COMP.CS.140 – Continuous Development and Deployment - DevOps

What is this course about

- How to design, implement, deploy and operate cloud applications.
- So, this is a DevOps course
- A lot about automation of the above

Course staff

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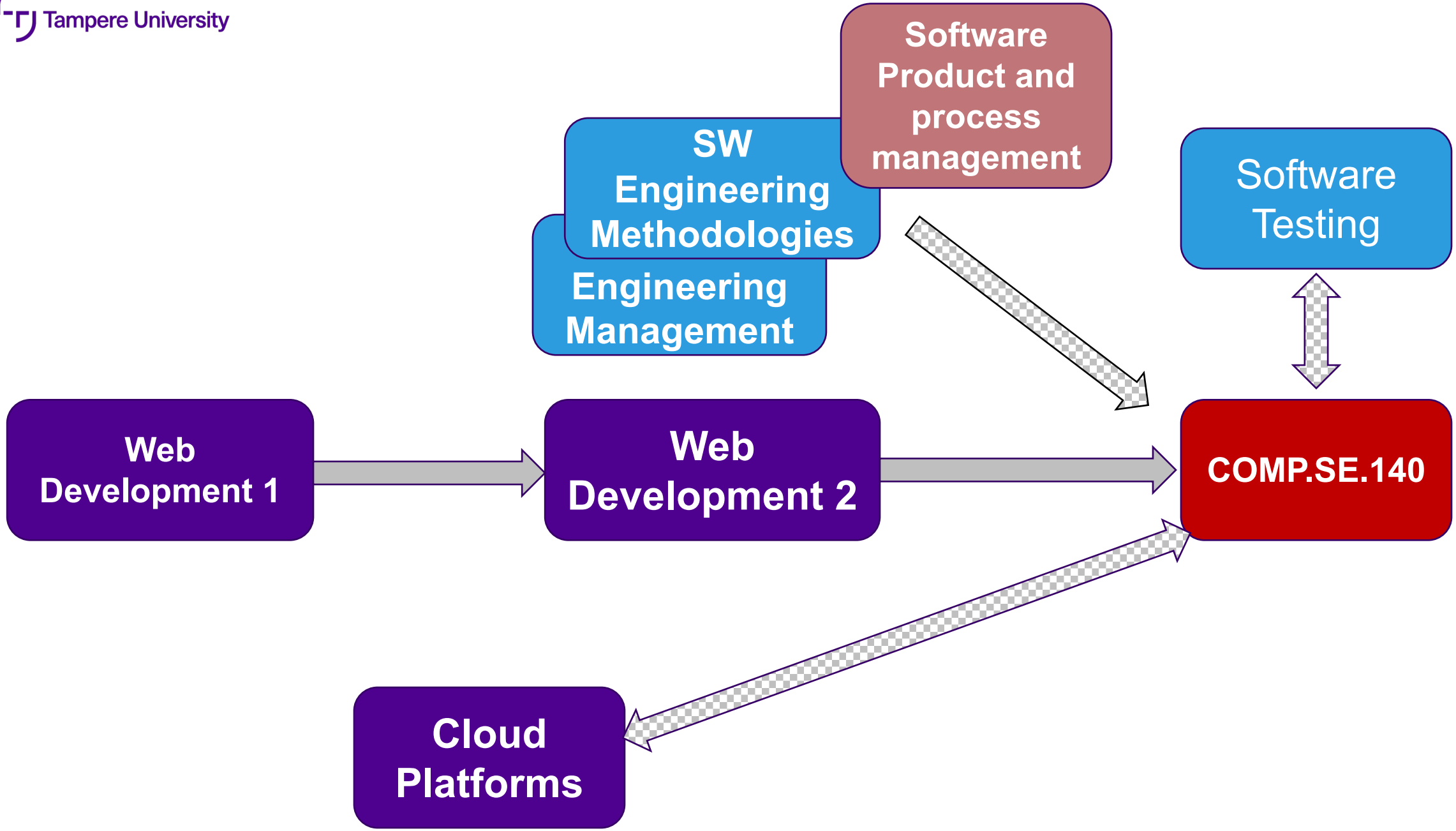
Software Product and process management
SW Engineering Methodologies
Engineering Management
Software Testing
Web Development 1
Web Development 2
COMP.SE.140
Cloud Platforms

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Pre-requisties required or not?

