Introduction to Computer Networking

Antonio Carzaniga

Faculty of Informatics
University of Lugano

September 17, 2014

Outline

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

General Information

- http://www.inf.usi.ch/carzaniga/edu/ntw/
- INFO.B178 on https://www2.icorsi.ch/course/view.php?id=3637

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- Announcements
  - http://www.inf.usi.ch/carzaniga/edu/ntw/news.html
  - or through iCorsi
  - *you are responsible for reading the announcements page (or reading the announcements sent through iCorsi)*

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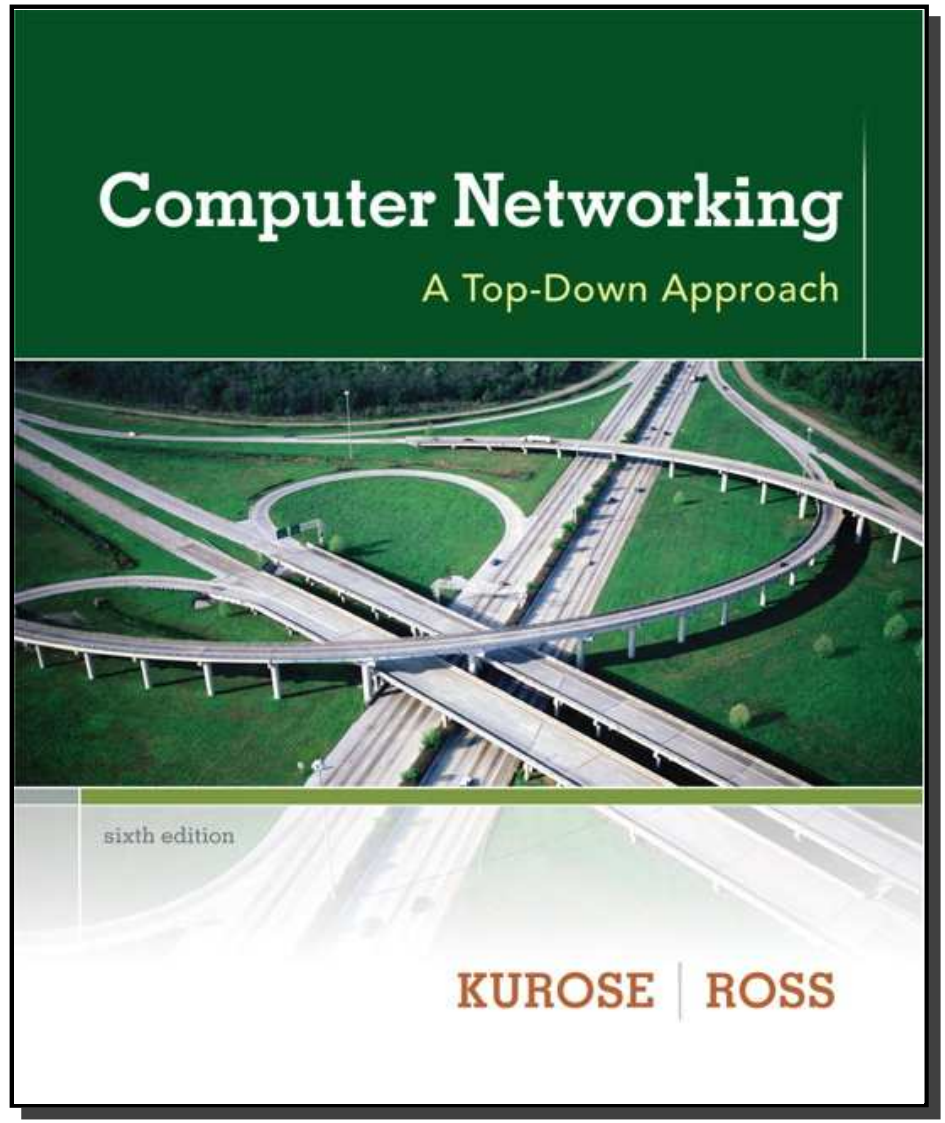
- Office hours
  - Antonio Carzaniga: *by appointment*
  - Leandro Pacheco: *by appointment*
  - Andrea Rosà: *by appointment*

