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Getting Started With LLVM Core Libraries



Synopsis

Get to grips with LLVM essentials and use the core libraries to build advanced tools

About This Book

Learn how to configure, build, and use LLVM and Clang based tools Explore the depths of the LLVM front-end, IR, code generator, and libraries, and learn how a modern compiler is implemented in a practical way. Customize your project to benefit from Just in Time compilation (JIT), static analysis and source-to-source transformations.

Who This Book Is For

This book is intended for enthusiasts, computer science students, and compiler engineers interested in learning about the LLVM framework. You need a background in C++ and, although not mandatory, should know at least some compiler theory. Whether you are a newcomer or a compiler expert, this book provides a practical introduction to LLVM and avoids complex scenarios. If you are interested enough and excited about this technology, then this book is definitely for you.

What You Will Learn

- Configure, build, and install extra LLVM open source projects including Clang tools, static analyzer, Compiler-RT, LLDB, DragonEgg, libc++, and LLVM test-suite
- Understand the LLVM library design and interaction between libraries and standalone tools
- Increase your knowledge of source code processing stages by learning how the Clang frontend uses a lexer, parser, and syntax analysis
- Manipulate, generate, and play with LLVM IR files while writing custom IR analyses and transformation passes
- Write tools to use LLVM Just-in-Time (JIT) compilation capabilities
- Find bugs and improve your code by using the static analyzer
- Design source code analysis and transformation tools using LibClang, LibTooling, and the Clang plugin interface

In Detail

LLVM is a bleeding edge compiler technology framework. Easily extendable and designed as a multitude of libraries, LLVM provides a smooth experience for compiler newcomers and reduces the steep learning curve often associated with compiler development. To start, this book will show you how to configure, build, and install LLVM libraries, tools, and external projects. Next, you will be introduced to LLVM design and how it works in practice throughout each LLVM compiler stage: frontend, IR, backend, the JIT engine, cross-compilation capabilities, and the plugin interface. With multiple hands-on examples and source code snippets, *Getting Started with LLVM Core Libraries* ensures a solid and smooth first step into the LLVM compiler development environment.

Book Information

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Customer Reviews

This book is a great, practical manual of LLVM project. It covers LLVM core source code with the most important external projects. It doesn't cover the source code line by line, but lists the most important classes and explains their role in the compiler tool chain. The book explains LLVM infrastructure starting from very abstract compiler concepts. Therefore it is a great piece of literature for people who want to get an overview of basics of compilers, but do not have a time to read details. The book starts with instructions on how to install the LLVM. It then follows the organization of LLVM itself: from the front end, over LLVM IR, to back-end. In each of these it briefly explains associated concept of compiler. After explaining certain concept, it fast dives into the source code, explaining how things are programmed in LLVM. Such approach is great for developers who want to use LLVM infrastructure for developing external tools. This book demonstrates how certain libraries can be reused from LLVM in order to start developing own tools. I really like simple instructions for installing the LLVM, as well as the explanation of the installation and usage of external LLVM projects such as DragonEgg and Compiler-RT. LLVM with Clang has a big database of tools and options which can be used with these tools. This book is doing an excellent job on listing the most important tools/options with examples and command line code. LLVM IR is explained in details. Also, LLVM back-end and LLVM JIT are explained with nice amount of details. The book contains fair amount of block diagrams which illustrate the LLVM and compiler procedures in a simple, but a clear manner. It is well structured, for this amount of details. It also contains useful links for additional explanations and projects.

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