An update on Clang-based C++ Tooling

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Tomorrowland (from Euro LLVM DevMeeting 2012)

- Tools
  - clang-format
  - clang-lint
  - clang-rename
- Libraries
  - Tooling
  - Refactoring
  - ASTMatchers
- Editor integration
  - Emacs
  - Vim
  - Eclipse
- IDE’ish Services
  - ClangD

Today

- Tools
  - clang-format ✔
  - clang~~-lint~~-tidy ✔
  - clang-rename ✘
- Libraries
  - Tooling ✔
  - Refactoring ✔
  - ASTMatchers ✔

- Editor integration
  - Emacs ✔ → YouCompleteMe
  - Vim ✔
  - Eclipse ✔
- IDE'ish Services → ycmd (libclang)
  - ClangD ✔

clang-format

- Automatic formatting for C++, ObjC, …
- New features
  - More languages: JavaScript, Java, Protocol Buffers
  - Include sorting
- Widely used across the world
- Plugins for many editors and IDEs

http://clang.llvm.org/docs/ClangFormat.html

YouCompleteMe

- Code completion and more for vim, emacs, sublime text etc.
- Many languages (C++, Java, Python, Go)
- C++ support based on libclang
  - Code completion
  - Fast syntax checks
  - GoToDeclaration, GoToDefinition
  - Apply FixIt hints

https://github.com/Valloric/YouCompleteMe

clang-tidy

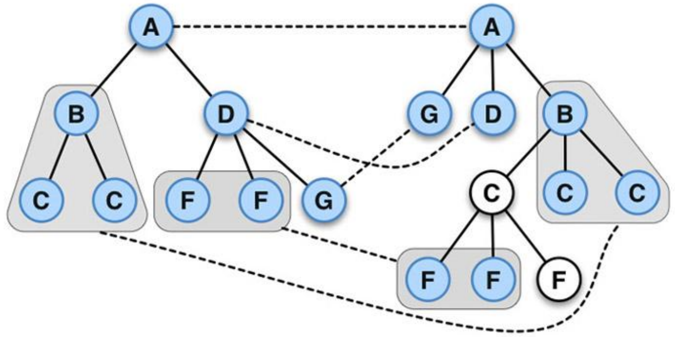
- clang-based C++ linter tool (and **much** more)
- >50 checks
  - Readability, efficiency, correctness, modernize, …
  - Highly configurable per (sub-)project
  - Can automatically fix the code in many cases
- Easy access to ASTMatchers and preprocessor hooks

http://clang.llvm.org/extra/clang-tidy/

AST matchers

- DSL to create predicates on Clang’s AST
- New features
  - More matchers (types, parents, ..)
  - Back-references (`equalsNode(“X”)`)
  - Starting nested matches within the callback
- clang-query
  - Quickly write and test AST matchers
  - Analyze translation units

http://clang.llvm.org/docs/LibASTMatchers.html



Demo

- From the LLVM Coding Standards:
  "Use Early Exits and continue to Simplify Code"

```
if (!isa<TerminatorInst>(I) &&
    I->hasOneUse() && doOtherThing(I)) {
  ... some long code ....
}
```

$\longrightarrow$

```
if (isa<TerminatorInst>(I))
  return;
if (!I->hasOneUse())
  return;
if (!doOtherThing(I))
  return;
... some long code ....
```