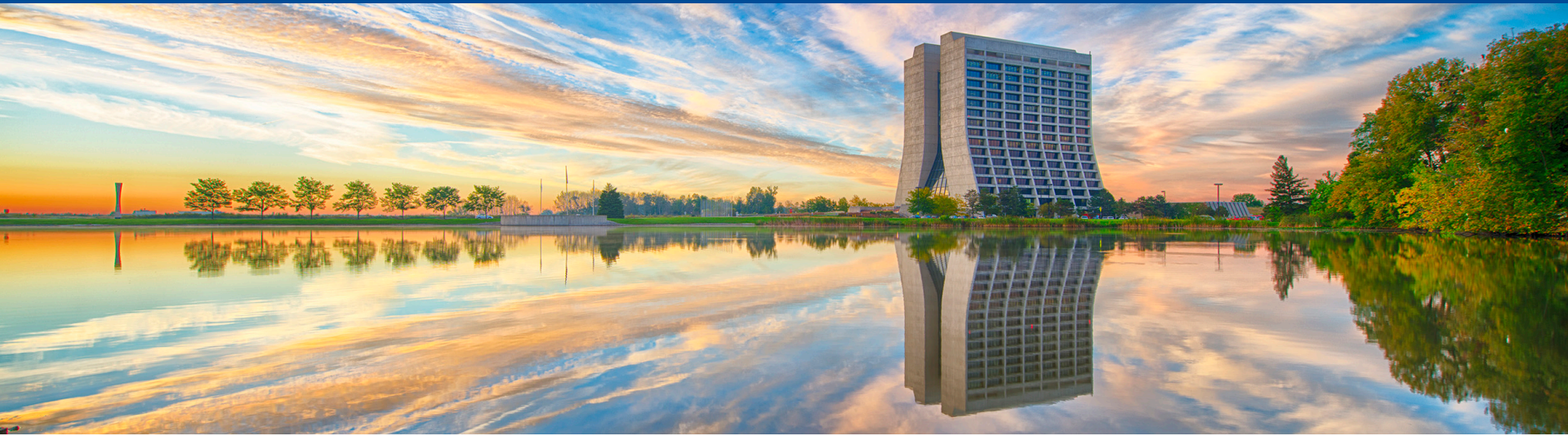
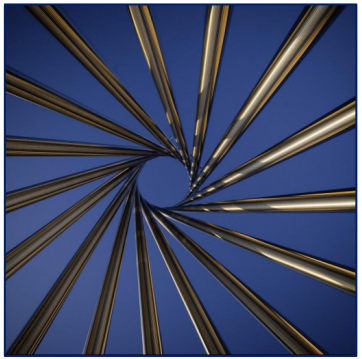


Status of Spack Development / Migration

LArSoft Coordination Meeting 2018-05-22

Chris Green, FNAL.



Goals

- Replace UPS with an off-the-shelf build / packaging / deployment system based on Spack.
- Support SIP-enabled MacOS systems.
- Provide tools for developers of experimental software packages (*cf* **cetbuildtools**, **mrb**).
- Provide facilities for release preparation, management and deployment (*cf* `buildFW`, `pullProducts`, `copyToSciSoft`, Jenkins scripts).
- Continue to provide relocatable binary distributions and satisfy other requirements that people have relied on with the current suite of tools.

Spack overview

- *De facto* standard tool for HPC.
- Python-based (2 or 3); “specs” -> Python classes.
- Spack “installation”: Spack code + specs from one (“`builtin`”) or more “Spack repos” + installed packages based on those specs.
- Specs do not generally specify exact versions (although they can). A particular build of a dependency tree can specify versions.
- “Variants” control configurable aspects of a spec such as language standard, optional features.
- Can satisfy dependencies from the system rather than building the world.
- All interoperating packages are tied to a compiler (e.g. Clang 5.0.1, GCC 7.3.0).
- Specs control build instructions, setup behavior, dependencies – essentially part of the installed system as well as describing the build environment.
- A package built in a particular way has an unique hash.

Achievements so far

- Requirements, plans.
- “Buildcache” (Patrick G.): binary packages suitable for relocation / deployment.
- ”Spackdev” (Jim A.): Spack-based multi-package development / test environment.
- “Spack chains” (Jim A.): manage a hierarchy of Spack installations.
- “Cetmodules” (Lynn, Chris): UPS-less cetbuildtools.
- New / improved specs for external packages, other contributions to Spack proper in various stages of discussion / approval (Chris, Lynn, Patrick).

Current efforts

- Produce an “MVP” – Minimum Viable Product:
  - Software stack with one OS / compiler / C++ standard / optimization level to allow experiments to, well, experiment (SLF7 / GCC 7.3 / C++17 / prof).
  - Keep track of issues along the way but achieve the narrow goal first and go back for the others later.
  - Everything built “our way” to maximize realism & compatibility for experiments.
  - Use system-available packages via `packages.yaml` where possible.
  - First demonstration of Cetmodules.
  - Provide art, gallery and dependencies thereof.
  - NOT “release”-oriented.
  - NOT a collection of every piece of software every experiment is likely to need.
  - NOT a solution to every problem.
  - NOT a guarantee that every remaining problem *can* be solved.

MVP: status

- **Done** (external packages): Boost, and everything up through Root (except Pythia6, for now), as currently built (as far as possible).
- **Done** (art suite): cetlib_except, cetlib building based on art-v2-develop branches, with all tests passing.
- **Upcoming**: fhicl-cpp, messagefacility should be straightforward; canvas may require work on dictionary building / finding facilities.
- **Upcoming**: shakedown of Spackdev with art suite.

Post-MVP

- Everything is currently tied to the compiler, including things that don't need to be (*e.g.* C and Python packages, data-only packages, *etc.*).
- Unclear how to manage multiple concurrent releases with suitable package reuse.
- Lots of glue to keep things consistent, easy to organize and manage everything from development through release preparation through distribution / deployment.
- More package specs (Geant4, *etc.*, *etc.*).
- Experiment / Collaboration signoff, migration plan.