

Seminar course

Operating Systems and Virtualization

(aka “os-virtualize-seminar”)

Preliminary meeting

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

Peter Okelmann
Dr. Masanori Misono
Prof. Pramod Bhatotia



About us



Chair of Decentralized System Engineering



Peter Okelmann

Interest:

Hypervisors, fast networking

<https://dse.in.tum.de/peter-okelmann/>



Dr. Masanori Misono

Postdoc

Project: extensible unikernels

<https://mmisono.github.io>



Prof. Pramod Bhatotia

Chair

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



Communication:

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

ls1-courses-tum.slack.com

[#ws-22-os-virtualize-seminar](#)

<https://github.com/TUM-DSE/seminars/>

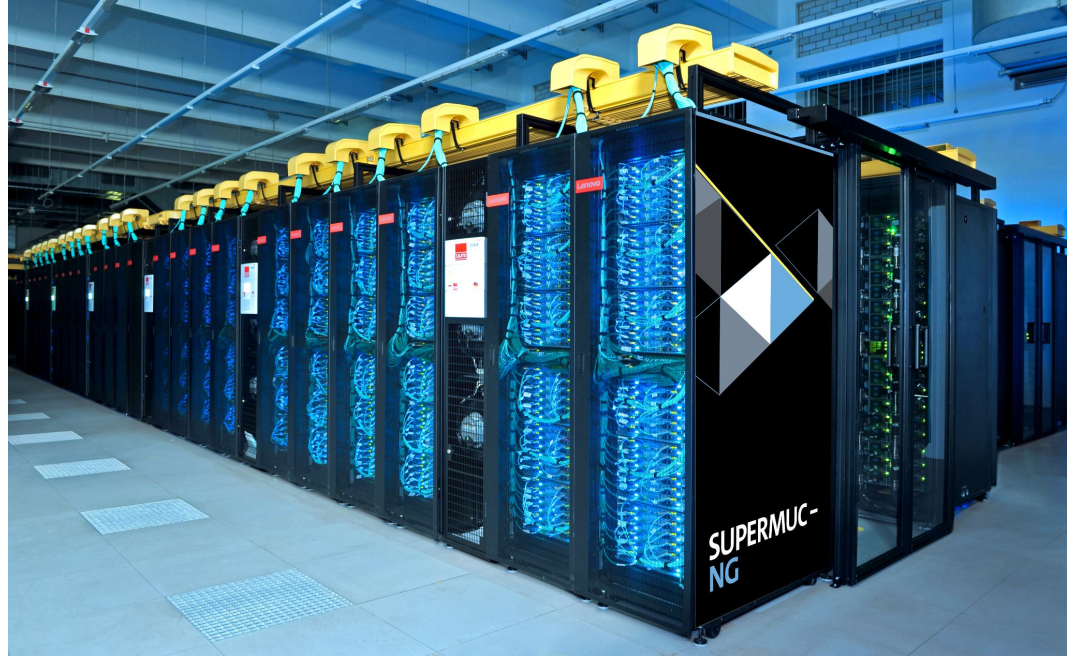
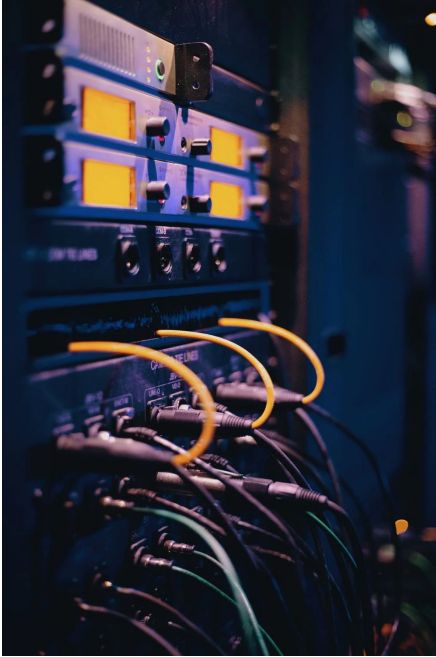
Context



Scalable, flexible, and fault-tolerance computing substrate

Inside of cloud

Operate data center – 1000s of machines.



Design challenges

How to manage massive computing infrastructures?

