CSc 450/550
Computer Networks
Introduction

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About the course

- Computer Communications and Networks
  - lectures: MR 11:30am-1:00pm, ELL 060
  - http://www.csc.uvic.ca/~csc450
    - lectures, labs, discussion board, etc
  - prerequisites
    - from UVic calendar
    - Computer organization (CSc 355)
    - Operating systems (CSc 360)

About the course instructor

- Jianping Pan
  - pan@uvic.ca
  - office hours: MR 10:30-11:30am
    - EOW 323, x7226; after May 22nd, ESS 566, x5796
  - work experience
    - UVic, industry research labs, UWaterloo, …
  - research area
    - computer networks and distributed systems
    - http://web.uvic.ca/~pan

About the lab instructors

- Jane Feng
  - rfeng@uvic.ca
- Monia Ghobadi
  - monia@uvic.ca
- Multi-section
  - check WebTT for your lab time/place
- Three lab projects
  - lab starts the week of May 8!

Course materials

- Required textbook
  - Computer networks, 4th edition (CN)
- Reference textbook
  - Computer networking, a top-down approach featuring the Internet, 3rd edition (TD)
- Explore further
  - web links @ course web site
  - Google!

What's computer network?

- The Internet: a network of networks
  - end systems
    - computers, many other *types* of electronic devices
  - communication links
    - copper, fiber
    - radio, satellite
  - intermediate systems
    - routers, switches, and many other mid-boxes
  - distributed applications

What computer networks offer?

- In distributed computer systems
  - computers, OS, **networks**, distributed OS, apps
- Networks for computer communications
  - remote inter-process communication
- Networks for distributed systems
  - a bigger, distributed, virtual computer
- Networks for distributed applications
  - the Web, p2p, online games, and many others

How computer networks do this?

- Network hardware
  - communication infrastructure
    - access links: Ethernet, WiFi, DSL, cable
    - backbone links: fiber, satellite
    - network devices: NIC, modems, routers, switches
  - switching: circuit vs packet
  - medium: wired vs wireless
  - scale: PAN, LAN, MAN, WAN, the Internet
- Network software

Network architectures

- Network software (network OS)
  - network architecture: a layered structure
    - OSI: application, presentation, session, transport, network, link, physical
      - ISO, ITU
    - the Internet: application, transport, network
      - IETF
    - LAN/MAN: IEEE 802
  - network services
  - network protocols

Network services

- Network software (network OS)
  - network architecture: a layered structure
  - network services
    - connection-oriented vs connectionless
      - connection establishment, data transfer
    - acknowledged vs unacknowledged
    - reliable vs unreliable
    - stream vs datagram
  - network protocols

Network protocols

- Network software (network OS)
  - network architecture: a layered structure
  - network services
  - network protocols
    - machine-to-machine language
      - define syntax, grammar, semantic
    - protocol mechanisms
    - control policies
      - connection mgmt, flow/error/congestion control

TCP/IP protocol stack

- Application
  - HTTP, SMTP, DNS, SNMP, etc
- Transport
  - TCP, UDP, RTP
- Network
  - IP (Internet Protocol)
  - IP multicast
  - mobile IP

Why study computer networks?

- How to use networks
  - not as a network user
  - but as a network programmer/engineer!
    - configure, diagnose, troubleshoot, improve networks
- How to design network protocols
  - or design any large-scale, *distributed* systems
- How to implement network protocols
  - or write any effective and efficient code

Course objectives

- "Understand the principles and practice of designing, building, and operating computer networks, particularly the Internet."
- Selected topics
  - application layer: client-server, HTTP, p2p
  - transport layer: TCP, UDP
  - network layer: IP, Internet routing
  - link layer: IEEE 802.3, IEEE 802.11

Your participation

- Lectures
  - bonus questions!
- Assignments (CSc 450: 10%; CSc 550: 5%)
- Lab projects (CSc 450: 30%; CSc 550:20%)
- Course projects (CSc 550: 15%)
- Exams
  - midterm (20%); final (40%)

Suggested approach

- Before lecture
  - read textbook; find questions
- Attend lecture
  - take notes; ask questions!
- After lecture
  - explore further; write assignments (start early!)
  - get help and help others (discussion board)
- Attend lab tutorial, do programming!

More systems courses @ UVic

- Embedded systems (CSc 460)
- Multimedia systems (CSc 461)
- Distributed systems (CSc 462)
- Fault-tolerant (CSc 454) and Parallel (464)
- Topics in systems (CSc 485A-H)
  - advanced operating systems
  - advanced computer networks
  - wireless mobile networks, etc

Your feedback

- Teaching/learning is interactive
  - two-way communications
- Let me know
  - what you think about lectures, assignments, tutorials, exams, topics, …
  - what you want to know more or probe further
- You can *always* reach me
  - in class, during office hours, by email/phone

Course policies

- See official course outline
  - late assignments, mark appeals, etc
  - academic integrity
  - accommodation, etc
- No group assignment/project/presentation
  - collaboration/participation is encouraged
  - responsibility: your submitted work is yours
  - obligation: give credits to references

Assignment 0

- Due on Friday, May 5th, 2006
- Send an email to pan@uvic.ca
  - Subject: [csc450] A0, or [csc550] A0
    - name, student number, academic program
    - things you want to know in networks
    - issues with course logistics
    - any other questions on the course
    - a URL to a mug shot
      - let me know you!

This lecture

- An introduction to the course
  - who, when, where, what
  - course materials
  - course objectives
  - course topics
  - you and the course

Next lecture

- An overview on computer networks
  - particularly the Internet
  - read CN Chapter 1