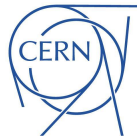


Operating System Changes

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U.S. DEPARTMENT OF
ENERGY

Office of
Science

Big operating system change!

- SL7 is end of life June 2024. Successor is Alma Linux 9
- UPS is historical Fermilab Unix product distribution, 30 years of life. But not supported on Alma 9.
- **This means we need to change the way we build code**
- **Problems:**

We need to use a new system “Spack” to build code

We have > 1 M lines of code

We need to validate our algorithms from SL7 vs Alma 9

We start commissioning ProtoDUNE-HD data taking in May

We have a collaboration meeting in May

Schedule for changes

GPVMS will be moving to Alma 9 in batches

- dunebuild03 and dunegpvm16 are already there (so is lxplus)
- dunebuild02 and dunegpvm10-15 moved on April 9, 2024
- **Rest will move on April 30** so we can resolve any remaining issues before the collaboration meeting

In parallel, we need help from physics groups/algorithms experts in building and testing our code using the new Spack build system.

But while construction occurs, you can still do interactive work and run jobs in SL7 containers, with some “features”.

Short term solution - containers

- Can run batch jobs in containers – already working but you must specify

```
--singularity-image /cvmfs/singularity.opensciencegrid.org/fermilab/fnal-wn-sl7:latest
```

In your jobsub_submit commands.

Note: **do NOT use the `-OS=SL7` flag** to get the desired behavior; that does not control what container is used in the job. All jobs automatically run in containers and have for several years.

- Can also set up an interactive container.
 - To do that, see the instructions on the next slide
- https://wiki.dunescience.org/wiki/SL7_to_Alma9_conversion is a start on documentation.

How to run interactively in an SL7 container

- log in to an Alma 9 gpvm
- then type:

```
/cvmfs/oasis.opensciencegrid.org/mis/apptainer/current/bin/apptainer shell --shell=/bin/bash \  
-B /cvmfs,/exp,/nashome,/pnfs/dune,/opt,/run/user,/etc/hostname,/etc/hosts,/etc/krb5.conf \  
--ipc --pid /cvmfs/singularity.opensciencegrid.org/fermilab/fnal-dev-sl7:latest
```

you will get a session that looks like

Apptainer>

- And you can then do your normal interactive stuff, with one exception – you can't submit jobs directly
- You can check your OS type with the command
`cat /etc/os-release`

One issue with the SL7 container

- The **SL7 container cannot submit batch jobs** for security reasons.
- Which can be an issue if you have a script that creates your submissions and that script depends on SL7 things like ups/upd
- My solution is to write the jobsub command from the script into a file `X.jobcmd`
- And then have a separate minimalist Alma9 terminal session where I can do
 - `source X.jobcmd`
- and run and monitor the job

While we get all of dune_sw set up in Alma9

- The LARSOFT and FNAL computing teams have set up a basic larsoft-based environment that you can use for simple activities like running root and submitting jobs.
- https://wiki.dunescience.org/wiki/SL7_to_Alma9_conversion explains how to set up a minimal spack environment on Alma9.
- Or see the next page...

Minimal Alma9 session with useful stuff

- You can execute the `submit` command with no setup but perhaps you want to do something in your alma9 session?
- You can get a minimal setup via:

```
# get the larsoft version of the env
```

```
source /cvmfs/larsoft.opensciencegrid.org/spack-packages/setup-env.sh
```

```
# get some basic things -
```

```
# use the command spack find to find packages you might want
```

```
# If you just type spack load ... you may be presented with a choice and will need to choose.
```

```
spack load root@6.28.12
```

```
spack load cmake@3.27.7
```

```
spack load gcc@12.2.0
```

```
spack load fife-utils@3.7.0
```

```
spack load metacat@4.0.0
```

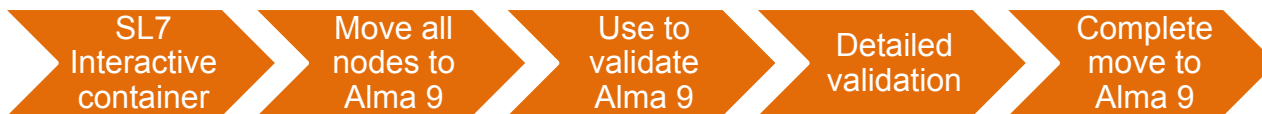
```
spack load sam-web-client@3.4%gcc@12.2.0
```


What is this spack thing?

