Advanced Data Structures

Lecture 00: Course Overview

Florian Kurpicz

Organizational Matters

Lectures

- Monday 09:45–11:14 (50.34, -120)
- lecture only

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Project (mandatory)

- topics will be handed out 16.05.2022
- coding project and small presentation
- 20 % of the final grade
- requires additional registration

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

Florian Kurpicz | Advanced Data Structures | 00 Course Overview   Institute of Theoretical Informatics, Algorithm Engineering

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Office Hours (Room 210)

- Monday 14:15–15:00 (lecture period)
- by appointment (otherwise)

Materials

Slides
- published before the lecture
  (`https://algo2.iti.kit.edu/lehre_4264.php`)
- before means like 10 to 15 minutes before

Recordings
- testing to record the lecture

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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**	FOR		simple
advanced		**data structures**			arrays, . . .
worst case	max	**complexity measure**			inputs
asymptotic	$\mathcal{O}(\cdot)$	**efficiency**	42%		constant factors