GNU Mes – Bootstrapping GNU

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Libre Planet '20

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GNU Mes: Bootstrapping GNU

GNU Mes

- A Scheme interpreter written in ~5,000LOC of simple C.
- A C compiler written in Scheme.
- Built on LISP: eval/apply, the Maxwell Equations of Software.

Ken Thompson

TURING AWARD LECTURE

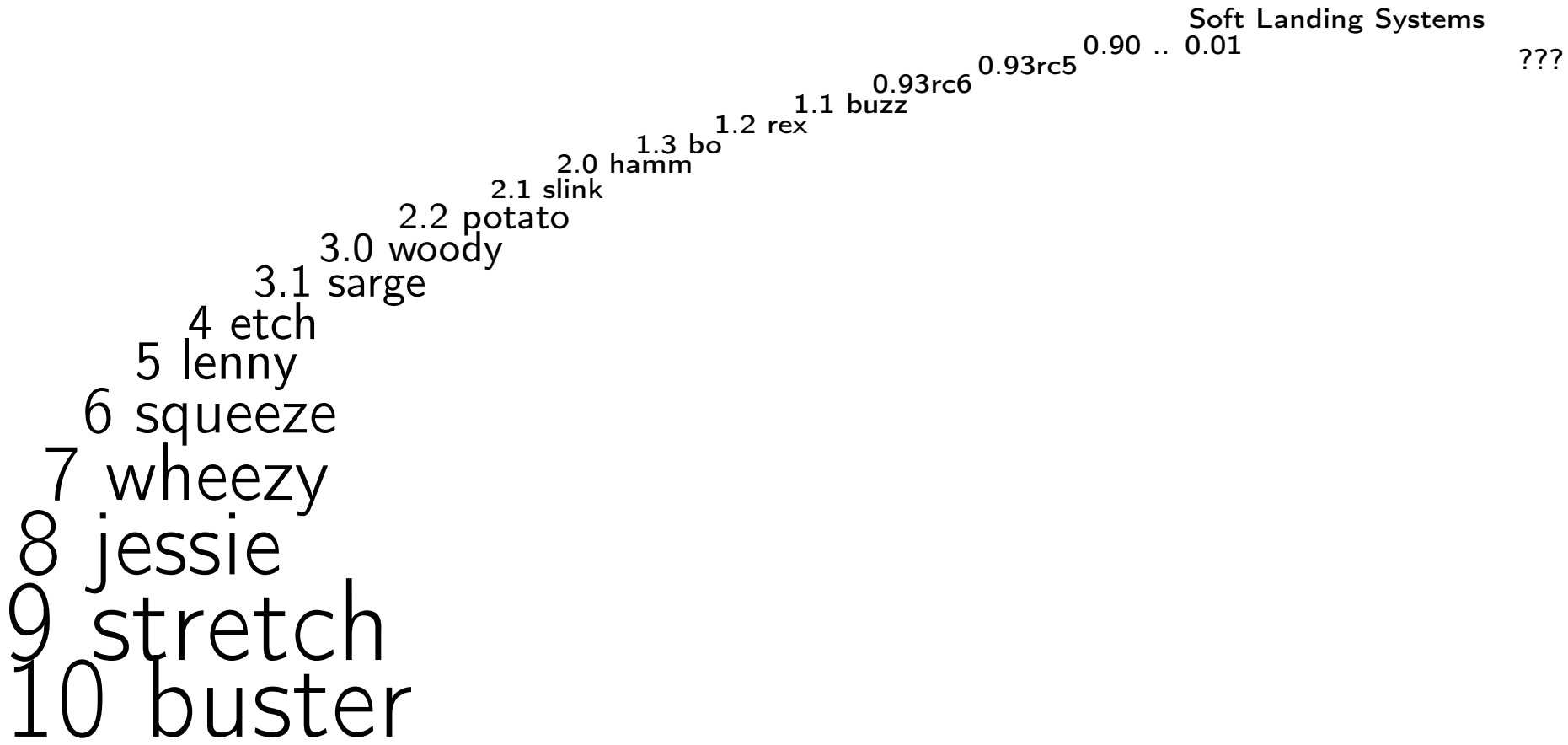
Reflections on Trusting Trust

To what extent should one trust a statement that a program is free of Trojan horses? Perhaps it is more important to trust the people who wrote the software.

