

# **Computer Networks**

## **Assignment-3**

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### **Part 1 (HTTP)**

#### **The Basic HTTP GET/RESPONSE interaction**

1. Both are running HTTP 1.1 . Accept-Language: en-US,en;
2. IP address of computer is 10.1.39.82 and of gaia.cs.umass.edu server is 10.4.20.103
3. HTTP/1.1 200 OK
4. Last-Modified: Sat, 17 Feb 2018 06:59:01 GMT
5. Content-Length: 128

#### **The HTTP CONDITIONAL GET/response Interaction**

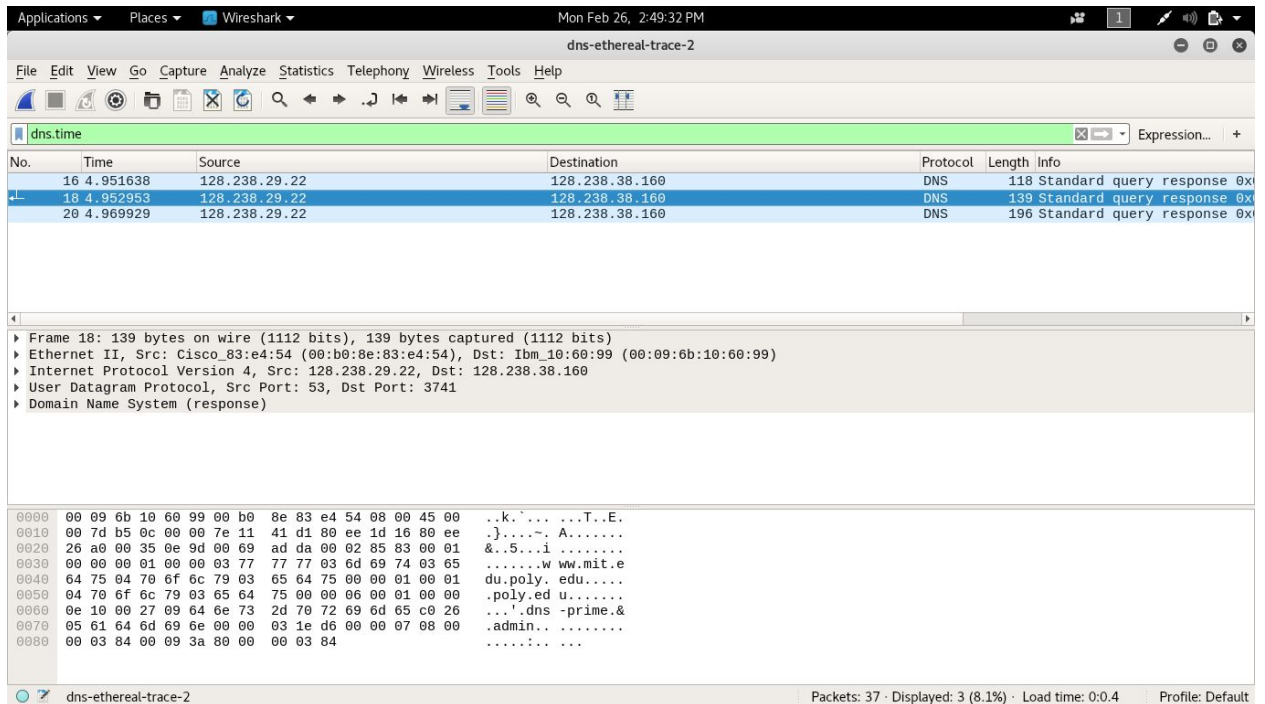
1. No.
2. Yes because we can see the contents in the Line-based text data field.
3. Yes. The information following is: If-Modified-Since: Sat, 17 Feb 2018 06:59:01 GMT . It is the date of the last modification of the file from the previous get request.

4. The status code and phrase returned from the server is HTTP/1.1 304 Not Modified. The server didn't return the contents of the file because the browser loaded it from its cache.

