

Are embedded buildsystems still needed?

Yes

No

Maybe

This is like a BoF

Please interrupt when you have questions / remarks / etc!

Slides can be found at <http://tinyurl.com/koenelce13>

How I got suckered into embedded linux



Early 2000s - PDAs

Small amount of RAM: 32MiB or 64MiB

Tiny flash: 16MiB or 32MiB

Might have MMC or CF slots

Which groups need a buildsystem?

- **Users: No**
 - They use the firmware image
 - Maybe use package feeds
- **Developers: Yes**
 - No SDK available
 - No on-target toolchain available
 - No working external toolchain available
- **Distro developers: Yes**
 - Familiar/OpenZaurus/OpenSimpad/etc completely built with OE

Buildsystems

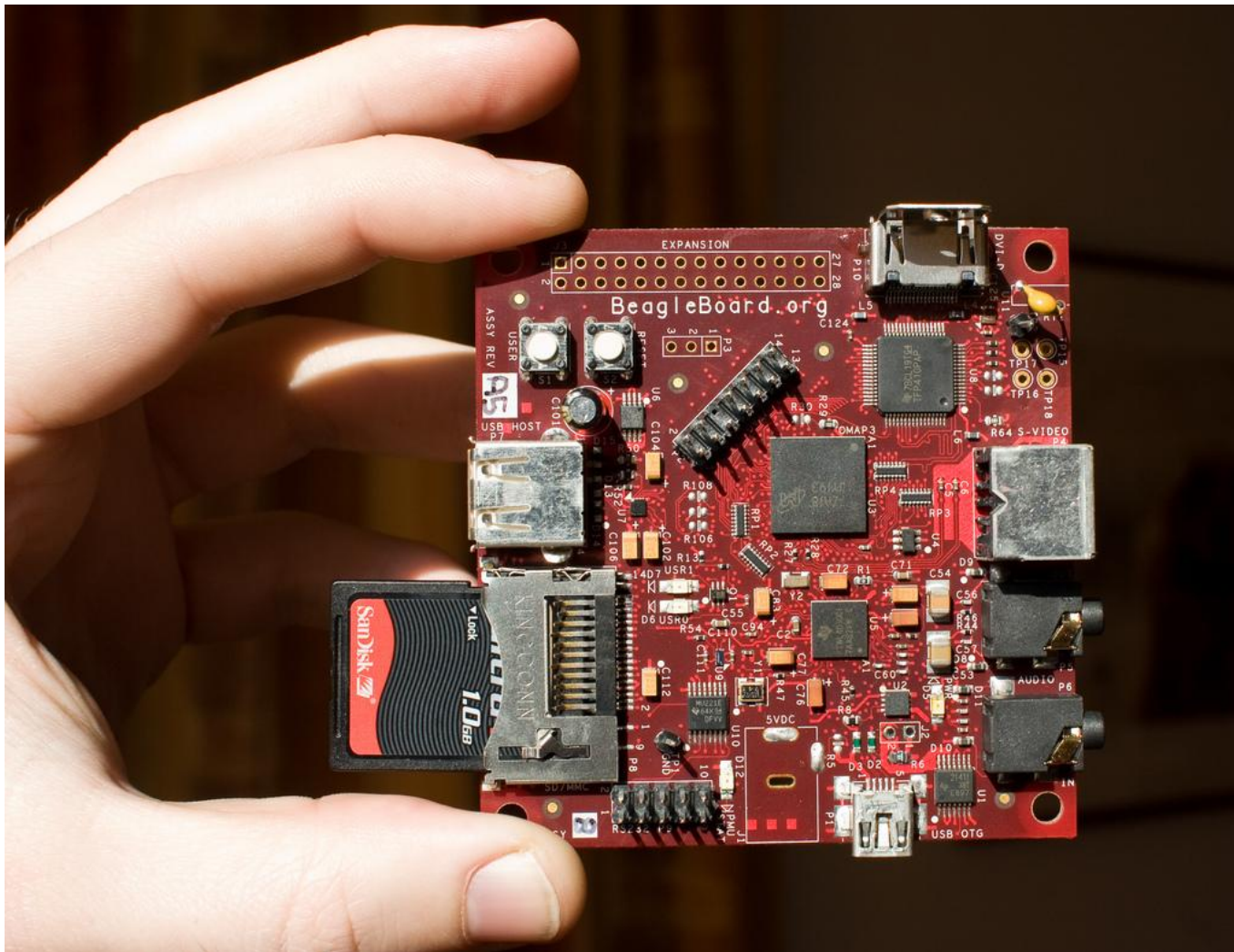
- iPAQ cluster at handhelds.org:
 - DUAL PCMCIA sleeve for networking and harddisk
 - ssh access on request
 - unmaintained after ~2002
 - doesn't actually run any handhelds.org distro
- Buildroot
 - doesn't scale for lots of different targets
 - Package management virtually non-existent
- OpenEmbedded
 - “Can you send me your working config?”

Everyone happy?

- Close cooperation between app developers (GPE/Opie) and distro people
- Close cooperation between distro people and buildsystem people
- In a lot of cases one person does all 3 of those things.

Very tight integration with very little distro specific 'enhancements'.

Late 2000s - Development boards



Late 2000s - Development boards

Reasonable amount of ram ($\geq 128\text{MB}$)

SD card storage

Ethernet!!!

Which groups need a buildsystem?