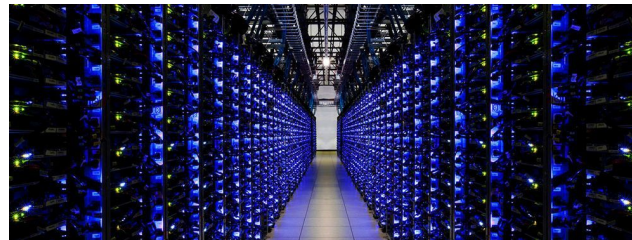
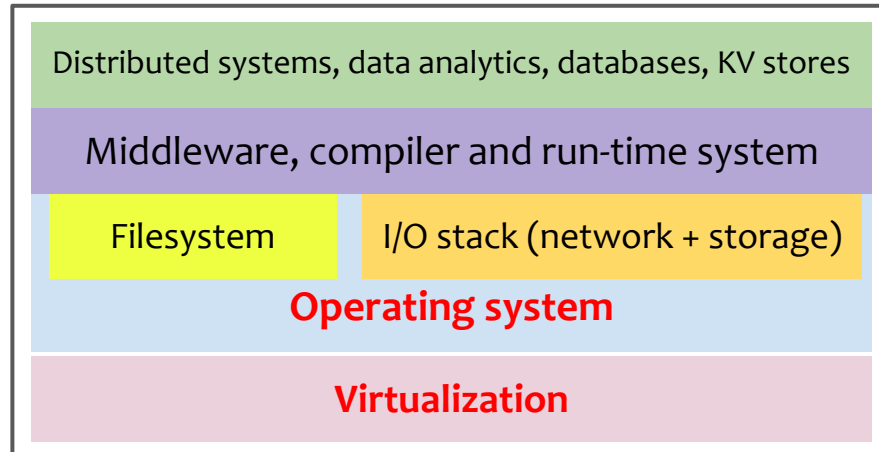
Challenges:

- Multi-tenancy
- Resource consolidation
- Security
- Resource management and isolation
- Performance
- Energy efficiency



OS and virtualization

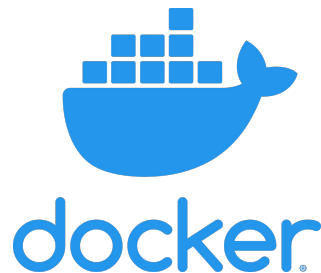
Play in managing the infrastructure and also they help us challenges



100s-1000s of machines

Different flavors of virtualization

- OS level virtualization
 - KVM, Xen, Hyper-V, VMware, VirtualBox, ...
- Containers
 - Docker, gVisor, ...
- Combination
 - Firecracker, Kata Container, ...



Firecracker

Papers from top systems conferences: ASPLOS, OSDI, USENIX ATC, VEE, EuroSys, and SOSP

| Topics |
|-------------------------------------|
| High-performance I/O Virtualization |
| Trusted computing in clouds |
| Heterogeneous virtualization |
| Virtual machine management |
| FPGA virtualization |
| Serverless platform |
| ... |

Format

Bird's eyes view



Team
(2 students per team)



Research papers
(Top systems conferences)



Understand



**Research
ideas**



1 presentation



1 short report



Peer-reviewing

Overview

Phase I

Kick-off



Phase II: Understand & explore

Understand



Presentation



Phase III: Research

Design



Implement
(Bonus)



Phase IV: Report & review

Report



Peer-review



Phase I: Kick-off meeting



Format and motivation
(all participants meeting)



Team formation
(2 students per team)



Paper selection
(Top systems conferences)



The first week

NOTE

1. A list of papers will be provided for FCFS bidding
2. Paper presentation guidelines will be provided for the next phase

Phase II: Understand & explore



Understand the paper(s)

Focus

1. **Understand** the paper and related work
2. Also **explore** a “laundry list” of research ideas/directions



Paper presentation

Focus

1. Explain the work/related work (“**why?**” and “**how?**”)
2. Explain and discuss all possible research directions
3. Pick a research direction



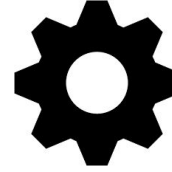
Phase III: Research



Research work

Focus:

Indepth research work to nail-down the problem and detailed approach to solve it!



Research prototype

Bonus: (Optional)

“Build the system to solve it!” and show us the working idea and associated results



