Student Answer Script View

MIT BLR - 3rd-5th and 7th Semester - Mid Term Examination - September 2024 Answer Sheet

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Year/Sem:	Semester 5
Subject Name:	Computer Networks
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14.00

30.00

Q.No : 1) Score : 1.00 / 1.00

An HTTP client wants to retrieve a web document from a given URL, but the IP address of the server is initially unknown. What transport and application-layer protocols, besides HTTP, are required to retrieve the document

DNS and UDP | DNS and TCP | ARP and UDP | FTP and TCP

Q.No : 2) **Score : 1.00 / 1.00**

If a signal travels a distance of 500 meters through a medium where the propagation speed is 2×10^8 meters per second , the propagation delay would be

- 2.5 microseconds
- 5 microseconds
- 1.5 microseconds
- None of these

Q.No : 3) Score : 1.00 / 1.00

Consider a link with a transmission rate of 100 Mbps. If the transmission delay for a packet is 4 milliseconds, what is the size of the packet

50,000 bits | 400,000 bits | 5,000 bits | 4,000 bits

Q.No : 4) **Score : 1.00 / 1.00**

Which of the following is true about HTTP persistent connections (HTTP keep-alive)

It keeps the server-side connection open for multiple clients	It allows multiple requests and responses between the client and server over a single TCP connection	It is only available in HTTP/2	It reduces server load but increases client-side delay

Q.No : 5) **Score : 1.00 / 1.00**

Which of the following statements is correct with respect to the File Transfer Protocol (FTP)

FTP uses a single connection for control and data transmission	FTP uses the User Datagram Protocol (UDP) for data transmission	FTP uses separate control and data connections	FTP encrypts all data transmissions for security

Q.No : 6) **Score : 0.00 / 1.00**

In the context of email protocols, which of the following statements is correct

SMTP is used to pull emails from a mail server	IMAP allows a user to access their email without downloading them	POP3 keeps emails on the server after retrieval	Both IMAP and POP3 are used to send emails

Q.No : 7) **Score : 0.00 / 1.00**

If a network can transfer 25 megabytes (MB) of data in 5 seconds, the throughput is

20 Mbps | 40 Mbps | 60 Mbps | 2.5Mbps

Q.No : 8) **Score : 0.00 / 1.00**

Which of the following statements about the Domain Name System (DNS) is true

DNS uses TCP for resolving hostnames	DNS always provides recursive query resolution	DNS uses a distributed database structure	DNS guarantees that all records are globally consistent

Q.No : 9) **Score : 0.00 / 1.00**

If the length of the whole UDP packet is 28 bytes. Then what is the length of the data

28 16 8 20

Q.No : 10) Score : 0.00 / 1.00

A UDP message is 512 bytes long. How many such UDP messages can be sent in 1 second over a link with a transmission rate of 10 Mbps

1953 2441 2048 1875

Q.No : 11 A) **Score : 2.00 / 5.00**

Let's consider a simple example with the following assumptions: The packet travels through 3 routers (4 links in total). Packet size L = 1500 bytes (12,000 bits). Each link has a transmission rate R = 10 Mbps.

Each link has a length d = 100 km, with a propagation speed s = 2×10^8 m/s

Processing delay at each router Dproc = 1 ms. Queuing delay at each router Dqueue = 2 ms.

Calculate the end-to-end delay

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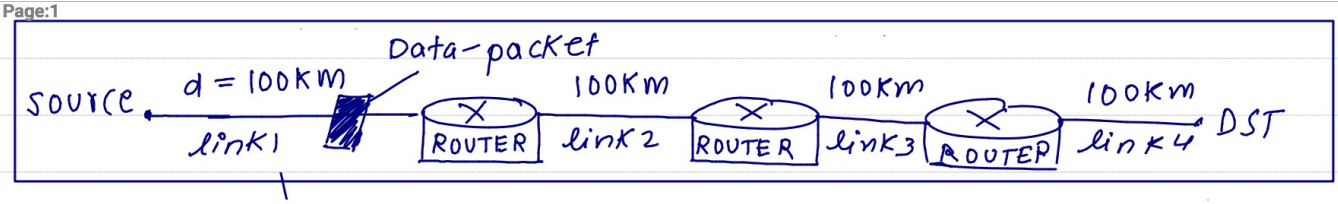

