Freie Universität Berlin

Telematics

Chapter 0

Organizational

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INRIA / Freie Universität Berlin

Institute of Computer Science

Computer Systems and Telematics (CST)

Why "Telematics"?

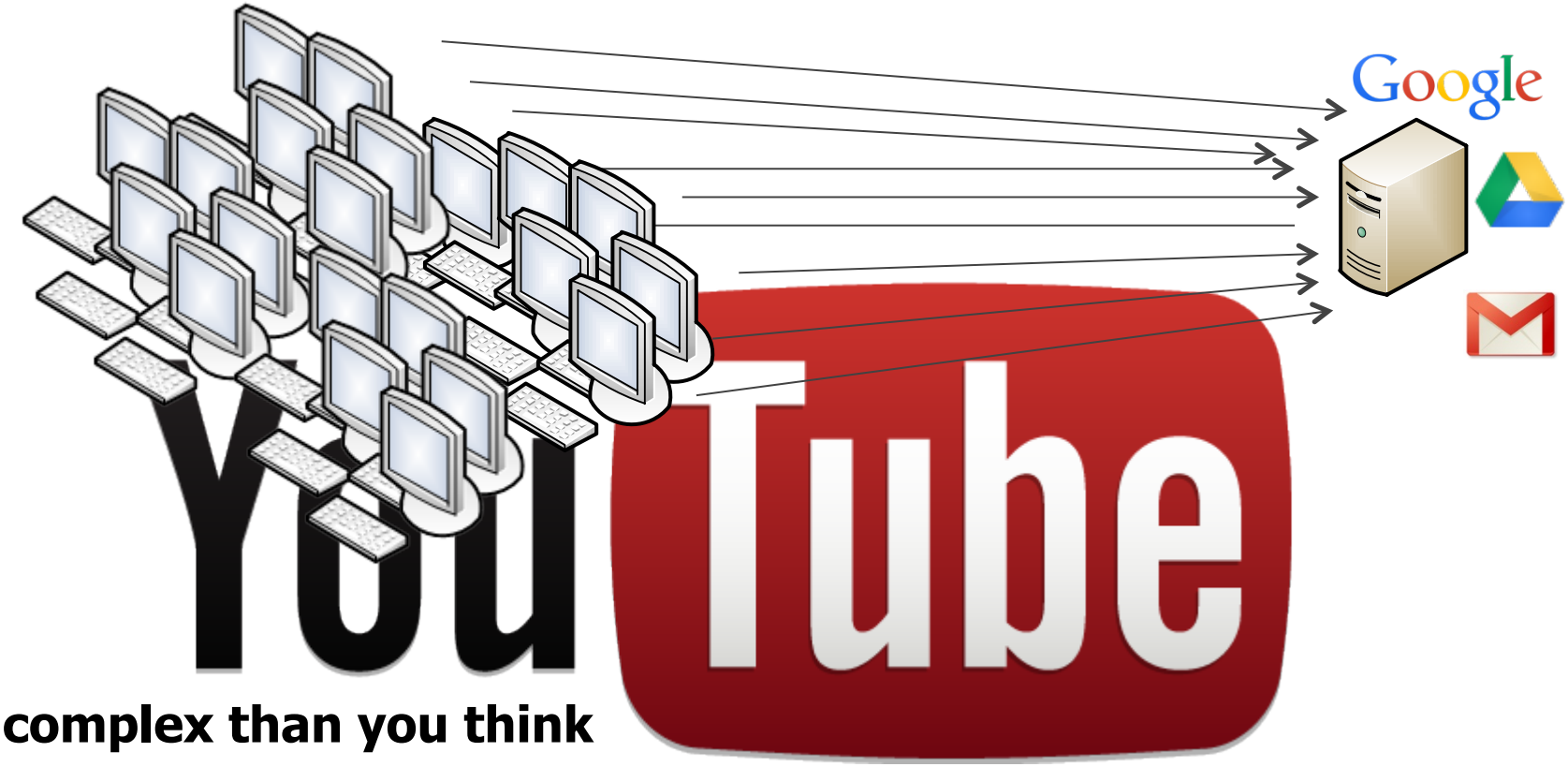
Etymology

- Telematics = **tele**communications + infor**matics**
  = Information and Communication Technologies (ICT)
- Similar courses also known as "Computer Networks"

