CS 356 Fall 2017 (Lam)

Bring a calculator and one page of notes (printed or handwritten on one side of paper). You can use the calculator in your cell phone but you must abide by the UT-Austin Student Honor Code. More specifically, you must not use the phone for any other purpose, such as accessing information stored in the phone or on the Internet.

Review homework solutions

Note: Following lists of major topics for your reference only. It is possible to have exam questions on materials covered in my lectures that are not in the following lists.

Chapter 1 topics

Modulation and demodulation, FDM/TDM/WDM, Shannon Theorem, and Sampling Theorem

Circuit switching, message switching, packet switching, virtual circuit packet switching; Internet structure, IXP, POP

Four components of delay in packet switching; bottleneck and throughput; traffic intensity and server utilization; packet loss

Little's Law, mean value and second moment formulas of a random variable

M/G/1 waiting time and delay formulas (and two special cases), justification of packet switching over circuit switching

Internet layered architecture, protocol stack, encapsulation, de-encapsulation

Chapter 2 topics

Client-server vs P2P architecture

Addressing processes - IP address and port number

Application needs vs transport protocol services

HTTP, SMTP, DNS, P2P:

Stateful vs stateless protocol, complexity at the network’s edge

HTTP - client-server delay in terms of round-trip times, persistent vs, nonpersistent, cookies and proxy cache, conditional GET

SMTP - using ascii characters only, MIME, base 64 encoding

Various DNS servers and various DNS records

File distribution delay analysis to show why P2P is more scalable than client-server (with just 1 server)

Sockets for TCP and UDP; welcome, connection, and datagram sockets
Video streaming - DASH (server, client), Content Distribution Networks (enter deep servers, bring home servers), third-party CDN uses DNS redirect

**Chapter 3 topics**

IP address and port numbers, multiplexing/demultiplexing, connection socket identified by 4-tuple

Services provided by TCP and UDP

Internet checksum,

Protocol design for Lossy FIFO channel and Lossy, Reordering, and Duplicative (LRD) channel

Alternating-bit protocol, pipelined protocols

sliding window protocol (general principles and implementation in TCP), cumulative acks, selective ACK, selective nack

ARQ, sliding window (including selective repeat, and go-back-N) performance analysis

TCP timeout estimation algorithms, retransmission and timer management (3 dup acks ~ selective nack)

TCP three-way handshake protocol, connection close protocol (timed wait)

TCP flow control, TCP congestion control (Reno versus Tahoe, slow start, threshold, 3 duplicate acks, fast retransmission, fast recovery), TCP throughput, additive increase multiplicative decrease (AIMD), throughput formula (limited by loss rate)