

The Emacs of Distros

How GNU Guix Seeks to Empower Users

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FOSDEM

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**Emacs Makes
All Computing Simple!**

Emacs Makes All Computing Simple!

or Emacs Makes A Computer Slow?

0. run

1. study & modify

2. redistribute

3. redistribute modified versions

freedom #1 → system design

0. run

1. **study & modify**

2. redistribute

3. redistribute modified versions

When large numbers of nontechnical workers are using a programmable editor, they will be tempted constantly to begin programming in the course of their day-to-day lives. This should contribute greatly to computer literacy [...]

– Stallman, 1981



the barriers to distro hacking

- ▶ **packaging**, ability to **extend**
- ▶ **package management tools**
- ▶ **esoteric configuration**
- ▶ **implementation language barriers**



Guix

M-x guix-demo

workflow

```
(define foo (package ...))
```



user

workflow

```
(define foo (package ...))
```

test



```
guix build foo
```

```
/gnu/store/...-foo-1.0
```

user

workflow

```
(define foo (package ...))
```

test

```
guix build foo  
/gnu/store/...-foo-1.0
```

git push

user

git.sv.gnu.org

```
graph TD; A["(define foo (package ...))"] -- test --> B["guix build foo /gnu/store/...-foo-1.0"]; B -- "git push" --> C["git.sv.gnu.org"]; C --> A;
```

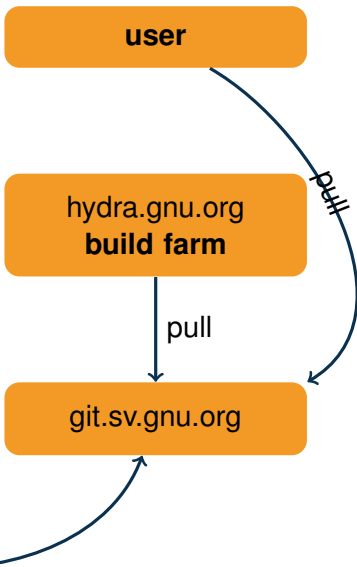
workflow

`(define foo (package ...))`

test

`guix build foo`
`/gnu/store/...-foo-1.0`

`git push`



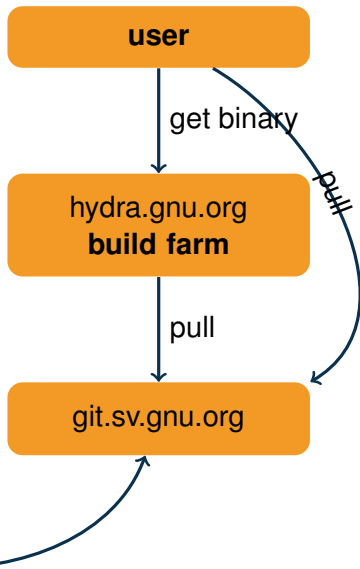
workflow

(define foo (package ...))

test

guix build foo
/gnu/store/...-foo-1.0

git push



workflow

```
(define foo (package ...))
```

test

```
guix build foo  
/gnu/store/...-foo-1.0
```

git push

user

git.sv.gnu.org

pull

workflow

```
(define foo (package ...))
```

test

```
guix build foo  
/gnu/store/...-foo-1.0
```

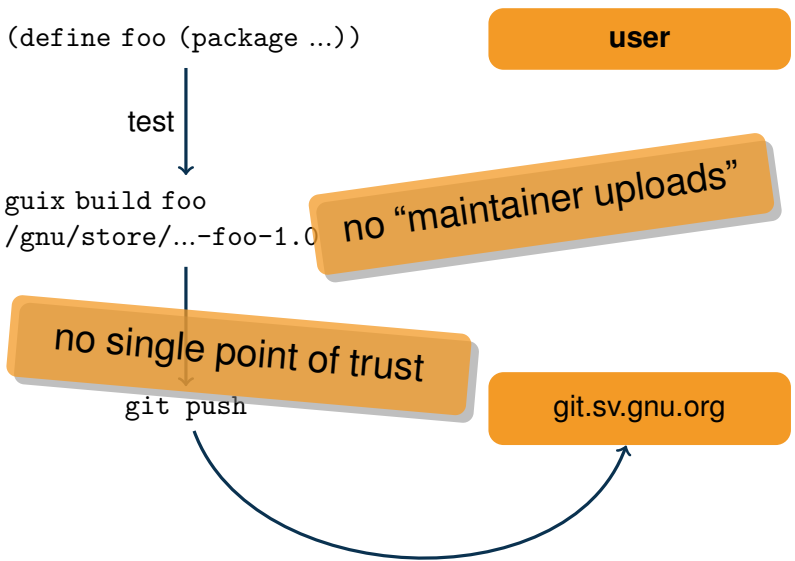
git push

user

no “maintainer uploads”