Focus of this course

- Interconnecting devices (and people)
- Communication aspects
- Applications on top

High-level Motivation

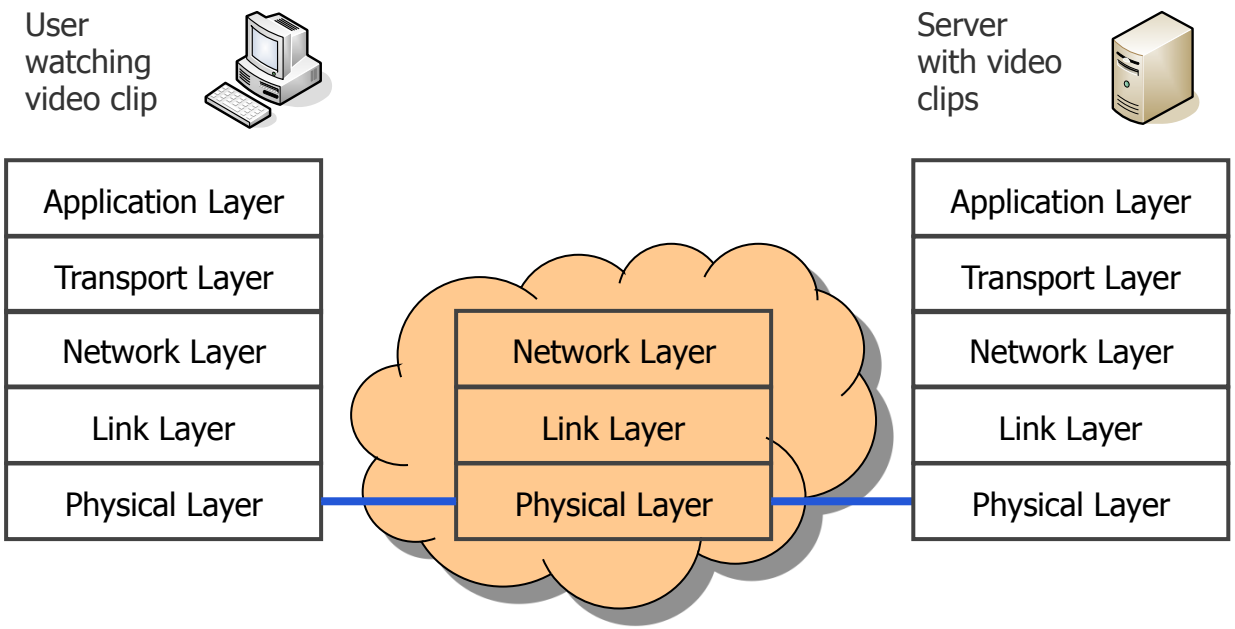


More complex than you think

- How do you transmit data?
- How do you access remotely multiple services from a single host?
- How do you achieve scalability?

Major Topics of this Course

- Application Layer
- Physical Layer
- Data Link & MAC Layer
- Network Layer
- Transport Layer
- New Trends



It's More Than Some Technical Background

- Internet is a prominent example of networking
  - You know how to cross a street. You should know how data flows!
  - Internet has a huge impact already, huge changes still to come

Two goals

1. Make you „informed citizens" about what powers these changes.
2. Hint at areas which you are interested to dig into.

At the End of this Course, You Should …

- know how networks in general are organized
- know what the Internet could be or is
- understand how wired/wireless networks work
- understand why/how protocols and layers are used
- understand how e-mails, videos get to where you are
- understand how operators operate real, big networks
- understand the cooperation of web browsers with web servers
- Be aware of security issues when you use the network
- be familiar with acronyms like: ALOHA, ARP, ATM, BGP, CDMA, CDN, CIDR, CSMA, DHCP, ETSI, FDM, FDMA, FTP, HDLC, HTTP, ICMP, IEEE, IETF, IP, IMAP, ISP, ITU, ISO/OSI, LAN, LTE, MAC, MAN, MPLS, MTU, NAT, NTP, PCM, POTS, PPP, PSTN, P2P, RARP, SCTP, SMTP, SNMP, TCP, TDM, TDMA, UDP, UMTS, VPN, WAN, ...