Senario: $D_{processing\ delay} = 1ms^{-1}$ $Q_{queing\ delay} = 2ms^{-1}$

(s) propagation speed $= 2 \times 10^8$ m/s

(d) = 100km

packet length (L) = 1500
12000 bits

transmission rate (R) = 10Mbps

End to end delay = $d_{pros} + d_{queing} + d_{transit} + d_{propagation}$

$d_{transmission} = \frac{L}{R}$ $d_{propagation} = \frac{d}{s}$

$d_{transmission\ delay} = \frac{L}{R} = \frac{12000\ bits}{10000\ bits/ms}$ 1.2 ms

$d_{propagation\ delay} = \frac{d}{s} = \frac{100km + 100km + 100km + 100km}{2 \times 10^8\ ms}$

$= \frac{400km}{2 \times 10^8 ms^{-1}}$

1 km = 1000 meters

$= \frac{400000\ meters}{2 \times 10^8\ meters/seconds}$

$= \frac{4 \times 10^5 m}{2 \times 10^8 m} = 2 \times 10^{5-8}$

$= 2 \times 10^{-3}$

$= 0.002$ seconds

= 0.02 miliseconds
0.02 ms

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$\therefore$ End-to-End delay $= d_{processing} + d_{queing} + d_{trans} + d_{propagation}$

$= 1ms + 2ms + 1.2ms + 0.02ms$

$= 3.2ms + 0.62$

$\boxed{3.22ms}$

Q.No : 11 B) **Score : 5.00 / 5.00**

Consider a **pseudoheader** which is the part of the header of the IP packet and in which the user datagram is to be encapsulated is as follows

Source IP: 192.168.1.1

Destination IP: 192.168.1.2

Protocol (UDP): 17

UDP Length: 16

UDP Header

Source Port: 1234 → 04D2

Destination Port: 5678 → 162E

Length: 16 → 0010

Checksum: 0000

Data

6865 6C6C 6F00

Compute the checksum for the above UDP details

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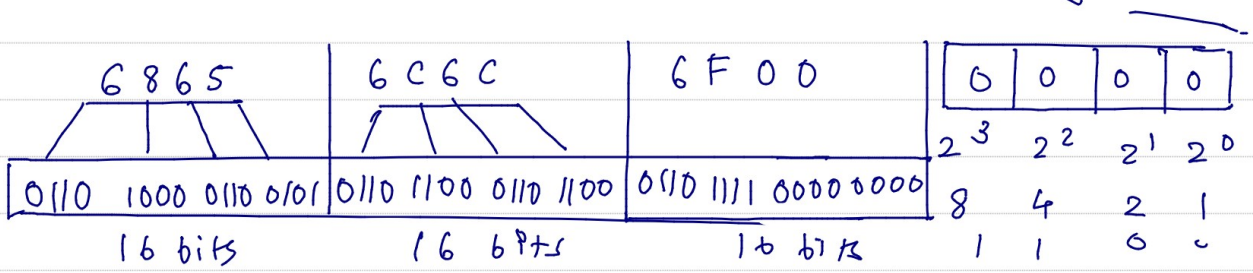
step 1:-

The data encapsulated in the UDP must be calculated and converted into binary



A B C D E F

10 11 12 13 14 15

length 16 → 0010

checksum: 0000

0110 1000 0110 0101 | 0110 1100 0110 1100 | 0110 1111 0000 0000

1001 0111 1001 1010 1001 0011 1001 0011 1001 0000 1111 1111

1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111

+

check for 1's complement

0000 0000 0000 0000

1

BIT overflow

shifting sequence by 1 bit will result

1000 0000 0000 0000 0000 0000 0000 0000 0000 0000 1000

checksum computed.

Q.No : 12 B) **Score : 2.00 / 5.00**

Describe how Web caching can reduce the delay in receiving a requested object. Will Web caching reduce the delay for all objects requested by a user or for only some of the objects? Why?

