Computer Networking

Antonio Carzaniga

Faculty of Informatics Università della Svizzera italiana

February 17, 2020

Outline

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

General Information

- 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/

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 - 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

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Computer Networking

A Top-Down Approach



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Evaluation

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■ +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
- ±10% instructor's discretionary evaluation
 - participation
 - extra credits
 - trajectory
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- -100% plagiarism penalties

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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.

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 - corollary: the grade of an assignment turned in more than two days late is 0

Ethics

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

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•	4 Chapo Trap House Chapo's bad boy @willt Bernie's victory rally	Cl 10 ♥ 293 ① Tap House @CHAPOTRAPHOUSE - Feb 12 bad boy @willmenaker is streaming live momentarily for victory raily Image: Stream of the st		Main page Contents Featured content Current events II Random article Donate to Wikipedia Wikipedia store Interaction Help About Wikipedia Community portal Recerc changes	rrom Wikipedia, the free encyclopedia "Chomsky" redirects here, For a (disambiguitable), ¹² (Dorm Dormsky"), Dorm December 7, 12201 jan American linguist; philosopher, cognitive scientist, hiotron, Piet- social critic, and political activist. Sometimes called "the father of modern illinguistics", ¹⁶¹ (Chomsky is abia on anjet Right of the father of philosophy and one of the philosophy and one of the	her uses, see Chomsky Noam Chomsky	HOME Nads - PLAYALL PLAYALL actes Akimbo (with Clift) - Numberphile Jackes Akimbo (with Clift)	VIDEOS PLAVLISTS	COMMUNITY CH > = SORT BY approximation of the sort o
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				Languages Ø Alemannisch	York City. He studied at the University of Pennsylvania.	Harvard Society of Fellows (1951-1955)			

















Streams or Packets?



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Streams or Packets?



Interconnections and Paths



web server

Interconnections and Paths



Interconnections and Paths



Program (1)

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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

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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)

Program (2)

Transport layer

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

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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

Program (3)

Link and physical layer

- Ethernet
- Basics of wireless communication
- IEEE 802.11 protocol

Program (3)

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