Course Structure

Freie Universität Berlin

⑧ ⑥ **Praktikum Mobilkommunikation**
Medienzugriff, Mobile IP, Mobiles Web

⑦ + **Embedded Sensor Web**
Projekte rund um Sensornetze

⑥ + **Seminar Technische Informatik**
Forschung in Mobilkommunikation, eingebettete Systeme, Internet

⑧ ⑥ **Mobilkommunikation**
Drahtlose Übertragung, Medienzugriff, GSM, 3G, WLAN, Mobile IP, Ad-hoc-Netze, WAP

⑦ **Embedded Internet**
Protkolle, Dienste, Internet, TCP/IP, Betriebssysteme für eingebettete Systeme

⑦ ⑤ **Mikroprozessorpraktikum**
Programmierung eingebetteter Systeme, mobile Endgeräte, Mikrocontroller, Steuerungssysteme

⑤ **Telematik**
Protokolle, Dienste, Standards, LAN, Internet, TCP/IP, WWW, Sicherheit, ISDN/IN/ATM, Dienstgüte, Multimedia, IPv6, MPLS

④ **Praktikum Technische Informatik (TI IV)**
Eingebettete Systeme, Schnittstellen, Treiber, Betriebssystem – programmieren, vernetzen, interagieren

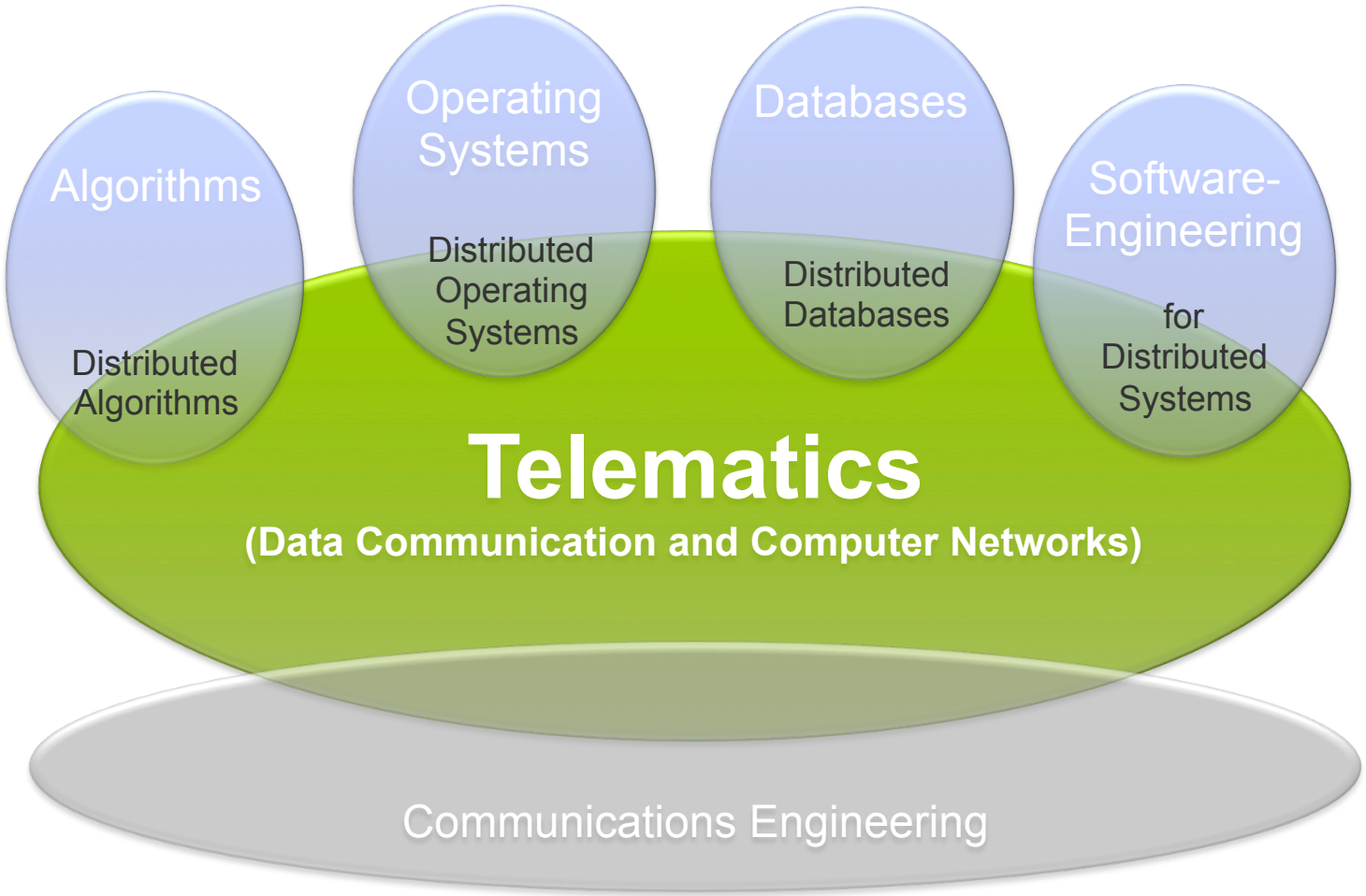
③ **Betriebs- und Kommunikationssysteme (TI III)**
Ein-/Ausgabe, DMA/PIO, Unterbrechungen, Puffer, Prozesse/Threads, UNIX/Windows, Netze, Medienzugriff, Protokolle, TCP/IP, Internet

