

Lab #1: Wireshark and Socket Programming

Networked Systems – ENSF 462, Lab B02

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Q1. Which of the following protocols are shown as appearing (i.e., are listed in the Wireshark “protocol” column) in your trace file: TCP, QUIC, HTTP, DNS, UDP, TLSv1.2?

The HTTP protocol is shown in the printed trace file for both the GET and OK messages.

Q2. How long did it take from when the HTTP GET message was sent until the HTTP OK reply was received? (By default, the value of the Time column in the packet-listing window is the amount of time, in seconds, since Wireshark tracing began. (If you want to display the Time field in time-of-day format, select the Wireshark View pull down menu, then select Time Display Format, then select Time-of-day.)

The GET message was sent at time 22.392135 with the OK message being received at time 22.463893. This means it took roughly 0.071758 seconds for the GET message to get an OK message in return.

Q3. What is the Internet address of the gaia.cs.umass.edu? What is the Internet address of your computer that sent the HTTP GET message?

The Internet address of the gaia website is 128.119.245.12 and the address of my computer sending the GET message is 192.168.1.78.

Q4. Expand the information on the HTTP message in the Wireshark “Details of selected packet” window so you can see the fields in the HTTP GET request message. What type of Web browser issued the HTTP request? The answer is shown at the right end of the information following the “User-Agent:” field in the expanded HTTP message display. [This field value in the HTTP message is how a web server learns what type of browser you are using.]

- Example: Firefox, Safari, Microsoft Internet Edge, Other

The web browser issuing the request (next to the User-Agent field) is listed as Mozilla/5.0.

Q5. Expand the information on the Transmission Control Protocol for this packet in the Wireshark “Details of selected packet” window so you can see the fields in the TCP segment carrying the HTTP message. What is the destination port number (the Lab 1 Getting Started with Wireshark Lab and Socket Programming number following “Dest Port:” for the TCP segment containing the HTTP request) to which this HTTP request is being sent?

The destination port number listed is 80.

Printed GET and OK Messages.

\\\\pp\\p_ppg p,

No. Time Source Destination Protocol Length Info

937 22.392135 192.168.1.78 128.119.245.12 HTTP 577 GET

/wireshark-labs/INTRO-wireshark-file1.html HTTP/1.1

Frame 937: 577 bytes on wire (4616 bits), 577 bytes captured (4616 bits) on interface

\\Device\\NPF_{DEB8B340-4738-4145-9CE0-725F4B8136F6}, id 0

Section number: 1

Interface id: 0 (\\Device\\NPF_{DEB8B340-4738-4145-9CE0-725F4B8136F6})

Interface name: \\Device\\NPF_{DEB8B340-4738-4145-9CE0-725F4B8136F6}

Interface description: Ethernet

Encapsulation type: Ethernet (1)

Arrival Time: Sep 30, 2025 16:34:42.560126000 Mountain Daylight Time

UTC Arrival Time: Sep 30, 2025 22:34:42.560126000 UTC

Epoch Arrival Time: 1759271682.560126000

[Time shift for this packet: 0.000000000 seconds]

[Time delta from previous captured frame: 0.000258000 seconds]

[Time delta from previous displayed frame: 0.000000000 seconds]

[Time since reference or first frame: 22.392135000 seconds]

Frame Number: 937

Frame Length: 577 bytes (4616 bits)

Capture Length: 577 bytes (4616 bits)

[Frame is marked: False]

[Frame is ignored: False]

[Protocols in frame: eth:ethertype:ip:tcp:http]

[Coloring Rule Name: HTTP]

[Coloring Rule String: http || tcp.port == 80 || http2]

Ethernet II, Src: Gold&WaterIn_07:91:f5 (70:70:fc:07:91:f5), Dst: Arcadyan_7f:61:30

(a8:a2:37:7f:61:30) Destination: Arcadyan_7f:61:30 (a8:a2:37:7f:61:30)

....0. = LG bit: Globally unique address (factory default)

....0. = IG bit: Individual address (unicast)

Source: Gold&WaterIn_07:91:f5 (70:70:fc:07:91:f5)

....0. = LG bit: Globally unique address (factory default)

....0. = IG bit: Individual address (unicast)

Type: IPv4 (0x0800)

[Stream index: 2]

Internet Protocol Version 4, Src: 192.168.1.78, Dst: 128.119.245.12

0100 = Version: 4

....0101 = Header Length: 20 bytes (5)

Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)

0000 00.. = Differentiated Services Codepoint: Default (0)

....00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)

Total Length: 563

Identification: 0x4839 (18489)

