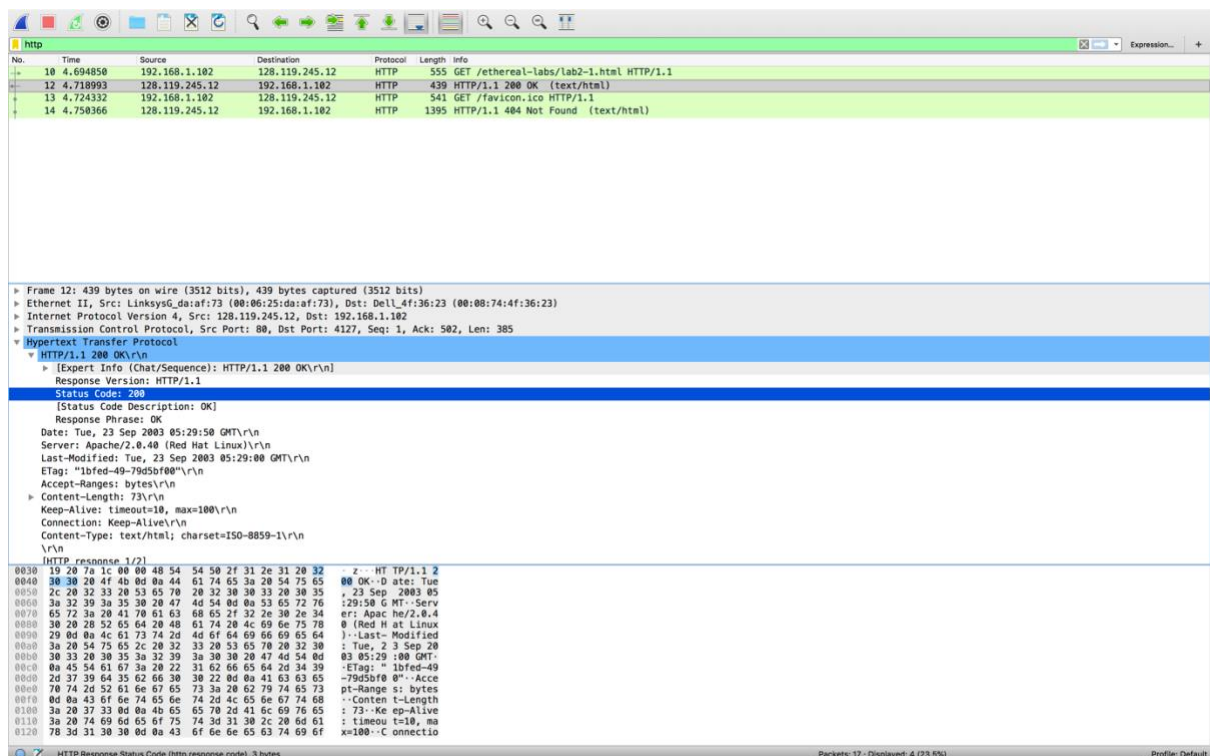


COMP9311 Lab2  
Name: Jiachen Li  
Student ID: z5184142

### Exercise3:

Q1: What is the status code and phrase returned from the server to the client browser?

The status code returned from the server to the client browser is 200 and the phrase is OK.



Q2: 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?

The last-modified time is Tue, 23 Sep 2003 05:29:00 GMT. The response also contains a DATE header, and it's Tue, 23 Sep 2003 05:29:50 GMT. Date field means the date and time that the message was originated while Last-modified means that the last time that the resources on the server was modified.

Q3: Is the connection established between the browser and the server persistent or non-persistent? How can you infer this?

The connection established between the browser and the server is persistent because the connection is keeping alive.

The screenshot shows a Wireshark packet capture of an HTTP transaction. The packet list pane at the top shows four packets: a GET request for /etherreal-labs/lab2-1.html (200 OK), a GET request for /favicon.ico (200 OK), and a GET request for /lab2-1.html (404 Not Found). The selected packet is the first one, an HTTP 200 OK response. The packet details pane shows the following structure:

- Internet Protocol Version 4, Src: 128.119.245.12, Dst: 192.168.1.102
- Transmission Control Protocol, Src Port: 80, Dst Port: 4127, Seq: 1, Ack: 582, Len: 385
- Hypertext Transfer Protocol
  - HTTP/1.1 200 OK\r\n
  - Date: Tue, 23 Sep 2003 05:29:50 GMT\r\n
  - Server: Apache/2.0.40 (Red Hat Linux)\r\n
  - Last-Modified: Tue, 23 Sep 2003 05:29:00 GMT\r\n
  - Etag: "1bfed-49-79d5b0f0"\r\n
  - Accept-Ranges: bytes\r\n
  - Content-Length: 73\r\n
  - Keep-Alive: timeout=10, max=100\r\n
  - Connection: Keep-Alive\r\n
  - Content-Type: text/html; charset=ISO-8859-1\r\n
  - \r\n
  - [HTTP response 1/2]
  - [Time since request: 0.024143000 seconds]
  - [Request in frame: 10]
  - [Next request in frame: 13]
  - [Next response in frame: 14]
- File Data: 73 bytes
- Line-based text data: text/html (3 Lines)

The packet bytes pane at the bottom shows the raw data of the response, including the headers and the body content.

Q4: How many bytes of content are being returned to the browser?  
73 bytes of content are being returned to the browser.

The screenshot shows the same Wireshark packet capture as before, but with the packet details pane expanded to show the file data of the selected HTTP 200 OK response. The structure is identical to the previous screenshot, but the 'File Data' section is now expanded, showing the raw data of the response body. The packet bytes pane at the bottom also shows the raw data of the response body.

Q5: What is the data contained inside the HTTP response packet?

<html>\n

Congratulations. You've downloaded the file lab2-1.html!\n

</html>\n

The image shows a Wireshark packet capture window. The top pane displays a list of captured packets. Packet 12 is selected, showing an HTTP GET request for /etherbase-labs/lab2-1.html. Packet 13 is also selected, showing an HTTP GET request for /favicon.ico. Packet 14 is selected, showing an HTTP 404 Not Found response. The bottom pane shows the details of the selected packet (14), which is an HTTP 404 Not Found response. The 'Hypertext Transfer Protocol' section is expanded, showing the response body: <html>\nCongratulations. You've downloaded the file lab2-1.html!\n</html>\n. The status bar at the bottom indicates 'Text item (text), 8 bytes' and 'Packets: 17 · Displayed: 4 (23.5%)'.

No.	Time	Source	Destination	Protocol	Length	Info
10	4.694850	192.168.1.102	128.119.245.12	HTTP	555	GET /etherbase-labs/lab2-1.html HTTP/1.1
12	4.718993	128.119.245.12	192.168.1.102	HTTP	439	HTTP/1.1 200 OK (text/html)
13	4.724332	192.168.1.102	128.119.245.12	HTTP	541	GET /favicon.ico HTTP/1.1
14	4.750366	128.119.245.12	192.168.1.102	HTTP	1395	HTTP/1.1 404 Not Found (text/html)

Frame 12: 439 bytes on wire (3512 bits), 439 bytes captured (3512 bits) on interface 0  
Ethernet II, Src: LinksysG\_da:af:73 (00:06:25:da:af:73), Dst: Dell\_4f:36:23 (00:08:74:4f:36:23)  
Internet Protocol Version 4, Src: 128.119.245.12, Dst: 192.168.1.102  
Transmission Control Protocol, Src Port: 80, Dst Port: 4127, Seq: 1, Ack: 582, Len: 385  
Hypertext Transfer Protocol  
Line-based text data: text/html (3 lines)  
<html>\nCongratulations. You've downloaded the file lab2-1.html!\n</html>\n

Text item (text), 8 bytes  
Packets: 17 · Displayed: 4 (23.5%)  
Profile: Default

## Exercise4:

Q1: 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?

No, there is no “IF-MODIFIED-SINCE” line in the HTTP GET.

The screenshot shows a Wireshark packet capture of an HTTP GET request. The packet list at the top shows five packets. The selected packet (No. 8) is a GET request from 192.168.1.102 to 128.119.245.12. The packet details pane shows the Hypertext Transfer Protocol section expanded, displaying the request method (GET), request URI (/ethereal-labs/lab2-2.html), and various headers including Host, User-Agent, Accept, Accept-Language, Accept-Encoding, Accept-Charset, Keep-Alive, and Connection. The packet bytes pane shows the raw data of the request.