Textbook

Computer Networking
A Top-Down Approach

James F. Kurose
Keith W. Ross

Addison-Wesley



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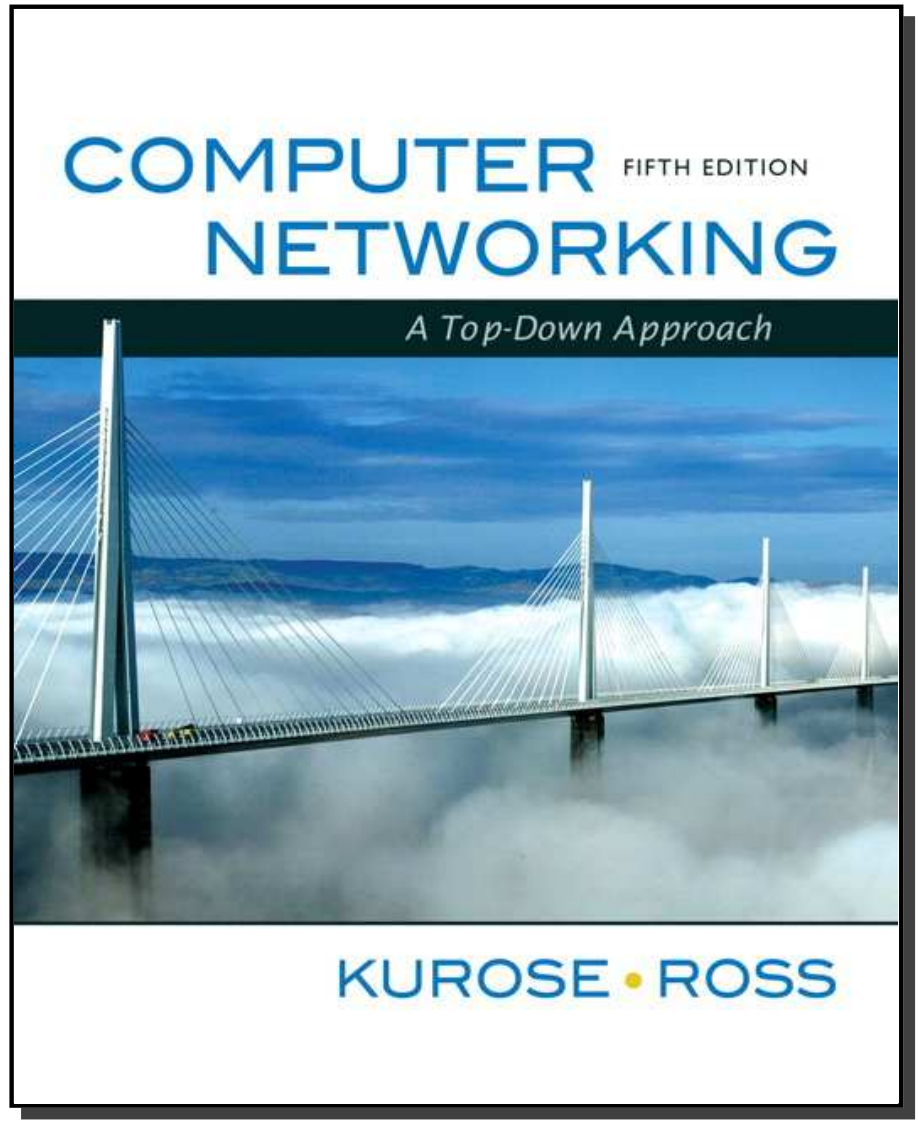

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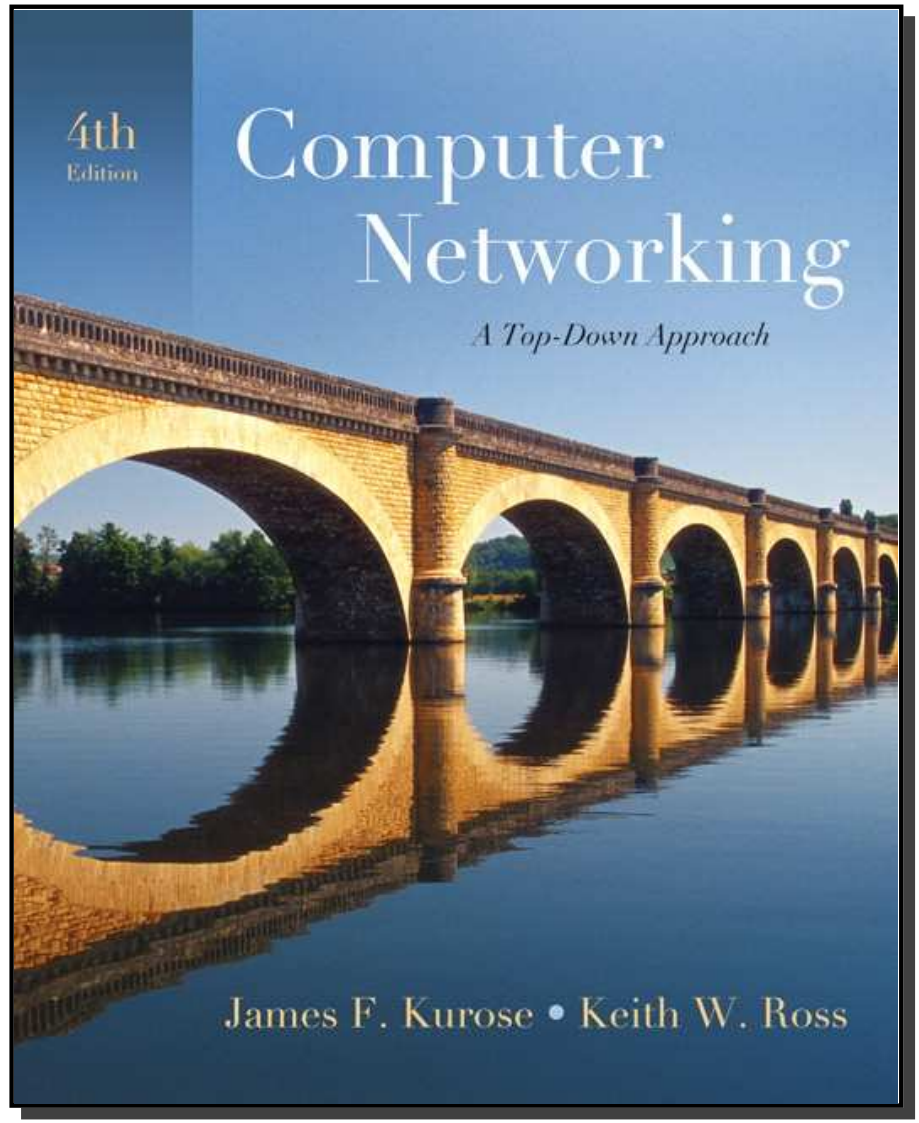

