

Computer Networking

Course Introduction

Antonio Carzaniga

Faculty of Informatics
Università della Svizzera italiana

February 17, 2020

- General course information
- Program
- Preliminary schedule
- Intro to computer networking: *the entire course in one hour*

■ On-line course information

- ▶ ***INFO.NTW20*** on iCorsi
- ▶ and on my web page: ***<http://www.inf.usi.ch/carzaniga/edu/ntw/>***
- ▶ previous editions also on-line: ***<http://www.inf.usi.ch/carzaniga/edu/ntw18f/>***

■ On-line course information

- ▶ **INFO.NTW20** on iCorsi
- ▶ and on my web page: <http://www.inf.usi.ch/carzaniga/edu/ntw/>
- ▶ previous editions also on-line: <http://www.inf.usi.ch/carzaniga/edu/ntw18f/>

■ Announcements (***you are responsible for reading them!***)

- ▶ through iCorsi
- ▶ and <http://www.inf.usi.ch/carzaniga/edu/ntw/news.html>

■ On-line course information

- ▶ **INFO.NTW20** on iCorsi
- ▶ and on my web page: <http://www.inf.usi.ch/carzaniga/edu/ntw/>
- ▶ previous editions also on-line: <http://www.inf.usi.ch/carzaniga/edu/ntw18f/>

■ Announcements (***you are responsible for reading them!***)

- ▶ through iCorsi
- ▶ and <http://www.inf.usi.ch/carzaniga/edu/ntw/news.html>

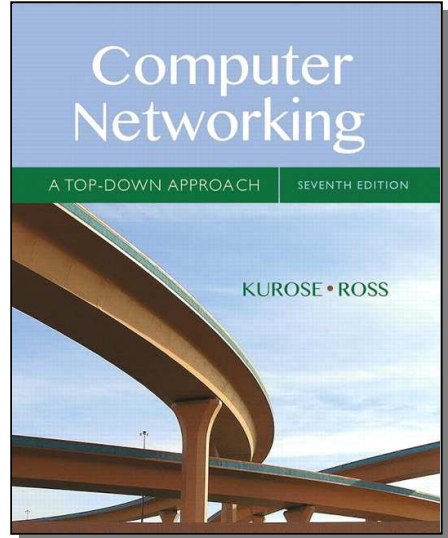
■ Office hours

- ▶ Antonio Carzaniga: *by appointment*
- ▶ Silvia Santini: *by appointment*
- ▶ Pietro Bressana: *by appointment*
- ▶ Matías Laporte: *by appointment*

