

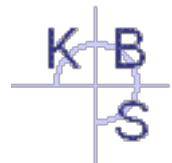
# Distributed Algorithms

Organizational Matters

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## Lecturer

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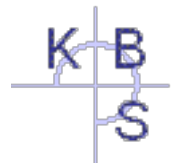
# Lecture & Tutorial

## Lecture

- Friday, 12-14, MA 049
- Website: <http://www.kbs.tu-berlin.de/da>
- Slides will be available online at the course website
- Registration (via course website): until **Oct. 31<sup>st</sup>**

## Tutorial

- Mohannad Nabelsee, M.Sc.
- Wednesday 14-16 Uhr MAR 4.064
- First tutorial: Oct. 21<sup>st</sup>
- Successful participation is precondition for exam



# Exams

## Type of exam

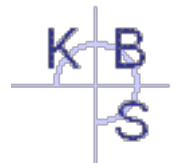
- Written exam at the end of the term

## Date

- See Website

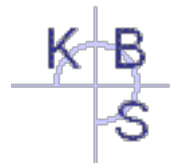
## Preparation

- Last lecture is dedicated to Q&A

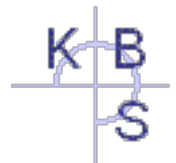


# Conditions and Materials

- Prerequisites
  - Basic knowledge of computer science
  - Basic knowledge in the field of distributed systems
- Materials
  - provided via course website @ ISIS
- Literature links
  - are provided chapter by chapter
  - usually on the last slides

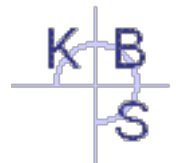


**Distributed Algorithms = Algorithms for Distributed Systems ?**



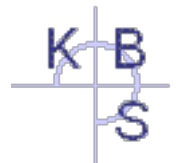
# Distributed Systems

- 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

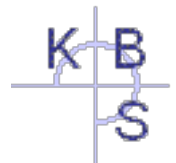
- A **distributed algorithm** is an algorithm containing several nodes that **work in parallel** cooperatively to solve a **common problem** by coordination through **message exchange**.
- In a distributed algorithm **state** and **control** are **distributed** on several nodes of the system and the 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.





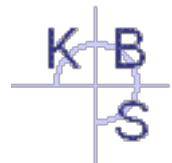
## Goals of the Lecture

- 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

1. Organizational Matters
2. Models for Distributed Systems
3. Flooding, Broadcast, Echo
4. Election
5. Termination Detection
6. Garbage Collection
7. Mutual Exclusion
8. Clocks
9. Snapshots
10. Fault Tolerance
11. Consensus
12. Self stabilization
13. Multicast Communication
14. Transactions
15. Security
16. P2P Systems



## 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]

