Yocto, Buildroot & Co.

Séminaire Fribourgeois Linux embarqué

11th November 2016

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Whoami

- Guy Morand
- Born in 1985
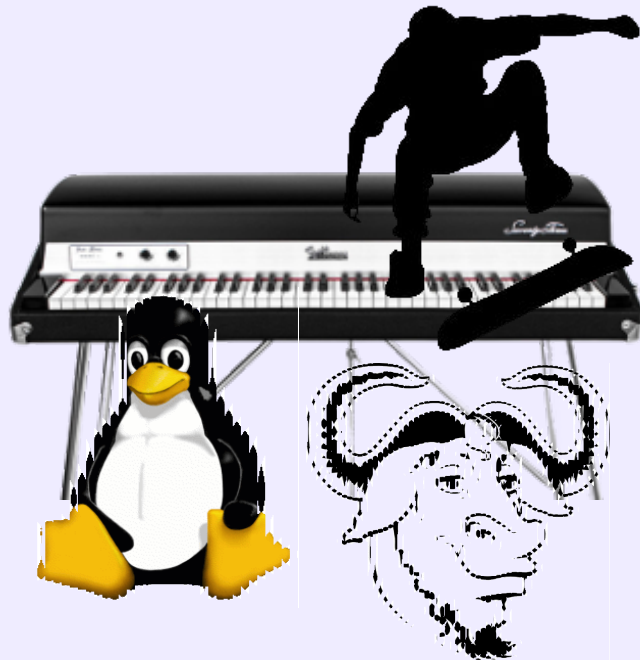
- guy-morand.ch

Where are we

Sources

Toolchain

Fetches

Compiles/Uses

Updates

Provides

Build system

Includes

uses

Builds

Compiles

MyApp(s) Root file system MyLib(s)

Kernel Bootloader

SDK

Hardware

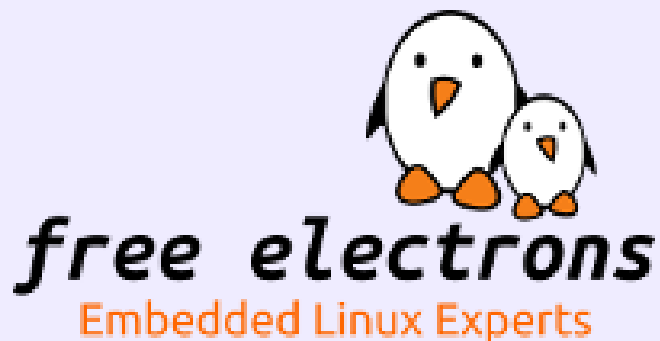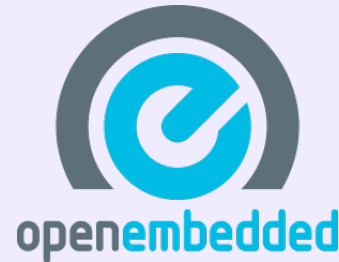Guy Morand
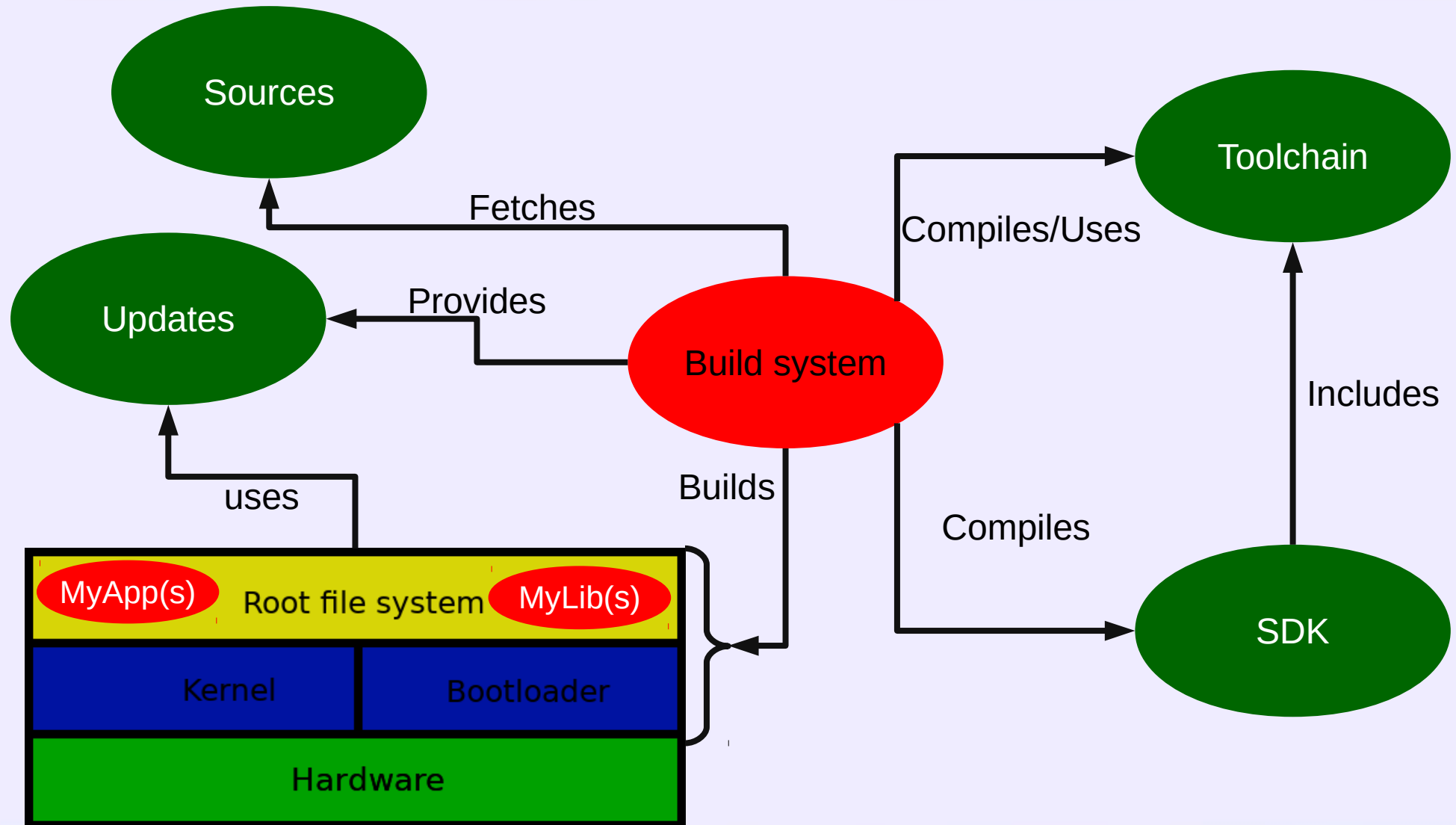
The buildroot project