② **Rechnerarchitektur (TI II)**
Harvard/v. Neumann, Mikroarchitektur, RISC/CISC, VLIW, Pipelining, Cache, Speicherhierarchie, Assembler, Multiprocessorsysteme

① **Grundlagen der Technischen Informatik (TI I)**
Schaltnetze, Schaltwerke, Logikminimierung, Gatter, Speicher, Halbleiter, Transistoren, CMOS, AD/DA-Umsetzer

④ Semester
Bachelor
Master

Related Fields



Time Schedule and Grading

- Lecture
  - Tuesday, 10:00 – 12:00, Hörsaal, Start of class at 10:15, (Hörsaal)
  - Thursday, 08:00 – 10:00, Hörsaal, Start of class at 08:30, (Hörsaal)
- Exercise
  - Tuesday, 16:00 – 18:00, Hörsaal, Start of class at 16:15
- Fail/Pass grading based on final written exam (Klausur)
  - Will take place during the last lecture (Hörsaal)
- You HAVE to register online in Campus Management

Office Hours, Communication, and Web Resources

- Dr. habil. Emmanuel Baccelli
  - Consulting hours: Tuesday, 14-15
  - Takustr. 9, Room 148
  - emmanuel.baccelli@fu-berlin.de

- Course homepage with slides, announcements, links
  - http://www.mi.fu-berlin.de/inf/groups/ag-tech/teaching/2013-14_WS/L_19531_Telematics/index.html

- Piazza.com: Online tool to manage class Q&A
  - http://piazza.com/fu-berlin.de/fall2013/19531

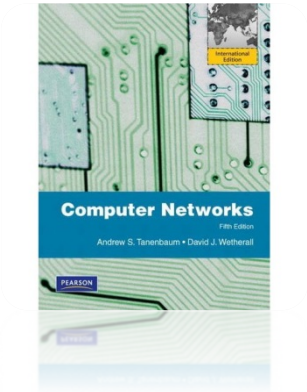
- Mailing list: Short-term news
  - mailto:ws1314-telematics@lists.fu-berlin.de