no single point of trust

git.sv.gnu.org



reproducible builds*

* almost!

```
$ guix build guile
```


isolated build: chroot, separate name spaces, etc.

reproducible builds*

* almost!

```
$ guix build guile  
/gnu/store/h2g4sc09h4... -guile-2.0.11
```

hash of **all** the dependencies



reproducible builds*

* almost!

```
$ guix build guile
/gnu/store/h2g4sc09h4...-guile-2.0.11

$ guix gc --references /gnu/store/...-guile-2.0.11
/gnu/store/4jl83jgzaac...-glibc-2.20
/gnu/store/iplay43cg58...-libunistring-0.9.3
/gnu/store/47p47v92cj9...-libffi-3.0.9
/gnu/store/drkwck2j965...-gmp-5.0.5
...
```

reproducible builds*

* almost!

```
$ guix build guile  
/gnu/store/h2g4sc09h4...-guile-2.0.11
```

```
$ guix gc --references /gnu/store/...-guile-2.0.11  
/gnu/store/4jl83jgzaac...-glibc-2.20  
/gnu/store/iplay43cg58...-libunistring-0.9.3  
/gnu/store/47p47v92cj9...-libffi-3.0.9  
/gnu/store/drkw...  
...
```

(nearly) bit-identical for everyone



The Hacking Process

1. (R)econnaissance
2. (I)nfection
3. (C)ommand And Control
4. (E)xfiltration

M-x hack-the-distro

build processes
chroot, separate UIDs

build daemon

Guile

(guix packages)

(guix store)

build processes
chroot, separate UIDs

Guile

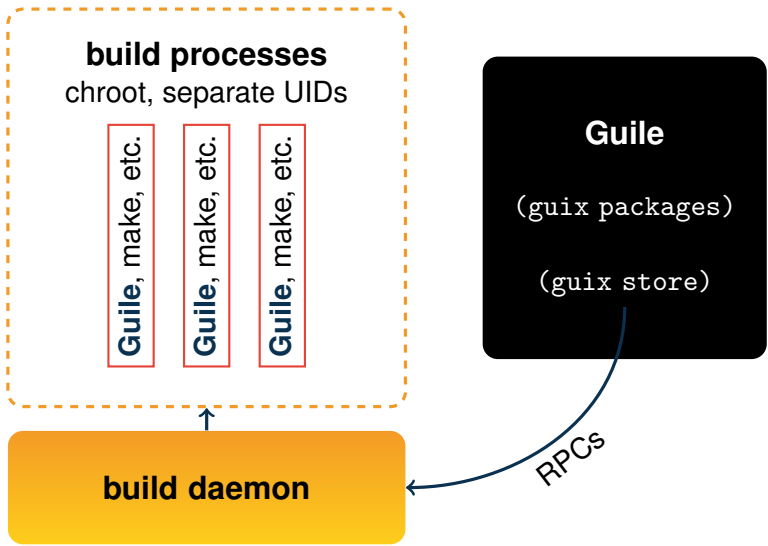
(guix packages)

(guix store)

build daemon

RPCs

```
graph TD; Guile[Guile  
(guix packages)  
(guix store)] -- RPCs --> BuildDaemon[build daemon]; subgraph BuildProcesses [build processes  
chroot, separate UIDs]; end;
```



build processes
chroot, separate UIDs

- Guile, make, etc.
- Guile, make, etc.
- Guile, make, etc.

Guile
(guix packages)
(guix store)

build daemon

RPCs

M-x

customize-operating-system

Linux-libre

Linux-libre



```
graph TD; A[Linux-libre] --> B[initial RAM disk]
```

initial RAM disk

Linux-libre



initial RAM disk

Guile!

Linux-libre



initial RAM disk

Guile!



