Libclang Integration in the KDevelop IDE

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About KDevelop

- A free, open-source, plugin extensible IDE
- Started in 1998 – GPL
- Cross-platform – written in C++/Qt
- Supports many languages
  - C++
  - Python, PHP, Ruby, QML/JS, …
- Debugger integration
  - GDB, Xdebug (PHP) – *no* LLDB yet! :'(
- Known for its powerful code navigation/completion support

History of C++ Language Support

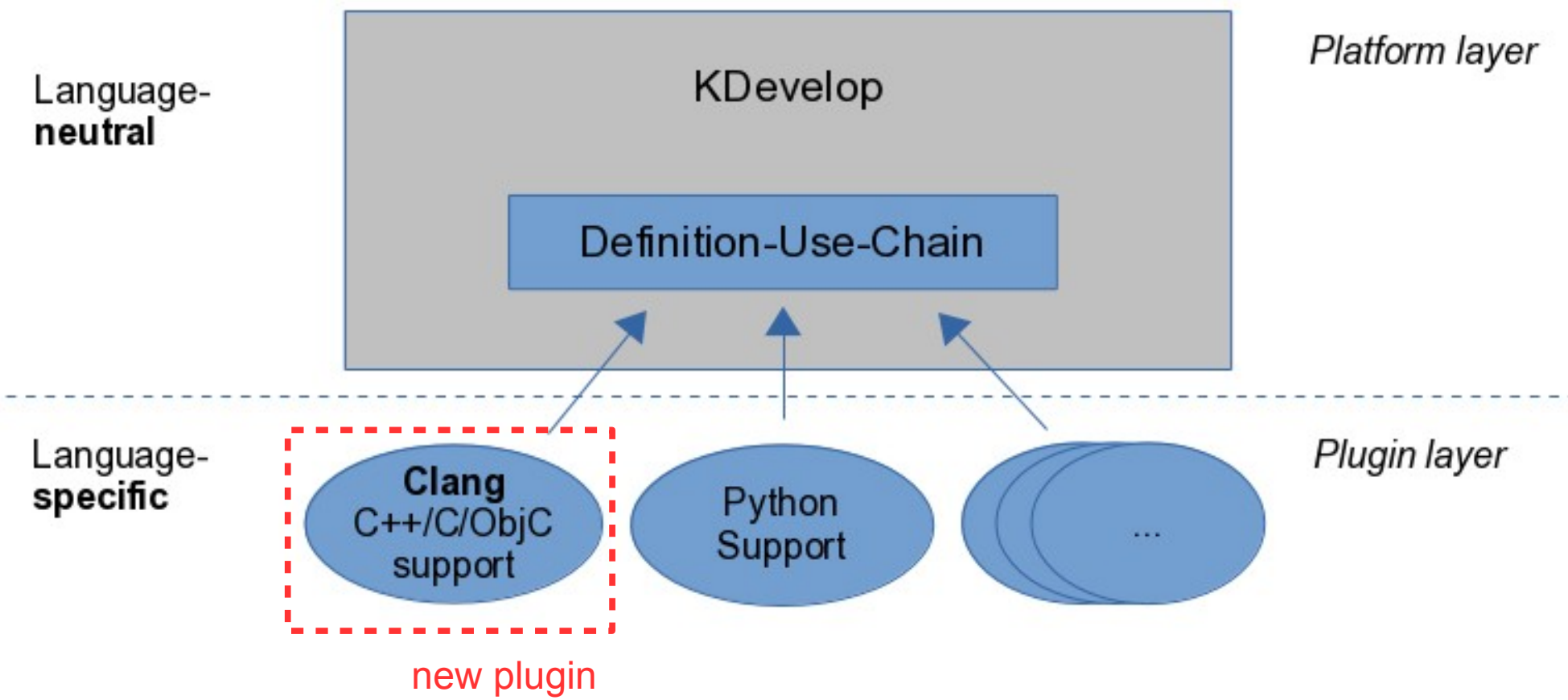
- Issues with current C++ Support
  - **Custom parser** living inside KDevelop code base
  - Over **50 000 LOC**
  - **Hard to maintain**, even harder to extend
    - Hint: C++11, C++14, …
  - Lots of issues with non-trivial C/C++ code
    - (designated initializers, ...)
  - Not possible to disambiguate between C vs. C++, or separate C++ standard versions
  - ...

