Quick start: LLVM compiler framework

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Contents

Introduction

2 LLVM framework quick start

Understanding LLVM

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LLVM is a collection of components which is useful to build a compiler.

What LLVM is made of

- C++ libraries
 - src/include/llvm/...
 - src/lib/...

- small application (tools)
 - src/tools/...
 - src/utils/...

You can find binaries of them in the installation directory under root/bin/...

clang

- clang is a compiler based on LLVM.
- It compiles all major C-like languages
- It can be added as a tool in the LLVM framework but must be manually cloned in the tool directory
 - cd src/tools
 - git clone http://llvm.org/git/clang
- You can easily see on a production quality compiler the impact of changes you made on your local copy of LLVM

Contents

Introduction

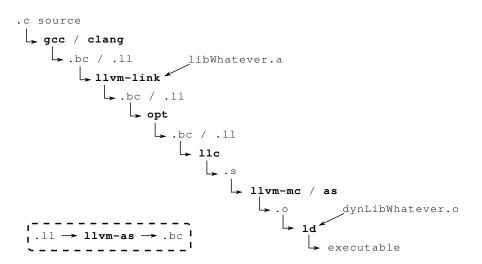
2 LLVM framework quick start

Commands

```
llym-as LLVM assembler
     llvm-dis LLVM disassembler
         opt LLVM optimizer
          IIc LLVM static compiler
           Ili directly execute programs from LLVM bitcode
    ||vm-|ink | LIVM bitcode linker
     Ilvm-lib LLVM lib exe compatible library tool
     Ilvm-nm list LLVM bitcode and object file's symbol table
  Ilvm-config Print LLVM compilation options
  ||vm-stress generate random || files
llym-dwarfdump print contents of DWARF sections
```

For a complete reference, see LLVM command guide ¹

http://llvm.org/docs/CommandGuide/index.html



Writing a LLVM pass

There are a lot of tutorials available:

 Official developer guide 1lvm.org/docs/WritingAnLLVMPass

Out-of-source pass github.com/quarkslab/llvm-dev-meeting-tutorial-2015

We will follow the first one, with a few adjustments.

Testing

LLVM has an internal testing infrastructure. ² Please use it.

Ilvm-lit LLVM Integrated Tester

- Forge a proper LLVM-IR input file (.II) for your test case
- Instrument it with lit script comments
- Run lit on your test
 - llvm-lit /llvm/test/myTests/singleTest.ll run a single test
 - llvm-lit /llvm/test/myTests run the test suite (folder)
- Run lit on the LLVM test suite (regression testing)

To submit a bug report to LLVM developers you will be asked to write a lit test case that highlights the bug.

²http://llvm.org/docs/TestingGuide.html