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

#### Recordings
- Recordings exist online ([https://youtube.com/@kurpicz](https://youtube.com/@kurpicz))
- New topics will be recorded

#### Additional Material
- References to literature included
- Most likely no script
- MIT course (some topics match)
# Content

## Trees/Graphs
- 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

<table>
<thead>
<tr>
<th>Theory</th>
<th>Practice</th>
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<tbody>
<tr>
<td>simple application model</td>
<td>complex</td>
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<tr>
<td>simple machine model</td>
<td>real</td>
</tr>
<tr>
<td>complex algorithms</td>
<td>simple</td>
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<tr>
<td>advanced data structures</td>
<td>arrays, ...</td>
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<tr>
<td>worst case complexity measure</td>
<td>inputs</td>
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<tr>
<td>asymptotic efficiency</td>
<td>constant factors</td>
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