Computer Networking
A Top-Down Approach

James Kurose
Keith Ross

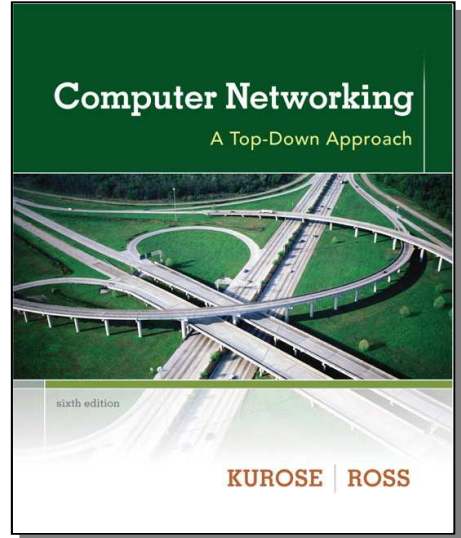
Addison-Wesley



Computer Networking
A Top-Down Approach

James Kurose
Keith Ross

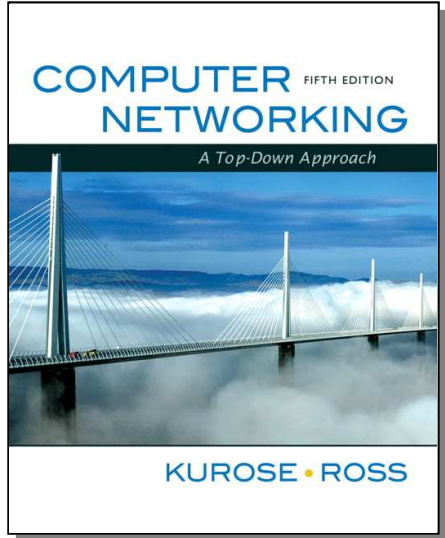
Addison-Wesley



Computer Networking
A Top-Down Approach

James Kurose
Keith Ross

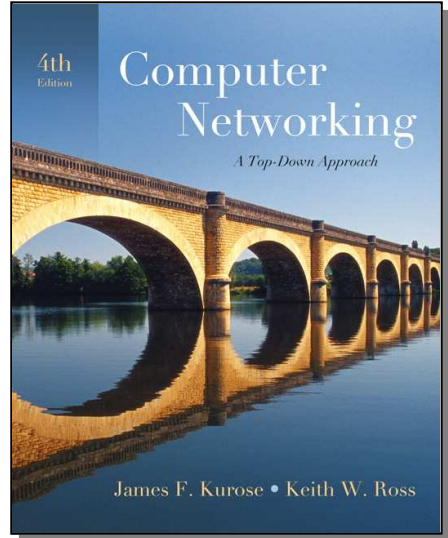
Addison-Wesley



Computer Networking
A Top-Down Approach

James Kurose
Keith Ross

Addison-Wesley



- +30% homework assignments
 - ▶ at least three *graded* assignments
 - ▶ grades added together, thus resulting in a weighted average
 - ▶ more homework exercises

- +30% midterm exam

- +40% final exam

- $\pm 10\%$ instructor's discretionary evaluation
 - ▶ participation
 - ▶ extra credits
 - ▶ trajectory
 - ▶ ...

- +30% homework assignments
 - ▶ at least three *graded* assignments
 - ▶ grades added together, thus resulting in a weighted average
 - ▶ more homework exercises

- +30% midterm exam

- +40% final exam

- $\pm 10\%$ instructor's discretionary evaluation
 - ▶ participation
 - ▶ extra credits
 - ▶ trajectory
 - ▶ ...

- -100% plagiarism penalties

*A student should never take someone else's material and present it as his or her own.
Doing so means committing plagiarism.*

A student should never take someone else's material and present it as his or her own. Doing so means committing plagiarism.

*You should never take someone else's material
and present it as your own*

A student should never take someone else's material and present it as his or her own. Doing so means committing plagiarism.

You should never take someone else's material and present it as your own

Do not take someone else's material and present it as your own!

A student should never take someone else's material and present it as his or her own. Doing so means committing plagiarism.

You should never take someone else's material and present it as your own

Do not take someone else's material and present it as your own!

Do NOT take someone else's material and present it as your own!

*A student should never take someone else's material and present it as his or her own.
Doing so means committing plagiarism.*

*You should never take someone else's material
and present it as your own*

***Do not take someone else's material
and present it as your own!***

**Do NOT take someone else's material
and present it as your own!**

Please, don't cheat!

*A student should never take someone else's material and present it as his or her own.
Doing so means committing plagiarism.*

*You should never take someone else's material
and present it as your own*

***Do not take someone else's material
and present it as your own!***

**Do NOT take someone else's material
and present it as your own!**

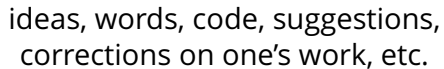
Please, don't cheat!

Just Do The Right Thing!

A student should never take someone else's material and present it as his or her own. Doing so means committing plagiarism.

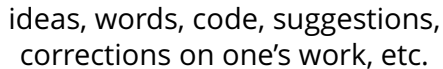
Plagiarism

A student should never take someone else's material and present it as his or her own. Doing so means committing plagiarism.



ideas, words, code, suggestions,
corrections on one's work, etc.

A student should never take someone else's material and present it as his or her own. Doing so means committing plagiarism.



ideas, words, code, suggestions, corrections on one's work, etc.

- Using someone else's material may be appropriate
 - ▶ e.g., software libraries
 - ▶ ***always clearly identify the external material, and acknowledge its source; failing to do so means committing plagiarism.***
 - ▶ the work will be evaluated based on its *added value*

- Committing plagiarism on an assignment or an exam will result in ***failing that assignment or that exam***
- Penalties may be escalated in accordance with the regulations of the Faculty of Informatics

Deadlines are firm.

