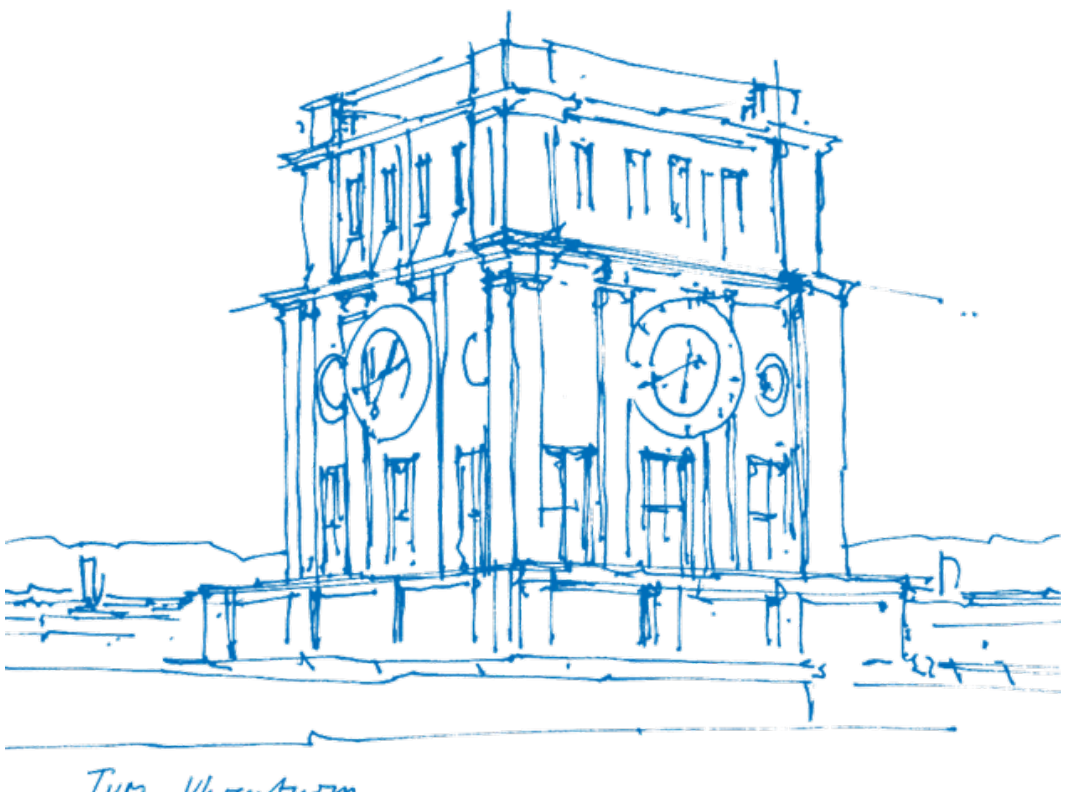
DataPro 2026

Preliminary meeting



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Structure of the course

Weekly meetings, day and time TBD. Only on-site.

Take-home assignments – code and report.

Final project – larger and longer.

Grading

Grading based on the assignments and final project.

Both code and presentation are important.

Grade thresholds TBD.

Requirements

Practical experience in implementing concepts covered in the Data Processing on Modern Hardware lecture.

Attending the lecture is *recommended*, but not required for completing this Praktikum.

The course is aimed at Master-level students who have experience in programming in a systems-level programming language (Rust, C/C++).

We expect some knowledge of topics from Advanced Computer Architecture.

Subject matter

- algorithm design for the memory hierarchy, cache utilisation,
- CPU parallelism wrt. databases,
- efficient synchronisation,
- SIMD/accelerators (GPUs, FPGAs),
- novel hardware (interconnects, RDMA, NVRAM)

Objectives

After the course students should:

- understand the memory hierarchy, how it affects algo design and perf;
- have understanding of different methods to achieve vectorisation (SIMD, autovectorisation) and its impact on performance;
- be able to reliably measure performance, analyse experiments scientifically;
- know how to debug code for performance, analyse `perf`, traces, flamegraphs;
- obtain hands-on experience with offloading computation from the CPU to other devices like GPUs, FPGAs, etc.
- be able to visualise performance data on charts, present results clearly;
- be able to understand and discuss systems papers.

Materials

- Old slides of DPoMH: moodle.tum.de/course/view.php?id=99889
- *"Computer Architecture: A Quantitative Approach"* (6th edition) by Hennessy and Patterson;
- *"Computer Systems: A Programmer's Perspective"* (3rd edition) by Bryant and O'Hallaron;
- State-of-the-art papers;