Fog and Cloud Computing
2025/26 – Autumn 2025 - UiO

Introduction to the Course

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https://www.uio.no/studier/emner/matnat/ifi/IN5700/index-eng.html

Questions: feel free to interrupt at any moment

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Goals

- Course content:
  - it will provide a solid base for understanding the **challenges** and **problems** underlying the design and development of **fog and cloud computing systems and applications**
  - thus, this course will teach how to **specify, design, program, analyze and implement** such systems and applications
  - the course has a significant programming component

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Learning Outcome

- Understand:
  - the basic principles and concepts of fog computing systems and their relation to other models such as Cloud Computing and Near-Far Computing
  - the challenges of developing fog based applications and middleware, and the possible solutions to deal with them
  - specifically, understand the issues mostly related to fog computing, namely: introduction to the fog programming model and related models, security, offloading, load balancing, containers and orchestration, application areas (machine learning, healthcare, etc.)
- Be capable to:
  - decide which is the best approach for a particular problem regarding the design and development of a fog computing system
  - design and implement an application using containers (e.g., Docker) while taking into account some of the issues mentioned
  - measure and analyze the performance of a fog computing application

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Professors

- Paulo Ferreira (lectures)
  - https://www.mn.uio.no/ifi/english/people/aca/paulofe/index.html
  - paulofe@ifi.uio.no
  - Zoom link: https://uio.zoom.us/j/8253296061
  - Contact me via Skype, Viber, WhatsApp, etc…
  - Tel: +47-22852876
  - Office: 10th floor, 10460

- Lyla Naghipour Vijouyeh (labs)
  - https://www.mn.uio.no/ifi/english/people/aca/lylan/
  - lylan@ifi.uio.no
  - Office: 10th floor, PhD lab

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Program

- Introduction to Course
- Introduction to Fog Computing
- Security Issues
- Offloading
- Load Balancing
- Fog Simulators
- Containers
- Machine Learning
- Healthcare

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Schedule

- Lectures:
  - Theoretical classes
  - Tuesday, 12h15-14h
  - Slides + Talks
  - The first class is mandatory (first class is on 19 August 2024)
- Group Sessions:
  - Lab. Classes (students install OMNET++)
  - Thursday, 12h15-14h (classes start 28 August 2024)

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Bibliography and Evaluation

- Bibliography:
  - Slides
  - Some selected articles provided by the teacher (ACM, IEEE, Elsevier, etc.)
- Evaluation:
  - Presentations of articles:
    - mandatory (min = 20 min; max = 25 min)
  - Moderation of articles:
    - mandatory: for each presentation there is a moderator
  - Mandatory individual project to be done by each student (show it works)
  - Group project assignment (2 students if IN5700; if IN9700 just 1):
    - 50% in the final evaluation (show it works; write report; exam)
  - Oral exam (see questions in the web site):
    - 50% in the final evaluation
    - the participants in the group are heard in the project simultaneously and examined in the theoretical material; final grades are given individually
  - The evaluation components parts must be done successfully in the same semester
  - No examination support material is allowed for the oral exam
  - The oral exam is in English

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Presentation and Moderation

- I will share some slides with you regarding the mandatory presentation
- Students should tell me (paulofe@ifi.uio.no) in case there is no mandatory presentation the week before

- For the mandatory moderation (like in a conference):
- Students should always come to the class (whether there is a presentation or not)
- Students will do the following:
    - keep the order in the room saying who is allowed to ask a question
    - ask a few questions regarding the paper that has been presented

- Each student does:
    - Mandatory individual project
    - Group project (2 students if IN5700; if IN9700 just 1)
    - Mandatory presentation and mandatory moderation of an article
    - Oral exam (individual grading)

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Detailed Plan

- Individual project specification delivered to students:
    - 18 September in the lab class
    - delivered and seen by the professor in the lab class on 25 September

- Group project specification:
    - delivered to students on 25 September in the lab class
    - group project delivered by students (in devilry - https://devilry.ifi.uio.no) on 7 Nov (Friday) at 23h59

- See here

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