Technische Universität Berlin

Distributed Algorithms 2016/17
Organizational Matters

Odej Kao | Complex and Distributed IT Systems

With material from R. Karnapke | KBS

Lecturer

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Lecture & Tutorial

Lecture

- Tuesday, 10-12, EMH 225
- Website: http://www.cit.tu-berlin.de/menue/teaching/wintersemester_1617/distributed_algorithms/
- Course will be managed through ISIS website
- Registration (by enrolling for the ISIS course): until Oct. 30st
- QISPOS registration will be announced on ISIS

Tutorial

- Mareike Hoeger, Dipl.-Inf.
- Monday 10-12, MA 043
- First tutorial: Oct. 31st
- Successful participation is precondition for exam
- Details on first tutorial

ISIS Course

Exams

Type of exam

- Oral exam at the end of the term

Date

- On Appointment at end of Semester

Preparation

- Last lecture is dedicated to Q&A

Conditions and Materials

Prerequisites

- Basic knowledge of computer science
- Basic knowledge in the field of distributed systems
- Knowledge of contents of BSc courses Systemprogrammierung and Verteilte Systeme recommended -> certain important slides of Verteilte Systeme will be available on ISIS

Materials

- provided via course website @ ISIS

Literature links

- are provided chapter by chapter
- usually on the last slides

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Distributed Algorithms = **Algorithms for Distributed Systems** ?

CIT Complex and Distributed IT Systems

Distributed Systems

A distributed system consists of several nodes that

- are connected by a network and
- communicate through message exchange
- to achieve a common functionality.

The field „Distributed Systems” is a subarea of Applied Computer Science and an important field.

Motivation

- A distributed algorithm is an algorithm containing several nodes that work in parallel cooperatively to solve a common problem by coordination through message exchange.

- In a distributed algorithm state and control are distributed on several nodes of the system and the implementation is parallelized.

- Through the inherent characteristics of distributed systems, engineering of distributed algorithms is much more complex than for a centralized algorithm with a similar functionality.

Goals of the Lecture

The lecture provides an overview of conceptual problems occurring in distributed systems and deals with their algorithmic possibilities of solution.

The students are to

- get to know the most important basic distributed algorithms
- develop an understanding of the structure of distributed algorithms, their complexity, their scalability and their fault tolerance features,
- choose convenient distributed algorithms while drafting distributed systems
- understand the possibilities, limits and risks of distributed systems.

Outline

- Introduction
- Application
- Echo
- Election
- Exclusion
- Clocks
- Snapshots & Snapshot Application
- Fault Tolerance
- Consensus
- Self Stabilization
- Transaction
- Security
- P2P

Literature

1. **G. Coulouris, J. Dollimore, and T. Kindberg. Distributed Systems: Concepts and Design. Addison-Wesley, 4th edition, 2005. [auch in Deutsch erhältlich]**
2. **F. Mattern. Verteilte Basisalgorithmen. Springer-Verlag, 1989.**
3. **G. Tel. Introduction to Distributed Algorithms. Cambridge University Press, 2nd edition, 2000.**
4. S. Mullender, editor. Distributed Systems. Addison-Wesley, 2nd edition, 1993.
5. N. Lynch. Distributed Algorithms. Morgan Kaufmann, 1996.
6. A. S. Tanenbaum and M. van Steen. Distributed Systems: Principles and Paradigms. Prentice Hall, 2nd edition, 2006. [auch in Deutsch und als Taschenbuch erhältlich]