- Started in 2005
- Focus on simplicity
- Minimalist
- Still very active
- Supported by few companies

free electrons
Embedded Linux Experts

mind
embedded development
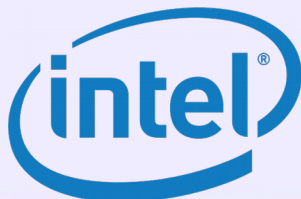an ESSENSIUM division

Yocto umbrella

- Born in 2010
- Covers different smaller projects:
  - Bitbake (2005)
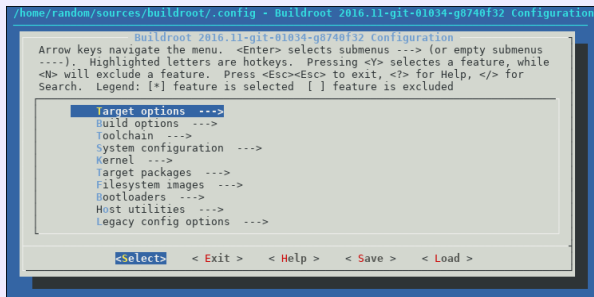 - OpenEmbedded
  - Poky
- Supported by many big actors of the market

Core system

- make

- Makefile

- Kconfig

- menuconfig

yocto · PROJECT

- Bitbake

- Recipes (OE)

- Meta-layers (Poky)

- Files / ENV

- Toaster web UI

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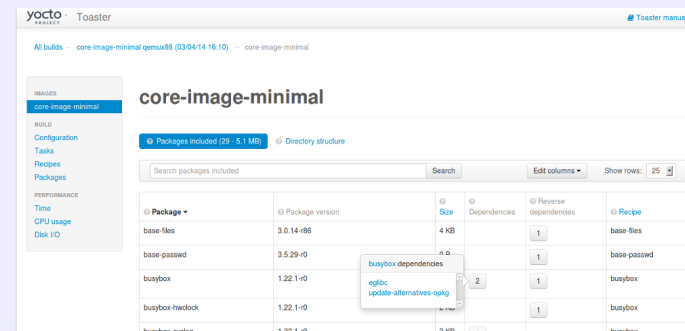
Where both are good

- Documentation

- Community

- Amount of available packages

- Support many build and source type
  - http(s) / ftp / git / ~~SVN~~ / ...
  - Makefile / autotools / cmake / qmake / ...

- Output image type

- Toolchain (glibc, musl libc)

- Offline builds

Where yocto is good

- SDK / Canadian cross
- Shared artifacts
- Incremental builds
- Packages repository
- Licensing

- No by design!
- No by design!
- Not smart
- Evil (full update)
- Generates meta info

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Some metrics

Version	2016.08.1	2.1 (krogoth)
Available packages	1991	4163
Configuration	raspberrypi2_defconfig	meta-raspberrypi MACHINE="raspberrypi2" core-image-minimal
Build time	2H05	6H12 (image) 3H45 (SDK)
SDK size	-	90Mb
Workspace size	5274Mb	26530Mb (image) 36580Mb (+SDK)
Image size	88Mb	53Mb
Root file system size	45Mb	5.6Mb
Boot time	17 seconds	18 seconds

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When should I use buildroot

- Few developers (<5)
  - They can hack at each level of the system
  - Familiar with Makefile/KConfig
- Full system update
- Build time is not important

When should I use yocto

- Many developers
- SDK
- Many platforms
- Fast incremental builds
- Continuous integration infrastructure
- Update package

Why should I NOT use yocto

- Heavy weight
- Learning curve

Other alternatives

- Makefile/Kconfig
  - OpenWRT
  - ~~ptxdist~~

- OE / Bitbake
  - Ångström

- Destkop distributions
  - Linux From Scratch
    - ALFS
  - emerge (Gentoo)
  - pkgbuild (Archlinux)
  - xbps (Void Linux)

Conclusion

? Questions ?

Links

- http://www.yoctoproject.org/

- http://buildroot.org/

- http://www.angstrom-distribution.org/

- https://openwrt.org/

- https://github.com/voidlinux/void-packages

- https://wiki.gentoo.org/wiki/Portage

- https://wiki.archlinux.org/index.php/Makepkg

- http://www.linuxfromscratch.org/alfs/

- http://trac.clfs.org/