010. = Flags: 0x2, Don't fragment

0... = Reserved bit: Not set

.1... = Don't fragment: Set

..0. = More fragments: Not set
 ...0 0000 0000 0000 = Fragment Offset: 0
 Time to Live: 128
 Protocol: TCP (6)
 Header Checksum: 0x0000 [validation disabled]
 [Header checksum status: Unverified]
 Source Address: 192.168.1.78
 Destination Address: 128.119.245.12
 [Stream index: 32]
 Transmission Control Protocol, Src Port: 57423, Dst Port: 80, Seq: 1, Ack: 1, Len: 523
 Source Port: 57423
 Destination Port: 80
 [Stream index: 35]
 [Stream Packet Number: 4]
 [Conversation completeness: Complete, WITH_DATA (63)]
 ..1. = RST: Present
 ...1 = FIN: Present
 1... = Data: Present
1.. = ACK: Present
1. = SYN-ACK: Present
1 = SYN: Present
 [Completeness Flags: RFDASS]
 [TCP Segment Len: 523]
 Sequence Number: 1 (relative sequence number)
 Sequence Number (raw): 2351174818
 [Next Sequence Number: 524 (relative sequence number)]
 Acknowledgment Number: 1 (relative ack number)
 Acknowledgment number (raw): 1663662137
 0101 = Header Length: 20 bytes (5)
 Flags: 0x018 (PSH, ACK)
 000. = Reserved: Not set
 ...0 = Accurate ECN: Not set
 0... = Congestion Window Reduced: Not set
0.. = ECN-Echo: Not set
0. = Urgent: Not set
 \\pp\\p_ppg p,
1 = Acknowledgment: Set
 1... = Push: Set
0.. = Reset: Not set
0. = Syn: Not set
0 = Fin: Not set
 [TCP Flags:AP...]
 Window: 255
 [Calculated window size: 65280]
 [Window size scaling factor: 256]
 Checksum: 0x39a0 [unverified]
 [Checksum Status: Unverified]

Urgent Pointer: 0
[Timestamps]
[Time since first frame in this TCP stream: 0.071207000 seconds]
[Time since previous frame in this TCP stream: 0.000258000 seconds]
[SEQ/ACK analysis]
[iRTT: 0.070949000 seconds]
[Bytes in flight: 523]
[Bytes sent since last PSH flag: 523]
TCP payload (523 bytes)
Hypertext Transfer Protocol
GET /wireshark-labs/INTRO-wireshark-file1.html HTTP/1.1\r\n
Request Method: GET
Request URI: /wireshark-labs/INTRO-wireshark-file1.html
Request Version: HTTP/1.1
Host: gaia.cs.umass.edu\r\n
Connection: keep-alive\r\n
Upgrade-Insecure-Requests: 1\r\n
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko)
Chrome/138.0.0.0 Safari/537.36 OPR/122.0.0.0\r\n
Accept:
text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,image/apng,*/*;q=0.8,application/signedexchange;v=b3;q=0.7\r\n
Accept-Encoding: gzip, deflate\r\n
Accept-Language: en-US,en;q=0.9,ja;q=0.8,fr;q=0.7,pl;q=0.6,ko;q=0.5\r\n
\r\n
[Response in frame: 945]
[Full request URI: http://gaia.cs.umass.edu/wireshark-labs/INTRO-wireshark-file1.html]
No. Time Source Destination Protocol Length Info
945 22.463893 128.119.245.12 192.168.1.78 HTTP 492 HTTP/1.1 200 OK (text/html)Frame 945: 492
bytes on wire (3936 bits), 492 bytes captured (3936 bits) on interface
\Device\NPF_{DEB8B340-4738-4145-9CE0-725F4B8136F6}, id 0
Section number: 1
Interface id: 0 (\Device\NPF_{DEB8B340-4738-4145-9CE0-725F4B8136F6})
Interface name: \Device\NPF_{DEB8B340-4738-4145-9CE0-725F4B8136F6}
Interface description: Ethernet
Encapsulation type: Ethernet (1)
Arrival Time: Sep 30, 2025 16:34:42.631884000 Mountain Daylight Time
UTC Arrival Time: Sep 30, 2025 22:34:42.631884000 UTC
Epoch Arrival Time: 1759271682.631884000
[Time shift for this packet: 0.000000000 seconds]
[Time delta from previous captured frame: 0.000221000 seconds]
[Time delta from previous displayed frame: 0.071758000 seconds]
[Time since reference or first frame: 22.463893000 seconds]
Frame Number: 945
Frame Length: 492 bytes (3936 bits)
Capture Length: 492 bytes (3936 bits)
[Frame is marked: False]

