

Automating Architecture Bootstrap

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Why care about Bootstrap?

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- Debian as an embedded distribution

rebootstrap

- A QA tool to bootstrap an architecture from nothing

¹Thanks to Holger Levsen and ProfitBricks (hardware)

²Thanks to Bernhard R. Link, Daniel Schepler, Guillem Jover, Johannes Schauer, Peter Pentchev, Wookey, and many package maintainers

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rebootstrap

- A QA tool to bootstrap an architecture from nothing
- `jenkins.debian.net`¹
- Tests 20 architectures
- Cross builds 100 packages
- 190 bugs filed, 120 fixed²

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Outline

- 1 Cross Toolchains
- 2 Cross Building
- 3 Architecture Bootstrap

Terminology

GNU Terminology for architectures

build what you are building on

host where your binary runs

target what the resulting compiler will produce

Most of the time: `$DEB_HOST_*`

Cross Toolchains

- Mostly a solved problem³

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- Mostly a solved problem³
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- Two approaches (use cross-arch dependencies?)

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Cross Toolchains

- Mostly a solved problem³
- Bootstrap: gcc/glibc “dance”
- Two approaches (use cross-arch dependencies?)
- `src:glibc` still needs patches

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Problematic Architectures

<code>alpha</code>	<code>libc</code> packages conflict
<code>hppa</code>	file conflicts for <code>libc</code> packages
<code>or1k, riscv</code>	<code>gcc</code> patches not upstreamed
<code>powerpcel</code>	<code>_old_getrlimit</code> defined multiple times
<code>sh4</code>	wrong paths in cross compiler
<code>armel, armhf, sh4</code>	<code>sid glibc</code> cannot be built with default <code>gcc</code>

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- `dpkg-buildpackage -a$HOST`

Satisfiability of Build-Depends

- 3000 packages can satisfy cross Build-Depends

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 - Toolchain dependencies need translation
 - Multi-Archify more packages

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Toolchain Dependency Translation

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- PoC: `src:gcc-cross-support`

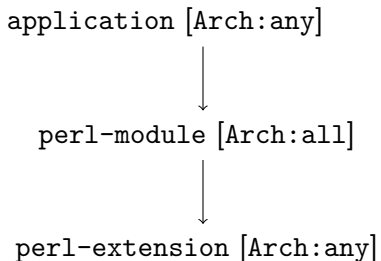
Multi-Arch

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application [Arch:any]



perl-module [Arch:all]



perl-extension [Arch:any, M-A:same]

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application [Arch:any]



perl-module [Arch: **any**, M-A: **same**]



perl-extension [Arch:any, M-A:same]

Multi-Arch Interpreter Issue

application [Arch:any] / **src:package**



perl-module [Arch:any, M-A:same]



perl-extension [Arch:any, M-A:same]

Partial Cross Archive Rebuild

- 1100 packages cross built on debomatic⁵

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- 450 successful

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Cross Compilation Problems

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- Build-Depends: `python` means host arch Python

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- Build-Depends: `python:any`
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- Build-Depends: `python:any`
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 - `help2man`
 - Needing oneself during build (e.g. `cracklib2`, `nss`)
 - Native/outdated configure checks
Maintain `config.site`

Bootstrap Overview

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- Cross build build-essential packages
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- Break dependency cycles

Package Selection

- Essential: yes and build-essential

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> 500 source packages

Build Profiles

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Example

`<cross>` Extra dependencies for cross compilation

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Dependency Reduction

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e.g. `src:openldap` and `src:cyrus-sasl2`

musl Port⁷

- Another C library

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musl Port⁷

- Another POSIX C library
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- Highlights issues such as missing includes

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Unsolved Problems

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Tomorrow: 11:00 Stockholm BoF