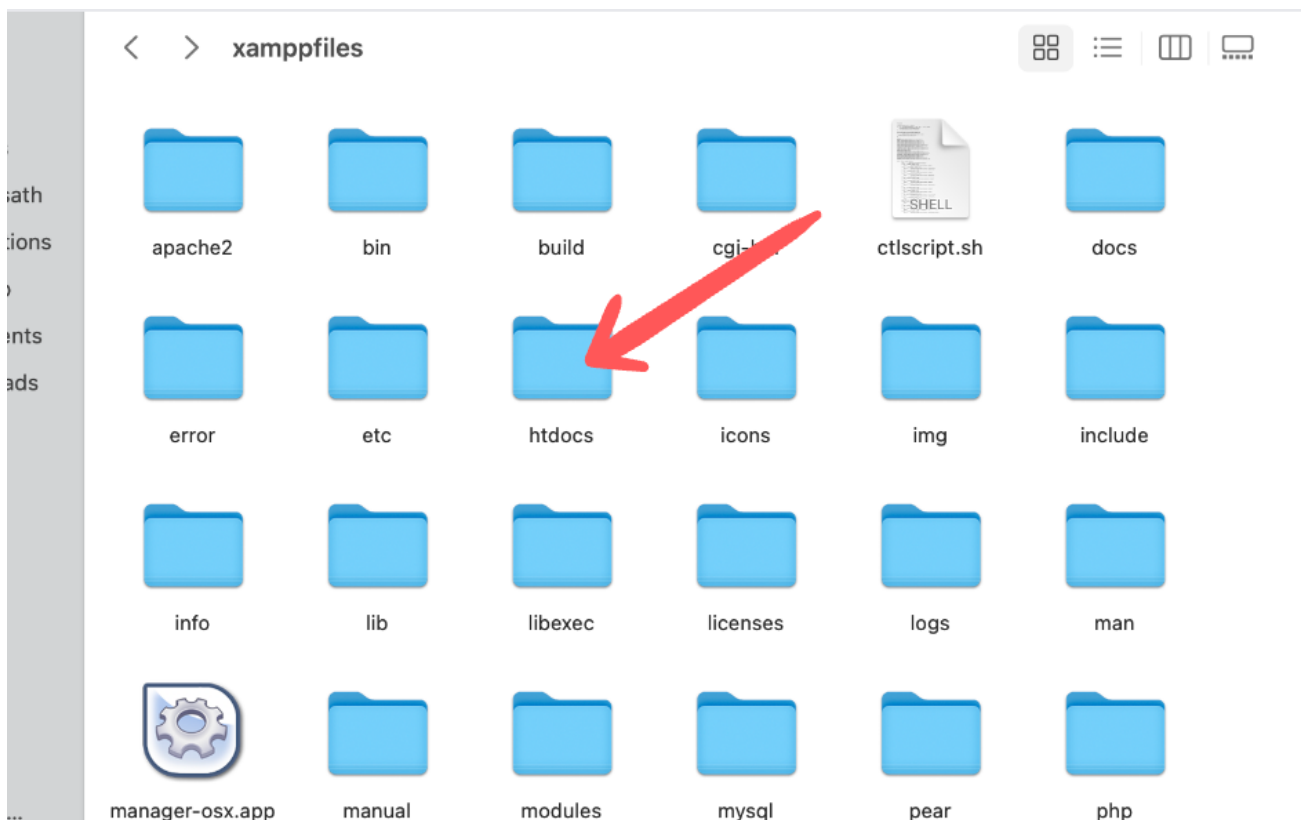
- Install Apache server (XAMPP)

