



COMP3234B

Computer and Communication Networks

2nd semester 2023-2024
Course Overview

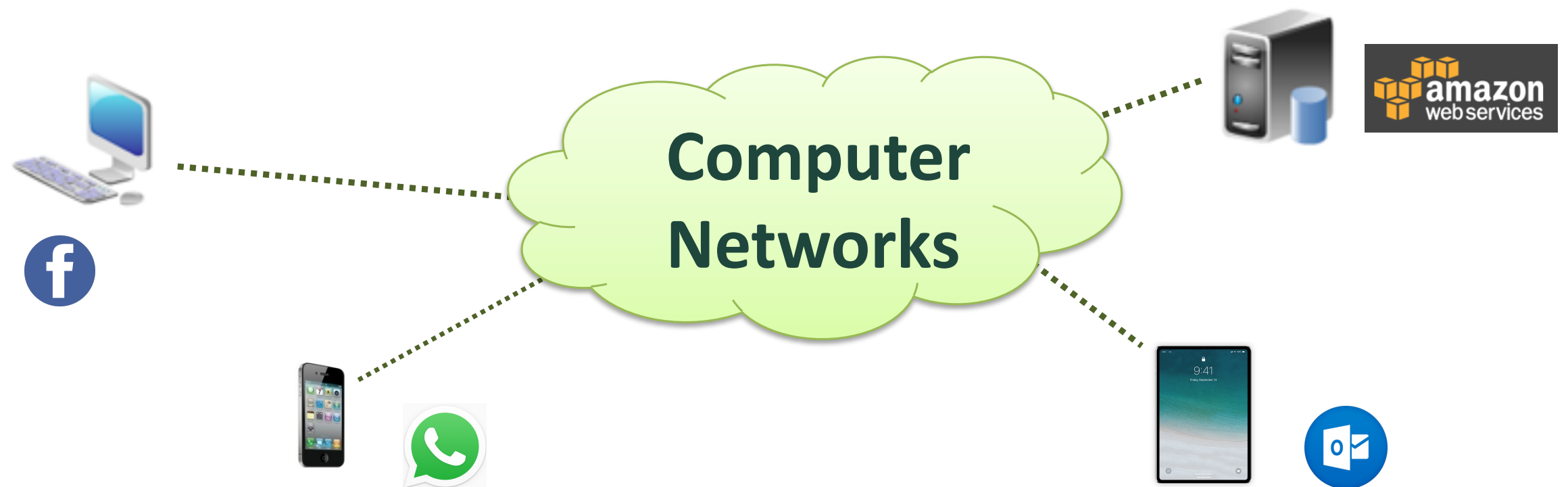
Prof. C Wu

Department of Computer Science
The University of Hong Kong

Course objectives

- ☑ Provide you with theoretical and practical basics of computer networks
- ☑ Understand the principles and issues related to communication software and networking hardware

WWW, Email, DNS, TCP, UDP, IP, router, ARP, switch, Ethernet, WiFi, etc.



Course objectives (cont'd)

- ☑ Understand the operating mechanisms of services in each layer of the network architecture

reliable data transfer, congestion control, store and forward, routing, switching, media access control, error detection and correction, etc.

- ☑ Understand various measures of data network performance
- throughput, delay, loss

- ☑ Design and implement network applications/protocols
- e.g., socket programming

