


Syllabus, Course Info, Introduction

Info 341 Networking and
Distributed Applications



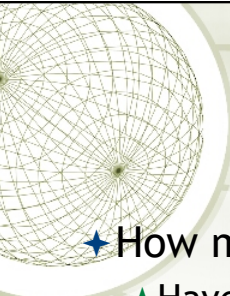
Course Basics

- ★ Syllabus
 - ✦ http://www.pensivepuffin.com/dwmcphd/syllabi/info341_au12/
- ★ Class email list
 - ✦ info341a_au12@uw.edu
- ★ Lab Notes
 - ✦ Ross



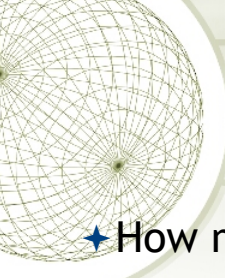
Info 341

A MODEST PROPOSAL




Quick Survey

- ★ How many of you ...
 - ◆ Have a home network and *manage* it?



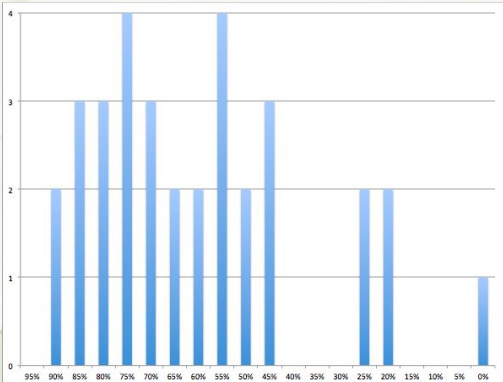
Quick Survey

- ★ How many of you ...
 - ◆ Have a home network and *manage* it?
 - ◆ Have taken 2 or more Java programming courses?

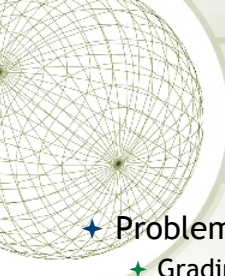


Info 341 is a Demanding Course

- ★ Typical year, distribution of students by percentage of total points

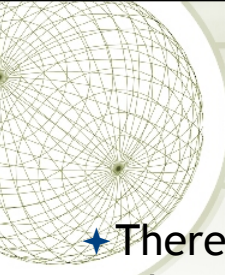


Percentage of Total Points	Number of Students
95%	2
90%	2
85%	3
80%	3
75%	4
70%	3
65%	2
60%	2
55%	4
50%	2
45%	3
25%	2
20%	2
0%	1



Grade Fairness Proposal

- ★ Problem
 - ★ Grading creates clear distinctions between students
 - ★ Students at the lower end of the grading scale need some help
- ★ Proposal
 - ★ Students above 90% contribute 3% of their points to help other students
 - ★ Students above 80% contribute 2% of their points to help other students
 - ★ Resulting pool of points is equally shared among students below 70%



You Get to Decide

- ★ There will be a Catalyst web survey where you can voice your opinion.
- ★ Please voice your opinion




Info 341
HIGH LEVEL OVERVIEW




Course Structure to Career

Weeks 0-2	Weeks 3-6	Weeks 7-10
<ul style="list-style-type: none">+ Physical Media+ Signal Processing+ Signal Transmission		