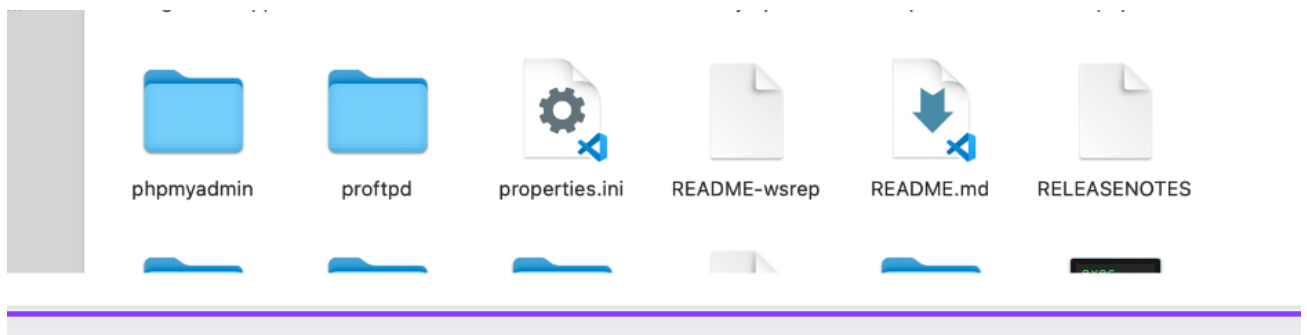Your XAMPP applications will be like this...

You can start the **'Apache Web Server'**...

Inside the XAMPP files you can find htdocs folder, Inside that htdocs, you should create your own folder where we will write our cgi scripts.

Inside that folder i am creating one new folder called 'Training' and inside that i am creating a python file name **'cgi_training.py'**

in that file i am just writing a small html code:


```python
#!/Library/Frameworks/Python.framework/Versions/3.11/bin/python3

# Required HTTP headers
print("Content-type: text/html\n")

# HTML content
print("<html>")
print("<head><title>Image and Text Example</title></head>")
print("<body>")
print("<h1>Welcome to Our Website!</h1>")
print("<h2>this one is header 2!</h2>")
print("<h3>this one is header 3!</h3>")
print("<h4>this one is header 4!</h4>")

print("</body>")
print("</html>")
```

or we can write like below also:


```python
#!/Library/Frameworks/Python.framework/Versions/3.11/bin/python3

# Required HTTP headers
print("Content-type: text/html\n")

htmlCode = """
<html>
<head><title>Image and Text Example</title></head>
```

```
 9    <body>
10    <h1>Welcome to Our Website!</h1>
11    <div style="
12        display:flex;
13        flex-direction:column;
14        color:red;
15        border:1px solid lightgrey;
16        border-radius: 15px;
17        width:50%;
18        box-shadow: rgb(38, 57, 77) 0px 20px 30px -10px;"
19    >
20    <h2>this one is header 2!</h2>
21    <h3>this one is header 3!</h3>
22    <h4>this one is header 4!</h4>
23    </div>
24    </body>
25    </html>
26    """
27
28    print(htmlCode)
```

We should target our folder and file in the browser where our server is running like below:
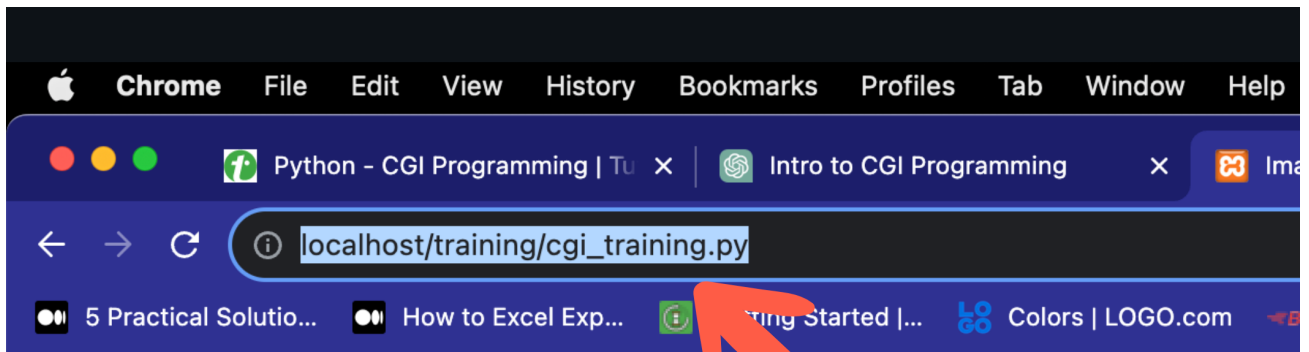
The output of the code will be like this:

Welcome to Our Website!

this one is header 2!

this one is header 3!

this one is header 4!

