Networks and Internet Applications – Study Guide

Unit 1. Computer networks and Internet

Base material

- Computer Networking book (8th edition).

Estimated time: 9 h.

Read the following sections from chapters 1, 4, 2 and 3 from Computer Networking book:

- ***Chapter 1 Computer Networks and the Internet***
  - Introduction pag.31-32
  - **1.1** What Is the Internet? pag.32-39
  - **1.2** The Network Edge pag.39-52
  - **1.3** The Network Core pag.52-65
  - **1.4** Delay, Loss, and Throughput in Packet-Switched Networks
    - Introduction pag.65
    - **1.4.1** Overview of Delay in Packet-Switched Networks pag.65-69
  - **1.5** Protocol Layers and Their Service Models pag.77-84
  - **1.6** Networks Under Attack pag.84-88
  - **1.7** History of Computer Networking and the Internet pag.88-94

- ***Chapter 4 The Network Layer: Data Plane***
  - **4.1** Overview of Network Layer
    - Introduction pag. 333
    - **4.1.1** Forwarding and Routing: The Data and Control Planes pag. 334-339

      Introduction only (Excluding the points regarding "Control Plane")
    - **4.1.2** Network Service Model pag. 339-340

      (Excluding "An Overview of Chapter 4")
  - **4.3** The Internet Protocol (IP): IPv4, Addressing. IPv6 and More
    - Introduction pag.360-361
    - **4.3.2** IPv4 Addressing pag. 363-374

      (Excluding "Principles in practice")

- **4.3.3** NAT pag.374-377
- **4.3.4** IPv6

  pag. 377-378 *(Excluding "IPv6 Datagram Format")*

  pag. 381-383 *(Section "Transitioning from IPv4 to IPv6")*

- **4.2** What's inside a Router?
  - Introduction pag. 341-344
  - **4.2.1** Input Port Processing and Destination-Based Forwarding pag. 344-347

- ***Chapter 2 Application Layer***
  - **2.1.3** Transport Services Available to Applications pag.118-120
  - **2.1.4** Transport Services Provided by the Internet pag.120-124

- ***Chapter 3 Transport Layer***
  - **3.1** Introduction and Transport-Layer Services pag.212-217
  - **3.2** Multiplexing and Demultiplexing pag.217-224

    (Excluding "Connectionless Multiplexing and Demultiplexing")
  - **3.3** Connectionless Transport: UDP
    - Introduction pag.224-228
  - **3.5** Connection-Oriented Transport: TCP
    - **3.5.1** The TCP Connection pag.257-260

      (Excluding "Case History" and the programming part in page 258)

Unit 2. Internet Applications

Base material

- Computer Networking book (8th edition).

Estimated time: 7,25h

Read the following sections from chapter 2 and 4 from Computer Networking book, as well as indicated pages from teaching module Cloud computing fundamentals and platforms.

- ***Chapter 2 Application Layer***
  - Introduction pag.111
  - **2.1** Principles of Network Applications
    - Introduction pag.112-114
    - **2.1.1** Network Application Architectures pag.114-115
    - **2.1.2** Processes Communicating pag.115-118
  - **2.2** The Web and HTTP pag.125-146
  - **2.3** Electronic Mail in the Internet pag.146-151
  - **2.4** DNS—The Internet's Directory Service pag. 152-166
  - **2.5** Peer-to-Peer File Distribution pag.166-173

    It is not required to go into detail with the mathematical calculation (pag.169), you only need to understand the explanation.

- ***Chapter 2 Application Layer***
    - **2.6** Video Streaming and Content Distribution Networks pag.173-182
- ***Chapter 4 The Network Layer: Data Plane***
    - **4.2** What's inside a router?
        - **4.2.5** Packet Scheduling pag.355-360

Unit 3. Multimedia Networks

Base material

- Computer Networking book (8th edition).

Read the following sections from chapter 2 from Computer Networking book:

- ***Chapter 2 Application Layer***
  - **2.6** Video Streaming and Content Distribution Networks pag.173-182

And the material provided in Practice 3.

Unit 4. Internet applications security principles

Base material

- Computer Networking book (8th edition).

Estimated time: 7,5h

Read the following sections from chapter 8 from Computer Networking book:

- ***Chapter 8 Security in Computer Networks***
  - **8.1** What Is Network Security? pag.638-640
  - **8.2** Principles of Cryptography pag.640-654
  - **8.3** Message Integrity and Digital Signatures pag.654-664
  - **8.4** End-Point Authentication pag.664-669
  - **8.5** Securing E-mail pag.669-674
  - **8.6** Securing TCP Connections: SSL pag.674-680
  - **8.7.** Network-Layer Security: IPsec and Virtual Private Networks pag.681-681
    - **8.7.1.** IPsec and Virtual Private Networks (VPNs) pag.681-683
  - **8.10** Summary pag.709-709