- We do not want to set bureaucratic rules, but
  - In order to teach advanced topics, we need to assume that the students know quite a lot.
    - Since we have separate courses, we do not want to teach everything here
  - We want that the required effort is reasonable for 5 cu.

- All teaching in this course assumes that you are starting second (theoretically last) year of master studies

What do we expect in practice

- Basics of “process” side of software engineering, (e.g what is Agile)
- Understand basics of operating systems and have sufficient mastering of Linux command line.
- Know basics of cloud, virtualization and docker.
- Be fluent in programming with technologies used cloud applications. You can use Java, JavaScript, Python or Golang, ...
- Know version management and be fluent with git
- Basics of TCP/IP, e.g. what is "NAT".

Last year

- About half of those with missing background decided to postpone
- More than half who decided to try, either dropped out failed

=> 25% succeeded

Course content

- Theory-part
  - Lectures (on-line) and reading material
  - This year I will try different approaches
- 3-6 Hands-on exercises
  - We use https://plus.tuni.fi/comp.se.140/fall-2021/ and https://course-gitlab.tuni.fi/ for returning
- A small project
  - You will build a continuous deployment pipeline for a small application
  - Details will be published 06.10. (tentative date)

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Rought plan of lectures – subject to change

- 31.08: Intro to the course and DevOps
- 07.09: Cloud from software engineering and business point of view;
- 14.09: Virtualization from SW engineering point view, what, why and how. Intro to containers and Docker
- 21.09: Continuous Deployment – what & why
- 28.09: CD - especially deployment, dependency management etc
- 05.10: Orchestration, Continuous deployment, tools and techniques
- 12.10: Cloud native architectures part 1
- 26.10: Project; GitlabCI; Cloud native architectures part 2
- 02.11: Cloud native architectures part 3
- 09.11: Automation; summary of Cloud Native
- 16.11: Hosting issues
- 23.11: Guest lecture
- 30.11: Tools - like Kubernetes and Ansible
- 07.12: Recap

