CS 457 Computer Networks
Fall 2016

http://www.cs.colostate.edu/~cs457

Dr. Indrajit Ray

http://www.cs.colostate.edu/~indrajit
Midterm Exam Information

- December 1, Thursday 2:00 pm – 3:15 pm
- Comprehensive exam
  - Chapters 1 – 6 + DNS and Email
  - Homeworks 1 – 4
  - Projects 1 and 2
- Closed book, Closed lecture notes
  - Non-programmable (only) calculator allowed
  - No cell phones, smart phones, laptops, PDAs
  - No cheat sheet
Question Set Breakdown

- Problem solving – 70 points
- Short answer – 30 points
- Problems are similar to those in homework
- Heavily weighted towards topics covered after 1st midterm
  - End to End protocols
  - Congestion control and Resource allocation
  - Email and DNS
SLIDES AND LECTURES ARE THE MOST IMPORTANT
MOST QUESTIONS ARE SIMILAR TO THOSE ON HOMEWORKS
Chapter 5 (***)

• End-to-End protocols
  – Simple de-multiplexer UDP (§ 5.1)
  – Reliable byte stream TCP (§ 5.2)
    • End-to-end issues (§ 5.2.1)
    • TCP Segment and sequence numbers (§ 5.2.2)
    • Connection establishment and termination (§ 5.2.3)
Chapter 5 (***)

• End-to-End protocols
  – Reliable byte stream (§ 5.2.4)
    • Sliding window revisited
      – Reliable transmission
      – Advertised window and Flow control
    • Adaptive retransmission (§ 5.2.5)
      – Estimating RTT
    • TCP DoS attacks and defense
      – Nagle’s algorithm
      – Delayed ACK and Piggybacking
Chapter 6 (***)

• Congestion control and resource allocation
  – Principles of congestion control (§ 6.1)
    • Why congestion occurs
    • Costs of congestion
    • Flow control versus Congestion control
    • Fairness in congestion control
  – Queuing and congestion control (§ 6.2)
    • Priority queuing
    • Fair queuing
Chapter 6 (***)

• Congestion control and resource allocation
  – TCP congestion control (§ 6.3)
    • Additive increase multiplicative decrease (§ 6.3.1)
    • TCP sawtooth behavior
    • Slow start (§ 6.3.2)
    • Fast retransmit (§ 6.3.3)
  – TCP throughput and fairness
Application Layer Protocols (**) 

- **DNS**
  - How DNS works
  - Recursive versus iterative query
  - Caching server and authoritative server

- **Email**
  - System components
  - SMTP
  - Email agents
Chapter 1 (*)

• Important concepts
  – Difference between bandwidth and latency/delay, what their roles are on network performance.
  – Delay X Bandwidth product
  – Layering architecture
  – Basic networking concepts
Chapter 2 (**)

• Important concepts
  – Reliable transmission (§ 2.5) (**)
  – Stop and wait protocol (§ 2.5.1) (**)
  – Sliding window protocol (§ 2.5.2) (**)
    • Effect of window sizes on protocol
  – Ethernet (§ 2.6)
    • Concept of carrier sense multiple access with collision detection
  – Error detection (§ 2.4.3)
Chapter 3 (*)

• Important concepts
  – Switches and learning bridges (§ 3.1.1, 3.1.4)
  – Spanning tree algorithm
  – Addressing (§ 3.2.3, 3.2.5, 3.2.6, 3.2.7
    • CIDR address, sub-netting, ARP, DHCP, address allocation
  – Fragmentation and reassembly (§ 3.2.2)
Chapter 3 (*)

• Important concepts
  – Forwarding (§ 3.2.4)
  – Network address translation
  – Routing (§ 3.3)
    • Distance vector (RIP)
    • Link state (OSPF)
Chapter 4 (*)

• Internetworking
  – BGP ( § 4.1.2)
  – IPv6 ( § 4.1.3)
  – IPSec

• Multicasting ( § 4.2)