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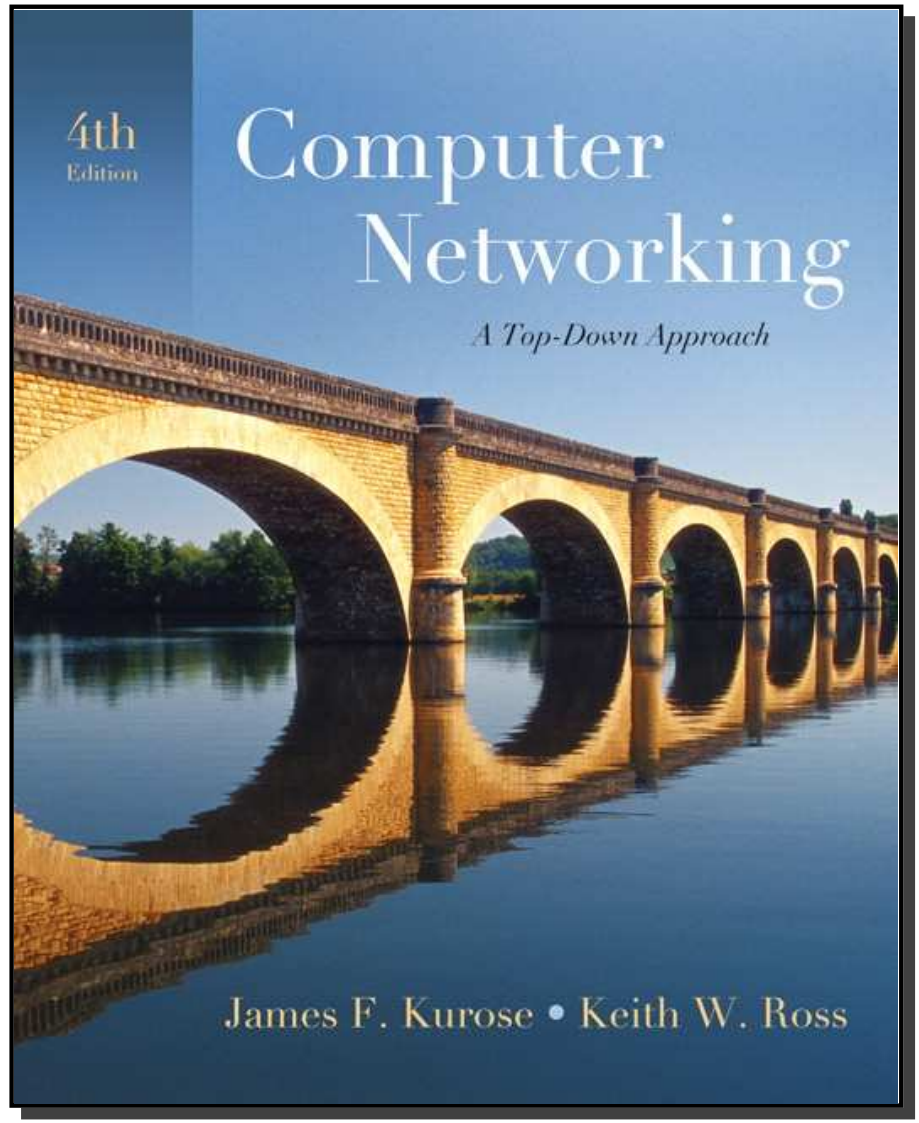

http://www.pearsonhighered.com/kurose-ross/

Evaluation

Evaluation

- +30% homework assignments
  - at least 3 *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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Just Do The Right Thing!

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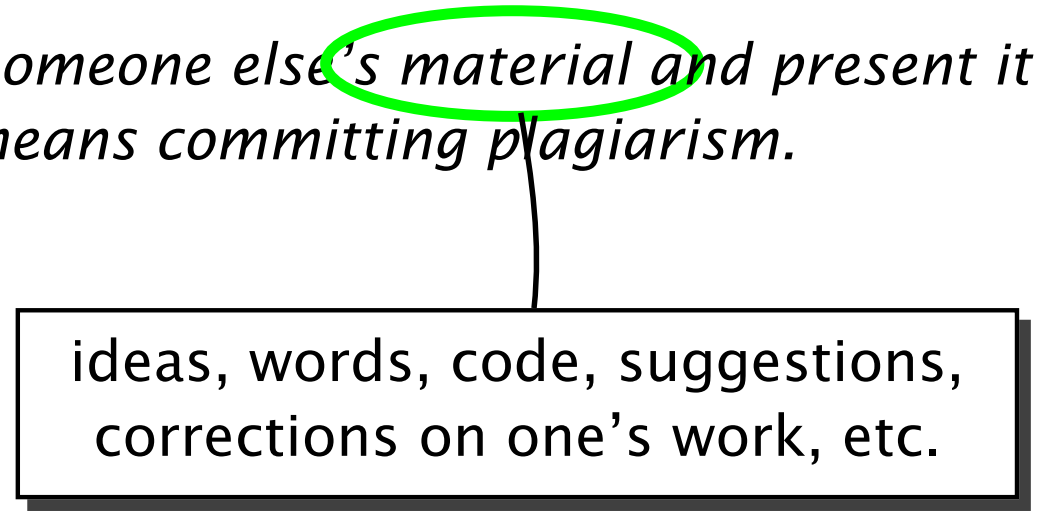

