

## Bootstrapping Intro – Current status

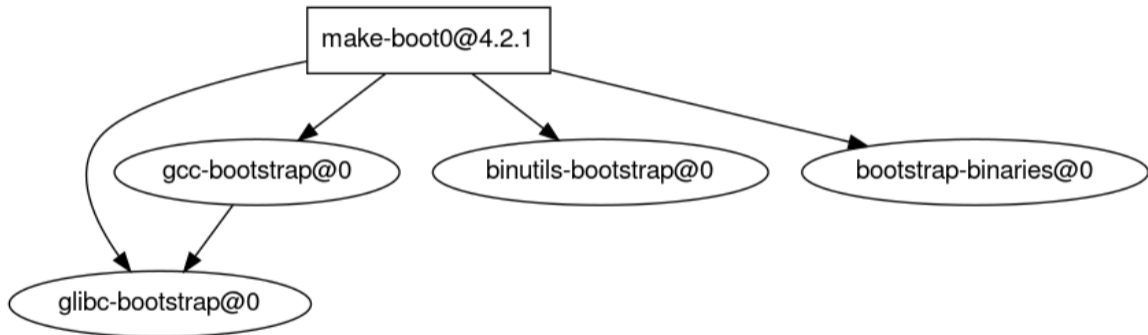
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GNU Guix Days @FOSDEM'20

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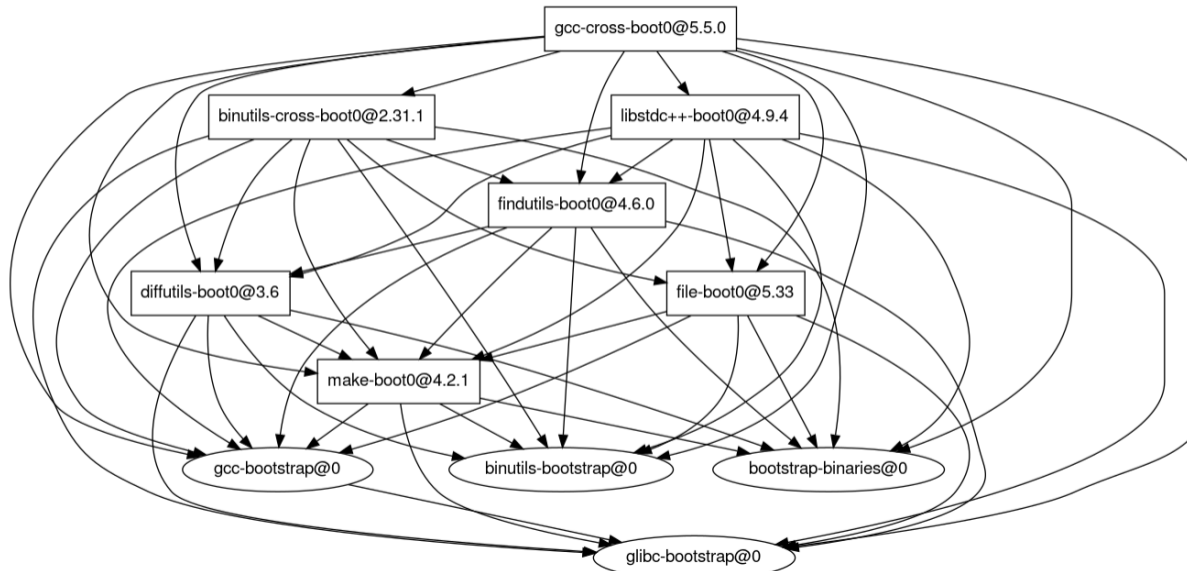
- 1 Bootstrapping Guix v1.0
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# Guix v1.0: The First Package



```
$ guix graph make  
$ guix graph make | dot -T png > make.png  
$ guix graph -e '(@@ (gnu packages commencement) gnu-make-boot0)'
```

