Self-Check Exercises Week 4

Self-Check Exercises: Lecture 14

1. The transport layer resides on/in the network ( **edge** / core - circle one or both) and manages communications from \_\_\_\_**Process**\_\_\_\_\_\_\_\_\_ to \_\_\_**Process**\_\_\_\_\_\_\_\_\_\_.
2. The network layer resides on/in the network ( **edge / core** - circle one or both) and manages communications from \_\_\_**Host**\_\_\_\_\_\_\_\_\_\_ to \_\_\_\_**Host**\_\_\_\_\_\_\_\_\_.
3. What is the purpose of transport-layer multiplexing?
   1. To take all of the signals from multiple sockets and create/encapsulate and place headers
   2. **Dividing information from multiple sources and of multiple sizes into discrete blocks of data with header identifying them, so they can be de-multiplexed at the receiving end**
4. What is the process of transport-layer de-multiplexing?
   1. Host receives the IP datagram then it sends the signal to the appropriate port specified by the application
   2. **Use information contained in the header of a transport-layer segment to determine the proper socket to deliver the data to, and feed the data (possible reassembling it in the process) back up to the application layer.**
5. For de-multiplexing, how is a TCP socket identified?
   1. **Source IP**
   2. **Source Port**
   3. **Destination IP**
   4. **Destination Port**
6. For de-multiplexing, how is a UDP socket identified?
   1. **Destination IP**
   2. **Destination Port**
7. Server X is running enigma services on port #2100. Client A is running an application that uses port #437 to request an enigma TCP connection to server X. Client B is running an application that uses port #1296 to request an enigma TCP connection to server X.

IP addresses:

Server X: 201.64.107.12

Client A: 128.193.51.213

Client B: 128.193.35.127

(See next page for questions)

a. The connection created for Client A is identified by the sockets at the endpoints as follows:

**IP address Port #**

**On Client A 201.64.107.12 2100**

**On Server X 128.193.51.213 437**

b. The connection created for Client B is identified by the sockets at the endpoints as follows:

**IP address Port #**

**On Client B 201.64.107.12 2100**

**On Server X 128.193.35.127 1296**

c. Client A starts a second application (running at the same time as the first application) that uses port #213 to request an enigma TCP connection to server X. The connection created for Client A is identified by the sockets at the endpoints as follows:

**IP address Port #**

**On Client A 201.64.107.12 2100**

**On Server X 128.193.51.213 213**

d. Is it OK for Client B to start a second application (running at the same time as the first application) that uses port #213 to request an enigma TCP connection to server X? Why or why not?

**Yes, because the socket is a combo of the port and IP address and it will still be unique to Client B even though Client A is using the same port on its host machine.**

e. Is it OK for Client A to start a third application (running at the same time as the first and second applications) that uses port #213 to request an enigma TCP connection to server X? Why or why not?

**No, because there would be no wat to distinguish this connection with that from the second connection.**

Self-Check Exercises: Lecture 15

1. Using the Sockets API, how is a socket similar to a file?
   1. **Opened for read/write, data streamed to it closed and cleaner up. They are nearly identical from a programmers perspective.**
2. What is necessary in the setup of a socket to specify this is going to be a UDP socket?

**SOCK\_DGRAM specification**

1. What is necessary in the setup of a socket to specify this is going to be a TCP socket?

**SOCK\_STREAM specification**

1. Where can I go for help with socket programming (from Syllabus)?

**Beej’s guide to network programming**

**Python socket programming documentation**

Self-Check Exercises: Lecture 16

1. What is reliable data transfer?

**The guarantee that message will be received with no errors.**

1. What about RDT is indicated by the two-generals problem?

**If there is any aspect of the communication channel, it is impossible to guarantee 100% reliable data transfer.**

1. What are some aspects of reliable data transfer?

**Error detection, acknowledgement, sequencing. timing (flow/congestion control), retransmission, fairness**

1. Theoretically, what is the maximum number of bytes that can be carried in the “application data” section of a UDP segment?

**65527 bytes. The length field is 16 bits, so the largest value it can hold is 65,535. The header is 8 bytes, which leave 65,527 bytes for the application data. It would not be practical to send something this size.**

1. What aspects of RDT does the UDP protocol implement?

**Simple error detection**

1. (TCP and UDP use 16-bit sums to compute the checksum field. For this exercise, use 8-bit sums.) Given the following bytes:

0 1 0 1 0 0 1 1

0 1 1 0 0 1 1 0

0 1 1 1 0 1 0 0

**Separate into 2 problems and carry the one to make it an 8 bit answer**

1. What is the 1’s-complement of the sum of these bytes?

**1101 0001**

1. If there is only one error bit in a segment, could it go undetected? How?

**No, if we add the 8 bit sum and it’s 1’s-complement the result will be all 1’s. The destination computes the sum and adds the checksum from the source. If there are any zeros in the result there is an error. All 1 bit errors would be detected.**

1. If there are 2 bits in error, could the errors go undetected? How?

**2 bit errors could go undetected. For example, if the last digit of the first number is converted to a 0 and the last digit of the second number is converted to a 1 the sum would be the same.**