Practical Lab

Computer Systems Lab

https://github.com/TUM-DSE/sys-lab

Dr. Atsushi Koshiba
Prof. Pramod Bhatotia

Course instructors

Chair of Decentralized Systems Engineering

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

Prof. Pramod Bhatotia

Professor

Dr. Atsushi Koshiba

Postdoc

Dr. Redha Gouicem

Research group reader

Dr. Masanori Misono

Postdoc

Charalampos Mainas

PhD student

Peter Okelmann

PhD student

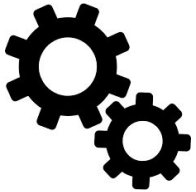
Sebastian Reimers

PhD student

Computer systems lab (aka “sys-lab”)

Team
(~4 students per team)

Understand



Evaluate

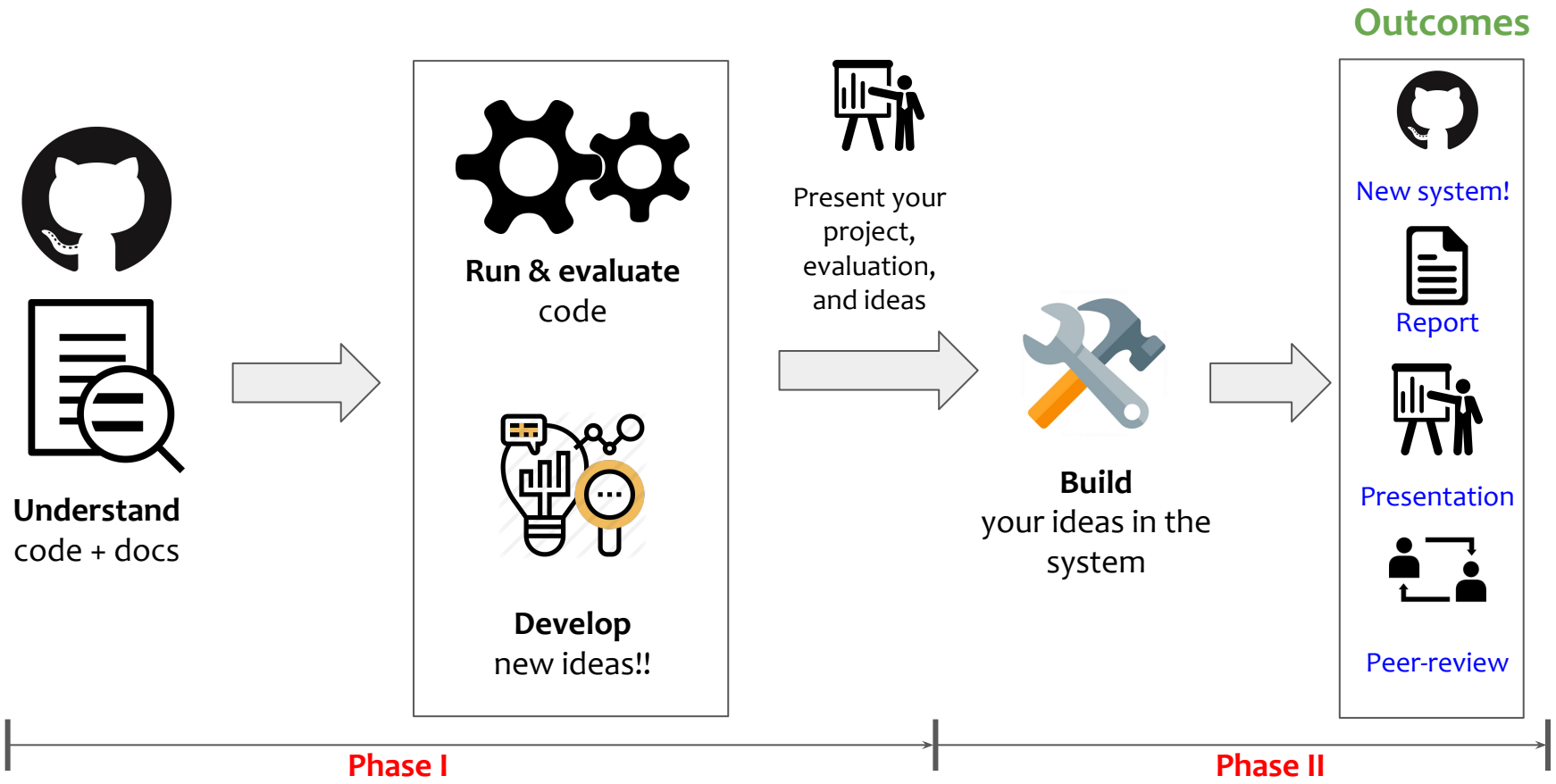
Generate ideas

Build on your ideas

sys-lab

Open source project
(state-of-the-art research topic)