Welcome to Our Website!

this one is header 2!

this one is header 3!

this one is header 4!

Here with the above example i am just showing how to generate a html content using python and send back it to browser using CGI. we can write a script to fetch the data from the file server file system or database and send it to browser.

CGI MODULE

The cgi module in Python provides tools for working with the Common Gateway Interface (CGI), a protocol that enables web servers to execute scripts and generate dynamic content

in response to HTTP requests.

The module includes functions like **cgi.FieldStorage()** that help parse and retrieve data submitted by users through HTML forms, allowing you to process user input.
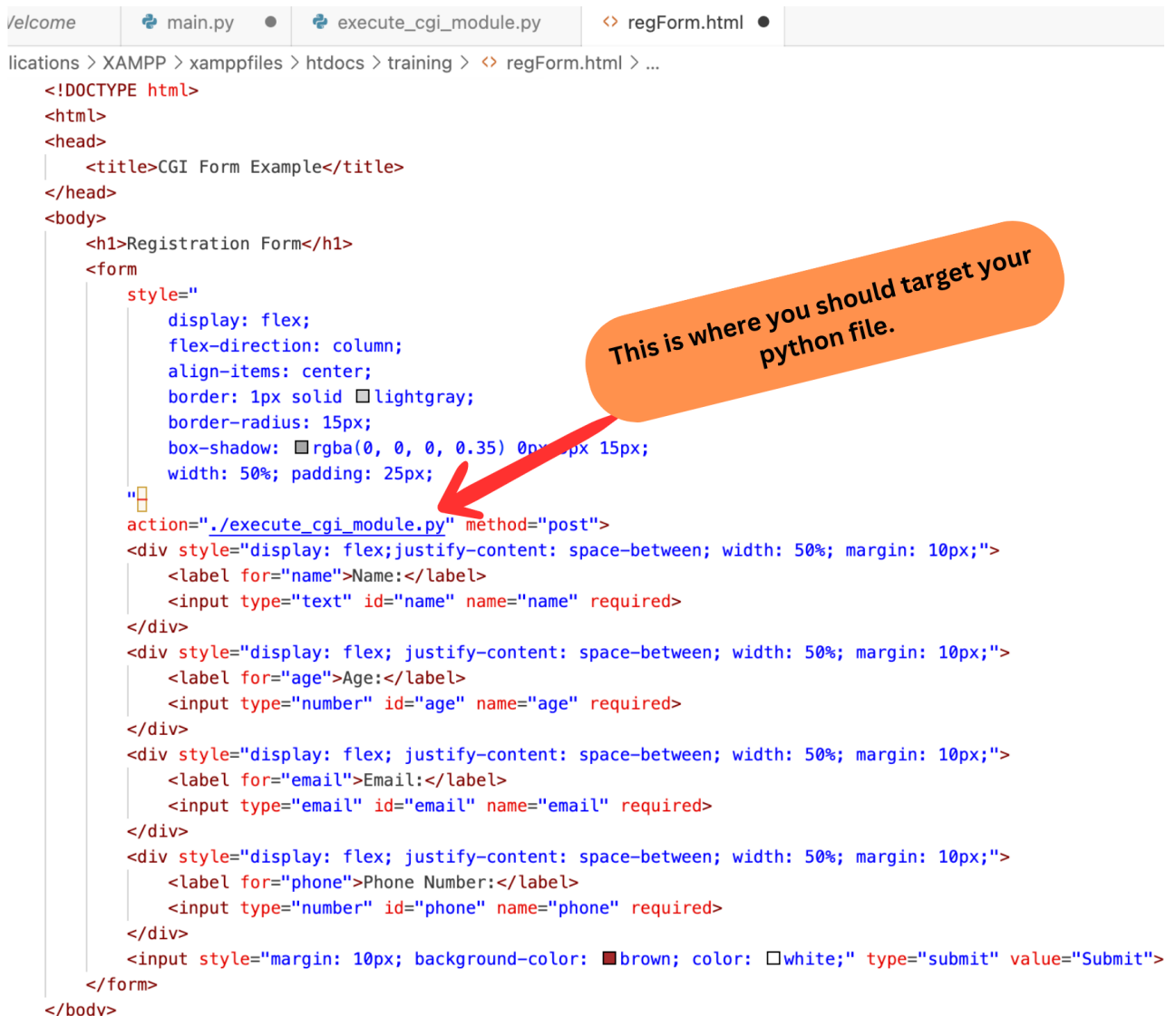
CGI Traceback (CGITB Module)

