



Happy Build with
OpenEmbedded

tick@0xlab.org

Happy Build with OpenEmbedded

tick@0xlab.org

August 16, 2009

[Outline](#)

[Build it now !](#)

[Introduction](#)

[Directory Tree](#)

[Settings](#)

[Recipes](#)

[Task and Images](#)

[Build Sequence](#)

[Pitfalls](#)

[Resources](#)

[Summary](#)

[Question?](#)

[Special Thanks](#)

Build it now !

Introduction

Directory Tree

Settings

Recipes

Task and Images

Build Sequence

Pitfalls

Resources

Summary

Question?

Special Thanks

Happy Build with
OpenEmbedded

tick@0xlab.org

Outline

Build it now !

Introduction

Directory Tree

Settings

Recipes

Task and Images

Build Sequence

Pitfalls

Resources

Summary

Question?

Special Thanks

Outline

Build it now !

Introduction

Directory Tree

Settings

Recipes

Task and Images

Build Sequence

Pitfalls

Resources

Summary

Question?

Special Thanks

`http://0xlab.org/~tick/oe_coscup_demo/`

Let's build!



Happy Build with
OpenEmbedded

tick@0xlab.org

Four steps:

- ▶ `git clone git://0xlab.org/oe_coscup_demo/oe_base.git`
- ▶ `cd oe_base`
- ▶ `./run_me_to_setup_whole_environment.sh`
- ▶ `bitbake coscup-0xlab-demo-image`

If build from scratch, for dual core 2.0G intel CPU 2G ram Ununtu 9.04 with 10M/10M network, it takes about 12 hours, and requires about 20GB hard disk space

[Outline](#)

[Build it now !](#)

[Introduction](#)

[Directory Tree](#)

[Settings](#)

[Recipes](#)

[Task and Images](#)

[Build Sequence](#)

[Pitfalls](#)

[Resources](#)

[Summary](#)

[Question?](#)

[Special Thanks](#)

- ▶ The build framework for embedded Linux.
- ▶ Support for **many** hardware architectures
- ▶ Multiple releases for those architectures
- ▶ Tools for speeding up the process of recreating the base after changes have been made
- ▶ **Easy** to customize
- ▶ Runs on any Linux distribution
- ▶ Cross-compiles 1000's of packages including GTK+, the X Windows system, Mono, Java, and about anything else you might ever need

[Outline](#)

[Build it now !](#)

[Introduction](#)

[Directory Tree](#)

[Settings](#)

[Recipes](#)

[Task and Images](#)

[Build Sequence](#)

[Pitfalls](#)

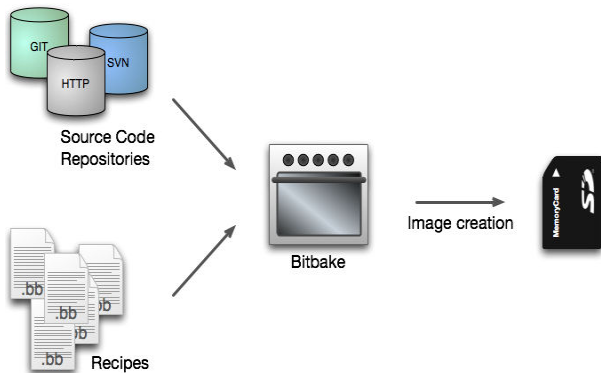
[Resources](#)

[Summary](#)

[Question?](#)

[Special Thanks](#)

- ▶ A tool for executing tasks and managing metadata
- ▶ Just like portage in BSD



From <http://pixhawk.ethz.ch>

Happy Build with
OpenEmbedded

tick@0xlab.org

Outline

Build it now !

Introduction

Directory Tree

Settings

Recipes

Task and Images

Build Sequence

Pitfalls

Resources

Summary

Question?

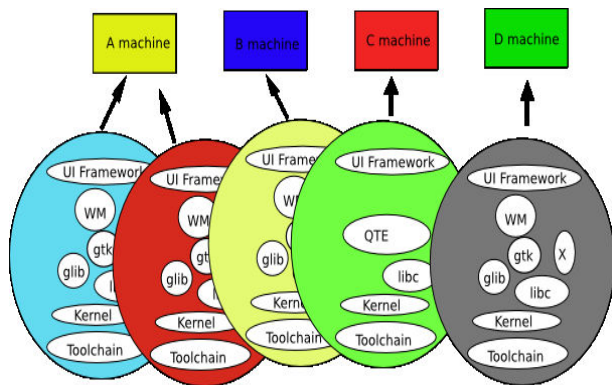
Special Thanks

Why OE?