- **Users: No**
 - They use the SD card image
 - Use package feeds
- **Developers: Maybe**
 - Flaky SDK available
 - Flaky on-target toolchain available
 - Flaky external toolchain available
- **Distro developers: Yes**
 - Angstrom completely built with OE

Buildsystems

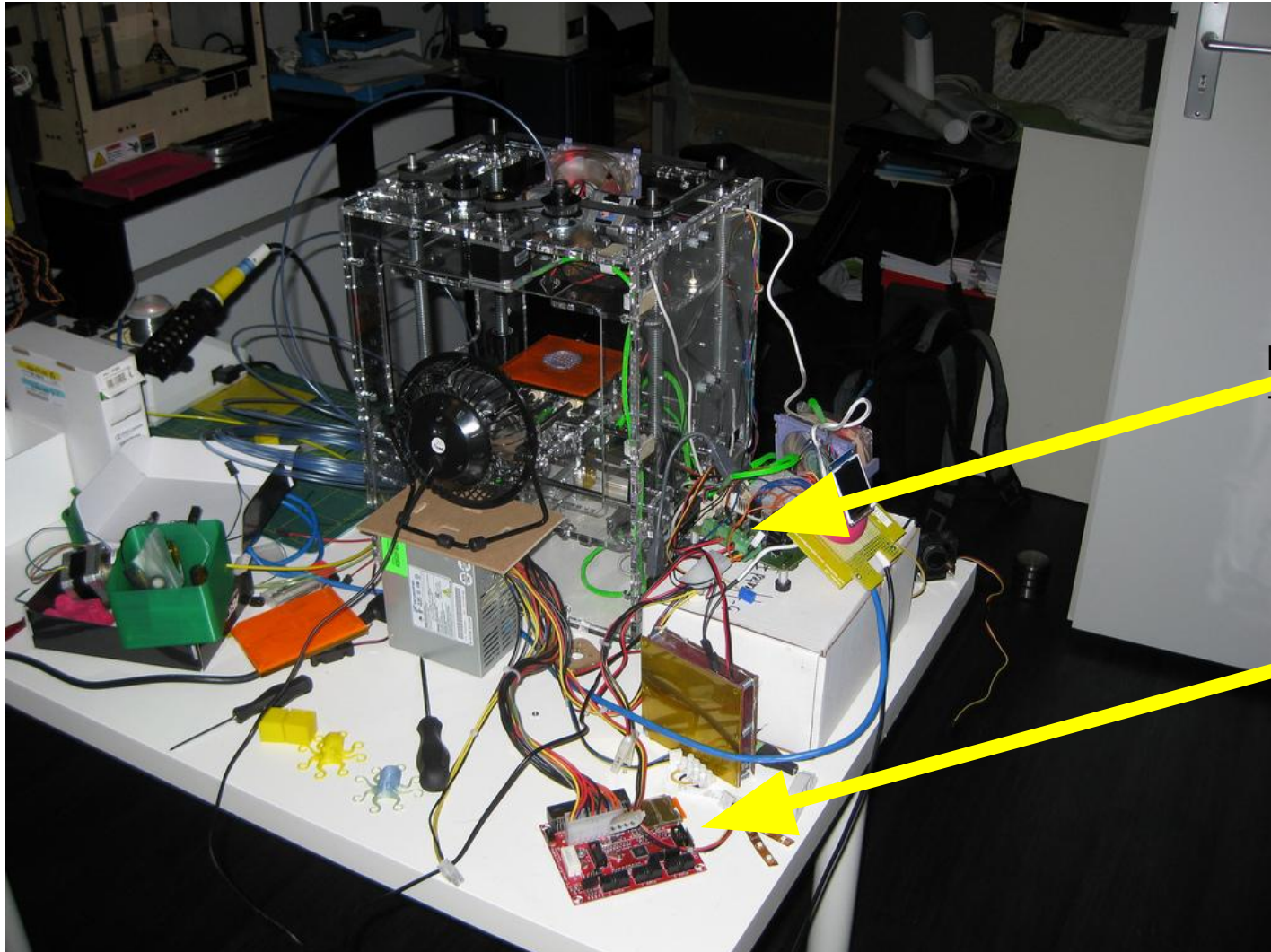
- OpenEmbedded
 - Angstrom config works, >90% of the distro configs don't work
- Gentoo-prefix
 - works **very** well
 - virtually unknown
- Other systems
 - lack ARM EABI support
 - lack cortex-A8 support
 - focussed on native builds

Everyone happy?

- No cooperation between app developers (GNOME/KDE/XFCE) and distro people
- Cooperation between distro people and buildsystem people
- Users expect RHEL type stability with gentoo style optimizations and debians wealth of prebuilt packages.

Everyone is very unhappy about the software, but OMG BLINKING **LEDS!!!”**

Early 2010s - Arduino and r-pi



Beaglebone
+ BeBoPr cape

Sanguino
derivative

Early 2010s - Arduino and r-pi

Users bitbang everything with an arduino :(

Which groups need a buildsystem?

- **Users: No**
 - They use the SD card image
 - They use python/nodejs/etc with PIP/npm/CPAN
 - Copy/paste instructions from blogs
 - Arduino IDE
- **Developers: No**
 - On-target toolchain available
 - They use python/nodejs/etc with PIP/npm/CPAN
- **Distro developers: Maybe**
 - Angstrom completely built with OE
 - Every other distro does ethical^H^H^H native builds

Quotes

- “I disabled USB in the kernel to make it boot faster. Users than want USB can easily reconfigure and rebuild the kernel because it’s using the yocto kernel tooling”
- “We don’t support X11 because we’re embedded and not bloated” - Buildsystem team in 2006
- “We support X11!!!” - Same team in 2011

Quotes

- “DT is external to the kernel, so I don’t really want to push the DT for my board upstream”
- “Should I switch from using OE to using Yocto?”
- “OE is a single script that only supports one thing” - Wolfgang Denx a few years earlier

AVR32

Hardware is not suited for native builds

Aarch64

No hardware available