



Chapter 0

Introduction

Algorithm Theory
WS 2012/13

Fabian Kuhn

About myself...



Fabian Kuhn

- PhD: ETH Zurich (2002)
- Afterwards: Microsoft Research, ETH, MIT, U. Lugano (CH)
- In Freiburg since April 2012
Chair of Algorithms and Complexity
- Background/Research:
Theory, algorithms (esp. distributed algorithms)

Organization

Lecture (Room 101-00-026):

- Tuesday 8:15 – 10:00
 - Should we make it 8:30 – 10:00 without a break in the middle?
- Wednesday 16:15 – 18:00 (Oct. 24, Oct. 31, then bi-weekly)
 - Should we also skip the break?
- Lecture will be in English

Exercises: (tentatively, details tomorrow)

- Wednesday 16:15 – 18:00
 - Rooms will be announced
- There will be bi-weekly exercises
 - Hand-in (in Wednesday lecture), first hand-in: Oct 31
 - First exercise class: Nov 7
- It is OK to work in groups of up to 3 people on the exercises

Exam

Exam:

- Final exam will take place after the semester (end of February)
 - Exact date to be announced
- Admission: 50% of exercise points
 - + one presentation in exercise class

Webpage:

- Contains slides, recordings, exercise sheets (+some solutions)

<http://ac.informatik.uni-freiburg.de>

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Design and analysis techniques for algorithms

- Selection of (possible) topics:
 - Divide and conquer
 - Greedy
 - Dynamic programming
 - Randomization
 - More on heaps, hash tables, ...
 - Graph algorithms
 - Amortized analysis
 - Approximation algorithms
 - Competitive analysis

Requirements

- I assume that you have some mathematical maturity and some knowledge of basic algorithms and data structures
 - E.g., from the Bachelor course Informatik 2
- In particular, you should be (at least partly) familiar with
 - Math. induction, basic (discrete) probability theory, ...
 - Big-O notation and Landau notation more generally
 - Searching and Sorting (binary search, mergesort, quicksort)
 - Binary search trees, balanced binary search trees
 - Priority queues (heaps)
 - Hash tables
 - Basic graph-theoretic definitions
 - Representations of graphs
 - Basic graph algorithms: traversal (depth-first, breadth-first), minimum spanning trees, shortest paths

Literature

- T. Cormen, C. Leiserson, R. Rivest, C. Stein:
Introduction to Algorithms, Third Edition
MIT Press, 2009
- T. Ottmann, P. Widmayer:
Algorithmen und Datenstrukturen
4th Edition, Spektrum Akademischer Verlag,
Heidelberg, 2002
- J. Kleinberg, E. Tardos:
Algorithm Design
Addison Wesley, 2005
- Original literature