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English

4 weekly 2 weekly

2 weekly

6 Summer Spring During the semester 180h 14

Hours

Lecture

Project Number of positions

CS-420	Advanced compiler c	Advanced compiler construction				
	Schinz Michel					
Cursus		Sem.	Туре		Language of	
Computer science		MA2, MA4	Opt.		teaching	
Cybersecurity		MA2, MA4	Opt.		Credits	
Data Science		MA2, MA4	Opt.		Semester	
SC master EPFL		MA2, MA4	Opt.		Exam	
					Workload Weeks	

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Summary

Students learn several implementation techniques for modern functional and object-oriented programming languages. They put some of them into practice by developing key parts of a compiler and run time system for a simple functional programming language.

Content

Part 1: implementation of high-level concepts

- functional languages: closures, continuations, tail call elimination,
- object-oriented languages: object layout, method dispatch, membership test.

Part 2: optimizations

- compiler intermediate representations (RTL, SSA, CPS),
- · inlining and simple optimizations,
- register allocation.

Part 3: run time support

- · interpreters and virtual machines,
- memory management (including garbage collection).

Keywords

compilation, programming languages, functional programming languages, object-oriented programming languages, code optimization, register allocation, garbage collection, virtual machines, interpreters, Scala.

Learning Prerequisites

Recommended courses CS-320 Computer language processing

Important concepts to start the course Excellent knowledge of Scala and C programming languages

Learning Outcomes

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

- Assess / Evaluate the quality of a compiler intermediate representation
- Design compilers and run time systems for object-oriented and functional programming languages
- Implement rewriting-based compiler optimizations
- Implement efficient virtual machines and interpreters
- Implement mark and sweep or copying garbage collectors

Teaching methods

Ex Cathedra, mini-project

Assessment methods

Continuous control (mini-project 80%, final exam 20%)

Supervision

Office hours	No		
Assistants	Yes		
Forum	Yes		

Resources

Virtual desktop infrastructure (VDI) No

Websites

• https://cs420.epfl.ch/