[Frame is ignored: False]
[Protocols in frame: eth:ethertype:ip:tcp:http:data-text-lines]
[Coloring Rule Name: HTTP]
[Coloring Rule String: http || tcp.port == 80 || http2]
Ethernet II, Src: Arcadyan_7f:61:30 (a8:a2:37:7f:61:30), Dst: Gold&WaterIn_07:91:f5 (70:70:fc:07:91:f5) Destination: Gold&WaterIn_07:91:f5 (70:70:fc:07:91:f5)
....0. = LG bit: Globally unique address (factory default)
....0 = IG bit: Individual address (unicast)
Source: Arcadyan_7f:61:30 (a8:a2:37:7f:61:30)
....0. = LG bit: Globally unique address (factory default)
....0 = IG bit: Individual address (unicast)
Type: IPv4 (0x0800)
[Stream index: 2]
Internet Protocol Version 4, Src: 128.119.245.12, Dst: 192.168.1.78
0100 = Version: 4
....0101 = Header Length: 20 bytes (5)
Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
0000 00.. = Differentiated Services Codepoint: Default (0)
....00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)
Total Length: 478
Identification: 0x3f46 (16198)
010. = Flags: 0x2, Don't fragment
0... = Reserved bit: Not set
\\pp\\p_ppg p,
.1.. = Don't fragment: Set
..0. = More fragments: Not set
...0 0000 0000 0000 = Fragment Offset: 0
Time to Live: 46
Protocol: TCP (6)
Header Checksum: 0xd459 [validation disabled]
[Header checksum status: Unverified]
Source Address: 128.119.245.12
Destination Address: 192.168.1.78
[Stream index: 32]
Transmission Control Protocol, Src Port: 80, Dst Port: 57423, Seq: 1, Ack: 524, Len: 438
Source Port: 80
Destination Port: 57423
[Stream index: 35]
[Stream Packet Number: 6]
[Conversation completeness: Complete, WITH_DATA (63)]
..1. = RST: Present
...1 = FIN: Present
....1... = Data: Present
....1.. = ACK: Present
....1. = SYN-ACK: Present
....1 = SYN: Present
[Completeness Flags: RFDASS]

[TCP Segment Len: 438]
Sequence Number: 1 (relative sequence number)
Sequence Number (raw): 1663662137
[Next Sequence Number: 439 (relative sequence number)]
Acknowledgment Number: 524 (relative ack number)
Acknowledgment number (raw): 2351175341
0101 = Header Length: 20 bytes (5)
Flags: 0x018 (PSH, ACK)
000. = Reserved: Not set
...0 = Accurate ECN: Not set
.... 0... = Congestion Window Reduced: Not set
.... .0.. = ECN-Echo: Not set
.... ..0. = Urgent: Not set
.... ...1 = Acknowledgment: Set
.... 1... = Push: Set
....0.. = Reset: Not set
....0. = Syn: Not set
....0 = Fin: Not set
[TCP Flags:AP...]
Window: 237
[Calculated window size: 30336]
[Window size scaling factor: 128]
Checksum: 0x54c3 [unverified]
[Checksum Status: Unverified]
Urgent Pointer: 0
[Timestamps]
[Time since first frame in this TCP stream: 0.142965000 seconds]
[Time since previous frame in this TCP stream: 0.000221000 seconds]
[SEQ/ACK analysis]
[iRTT: 0.070949000 seconds]
[Bytes in flight: 438]
[Bytes sent since last PSH flag: 438]
TCP payload (438 bytes)
Hypertext Transfer Protocol
HTTP/1.1 200 OK\r\n
Response Version: HTTP/1.1
Status Code: 200
[Status Code Description: OK]
Response Phrase: OK
Date: Tue, 30 Sep 2025 22:34:41 GMT\r\n
Server: Apache/2.4.6 (CentOS) OpenSSL/1.0.2k-fips PHP/7.4.33 mod_perl/2.0.11 Perl/v5.16.3\r\n
Last-Modified: Tue, 30 Sep 2025 05:59:01 GMT\r\n
ETag: "51-63ffe72e099e4"\r\n
Accept-Ranges: bytes\r\n
Content-Length: 81\r\n
[Content length: 81]
Keep-Alive: timeout=5, max=100\r\n

Connection: Keep-Alive\r\n

Content-Type: text/html; charset=UTF-8\r\n

\r\n

[Request in frame: 937]

[Time since request: 0.071758000 seconds]

[Request URI: /wireshark-labs/INTRO-wireshark-file1.html]

[Full request URI: http://gaia.cs.umass.edu/wireshark-labs/INTRO-wireshark-file1.html]

File Data: 81 bytes

Line-based text data: text/html (3 lines)

<html>\n

\\pp\\p_ppg p,

Congratulations! You've downloaded the first Wireshark lab file!\n

</html>\n

No. Time Source Destination Protocol Length Info

965 22.915686 192.168.1.78 128.119.245.12 HTTP 523 GET /favicon.ico HTTP/1.1 Frame 965: 523 bytes on wire (4184 bits), 523 bytes captured (4184 bits) on interface

\Device\NPF_{DEB8B340-4738-4145-9CE0-725F4B8136F6}, id 0

Section number: 1

Interface id: 0 (\Device\NPF_{DEB8B340-4738-4145-9CE0-725F4B8136F6})

Interface name: \Device\NPF_{DEB8B340-4738-4145-9CE0-725F4B8136F6}

Interface description: Ethernet

Encapsulation type: Ethernet (1)

Arrival Time: Sep 30, 2025 16:34:43.083677000 Mountain Daylight Time

UTC Arrival Time: Sep 30, 2025 22:34:43.083677000 UTC

Epoch Arrival Time: 1759271683.083677000

[Time shift for this packet: 0.000000000 seconds]

[Time delta from previous captured frame: 0.103992000 seconds]

[Time delta from previous displayed frame: 0.451793000 seconds]

[Time since reference or first frame: 22.915686000 seconds]

Frame Number: 965

Frame Length: 523 bytes (4184 bits)

Capture Length: 523 bytes (4184 bits)

[Frame is marked: False]

[Frame is ignored: False]

[Protocols in frame: eth:ethertype:ip:tcp:http]