No.	Time	Source	Destination	Protocol	Length	Info
8	2.331268	192.168.1.102	128.119.245.12	HTTP	555	GET /ethereal-labs/lab2-2.html HTTP/1.1
10	2.357982	128.119.245.12	192.168.1.102	HTTP	739	HTTP/1.1 200 OK (text/html)
14	5.517390	192.168.1.102	128.119.245.12	HTTP	668	GET /ethereal-labs/lab2-2.html HTTP/1.1
15	5.548216	128.119.245.12	192.168.1.102	HTTP	243	HTTP/1.1 304 Not Modified

Frame 8: 555 bytes on wire (4440 bits), 555 bytes captured (4440 bits) on Ethernet II, Src: Dell44:4f:36:23 (08:00:74:4f:36:23), Dst: LinksysG\_daf:73 (08:06:25:da:af:73) Internet Protocol Version 4, Src: 192.168.1.102, Dst: 128.119.245.12 Transmission Control Protocol, Src Port: 4247, Dst Port: 80, Seq: 1, Ack: 1, Len: 501

Hypertext Transfer Protocol

GET /ethereal-labs/lab2-2.html HTTP/1.1

[Expert Info (Chat/Sequence): GET /ethereal-labs/lab2-2.html HTTP/1.1]

[GET /ethereal-labs/lab2-2.html HTTP/1.1]

[Severity level: Chat]

[Group: Sequence]

Request Method: GET

Request URI: /ethereal-labs/lab2-2.html

Request Version: HTTP/1.1

Host: gaia.cs.umass.edu

User-Agent: Mozilla/5.0 (Windows; U; Windows NT 5.1; en-US; rv:1.0.2) Gecko/20021120 Netscape/7.01

Accept: text/xml,application/xml,application/xhtml+xml,text/html;q=0.9,text/plain;q=0.8,video/x-mng,image/png,image/jpeg,image/gif;q=0.2,text/css,\*/\*;q=0.1

Accept-Language: en-us,en;q=0.5

Accept-Encoding: gzip, deflate, compress;q=0.9

Accept-Charset: ISO-8859-1, utf-8;q=0.66,\*/\*;q=0.66

Keep-Alive: 300

Connection: keep-alive

[Full request URI: http://gaia.cs.umass.edu/ethereal-labs/lab2-2.html]

[HTTP request 1/2]

[Response in frame: 10]

[Next request in frame: 14]

Q2: Does the response indicate the last time that the requested file was modified?

Yes, the last modified time of the requested file is Tue, 23 Sep 2003 05:35:00 GMT.

The screenshot shows a Wireshark packet capture of an HTTP 200 OK response. The packet list at the top shows five packets. The selected packet (No. 10) is a 200 OK response from 128.119.245.12 to 192.168.1.102. The packet details pane shows the Hypertext Transfer Protocol section expanded, displaying the response version (HTTP/1.1), status code (200), status code description (OK), response phrase (OK), date (Tue, 23 Sep 2003 05:35:00 GMT), server (Apache/2.0.40 (Red Hat Linux)), ETag, Accept-Ranges, Content-Length, Keep-Alive, Connection, Content-Type, and Content-Disposition. The packet bytes pane shows the raw data of the response.

No.	Time	Source	Destination	Protocol	Length	Info
8	2.331268	192.168.1.102	128.119.245.12	HTTP	555	GET /ethereal-labs/lab2-2.html HTTP/1.1
10	2.357982	128.119.245.12	192.168.1.102	HTTP	739	HTTP/1.1 200 OK (text/html)
14	5.517390	192.168.1.102	128.119.245.12	HTTP	668	GET /ethereal-labs/lab2-2.html HTTP/1.1
15	5.548216	128.119.245.12	192.168.1.102	HTTP	243	HTTP/1.1 304 Not Modified

Hypertext Transfer Protocol

HTTP/1.1 200 OK

[Expert Info (Chat/Sequence): HTTP/1.1 200 OK]

[HTTP/1.1 200 OK]

[Severity level: Chat]

[Group: Sequence]

Response Version: HTTP/1.1

Status Code: 200

[Status Code Description: OK]

Response Phrase: OK

Date: Tue, 23 Sep 2003 05:35:00 GMT

Server: Apache/2.0.40 (Red Hat Linux)

ETag: "1b1ef-173-8f4ae000"

Accept-Ranges: bytes

Content-Length: 371

Keep-Alive: timeout=10, max=100

Connection: Keep-Alive

Content-Type: text/html; charset=ISO-8859-1

[HTTP response 1/2]

[Time since request: 0.026634000 seconds]

[Request in frame: 8]

[Next request in frame: 14]

[Next response in frame: 15]

