AI: Internet Computing

Lecture 1 — Introduction

Acknowledgement and Disclaimer

The present lecture *AI: Internet Computing* is based on the lecture *Angewandte Informatik 2 (AI 2)*.

We would like to thank the previous professors at AIFB who have been involved in the design and development of the lecture over the years. These are **Prof. Dr. Hartmut Schmeck** (2006–2007); **Dr. Matthias Bonn**, **Prof. Dr.-Ing. Stefan Tai**, and **Dr. Lukas König** (2008); **Prof. Dr.-Ing. Stefan Tai** (2009–2014); **Prof. Dr.-Ing. J. Marius Zöllner** (2015); **Prof. Dr. Ingo Scholtes** (2016); and **Prof. Dr. Agnes Koschmider** (2017).

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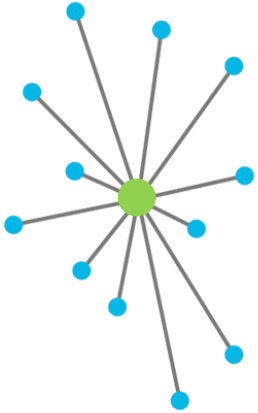
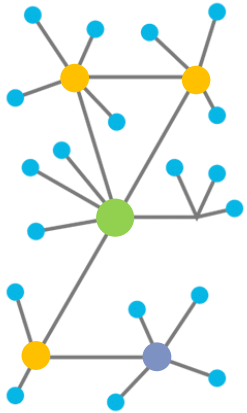
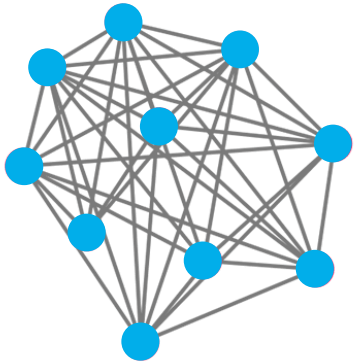
Internet Computing
Distributed Systems vs. Decentralized Systems







Centralized Network
(e.g., Web-Services)

Partially
(De-)Centralized Network
(e.g., Domain Name Systems)

Decentralized Networks
(e.g., Peer-to-Peer Networks)

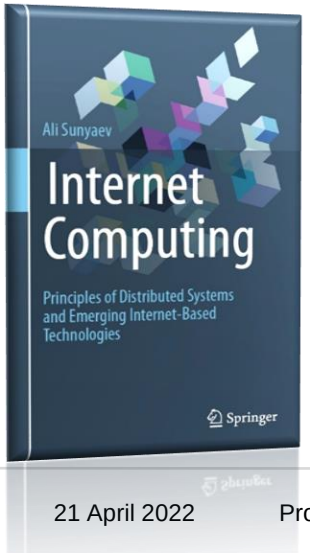
Degree of Decentralization

Client Server (3rd Level) Server (2nd Level) Server (1st Level)

Figures align with Baran P. (1964) On Distributed Communications Networks. IEEE Transactions on Communications Systems 12(1):1–9.

Learning Goals of the Lecture

In this course you will learn key architectures and technologies for the design and implementation of **Internet Computing** applications.



Textbook: Internet Computing

- Principles of Distributed Systems and Emerging Internet-Based Technologies
- Introduces students and young professionals to the fundamentals of contemporary, emerging and future technologies and services in Internet computing

