Karlsruhe Institute of Technology

Advanced Data Structures

Lecture 00: Course Overview

Florian Kurpicz

Organizational Matters

Lectures

- Monday 14:00–15:30 (50.34, 236)
- lecture only

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Project (mandatory)

- topics will be handed out 03.05.2023
- coding project and small presentation
- 20 % of the final grade
- requires additional registration

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- 20 minutes
- 80 % of the final grade
- pizza marks content not relevant for exam 

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Office Hours (Room 208)

- Monday 15:45–16:30 (lecture period)
- by appointment (otherwise)

Materials

Slides

- published before the lecture
  (`https://ae.iti.kit.edu/4719.php`)
- or in ILISA
- before means like 10 to 15 minutes before

Recordings

- recordings exist online
  (`https://youtube.com/@kurpicz`)
- new topics will be recorded

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Additional Material

- references to literature included
- most likely no script
- MIT course (some topics match)
  `https://ocw.mit.edu/courses/6-851-advanced-data-structures-spring-2012/`

Content

Trees/Grahps

- bit vectors and succinct trees
- dynamic bit vectors and succinct trees
- succinct graphs

External Memory

- cache-oblivious B-trees
- buffer trees and EM lookup

Integers

- range minimum queries (lowest common ancestor queries)
- predecessor queries
- vEB-tree and fusion trees

Strings

- string B-trees and suffix arrays
- compressed suffix array and suffix tree

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Gap Between Theory and Practice (Lecture AE Sanders)

Different Viewpoints

Theory				Practice
simple		**application model**		complex
simple		**machine model**		real
complex		**algorithms**		simple
advanced		**data structures**		arrays, . . .
worst case		**complexity measure**		inputs
asymptotic		**efficiency**		constant factors