



Gentoo Prefix on CVMFS to Manage HEP Software Stacks

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Agenda

- ▶ Short review
 - Gentoo Linux — <https://www.gentoo.org>
- ▶ Portage package manager
 - Advantages to use it to manage HEP software stacks
 - Live demo of how to start the test stacks
 - Docker container
 - Gentoo Prefix environment on CVMFS

Gentoo's Portage Package Manager

- ▶ Written in Python, based on FreeBSD's ports system
- ▶ Packages are special shell scripts called ebuilds
- ▶ Extensive options for dependency management
- ▶ Highly flexible configuration/customization
- ▶ Parallel and distributed builds (with distcc)
- ▶ Supports installing many versions of the same package
- ▶ Easy to support live packaging from git/svn/hg repos
- ▶ Use case in HEP: managing LCG releases in CVMFS

Why Use Portage?

- ▶ Portage is a mature solution (15+ years development)
 - Formal, versioned Package Manager Specification (PMS)
 - Used by Google's Chrome OS and CoreOS
- ▶ More than 19,000 currently available packages,
including many HEP packages (Geant4, ROOT, etc)
- ▶ Leverage work done by other volunteer developers
- ▶ Extensive documentation at devmanual.gentoo.org
- ▶ Support for multiple OS's and hardware architectures

Distribution Models for HEP

- ▶ Full OS, Virtual Machines, Containers
 - Base images with common HEP packages
 - Binary package servers with pre-compiled add-ons
 - Automated image build process with Catalyst
- ▶ Gentoo Prefix Environments
 - Packages installed within a prefix by non-root users
 - Good solution for distributing via CVMFS
 - Support for Mac OS X and other systems (users' laptops)
 - Experimental installations now available!

Why Use Portage for LCG releases?

- ▶ No setup! Optionally start a new shell to get things working automatically
- ▶ Consistent libraries, no need for `LD_LIBRARY_PATH`
- ▶ Self-contained, depends only on the kernel
 - Single installation works for all Linux distributions
 - Same installation can also work for multiple compilers
- ▶ Possibility of supporting macOS
- ▶ Possibility to have everything in CVMFS and use docker with only a 1MB busybox image!
- ▶ Same system can be used for LCG and docker images
- ▶ Can be used to manage common “base system” and add spack on top

How do I use Gentoo Prefix from CVMFS?

Gentoo prefix on Linux via CVMFS

```
$ /cvmfs/sft.cern.ch/lcg/contrib/gentoo/linux/startprefix
```

Gentoo prefix on MacOS via CVMFS

```
$ /cvmfs/sft.cern.ch/lcg/contrib/gentoo/macos/startprefix
```

Starting a busybox Docker container (on a machine with CVMFS installed)

```
$ docker run -it -v /cvmfs:/cvmfs busybox \  
  /cvmfs/sft.cern.ch/lcg/contrib/gentoo/linux/bin/bash -l
```

Starting the Gentoo HSF test stack container

```
# docker run -it -e DISPLAY=$DISPLAY -v /tmp/.X11-unix:/tmp/.X11-unix \  
  rootproject/root-gentoo bash -l
```