Format

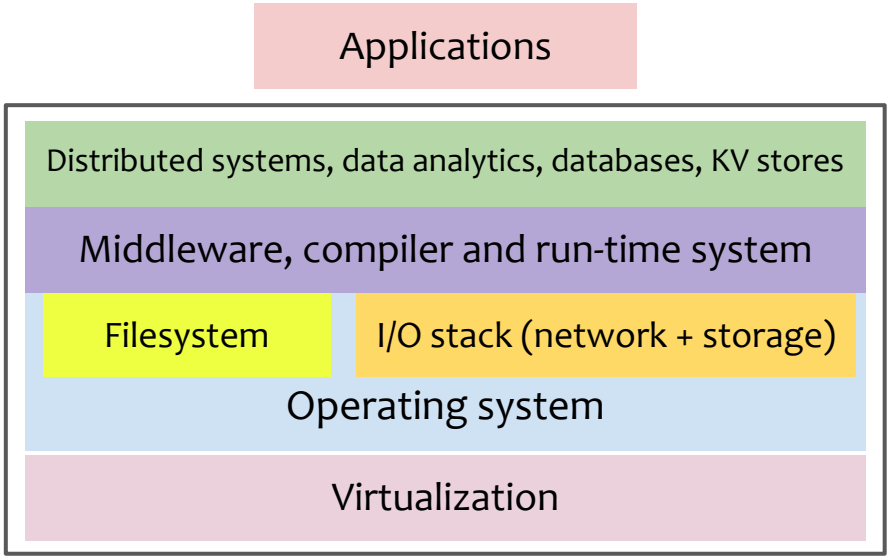

Outcomes
Understand
code + docs
Run & evaluate
code
Develop
new ideas!!
Present your
project,
evaluation,
and ideas
Build
your ideas in the
system
New system!
Report
Presentation
Peer-review
Phase I
Phase II

Focus of this Lab

- State of the art open-source computer systems projects

- End-to-end system design and development
  - What is it? → Learn by understanding the system
  - How can we use it? → Learn by evaluating the system
  - What can be improved? → Learn by generating new ideas!
  - How to realise our ideas? → Learn by building the system