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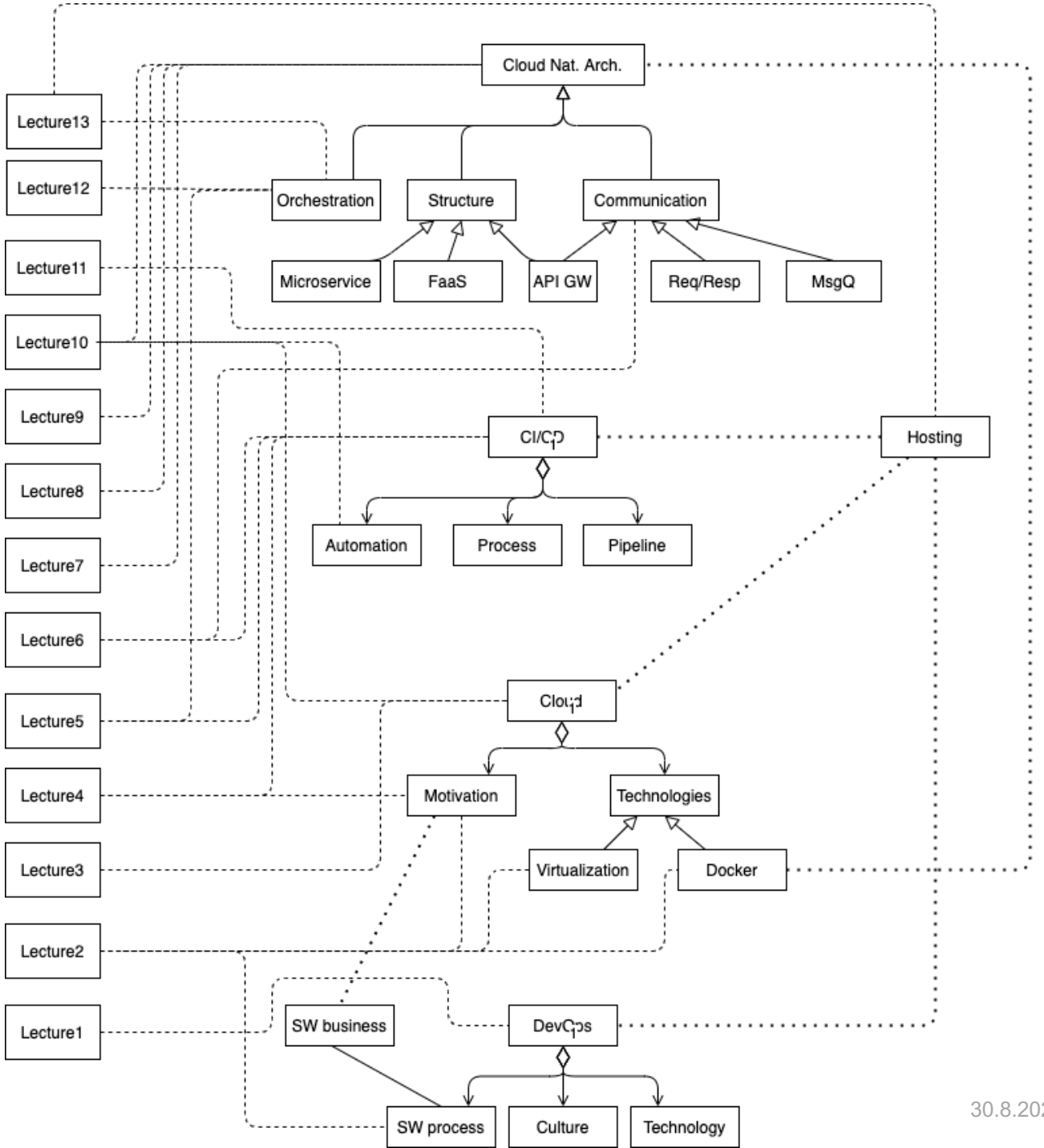
Content map



Project

- In which language?
  - YAML
  - JavaScript, Python, Golang…
- The main parts are
  - building of the pipeline
  - Cloud-friendly application structure

Teaching

- “Lectures”
  - Tuesdays at 10 in Zoom. Some parts are replaced with last year’s recordings but we aim to get together each week
  - Or should we change the time?
- Online Support-session (online version of “kooditorio”)
  - Details to be defined.

Tools and environments we uses

- plus.tuni.fi
- course-gitlab.tuni.fi
- Linux virtual machine

On-line exercises

- 3-6 exercises
- To
  - get hands-on view to content
  - prepare for the project