[Coloring Rule Name: HTTP]

[Coloring Rule String: http || tcp.port == 80 || http2]

Ethernet II, Src: Gold&WaterIn_07:91:f5 (70:70:fc:07:91:f5), Dst: Arcadyan_7f:61:30 (a8:a2:37:7f:61:30) Destination: Arcadyan_7f:61:30 (a8:a2:37:7f:61:30)

....0. = LG bit: Globally unique address (factory default)

....0. = IG bit: Individual address (unicast)

Source: Gold&WaterIn_07:91:f5 (70:70:fc:07:91:f5)

....0. = LG bit: Globally unique address (factory default)

....0. = IG bit: Individual address (unicast)

Type: IPv4 (0x0800)

[Stream index: 2]

Internet Protocol Version 4, Src: 192.168.1.78, Dst: 128.119.245.12

0100 = Version: 4
 0101 = Header Length: 20 bytes (5)
 Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
 0000 00.. = Differentiated Services Codepoint: Default (0)
00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)
 Total Length: 509
 Identification: 0x483b (18491)
 010. = Flags: 0x2, Don't fragment
 0... = Reserved bit: Not set
 .1.. = Don't fragment: Set
 ..0. = More fragments: Not set
 ...0 0000 0000 0000 = Fragment Offset: 0
 Time to Live: 128
 Protocol: TCP (6)
 Header Checksum: 0x0000 [validation disabled]
 [Header checksum status: Unverified]
 Source Address: 192.168.1.78
 Destination Address: 128.119.245.12
 [Stream index: 32]
 Transmission Control Protocol, Src Port: 57423, Dst Port: 80, Seq: 524, Ack: 439, Len: 469
 Source Port: 57423
 Destination Port: 80
 [Stream index: 35]
 [Stream Packet Number: 8]
 [Conversation completeness: Complete, WITH_DATA (63)]
 ..1. = RST: Present
 ...1 = FIN: Present
 1... = Data: Present
1.. = ACK: Present
1. = SYN-ACK: Present
1 = SYN: Present
 [Completeness Flags: RFDASS]
 [TCP Segment Len: 469]
 Sequence Number: 524 (relative sequence number)
 Sequence Number (raw): 2351175341
 [Next Sequence Number: 993 (relative sequence number)]
 Acknowledgment Number: 439 (relative ack number)
 Acknowledgment number (raw): 1663662575
 0101 = Header Length: 20 bytes (5)
 Flags: 0x018 (PSH, ACK)
 000. = Reserved: Not set
 ...0 = Accurate ECN: Not set
 0... = Congestion Window Reduced: Not set
0.. = ECN-Echo: Not set
 \\pp\\p_ppg p,
0. = Urgent: Not set
1 = Acknowledgment: Set

.... 1... = Push: Set
.... .0.. = Reset: Not set
.... ..0. = Syn: Not set
.... ...0 = Fin: Not set
[TCP Flags:AP...]
Window: 254
[Calculated window size: 65024]
[Window size scaling factor: 256]
Checksum: 0x396a [unverified]
[Checksum Status: Unverified]
Urgent Pointer: 0
[Timestamps]
[Time since first frame in this TCP stream: 0.594758000 seconds]
[Time since previous frame in this TCP stream: 0.401484000 seconds]
[SEQ/ACK analysis]
[iRTT: 0.070949000 seconds]
[Bytes in flight: 469]
[Bytes sent since last PSH flag: 469]
TCP payload (469 bytes)
Hypertext Transfer Protocol
GET /favicon.ico HTTP/1.1\r\n
Request Method: GET
Request URI: /favicon.ico
Request Version: HTTP/1.1
Host: gaia.cs.umass.edu\r\n
Connection: keep-alive\r\n
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko)
Chrome/138.0.0.0 Safari/537.36 OPR/122.0.0.0\r\n
Accept: image/avif,image/webp,image/apng,image/svg+xml,image/*,*/*;q=0.8\r\n
Referer: http://gaia.cs.umass.edu/wireshark-labs/INTRO-wireshark-file1.html\r\n
Accept-Encoding: gzip, deflate\r\n
Accept-Language: en-US,en;q=0.9,ja;q=0.8,fr;q=0.7,pl;q=0.6,ko;q=0.5\r\n
\r\n
[Response in frame: 966]
[Full request URI: http://gaia.cs.umass.edu/favicon.ico]
No. Time Source Destination Protocol Length Info
966 22.987610 128.119.245.12 192.168.1.78 HTTP 538 HTTP/1.1 404 Not Found (text/html)Frame 966:
538 bytes on wire (4304 bits), 538 bytes captured (4304 bits) on interface
\Device\NPF_{DEB8B340-4738-4145-9CE0-725F4B8136F6}, id 0
Section number: 1
Interface id: 0 (\Device\NPF_{DEB8B340-4738-4145-9CE0-725F4B8136F6})
Interface name: \Device\NPF_{DEB8B340-4738-4145-9CE0-725F4B8136F6}
Interface description: Ethernet
Encapsulation type: Ethernet (1)
Arrival Time: Sep 30, 2025 16:34:43.155601000 Mountain Daylight Time
UTC Arrival Time: Sep 30, 2025 22:34:43.155601000 UTC
Epoch Arrival Time: 1759271683.155601000