# Guix v1.0: The First GCC



# Guix bootstrap tarballs

```
$ guix build bootstrap-tarballs
```

# Guix v1.0 bootstrap binary seed

```
$ du -schx $(readlink $(guix build bootstrap-tarballs)/*)
2.1M    /gnu/store/9623n4bq6iq5c8cwwdq99qb7d0xj93ym-binutils-static-stripped-tarball-
18M    /gnu/store/437xwygmmwwpkddcyy1qvjcv4hak89pb-gcc-stripped-tarball-5.5.0/gcc-st
1.8M    /gnu/store/55ccx18a0d1x5y6a575jf1yr0ywizvdg-glibc-stripped-tarball-2.26.105-g
5.7M    /gnu/store/bqf0ajclbvnbm0a46819f30804y3ilx0-guile-static-stripped-tarball-2.2
5.8M    /gnu/store/j8yzjmh9sy4gbdfwjrhw46zca43aah6x-static-binaries-tarball-0/static-
33M     total
$ for i in $(readlink $(guix build bootstrap-tarballs)/*);\
do sudo tar xf $i; done
$ du -schx *
130M    bin
13M     include
54M     lib
51M     libexec
5.2M    share
252M    total
```

## Reduce binary seeds to bare minimum

*These big chunks of binary code are practically non-auditable which breaks the source to binary transparency that we get in the rest of the package dependency graph.*

*Every unauditable binary leaves us vulnerable to compiler backdoors as described by Ken Thompson in the 1984 paper [Reflections on Trusting Trust](#).*

*Thus, our goal is to reduce the set of bootstrap binaries to the bare minimum. – Ludovic Courtès (GNU Guix documentation, December 2017)*



# Guix Reduced Binary Seed

```
$ du -schx $(readlink $(guix build bootstrap-tarballs)/*)
5.7M    /gnu/store/9f8gi8raqfx9j3l9d00qrrc0jg3r1kyj-guile-static-stripped-tarball-2.2
80K     /gnu/store/b6rjl52hibhmvyw4dg8678pwryhla0h2-linux-libre-headers-stripped-tarball-0.19
12K     /gnu/store/d7zlxsjcnqilmvqwx7scija9x9bjw8cw-mescc-tools-static-stripped-tarball-0.19
428K    /gnu/store/n7zc4kpi8ny6jlfaiakkzxlwhc5fvr1vr-mes-minimal-stripped-tarball-0.19
6.0M    /gnu/store/nv4djwlr1jfqmynqr2cqvf wz0ydx7kxb-static-binaries-tarball-0/static-binaries-tarball-0
13M     total
```

```
$ for i in $(readlink $(guix build bootstrap-tarballs)/*);\  
do sudo tar xf $i; done
```

Password:

```
$ du -schx *
93M     bin
700K    include
38M     lib
14M     share
145M    total
```

# Scheme-only bootstrap: Gash Core Utils

awk	cp	gash	mv	sleep	uname
basename	cut	grep	pwd	sort	uniq
bash	diff	gzip	reboot	tar	wc
cat	dirname	head	rm	test	which
chmod	expr	ln	rmdir	touch	
cmp	false	ls	sed	tr	
compress	find	mkdir	sh	true	

## Guix Scheme-only bootstrap

```
$ du -schx $(readlink $(guix build bootstrap-tarballs)/*)
5.7M    /gnu/store/1mq2pcd2h7g54xpi2jrgj6ibbi4lgi3c-guile-static-stripped-tarballs
80K     /gnu/store/bl1r2bpk6fam8r2gjvr5mvr48i3dm2hn-linux-libre-headers-stripped
12K     /gnu/store/w0dlz486dhh8aiq8pxm5akllz628fqin-mescc-tools-static-stripped
428K    /gnu/store/15j6l18q44ymlrh1cfp4s4hc9835xic5-mes-minimal-stripped-tarballs
6.2M    total

$ for i in $(readlink $(~/src/guix/wip-bootstrap/pre-inst-env guix build bootstrap-tarballs)/*); do sudo tar xf $i; done

$ du -schx *
4.9M    bin
700K    include
38M     lib
14M     share
57M     total
```