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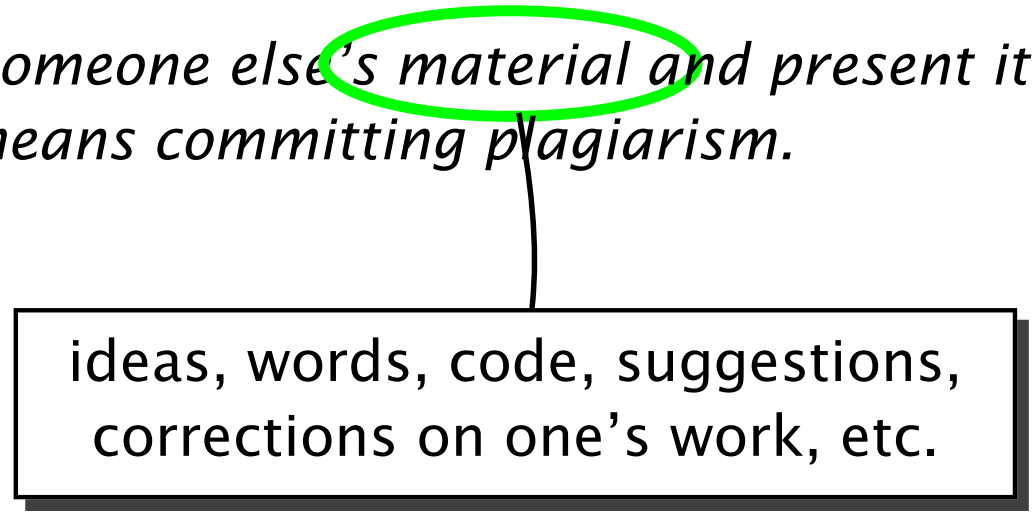

- Using someone else's material may be appropriate
  - e.g., software libraries
  - *always clearly identify the external material, and acknowledge its source; failing to do so means committing plagiarism.*
  - the work will be evaluated based on its *added value*

Plagiarism

- 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

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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)
  - ...
- This knowledge is essential to understanding networked communications
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- This knowledge is essential to understanding networked communications
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- 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?

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Our View

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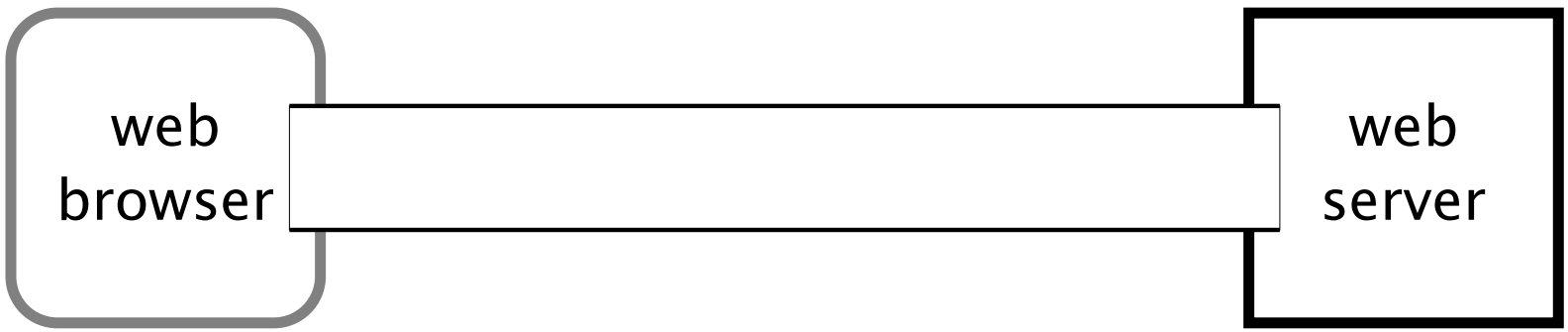

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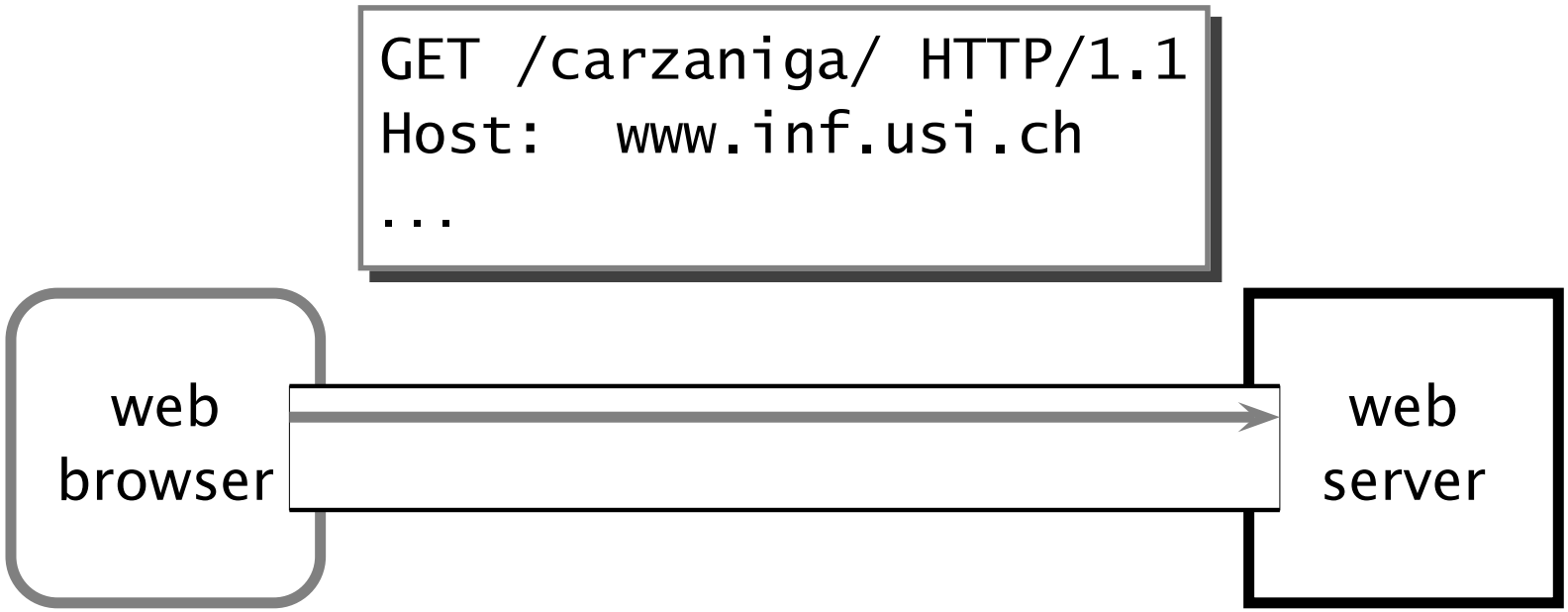