Clang to the Rescue!

- C/C++/ObjC language frontend for LLVM
- Features
  - Expressive diagnostics
  - Allows tight integration with IDEs
  - BSD-licensed
  - Highly active community
  - Stable API via **libclang**

Implementation overview

Language Support Architecture



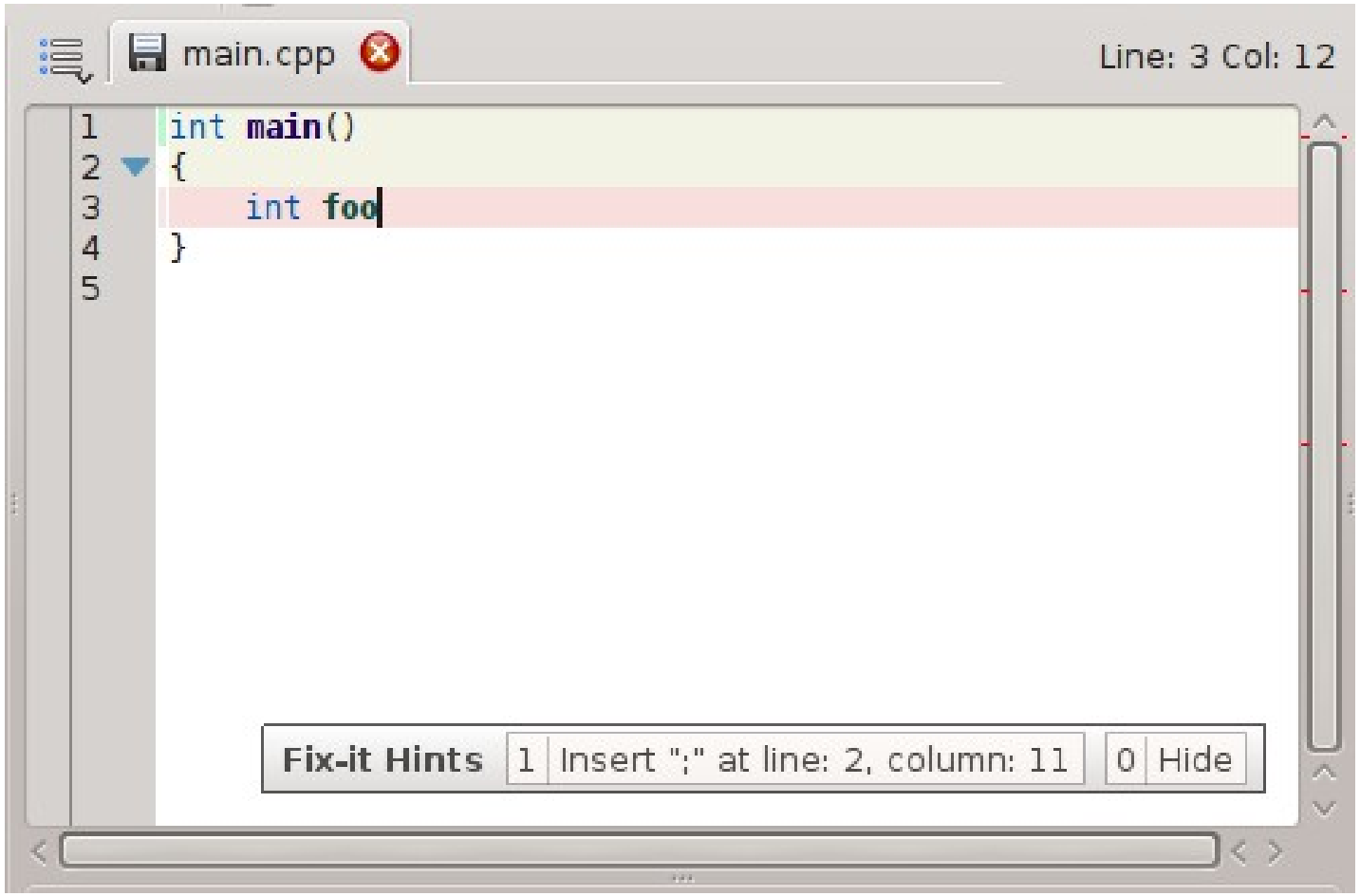
Libclang Features Used

- C++ AST introspection
  - Extract definitions, uses, their attributes
- Diagnostic reporting
  - Spell-checking, fixits
- Macro definitions/expansions
- PCH generation
- Unsaved files for editor buffers
- Code completion