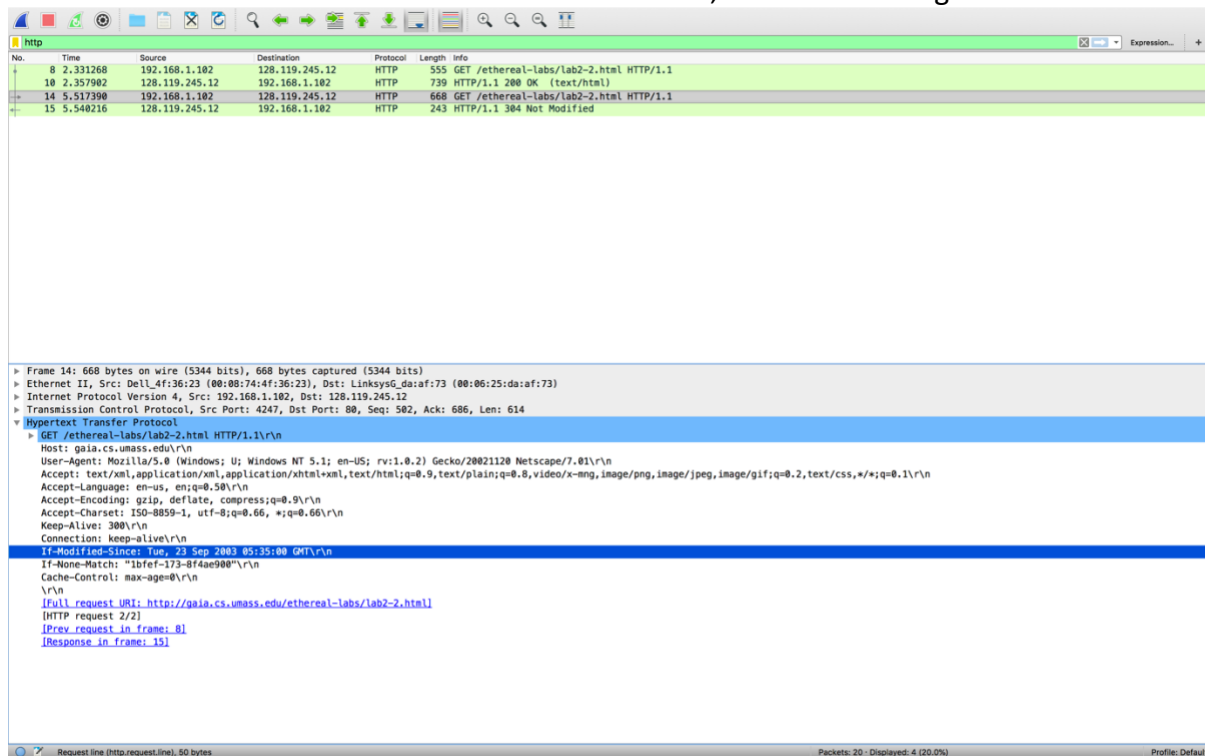
File Data: 371 bytes

Line-based text data: text/html (10 lines)

<html>

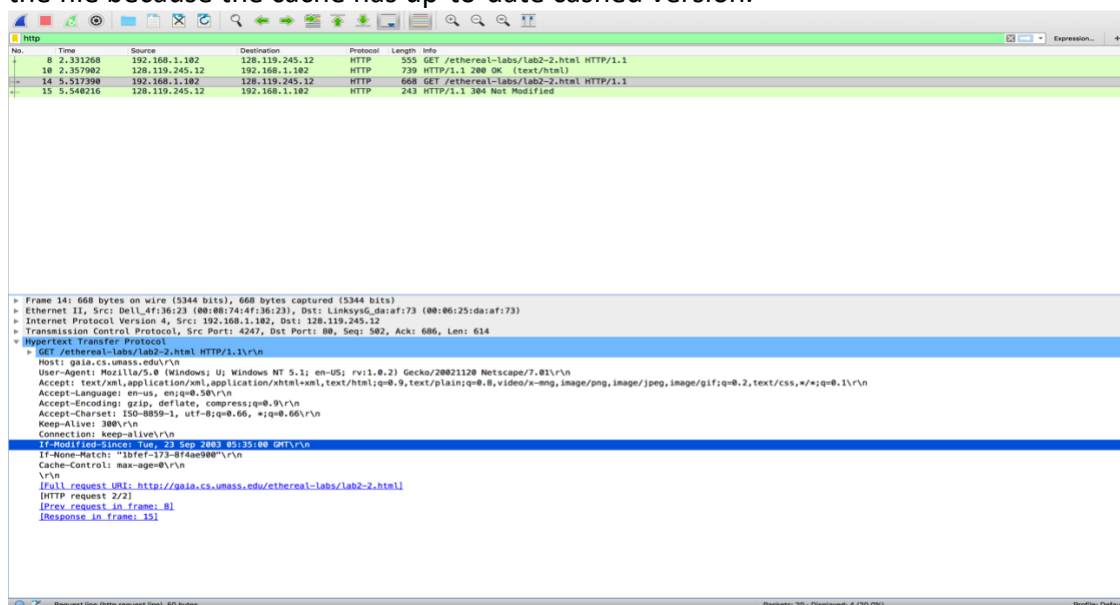
Q3: Now inspect the contents of the second HTTP GET request from the browser to the server. Do you see an “IF-MODIFIED-SINCE:” and “IF-NONE-MATCH” lines in the HTTP GET? If so, what information is contained in these header lines?