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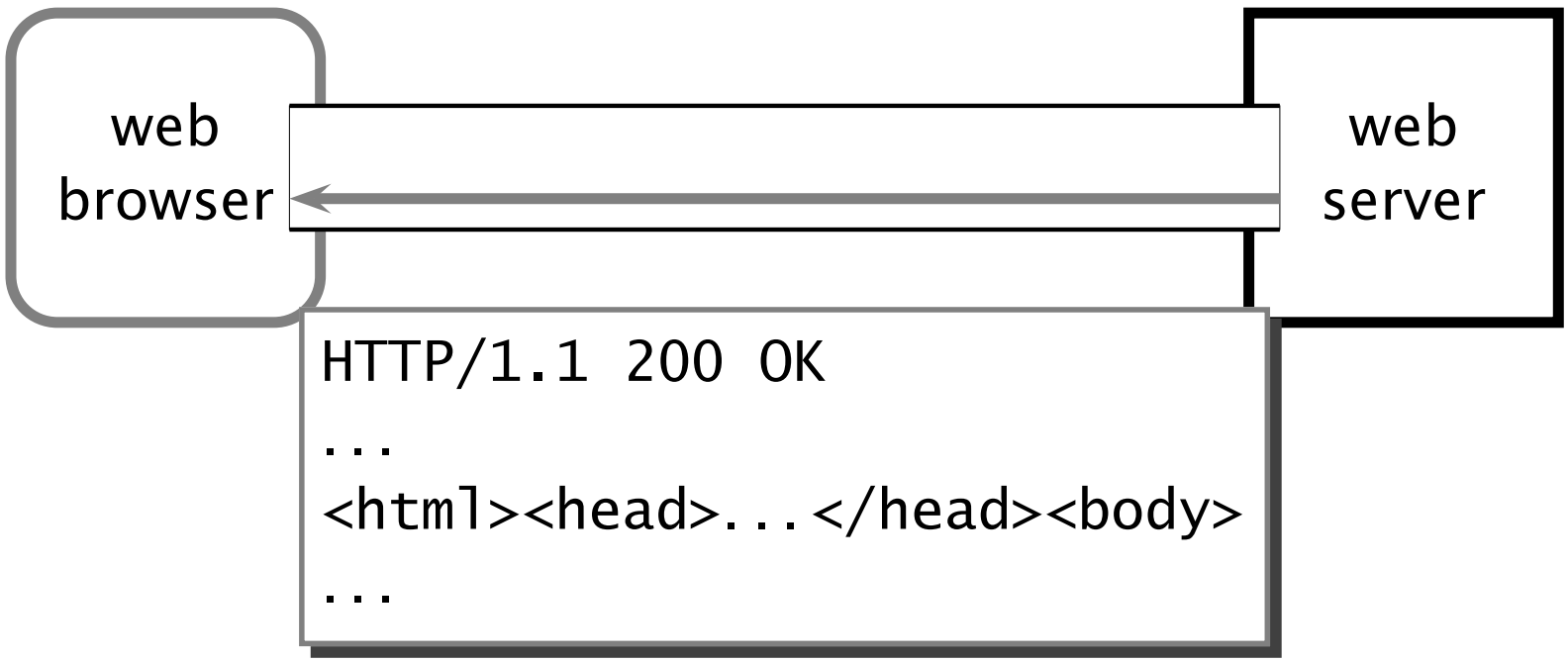