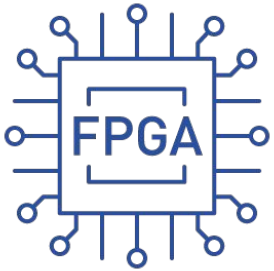
Research topics



100s-1000s of machines

Data center systems

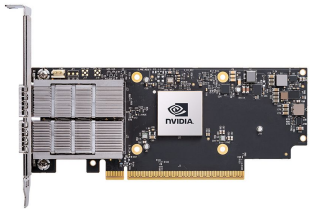
Tentative topics: WS 2022/23



FPGA + Operating systems

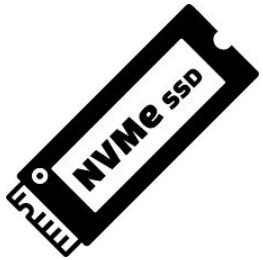
eBPF + storage systems

Unikernel OS



SmartNICs + network & distributed systems + Persistent memory

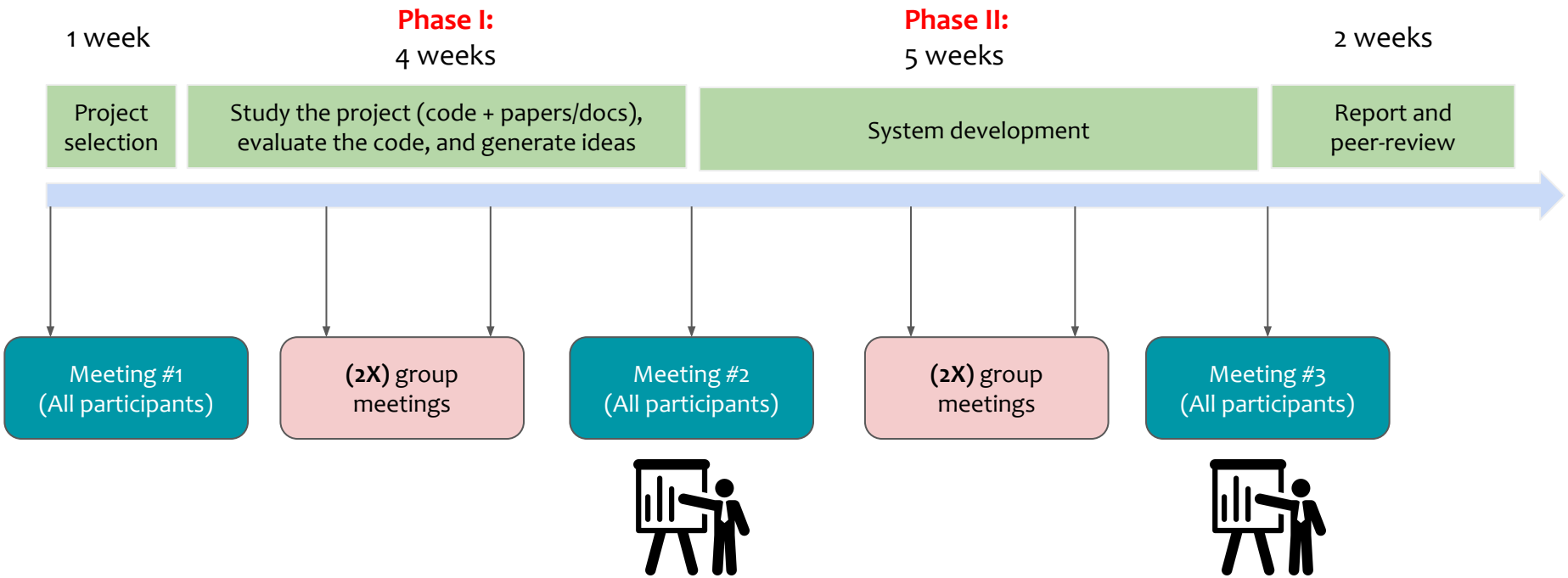
Secure containers for Arm



IO stack for NVMe SSDs

IMPORTANT:
The exact list of projects will be provided in the first week

Timeline


1 week
Phase I:
4 weeks
Phase II:
5 weeks
2 weeks
Project selection
Study the project (code + papers/docs), evaluate the code, and generate ideas
System development
Report and peer-review
Meeting #1 (All participants)
(2X) group meetings
Meeting #2 (All participants)
(2X) group meetings
Meeting #3 (All participants)

Grading

Category	Details	Grade
System building	Extending the system with additional features	40%
Running and evaluating code	Reproduce the results described by the authors	20%
Presentation	Two presentations are due after each phase, audience participation is also graded	20%
Report and peer-reviewing	One report covering all aspects and reviewing reports of your peers	20%

Grading

Category	Details	Grade
System building	Extending the system with additional features	40%
Running and evaluating code	Reproduce the results described by the authors	20%
Presentation	Two presentations are due after each phase, audience participation is also graded	20%
Report and peer-reviewing	One report covering all aspects and reviewing reports of your peers	20%
Pull-requests	**Successful pull requests to the project**	**20% (BONUS)**

Grading

Category	Details	Grade
System building	Extending the system with additional features	40%
Running and evaluating code	Reproduce the results described by the authors	20%
Presentation	Two presentations are due after each phase,	20%
Pull-requests	**Successful pull requests to the project**	**20% (BONUS)**

The top students will be nominated/encouraged to participate in the artifact evaluation committee for the major systems conferences

Organization

- Meetings:
  - Project-based course (~4 students / group)
  - **3** all participant meetings
  - **4** group meetings (with the team mentor)
- Communication:
  - Slack: course channel for announcements and group channel for the team work
  - Hotcrp for report submission and peer-reviewing
- Format:
  - **Meeting #1: Kick-off --** project selection, team formation, and next steps
  - **Meeting #2: Intermediate presentation** covering overview, evaluation, and new ideas!
  - **Meeting #3: Final presentation** covering your final contributions (demo, code, & report)

Learning goals

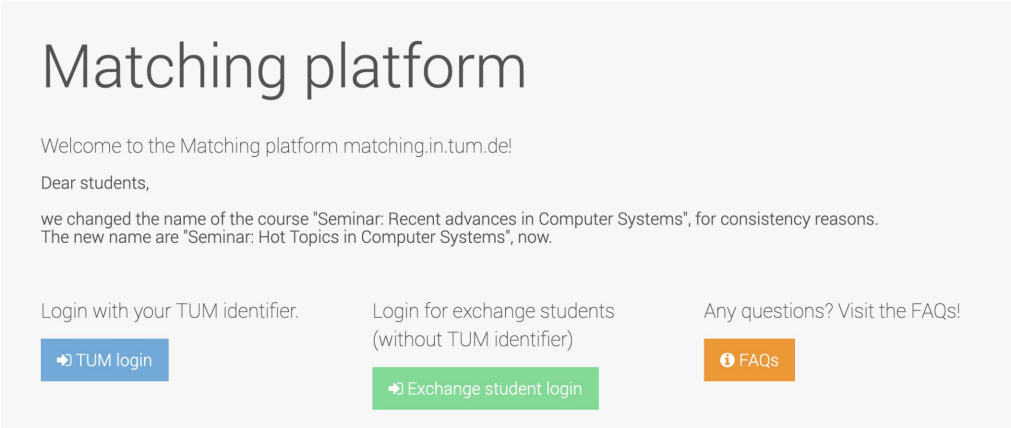
- Our goal is to have fun breaking and hacking computer systems
- Learn about cutting-edge research in computer systems
- Cultivate an environment for innovation and collaboration
  - Pushes the boundaries of the state of the art
  - Contributing to ongoing open-source projects
- Communication: presenting your work to your peers
- Peer-reviewing: giving constructive feedback to improve other's work
- Reproducibility: delivering your work such that others can build on it

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

Interested?



Sign up on the TUM matching platform

Contacts

- Dr. Atsushi Koshiba
  - atsushi.koshiba@tum.de
- Prof. Pramod Bhatotia
  - pramod.bhatotia@in.tum.de

  - **All course information:** https://github.com/TUM-DSE/sys-lab

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

Channel: #ws-22-sys-lab

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