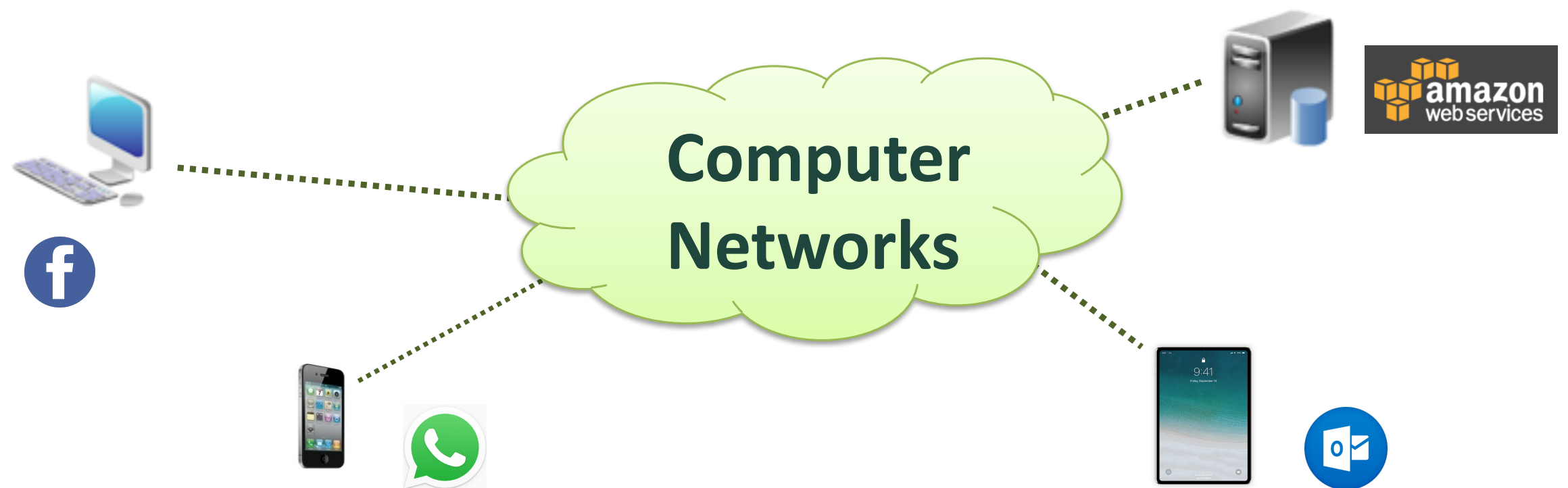
application

transport

network

link

physical



Structure of the course

❑ A top-down approach

❑ Start at the top

- Network applications: web, email, DNS, ...
- How applications are implemented: protocols, socket programming

❑ What's underneath applications

- Transport protocols (TCP, UDP)
- IP, routing

❑ What's further down

- Link technologies: Ethernet, WiFi, etc.

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physical

Learning outcomes

Outcome 1 [Concepts]: be able to explain the terminologies of computer networks, such as host, links, protocol stack, access/core network, throughput, etc.; be able to describe the services and functions provided by each layer in the Internet protocol stack.

Outcome 2 [Technologies and Protocols] : be able to describe the working principles behind key network technologies, such as circuit/packet switching, reliable data transfer, flow/congestion control, routing, multiple access, etc., and key protocols used in modern computer networks, such as 802.11 WiFi, Ethernet, ARP, IP, TCP, etc.

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Learning outcomes (cont'd)

Outcome 3 [Analysis]: be able to calculate packet delay, throughput, channel efficiency according to different network protocols; be able to carry out reliable data transfer protocols and routing algorithms in given networks.

Outcome 4 [Implementation]: be able to demonstrate knowledge in using Socket Interface to design and implement network protocols, such as designing a network application, implementing a reliable data transfer protocol in given networks.

Outcome 5 [Practicality]: be able to plan for IP networks and properly assign IP addresses to interfaces in given networks.

application

transport

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link

physical

Course information

● Teacher:

- Prof. Chuan Wu (office: 427 Chow Yei Ching Building)

- Consultation hours:

 - Tuesdays: 12:20-12:50pm

 - Thursdays: 12:20-12:50pm, 3:20-5:20pm

● Teaching assistants (office: 412 Chow Yei Ching Building)

- Mr. Shiwei Zhang

 - Consultation hours: Mondays 2-5pm

- Mr. Guicheng Qi

 - Consultation hours: Wednesdays 2-5pm

- Mr. Borui Wan

 - Consultation hours: Fridays 2-5pm

● Discussion forums, contact emails, etc. on Moodle

Course information (cont'd)