[Time shift for this packet: 0.000000000 seconds]
 [Time delta from previous captured frame: 0.071924000 seconds]
 [Time delta from previous displayed frame: 0.071924000 seconds]
 [Time since reference or first frame: 22.987610000 seconds]
 Frame Number: 966
 Frame Length: 538 bytes (4304 bits)
 Capture Length: 538 bytes (4304 bits)
 [Frame is marked: False]
 [Frame is ignored: False]
 [Protocols in frame: eth:ethertype:ip:tcp:http:data-text-lines]
 [Coloring Rule Name: HTTP]
 [Coloring Rule String: http || tcp.port == 80 || http2]
 Ethernet II, Src: Arcadyan_7f:61:30 (a8:a2:37:7f:61:30), Dst: Gold&WaterIn_07:91:f5 (70:70:fc:07:91:f5) Destination: Gold&WaterIn_07:91:f5 (70:70:fc:07:91:f5)
0. = LG bit: Globally unique address (factory default)
0 = IG bit: Individual address (unicast)
 Source: Arcadyan_7f:61:30 (a8:a2:37:7f:61:30)
0. = LG bit: Globally unique address (factory default)
0 = IG bit: Individual address (unicast)
 Type: IPv4 (0x0800)
 [Stream index: 2]
 Internet Protocol Version 4, Src: 128.119.245.12, Dst: 192.168.1.78
 0100 = Version: 4
 0101 = Header Length: 20 bytes (5)
 Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
 0000 00.. = Differentiated Services Codepoint: Default (0)
00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)
 Total Length: 524
 Identification: 0x3f47 (16199)
 010. = Flags: 0x2, Don't fragment
 0... = Reserved bit: Not set
 \\pp\\p_ppg p,
 .1.. = Don't fragment: Set
 ..0. = More fragments: Not set
 ...0 0000 0000 0000 = Fragment Offset: 0
 Time to Live: 46
 Protocol: TCP (6)
 Header Checksum: 0xd42a [validation disabled]
 [Header checksum status: Unverified]
 Source Address: 128.119.245.12
 Destination Address: 192.168.1.78
 [Stream index: 32]
 Transmission Control Protocol, Src Port: 80, Dst Port: 57423, Seq: 439, Ack: 993, Len: 484
 Source Port: 80
 Destination Port: 57423
 [Stream index: 35]
 [Stream Packet Number: 9]

[Conversation completeness: Complete, WITH_DATA (63)]
..1. = RST: Present
...1 = FIN: Present
.... 1... = Data: Present
.... .1.. = ACK: Present
.... ..1. = SYN-ACK: Present
.... ...1 = SYN: Present
[Completeness Flags: RFDASS]
[TCP Segment Len: 484]
Sequence Number: 439 (relative sequence number)
Sequence Number (raw): 1663662575
[Next Sequence Number: 923 (relative sequence number)]
Acknowledgment Number: 993 (relative ack number)
Acknowledgment number (raw): 2351175810
0101 = Header Length: 20 bytes (5)
Flags: 0x018 (PSH, ACK)
000. = Reserved: Not set
...0 = Accurate ECN: Not set
.... 0... = Congestion Window Reduced: Not set
.... .0.. = ECN-Echo: Not set
.... ..0. = Urgent: Not set
.... ...1 = Acknowledgment: Set
.... 1... = Push: Set
....0.. = Reset: Not set
....0. = Syn: Not set
....0 = Fin: Not set
[TCP Flags:AP...]
Window: 245
[Calculated window size: 31360]
[Window size scaling factor: 128]
Checksum: 0xa668 [unverified]
[Checksum Status: Unverified]
Urgent Pointer: 0
[Timestamps]
[Time since first frame in this TCP stream: 0.666682000 seconds]
[Time since previous frame in this TCP stream: 0.071924000 seconds]
[SEQ/ACK analysis]
[This is an ACK to the segment in frame: 965]
[The RTT to ACK the segment was: 0.071924000 seconds]
[iRTT: 0.070949000 seconds]
[Bytes in flight: 484]
[Bytes sent since last PSH flag: 484]
TCP payload (484 bytes)
Hypertext Transfer Protocol
HTTP/1.1 404 Not Found\r\n
Response Version: HTTP/1.1
Status Code: 404

[Status Code Description: Not Found]
Response Phrase: Not Found
Date: Tue, 30 Sep 2025 22:34:41 GMT\r\n
Server: Apache/2.4.6 (CentOS) OpenSSL/1.0.2k-fips PHP/7.4.33 mod_perl/2.0.11 Perl/v5.16.3\r\n
Content-Length: 209\r\n
[Content length: 209]
Keep-Alive: timeout=5, max=99\r\n
Connection: Keep-Alive\r\n
Content-Type: text/html; charset=iso-8859-1\r\n\r\n
[Request in frame: 965]
[Time since request: 0.071924000 seconds]
[Request URI: /favicon.ico]
[Full request URI: http://gaia.cs.umass.edu/favicon.ico]
File Data: 209 bytes

