UE19CS351 - Compiler Design

Session: Jan 2022 – May 2022

MANUAL

Semester:	VI
Problem Statement :	Install Clang and LLVM Course
Anchor :	Prof. Preet Kanwal
Teaching Assistant :	Anirudh H M

This document will guide you through installing and setting up Clang and LLVM, which will be used in the upcoming labs and assignment

1) Downloading a release

The easiest way to get started is to download a prebuilt release from the project's Github page

- Visit https://github.com/llvm/llvm-project/releases/tag/llvmorg-13.0.1
- Under `Assets`, find the appropriate package for your operating system. If in doubt, the most likely packages are -
    - https://github.com/llvm/llvm-project/releases/download/llvmorg-13.0.1/clang+llvm-13.0.1-aarch64-linux-gnu.tar.xz for Linux
    - https://github.com/llvm/llvm-project/releases/download/llvmorg-13.0.1/clang+llvm-13.0.1-x86_64-apple-darwin.tar.xz for macOS
    - https://github.com/llvm/llvm-project/releases/download/llvmorg-13.0.1/LLVM-13.0.1-win64.exe for Windows
- Set up the package
    - If the package is a `tar.xz` archive, extract it into a folder
    - If the package is an executable, run the installer and follow the instructions
- You are now ready to use Clang and LLVM! If you have extracted the package into a folder, you will have to provide the full path to the executable

Note: Several OS-specific installation methods exist, which some may find easier to use. However, most of the exercises use LLVM 13, which may not be available using these methods. Some of these methods are listed below as a last resort, and equivalent commands for LLVM <13 are provided in the manual for most exercises. Kindly bear in mind that support for these installations will be limited

- Various package managers may contain an `llvm` / `clang` package, and can be installed

  accordingly
- On macOS, `xcode-select` can be used to install the LLVM toolchain
- On multiple platforms, the Visual Studio IDE can be used to install the LLVM toolchain

2) Building from source

This section provides some guidance on how to compile the LLVM toolchain from source. Note that none of the core labs and assignments will require you to build from source. However, some of the optional exercises and exploratory hints will require a debug build of these tools, which requires building from source. The official guide for compiling LLVM can be found at

- You will need the following tools -
    - `git`
    - `cmake`
    - `ninja` (not essential, but recommended)
- Run the following commands to download the source and build it -

```
git clone --depth=1 https://github.com/llvm/llvm-project.git
cd llvm-project
mkdir build
cmake \
    -S llvm \
    -B build \
    -G "Unix Makefiles" \
    -DLLVM_ENABLE_ASSERTIONS=On \
    -DCMAKE_BUILD_TYPE=Release \
    -DLLVM_PARALLEL_LINK_JOBS=2 \
    -DLLVM_ENABLE_PROJECTS='clang'
    ↪# if using ninja, replace '-G "Unix Makefiles"' with '-G "Ninja"'
cmake --build build
```

The tools will now be available at `<project_dir>/build/bin`