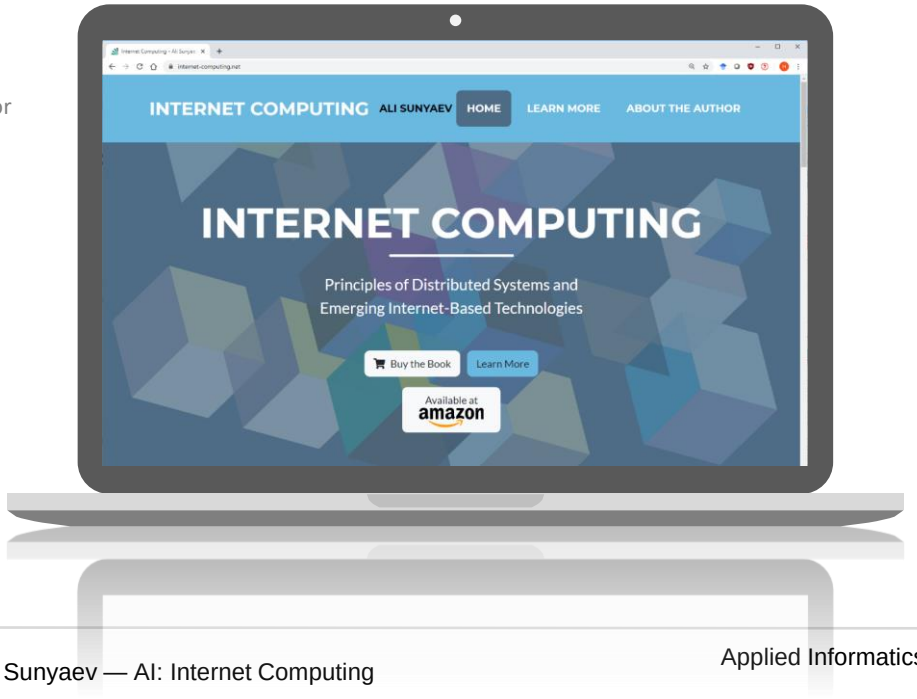
Textbook: Internet Computing

Learning goals and summary for each chapter

Website: www.internet-computing.net

Available online

A wealth of examples for every chapter



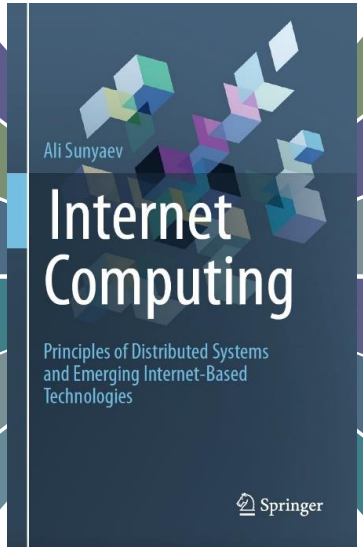
12 Chapters

Recommendations for further readings at the end of each chapter

Questions for checking students' comprehension at the end of each chapter

Textbook: Internet Computing—Chapters

1. Introduction to Internet Computing
2. Information Systems Architecture
3. Design of Good Information Systems Architectures
4. Internet Architectures
5. Middleware
6. Web Services



7. Cloud Computing
8. Fog and Edge Computing
9. Distributed Ledger Technology
10. The Internet of Things
11. Critical Information Infrastructures
12. Emerging Technologies

Textbook: Internet Computing—Chapters

01

Introduction to Internet Computing

- A Brief History of the Internet
- Defining Internet Computing
- Distributed Information Systems for Internet Computing
- Application Examples of Internet Computing

02

Information Systems Architecture

- Defining Information Systems Architecture
- The Principles of Information Systems Architecture
- Architectural Views
- Architectural Patterns

03

Design of Good Information Systems Architectures

- Architecture Design
- IS Architectures' Quality
- The Information Systems Architecture Design Process

04

Internet Architectures

- History of the Internet
- Today's Internet Network Infrastructure
- The Internet Protocol
- Content Delivery Networks
- Emerging Internet Network Architecture

Textbook: Internet Computing—Chapters

05

Middleware

- Introduction to Middleware
- Remote Procedure Call
- Middleware Categories

06

Web Services

- Introduction to Web Services
- Basic Web Technologies
- Web Service Architectures

07

Cloud Computing

- An Introduction to Cloud Computing
- Essentials to the Provision of Cloud Services
- Chances and Challenges of Cloud Computing
- Security and Data Protection in Cloud Environments

08

Fog and Edge Computing

- Fog and Edge Computing Fundamentals
- Challenges and Opportunities of Fog and Edge Computing
- Fog and Edge Computing in Practice

Textbook: Internet Computing—Chapters

09

Distributed Ledger Technology

- Background of Distributed Ledger Technology
- Technical Foundation
- The Bitcoin Blockchain
- Smart Contracts
- Applications of Distributed Ledger Technology

10

The Internet of Things

- Introduction of the Internet of Things
- The Internet of Things: Technologies and Architectures
- Internet of Things Applications
- Challenges and the Future of the Internet of Things

11

Critical Information Infrastructures

- Foundations of Critical Information Infrastructures
- Properties of Critical Information Infrastructures
- Functions of Critical Information Infrastructures
- Operation of Critical Information Infrastructures

12

Emerging Technologies

- Emergence and Emerging Technology
- Immersive Technologies
- Virtual Assistant
- Artificial Intelligence