Lab: Efficient Algorithms for Selected Problems

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Topic of the lab

Competitive programming

Solving challenging programming exercises with limited resources by combining efficient algorithms and efficient implementations.

Structure of the lab

Plan for the term

- There will be five exercise sheets, about 35 exercises in total
- Upload your solutions to our server
- After sheet 2: (Fixed) teams are allowed, we track individual contributions
- Meet every 2-3 weeks to present solutions
- Hand in report at the end of the term
- Grading based on # of correct solutions (1/3), active participation in the meetings & presentation of solutions (1/3) and the report (1/3)
- You may upload solutions after the presentation (will count slightly less towards your grade)
- Mandatory attendance to the lab meetings

Submitting solutions

Automatic testing

- Upload source code, server will compile and execute
- Server runs code on (secret) inputs and compares output (be careful with spaces/newlines)
- Read input from standard input
- Server applies strict time and memory limits
- Response: Correct, Wrong Answer, Timeout, Runtime error, Compile error
- New testcases might be added during the semester

Supported languages

- C++17: `g++-12.2.0-14`
- Java 17: `openjdk-17.0.10`
- Python 3: `3.11.2` (no numpy)

Lab server at

`https://competitive-programming2.informatik.uni-bonn.de`

$\rightarrow$ Demonstration

If you choose to participate in the Lab, please send an email to s6aawein@uni-bonn.de. We will then send you your Login-Information via mail.

Presentation of Solutions

- Short presentation of problem setting and solution idea
- Code segments are allowed to be shown but should not be a substitute for presentation
- Someone (with average coding experience) who did not read the problem description should be able to solve the problem after hearing the presentation
- Depending on difficulty of the exercise the presentation length can vary, we estimate a time length of ≈ 3 minutes for easier exercises and ≈ 10 minutes for more difficult ones
- If you want to present a specific problem, please write us an email in advance until the thursday before the next meeting

Guideline/Suggestions for Presentations

- Introduce problem setting:
  - What is the problem about? What do we want to solve?
  - How is the input given?
  - What is the main difficulty?
  - Possible further remarks if given by problem description
- Idea of the algorithm:
  - How does the algorithm work? What technique(s) does it use?
  - Why does the (approximation) algorithm work? What is the proof idea/ how can one show that the algorithm works correctly?
  - What is the asymptotic runtime (and why)?
- Images/Figures are nice to have but not required
- Presentation can also be made at the whiteboard

Timeline

Meetings and Presentations

Meeting	Presentation	Release
08.04.2025	Organization	Sheet 1
22.04.2025	Solutions Sheet 1	Sheet 2
06.05.2025	Solutions Sheet 2	Sheet 3
27.05.2025	Solutions Sheet 3	Sheet 4
24.06.2025	Solutions Sheet 4	Sheet 5
15.07.2025	Solutions Sheet 5	

Deadline for final reports (preliminary): 24.08.2025
Registration in Basis: 17.04.2025 - 30.04.2025