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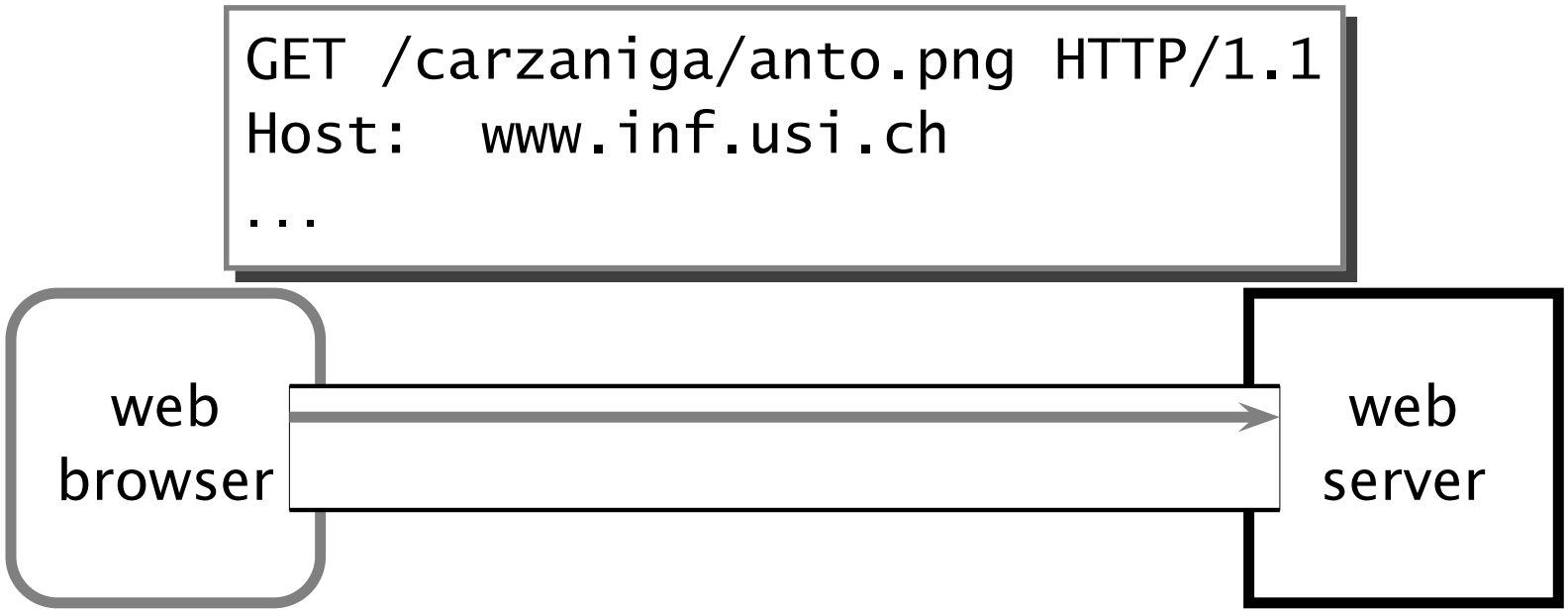

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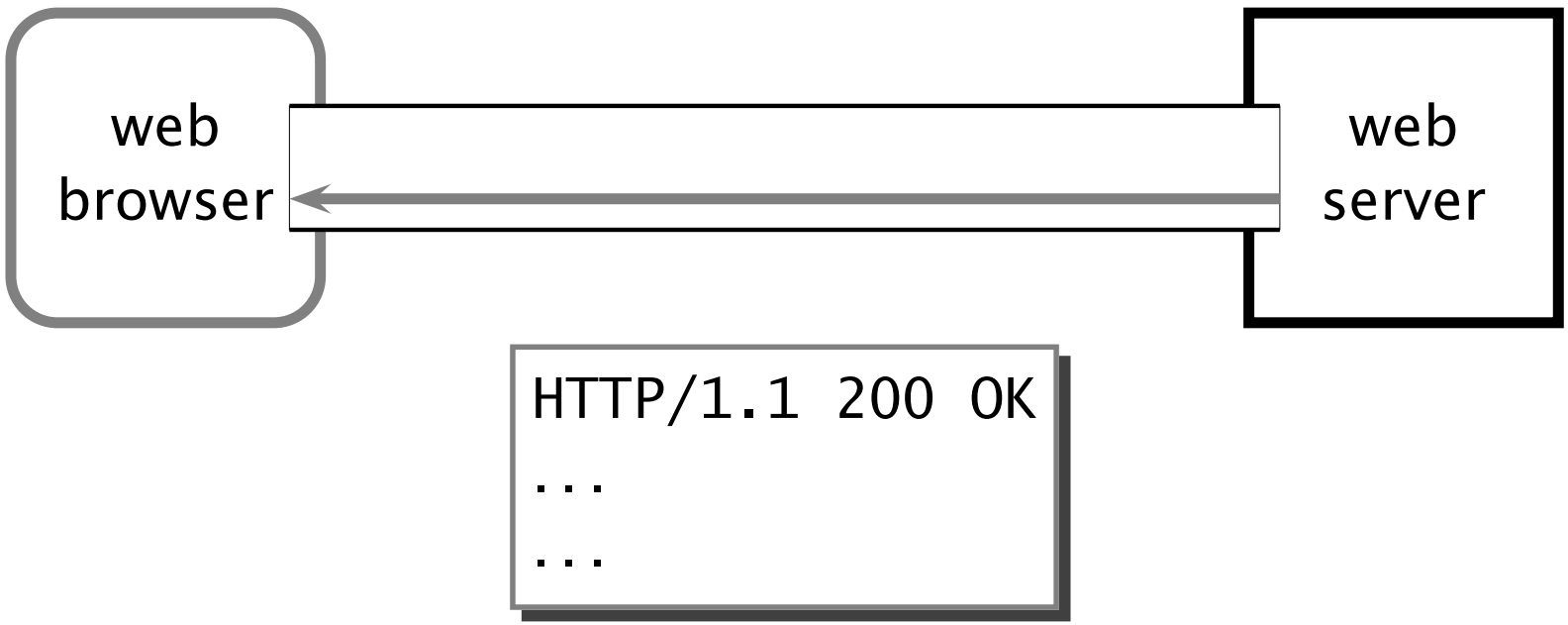
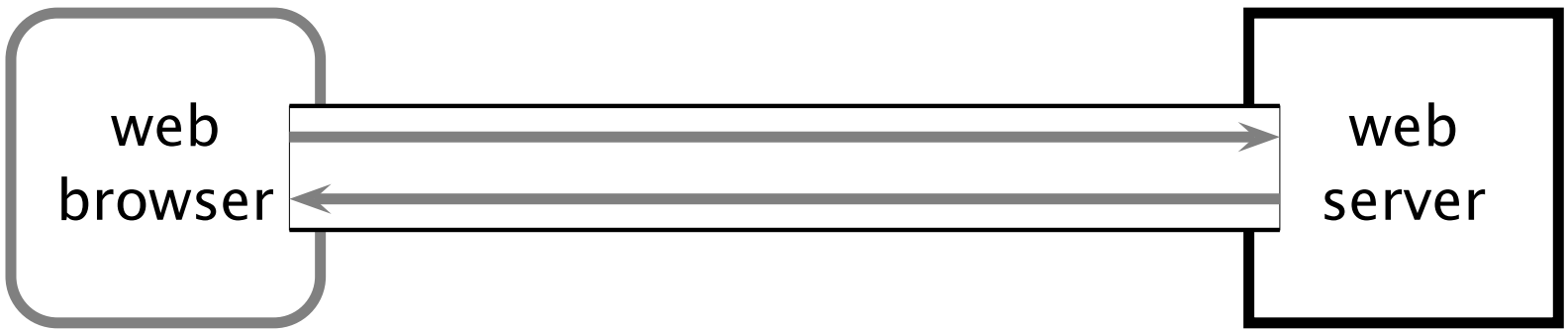