Line-based text data: text/html (7 lines)
<!DOCTYPE HTML PUBLIC "-//IETF//DTD HTML 2.0//EN">\n
<html><head>\n
\\pp\\p_ppg p,
<title>404 Not Found</title>\n
</head><body>\n
<h1>Not Found</h1>\n
<p>The requested URL /favicon.ico was not found on this server.</p>\n
</body></html>\n

TCP Port Number

The image shows a Wireshark packet capture of an HTTP 404 Not Found response. The packet list on the left shows a GET request for /favicon.ico from 192.168.1.78 to 192.168.1.110. The selected packet (No. 5208) is the corresponding HTTP response. The packet details pane on the right shows the structure of the HTTP response, including the status line: 200 OK (text/html). The packet bytes pane on the right shows the raw data of the response, which is the HTML content of the 404 error page.

Frame 5208: 688 bytes on wire (5504 bits), 688 bytes captured (5504 bits) on interface Device\NPF_{DEB88340-4738-41...}

Ethernet II, Src: GoldstarIn (97:91:f5:70:20:fc:07:91:f5), Dst: Arcadyan_Ff61:30 (a8:a2:37:7f:61:30)

Internet Protocol Version 4, Src: 192.168.1.78, Dst: 192.168.1.110

Transmission Control Protocol, Src Port: 58469, Dst Port: 80, Seq: 1, Ack: 1, Len: 634

Source Port: 58469

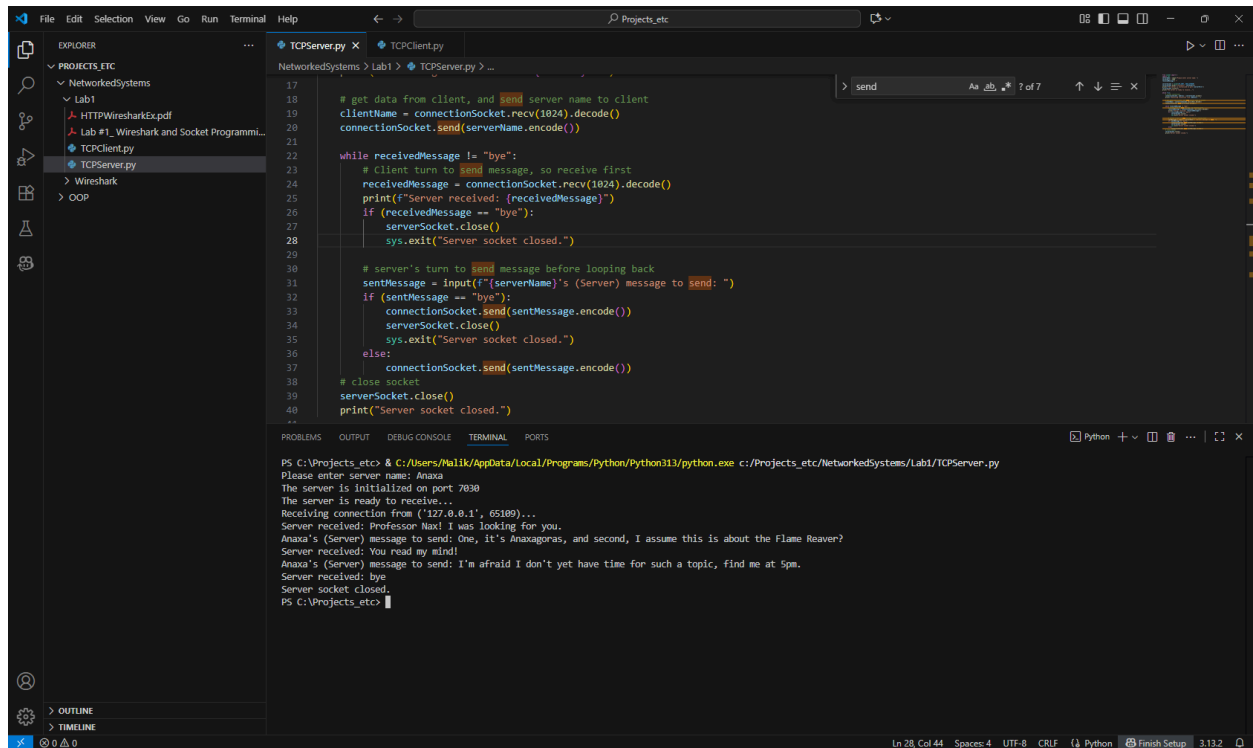
Destination Port: 80

[Stream index: 22]
[Stream Packet Number: 4]
[Conversation completeness: Complete, WITH_DATA (31)]
[TCP Segment Len: 634]
Sequence Number: 1 (relative sequence number)
Sequence Number (raw): 69039724
[Next Sequence Number: 635 (relative sequence number)]
Acknowledgment Number: 1 (relative ack number)
Acknowledgment Number (raw): 287567592
0101 = Header Length: 20 bytes (5)
Flags: 0x018 (PSH, ACK)
Window: 255
[Calculated window size: 65280]
[Window size scaling factor: 256]
Checksum: 0x3a0f (Unverified)
[Checksum Status: Unverified]
Urgent Pointer: 0
[Timestamps]
[SISO/ACK analysis]
TCP payload (634 bytes)
Hypertext Transfer Protocol