- Implemented in plus.tuni.fi

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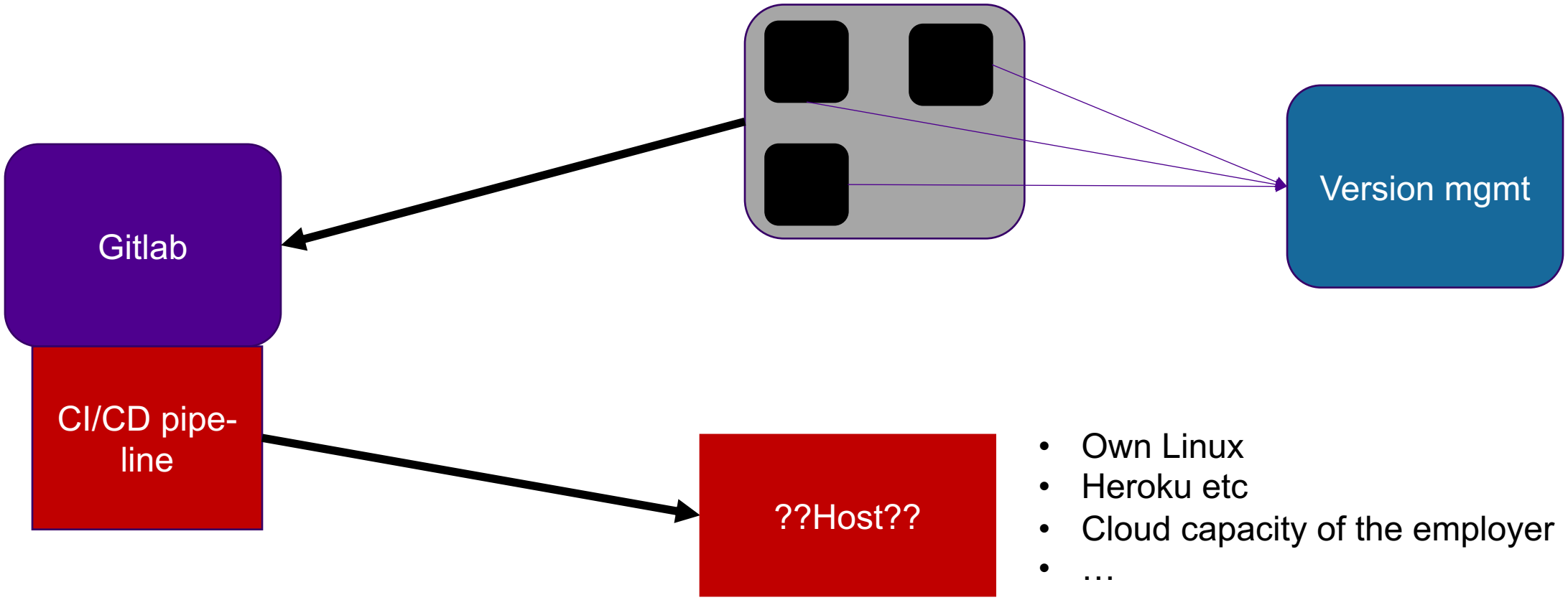