Deadlines are firm.

Deadlines Are Firm!

Deadlines are firm.

Deadlines Are Firm!

- Exceptions may be granted
 - ▶ at the instructor's discretion
 - ▶ only for documented medical conditions or other documented emergencies

Deadlines are firm.

Deadlines Are Firm!

- Exceptions may be granted
 - ▶ at the instructor's discretion
 - ▶ only for documented medical conditions or other documented emergencies

- Each late day will reduce the assignment's grade by *one third of the total value* of that assignment

Deadlines are firm.

Deadlines Are Firm!

- Exceptions may be granted
 - ▶ at the instructor's discretion
 - ▶ only for documented medical conditions or other documented emergencies
- Each late day will reduce the assignment's grade by *one third of the total value* of that assignment
 - ▶ corollary: the grade of an assignment turned in more than two days late is 0

- From this course you can learn how to
 - ▶ eavesdrop network traffic (Web, e-mail, etc.)
 - ▶ forge network traffic (e.g., e-mail)
 - ▶ ...

- This knowledge is essential to understanding networked communications
 - ▶ you are encouraged to play with the network, just like you would play with the software on your computer

- From this course you can learn how to
 - ▶ eavesdrop network traffic (Web, e-mail, etc.)
 - ▶ forge network traffic (e.g., e-mail)
 - ▶ ...
- This knowledge is essential to understanding networked communications
 - ▶ you are encouraged to play with the network, just like you would play with the software on your computer
- Nevertheless, abusing this knowledge is unethical—in fact, it may be considered a crime

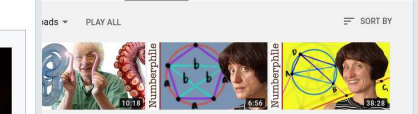
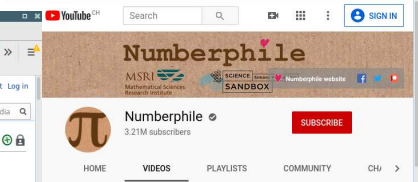
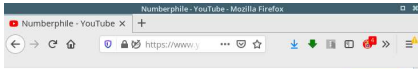
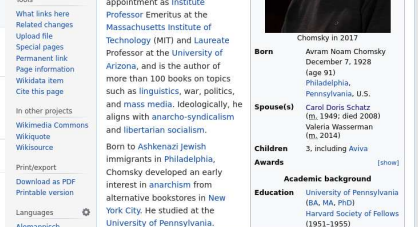
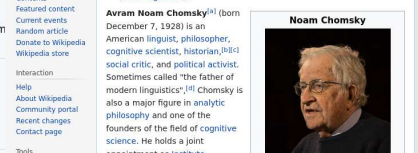
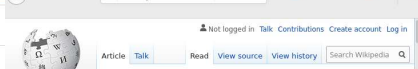
PART 2

What this course is about

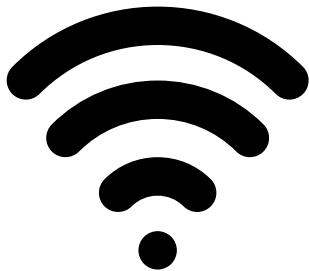
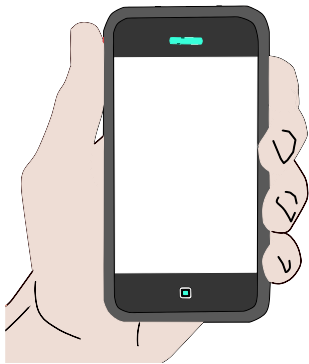
An overview of the entire course in one hour or so

What is the Internet?

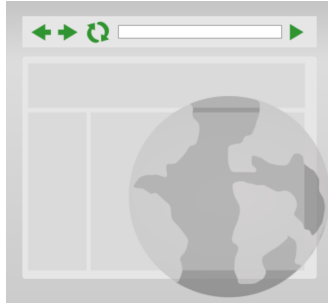
What is the Internet?