0020 f5 0c e4 65 00 50 29 26 a0 8c bd fe 6b e8 50 18 ...-2015k.p.
0030 00 ff 3a 0f 00 00 47 45 54 20 2f 7f 69 72 65 73GE T. Adres
0040 68 61 72 6b 2d 6c 61 62 73 2f 49 4e 54 52 4f 2d hark-lab s/INTRO-
0050 77 69 72 65 73 68 61 72 60 2d 66 69 6c 65 31 2e wreshar k-file1.
0060 68 74 6d 6c 20 40 54 54 50 2f 31 2e 31 6d 0a 48 html HTTP P/1.1 H
0070 6f 73 74 3a 20 67 61 69 61 2e 63 73 2e 75 6d 61 ost: gai a.cs.uma
0080 73 73 2e 65 64 75 6d 0a 43 6f 6e 6e 65 63 74 69 ss.edu: Connecti
0090 6f 6e 3a 20 65 65 65 70 2d 61 6c 69 76 65 6d 6a ons: keep-alive
00a0 43 61 61 68 65 2d 43 6f 6e 74 72 6f 6c 3a 20 6d Cache-Co ntrol: m
00b0 61 78 2d 61 67 65 3d 30 0d 0a 55 70 67 72 61 64 ax-age=0 Upgrad
00c0 65 2d 49 6e 73 65 61 75 72 65 2d 52 65 71 75 65 e-Insecu re-Reqe
00d0 73 74 73 3a 20 31 6d 0a 55 73 65 72 2d 41 67 65 stat: 1 User-Age
00e0 6e 74 3a 20 4d 6f 7a 69 6c 6c 61 2f 35 2e 30 20 nt: Mozil lla/5.0
00f0 20 57 69 6e 64 6f 77 73 20 4e 54 20 31 30 2e 30 (Windows NT 10.0
0100 30 20 57 69 6e 36 3a 30 20 70 36 3a 20 20 41 70 s; win4; x64) Ap
0110 70 6c 65 57 65 62 4b 69 74 2f 35 33 37 2e 33 36 plewebk t/537.36
0120 20 28 4b 48 54 4d 4c 2c 20 6c 69 6b 65 20 47 65 (KHTML, like Ge
0130 63 6b 6f 20 2b 43 68 72 6f 6d 65 2f 31 32 30 2e cko) Chr one/130.
0140 30 2e 30 2e 30 20 53 61 66 61 72 69 2f 35 33 37 0.0.0 Sa far/1337
0150 2e 33 36 20 4f 50 52 2f 31 32 32 2e 30 2e 30 2e .36 OPR/ 122.0.0.
0160 30 6d 0a 41 63 63 65 70 74 3a 20 74 65 70 74 2f 0 Accp t: text/
0170 68 74 6d 6c 2c 61 70 70 6c 6c 69 63 61 74 69 6f 6e /html,app lication
0180 2f 78 68 74 6d 6c 2b 78 6d 6c 2c 61 70 70 6c 69 /xhtml,x ml,appli
0190 63 61 74 69 6f 6e 2f 78 6d 6c 3b 71 3d 30 2e 39 cation/x ml;q=0.9
01a0 2c 69 6d 61 67 65 2f 61 76 69 6e 2c 69 6d 61 67 ,image/a vif,imag
01b0 65 2f 77 65 62 70 2c 69 6d 61 67 65 2f 61 70 6e e/webp,1 mage/apn
01c0 67 2c 2a 2f 2a 3b 71 3d 30 2e 38 2c 61 70 70 6c g,/*;q= 0.8,appl
01d0 69 63 61 74 69 6f 6e 2f 73 69 67 6e 65 6d 2d 65 ication/ signed-e
01e0 78 63 68 61 6e 67 65 3b 70 3d 62 33 3b 71 3d 30 xchange; v=b3;q=0