- Spack (Supercomputer Package) is a packaging tool used by various supercomputing centers.
- A Spack build and installation of LArSoft and dependent products is now available and it works on Alma9. Many thanks to Stephen White, Patrick Gartung, Marc Mengel, Chris Green.
- <https://fifewiki.fnal.gov/wiki/Spack> has a nice general tutorial
- Example Spack recipes for LArSoft packages and dependencies now available in https://github.com/FNALssi/fnal_art
 - A lot of work has gone into supporting external packages.
- dunesw is now being distributed with the e26 (gcc v12.1.0) and c14 (clang 14.0.6) since v09_78_06d00. Thanks to Lynn Garren for all her help!
- dunesw has been migrated to use CetModules
- Still some work to be done on makefiles and making Spack recipes though. **Helpers needed!**
- UPS workflows will require updating to Spack equivalents

Draft timeline

- 2 paths
 - Short term, most people use containers
 - Long term full validated port to Alma 9



April 30, 2024



Late 2024

Review of where we are on Alma9

- Tom Junk has been heroically working on porting our environment to Spack but he needs help (see next page).
 - Patrick Gartung has patched dune_sw makefiles, Gavin Davies is checking the pull requests
 - Liam O'Sullivan has been porting edep-sim and TMS
 - Others I probably don't know about
 - Volunteers and helpers needed – contact trj@fnal.gov
- Dave Demuth is working on a dune specific tutorial

HELP WANTED – Release managers

- **DUNE Release Manager, LArSoft experience**
- The release manager **produces the weekly releases** of LArSoft-based DUNE software, which is used for far detector simulation and reconstruction, as well as the ProtoDUNEs, coldboxes, ICEBERG and Nd-Gar. The release manager tests **approves pull requests** using the CI system and interactively builds and tests before merging them into the main develop branches of the repositories. The release manager **runs builds for all supported platforms** and **deploys the built software** for collaboration use on distributed filesystems and web servers. The release manager **writes release notes** for the DUNE wiki.
- **Estimated FTE: 0.2**, though non-recurring work involving refactoring software and upgrading build systems may create large temporary needs for effort

HELP WANTED – Release managers

- **DUNE Release Manager, edep-sim experience**
- The release manager **produces software releases** used for ND-LAr, TMS and SAND. The release manager tests approved pull requests using the CI system and interactively builds and tests before merging them into the main develop branches of the repositories. The release manager **runs builds for all supported platforms** and **deploys the built software** for collaboration use on distributed filesystems and web servers. The release manager **writes release notes** for the DUNE wiki.
- **Estimated FTE: 0.2**, though non-recurring work involving refactoring software and upgrading build systems may create large temporary needs for effort

Help wanted - DUNE Software Integration Coordinator

- The DUNE Software Integration Coordinator leads a team of software managers, developers and stakeholders.
- Holds regular meetings to discuss software architecture, algorithm integration, status of the DUNE software stacks, open pull requests, testing and documentation.
- Attends LArSoft coordination meetings, offline leads meetings, and steering group meetings, and meetings organized by Fermilab relevant to software development, maintenance, and deployment.
- Sets project deliverables, schedules, and deadlines.
- The software manager works with developers and physics experts to identify reviewers for pull requests and ensures timely review, decisions and integration.
- Coordinates the production of coding guidelines.
- The software integration manager follows the main progress in the physics working groups in order to ensure that software solutions are targeted at physics deliverables.
- Presents status at DUNE Software and Computing meetings and at DUNE Collaboration meetings.
- Estimated FTE: 0.5