## Part 2 (DNS)

1. UDP is used here.  
**NOTE** - DNS goes over TCP when the size of the request or the response is greater than a single packet such as with responses that have many records or many IPv6 responses or most DNSSEC responses. The Transmission Control Protocol (TCP) is used when the response data size exceeds 512 bytes.
2. There were 2 answers containing information about the name of the host, the type of address, class, the TTL, the data length and the IP address.
3. Yes. They both provide 132.151.6.75 (type A message as well as destination IP address of the SYN packet) It corresponds to the first IP address provided in the DNS response message.
4. No

## 5. Sort queries according to DNS response time.



- Destination port of DNS query message: 53 Source port of DNS response message: 53
- The DNS query message is a type “A” query, containing only 1 question and not containing any answers.
- The response message contains 3 answers to the query which is the type “A” address of <http://www.mit.edu> . These answers contain RRs of type CNAME and A.
- DNS query message is sent to IP address 128.238.29.22 . Yes
- It’s a type NS DNS query that doesn’t contain any answers.
- The response message provides 3 MIT nameservers:  
w20ns.mit.edu[18.70.0.160], strawb.mit.edu[18.71.0.150],  
bitsy.mit.edu[18.72.0.3]. Their IP addresses can be found in Additional records section.

## Part 3 (TCP)

1. Source - IP address: 192.168.1.102, Port Number: 1161
2. Destination - IP address 128.119.245.12, Port Number: 80

1. Sequence number of the TCP SYN segment is used to initiate the TCP connection between the client computer and gaia.cs.umass.edu. The value is 0 in the given trace. The SYN flag is set to 1 (Set) which indicates that this segment is a SYN segment.
2. Sequence number of the SYNACK segment from gaia.cs.umass.edu to the client computer in reply to the SYN has the value of 0 in this trace. The value of the ACKnowledgement field in the SYNACK segment is 1. The value of the ACKnowledgement field in the SYNACK segment is determined by gaia.cs.umass.edu by adding 1 to the initial sequence number of SYN segment from the client computer (i.e. the sequence number of the SYN segment initiated by the client computer is 0.) In this case, the initial sequence number of the SYN segment from the client computer is 0, thus the value of the acknowledgement field in the SYN\_ACK segment is 1. The SYN flag and Acknowledgement flag in the segment are set to 1 (Set) and they indicate that this segment is a SYNACK segment.
3. 4th segment is the TCP segment containing the HTTP POST command. The sequence number of this segment has the value of 1.
4. Length of 1st TCP segment is 565 bytes and length of other 5 TCP segments is 1460 bytes.
5. The minimum amount of buffer space (receiver window) advertised at gaia.cs.umass.edu for the entire trace is 5840 byte. Its shown in the 2nd packet info which has first ACK from the server. The sender is never throttled due to lacking of receiver buffer space.
6. There are no retransmitted segments in the trace file. We can verify this by checking the sequence numbers of the TCP segments in the given trace. They should increase monotonically.

## Part 4 (UDP)

1. The UDP header contains 4 fields: source port, destination port, length, and checksum.
2. It includes 34 data bytes plus 8 bytes for header. (4 fields, 2 bytes per field. Total 8 bytes)
3. Yes, source address is same as my IP address (10.1.39.82)
4. 10.4.20.22
5.  $65535 - 8 = 65527$  bytes ( $2^{16} - 1$  - header size)
6.  $2^{16} - 1 = 65535$
7. The IP protocol number for UDP is 0x11 hex system. (17 in decimal system)
8. The UDP checksum is calculated as the 16-bit one's complement of the one's complement sum of a pseudo header of information from the IP header, the UDP header, and the data. This is padded as needed with zero bytes at the end to make a multiple of 2 bytes.
9. The source port of the UDP packet sent by the host is the same as the destination port of the reply packet, and conversely the destination port of the UDP packet sent by the host is the same as the source port of the reply packet.