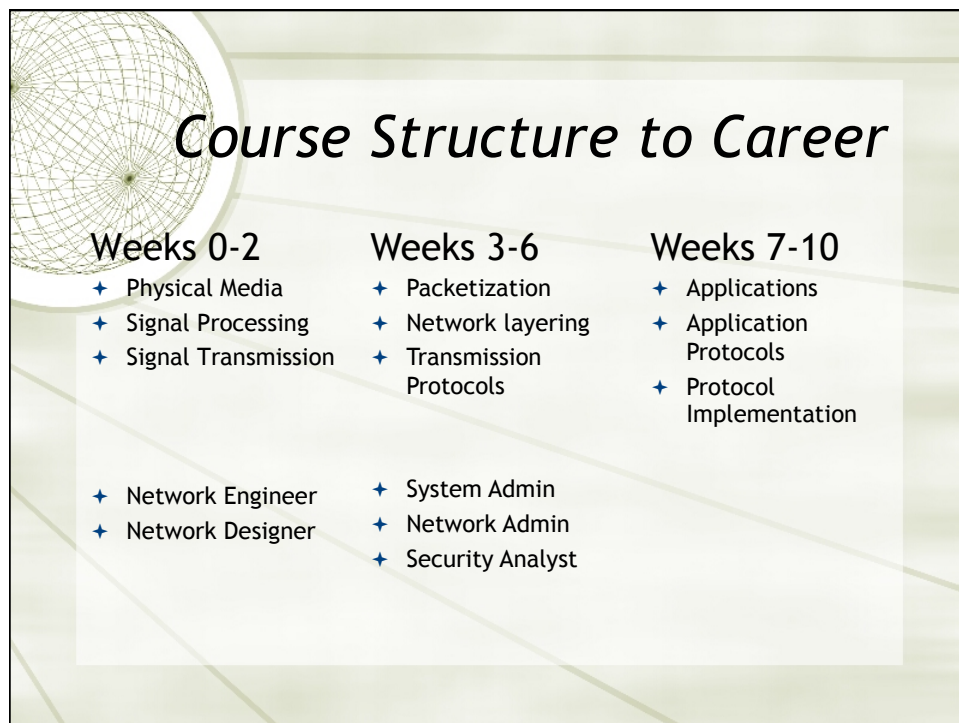
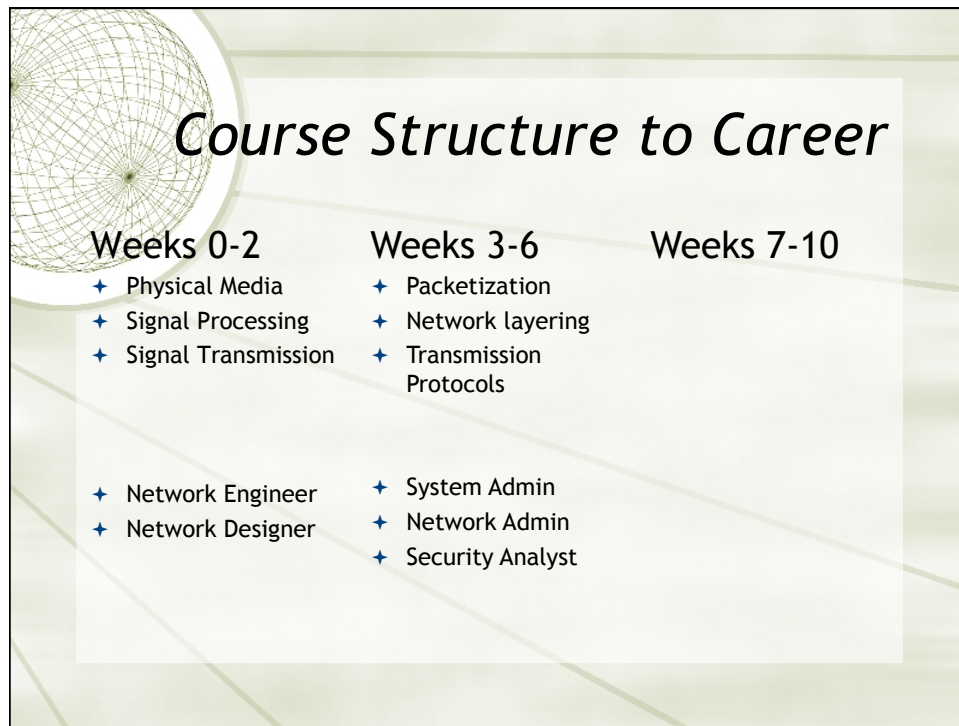
Course Structure to Career


Weeks 0-2	Weeks 3-6	Weeks 7-10
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Course Structure to Career

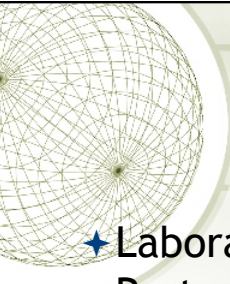
Weeks 0-2	Weeks 3-6	Weeks 7-10
<ul style="list-style-type: none">+ Physical Media+ Signal Processing+ Signal Transmission	<ul style="list-style-type: none">+ Packetization+ Network layering+ Transmission Protocols	
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Course Structure to Career

Weeks 0-2	Weeks 3-6	Weeks 7-10
<ul style="list-style-type: none"> ✦ Physical Media ✦ Signal Processing ✦ Signal Transmission 	<ul style="list-style-type: none"> ✦ Packetization ✦ Network layering ✦ Transmission Protocols 	<ul style="list-style-type: none"> ✦ Applications ✦ Application Protocols ✦ Protocol Implementation
<ul style="list-style-type: none"> ✦ Network Engineer ✦ Network Designer 	<ul style="list-style-type: none"> ✦ System Admin ✦ Network Admin ✦ Security Analyst 	<ul style="list-style-type: none"> ✦ System Admin ✦ Application Design ✦ Programmer ✦ System Analyst

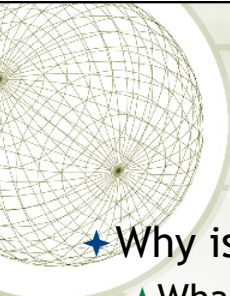


Lab Structure

- ✦ Laboratory will provide an “Application Protocol” experience
 - ✦ How many of you use Twitter?