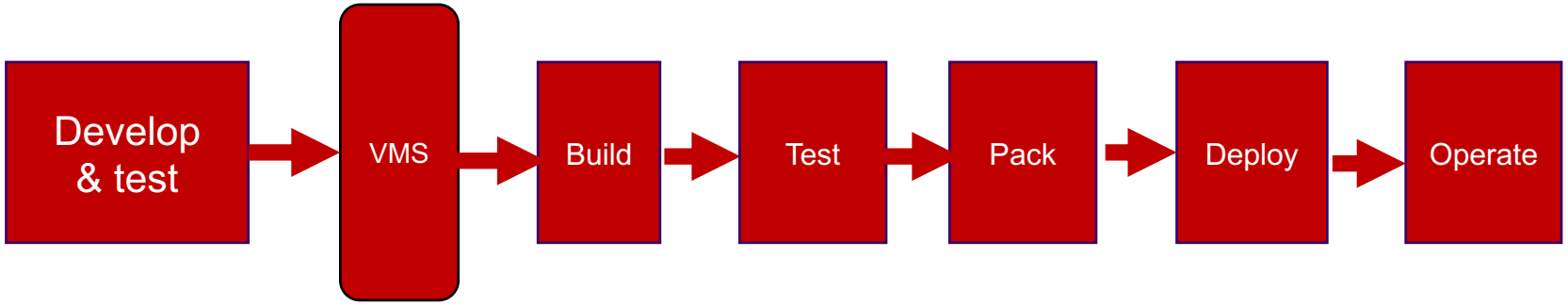
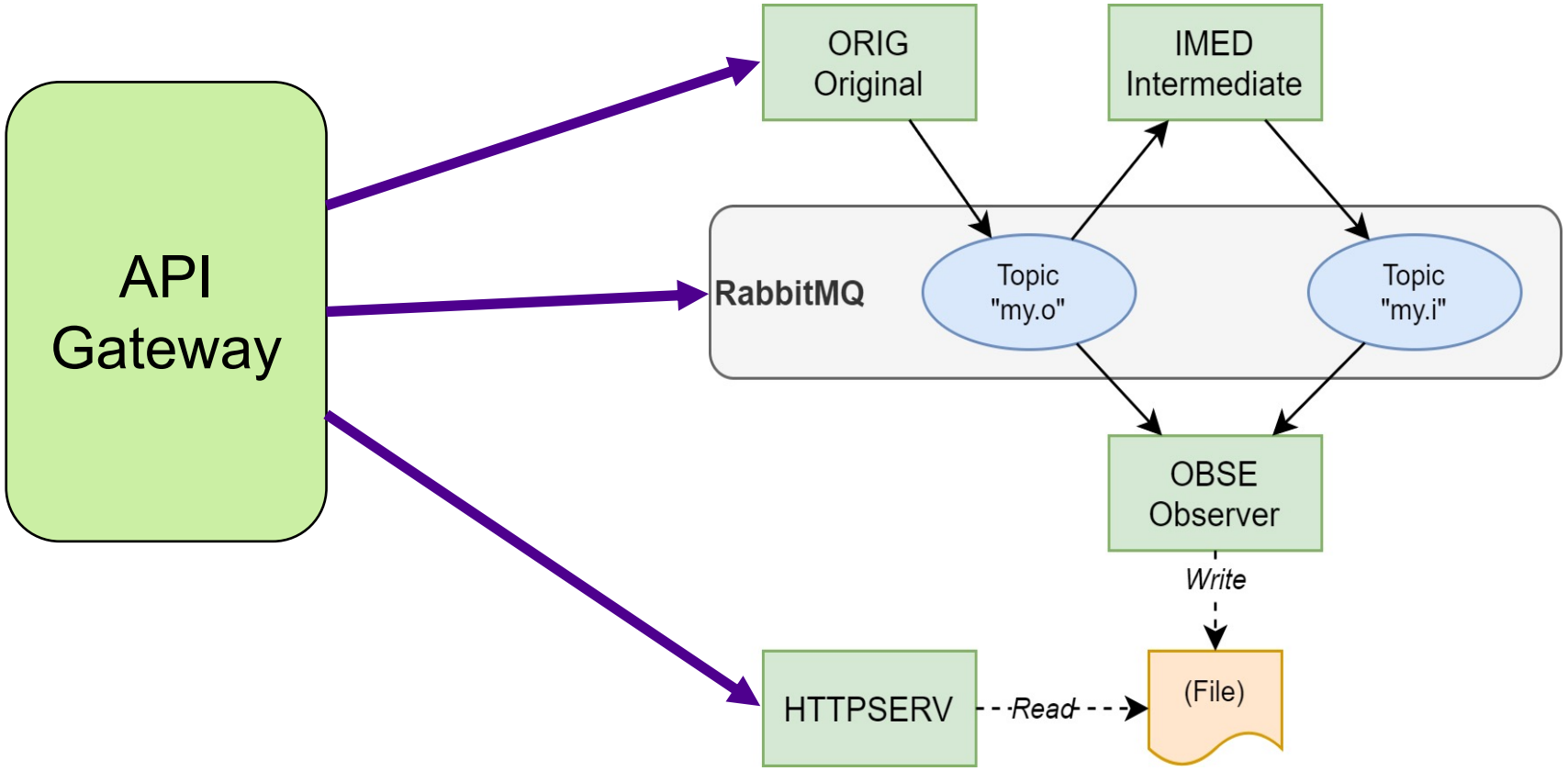
Project



