

CS-601

Topics in designing scalable systems software

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Cursus	Sem.	Type
Computer and Communication Sciences		Opt.

Language of teaching	English
Credits	2
Session	
Exam	Project report
Workload	60h
Hours	28
Courses	10
TP	4
Project	14
Number of positions	40

Frequency

Only this year

Summary

The course will cover the state-of-the-art techniques and principles for designing single node scalable systems software. The course will cover lectures, paper discussion, and a semester-long project focusing on scalability.

Content

The course will focus on understanding the notion of scalability and then learn how to be critical about papers and techniques. The course will cover some of the fundamentals of designing scalable systems in the form of lectures. Later, the course will discuss and debate some of the papers from various areas. The discussion will include in-class presentations, which will be done by a group of students. On the practical side, students will work on a semester long project addressing some of the open problems in designing systems software. The course will cover papers encompassing multicore systems as well as heterogeneous hardware.

- Scalability and concurrency [lecture]
- Synchronization mechanisms [lecture]
- Memory models [lecture]
- Performance profiling [lecture]

- Scaling systems for heterogeneous hardware : [in-class discussion]
- Operating systems: Linux scalability, K42, Commutativity, Barrelfish, Tornado
- Databases: Silo, Bohm, MOCC
- File systems: Scalefs, Linux file system scalability, nova, directfs
- Graph analytics: COST, Mosaic, Aspen
- General runtime systems
- Key value stores

In this course, students will work on a semester long course project in groups. Students will come up with the choice of their own topic ranging from designing data structures, synchronization algorithms, to optimizing existing systems to even evaluating the scalability bottlenecks in existing works.

Note

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

- Understand a set of basic principles for designing systems
- Design computer systems that scales well
- Integrate multiple techniques, ideas, and algorithms

Resources

Websites

- <https://cs601-dsss.github.io/>