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Exercise 3:

Question 1: What is the status code and phrase returned from the server to the client browser?

- Status code: 200
- Response Phrase: OK
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Question 2: When was the HTML file that the browser is retrieving last modified at the server? Does the response also contain a DATE header? How are these two fields different?

- Last-Modified: Tue, 23 Sep 2003 05:29:00
- Date: Tue, 23 Sep 2003 05:29:50
- The Last-Modified response header is a header sent by the server specifying the date of the last modification of the requested source. Other hand, Date header contains the date and time at which the message was generate, also it is one of the forbidden response headers.

Question 3: Is the connection established between the browser and the server persistent or non-persistent? How can you infer this?

- The connection established is persistent because when you look at Connection header it is Keep-Alive.

Question 4: How many bytes of content are being returned to the browser?

- Content-Length: 73

Question 5: What is the data contained inside the HTTP response packet?

```
<html>\n
Congratulations. You've downloaded the file lab2-1.html!\n
</html>\n
```

Exercise 4:

Question 1: Inspect the contents of the first HTTP GET request from the browser to the server. Do you see an "IF-MODIFIED-SINCE" line in the HTTP GET?

- There is no IF-MODIFIED-SINCE line

Question 2: Does the response indicate the last time that the requested file was modified?

- Last-Modified: Tue, 23 Sep 2003 05:35:00 GMT

Question 3: Now inspect the contents of the second HTTP GET request from the browser to the server. Do you see an "IF-MODIFIED-SINCE:" and "IF-NONE-MATCH" lines in the HTTP GET? If so, what information is contained in these header lines?

- If-Modified-Since: Tue, 23 Sep 2003 05:35:00 GMT. This information indicates the time for which a browser first downloaded a resource from the server.
- If-None-Match: "1bfef-173-8f4ae900". This information is for checking the Etag value. The server will send back the requested file, with a 200 status, if and only if it does not have an Etag matching with the given value from If-None-Match.

Question 4: What is the HTTP status code and phrase returned from the server in response to this second HTTP GET? Did the server explicitly return the contents of the file? Explain.

- Status Code: 304
- Response Phrase: Not Modified
- The server did not explicitly return the contents of the file because the file was not modified since the last modified date from the first GET request. Hence, the file is loaded from the cache (could be the browser's cache of the local server)

Question 5: What is the value of the Etag field in the 2nd response message and how it is used? Has this value changed since the 1st response message was received?

- Etag: "1bfef-173-8f4ae900"
- The Etag is used for comparison with the If-None-Match value, if the Etag is different, so we need to get the requested file from the server not the cache.

- This value has not changed since the 1st response message, hence 304 code (not-modified) status in the second response message from the server.

Exercise 5:

```
$python3 PingClient.py localhost 8080
```

```
ping to 127.0.0.1, seq = 3331, rtt = Timeout
```

```
ping to 127.0.0.1, seq = 3332, rtt = 182.0
```

```
ping to 127.0.0.1, seq = 3333, rtt = 144.0
```

```
ping to 127.0.0.1, seq = 3334, rtt = 103.0
```

```
ping to 127.0.0.1, seq = 3335, rtt = 85.0
```

```
ping to 127.0.0.1, seq = 3336, rtt = 142.0
```

```
ping to 127.0.0.1, seq = 3337, rtt = 102.0
```

```
ping to 127.0.0.1, seq = 3338, rtt = Timeout
```

```
ping to 127.0.0.1, seq = 3339, rtt = 13.0
```

```
ping to 127.0.0.1, seq = 3340, rtt = 11.0
```

```
ping to 127.0.0.1, seq = 3341, rtt = Timeout
```

```
ping to 127.0.0.1, seq = 3342, rtt = 194.0
```

```
ping to 127.0.0.1, seq = 3343, rtt = Timeout
```

```
ping to 127.0.0.1, seq = 3344, rtt = 167.0
```

```
ping to 127.0.0.1, seq = 3345, rtt = 72.0
```

```
minimum rtt is 11.0, maximum rtt is 194.0, and average rtt is  
110.455
```