COMP 5622

Advanced Computer Communications and Networking

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Who's Who

- Instructor:

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- TA:

- Course web site:
  - http://course.cse.ust.hk/comp5622/index.html

Grading

- Paper Review and Presentation 15%
- Project Proposal 10%
- Idea Presentation 10%
- Project Report 30%
- Final 35%

Introduction

- What you have learnt
  - COMP 4621/5621 or ELEC 4120 has already laid the foundation of computer networks
  - We will review the concepts and techniques discussed in these prerequisite courses

- In this course we concentrate on advanced topics in computer networks beyond what you learnt

What you Learnt!: Overview

Goal:

- broader coverage of networking
- approach:
  - descriptive
  - use Internet as example

Overview:

- what's the Internet
- what's a protocol?
- network edge
- network core
- access net, physical media
- Internet/ISP structure
- performance: loss, delay
- protocol layers, service models
- history

What you Learnt!: Application Layer

Goals:

- conceptual, implementation aspects of network application protocols
  - transport-layer service models
  - client-server paradigm
  - peer-to-peer paradigm
- learnt about protocols by examining popular application-level protocols
  - HTTP
  - FTP
  - SMTP / POP3 / IMAP
  - DNS
- Basic P2P applications
  - Napster, Gnutella, Kazza, BitTorrent
- programming network applications
  - socket API

What you Learnt!: Transport Layer

Goals:

- understand principles behind transport layer services:
  - Multiplexing and demultiplexing
  - reliable data transfer
  - flow control
  - congestion control
- learnt about transport layer protocols in the Internet:
  - UDP: connectionless transport
  - TCP: connection-oriented transport
  - TCP congestion control

What you Learnt!: Network Layer

Goals:

- understand principles behind network layer services:
  - routing (path selection)
  - dealing with scale
  - how a router works
  - advanced topics: IPv6
- instantiation and implementation in the Internet

Overview:

- network layer services
- routing principles: path selection
  - Link state and distance vector
- hierarchical routing
- SDN
- IP
- Internet routing protocols
  - intra-domain
  - inter-domain
- what's inside a router?
- IPv6

What you Learnt!: The Data Link Layer

Goals:

- understand principles behind data link layer services:
  - error detection, correction
  - sharing a broadcast channel: multiple access
    - Channel partitioning, random access (ALOHA, CSMA), taking turns
  - link layer addressing
  - reliable data transfer, flow control: *done!*
- instantiation and implementation of various link layer technologies

What Else is Left to Learn?

- Why am I taking this course? I know everything already!
- Not quite yet!

What Else is Left to Learn?

- Multimedia Networking (1.5 weeks)
- Content Distribution over P2P Networks (1 week)
- Wireless Networking (3.5 weeks)
- IoT and Mobile Sensing (1.5 weeks)
- Network Security and Wireless Security (1.5 weeks)
- Advanced Topics related to Congestion Control (1 week)
- Student Presentations (3 weeks)
  - Paper Review and Presentation
  - Idea Sharing Presentation