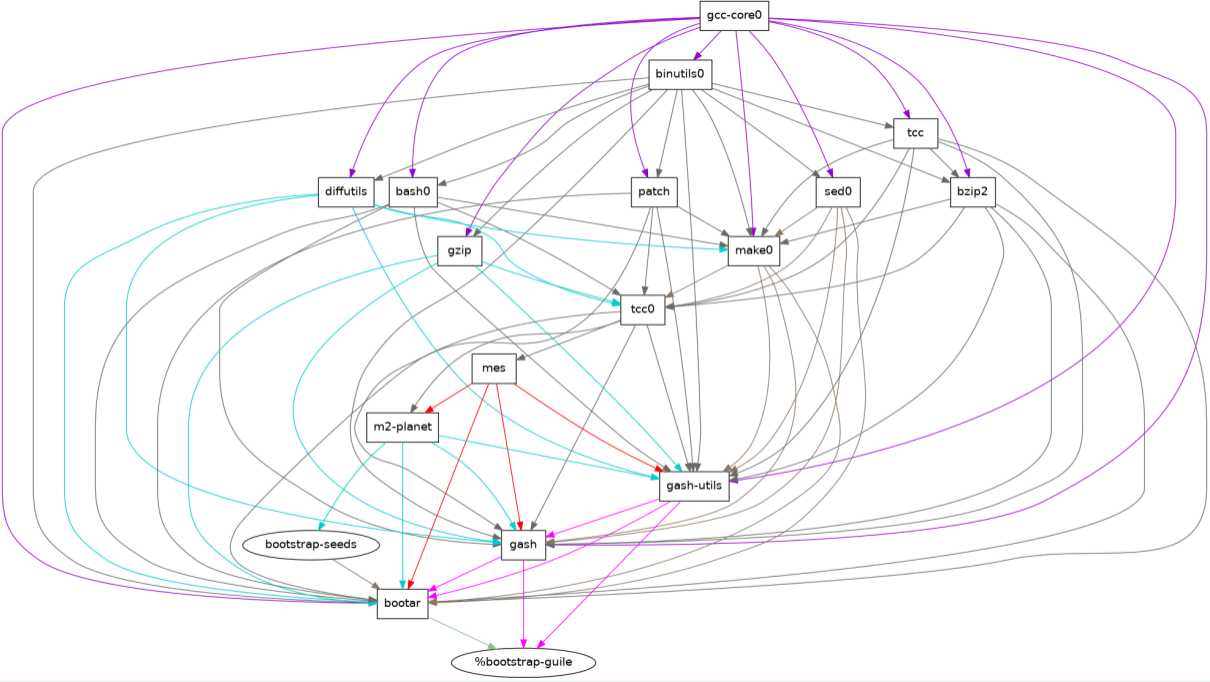
# WE DID IT! We did what?

## Adapt Mes and Mes C Library for M2-Planet

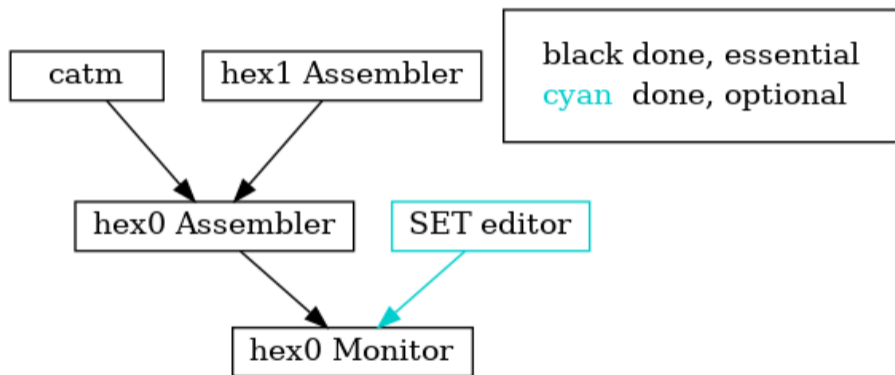
- `#define FOO => ...; #if BAR => ...; CAR (x) => x->car`
- remove global and static array data
- `foo.bar => foo->bar`
- rewrite pointer arithmetic
- rewrite garbage collector
- mature M2-Planet
- ...

# Guix Full Source Bootstrap

```
du -schx $(readlink $(guix build bootstrap-tarballs)/*)
3.1M      /gnu/store/jk0yji9k25p4h8ly06g3p46k8mz8rnz6-guile-static-stripped-tarballs
84K      /gnu/store/040sshfnimkzm9j7pzj9aind5api5s2h-linux-libre-headers-stripped
3.6M      total
$ for i in $(readlink $(guix build bootstrap-tarballs)/*); \
  do sudo tar xf $i; done
$ du -schx *
4.5M      bin
704K      include
6.1M      lib
4.3M      share
16M       total
```

