

Socket Programming Assignment

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1 Overview

Code repository: <https://github.com/jserra7d5/cs-372-assignment-1>

This assignment demonstrates socket programming in Python using the raw socket API. Three programs were implemented to showcase different aspects of network communication:

1. **simple_get.py** - Basic HTTP GET client for small files
2. **large_file_get.py** - HTTP GET client with loop for large files
3. **simple_server.py** - Simple HTTP server

All programs use the Python socket API as required.

2 Implementation Details

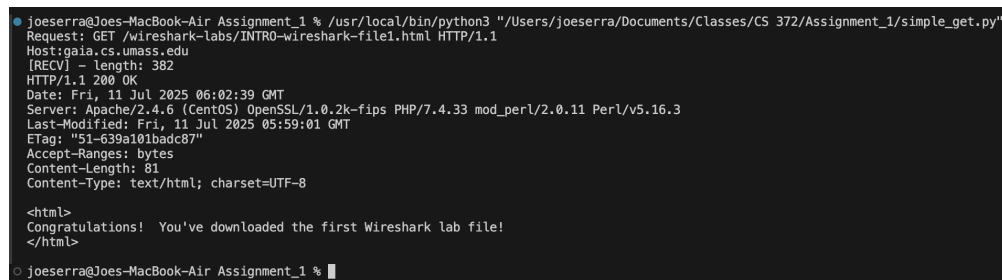
2.1 Simple GET Client (simple_get.py)

This program connects to `gaia.cs.umass.edu` and retrieves a small HTML file using a single `recv()` call.

Usage:

```
1 python3 simple_get.py
```

Screenshot of `simple_get.py` execution:



```
joeserra@Joes-MacBook-Air Assignment_1 % /usr/local/bin/python3 "/Users/joeserra/Documents/Classes/CS 372/Assignment_1/simple_get.py"
Request: GET /wireshark-labs/INTRO-wireshark-file1.html HTTP/1.1
Host: gaia.cs.umass.edu
[RECV] - length: 382
HTTP/1.1 200 OK
Date: Fri, 11 Jul 2025 06:02:39 GMT
Server: Apache/2.4.6 (CentOS) OpenSSL/1.0.2k-fips PHP/7.4.33 mod_perl/2.0.11 Perl/v5.16.3
Last-Modified: Fri, 11 Jul 2025 05:59:01 GMT
ETag: "51-639a101badc87"
Accept-Ranges: bytes
Content-Length: 81
Content-Type: text/html; charset=UTF-8

<html>
Congratulations! You've downloaded the first Wireshark lab file!
</html>
joeserra@Joes-MacBook-Air Assignment_1 %
```

Figure 1: Execution of `simple_get.py` showing HTTP GET request and response

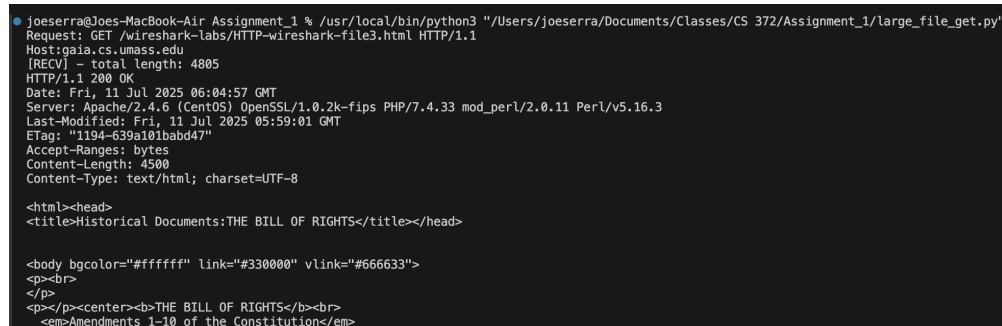
2.2 Large File GET Client (large_file_get.py)

This program demonstrates handling larger files by implementing a receive loop that continues until the server closes the connection.

Usage:

```
1 python3 large_file_get.py
```

Screenshot of large_file_get.py execution:

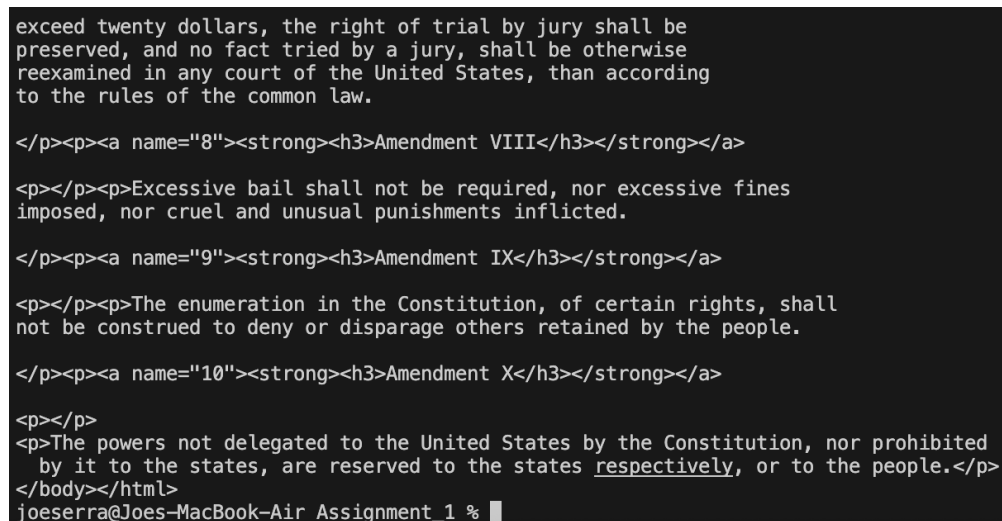


```
joeserra@Joes-MacBook-Air Assignment_1 % /usr/local/bin/python3 "/Users/joeserra/Documents/Classes/CS 372/Assignment_1/large_file_get.py"
Request: GET /wireshark-labs/HTTP-wireshark-file3.html HTTP/1.1
Host: gaia.cs.umass.edu
[RECV] - total length: 4805
HTTP/1.1 200 OK
Date: Fri, 11 Jul 2025 06:04:57 GMT
Server: Apache/2.4.6 (CentOS) OpenSSL/1.0.2k-fips PHP/7.4.33 mod_perl/2.0.11 Perl/v5.16.3
Last-Modified: Fri, 11 Jul 2025 05:59:01 GMT
ETag: "1194-639a101babd47"
Accept-Ranges: bytes
Content-Length: 4500
Content-Type: text/html; charset=UTF-8

<html><head>
<title>Historical Documents:THE BILL OF RIGHTS</title></head>

<body bgcolor="#ffffff" link="#330000" vlink="#666633">
<p><br>
</p>
<p><p><center><b>THE BILL OF RIGHTS</b><br>
<em>Amendments 1-10 of the Constitution</em>
```

Figure 2: (Pt. 1) Execution of large_file_get.py showing chunked file retrieval



```

exceed twenty dollars, the right of trial by jury shall be
preserved, and no fact tried by a jury, shall be otherwise
reexamined in any court of the United States, than according
to the rules of the common law.

</p><p><a name="8"><strong><h3>Amendment VIII</h3></strong></a>

<p></p><p>Excessive bail shall not be required, nor excessive fines
imposed, nor cruel and unusual punishments inflicted.

</p><p><a name="9"><strong><h3>Amendment IX</h3></strong></a>

<p></p><p>The enumeration in the Constitution, of certain rights, shall
not be construed to deny or disparage others retained by the people.

</p><p><a name="10"><strong><h3>Amendment X</h3></strong></a>

<p></p>
<p>The powers not delegated to the United States by the Constitution, nor prohibited
by it to the states, are reserved to the states respectively, or to the people.</p>
</body></html>
joeserra@Joes-MacBook-Air Assignment_1 %
```

Figure 3: (Pt. 2) Execution of large_file_get.py showing chunked file retrieval

2.3 Simple HTTP Server (simple_server.py)

This program creates a basic HTTP server that listens on localhost and serves a simple HTML response to web browsers.

Usage:

```
1 python3 simple_server.py
```

Then open browser to: `http://127.0.0.1:8080`
 Screenshot of `simple_server.py` execution:

```

joeserra@Joes-MacBook-Air Assignment_1 % /usr/local/bin/python3 "/Users/joeserra/Documents/Classes/CS 372/Assignment_1/simple_server.py"
HTTP Server listening on 127.0.0.1:8080
Connection from ('127.0.0.1', 51582)
Connected by ('127.0.0.1', 51582)
Received: b'GET / HTTP/1.1\r\nHost: localhost:8080\r\nSec-Fetch-Dest: document\r\nUser-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/18.5 Safari/605.1.15\r\nUpgrade-Insecure-Requests: 1\r\nAccept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8\r\nSec-Fetch-Site: none\r\nSec-Fetch-Mode: navigate\r\nAccept-Language: en-US,en;q=0.9\r\nPriority: u=0, \r\nAccept-Encoding: gzip, deflate\r\nConnection: keep-alive\r\n\r\n'
Sending>>>>>
HTTP/1.1 200 OK
Content-type: text/html; charset=UTF-8
<html><Congratulations! You've downloaded the first Wireshark lab file!</html>
<<<<<<<<

```

Figure 4: Execution of `simple_server.py` showing server startup and client connections

Screenshot of browser accessing the server:

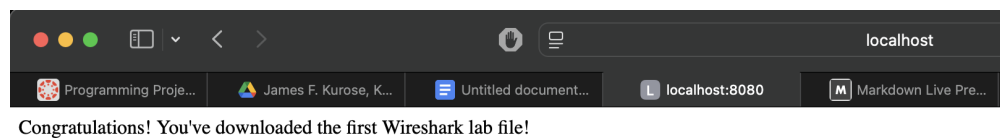


Figure 5: Browser view of the HTTP server response

3 References

1. Python Software Foundation. "Socket Programming in Python." Python Documentation. <https://docs.python.org/3/library/socket.html>
2. Fielding, R., et al. "Hypertext Transfer Protocol – HTTP/1.1." RFC 2616, Internet Engineering Task Force, 1999. <https://tools.ietf.org/html/rfc2616>
3. Kurose, James F., and Keith W. Ross. *Computer Networking: A Top-Down Approach*. 8th ed., Pearson, 2021.
4. Stevens, W. Richard, et al. *UNIX Network Programming, Volume 1: The Sockets Networking API*. 3rd ed., Addison-Wesley, 2003.
5. Mozilla Developer Network. "HTTP Messages." MDN Web Docs. <https://developer.mozilla.org/en-US/docs/Web/HTTP/Guides/Messages>