Yes. The information contained in If-Modified-Since header is Tue, 23 Sep 2003 05:35:00, which is the last modified time that the server sent to the browser. The If-None-Match header contains the text “1bfef-173-8f4ae900”, which is the ETag.



Q4: 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.

The HTTP status code returned from the server in response to this second HTTP GET is 304, and the Phrase is Not Modified. The server did not explicitly return the contents of the file because the cache has up-to-date cached version.



Q5: What is the value of the Etag field in the 2nd response message and how it is used? Has this value changed since the 1<sup>st</sup> response message was received?

The value of the Etag field in the 2<sup>nd</sup> response message is “1bfef-173-8f4ae900”, the browser will receive Etag in the first response packet from the Server, when the browser sends the next same request to the server, the value of the Etag will be taken into IF-NONE-MATCH field, then the server will check the file that the browser request and calculates the Etag again. If the value of the Etag matches with the Etag from the browser’s request, then the server will send 304 status code to browser to tell the browser that the file that it requested has not been modified since the last time it requested, which means that the file in the browser is up-to-date.

This value didn’t change since the 1<sup>st</sup> response message was received.

The image displays two screenshots of a Wireshark packet capture. The top screenshot shows the first three packets: a GET request (No. 8), a 200 OK response (No. 10), and another GET request (No. 14). The bottom screenshot shows the fourth packet (No. 15), which is an HTTP 304 Not Modified response. The packet list table in both screenshots is as follows:

No.	Time	Source	Destination	Protocol	Length	Info
8	2.331268	192.168.1.102	128.119.245.12	HTTP	555	GET /etherreal-labs/lab2-2.html HTTP/1.1
10	2.357982	128.119.245.12	192.168.1.102	HTTP	739	HTTP/1.1 200 OK (text/html)
14	5.517390	192.168.1.102	128.119.245.12	HTTP	668	GET /etherreal-labs/lab2-2.html HTTP/1.1
15	5.540216	128.119.245.12	192.168.1.102	HTTP	243	HTTP/1.1 304 Not Modified

The detailed view of the 304 response (No. 15) shows the following fields:

- Frame 15: 243 bytes on wire (1944 bits), 243 bytes captured (1944 bits)
- Ethernet II, Src: LinksysG\_da:af:73 (00:00:25:da:af:73), Dst: Dell\_4f:36:23 (00:00:74:4f:36:23)
- Internet Protocol Version 4, Src: 128.119.245.12, Dst: 192.168.1.102
- Transmission Control Protocol, Src Port: 80, Dst Port: 4247, Seq: 686, Ack: 1116, Len: 189
- Hypertext Transfer Protocol
  - HTTP/1.1 304 Not Modified
  - (Expert Info (Chat/Sequence): HTTP/1.1 304 Not Modified)
  - Response Version: HTTP/1.1
  - Status Code: 304
  - (Status Code Description: Not Modified)
  - Response Phrase: Not Modified
  - Date: Tue, 23 Sep 2003 05:35:53 GMT
  - Server: Apache/2.0.40 (Red Hat Linux)
  - Connection: Keep-Alive
  - Keep-Alive: timeout=10, max=99
  - Etag: "1bfef-173-8f4ae900"
- VLAN (HTTP response 2/2)
- [Time since request: 0.022826000 seconds]
- [Prev. request in frame: 8]
- [Prev. response in frame: 10]
- [Request in frame: 14]