Packets: 6792 - Displayed: 4 (0.1%) - Dropped: 0 (0.0%) Profile: Default

Socket Programming Output

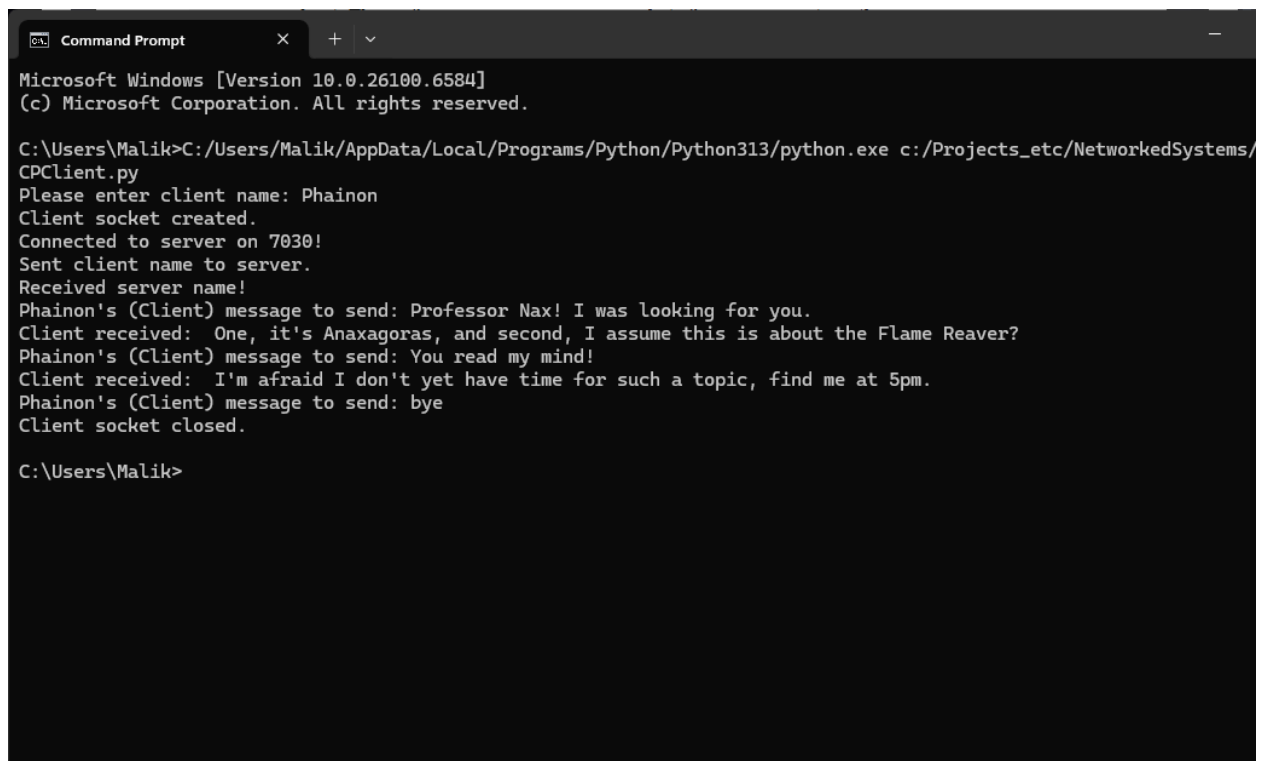


The screenshot shows the Visual Studio Code editor with a file named `TCPServer.py` open. The code is a Python script for a TCP server. The terminal at the bottom shows the execution of the script, which prompts for a server name, initializes on port 7030, and receives connections from '127.0.0.1'. The server receives messages from a client named 'Phainon' and responds accordingly.

```
17
18 # get data from client, and send server name to client
19 clientName = connectionSocket.recv(1024).decode()
20 connectionSocket.send(serverName.encode())
21
22 while receivedMessage != "bye":
23     # client turn to send message, so receive first
24     receivedMessage = connectionSocket.recv(1024).decode()
25     print("Server received: (receivedMessage)")
26     if (receivedMessage == "bye"):
27         serverSocket.close()
28         sys.exit("Server socket closed.")
29
30 # server's turn to send message before looping back
31 sentMessage = input("(serverName)'s (Server) message to send: ")
32 if (sentMessage == "bye"):
33     connectionSocket.send(sentMessage.encode())
34     serverSocket.close()
35     sys.exit("Server socket closed.")
36 else:
37     connectionSocket.send(sentMessage.encode())
38
39 # close socket
40 serverSocket.close()
41 print("Server socket closed.")
```

Terminal Output:

```
PS C:\Projects_etc> & C:/Users/Malik/AppData/Local/Programs/Python/Python313/python.exe c:/Projects_etc/NetworkedSystems/Lab1/TCPServer.py
Please enter server name: Anaxa
The server is initialized on port 7030
The server is ready to receive...
Receiving connection from ('127.0.0.1', 65109)...
Server received: Professor Nax! I was looking for you.
Anaxa's (Server) message to send: One, it's Anaxagoras, and second, I assume this is about the Flame Reaver?
Server received: You read my mind!
Anaxa's (Server) message to send: I'm afraid I don't yet have time for such a topic, find me at 5pm.
Server received: bye
Server socket closed.
PS C:\Projects_etc>
```



The screenshot shows a Windows Command Prompt window with the output of the `CPClient.py` script. The client prompts for a client name, connects to the server on port 7030, and sends messages to the server. The server responds with the client's name and the messages sent.

```
Microsoft Windows [Version 10.0.26100.6584]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Malik>C:/Users/Malik/AppData/Local/Programs/Python/Python313/python.exe c:/Projects_etc/NetworkedSystems/CPClient.py
Please enter client name: Phainon
Client socket created.
Connected to server on 7030!
Sent client name to server.
Received server name!
Phainon's (Client) message to send: Professor Nax! I was looking for you.
Client received: One, it's Anaxagoras, and second, I assume this is about the Flame Reaver?
Phainon's (Client) message to send: You read my mind!
Client received: I'm afraid I don't yet have time for such a topic, find me at 5pm.
Phainon's (Client) message to send: bye
Client socket closed.

C:\Users\Malik>
```