Correct the following snippet of socket programs and justify the correction

```
if (listen(server_fd, 0) < 0) {
perror("listen");
exit(EXIT_FAILURE);
}
```

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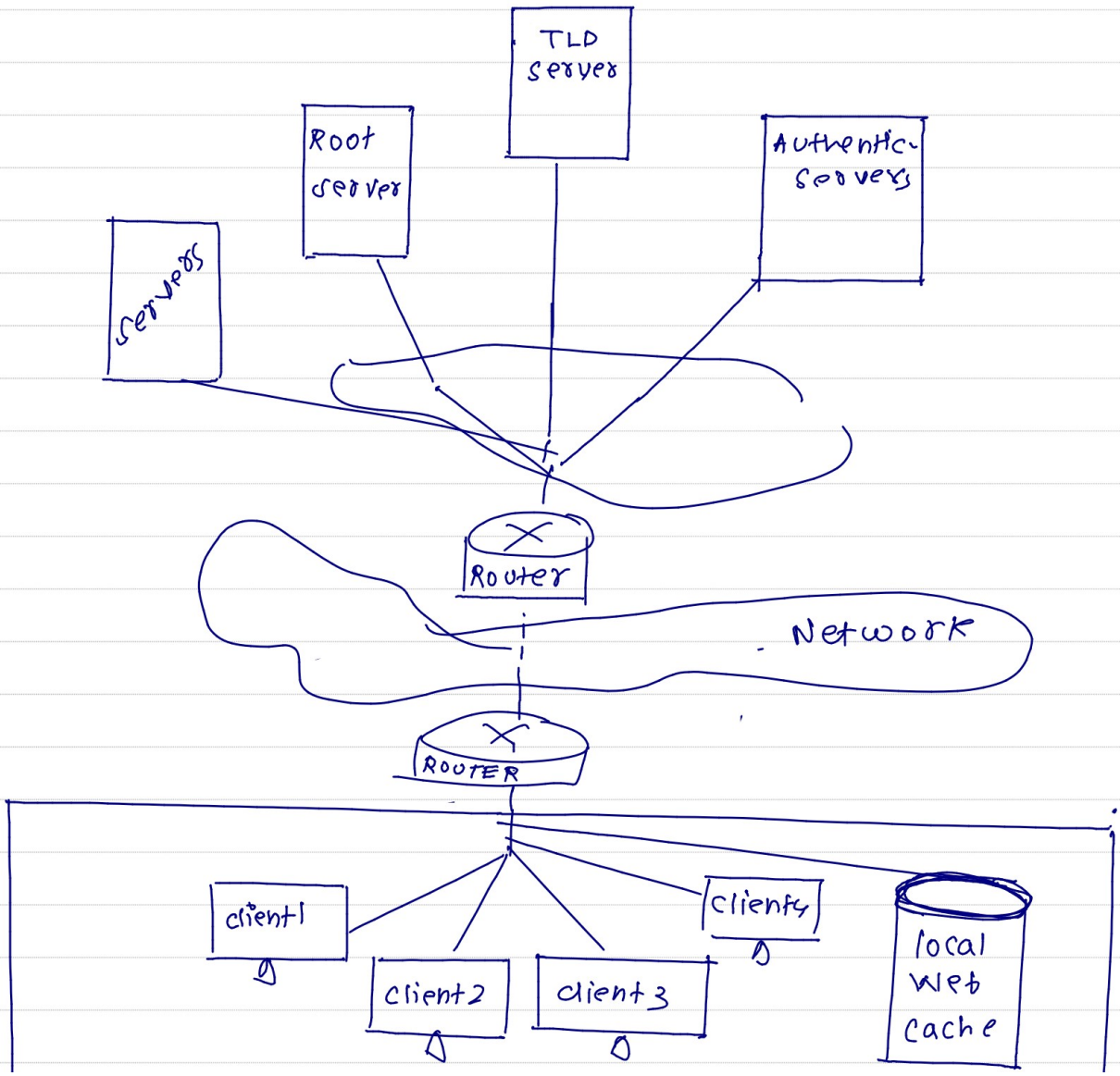
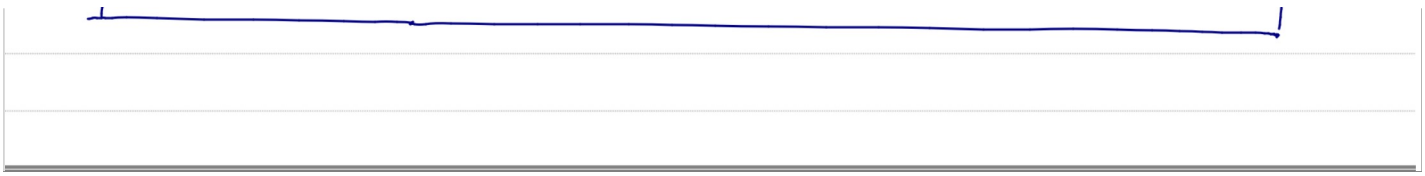
Web caching is used in a server-client (i.e institutional) system. It reduces the delay in receiving requested objects. Sometimes when hosts request the same website, and access the same IP address, it gets stored in the Web cache, The web cache being close to the the clients makes the process of accessing frequently requested objects faster, efficient with lesser delay.



