



UPPSALA
UNIVERSITET

Advanced Compiler Design (Kompilator teknik DV2)

Science-based computer engineering meeting "hackers at heart"

Q1: What exactly is it that separates a pretty good programming language implementation from a very good one?

Q2: What exactly is it that separates a pretty good approach to developing high-performance system software from a very good one?

The lectures of this course answer Q1 and the project part of the course shows you the way to discover the answer to Q2 yourself.

More specifically, advanced compiler techniques studies the construction of high-performance interpreters for virtual machines and (just-in-time) optimizing compilers for modern uniprocessor architectures. The course also covers optimizations for modern computer architectures such as parallel machines and complex memories with several cache levels.

After taking compiler design 1, you may want to know more about data-flow analysis, program optimization and code generation for complete programs. The course presents classical compiler optimizations guided by static analysis of the code, efficient intermediate representations, register allocation, and instruction scheduling in the context of actual compilers for high-level languages.

In addition, the course examines the structure of efficient virtual machine bytecode interpreters and techniques for efficient just-in-time compilation to native code.

Towards the end of the course we start getting dirty: we examine techniques to perform garbage collection (i.e., automatic memory management).



Research in just-in-time garbage collection

However, the really dirty part of the course comes after that: there is no exam, but the course has a project and to pass the course you have to get your hands into it... But who said that getting dirty isn't fun? Have you forgotten your childhood?

You will meet the compiler research team and work with projects like High-Performance Erlang (HiPE).



Prerequisites: Programming, data structures, compiler design 1.

Goals: Learn the answer to Question 1 and form some personal (and possibly very valuable) opinion on what the answer to Question 2 is. Get in touch with ongoing research.