C++ as a service — rapid software development and dynamic interoperability with Python and beyond

Interactive C++: cling and clang-repl

Vassil Vassilev

10.03.2022
Continuing to rebase cling on top of llvm13 (40 tests out of 185 fail)
Status. Clang-Repl

- Built a quick prototype that can connect python to clang-repl in clang-14-rc to be potentially used in the awkward array project connecting Python and C++
- We will collect first round of feedback and we can prepare a demo

The goal is to provide an easy installation and use of the Cling-inspired incremental compilation we landed in Clang
Status. InterOp

- Currently working on improving the performance of CreateScopeProxy in cppyy. Need to coordinate the work with the D use-case
- Investigating how to use llvm-lite to generate LLVM IR in Numba which calls into cppyy

The goal is to rework the python-to-C++ automatic binding generator cppyy to use LLVM interfaces which can help improving speed and accuracy
Status. Clad

- Made Clad’s custom derivatives utilize the pushforward mechanism
- Finished support for passed by reference arguments and return types
- Implemented single pass pushforward support (computing the value and its gradient)
- Completed support of derivatives of user defined types wrt scalar builtin types (eg std::complex)
- Finished the paper for ACAT on GPU Accelerated AD
- Added binder tutorial for clad
- Working on various prototypes and have a concrete approach for getting Clad derivatives from RooFit functions
People

Purva Chaudhari
Error Recovery in Clang-Repl
(Feb 2022-May 2022)
CaaS Open Projects

- Patches against clang.git
  - Implement FileManager uncaching
  - Adapt the user of invalidateCache to its new signature
  - Mark the file entry invalid, until reread
  - Propagate cache flags from LookupFile() to FileManager::getFile()
  - Pass the OpenFile flag also to DirectoryLookup
  - Do not load the source file just to get an irrelevant SourceLoc (ROOT-7111)
  - Allow interfaces to operate on in-memory buffers with no source location info [Pratyush Das]

- Open projects are tracked in our open projects page.
Next Meetings

- Monthly Meeting — 7th Apr, 1700 CET/0800 PDT
  - Matheus Izvekov — Presentation on type re-sugaring in clang

If you want to share your knowledge/experience with interactive C++ we can include presentations at an upcoming next meeting
Thank you!