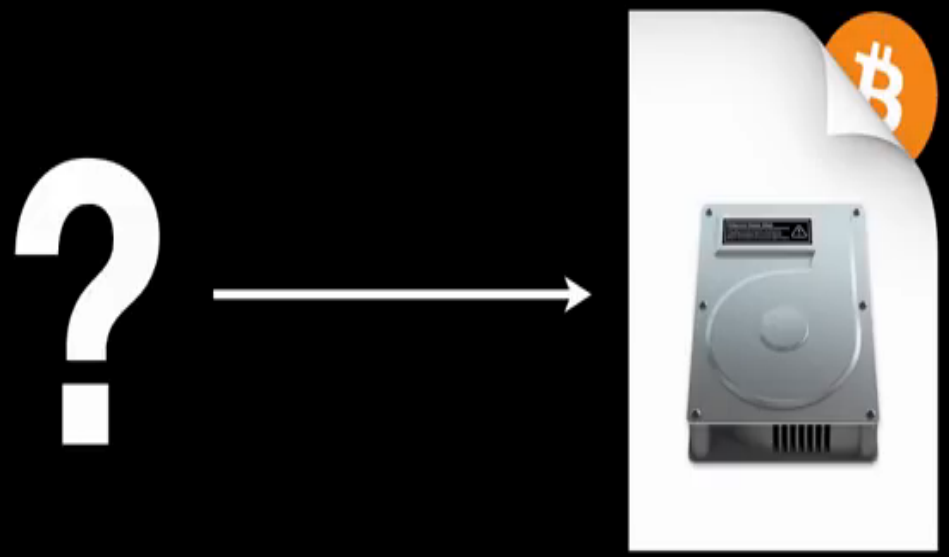
Long path: Ignoring the Problem

- 500+ MB: no bootstrap

Journey to the Source?

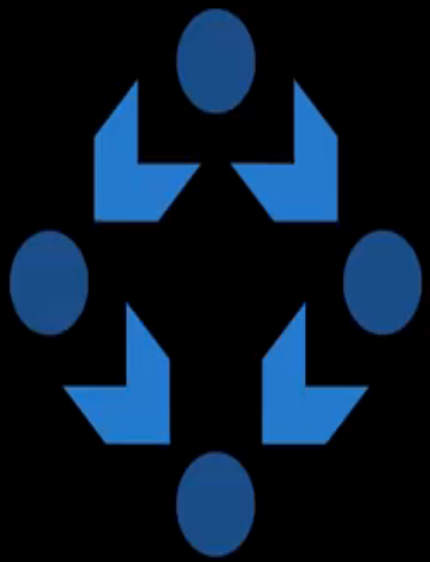


As time goes on we will expire the binary packages for old releases. Currently we have binaries for squeeze, lenny, etch, sarge, woody, potato, slink, hamm and bo available, and only source code for the other releases. – www.debian.org/distrib/archive



Bitcoin Build System Security

Carl Dong, Chaincode Labs



Reproducible Builds

What is a Bootstrap?

Impossible task: pull yourself up on your boot straps

Software: to create your first: kernel, shell, C compiler, ...