Phase IV: Report & review



Report

Focus

Prepare a single “short & sweet” report summarizing

- (a) Paper
- (b) Research work



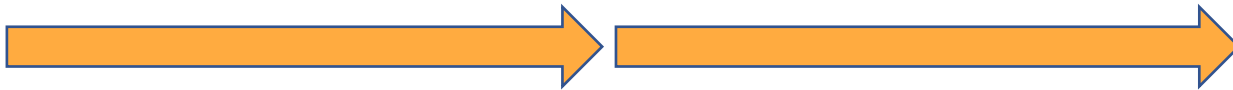
Peer-review

Focus

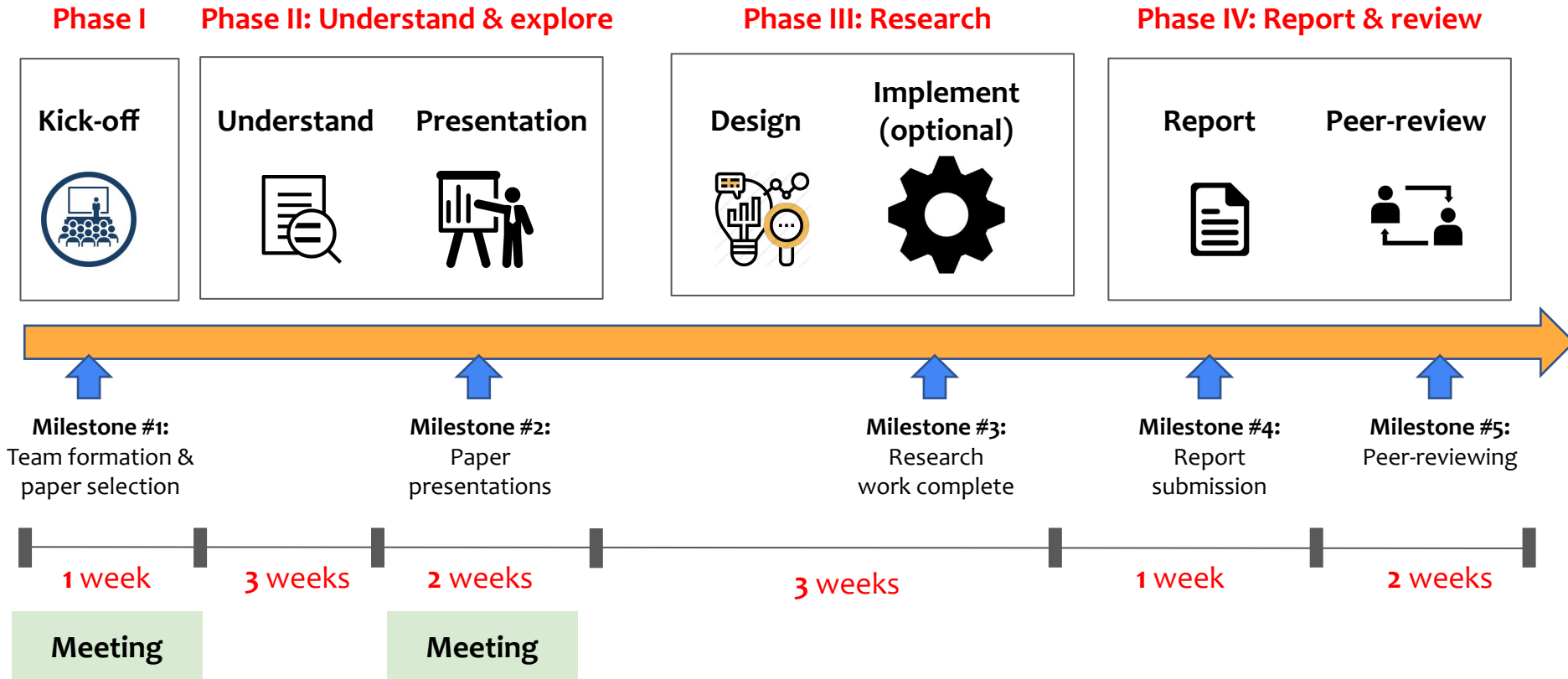
Give constructive (positive and critical) feedback for

- (a) Paper summary
- (b) Research work

END.



Overall timeline



Important dates

| Meetings | Date (Thu at 13:00h) |
|--------------|----------------------|
| Kick-off | TBD |
| Presentation | TBD |

| Submission dues | Date |
|-----------------|------|
| Report | TBD |
| Peer-reviews | TBD |

Organization



- Format
 - Team-based seminar course (2 students per team)
- Communication
 - Slack for announcements and information sharing
 - Hotcrp for report submission and peer-reviewing
- Meetings (**in-person, attendance is compulsory**)
 - **Meeting #1:** Kick-off
 - **Meeting #2:** Paper presentation

Learning goals

- Learn about the cutting-edge research in computer systems
- Promote critical thinking
- Cultivate an environment for innovation
 - To push the boundaries by advancing the state-of-the-art
- Improve scientific skills
 - Presentation
 - Writing
 - Communication: discussion and arguing
 - Mentorship: giving feedback and moderating discussion
- Encourage system building and evaluation
 - Learn by building, breaking, and benchmarking systems
- Importantly, to have fun!

- 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?



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.

 TUM login

Login for exchange students
(without TUM identifier)

 Exchange student login

Any questions? Visit the FAQs!

 FAQs

Sign up on the TUM matching platform

Contact



- Peter Okelmann
 - peter.okelmann@tum.de
- Dr. Masanori Misono
 - masanori.misono@in.tum.de
- **All seminar-related info:** <https://github.com/TUM-DSE/seminars>



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