universität innsbruck

Advanced Distributed Systems

Lecture 00-Introduction and course organization

Dr. Zahra Najafabadi Samani

Agenda

- About me
- Lecture organization
- Exam and evaluation
- Course syllabus
- Research topics

About me

About me

- Current position:
  - Postdoctoral university assistant in Parallel and Distributed Systems
- Educational background:
  - **PhD in informatics,** Distributed and Parallel System
  - **Master of computer science**. Distributed and Parallel Systems
    - **Specialization** - Distributed systems, Cloud, Fog, and Edge Computing
- Working experience:
  - **SPICE:** Smart Data Pipeline for the Cognitive Computing Continuum 2025-2027
  - **H2020 DataCloud:** Adaptive Computing Continuum Resource Provisioning tool ADA-PIPE. 2021 – 2023
  - **Karntner Fog:** A 5G-Enabled Fog Infrastructure for Automated Operation of Carinthia's 5G Playground Application Use Cases. 2021 – 2023
  - **POSE:** Performance oriented software engineering. 2024
  - **H2020 Articonf**: Semantic Model with Self-Adaptive and Autonomous Relevant Technology. 2019 - 2021
- Contact:
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Lecture organization

Lecture organization

- **Structure.** The course contains two parts:
  - Lecture
  - Exercises
- **Location:** Seminar room 1 (ICT building)
- **Time:** Thursday- 8:30-11
- **Date:** 02.10.2025- 29.01.2026

Final evaluation- First option

Final project-Last two sessions

- Selecting one of the course topics
- Selecting three newest papers from good conferences or journals
  - Introduction of the topic
  - Paper goals
  - Adopted Methods
  - Evaluation method and results
  - The shortcoming of the paper
  - Your solution
- Providing a summary of the paper revision(3-5 pages)
- Active participation and asking question

Journals and conferences

- Journals
  - Journal impact factor>1
  - Quartiles : Q1 and Q2 (https://www.scimagojr.com/journalsearch.php)
  - Journal publisher:
    - IEEE
    - ACM
    - Elsevier
    - Springer
- Conferences:
  - Conference publisher:
    - IEEE
    - ACM
    - Springer
  - Rank A and B (http://portal.core.edu.au/conf-ranks/)

Exam and evaluation

Exam and evaluation

- **Final exam:** written exam- 40 % grade
- **Projects, presentation, and exercises:** 60% grade
- **Passing the course:** achieving at least 50% of each
- **Final Exam date:** 29.01.2026

Final evaluation- Second option

Final project-Last three sessions

- Selecting one of the course topics
- Write a paper
  - Review several papers (at least five) from good journals and conferences
  - Identify shortcomings
  - Propose a method to solve the problem
  - Implement the proposed method
  - Analyze and compare results with related methods or baselines
- Submit 8-10 pages report (8-10 pages)
- Present findings to the class
- Active participation and asking question

Projects and evaluation

- **Final Project:** 40 % grade
- **Exercises:** 60% grade
- **Passing the course:** achieving at least 50% of each

Course syllabus

Course syllabus

1. Introduction to the distributed systems
2. Service-oriented architecture and microservices
3. Kubernetes, Prometheus, Grafana
4. Resource management and scheduling
    a) Introduction to resource management and scheduling
    b) Scheduling algorithms
5. Optimization methods
6. Load Balancing and autoscaling
    a) Load Balancing algorithms and techniques (Round-robin, Weighted round-robin, and variants)
    b) Autoscaling concepts and techniques
7. Event, stream, and message queue
    a) Actor model and Event-driven architecture
    b) Batch and Stream processing
    c) Message queue and brokers

Course syllabus

8. Fault-Tolerant in Distributed Systems
    a) Introduction to fault-tolerance
    b) Type of fault and failures in distributed systems
    c) Failure Detection and Monitoring
    d) Fault tolerance techniques in Cloud-Edge (reactive and proactive)

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Thank you for your attention☺

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