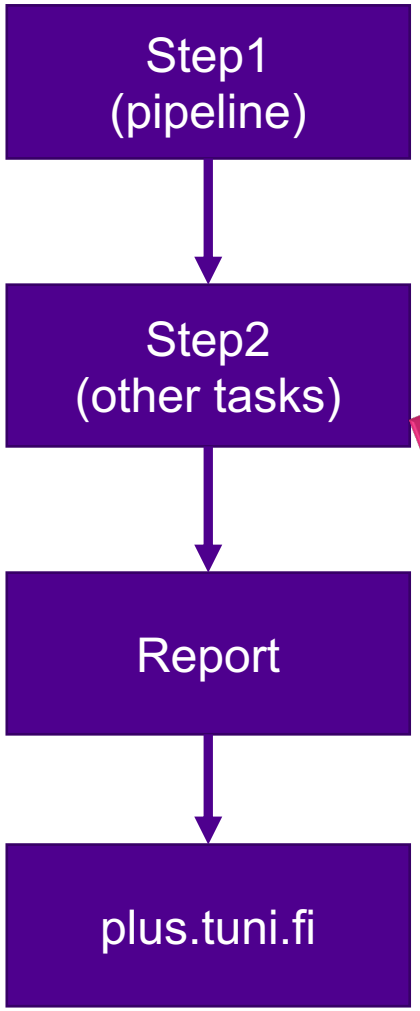
- Own Linux
- Heroku etc
- Cloud capacity of the employer
- …

