COSC 2327 Introduction to Computer Networks

Exam #1 Topics (Exam Date: Oct 3th)

CLOSED-BOOK exam (Double-sided cheat sheet is allowed.)

Chapter 1.

1. Internet
    - Definition
2. Network Structure: Network edge & Network core
    - Network Edge
        - End systems, Access Networks, ~~Physical media~~
        - Definition of Access Networks, types of access networks, compare them.
    - Network Core
        - Differences among hub, switch, router
        - What happens in network core? Packet Forwarding!
        - Two approaches to forward data:
            - Packet Switching (store-n-forward)
                a. E.g., How much time does it take to send all (three) packets to the destination? (See ppt slides.)
            - Circuit Switching
                a. What is multiplexing?
                b. Two types of multiplexing:
                    i. Frequency-Division Multiplexing (FDM)
                    ii. Time-Division Multiplexing (TDM)
                c. Difference between FDM and TDM
            - Packet Switching vs. Circuit Switching
    - Internet's Hierarchical structure
3. Delay, Packet Loss, Throughput in packet-switched networks
    - Understand four types of delay
    - Transmission delay vs. Propagation delay: Understand 'caravan analogy'
    - Relationship between Queuing delay and packet loss
    - Understand definitions of throughputs (instantaneous, average, end-to-end throughputs). Know how to compute average, end-to-end throughputs.
4. Internet Protocol Stack
    - Application – Transport – Network – Link – Physical layers
5. Security
    - Virus vs. Worm
    - Understand DoS and DDoS attacks. Understand bonet, bonet operator.
    - Understand 'packet snitting', 'IP spoofing'

Chapter 2.

1. Principles of Network applications
    - Two application architecture: Client-Server, Peer-to-Peer (P2P)
    - What is a process? Client process vs. server process in the two architectures above.
    - Receiving process' *identifier*: IP address and Port #
2. Web & HTTP
    - Web application uses HTTP, and port # 80
    - Non-persistent HTTP vs. Persistent HTTP:
        - How many RTTs to get objects?
    - Persistent HTTP without pipelining vs. Persistent HTTP with pipelining
    - Cookies: Understand how cookies are used to keep state.
    - Web caches (proxy servers): Understand how proxy server works. Understand "Conditional-Get". Why/how "Conditional-Get" is used? Why use cache?
3. FTP
    - TCP control connection (port 21), TCP data connection (port 20)
    - FTP is said to send its control information *out-of-band*.
4. Electronic email
    - Components: user agents, mail servers, SMTP, mail access protocols
    - Mail Servers:
        - SMTP, Port #25
        - Who is a client? Who is a server?
        - Understand the example: [Scenario] Alice sends message to Bob
    - Mail Access Protocols
        - Understand POP3, IMAP, HTTP. What are port numbers?
        - Difference between POP3 and IMAP?
    - Understand the difference between pull protocol and push protocol.
5. Transport layer protocols: TCP, UDP
6. DNS
    - What does DNS do? (What are DNS's services?):
        - See the slide p.3 (Ch2-Part2 Slides)
    - Why not centralized?
    - Understand the hierarchical structure of DNS
        - Root DNS servers – TLD DNS servers – Authoritative DNS servers – and so on
    - Understand how DNS query is sent.
        - It is first sent from a request host to Local DNS server →Local DNS server sends the request to a Root DNS server. → and so on
        - Understand examples (iterated query vs. recursive query).
        - How many DNS messages sent?
            - When iterated query is used
            - When recursive query is used
            - When only the university has a DNS server
            - When each department has its own DNS server
    - Understand DNS Caching
    - What is DNS registrar?