- Lecture/lab hours (all in CYCC501)

Tuesdays 10:30am—12:20pm: lectures

Thursdays 10:30am—12:20pm: lectures or lab sessions

- Lab sessions

Mandatory participation: You get the lab score if you finish the lab tasks during the lab session or within 6 days (i.e., by 11:59pm of the following Wednesday, for most labs)

Tentative schedule

(Refer to the latest schedule in the “Schedule” table on Moodle course page)

| Week | Date | Lecture Topic | Required Reading |
|----------------------|------------------|---|------------------------|
| 1 | Jan. 16 | Course overview; Internet, protocol, layering, core/access networks, circuit vs. packet switching, network performance metrics (LO1, 3) | Ch. 1.1 – 1.5 |
| | Jan. 18 | Application layer – basics, socket programming (LO1, 4) | Ch. 2.1, 2.7 |
| 2 | Jan. 23 | Application layer – Web, email, DNS (LO2) | Ch. 2.2, 2.3, 2.4 |
| | Jan. 25 | Lab 1: socket programming (LO4) | |
| 3 | Jan. 30 | Transport – basics, multiplexing/demultiplexing, UDP, reliable data transfer (LO1,2,3) | Ch. 3.1, 3.2, 3.3, 3.4 |
| | Feb. 1 | Transport – GBN, selective repeat (LO2,3) | Ch. 3.4 |
| 4 | Feb. 6 | Transport – TCP RDT, flow control, connection management (LO2,3) | Ch. 3.5 |
| | Feb. 8 | Lab 2: RDT (LO2,3) | |
| 5 | Chinese New Year | | |
| 6 | Feb. 20 | Transport – TCP congestion control (LO2,3) | Ch. 3.6, 3.7 |
| | Feb. 22 | Transport – TCP throughput, RTT (LO2,3) | Ch. 3.7, 3.5 |
| 7 | Feb. 27 | Network – routing and forwarding, datagram, router, IP addressing (LO1, 2, 5) | Ch. 4.1, 4.2, 4.3 |
| | Feb. 29 | Network – DHCP, NAT, IPv6, ICMP (LO2,5) | Ch. 4.3, 5.6 |
| 8 Reading Week | Mar. 5 | Lab 3: TCP (LO2,3) | |
| 9 | Mar. 12 | Network – routing algorithms (LO2, 3) | Ch. 5.2 |
| | Mar. 14 | Midterm exam | |
| 10 | Mar. 19 | Network – Internet routing protocols (LO2, 3) | Ch. 5.3, 5.4 |
| | Mar. 21 | Lab 4 IP (LO2) | |
| 11 | Mar. 26 | Link – services, error detection and correction, multiple access (LO1,2,3) | Ch. 6.1, 6.2, 6.3 |
| | Mar. 28 | Lab 5 routing (LO2) | |
| 12 | Apr. 2 | Link – multiple access, link-layer addressing, ARP (LO2,3) | Ch. 6.3, 6.4 |
| | Apr. 4 | Public Holiday | |
| 13 | Apr. 9 | Link – Ethernet, switch, MPLS (LO2,3) | Ch. 6.4, 6.5 |
| | Apr. 11 | Lab 6 ARP, Ethernet (LO2,3) | |
| 14 | Apr. 16 | Link – wireless links, WiFi (LO2,3) | Ch. 7.1, 7.2, 7.3 |
| | Apr. 18 | Link – Bluetooth, Zigbee, course wrap-up (LO2) | Ch. 7.3 |
| 15 | Apr. 23, 25 | TBA | |