Happy Build with
OpenEmbedded

tick@0xlab.org



[Outline](#)

[Build it now !](#)

[Introduction](#)

[Directory Tree](#)

[Settings](#)

[Recipes](#)

[Task and Images](#)

[Build Sequence](#)

[Pitfalls](#)

[Resources](#)

[Summary](#)

[Question?](#)

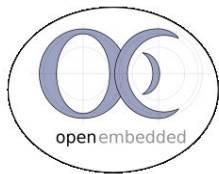
[Special Thanks](#)

Why OE?



Happy Build with
OpenEmbedded

tick@0xlab.org



Outline

Build it now !

Introduction

Directory Tree

Settings

Recipes

Task and Images

Build Sequence

Pitfalls

Resources

Summary

Question?

Special Thanks

Outline

Build it now !

Introduction

Directory Tree

Settings

Recipes

Task and Images

Build Sequence

Pitfalls

Resources

Summary

Question?

Special Thanks

Automatize reproducing what we/others did.

Why NOT OE?



Happy Build with
OpenEmbedded

`tick@0xlab.org`

- ▶ OE is convenient – after you pass the learning curve.

Outline

Build it now !

Introduction

Directory Tree

Settings

Recipes

Task and Images

Build Sequence

Pitfalls

Resources

Summary

Question?

Special Thanks

Why NOT OE?



Happy Build with
OpenEmbedded

tick@0xlab.org

- ▶ OE is convenient – after you pass the learning curve.
- ▶ If you just want one product, and just one distribution. You can live easier.

[Outline](#)

[Build it now !](#)

[Introduction](#)

[Directory Tree](#)

[Settings](#)

[Recipes](#)

[Task and Images](#)

[Build Sequence](#)

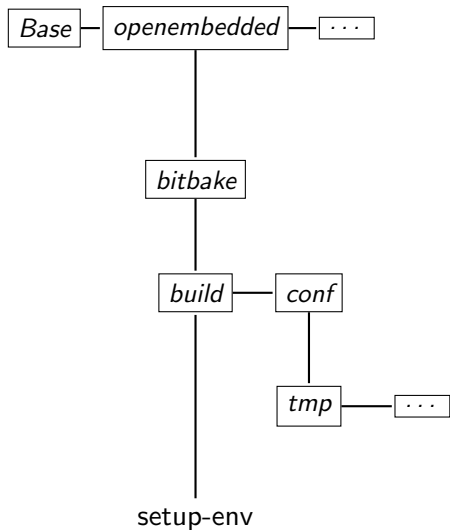
[Pitfalls](#)

[Resources](#)

[Summary](#)

[Question?](#)

[Special Thanks](#)



Happy Build with
OpenEmbedded

tick@0xlab.org

[Outline](#)

[Build it now !](#)

[Introduction](#)

[Directory Tree](#)

[Settings](#)

[Recipes](#)

[Task and Images](#)

[Build Sequence](#)

[Pitfalls](#)

[Resources](#)

[Summary](#)

[Question?](#)

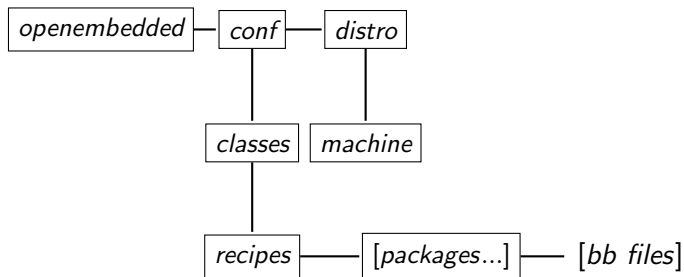
[Special Thanks](#)

OE Tree structure



Happy Build with
OpenEmbedded

tick@0xlab.org



Outline

Build it now !

Introduction

Directory Tree

Settings

Recipes

Task and Images

Build Sequence

Pitfalls

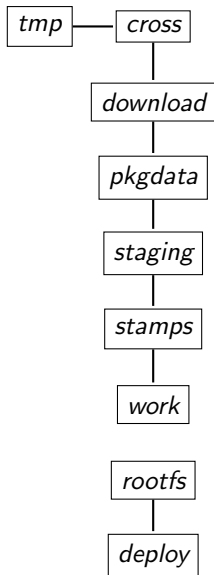
Resources

Summary

Question?