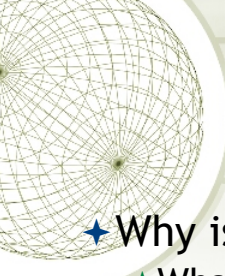


Info 341
INTRODUCTION



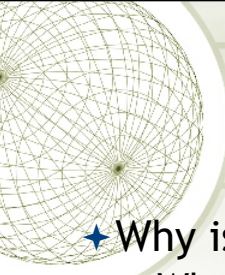
Motivating Networking

- ★ Why is networking useful?
- ◆ What can you do with networking?



Motivating Networking

- ★ Why is networking useful?
 - ✦ What can you do with networking?
 - ✦ Remote Access
 - ✦ Resource Sharing
 - ✦ Information Dissemination
 - ✦ Communication
 - ✦ Collaboration
 - ✦ Remote Management
 - ✦ Fun



Motivating Networking

- ★ Why is networking useful?
 - ✦ What can you do with networking?
 - ✦ Remote Access - telnet/ssh
 - ✦ Resource Sharing - ftp/file transfer
 - ✦ Information Dissemination - http/web
 - ✦ Communication - IM/chat/email
 - ✦ Collaboration - Netmeeting/Video Conference
 - ✦ Remote Management - backups/configuration
 - ✦ Fun - Games

Computer Network Growth

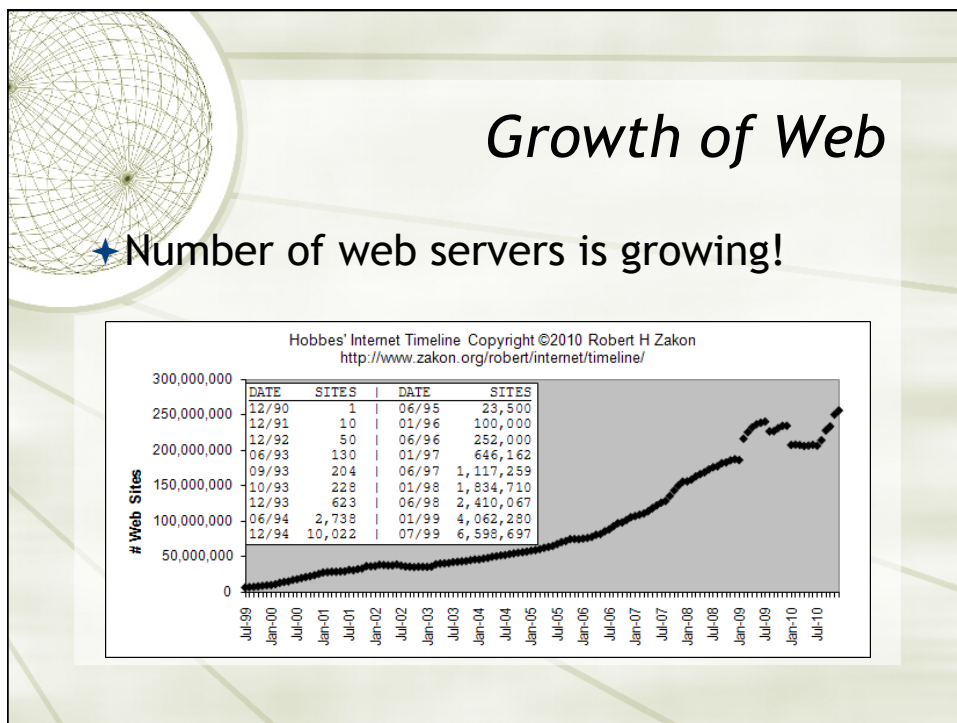
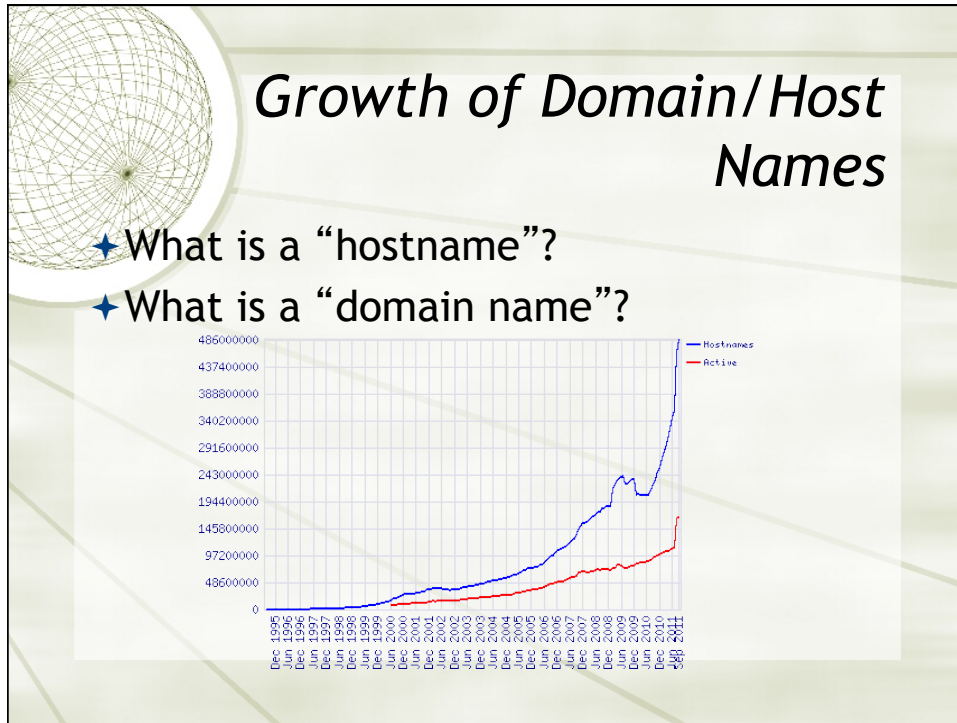
- ★ Computer networks have been consistently growing since 1970's
- ★ Were there “networks” around before computers?

