Computer Networks and Distributed Systems

Course Description

To an ever-greater extent, computers are not stand-alone but integrated into networks in which data and other computer system functions can be accessed. This enables distributed systems in which data and certain computer functions can be systematically assigned to different computers within a network in order to jointly accomplish defined tasks. While the various computers within a network or a distributed system were in the past stationary, many computers used within a network are now mobile, leading to completely new application scenarios in both the private and the business context.

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1. Computer Networks
   1. Basics of Data Transmission
   2. OSI Reference Model
   3. Network Topologies
2. TCP/IP and Internet
   1. Origin and Structure of the Internet
   2. TCP/IP Protocol Stack
   3. Selected IP-based Protocols and Services
3. Communication and Coordination
   1. Basic Concepts
   2. Concurrency, Semaphores, and Deadlock
   3. Remote Procedure Calls
   4. Message-oriented Communication
   5. CORBA
   6. EJBs
4. Distributed Systems Architectures
   1. Client Server Systems and Distributed Applications
   2. Service Orientation: SOA, Web Services, and Microservices
   3. Cloud Applications
   4. Distributed Database Systems
   5. High-Performance Computing Cluster
   6. Distributed Ledger Technologies
5. Mobile Computing
   1. Fundamentals, Techniques, and Protocols of Mobile Computing
   2. Mobile Internet and its Applications
   3. Mobile Communication Networks
6. Network Security

6.1 Introduction to Network Security

6.2 Authentication in Distributed Systems

1. Secure Internet Protocols
2. Security and Data Protection in Mobile Systems