Project

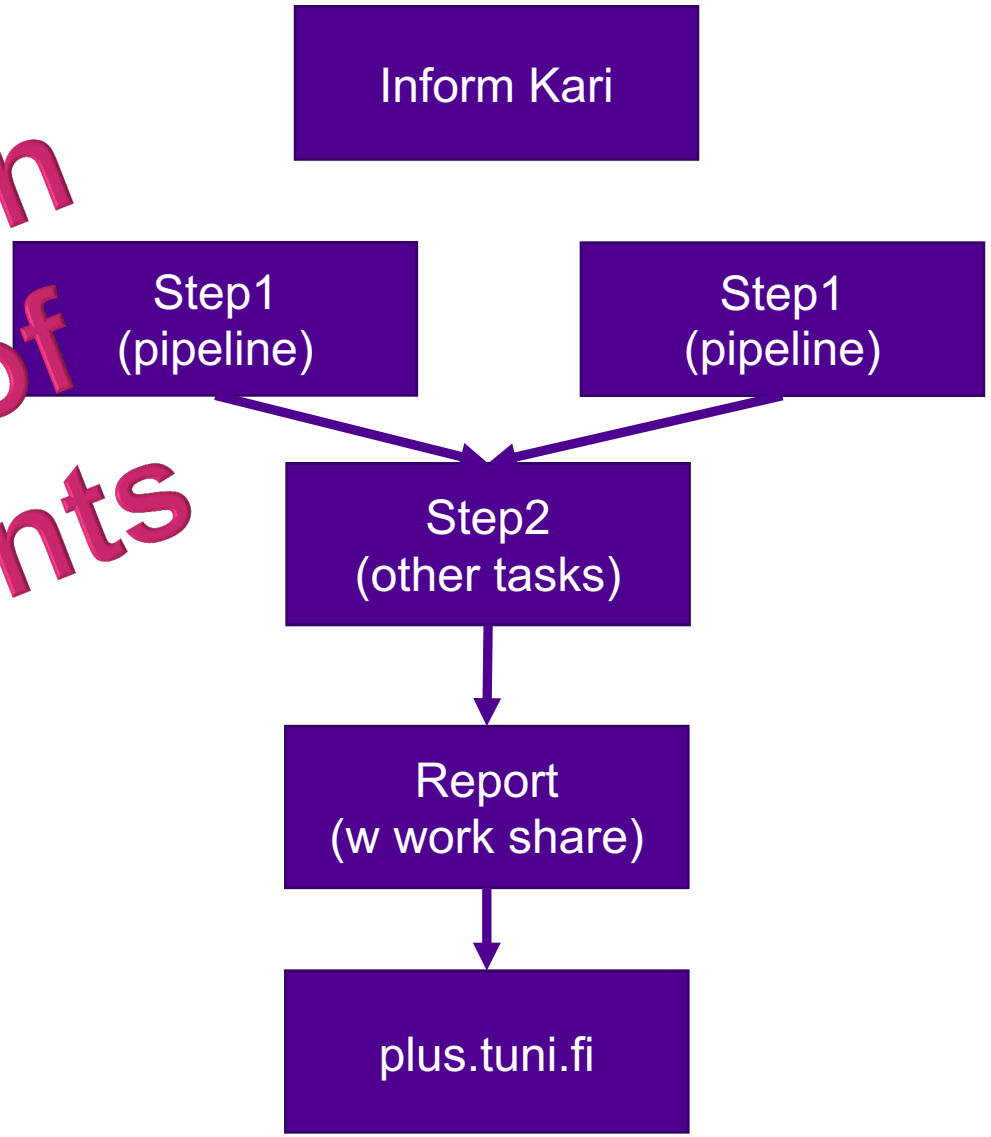

Develop & test
VMS
Build
Test
Pack
Deploy
Operate


API Gateway
ORIG Original
IMED Intermediate
RabbitMQ
Topic "my.o"
Topic "my.i"
OBSE Observer
Write
HTTPSERV
Read
(File)

Two options: individual or pair



Depends on number of participants



Passing requirements

- Exam (50%)
  - Electronic
- Project (40%)
  - Details will be published in couple of weeks
- The on-line exercises (10%)

On-line or not

- During the first period we are on-line
- Second period to be agreed later

Course material

- Examples of recommended reading
  - Humble, Farley: Continuous Delivery: Reliable Software Releases through Build, Test, and Deployment Automation (Addison-Wesley Signature Series)
    - Classical book but a bit outdated
  - Summary part of “Lwakatare, Lucy Ellen: DevOps adoption and implementation in software development practice : concept, practices, benefits and challenges, ”, http://urn.fi/urn:isbn:9789526217116

FAQ

- Q: Is this an AWS course?
- A: No. We will use AWS as on example in various places, but the philosophy is to stay technology and vendor neutral
- Q: Is this a Kubernetes course?
- A: No. You will hear about Kubernetes but this course is more about general principles.
- Q: How does this course relate to *TIE-23546 Cloud Platforms*?
- A: This course is a DevOps course aimed at master-level students majoring or with strong background on software engineering. TIE-23546 is for open university students and it's content focuses in infrastructure.
- Q: Can this course we taken remotely?
- A: Yes, but for the exam you need to use facilities of some Finnish university with a compatible exam room. Naturally, a worsening COVID-19 situation may change this rule.
- Q: Are events recorded?
- A: Yes, and we also utilize the recordings from the last year.

My goals & thinking

- Tell “why” – you should understand the background of techniques and practices
- No ”repeat after me” thinking
- Teach principles instead of spesific technologies
- Avoid “Cargo Cult Programming”

