Project 1 Report

CS 118: Computer Network Fundamentals

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1 High-Level Description

Our server works by first creating and binding a socket. After creating the socket, the server reads in the HTTP request from it. To handle requests, a function, GenerateResponse(), is called to parse through the request for the uri. A HeaderInfo object is created to keep track of variables that the header will use. If the uri does not lead to a valid file, the failure variable in HeaderInfo is set to true. Otherwise, the function creates the response message by getting the content from the uri and checking its data to find the content-length, content-type, last-modified time, etc. These fields are stored in a HeaderInfo object. Afterward, it gets the current time using the tm structure and passes that data into the HeaderInfo object. It can now generate the HTTP response by calling HeaderInfo's GenerateResponse() function. If the request failed, we begin a message with HTTP/1.1 404 Not Found. Otherwise, the message begins with HTTP/1.1 200 OK. We can fill the rest of the header with data from the HeaderInfo object and send the response through the socket.
To read in requests while generating responses, we utilized the fork() function to create two processes - one that responds to requests and one that listens to the port. After the response message is sent, the process that handles requests closes the socket and terminates.

2 Difficulties

Early on, we had trouble displaying images and binary files. HTML pages would display just fine, but images would show up as a small square in the middle of the page instead of the image we wanted. We found that this was because we had an extra carriage return between the last line of the http response and the file content. The extra carriage return did not make a difference for text files except the last two characters were truncated, but for image files, the content looked like nonsense. Once the extra "\r\ n" was removed, our image displayed correctly.

3 Manual

To compile our server, type make into the command line. To run our server, type: ./server $portnum into the the command line, where $portnum is a valid port-number such as 5000. We accessed our server through a browser via localhost:5000. Requests for files are done by adding the filename to the url, e.g. localhost:5000/banana.gif. The server continues to run until interrupted with SIGINT.

4 Sample Outputs

1. Request for Nothing:

```
GET / HTTP/1.1
Host: localhost:5000
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:57.0) Gecko/20100101 Firefox/57.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
DNT: 1
Connection: keep-alive
Upgrade-Insecure-Requests: 1
```

   Response for Nothing:

```
HTTP/1.1 404 Not Found
Connection: close
Server: webserver/0.0.1
Content-Type: text/html
Date: Sat, 03 Feb 2018 05:12:44 GMT
Content-Length: 35
```

2. Request for small binary file:

   ```
   GET /client HTTP/1.1
   Host: localhost:5000
   User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:57.0) Gecko/20100101 Firefox/57.0
   Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
   Accept-Language: en-US,en;q=0.5
   Accept-Encoding: gzip, deflate
   DNT: 1
   Connection: keep-alive
   Upgrade-Insecure-Requests: 1
   ```

   Response for small binary file:

   ```
   HTTP/1.1 200 OK
   Connection: close
   Server: webserver/0.0.1
   Content-Type: application/octet-stream
   Last-Modified: Sat, 03 Feb 2018 05:16:09 GMT
   Date: Sat, 03 Feb 2018 05:16:29 GMT
   Content-Length: 21600
   ```

3. Request for large binary file:

   ```
   GET /big_binary_file HTTP/1.1
   Host: localhost:5000
   User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:57.0) Gecko/20100101 Firefox/57.0
   Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
   Accept-Language: en-US,en;q=0.5
   Accept-Encoding: gzip, deflate
   DNT: 1
   Connection: keep-alive
   Upgrade-Insecure-Requests: 1
   ```

   Response for large binary file:

   ```
   HTTP/1.1 200 OK
   Connection: close
   Server: webserver/0.0.1
   Content-Type: application/octet-stream
   Last-Modified: Sat, 03 Feb 2018 05:06:52 GMT
   Date: Sat, 03 Feb 2018 05:17:20 GMT
   Content-Length: 100000000
   ```

4. Request for HTML file:

```
GET /moose.html HTTP/1.1
Host: localhost:5000
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:57.0) Gecko/20100101 Firefox/57.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
DNT: 1
Connection: keep-alive
Upgrade-Insecure-Requests: 1
```

   Response for HTML file:

```
HTTP/1.1 200 OK
Connection: close
Server: webserver/0.0.1
Content-Type: text/html
Last-Modified: Thu, 01 Feb 2018 10:10:19 GMT
Date: Sat, 03 Feb 2018 05:19:10 GMT
Content-Length: 32
```

5. Request for an image file:

```
GET /10-dithering-opt.jpg HTTP/1.1
Host: localhost:5000
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:57.0) Gecko/20100101 Firefox/57.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
DNT: 1
Connection: keep-alive
Upgrade-Insecure-Requests: 1
```

   Response for image file:

```
HTTP/1.1 200 OK
Connection: close
Server: webserver/0.0.1
Content-Type: image/jpeg
Last-Modified: Thu, 01 Feb 2018 10:10:19 GMT
Date: Sat, 03 Feb 2018 05:20:46 GMT
Content-Length: 168094
```

6. Request for a file with a name that contains spaces:

```
GET /moose%20with%20spaces.html HTTP/1.1
Host: localhost:5000
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:57.0) Gecko/20100101 Firefox/57.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
```

```
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
DNT: 1
Connection: keep-alive
Upgrade-Insecure-Requests: 1
```

Response for a file with spaces in its name:

```
HTTP/1.1 200 OK
Connection: close
Server: webserver/0.0.1
Content-Type: text/html
Last-Modified: Sat, 03 Feb 2018 05:06:52 GMT
Date: Sat, 03 Feb 2018 05:21:47 GMT
Content-Length: 49
```