Impressions

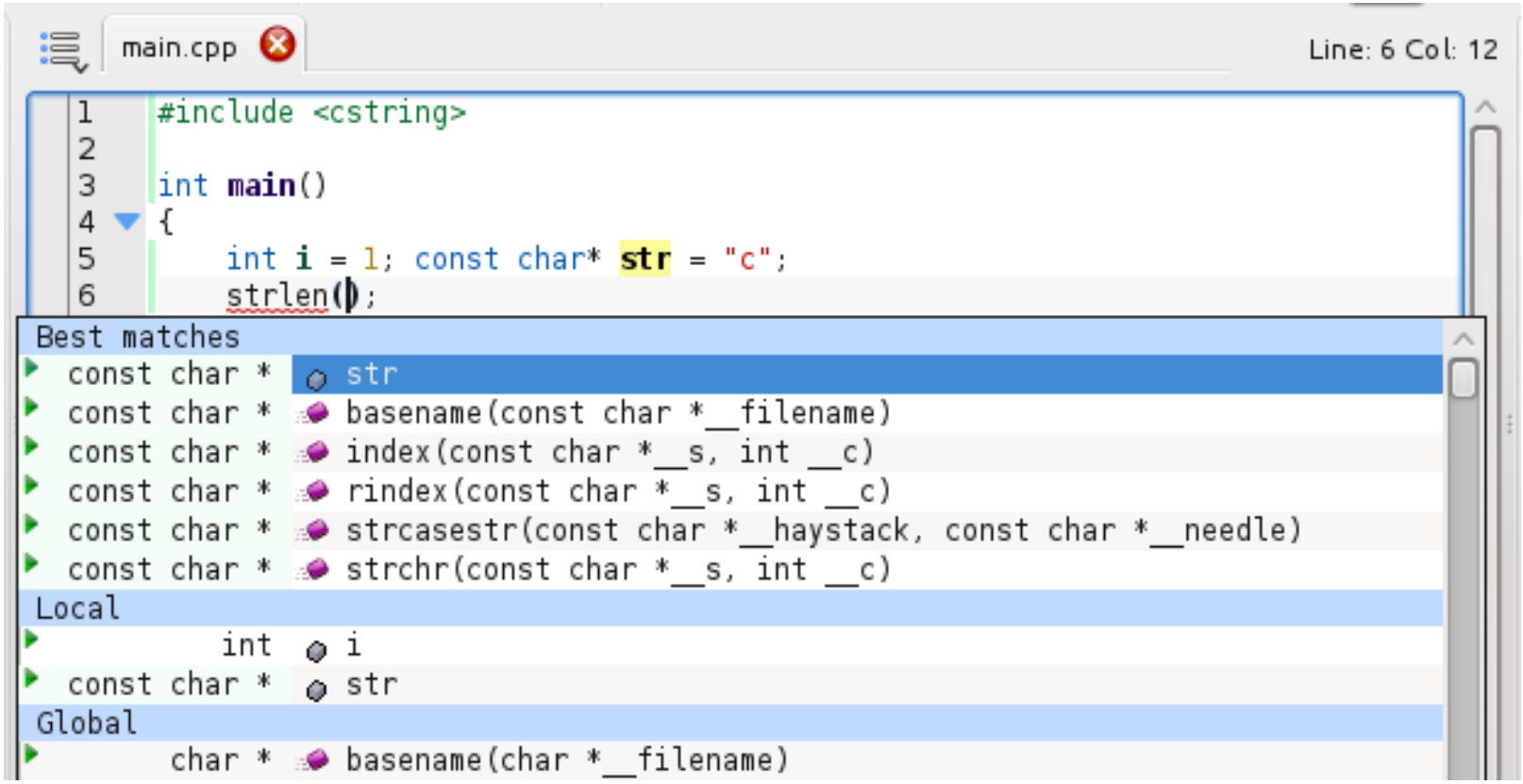
Clang Assistants

- Providing diagnostics/fixits from Clang



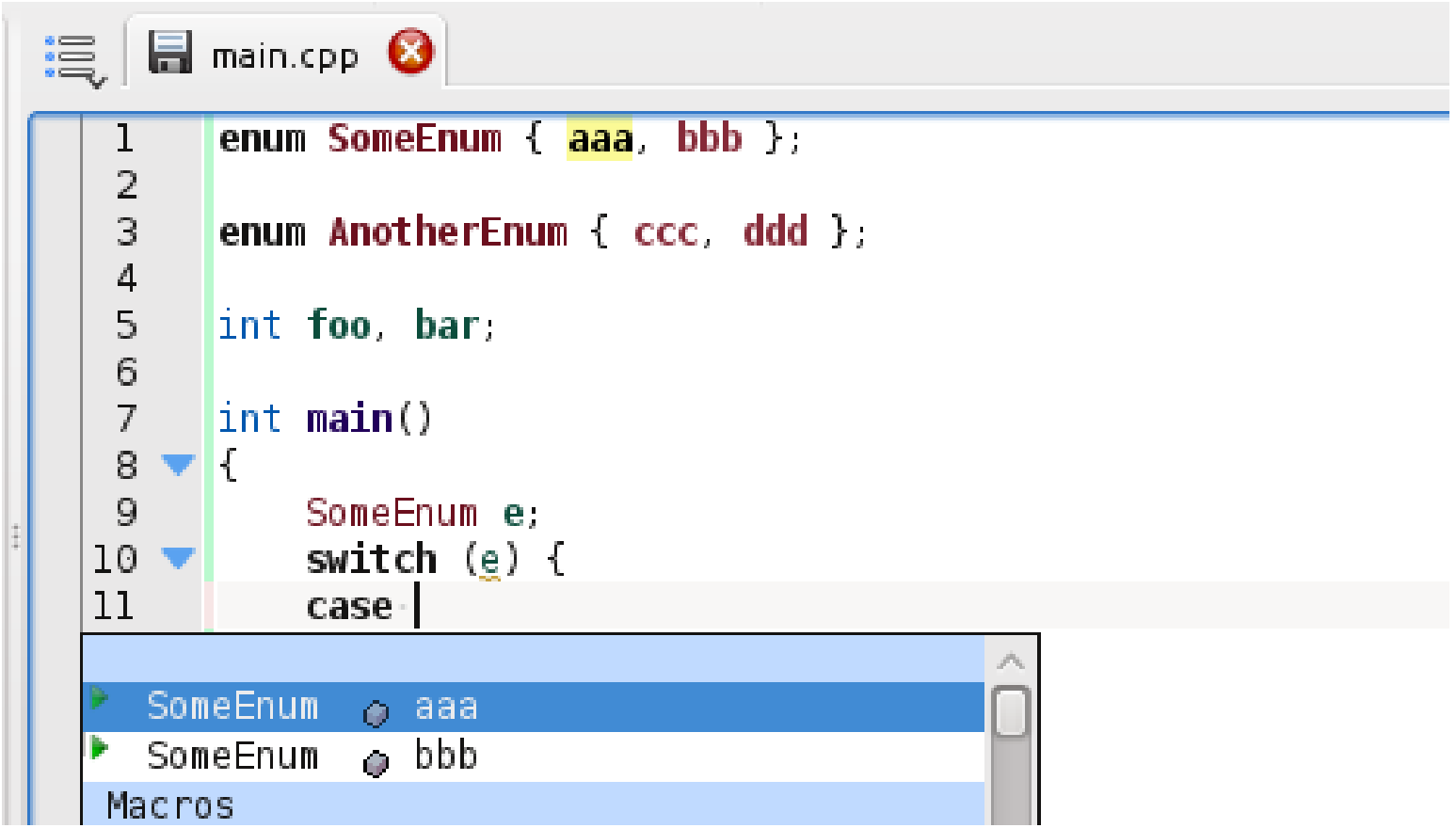
Clang Code Completion

- Show viable expressions for current context



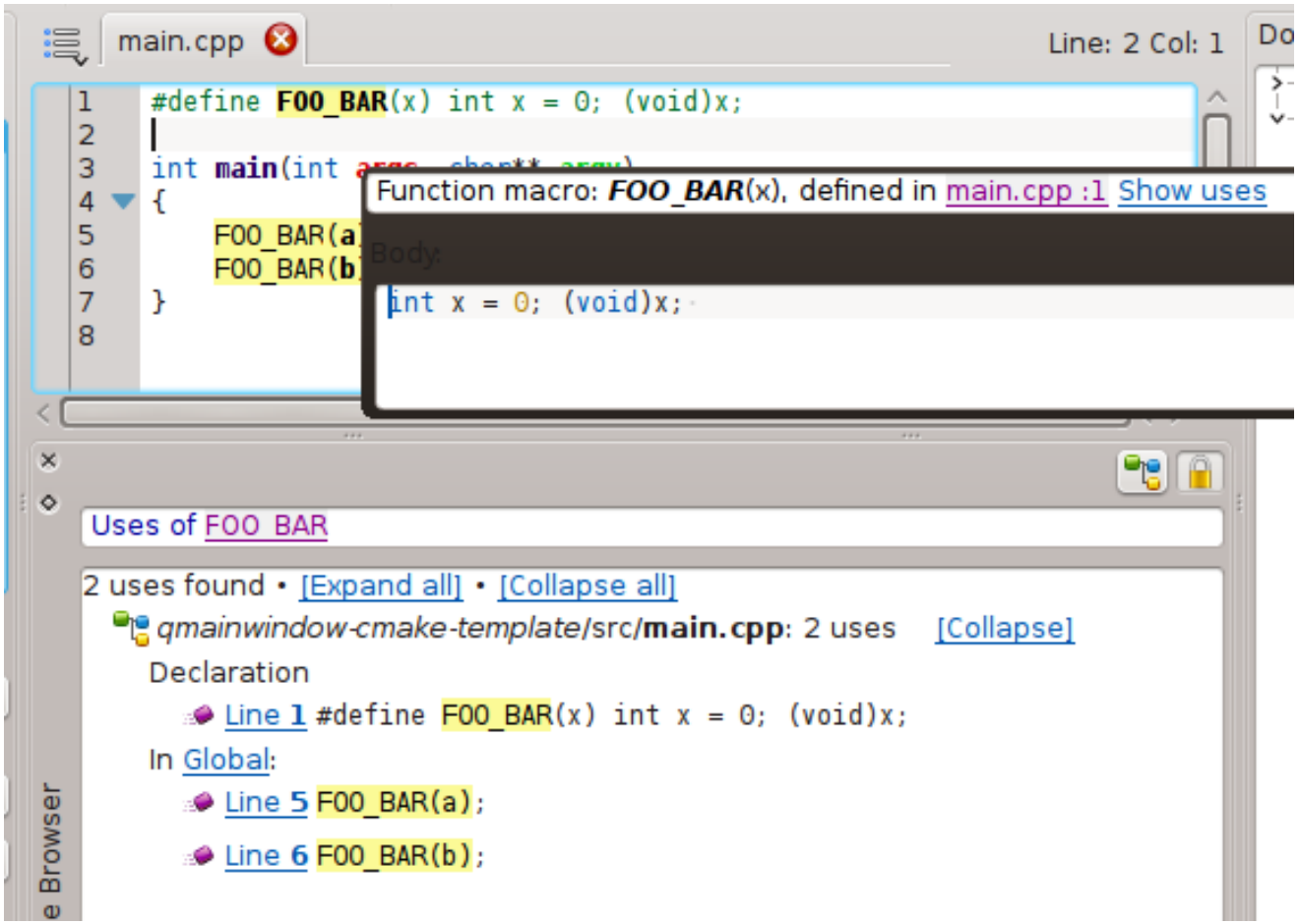
Clang Code Completion cont'd

- Special completion: Enum-case labels