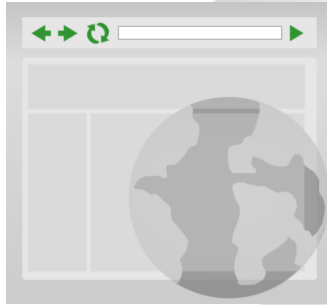
What is the Internet?

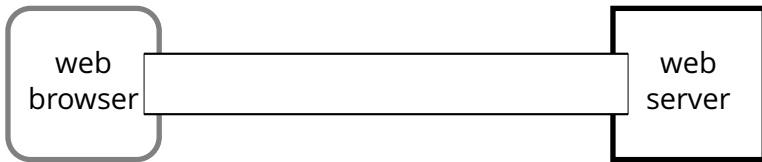


What is the Internet?

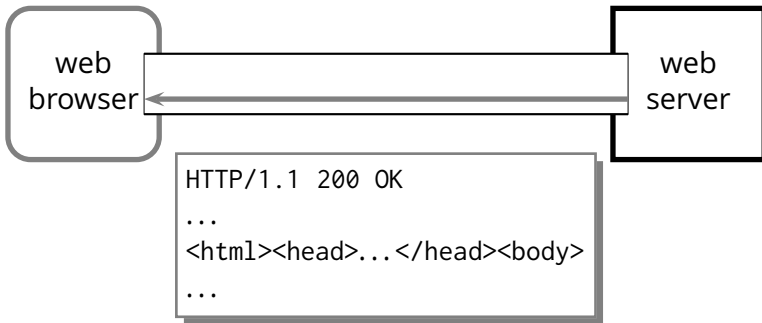


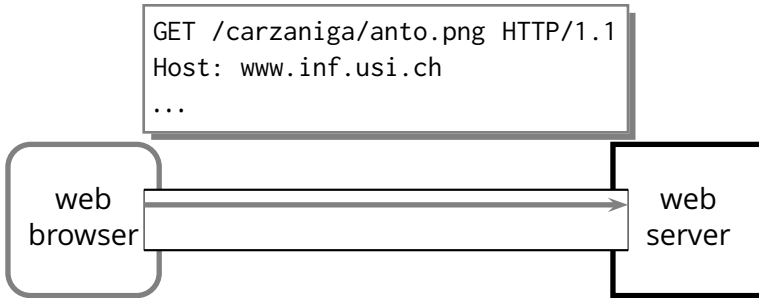
What is the Internet?

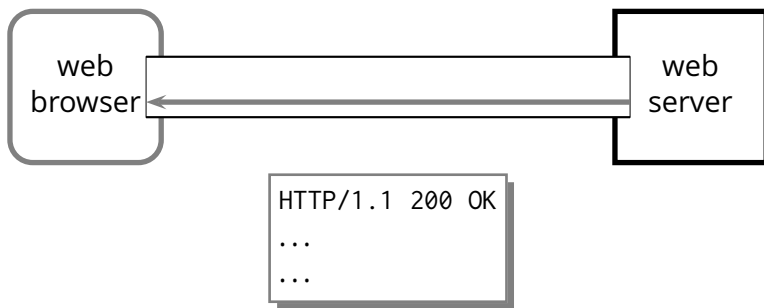




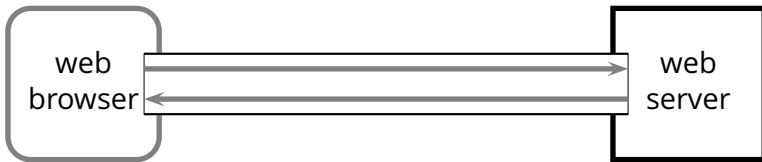








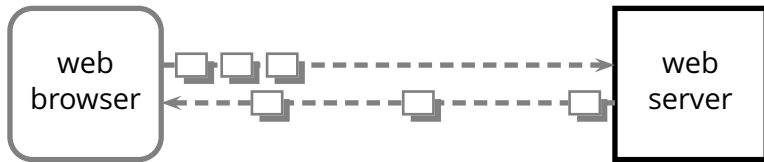
Streams or Packets?



Streams or Packets?



