

CSCD 433/533

Advanced Computer Networks

Lecture 1
Course Overview
Winter 2017

The Course

- CSCD 433/533
 - Combination Senior/Graduate Student class
 - As seniors, you are expected to know a lot
 - Graduate students are expected to know more!
 - Class will accommodate both groups
 - Graduate students will do more work
 - More about that later ...

The Course

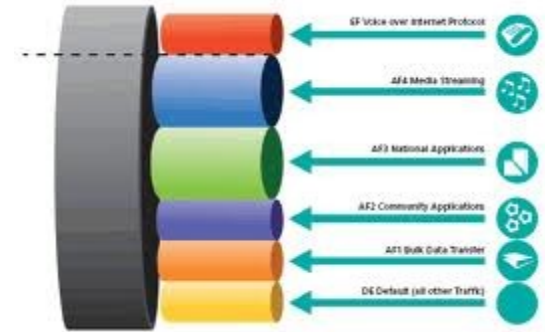


- CSCD 433/533
 - Advanced network class with some network programming
 - Goals and Learning Objectives

Goals for the Course

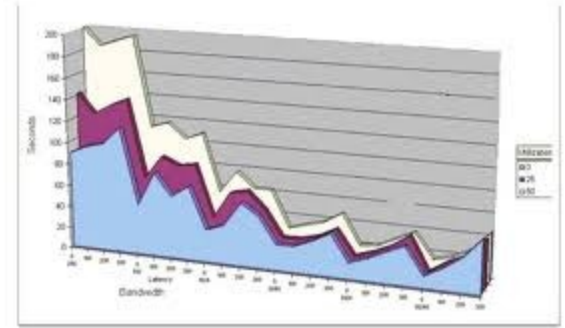
- **Learn about networks as systems**
 - There are fundamental design principles for networks
 - Performance,
 - Software and hardware components, and
 - Underlying protocols
- Explore Quality of Service (QOS) features of networks including protocols
- Continue learning network programming

Quality of Service

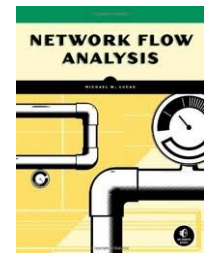


- Different applications have different requirements for handling their network traffic
 - Applications generate traffic at varying rates
 - Generally require networks to carry traffic at the rate at which they generate it
- Will learn how networks handle this

Learning Objectives

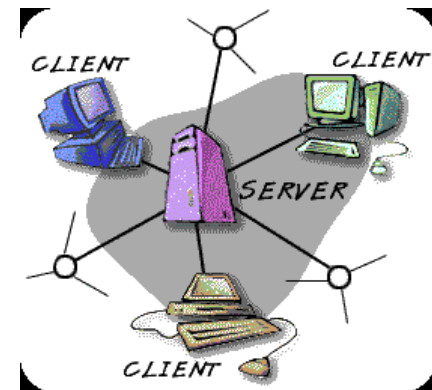


- Study design principles of the Internet as an example of a successful network that scales
 - Read and discuss papers
- Learn about network performance, how to perform measurement and tools
- Study some specific software and hardware components and understand how they work



Learning Objectives Continued

- Study applications that require QOS features and learn which protocols support them
 - **For example:** Streaming Media, Internet phones
- Write network programs to better understand network concepts



Importance of Networks



- Networks are one of the most important things you will study in CS
 - How useful is a standalone computer in today's world?
 - Computing devices once were mostly standalone, separate entities
 - Networks created originally to exchange information between researchers and government entities

