

National University of Singapore  
School of Computing

CS2105

Tutorial 3

Question paper

**To students:**

Please be reminded that submission deadline of **assignment 1** is **Sunday (18 Sep 2022) 2359**.

1. Launch your browser and open its network diagnostic tool (e.g. press F12 if you use Chrome on Windows, or Cmd + Opt + I for Mac). Then click the "Network" tab to observe network communication.

Copy-and-paste the following URL in the address bar of your browser:

<http://tiny.cc/atupaz>

Enter your choice and press the "Submit" button.

- a) Look at the entry named "formResponse". What is the HTTP request method issued?
- b) Briefly explain when HTTP POST and GET methods are used.

POST

submit response receive data

2. [KR, Chapter 2, P21] Suppose that your department has a local DNS server for all computers in the department. You are an ordinary user (i.e., not a network/system administrator). Can you determine if an external Web site was likely accessed from a computer in your department a **couple of seconds** ago? Explain.

policy of caching/replacement algo.

Yes. Last updated cache time. → RTT.

dig -t a www.cse.cuhk.edu.hk  
local IP is same

3. [Modified from KR, Chapter 2, P31] You are given 4 programs: **TCPEchoServer.py**, **TCPEchoClient.py**, **UDPEchoServer.py** and **UDPEchoClient.py**.

cannot find server  
→ no response

- a) Suppose you run **TCPEchoClient** before you run **TCPEchoServer**. What happens?

Why? Connection Refused. Server is not running. TCP needs 3-way-handshake. → connection oriented

- b) Suppose you run **UDPEchoClient** before you run **UDPEchoServer**. What happens?

Why? Script runs, awaiting for server. But doesn't run even after server is on.

connection-less

no handshake expected.

4. [KR, Chapter 3, R7] Suppose a process in Host C has a UDP socket with port number 6,789. Suppose both Host A and Host B each sends a UDP segment to Host C with destination port number 6,789. Will both of these segments be directed to the same

IP header  
 4 IP address, port no.

Yes. UDP header source port. Multiplexing

socket at Host C? If so, how will the process at Host C know that these two segments originated from two different hosts?

$$\begin{array}{r} 1111 \\ 0101100 \\ + 01100101 \\ \hline 1100001 \\ \rightarrow 0011110 \end{array}$$

5. [Modified from KR, Chapter 3, P4]

a) Suppose you have the following 2 bytes: 01011100 and 01100101. What is the 1s complement of the sum of these 2 bytes?

just flip.

b) Suppose you have the following 2 bytes: 11011010 and 01100101. What is the 1s complement of the sum of these 2 bytes?

$$\begin{array}{r} 11011010 \\ + 01100101 \\ \hline 10011111 \\ + 1 \\ \hline 01000000 \\ \rightarrow 10111111 \end{array}$$

(Note: UDP and TCP use 16-bit words in computing their checksums. For simplicity you are asked to consider 8-bit checksums in this problem).

6. [Modified from KR, Chapter 3, P5] Suppose that UDP receiver computes the checksum for the received UDP segment and finds that it matches the value carried in the checksum field. Can the receiver be absolutely certain that no bit errors have occurred? You may use Q5 as an example to explain. No. eg.

$$11011000$$

$$+ 01100111 \rightarrow \text{yield the same checksum}$$

$\therefore$  Some bit corruption might yield same checksum.

7. [KR, Chapter 3, R9] In our rdt protocols, why did we need to introduce sequence numbers?

To handle duplicate packets received by receiver so it can discard duplicates.   
 distinguish packets from idk 20 due to ACK/NAK corruption.

8. Do you have any question on Assignment 1 to clear? python

## Extra Question

- 1.6 A Web server supports both HTTP/1.0 and HTTP/1.1. So far 100 clients have downloaded a web page from the server, which contains 1 HTML file and 2 images. Half of the clients run HTTP/1.0 and the other half run HTTP/1.1. How many sockets has the Web server ever created?

- ☒ A. 201
- B. 200
- C. 100
- D. 101
- E. None of the above

## Extra Question

Suppose that a Web server runs in Host C on port 80. Suppose this Web server uses <sup>TCP</sup> persistent connections, and is currently receiving requests from two different Hosts, A and B. Are all of the requests being sent through the same socket at Host C? If they are being passed through different sockets, do both of these sockets have port 80? Discuss and explain.

Yes.

For each persistent connection, the Web server creates a separate "connection socket". Each connection socket is identified with a four-tuple: (source IP address, source port number, destination IP address, destination port number). When host C receives an IP datagram, it examines these four fields in the datagram/segment to determine to which socket it should pass the payload of the TCP segment. Thus, the requests from A and B pass through different sockets.