Streams or Packets?



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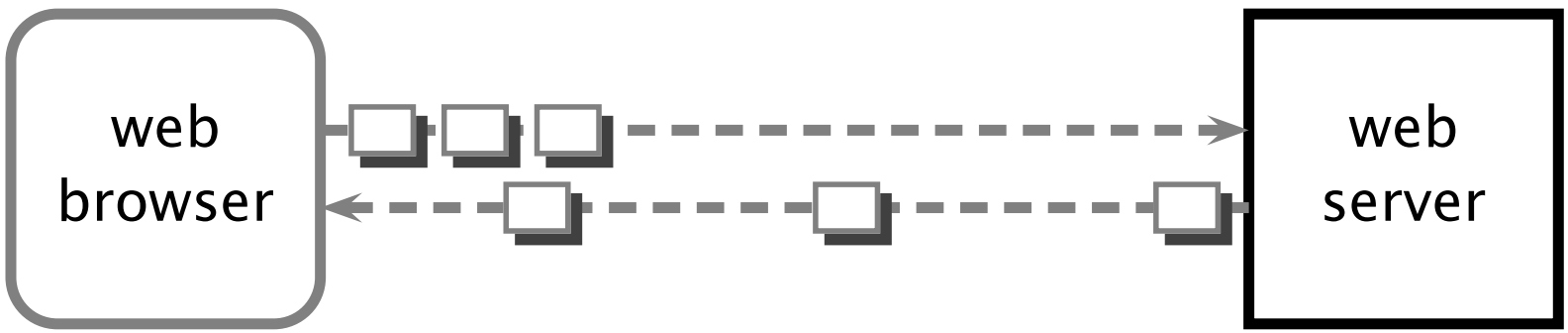

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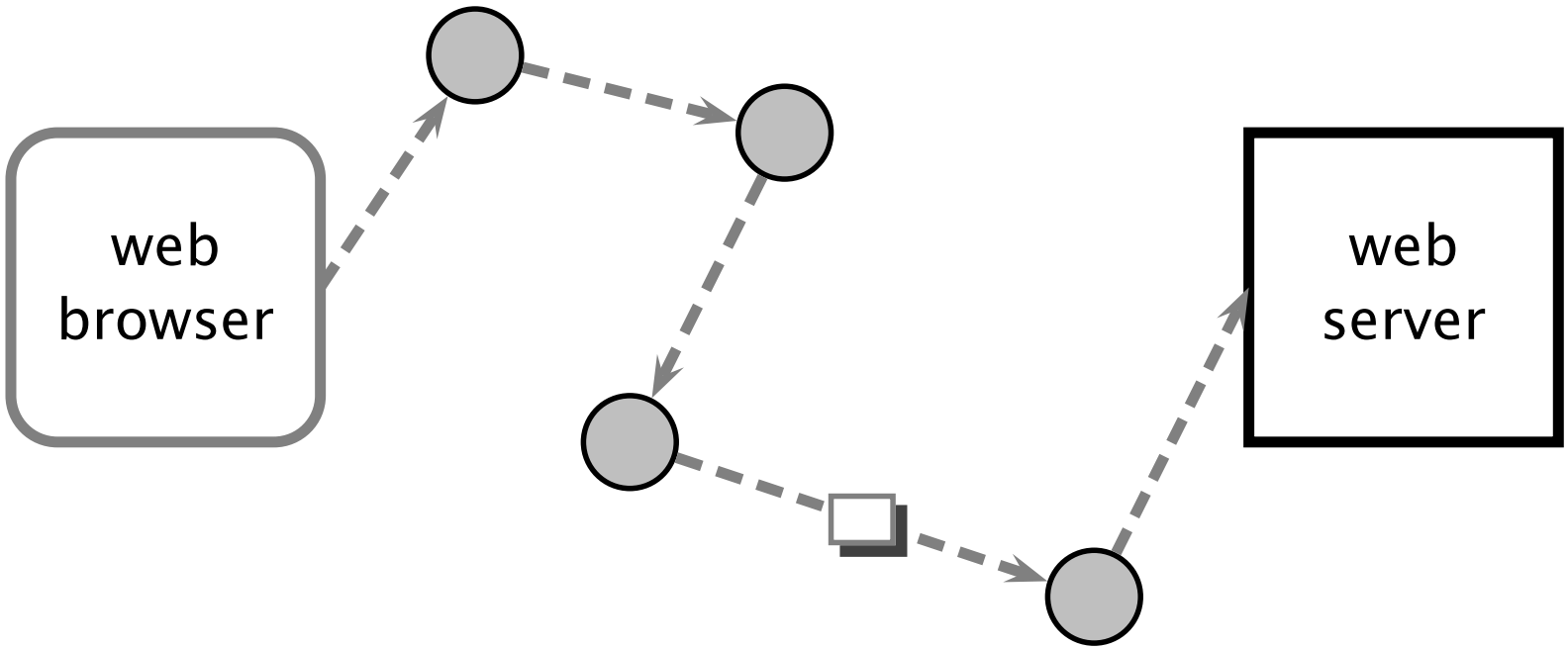