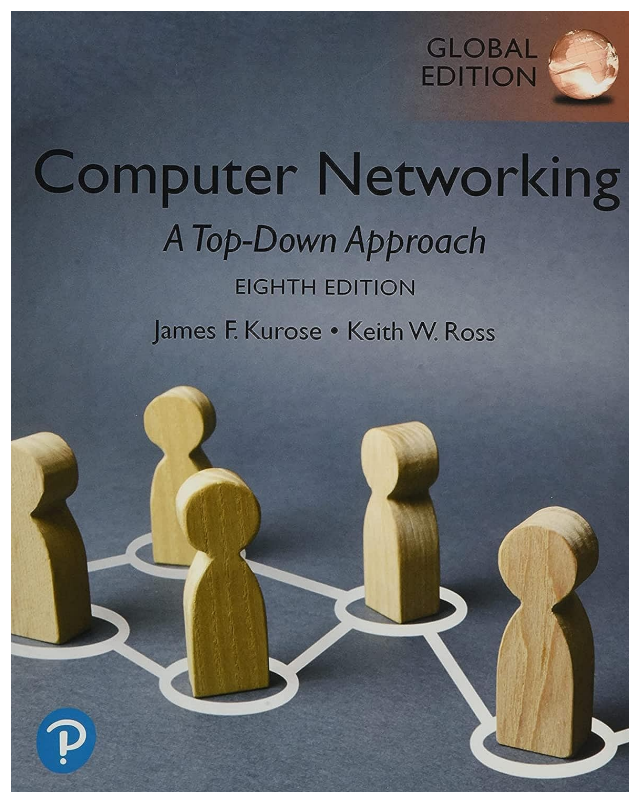
Textbook

Computer Networking: A Top-Down Approach (8th Edition)

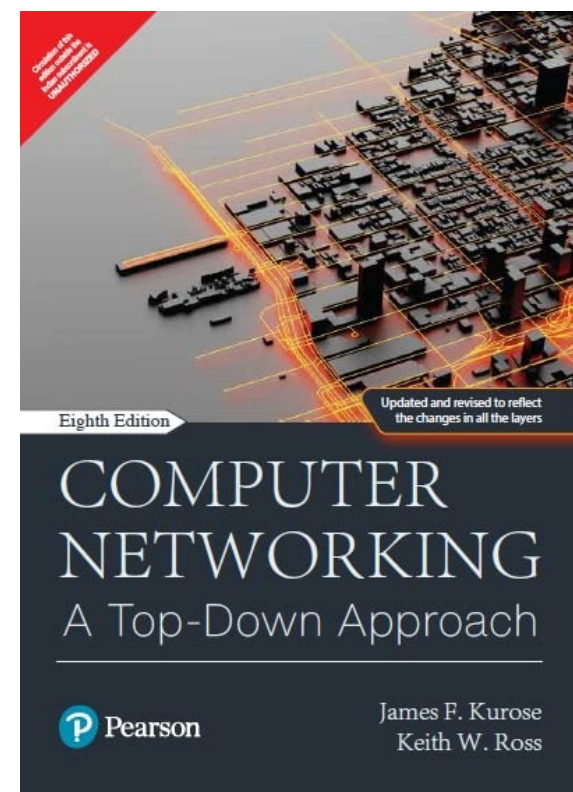
James F. Kurose & Keith W. Ross

Pearson, 2021/2022

Global Edition:



US Edition:



Required reading list and other references given at the end of each set of lecture slides

Assessment and grading (tentative)

- 6 labs

6%

- 1 mark for each lab (1, 0.5 or 0)

- 1 programming assignment

- Implementing a simple application using socket programming
- Using Python

36%

- 3 written assignments

- problem analysis and solving, performance calculation

8%

- 1 midterm examination

- 1 final examination

50%

Academic policies

Late policy

- 10% deduction per day, for a maximum of 3 days
- no assignment will be accepted after 3 days beyond the deadline

Write your own programs and assignments

- Discussions on course materials and assignment requirements are encouraged, but you should write your own assignment, as an individual creative process
- Plagiarism detection for every assignment

All about plagiarism at <http://www.hku.hk/plagiarism>

Especially, “What constitutes plagiarism” at <https://tl.hku.hk/plagiarism/understanding-plagiarism/>

- The copier and the being copied will get “0”