CSE 123b
Communications Software
Spring 2004
Final Review
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Final Mechanics

- Will cover entire year of material (but likely with some bias to the material post-midterm)
- Based on lecture material, homeworks, textbook reading and project work

- Closed book, closed note, closed PDA, cell phone, etc
  - You get one 8.5x11 sheet of notes (both sides is fine)

- Will be similar in style to midterm (although I will try to make more of the questions more focused)
Protocol Layering & Internetworking

- Why do we layer protocols? Pros/Cons?
  - What are the layers and what functions do they serve?
  - What layer do the protocols we’ve studied fall into?

- What is Internetworking? What is it good for?

- What features does the IP protocol provide and why (and why not others?)

- What is the end-to-end principle and how you might use it when designing a set of protocols?
Reliable communications

- What is the difference between ARQ and FEC?
- How does ARQ work?
- How to detect delayed or duplicated packets?
- How to detect lost packets?

- What are Stop and wait and sliding window?
  - How does the window size impact throughput?
  - How to implement each? 😊

- How does flow control work in sliding window protocols?
Connections

- How to differentiate packets belonging to different “sessions”? (distinct conversations between pairs of processes)
- Connection-oriented vs connection-less protocols
  - Usefulness of each?

- How to establish a reliable connection?
- How to tear down a reliable connection?
- How do you use state machines to implement this?

- How do TCP and UDP work wrt these issues?
### Congestion Control

- How does queuing work? How is congestion caused?
- What techniques can be used to reduce/manage congestion?
- How to detect congestion?
- How to respond to it?

- How does TCP congestion control work?
  - Slow start?
  - Congestion Avoidance?
  - Fast retransmission and fast recovery?
  - What assumptions are being made in these protocols?
Intra-domain Routing

- What purpose does routing serve?
  - What are the pros/cons of destination-based routing?
- What is the difference between routing and forwarding?
- How does Distance Vector Routing work?
  - Poison reverse and split horizon?
- How does Link State Routing work?
  - What is in a link-state packet?
  - Reliable Flooding? Shortest-Path algorithm?
Inter-domain routing

- Why are inter and intra-domain routing different?
- What is a path vector protocol?
  - Why is it appropriate for inter-domain routing?
- How is BGP used to enforce routing policies?
- Routing policies?
  - What is peering vs transit? Why do they exist?
Multicast

- What is it?
- How does it work in a local-area network (IGMP)?
- Shared tree vs source-based tree (pros/cons)
- How does RPM work?

- How does tunneling work?
MobileIP

- What are the problems in supporting mobility for TCP/IP?
- What were the design constraints of mobile IP?
- What is the relation between correspondent host, home agent, foreign agent and mobile host?
Naming/DNS

- How does the DNS namespace work and why is it hierarchical?
  - Hierarchical namespace?
- What is in a DNS Record?
- How do DNS lookups work?
- Name caching?
HTTP/Web/Caching/CDNs

- How does the HTTP protocol work?
- Performance/Overhead?
  - What problem is solve by persistent connections?
  - How is Web caching implemented in HTTP?
  - How is caching used to improve performance?
  - What problem is addressed by CDNs
  - What workload characteristics impact the performance of caching
- Mechanisms
  - How does DNS-based load balancing work for CDNs?
P2P

- What does it mean to be peer-to-peer?
- Centralized vs structured vs unstructured?
- How does unstructured lookup work in Gnutella?
- How does structured lookup work in Chord?

- How are P2P workloads different from Web workloads?
Network Security

- Communications Security
  - Public vs Private Key technologies; pros/cons of each
  - General protocols for authenticity, integrity, confidentiality
- Software vulnerabilities
  - Generally how do buffer overflows work?
- Denial-of-service attacks
  - What are they? How do they deny service?
  - What kinds of DoS attacks can be detected using the backscatter technique, which cannot? What can we tell about techniques?
- What kinds of attacks to firewalls and intrusion detection systems protect against?
- Network worms: why do they spread? What factors control their growth?
10,000 foot questions

- What happens when you click on a Web page link?
  - Application layer, naming, transport, routing, etc…

- How do you get songs or videos from a P2P network?
  - Search protocol, transport layer, routing, etc…

- Why kinds of challenges are faced in deploying new protocols?
Questions?
Thanks

- It's been a tough class but you guys have gotten through it (almost :-)
- You're ready to cause problems on the Internet...

- See you at the final and good luck!