source + ?? =

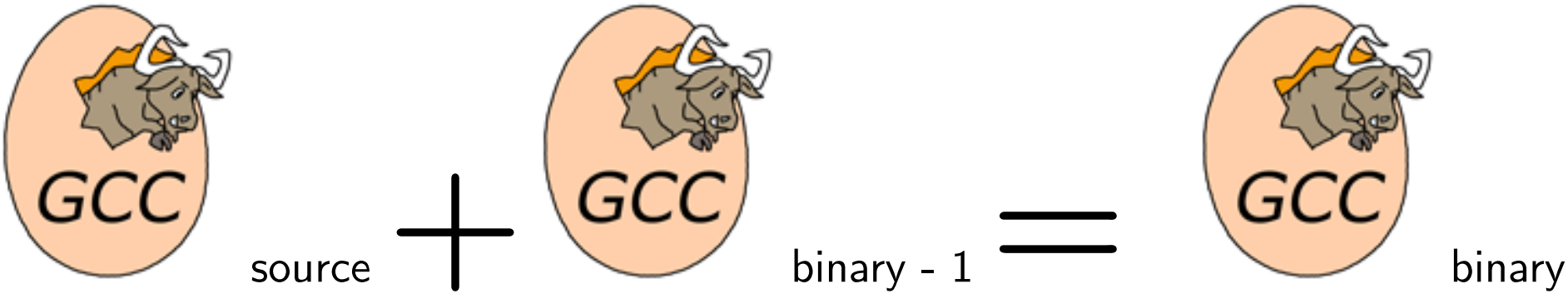
binary

How to Bootstrap: An Old Recipe...

Recipe for yoghurt: Add yoghurt to milk – Anonymous

How to Bootstrap: Create your second GCC

Traditional recipe: like yoghurt



. . . and done!

We're Reproducible!

We're Reproducible!

