Gentoo Linux for Neuroscience

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The Current State of Scientific Software Management

Bad

- Manual Software Management ⇒ **unreproducible**
- Bundled Software Packages ⇒ **intransparent**
- Legacy “stable” systems ⇒ **antiquated**
The Current State of Scientific Software Management

Not Bad

- NeuroDebian; Containers
- The Canadian Brain Imaging Research Platform (CBRAIN)
Many Excellent Features

- Data Analysis Reproducibility (≈Software Environment Reproducibility)
- Researcher Autonomy
- Development Software Access

Source: Duisburg-Essen University Website
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)
How We Can Make Science Better

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
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??
How YOU Can Make a Difference

Increase Visibility/Accessibility

- Help compose documentation and tutorials
- Get the initiative represented in the Gentoo Webspace:
  - 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)