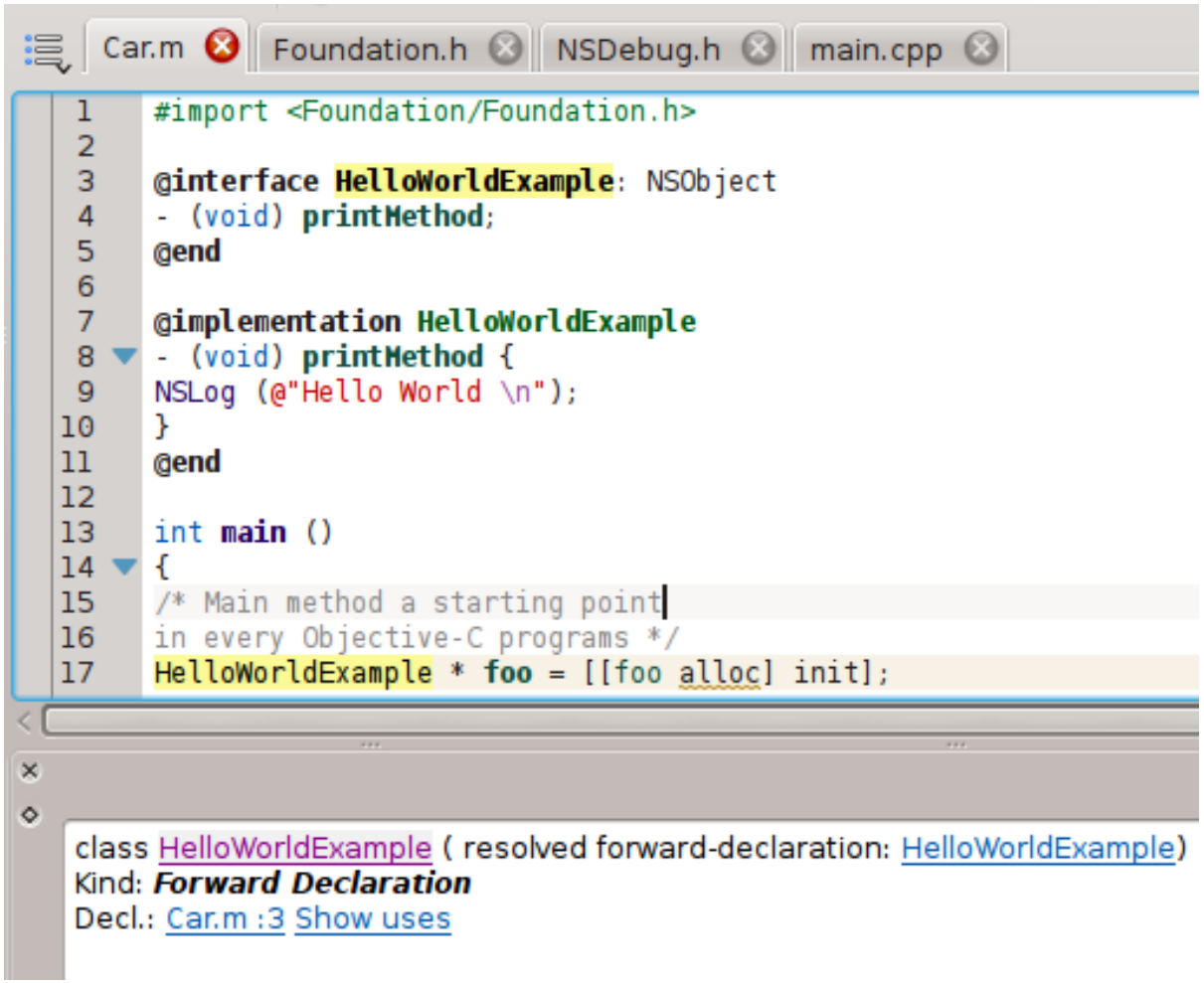
Clang Macro Navigation

- Show definition text and uses of Macro definitions



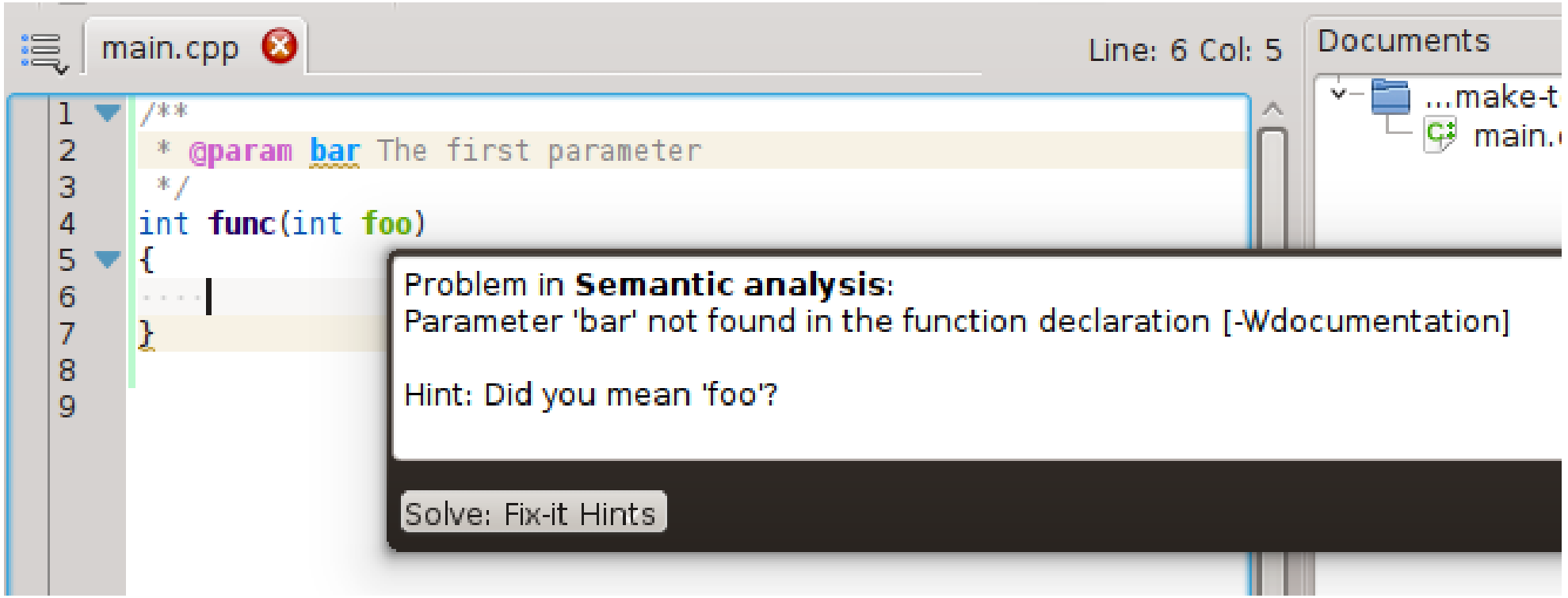
Clang Objective-C Support

- A little bit of Objective-C support



Clang Helpers

- Clang parsing Doxygen-style comments



What's up next?

TODO in our C++ support

- Libclang
  - Fix C++11-auto type deduction
  - Get preprocessed contents in macro expansions
  - “Identifiable” diagnostics
    Introduce: `int clang_getDiagnosticId(…)`?
- KDevelop Clang support plugin
  - Backport of our custom parser's capabilities
    - Example: Auto-transform of `.` to `->` in
      `string* s = …; s.<cursor>`
  - Make it work on Windows (MSVC):
    No `constexpr` support yet! :(

Join Us!

- **kdev-clang is manageable** (below 10 KLOC)
  - Clean, C++11-aware code base
  - Fully unit-tested
- KDevelop provides **powerful** language-agnostic interfaces, saves precious **manpower**
- Easy to implement **new assistants/warnings**, …

Thanks!

References

- **Contact**
  - IRC: #kdevelop on Freenode
  - Mailing list: kdevelop-devel@kde.org

- **GSoC: Clang Integration in KDevelop:**
  http://kfunk.org/2014/04/28/gsoc-2014-improving-the-clang-integration-in-kdevelop/
  (+ follow-up posts)

- **Try it out yourself:**
  http://milianw.de/blog/katekdevelop-sprint-2014-let-there-be-clang [Section: Take my Code]