We're Reproducibly Malicious

Reproducibility **is not enough**

Reproducibility
Clean source code

is not enough

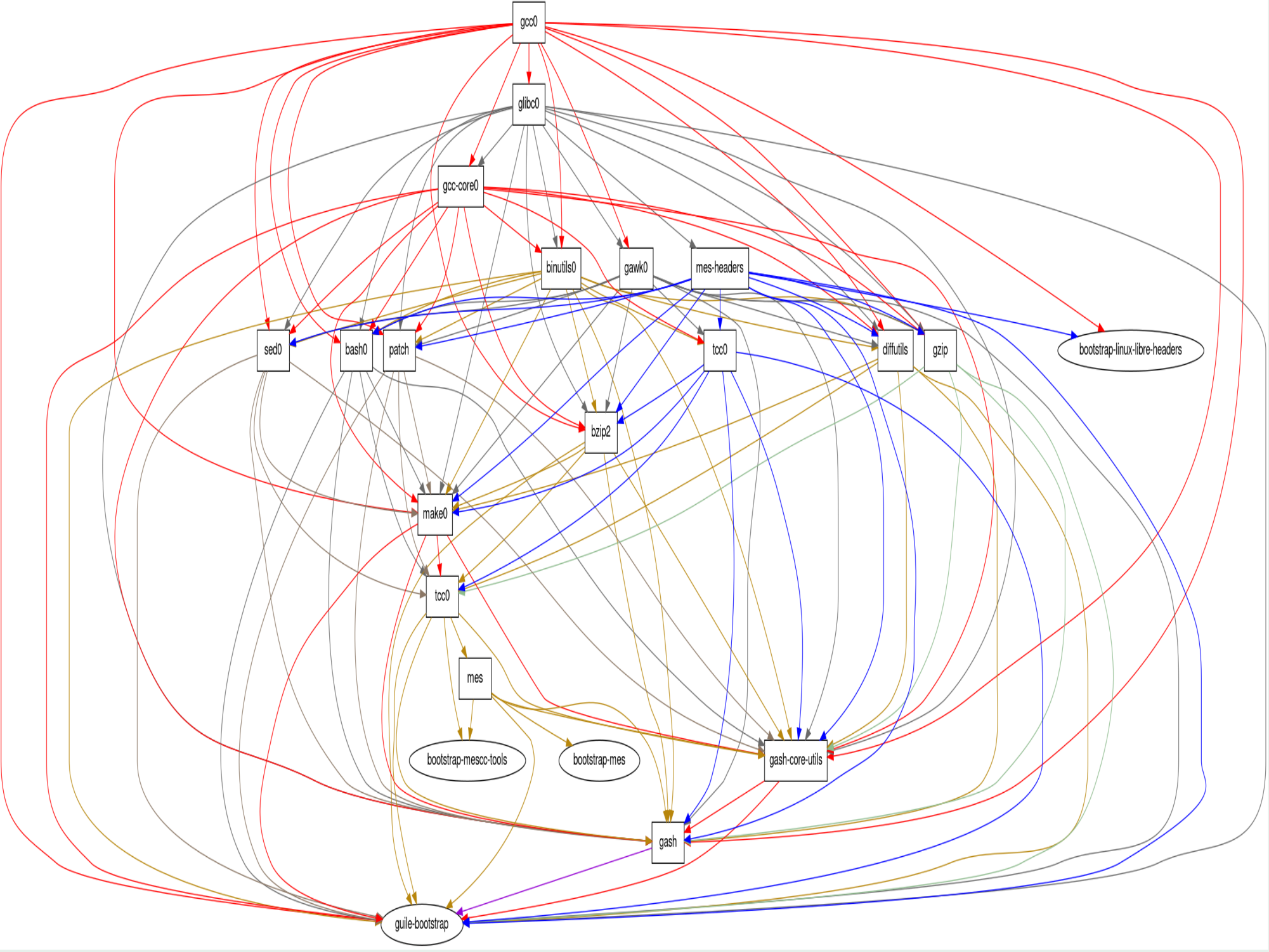
Guix

Pronounced *Geeks*

Long path: Scheme-only bootstrap

- 500+ MB: no bootstrap
- 252 MB: GNU Guix System v1.0
- 145 MB: Reduced Binary Seed
  - master branch
  - ~~GCC~~, ~~GLIBC~~, ~~Binutils~~
  - + MesCC-Tools, + Mes
- 57 MB: Scheme-only
  - wip-bootstrap branch
  - ~~Awk~~, ~~Bash~~, ~~Bzip2~~, ~~GNU Core Utilities~~, ~~Grep~~, ~~Gzip~~, ~~Make~~, ~~Patch~~, ~~Sed~~, ~~Tar~~, and ~~XZ~~.
  - + Gash (source only!)

NLnet Foundation


gcc0
glibc0
gcc-core0
binutils0
gawk0
mes-headers
sed0
bash0
patch
tcc0
diffutils
gzip
bootstrap-linux-libre-headers
bzip2
make0
tcc0
mes
bootstrap-mescc-tools
bootstrap-mes
gash-core-utils
gash
guile-bootstrap

Full Source Bootstrap

Long path: Full Source Bootstrap

- 500+ MB: no bootstrap

- 252 MB: GNU Guix System v1.0

- 145 MB: Reduced Binary Seed
  - master branch
  - ~~GCC~~, ~~GLIBC~~, ~~Binutils~~
  - + MesCC-Tools, + Mes

- 57 MB: Scheme-only
  - wip-bootstrap branch
  - ~~Awk~~, ~~Bash~~, ~~Bzip2~~, ~~GNU Core Utilities~~, ~~Grep~~, ~~Gzip~~, ~~Make~~, ~~Patch~~, ~~Sed~~, ~~Tar~~, and ~~XZ~~.
  - + Gash (source only!)

- 357 bytes: Full Source
  - ~~MesCC-Tools~~, ~~Mes~~
  - + Stage0: 357 bytes (x86)

Joy of Source

Vulnerability to a trusting trust attack is a symptom of an unauditable or missing bootstrap story. – janneke

Thanks

- Carl Dong
- Danny Milosavljevic
- David Terry
- Jeremiah Orians
- Ludovic Courtès
- Matt Wette
- Pjotr Prins
- Rutger van Beusekom
- Timothy Sample
- Vagrant Cascadian

Want to join?

You can help

- raise awareness
- make core GNU packages bootstrappable again
  - ~~XZ-only~~ => .GZ tarballs (thank you: sed, coreutils!)
  - GCC (c++!), GNU Libc (python?!)
- reduced bootstrap NixOS, Debian
- port MesCC to the Hurd, FreeBSD
- retweet/toot `@janneke_gnu janneke@octodon.social`

Connect

- irc freenode.net #bootstrappable #guix
- mail bug-mes@gnu.org guix-devel@gnu.org
- git https://git.savannah.gnu.org/git/mes.git
- web bootstrappable.org