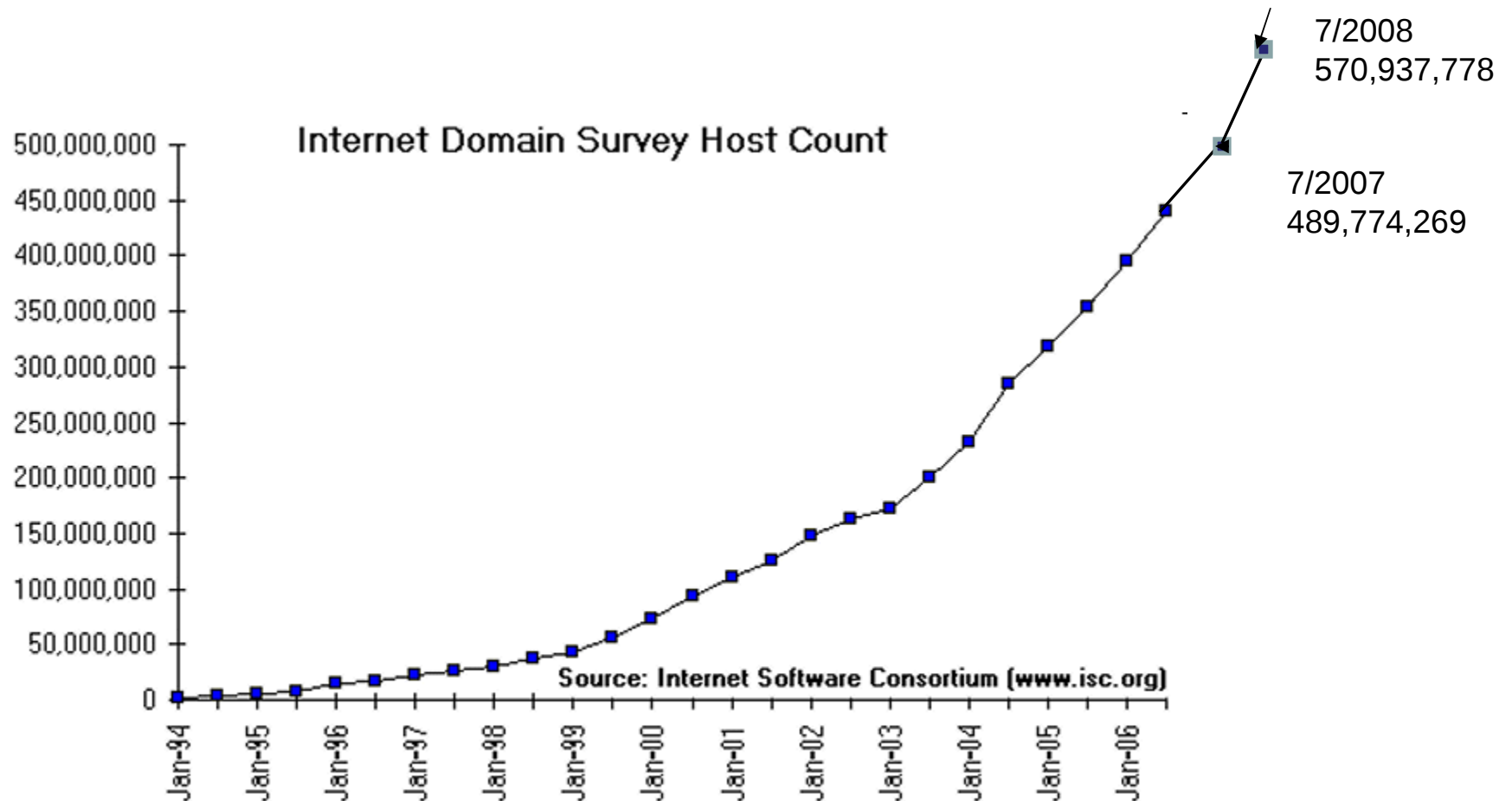
Importance of Networks

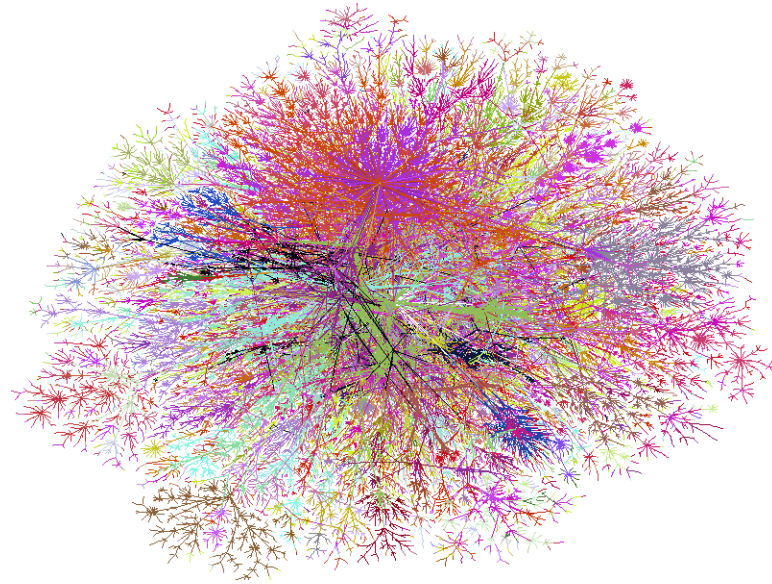
- Networks are ubiquitous
- Fun to look at Internet Maps
- Here is a historical look at the Internet

