Towards a modern CMake workflow

OMNeT++ Community Summit

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Introduction

Motivation for another build system

CMake as a powerful alternative

Developing with Visual Studio Code

Technical Preview

Motivation for another build system

The OMNeT++ build system

OMNeT++ . . .

- comes with an Eclipse-based IDE
- comes with a pre-built MinGW/MSYS environment (Linux build tools for Windows)
- offers an "out of the box" experience (IDE, toolchain, examples) for beginners

OMNeT++ *Makefile-based* build system (opp_makemake) . . .

- feels native only on Unix systems
- makes management of dependencies and variants difficult
- often conflicts with CMake-based dependencies
- complicates the use of other IDEs (especially on Windows)

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Why CMake?

We believe
A well-designed software architecture and build environment reduces the management overhead and thus allows even small teams to maintain and improve complex projects.

1. CMake is the de facto standard for almost every C/C++ open-source project thanks to its versatility
2. CMake generates native build environments that will compile source code, create libraries, generate wrappers and build executables in arbitrary combinations
3. CMake is cross-platform from the beginning (e.g., can generate Makefiles but also the Ninja build rules)

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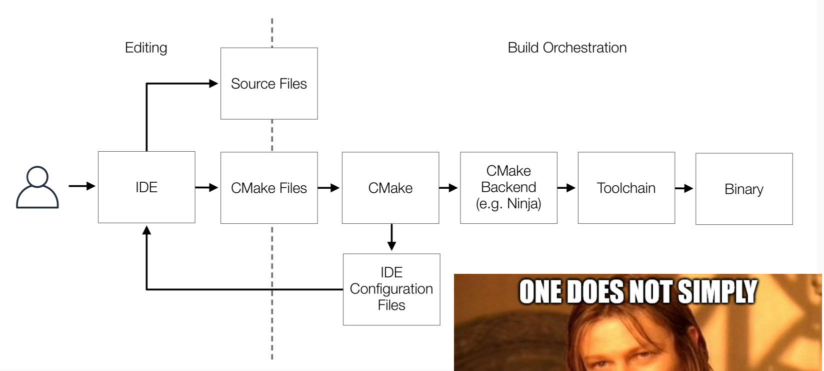
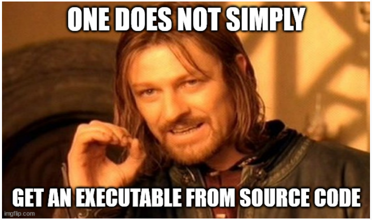
CMake as a powerful alternative

From Sources to Executables





Requirements

- Write code only once – if the concept performs in simulation, have everything ready for the production code
- Minimize management overhead by having a single source of truth/configuration (CMake files)
- Allow for continuous integration (automated tests etc.)
- Seamless workflow between simulation and actual production code (transferring results made easy)

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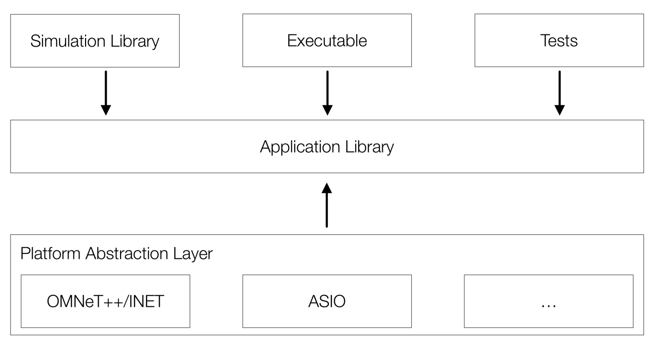
Make OMNeT++ a first-class citizen

OMNeT++ is neatly integrated into sophisticated projects:

- Simulation: business logic and INET[1]
- Testing: Unit tests covering your code, e.g. with GTest
- Production: business logic and ASIO[2] for deployment



[1] OMNeT++ model, i.e. simulated network communications

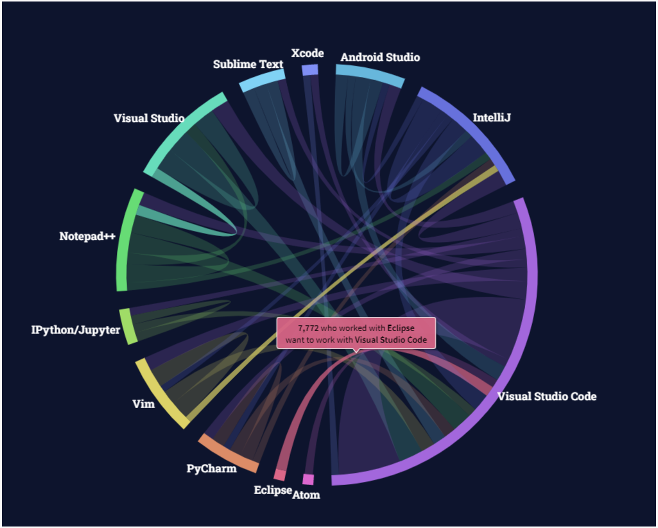
[2] C/C++ asynchronous network library, i.e. native network communications

Developing with Visual Studio Code

The OMNeT++ IDE

- Straightforward workflow for novices and self-contained simulation models, i.e. without dependencies to third-party components
- Does not ship with CMake support (Eclipse plugin exists)
- Its Eclipse core can be slow and bulky

What does the community want?[3]



[3] Stackoverflow Survey 2021:
`https://insights.stackoverflow.com/survey/2021`

OMNeT++ and Visual Studio Code (VSCode)

VSCode is cross-platform and highly customisable. We suggest the following extensions making VSCode a neat IDE for OMNeT++ development (with CMake):

- Cpptools (C/C++ Language Support)
- CMake (Language Support)
- CMake Tools (CMake project integration and automation)
- OMNeT++-NED (NED language support)
- VSCode-LLDB (LLDB debugging support)

Technical Preview

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OMNeT++ tictoc demo in VSCode

`https://github.com/HpLightcorner/opp-summit-2021-cmake-tp`

Find the latest OMNeT++ CMake package at

`https://github.com/omnetpp/cmake`