Historic Growth of Networks

- ★ Growth in Hosts
- ★ What's a “host”?

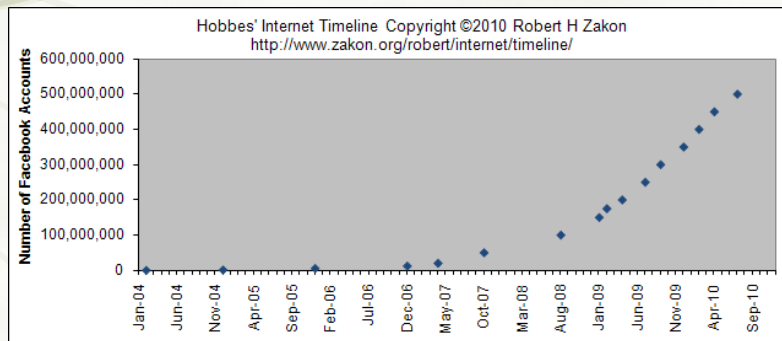
Hobbes' Internet Timeline Copyright ©2010 Robert H Zakon
<http://www.zakon.org/robert/internet/timeline/>

DATE	HOSTS	DATE	HOSTS
12/69	4	10/84	1,024
06/70	9	10/85	1,961
10/70	11	02/86	2,308
12/70	13	11/86	5,059
04/71	23	12/87	28,174
10/72	31	07/88	39,000
01/73	35	10/88	56,000
06/74	62	07/89	130,000
03/77	111	10/89	159,000
12/79	188	10/90	313,000
08/81	213	10/91	617,000
05/82	235	10/92	1,136,000
08/83	562	10/93	2,056,000



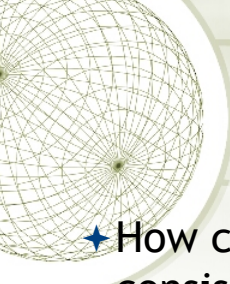
Growth of Social Networking

- ★ Number social network users grows!



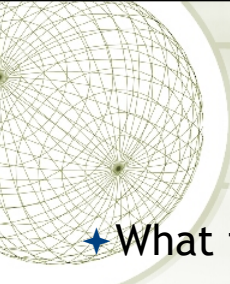
Some Initial Principles

- ★ How can we talk about networking in a consistent way?



