

## Network System Design: Methodologies and Tools, Spring 2011

Instructor: Prof. Ying-Dar Lin, [ydlin@cs.nctu.edu.tw](mailto:ydlin@cs.nctu.edu.tw)

### Course Objective:

This course is a part of the book project “Computer Networks: An Open Source Approach” and would use an innovative way to create a reader community on the Facebook to ask and answer questions. Initially, students are given (1) selected solutions to exercises of open source implementations (OSIs) in all chapters, (2) selected solutions to end-of-chapter hands-on exercises, and (3) end-of-chapter FAQs. Your objective is to extend/enhance them. Among chapters 2~8, students are asked to pick on 3/18 one main chapter to ask and one main chapter to answer. For the main chapter you are in charge to ask, you should ask on the Facebook (1) at least 1 question on each OSI, (2) at least 1 question on each hands-on exercise, and (3) at least 5 questions beyond the current FAQ. For the other chapters, totally you should ask at least 8 questions on OSI’s, 8 questions on hands-on exercises, and 8 questions beyond the FAQs. For the main chapter you are in charge to answer, you should answer all posted questions on the Facebook community. You also grade questions for the chapter you are in charge to answer, and grade answers that answer the questions you post. The grade ranges from 5 (best) to 0 (worst). Your course grade would be 30% on the average grade you receive on the questions you ask, 30% on the average grade you receive on the answers you post, and 40% on the grade you receive from the instructor on the summary you compile and present for the chapter. The summary includes (1) extended solutions and FAQ to exercises of OSIs, (2) extended solutions to end-of-chapter hands-on exercises, and (3) extended end-of-chapter FAQ.

The class lecture shall start from Appendices B, C, and D to equip students with basic hands-on skills. Then for each chapter, the lecture would be on (1) key concepts, (2) end-of-chapter FAQ, (3) OSIs and the solutions to their exercises. You are asked to post, in 2 weeks after the lecture, your questions to the chapter you are in charge to ask, and to answer, in 3 weeks after the lecture, the questions of the chapter you are in charge to answer. You should write and present your summary to the class in 4 weeks after the lecture.

**Prerequisite:** Computer Networks or equivalent

**Textbook:** Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, Computer Networks: An Open Source Approach, McGraw-Hill, Feb 2011; available on Amazon.com.

**Grade:** Average grade on your questions (30%), average grade on your answers (30%), grade on your summary (40%).

**Textbook homepage:** [www.mhhe.com/lin](http://www.mhhe.com/lin)

**Course community on Facebook:** to be announced.

**Class hours:** Friday 1:30-4:20PM in 701 EECS (電資大樓 701)

### Course agenda:

Part	Topic	Date	Summary Presentation
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1	Appendices B, C, D	3/4	
2	Chapter 1 Fundamentals A Packet's Life	3/11	
3	Chapter 2 Physical Layer	3/18	4/15
4	Chapter 3 Link Layer	3/25, 4/1	4/29
5	Chapter 4 IP Layer	4/8, 4/15	5/13
6	Chapter 5 Transport Layer	4/22, 4/29	5/27
7	Chapter 6 Application Layer	5/6, 5/13	6/10
8	Chapter 7 Internet QoS	5/20	Written report only
9	Chapter 8 Network Security	5/27	Written report only

### Textbook Overview:

*Computer Networks: An Open Source Approach* considers *why* a protocol, designed a specific way, is more important than *how* a protocol works. Key concepts and underlying principles are conveyed while explaining protocol behaviors. To further bridge the long-existing gap between design and implementation, it illustrates *where* and *how* protocol designs are implemented in Linux-based systems. A comprehensive set of fifty-six *live* open source implementations spanning across hardware (8B/10B, OFDM, CRC32, CSMA/CD, and crypto), driver (Ethernet and PPP), kernel (longest prefix matching, checksum, NAT, TCP traffic control, socket, shaper, scheduler, firewall, and VPN), and daemon (RIP/OSPF/BGP, DNS, FTP, SMTP/POP3/IMAP4, HTTP, SNMP, SIP, streaming, and P2P) are *interleaved* with the text.

### Quotes from Reviewers:

“The exposure to real life implementation details in this book is phenomenal... Definitely one of the better books written in the area of Computer Networks.” – Mahasweta Sarkar, San Diego State University

“Written by RFC and open source contributors, this book definitely is an authentic guide for network engineers.” – Wen Chen, Cisco Fellow

“Interleaving designs and implementations into the same book bridges the long-existing gap and makes this an ideal text to teach from.” – Mario Gerla, University of California, Los Angeles

“The sidebars of Historical Evolution and Principle in Action make the reading more enjoyable, while Performance Matters treat computer networking quantitatively.” – H. T. Kung, Harvard University