Homework 4

RELEASE DATE: 2015/11/16
DUE DATE: 2015/11/30 (Mon.) 12:10pm

◆ Please hand in your handwriting assignment after class.
◆ Each question is 10 point, and the total point is 100 point.
◆ Please write the solution in detail and clearly for each question; otherwise, you will lose partial point.
◆ Penalty for late parts: 90% of value for one-day late, 80% two-day late, ....

The following questions are from “Chapter 4 review problem” in “Computer Science: An Overview”, 12th Edition by J. Glenn Brookshear.

6. What happens when two nodes using the CSMA/CD, encounter collision in the network?

   Both machines detect the clash and pause for a brief, independently random period of time before trying to transmit again.
   You can find more detail on Wikipedia:
   https://en.wikipedia.org/wiki/Carrier_sense_multiple_access_with_collision_detection

10. How does a router differ from such devices as repeaters, bridges, and switches?

    ✷ Routers get signal from source, send to another source on a more complex level (Routing protocol).
    ✷ Switches get signal from source, send data to another source (Forward).
    ✷ Repeaters get signal and repeat it (think passing a ball down a line of people) to prevent data loss from attenuation.
    ✷ Bridges separate broadcast domains to cut down on traffic in a hub based network or used to translate between two transfer media (think of it like a filter).

Unlike devices as repeaters, bridges and switches which connect compatible networks, routers connect two incompatible networks resulting in a network of networks call an internet.

11. State the distinction between the client-server model and the P2P model.

    A client/server computer network is one which has a centralized infrastructure – one computer, called the “server,” acts as go-between for all other computers, which are called “clients.” The server can share its resources with clients, but clients do not
share their resources such as computing power or hard drive space with the network.

A peer-to-peer network – not to be confused with peer-to-peer file sharing through torrents and the like – is one in which there is no central server. All computers are connected and each can act as the server or client to another. The computers all share resources with each other such as computer processing or hard drive space.

12. What is the difference between congestion control and flow control?
   Flow control, meaning that a TCP transport layer at a message’s origin can reduce the rate at which it transmits segments to keep from overwhelming its counterpart at the destination.
   Congestion control, meaning that a TCP transport layer at a message’s origin can adjust its transmission rate to alleviate congestion between it and the message’s destination.

21. What is the role of a name server?
   A name server is a specialized server on the Internet that handles queries or questions from your local computer, about the location of a domain name's various services.

22. What is the distinction between routing and forwarding?
   Routing means finding a suitable path for a packet from sender to destination and Forwarding is the process of sending the packet toward the destination based on routing information.

23. Define each of the following:
   a. Cloud computing
   b. Hot spot
   c. Top-level domains
   d. Secure Shell

   a. Cloud computing enables companies to consume compute resources as a utility -- just like electricity -- rather than having to build and maintain computing infrastructures in-house.
   b. A hotspot is a physical location that offers Internet access over a wireless local area network (WLAN) through the use of a router connected to a link to an Internet service provider. Hotspots typically use Wi-Fi technology.
   c. A top-level domain (TLD) is one of the domains at the highest level in the hierarchical Domain Name System of the Internet. The top-level domain names
are installed in the root zone of the name space. For all domains in lower levels, it is the last part of the domain name, that is, the last label of a fully qualified domain name. For example, in the domain name www.example.com, the top-level domain is com.

d. Secure Shell, or SSH, is a cryptographic (encrypted) network protocol to allow remote login and other network services to operate securely over an unsecured network.

43. In what way could TCP be considered a better protocol for implementing the transport layer than UDP? In what way could UDP be considered better than TCP?
   TCP actually confirms that the entire message made it to the destination, whereas UDP does not. However, UDP is more efficient. We can use UDP when we can accept packet loss.

47. What is SSL and what are its benefits?
   Transport Layer Security (TLS) and its predecessor, Secure Sockets Layer (SSL), both of which are frequently referred to as 'SSL', are cryptographic protocols designed to provide communications security over a computer network. Several versions of the protocols are in widespread use in applications such as web browsing, email, Internet faxing, instant messaging, and voice-over-IP (VoIP). Major web sites (including Google, YouTube, Facebook and many others) use TLS to secure all communications between their servers and web browsers.

49. What is the significance of certificate authorities in public-key encryption?
   The task of certificate authorities is to maintain accurate list of parties and their public keys.