PID 1: GNU dmd
services...

Linux-libre



initial RAM disk

Guile!



PID 1: GNU dmd
services...

Guile!

Linux-libre

initial RAM disk

Guile!

PID 1: GNU dmd
services...

Guile!

?

M-x guix-status

timeline

- ▶ Nov. 2012 — dubbed GNU
- ▶ Jan. 2013 — **0.1**
- ▶ ...
- ▶ Apr. 2014 — **0.6**, signed binaries, `guix system`
- ▶ July 2014 — **0.7, installable operating system!**
- ▶ Nov. 2014 — **0.8**, device mapping, more services, etc.

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- ▶ 29 Jan. 2015 — **0.8.1**, **ARMv7 port**, **bug fixes**
- ▶ 30 Jan. 2015 — officially **FSDG-compliant!**

A white ceramic mug is filled to the brim with numerous small, round, brown pellets. The pellets have a slightly rough, textured surface. The word "status" is printed in a clean, white, sans-serif font across the center of the mug, partially overlapping the pellets. The background is a soft, out-of-focus green, suggesting an outdoor setting. The lighting is bright and even, highlighting the texture of the pellets and the smooth surface of the mug.

status

status

- ▶ full-featured package manager
- ▶ 1,200 packages, 4 platforms
- ▶ **Guix System Distribution**^β
- ▶ binaries at <http://hydra.gnu.org>
- ▶ tooling: auto-update, “linting”, etc.
- ▶ I10n: 8 languages!

Commits per Month



Activity

30 Day Summary

Dec 6 2014 — Jan 5 2015

272 **Commits**

11 **Contributors**

including 2 new contributors

1 **New Language :**

SQL added Dec 17

12 Month Summary

Jan 5 2014 — Jan 5 2015

2448 **Commits**

Up +721 (41%) from previous 12 months

36 **Contributors**

Up +22 (157%) from previous 12 months

thanks for the code, reports, ideas, build machines...

- ▶ Eric Bavier, Taylan Ulrich Bayirli/Kammer, Federico Beffa, Marek Benc, Sou Bunnbu, Tomáš Čech, John Darrington, Eelco Dolstra & the Nix crew, Andreas Enge, Alírio Eyng, Joshua Grant, Raimon Grau, Nikita Karetnikov, Alex Kost, Julien Lepiller, Aljoshia Papsch, Deck Pickard, Manolis Ragkousis, Cyril Roelandt, Alex Sassmannshausen, Cyril Schenkel, Jason Self, Sree Harsha Totakura, David Thompson, Mark H. Weaver, Ricardo Wurmus
- ▶ Lluís Batlle i Rossell, Daniel Clark, Alexandru Cojocaru, Aleix Conchillo Flaqué, Rafael Ferreira, Christian Grothoff, Jeffrin Jose, Kete, Matthew Lien, Niels Möller, Yutaka Niibe, Adam Pribyl, Benno Schulenberg, Alen Skondro, Matthias Wachs, Zerwas
- ▶ Inria for allowing me to travel to Brussels

work in progress

- ▶ **big packages:** IcedTea, LibreOffice, KDE, etc.
- ▶ **GNU/Hurd port** (Manolis Ragkousis)
- ▶ guix web: **Web UI** (David Thompson)
- ▶ guix publish: **publish substitutes** (David Thompson)
- ▶ ...

the road to 1.0

0. OS features: LVM, wicd(?), etc.
1. more service definitions

the road to 1.0

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5. larger, more robust **build farm**...
6. less dog food...
7. more packages...

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7. more packages...
8. *your idea here*

your help needed!

- ▶ **install the distribution**
- ▶ **use it**, report bugs, add packages
- ▶ help with the **infrastructure** + admin
- ▶ share your **ideas!**



`ludo@gnu.org`

`http://gnu.org/software/guix/`

credits

- ▶ GNU Guix logo, GFDL, <http://gnu.org/s/guix/graphics>
- ▶ NSA SIGDEV slide, <http://www.heise.de/ct/artikel/NSA-GCHQ-The-HACIENDA-Program-for-Internet-Colonization-229.html>
- ▶ dog food, http://en.wikipedia.org/wiki/File:Kibbles_How_Others_See_Me.jpg
- ▶ commit stats & project summary, <https://www.openhub.net/p/gnuguix>

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