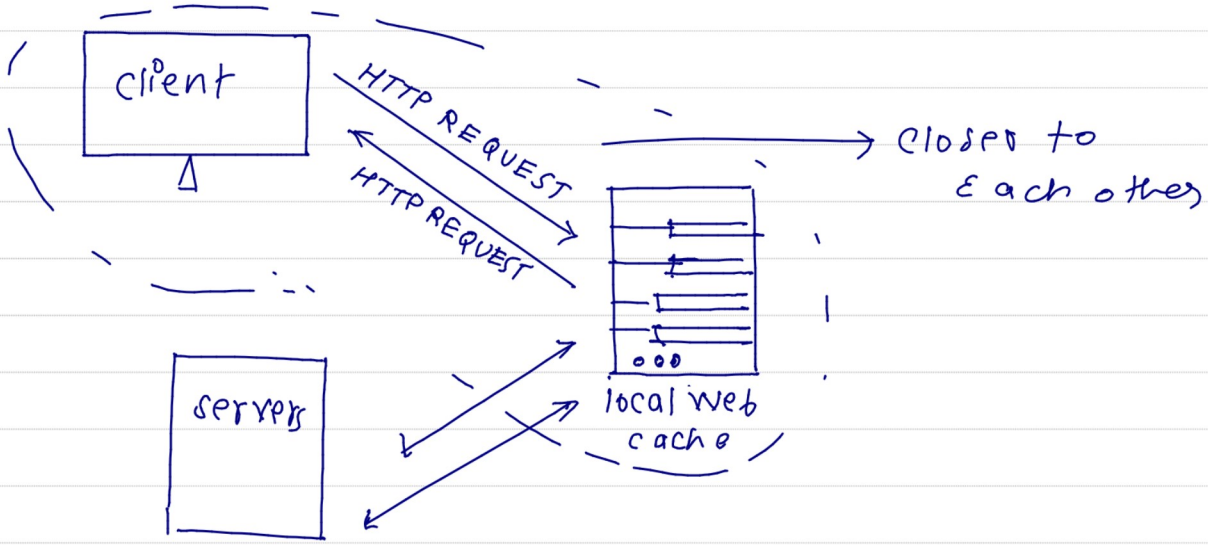


No installing a web cache wont reduce the delay for all objects requested by the user. The reason behind this is because a web cache only stores the most frequenty accessed objects. Lets say a user completley request a new object in that case the web cache has to access the servers, but they do certainly decrease the delay.

For example let us assume that a certain cache hit rate is 40%.

. then end to end delay = 0.4 (delay created by transmission of object (negligible) +

0.6 (delay created by object which are not in cache) = 1.2 ms -



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```
if (listen (server_fd, 0 ) < 0
    {                                  syntax error
    perror ("listen");
    exit (EXIT_FAILURE);
}
```

corrected code snippet

```
if (server_fd < 0 ){
    listen();
    (exit_FAILURE);
    }
```