CS-451

Distributed algorithms

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Cursus	Sem.	Type
Computer science minor	H	Obl.
Computer science	MA1, MA3	Obl.
SC master EPFL	MA1, MA3	Obl.

Language of teaching	English
Credits	4
Session	Winter
Semester	Fall
Exam	Written
Workload	120h
Weeks	14
Hours	**3 weekly**
Courses	2 weekly
Exercises	1 weekly
Number of positions	

Summary

Computing is often distributed over several machines, in a local IP-like network, a cloud or in a P2P network. Failures are common and computations need to proceed despite partial failures of machines or communication links. The foundations of reliable distributed computing will be studied.

Content

Reliable broadcast
Causal Broadcast
Total Order Broadcast
Consensus
Non-Blocking Atomic Commit
Group Membership, View Synchrony
Terminating Reliable Broadcast
Shared Memory in Message Passing System
Byzantine Fault Tolerance
Self Stabilization
Population protocols (models of mobile networks)

Keywords

Distributed algorithms, checkpointing, replication, consensus, atomic broadcast, ditributed transactions, atomic commitment, 2PC.

Learning Prerequisites

Required courses

Basics of Algorithms, networking and operating systems

Recommended courses

The lecture is orthogonal to the one on concurrent algorithms: they can be taken in parallel.

Learning Outcomes

By the end of the course, the student must be able to:

- Choose an appropriate abstraction to model a distributed computing problem
- Specify the abstraction
- Present an implementation of it

- Analyze its complexity

Teaching methods

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Assessment methods

Mid-term and final exams.

Supervision

Office hours	Yes
Assistants	Yes
Forum	Yes

Resources

Ressources en bibliothèque

- Introduction to reliable and secure distributed programming / Cachin

Notes/Handbook

Reliable and Secure Distributed Programming
Springer Verlag
C. Cachin, R. Guerraoui, L. Rodrigues

Websites

- http://lpdwww.epfl.ch/education

Videos

- http://wandida.com