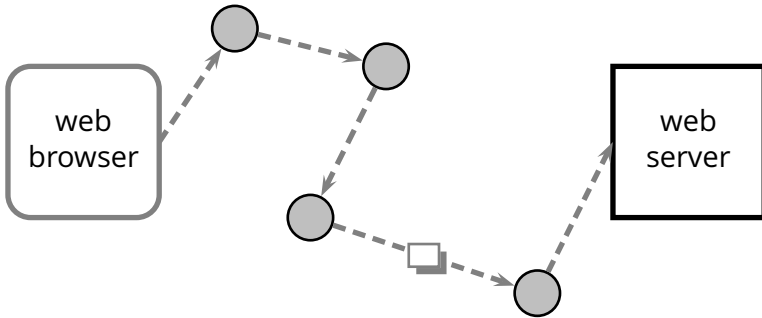
Streams or Packets?



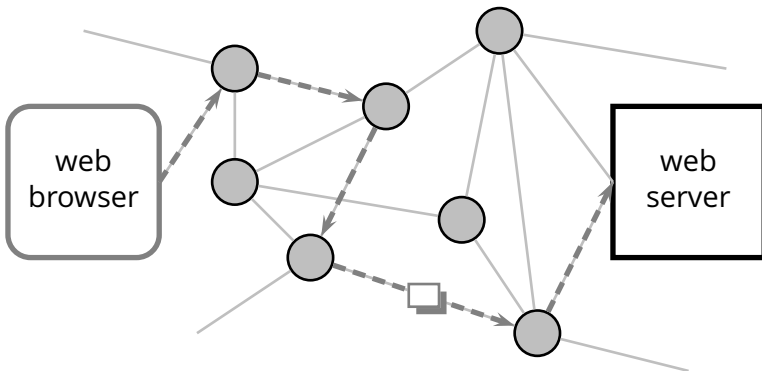
Interconnections and Paths



Interconnections and Paths



Interconnections and Paths



■ Introduction to networking and the Internet

- ▶ the course in one lecture: a tour of all the topics of the course through an end-to-end scenario
- ▶ the layered architecture
- ▶ what is a protocol
- ▶ basic network services: connection-oriented and connectionless service; packet switching vs. circuit switching
- ▶ a bit of an historical perspective

■ Introduction to networking and the Internet

- ▶ the course in one lecture: a tour of all the topics of the course through an end-to-end scenario
- ▶ the layered architecture
- ▶ what is a protocol
- ▶ basic network services: connection-oriented and connectionless service; packet switching vs. circuit switching
- ▶ a bit of an historical perspective

■ Application layer

- ▶ the application interface: OS primitives
- ▶ a simple client/server program
- ▶ the Web: HTTP; web caching
- ▶ e-mail: transfer protocol (SMTP); access protocols (POP and IMAP); message format (MIME)
- ▶ DNS
- ▶ peer-to-peer networks (BitTorrent)

■ Transport layer

- ▶ multiplexing/demultiplexing
- ▶ UDP: connectionless transport protocols
- ▶ principles of reliable data transfer
- ▶ principles of congestion control
- ▶ TCP: header format, reliability, congestion control

■ Transport layer

- ▶ multiplexing/demultiplexing
- ▶ UDP: connectionless transport protocols
- ▶ principles of reliable data transfer
- ▶ principles of congestion control
- ▶ TCP: header format, reliability, congestion control

■ Network layer

- ▶ forwarding and routing for datagram and virtual-circuit services
- ▶ router architecture: interfaces, switching fabric, queues
- ▶ IP: header formats (IPv4 and IPv6), addressing, extensions, fragmentation, IP forwarding
- ▶ Routing algorithms and principles: link-state and distance vector routing, hierarchical routing
- ▶ IP Routing: OSPF, RIP, BGP

- Link and physical layer
 - ▶ Ethernet
 - ▶ Basics of wireless communication
 - ▶ IEEE 802.11 protocol

■ Link and physical layer

- ▶ Ethernet
- ▶ Basics of wireless communication
- ▶ IEEE 802.11 protocol

■ Cross-layer Topics

- ▶ basic elements of communication security: block ciphers, modes of operation, public-key cryptography, RSA, basics of TLS/SSL