Advanced Data Structures

Lecture 00: Course Overview

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Organizational Matters

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

Project (mandatory)
- topics will be handed out 08.05.2023
- coding project and small presentation
- 20 % of the final grade
- requires additional registration

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

Office Hours (Room 208)
- Monday 15:45–16:30 (lecture period)
- by appointment (otherwise)

Materials

Slides

- published before the lecture
  (https://algo2.iti.kit.edu/4521.php)
- before means like 10 to 15 minutes before

Recordings

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

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

Gap Between Theory and Practice (Lecture AE Sanders)

Different Viewpoints

Theory				Practice
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

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