Problem No: 06

Problem Name: Create an HTTP Server Only as Localhost Serving in Python"

Objective

To implement an HTTP server in Python that runs only on localhost (127.0.0.1) and serves web content accessible only from the local machine.

Theory

Localhost refers to the loopback network interface (IP address 127.0.0.1). When a server binds to 127.0.0.1, it accepts requests only from the same machine and cannot be accessed externally.

Advantages of localhost binding:

- Improved security (no external access)
- Safe testing environment
- Ideal for development purposes

In HTTP communication:

- Browser sends GET request to localhost
- Server processes request
- Server returns HTTP response with HTML content

Key Concepts

- Loopback address (127.0.0.1)
- HTTP request-response lifecycle
- Port binding
- Local server execution

Application

Localhost servers are widely used for:

- Web development
- Backend testing
- API debugging
- Learning client-server architecture

Implementation in Python

Server Code (localhost_server.py)

```
from http.server import HTTPServer, BaseHTTPRequestHandler

HOST = "127.0.0.1"   # Localhost only
PORT = 8080

class LocalHandler(BaseHTTPRequestHandler):
    def do_GET(self):
        self.send_response(200)
        self.send_header("Content-type", "text/html")
        self.end_headers()

        html = """<!DOCTYPE␣html>
<html>
<head>
<title>Localhost␣Server</title>
<style>
body{font-family:Arial;text-align:center;background:#eef;}
h1{color:#222;}
</style>
</head>
<body>
<h1>Localhost␣HTTP␣Server␣Running</h1>
<p>This␣server␣is␣accessible␣only␣from␣this␣machine.</p>
```

```
</body>
</html>"""

        self.wfile.write(html.encode("utf-8"))

if __name__ == "__main__":
    print(f"Server running at http://{HOST}:{PORT}")
    server = HTTPServer((HOST, PORT), LocalHandler)
    server.serve_forever()
```

Execution Steps

1. Save the file as `localhost_server.py`
2. Open terminal in the file directory
3. Run: `python localhost_server.py`
4. Open browser and visit: `http://127.0.0.1:8080`

Result

The HTTP server runs successfully on localhost and serves an HTML webpage. The server cannot be accessed from external devices because it is bound only to 127.0.0.1.

Sample Output

Server Console:

```
Server running at http://127.0.0.1:8080
127.0.0.1 - - "GET / HTTP/1.1" 200 -
```

Client Browser:

Localhost HTTP Server Running

This server is accessible only from this machine.

Discussion

Binding the server to 127.0.0.1 restricts access to the local system. This configuration is commonly used during development to ensure security and prevent unauthorized external connections.

Conclusion

The localhost HTTP server was successfully implemented in Python. The experiment demonstrates secure local server configuration and strengthens understanding of HTTP-based client-server communication.