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

Interactive C++: cling and clang-repl

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Add support for numerical differentiation fallback in Clad

Modernize the LLVM "Building A JIT" Tutorial Series

Utilize second order derivatives from Clad in ROOT

Add support for differentiating functor objects in clad

Status. Clang-Repl

✤ The initial version of clang-repl landed! [D96033]

Status. Cling

* <u>Reduced patches from our clang fork</u>

  * <u>D77598</u> (Integral template argument suffix printing) [Pratyush] — Landed in llvm but needs tuning to replace the patch in ROOT.

* Investigate crashes in Cling with the Thrust library — resolved by avoiding to rely on Thrust so far

Status. InterOp

✤ Second revision of the interoperability spec (requires some cleanup).

✤ Thanks to Wim we have defined a path forward with a deliverable basic template instantiation support when bridging python and clang-repl. The target is early fall.

✤ This work will also polish the requirements doc further and show code examples.

Status. Clad

✤ Resolve issues with Clad argument passing — clarified.

✤ Released Clad v0.8

✤ [Baidyanath] Working on proper tapenade-style array support in clad

✤ [Garima] Advances the user-extensible error estimation framework. Will work on preparing a generic clad tutorial.

✤ [Parth] Working on uploading doxygen documentation of clad on readthedocs. Prepares a tutorial on clad troubleshooting for developers.

Plans

✤ Start rebasing cling to LLVM13.

  ✤ That would require a clad-like compatibility layer to maintain the llvm9
     support

✤ Work on the Partial Translation Unit design for clang-repl

✤ Accelerate upstreaming clang patches

✤ Automatically differentiate the CUDA kernels (including computation
   scheduler)

✤ Enable Clad in xeus-cling

CaaS Open Projects

✤ <u>Patches against clang.git</u>

    ✤ [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 out <u>open projects page</u>.

Next Meetings

✤ Monthly Meeting — 1st July, 1700 CET/0800 PDT

✤ Ioana and Garima will talk about their projects in an IRIS-HEP topical meeting on 21st of June. Details <u>here</u>.

✤ Tentative talk schedule:

  ✤ OrcV2, Lang Hames, Apple, July

  ✤ Language Interop Progress, Vassil, Princeton, Aug

  ✤ Cppyy — how to bridge dynamically python and C++, Wim Lavrijsen, LBL, Sep

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

Thank you!