Practical course

Advanced Systems Programming

(SoSe 2025)

Preliminary meeting

System Research Group

https://dse.in.tum.de/

Start at 10:05

Prerequisites

- *Finish "System Programming" offered by our group beforehand*
  - https://github.com/ls1-sys-prog-course/docs
- Please fill the form if you apply for this course
  - https://collab.dvb.bayern/display/TUMcsel/Practical+course%3A+Advanced+Systems+Programming+--+SoSe+2025
- Please also apply to the matching system

About us

System Research Group
Prof. Pramod Bhatotia   https://dse.in.tum.de/

Dr. Masanori Misono		masanori.mison@in.tum.de
Dr. Jörg Thalheim		joerg@thalheim.io
Dr. Antoine Kaufmann		antoine.kaufmann@in.tum.de
Patrick Sabanic		patrick.sabanic@tum.de
Felix Gust		felix.gust@tum.de

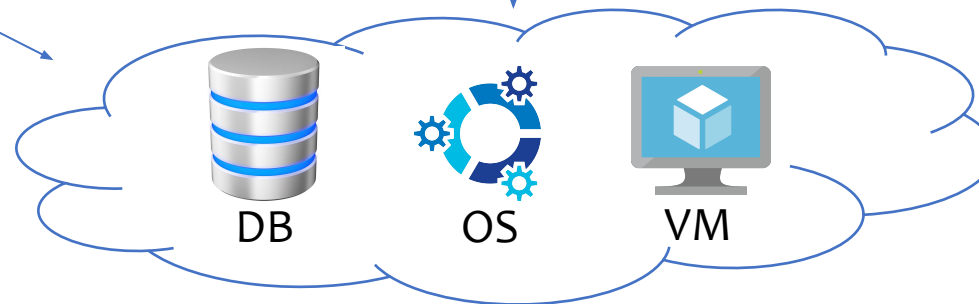# Systems programming applications

Internet of things

Transportation

Healthcare

DB OS VM

Low level systems programming is an essential building block for high level applications

Software core properties
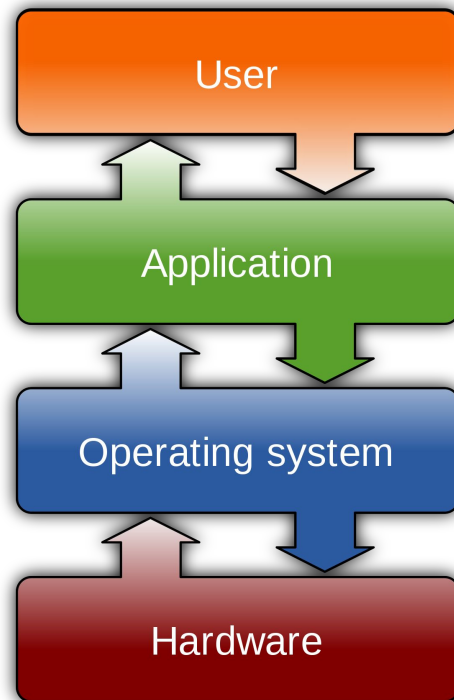
Performance

Reliability

Security

Efficient low level systems programming is critical to ensure these properties

System stack

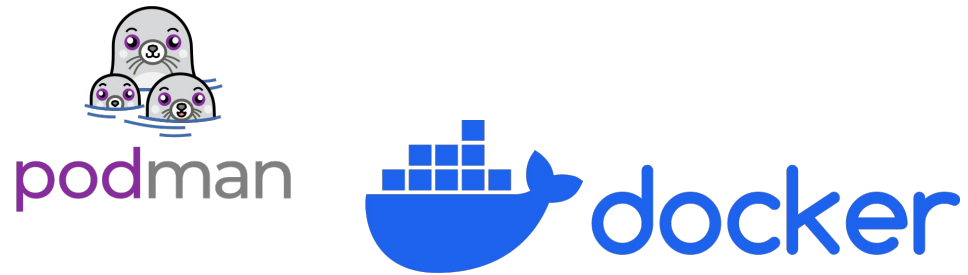Systems programming spans in multiple system levels and application domains

User

Application

Operating system

Hardware

Cloud Services

Time to get hands-on experience!

Course topics

- This course covers some of advanced systems programming:

Containers

Unikernels

Hypervisors

HW Acceleration

SmartNIC

FPGA

SimBricks

Prerequisites

- ***The students must successfully finish the following course beforehand.***
  - Practical Lab: Systems Programming (2023-)
  - Practical Lab: Advanced Systems Programming in C/Rust (offered in 2021-2023)

- This course differs from the "Practical Lab: Advanced Systems Programming in C/Rust" offered in 2021-2023.
  - That course is now called "Practical Lab: Systems Programming."
  - This course covers more advanced topics than the "Practical Lab: Systems Programming".

If the prerequisites are unclear/strict -- please check with the instructor!

Lab format

- Lab assignments
  - **4 practical programming exercises** with public & private unit tests
  - Deadline of 2 - 3 weeks depending on the difficulty/workload
  - Online submission
  - No further exam / quiz / projects

- Weekly meeting
  - Video with theoretical background coverage
  - Question and answer session to explain and discuss each assignment
  - Slack channel for questions

Grading system

- Github classroom (https://classroom.github.com/)
  - Template repository for each task with detailed instructions & test cases

- Automated tests
  - Points are distributed among the exercises based on the estimated workload (30-60 points)
  - Specially designed test cases with gradually increasing difficulty
  - Hidden tests to detect & prevent gaming the grading system

Languages / OS

- Languages
  - Choice between **C, C++ and Rust**
  - Limited choice of allowed libraries (different per language)
  - Can be switched for each task
  - Some tasks require a specific language

- OS Environment information
  - All executables must run on **Linux, x86_64**
  - Use virtual machines if you run a different OS (i.e. Hyper-V on Windows)
  - You can also use the remote desktop (lxhalle.in.tum.de)

Learning goals

- Learn advanced topics related to computer systems
- Be able to write low-level code to manage complex systems

- Importantly, have fun!

Code of conduct

- University plagiarism policy
    - https://www.in.tum.de/en/current-students/administrative-matters/student-code-of-conduct/

- Decorum
    - Promote freedom of thoughts and open exchange of ideas
    - Cultivate dignity, understanding and mutual respect, and embrace diversity
    - Racism and bullying will not be tolerated

- **Please write your own code!**

Interested?

Matching platform

Welcome to the Matching platform matching.in.tum.de!

Dear students,

we changed the name of the course "Seminar: Recent advances in Computer Systems", for consistency reasons.
The new name are "Seminar: Hot Topics in Computer Systems", now.

Login with your TUM identifier.   Login for exchange students (without TUM identifier)   Any questions? Visit the FAQs!

➡ TUM login   ➡ Exchange student login   ❶ FAQs

Sign up on the TUM matching platform

Please fill the form!

https://collab.dvb.bayern/display/TUMcsel/Practical+course%3A+Advanced+Systems+Programming+--+SoSe+2025

Contacts

- Masanori Misono
  - masanori.misono@in.tum.de

We *strongly* prefer slack for all communications. Please join the slack channel.

Workspace: http://ls1-courses-tum.slack.com/

Website: https://github.com/ls1-adv-sys-prog-course/docs

Channel: #ss-25-adv-sys-prog

Join us with TUM email address (@tum.de)