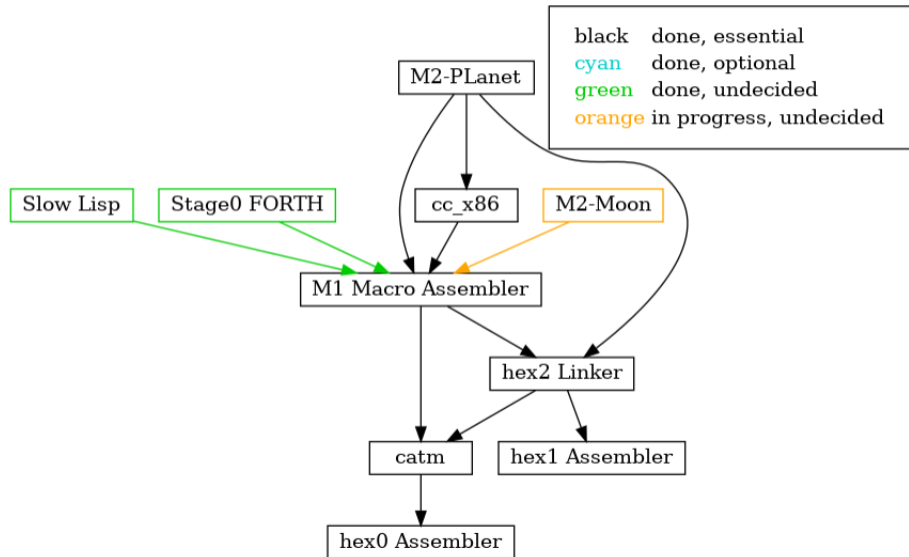


# Full Source Bootstrap: Stage 0

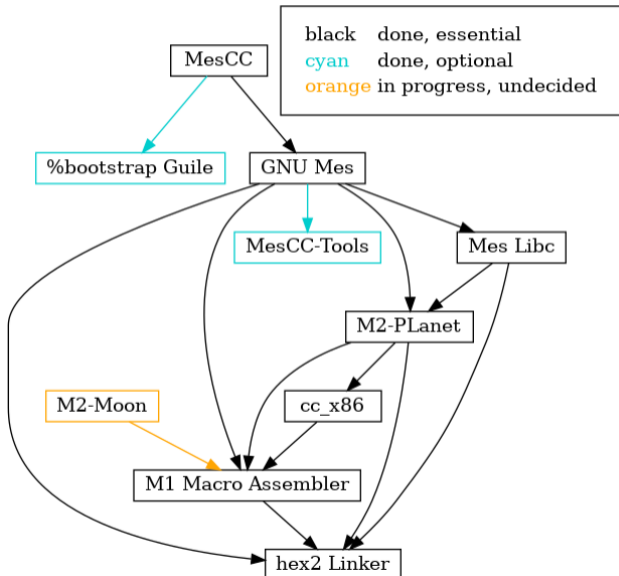




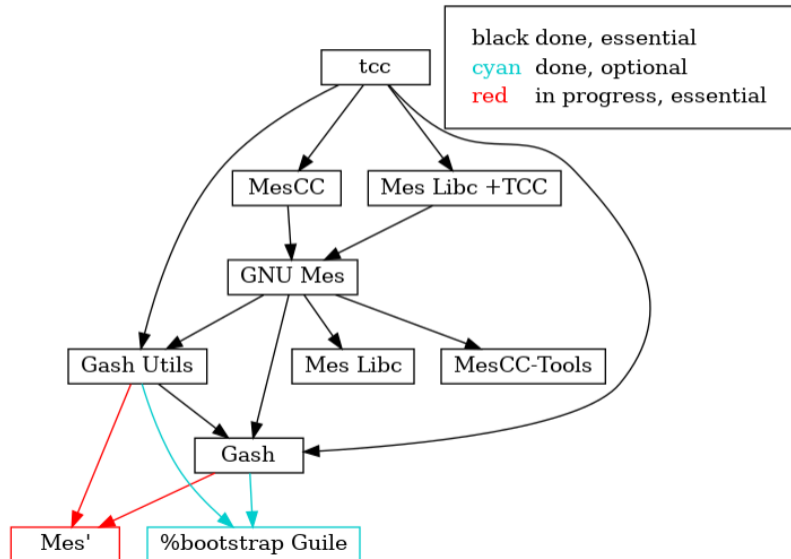
# Full Source Bootstrap: Stage 1



# Full Source Bootstrap: Stage 2



# Full Source Bootstrap: Stage mes



# Full Source Bootstrap: Stage mesboot