<http://www.cheswick.com/ches/map/gallery/#pookie>

Internet Growth

Internet growth is exponential!!
Growth of Internet Hosts





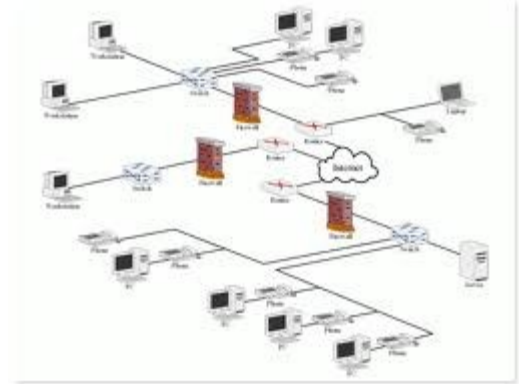
Topics Covered

Topics Covered

- **CSCD 330**
 - OSI Model
 - Layered architecture, purpose of layers
 - Layers
 - Link – Ethernet, Network – IP, Transport – TCP,UDP, Applications – HTTP, SMTP, DNS
 - Routing
 - Routers, algorithms – introduction to BGP, OSPF
 - Reliable transport, principles for that
 - Socket programming – Java

Topics Covered

- CSCD 433/533
 - Network design
 - How do you design a network?
 - Are there fundamental properties that most networks must exhibit?
 - What are the factors that affect performance and how do you design for them?



Topics Covered

- **CSCD 433/533**
 - Routing
 - Routers - performance, details
 - Algorithms – more about performance
 - Multi Protocol Label Switching (MPLS)
 - Multicast
 - Virtual Private Networks (VPNs)
 - Tunnels

Topics Covered

- **CSCD 433/533**
 - Resource Allocation
 - Congestion Control
 - Quality of Service
 - Real time Protocols
 - Wireless, mostly 802.11
 - Other topics
 - Network programming

Course Structure

- CSCD 433 – Grads and Undergrads
 - M, W, F – Lecture Tu, Th - Labs

Lab Details

- Wireshark
- Programming exercises
- Other Lab tools
- Online tools

Course Structure

- **CSCD 533 – Grad Students**
 - 1. Survey Paper or
 - 2. Create a Lecture (or Lab)
 - Must clear the idea with me
 - Need to sign up ahead of time
 - I have topic suggestions

Assignments

- CSCD 433/533
- Programs
 - Several programs related to course topics
- Homework
 - Homework – some problems from text
 - Short Writing Assignments

Assignments

- **CSCD 433/533**
 - Tests - takehome
 - Final (optional)
 - **In-class Participation**
 - Make sure you come to class
 - If you come, participate - talk !!!
 - I should know your name

Book Perspective

- Textbooks
 - What are they good for?

Book Perspective



- **What are the usefulness of Textbooks?**
 - Offer a guide to the topics
 - What's important / what's not important
 - Authors typically have years of experience
 - Tanenbaum textbook is in its 5th edition
 - Updated network information

Book Perspective

- From reading you get ...
- Principles
 - Thought processes led to today's networks
 - If understand principles, then can understand new proposed protocols, network architecture
- Software
 - Important to allow networks to provide new services
 - Software allows new services to be provided with existing hardware - cheaper, easier
 - P2P, VOIP, Real time service

Book Perspective

- **Network Behavior**
 - How does the integration of hardware/software affect behavior?
 - How do you predict network behavior?
- **Compare to Other “Systems”**
 - OS’s, distributed systems, other software architecture systems
 - All are complex and rely on design principles
 - Useful to examine common elements of system complexity
 - If you understand general principles, can apply it to any system and simplify it

Questions



Finish

Web page:

<http://penguin.ewu.edu/cscd433/>

Buy Book !!!

Lab – No scheduled lab this week



















































