

Gentoo Linux for Neuroscience

Horea Christian

Institute for Biomedical Engineering, ETH Zurich

October 8, 2016

Bad

- ▶ Manual Software Management ⇒ *unreproducible*
- ▶ Bundled Software Packages ⇒ *intransparent*
- ▶ Legacy “stable” systems ⇒ *antiquated*

Not Bad

- ▶ NeuroDebian; Containers
- ▶ The Canadian Brain Imaging Research Platform (CBRAIN)

Many Excellent Features



Source: Duisburg-Essen University Website

- ▶ Data Analysis Reproducibility (\sim Software Environment Reproducibility)
- ▶ Researcher Autonomy
- ▶ Development Software Access

Implementations

Reproduce and/or develop data analysis routines on:

- ▶ Physical Machines
- ▶ Virtual Machines (OpenStack, Amazon EC2, etc.)
- ▶ Shared Clusters

Summary

Three Simple Words:

- ▶ Gentoo
- ▶ Gentoo
- ▶ Gentoo (Prefix)

Software Environment Replicability

Copy/merge and run `emerge -vaDnu world`:

- ▶ `/etc/portage/package.accept_keywords`
- ▶ `/etc/portage/package.mask`
- ▶ `/etc/portage/package.use`
- ▶ `/var/lib/portage/world`
- ▶ parts of `/etc/portage/make.conf`

VERSIONED Software Environment Replicability

Also copy/merge:

- ▶ `/usr/local/portage/` excluding distfiles

OR

- ▶ a more detailed `/etc/portage/package.mask`

Software Availability

- ▶ Over 30 packages for neuroscience are available in Gentoo Science.
- ▶ Many neuroscience packages include live ebuilds.

NeuroGentoo

- ▶ Is not a separate distribution
- ▶ Is not a separate repository
- ▶ Is an initiative to make Gentoo/Science a better alternative to NeuroDebian



"NeuroGentoo Logo" by Horea Christian - CC-BY-SA/3.0



Source: NeuroDebian Twitter Page

Improve System Replication Workflow

- ▶ Does copying Portage files satisfy reasonable system replication needs?
- ▶ When is it no longer feasible to turn a replication box into a development box?

Test System Replication Ease

Is the workflow *really* accessible on common research platforms:

- ▶ OpenStack images?
- ▶ Amazon EC2 images?
- ▶ Gentoo Prefix Bootstrapping?
- ▶ Docker??

Increase Visibility/Accessibility

- ▶ Help compose documentation and tutorials
- ▶ Get the initiative represented in the Gentoo Webspaces:
 - ▶ Separate Project?
 - ▶ Subproject of Gentoo Science?

Help Package More Software

- ▶ Add more neuroscience packages (e.g. BROCCOLI)
- ▶ Help with outstanding package issues:
 - ▶ ANTs (unbundling)
 - ▶ FSL (GUI components)
 - ▶ AFNI (CMake - upstream and NeuroDebian are happy to help)