The cgitb module in Python is a built-in module that stands for **"CGI traceback."** It provides enhanced traceback formatting and error reporting for CGI scripts.

When an error occurs in a CGI script, the **cgitb module** can generate detailed HTML error pages that include traceback information, making it easier to diagnose and fix issues. This module is particularly useful for debugging CGI scripts in a web environment.

Example for using CGI Module

Initially Create a .html file in which i write a simple form.

```
Welcome        main.py    ●    execute_cgi_module.py        <> regForm.html ●

lications > XAMPP > xamppfiles > htdocs > training > <> regForm.html > ...
    <!DOCTYPE html>
    <html>
    <head>
        <title>CGI Form Example</title>
    </head>
    <body>
        <h1>Registration Form</h1>
        <form
            style="
                display: flex;
                flex-direction: column;
                align-items: center;
                border: 1px solid □lightgray;
                border-radius: 15px;
                box-shadow: ■rgba(0, 0, 0, 0.35) 0px  px 15px;
                width: 50%; padding: 25px;
            "
            action="./execute_cgi_module.py" method="post">
            <div style="display: flex;justify-content: space-between; width: 50%; margin: 10px;">
                <label for="name">Name:</label>
                <input type="text" id="name" name="name" required>
            </div>
            <div style="display: flex; justify-content: space-between; width: 50%; margin: 10px;">
                <label for="age">Age:</label>
                <input type="number" id="age" name="age" required>
            </div>
            <div style="display: flex; justify-content: space-between; width: 50%; margin: 10px;">
                <label for="email">Email:</label>
                <input type="email" id="email" name="email" required>
            </div>
            <div style="display: flex; justify-content: space-between; width: 50%; margin: 10px;">
                <label for="phone">Phone Number:</label>
                <input type="number" id="phone" name="phone" required>
            </div>
            <input style="margin: 10px; background-color: ■brown; color: □white;" type="submit" value="Submit">
        </form>
    </body>
```

This is where you should target your python file.

Creating an another python file to fetch the html data using cgi module and rendering it like previous.

```
Welcome        execute_cgi_module.py  ×

Applications > XAMPP > xamppfiles > htdocs > training >  execute_cgi_module.py >
  1    #!/Library/Frameworks/Python.framework/Versions/3.11/bin/python3
  2
  3
  4    # Required HTTP headers
  5    print("Content-type: text/html\n")
  6
  7    import cgi
  8    # Get form data
  9    form = cgi.FieldStorage()
 10
 11    # Retrieve form field values
 12    name = form.getvalue("name")
 13    age = form.getvalue("age")
 14    email = form.getvalue("email")
 15    phone = form.getvalue("phone")
 16
 17    render_form = """
 18    <html>
 19        <body>
 20            <h1>Registered Form Details</h1>
 21            <p>Name: {}</p>
 22            <p>Age: {}</p>
 23            <p>Email: {}</p>
 24            <p>Phone: {}</p>
 25        </body>
 26    </html>
 27    """.format(name, age, email, phone)
 28    print(render_form)
 29
```

Here as you can see, we are just importing the cgi module and get the form data from the html file and rendering it as below.