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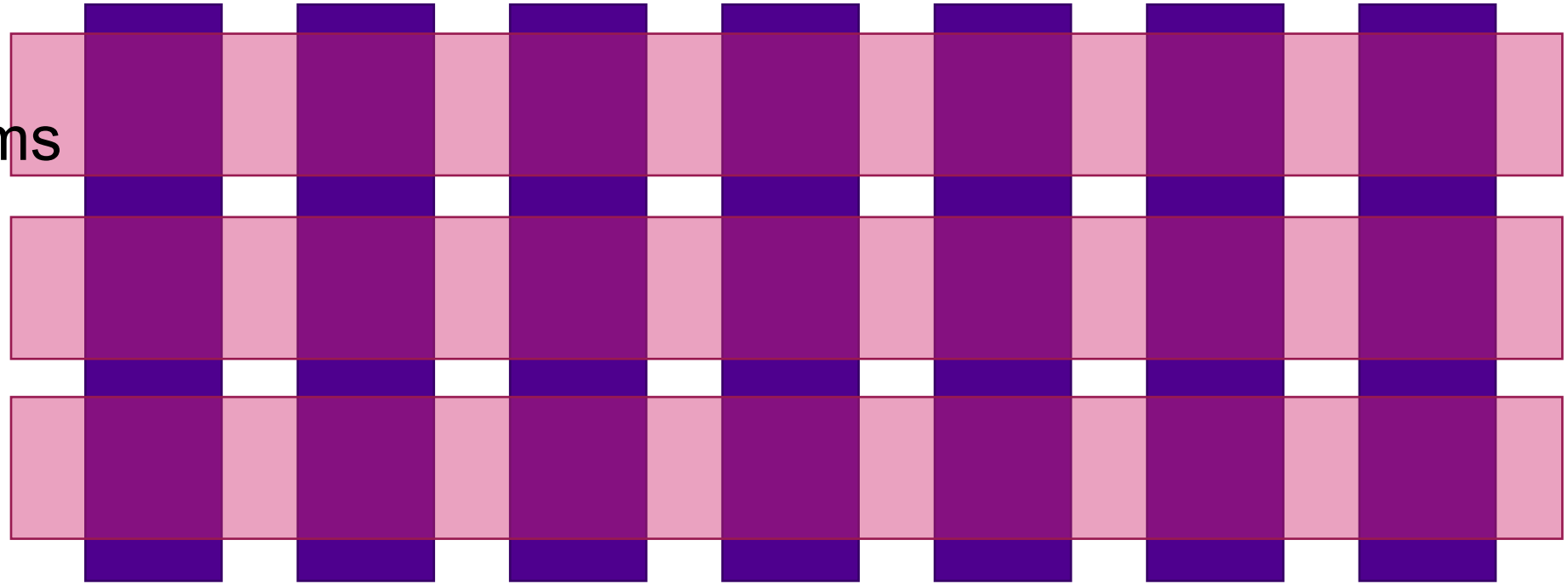
Created: 1 January 1967

What and why?

tools

ECO-systems
- Azure
- Amazon
- Google



Underlying principles

Course material will be in ”plus”.

- Previous years:
  - https://plus.cs.tut.fi/cloudapps/spring-2019/
  - https://plus.tuni.fi/tie-23536/autumn-2019/
  - https://plus.tuni.fi/comp.se.140/fall-2020/c01_intro/03_material/

- This year:
  - https://plus.tuni.fi/comp.se.140/fall-2021/c01_intro/03_material/ (still a copy from 2020)

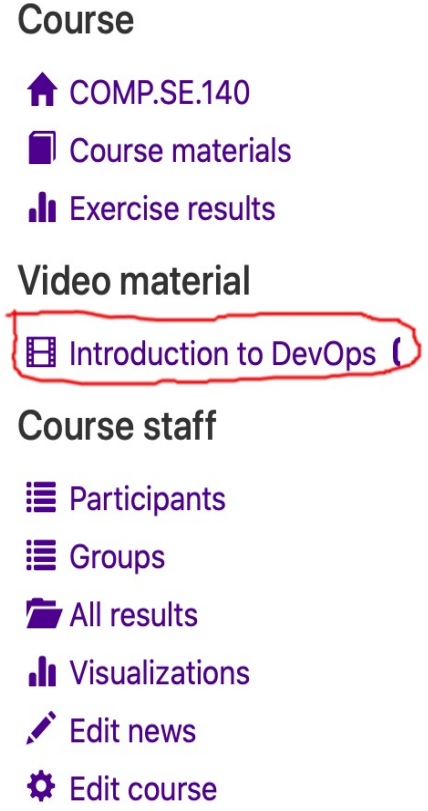
First plus-”exercise” is a background check

- Opened 24.08
- Second will be hands-on with Docker

Homeworks

- Watch the video and remembering the content, what does this picture bring to your mind?
- Read NIST definition of Cloud Computing: https://csrc.nist.gov/publications/detail/sp/800-145/final

and prepare to discuss the *five essential characteristics* – what examples you have personally experienced those



About communication

- Email (yes, I assume that you read your tuni-mail regurlary. If you want me to use some other mail, let me know)
- Plussa