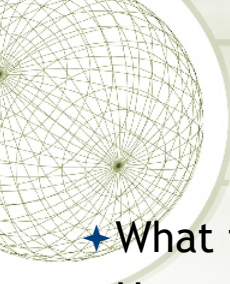
Some Initial Principles

- ★ How can we talk about networking in a consistent way?
 - ◆ Data Transferred
 - ◆ Equipment Required
 - ◆ Protocols



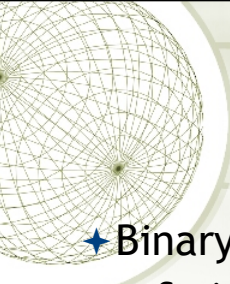
Networks transfer data

- ★ What is data?



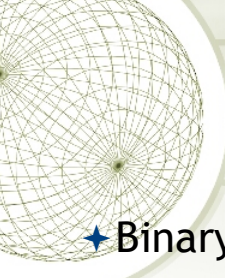
Networks transfer data

- ★ What is data?
- ★ How can we represent data?



Binary Representations

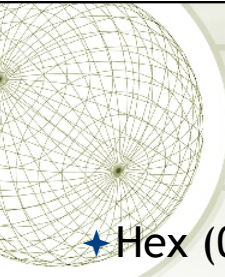
- ★ Binary (0, 1) is used to encode data
 - ★ Series of binary digits (bits) can represent many different things ...



Binary Representations

- ★ Binary (0, 1) is used to encode data
 - ★ Series of binary digits (bits) can represent many different things ...


A series of Bits	Decimal Number	ASCII Character
1	1	soh
100	4	eot
1101	13	cr
110100	52	"4"
1000001	65	"A"
1010100	84	"T"
1111011	123	"{"



Hex Representations


- ★ Hex (0-9A-F) is commonly used to represent binary data

A series of Bits	Decimal Number	ASCII Character	Hexidecimal
1	1	soh	1
100	4	eot	4
1101	13	cr	D
110100	52	"4"	34
1000001	65	"A"	41
1010100	84	"T"	54
1111101	125	"{"	7D



Bits, Bytes, Octets

- ★ Our “series of binary digits” is almost always 8 bits
 - ★ A series of 8 bits we often call a “byte”
 - ★ A byte is sometimes called an “octet”
- ★ Network speed is often measured in bits and bytes
 - ★ Kbps (kilo bits per second)
 - ★ KBps (kilo bytes per second)
 - ★ Mbps (mega bits per second)
 - ★ MBps (mega bytes per second)



Simple Comparison

- ★ Which is faster?
 - ★ A network running at 7 Mbps
 - ★ A network running at 1 MBps
- ★ Which is faster?
 - ★ A network running at 1024 KBps
 - ★ A network running at 1 MBps

Data Transferred

- ★ Defining networking by the data is problematic
 - ✦ Why should the specific data matter?
 - ✦ Why should the network care?
- ★ Generally, we don't describe networks around the data transferred
 - ✦ Some caveats

Equipment

- ★ Maybe describe networks by the necessary equipment
 - ✦ NIC
 - ✦ Hub
 - ✦ Switch
 - ✦ Router
 - ✦ AP





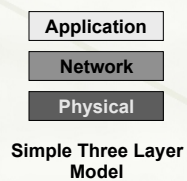
Protocols

- ★ Maybe describe networks by the protocols ...
 - ✦ HTTP
 - ✦ FTP
 - ✦ TCP/IP
 - ✦ ARP/RARP
 - ✦ TLS/SSL
 - ✦ SNMP
 - ✦ SMTP
 - ✦ ...



Some Initial Principles

- ★ How can we talk about networking in a consistent way?
 - ✦ Layered Model



Some Initial Principles

★ How can we talk about networking in a consistent way?

✦ Layered Model

Application
Network
Physical

Simple Three Layer Model

Application
Presentation
Session
Transport
Network
Data link
Physical

OSI 7 Layer Model

Some Initial Principles

★ How can we talk about networking in a consistent way?

✦ Layered Model

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Network
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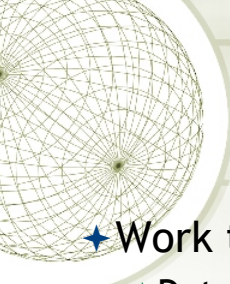
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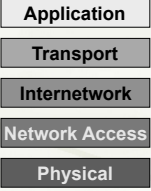
Application
Transport
Internetwork
Network Access
Physical

Internet Reference Model



During the quarter ...

- ★ Work through the layers, bottom up
 - ★ Data transmission and encoding
 - ★ Media control, media access
 - ★ Networks of networks
 - ★ Protocols for applications



Internet Reference Model