## Exercise 5:

### Result:

```
Desktop — java PingServer 8888 — 80x24
Last login: Thu Aug 9 14:06:26 on ttys000
lijiachendeMacBook-Pro:~ lijiachen$ cd desktop
lijiachendeMacBook-Pro:desktop lijiachen$ java PingServer 8888
Received from 127.0.0.1: ping 1
  Reply sent.
Received from 127.0.0.1: ping 2
  Reply sent.
Received from 127.0.0.1: ping 3
  Reply not sent.
Received from 127.0.0.1: ping 4
  Reply sent.
Received from 127.0.0.1: ping 5
  Reply sent.
Received from 127.0.0.1: ping 6
  Reply not sent.
Received from 127.0.0.1: ping 7
  Reply not sent.
Received from 127.0.0.1: ping 8
  Reply sent.
Received from 127.0.0.1: ping 9
  Reply not sent.
Received from 127.0.0.1: ping 10
  Reply sent.
[]

Desktop — -bash — 80x24
Last login: Thu Aug 9 14:08:16 on ttys001
lijiachendeMacBook-Pro:~ lijiachen$ cd desktop
lijiachendeMacBook-Pro:desktop lijiachen$ java PingClient 127.0.0.1 8888
ping to /127.0.0.1, seq = 1, rtt = 228ms
ping to /127.0.0.1, seq = 2, rtt = 27ms
ping to /127.0.0.1, seq = 3, timeout
ping to /127.0.0.1, seq = 4, rtt = 60ms
ping to /127.0.0.1, seq = 5, rtt = 144ms
ping to /127.0.0.1, seq = 6, timeout
ping to /127.0.0.1, seq = 7, timeout
ping to /127.0.0.1, seq = 8, rtt = 72ms
ping to /127.0.0.1, seq = 9, timeout
ping to /127.0.0.1, seq = 10, rtt = 175ms
Average Time is 117ms, Max Time is 228ms, Min Time is 27ms
lijiachendeMacBook-Pro:desktop lijiachen$

Desktop — java PingServer 20000 — 80x24
Received from 127.0.0.1: ping 10
  Reply sent.
^ClijiachendeMacBook-Pro:desktop lijiachen$ java PingServer 20000
Received from 127.0.0.1: ping 1
  Reply sent.
Received from 127.0.0.1: ping 2
  Reply sent.
Received from 127.0.0.1: ping 3
  Reply sent.
Received from 127.0.0.1: ping 4
  Reply not sent.
Received from 127.0.0.1: ping 5
  Reply not sent.
Received from 127.0.0.1: ping 6
  Reply sent.
Received from 127.0.0.1: ping 7
  Reply sent.
Received from 127.0.0.1: ping 8
  Reply not sent.
Received from 127.0.0.1: ping 9
  Reply not sent.
Received from 127.0.0.1: ping 10
  Reply sent.
[]

Desktop — -bash — 80x24
ping to /127.0.0.1, seq = 1, rtt = 228ms
ping to /127.0.0.1, seq = 2, rtt = 27ms
ping to /127.0.0.1, seq = 3, timeout
ping to /127.0.0.1, seq = 4, rtt = 60ms
ping to /127.0.0.1, seq = 5, rtt = 144ms
ping to /127.0.0.1, seq = 6, timeout
ping to /127.0.0.1, seq = 7, timeout
ping to /127.0.0.1, seq = 8, rtt = 72ms
ping to /127.0.0.1, seq = 9, timeout
ping to /127.0.0.1, seq = 10, rtt = 175ms
Average Time is 117ms, Max Time is 228ms, Min Time is 27ms
lijiachendeMacBook-Pro:desktop lijiachen$ java PingClient 127.0.0.1 20000
ping to /127.0.0.1, seq = 1, rtt = 173ms
ping to /127.0.0.1, seq = 2, rtt = 75ms
ping to /127.0.0.1, seq = 3, rtt = 91ms
ping to /127.0.0.1, seq = 4, timeout
ping to /127.0.0.1, seq = 5, timeout
ping to /127.0.0.1, seq = 6, rtt = 15ms
ping to /127.0.0.1, seq = 7, rtt = 121ms
ping to /127.0.0.1, seq = 8, timeout
ping to /127.0.0.1, seq = 9, timeout
ping to /127.0.0.1, seq = 10, rtt = 71ms
Average Time is 91ms, Max Time is 173ms, Min Time is 15ms
lijiachendeMacBook-Pro:desktop lijiachen$
```