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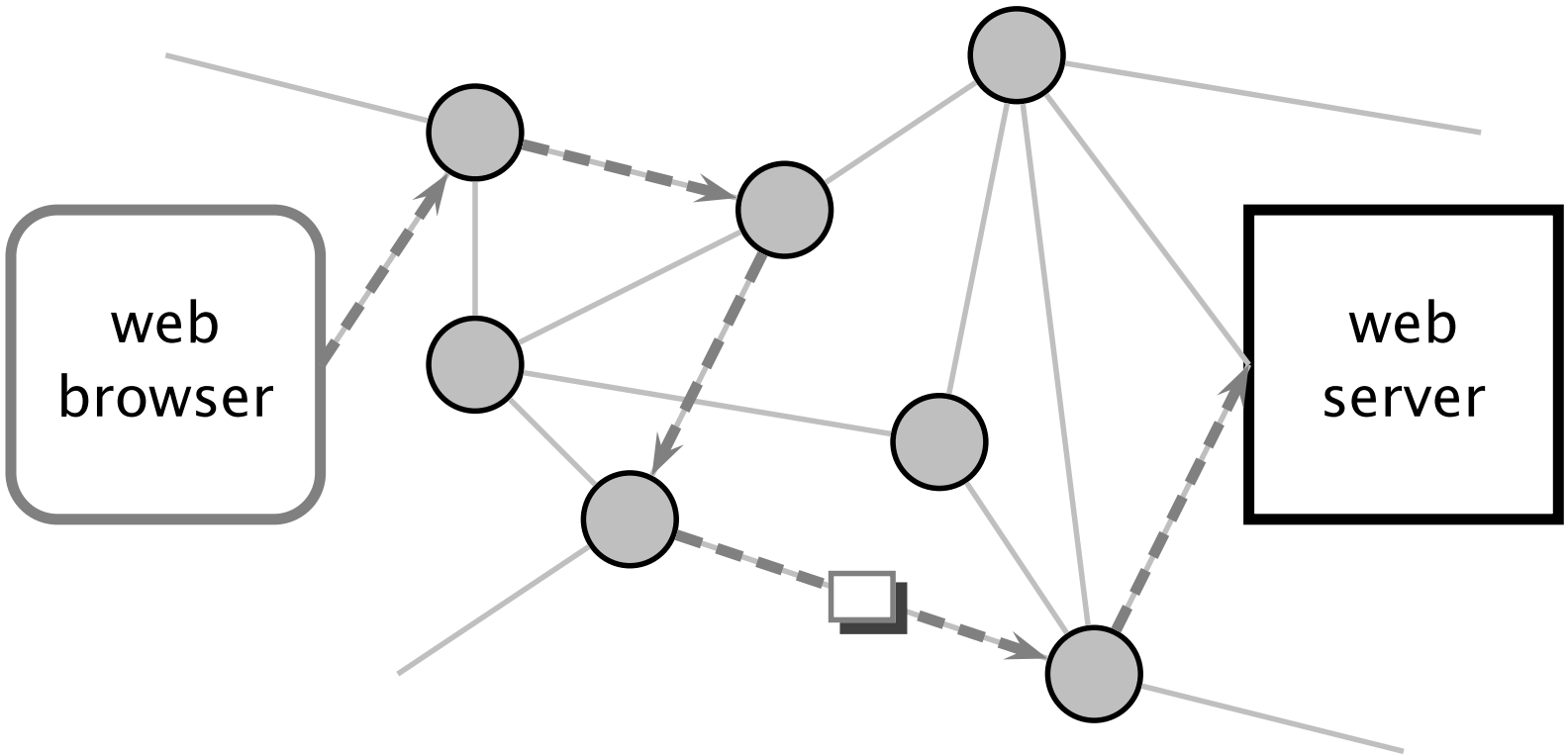

Program (1)

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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)

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