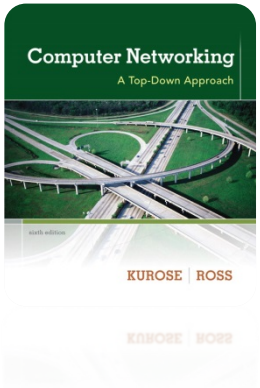
Literature

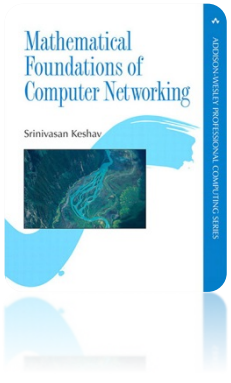
- No textbook specific to this course

- Recommendable literature:
  - A. Tanenbaum & D. Wetherall: Computer Networks (5th edition)
  - J. Kurose & K. Ross: Computer Networking (6th edition)
  - S. Keshav: Mathematical Foundations of Computer Networking (2012)
  - (there is more litterature: W. Stallings book, W. Goralski book…)

  - IETF drafts and RFCs
  - IEEE 802 LAN/MAN standards







Details Specific to this Course

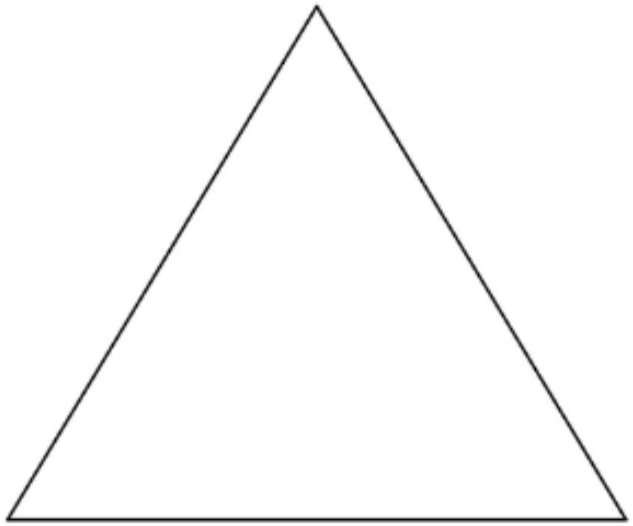
- Attention span: Exponential decay!
- Cognitive breaks: Every 20 minutes, so 3 in total.
- Experiment to refresh our brains
  - Breaks 1 & 2 share your music
    - Send us your suggestions
  - Last break: Take a walk?

Some Simple Rules …

- No laptops/phones
- Deployment of an anti-sleeping student strategy
- **Most important:** You are the only one responsible for your own brain

$\Rightarrow$ Don’t stop thinking!

Digitizing an Ancient Greek Lesson



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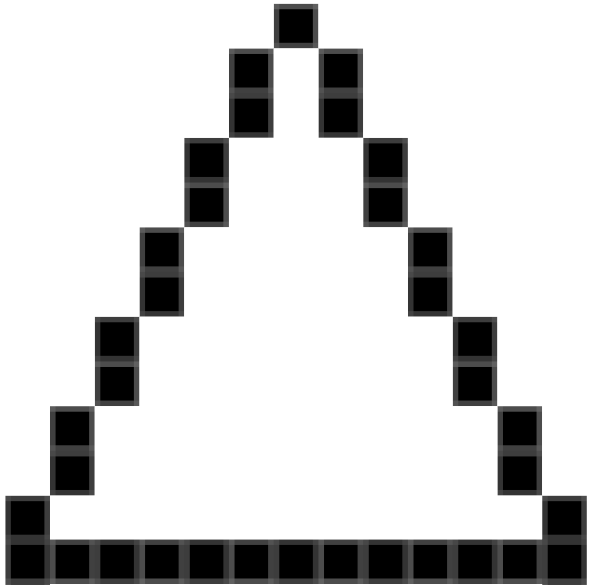

Three sides of that story:

- YOU have to make the effort to understand the concepts
- From atoms to bits
- Copy of a copy of a …