

Seminar course

# Operating Systems and Virtualization

(aka “os-virtualize-seminar”)

Preliminary meeting

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

Dr. Masanori Misono

Prof. Pramod Bhatotia



# About us



## Chair of Decentralized System Engineering



Dr. Masanori Misono  
Postdoc

<https://mmisono.github.io>



Prof. Pramod Bhatotia  
Chair

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



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



**Communication:**

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

[ls1-courses-tum.slack.com](https://ls1-courses-tum.slack.com)

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

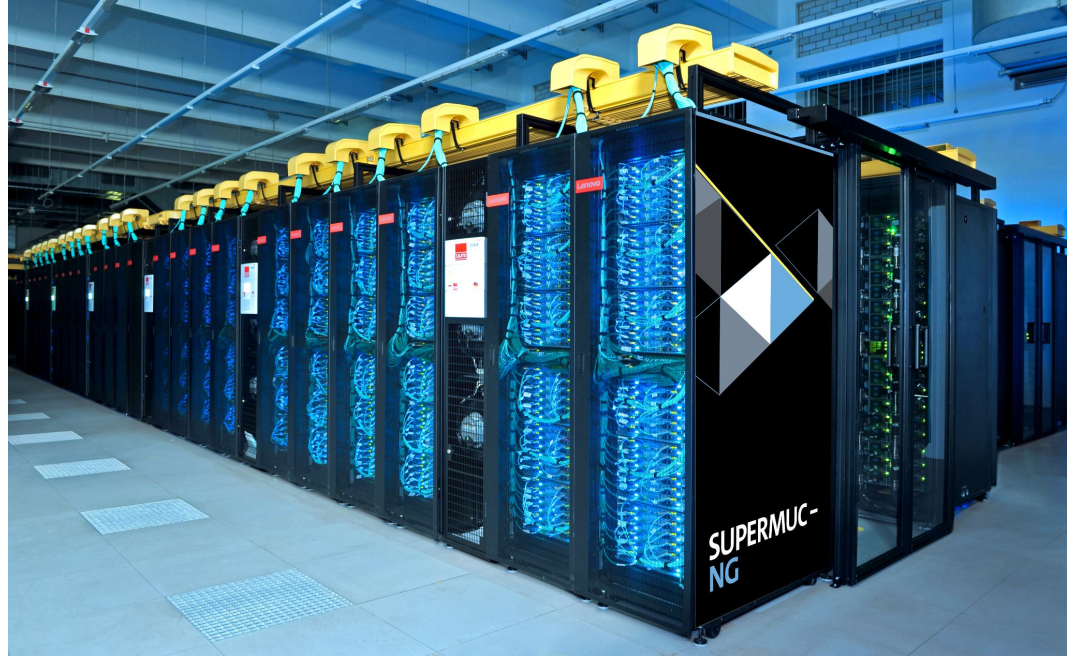
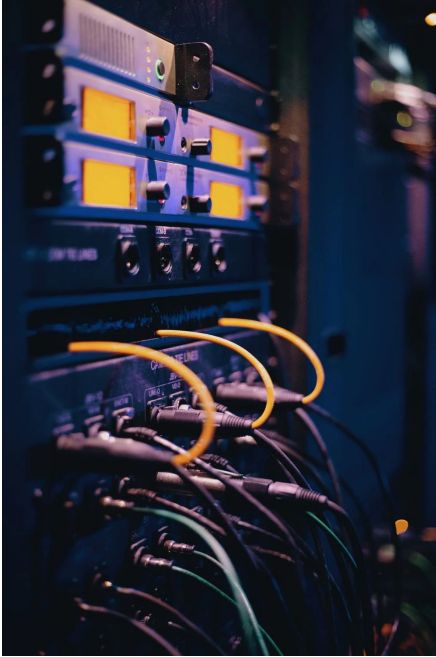
Context



Scalable, flexible, and fault-tolerance computing substrate

# Inside of cloud

Operate data center – 1000s of machines.



# Design challenges

How to manage massive computing infrastructures?

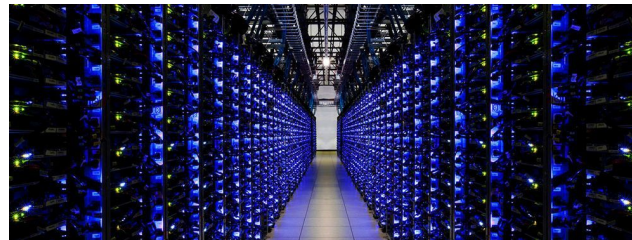
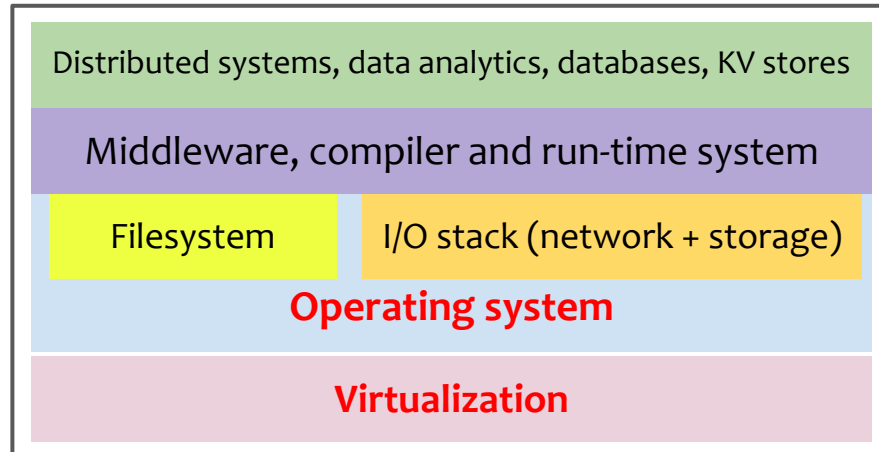
Challenges:

- 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

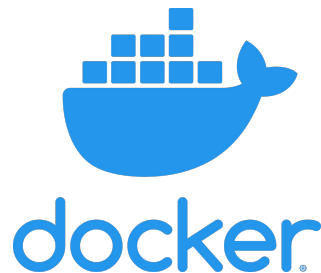


100s-1000s of machines



# 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

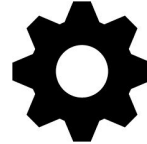


## Phase III: Research

Design



Implement  
( Bonus)

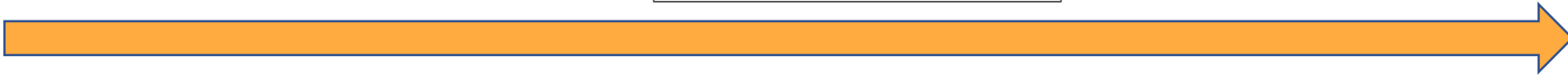


## Phase IV: Report & review

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



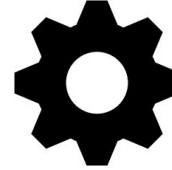
# Phase III: Research



## 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



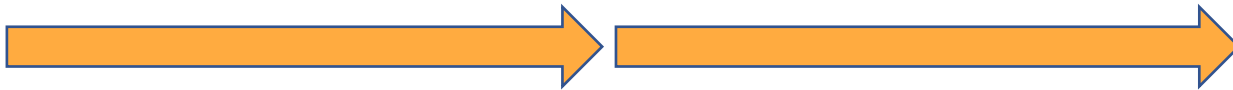
## Peer-review

### Focus

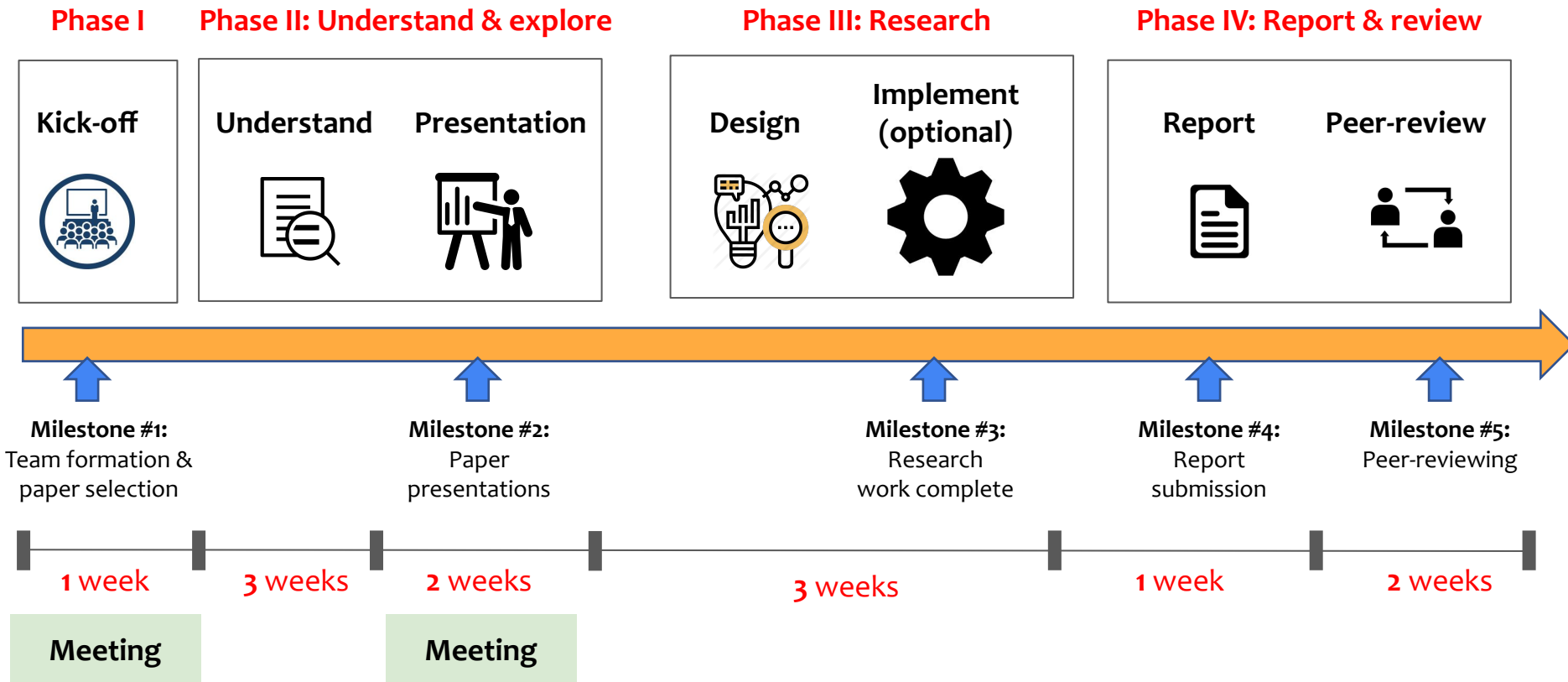
Give constructive (positive and critical) feedback for

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

# END.



# Overall timeline



# 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/](https://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



- Dr. Masanori Misono
  - [masanori.misono@in.tum.de](mailto:masanori.misono@in.tum.de)
- **All seminar-related info:** <https://github.com/TUM-DSE/seminars>



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