

Code Optimization and Transformation Course Project on:

If-Switch

The Code Optimization and Transformation course exam is composed by two parts. One is an oral test, the other is an homework, to be terminated before course last call. To pass the whole exam, you must get a pass grade from both the test and the homework. The homework must be taken in pairs.

During the lab classes, the LLVM [4] compiler has been introduced. The homework must use the 3.0 release version of LLVM. A sample project – COT passes [5] – is available on GitHub [3]. It must be used as a starting point for the homework. LLVM testing framework [2] must be used to validate the implementation.

Sources must versioned using Git [6]. A good tutorial can be found here [1]. Sources must be published on GitHub [3].

Assignment

LLVM IR provides two kind of conditional jump instructions: binary – `br` – and n-ary – `switch`. Front-ends can use them to translate `switch` statements. Indeed they can generate a `br` for each `case` or exploit the `switch` instruction.

The goal of this project is two implement two normalization passes. The first look for `br`-based translation of `switch` statements and translate them into `switch`-based form. The second does the opposite, thus from `switch`-based to `br`-based.

Advices

Basically you have to look at the structure of the Control-flow Graph in order to detect translations of `switch` statements. Fundamental tool you need are dominator and post-dominator trees.

References

- [1] Scott Chacon. Pro Git. URL <http://git-scm.com/book>.

- [2] John T. Criswell, Daniel Dunbar, Reid Spencer, and Tanya Lattner. LLVM Testing Infrastructure Guide. URL <http://llvm.org/releases/3.0/docs/TestingGuide.html>.
- [3] GitHub Inc. GitHub. URL <http://github.com>.
- [4] University of Illinois at Urbana-Champaign. Low Level Virtual Machine. URL <http://www.llvm.org>.
- [5] Ettore Speziale. Compiler Optimization and Transformation Passes. URL <https://github.com/speziale-ettore/COTPasses>.
- [6] Linus Torvalds. Git. URL <http://git-scm.com>.