

CS 5651 Computer Networks

Exam 1 Review

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Exam 1 - Major Topics

Exam Info

Exam on Wednesday! Closed book. No Calculators.

Covers:

- Chapter 1 - Basic introduction, TCP/IP Layered Architecture Model
- Chapter 2 - Application Layer Overview

Important Concepts

- Network Core versus Network Edge
- Client/Server versus P2P Architectures
 - Understand the similarities and differences
- Circuit Switched versus Packet Switched Networks
 - Circuit Switched Networks
 - Reserve the communication channel, essentially reserving bandwidth and capacity
 - Provides guarantees on quality of service
 - TDM (time division multiplexing), FDM (frequency division multiplexing)
 - Packet Switched Networks
 - No reservation of bandwidth, capacity, or quality of service
 - Uses statistical multiplexing to ensure fair sharing of network resources
 - Good for bursty data, not so good for various type of streaming, continuous data

TCP/IP Protocol Suite

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Layered, service model where each layer of the network builds upon and uses the services of the layer below it!

- Five layers of structure, service, and abstraction
 - Application Layer (*messages*) - user defined protocols and services
 - Transport Layer (*segment*) - process to process communication
 - Network Layer (*datagram*) - host to host communication
 - Link Layer (*frame*) - single hop data communication (*i.e. pass the data to your connected neighbor (for instance, the next switch or router)*)
 - Physical Layer - actual bits on the wire or through the airwaves
- Protocol Suite uses *Encapsulation!*
 - Make sure you understand!
 - e.g. Transport layer segment holds a message
 - e.g. Network layer datagram holds a segment
 - e.g. Link layer frame holds a datagram

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- Application layer services?

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 - Difference between TCP and UDP and what choices you have as a developer!
 - TCP - reliable, connection oriented service model
 - UDP - unreliable, connection-less, best-effort delivery service model

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- Network Layer
 - Unreliable, best-effort delivery service model

Application Layer Protocols

- HTTP - client/server protocol for information request and transfer
 - What's does RTT mean for HTTP? How does that relate to persistent and pipelined connections?
 - How does the protocol work?
- DNS - client/server protocol for resolving names and numbers
 - What's the structure of the system and how does it work?
 - How is it organized?
 - What can you ask and what can you get back?
- P2P
 - What is it? How does it roughly work?
 - How does it differ from client/server?
- What do port numbers tell us about the protocols or vice versa?

Other Topics

- Sockets - communication abstraction for programming network
 - What are they? How do you use sockets? What do you need to setup a socket?
- Delay, Loss, and Congestion
 - Processing delay - time for a router to inspect and process a packet
 - Transmission delay - time to put the bits on the wire (or in the air)
 - $trans_{delay} = L/R$
 - Propagation delay - time to propagate the data over distance
 - $trans_{prop} = distance/speed$
- Loss - how are packets dropped? Why are they dropped?

Also Know

- Lab-based Knowledge
 - Network tools - ping, traceroute, host, nslookup, dig, etc...
 - Wireshark
- Coding Experience
 - How do you write socket code?
 - What are important steps in setting up and tearing down sockets?
 - How do some of the functions work? Which ones block?