Special Thanks

TMPDIR structure



Happy Build with
OpenEmbedded

tick@0xlab.org

[Outline](#)

[Build it now !](#)

[Introduction](#)

[Directory Tree](#)

[Settings](#)

[Recipes](#)

[Task and Images](#)

[Build Sequence](#)

[Pitfalls](#)

[Resources](#)

[Summary](#)

[Question?](#)

[Special Thanks](#)

```
export OEDIR = /home/tick/work/oe_coscup
export BBPATH = "${OEDIR}/build : ${OEDIR}/openembedded"
export PYTHONPATH = "${OEDIR}/bitbake/lib"
export PATH = "${OEDIR}/bitbake/bin : ${PATH}"
if(('cat /proc/version | grepUbuntu | wc -l' == 1)); then
    if(('cat /proc/sys/vm/mmap_min_addr' > 0)); then
        echo0 | sudotee/proc/sys/vm/mmap_min_addr
    fi
fi
```

[Outline](#)

[Build it now !](#)

[Introduction](#)

[Directory Tree](#)

[Settings](#)

[Recipes](#)

[Task and Images](#)

[Build Sequence](#)

[Pitfalls](#)

[Resources](#)

[Summary](#)

[Question?](#)

[Special Thanks](#)

```
MACHINE = "beagleboard"  
DISTRO = "angstrom - 2008.1"  
BUILD_ARCH = "i686"  
#INHERIT += "rm_work"  
PARALLEL_MAKE = " -j2"  
BB_NUMBER_THREADS = "2"  
TMPDIR = "/home/tick/OE/build/tmp"  
BBFILES := "/home/tick/OE/openembedded/recipes/ * / * .bb"
```

[Outline](#)

[Build it now !](#)

[Introduction](#)

[Directory Tree](#)

[Settings](#)

[Recipes](#)

[Task and Images](#)

[Build Sequence](#)

[Pitfalls](#)

[Resources](#)

[Summary](#)

[Question?](#)

[Special Thanks](#)

▶ Overwrite¹

- ▶ :=
- ▶ +=
- ▶ =+
- ▶ .=
- ▶ =.

▶ Tasks do_xxx

▶ File download, supports: local file, CVS, Subversion (SVN), http, https, git

- ▶ SRC_URI = "file://relativefile.patch"
- ▶ SRC_URI =
"cvs://CVSROOT;module=mymodule;tag=some-version;method=ext"
- ▶ SRC_URI = "http://oe.handhelds.org/not_there.aac;md5sum=12343"
- ▶ SRC_URI = "svn://svn.oe.handhelds.org/svn;module=vip;proto=http;rev=667"
- ▶ SRC_URI = "git://git.oe.handhelds.org/git/vip.git;protocol=http"

Outline

Build it now !

Introduction

Directory Tree

Settings

Recipes

Task and Images

Build Sequence

Pitfalls

Resources

Summary

Question?

Special Thanks

¹<http://bitbake.berlios.de/manual/>

- ▶ include
- ▶ inherit

Outline

Build it now !

Introduction

Directory Tree

Settings

Recipes

Task and Images

Build Sequence

Pitfalls

Resources

Summary

Question?

Special Thanks

[PROJECT NAME]_[VERSION|SCM].bb

For example:

firefox_3.0.8.bb

Outline

Build it now !

Introduction

Directory Tree

Settings

Recipes

Task and Images

Build Sequence

Pitfalls

Resources

Summary

Question?

Special Thanks

- ▶ **DESCRIPTION** : the description of target package project
- ▶ **LICENSE** : License of target package project
- ▶ **SECTION** : which category of this project
- ▶ **HOMEPAGE** : The web site of target project
- ▶ **RDEPENDS** : The dependency of target project on target device (runtime dependency)
- ▶ **DEPENDS** : The compile time dependency of target project on build host
- ▶ **EXTRA_OECONF** : The configure flag for target project
- ▶ **S** : The source directory of this project after downloade
- ▶ **D** : The destination directory of this project when packaging
- ▶ **PV** : Package Version (from source) ²
- ▶ **PN** : Package name (for package manager)
- ▶ **PR** : Package release number (for build system, and package manager)
- ▶ **PE** : Package emergency (for downgrade, or serious bug fix)
- ▶ **FILE_XXXX** : Packaging the following file into package PROJECT-XXXX
- ▶ **WORDIR** : The directory where the project been built

[Outline](#)

[Build it now !](#)

[Introduction](#)

[Directory Tree](#)

[Settings](#)

[Recipes](#)

[Task and Images](#)

[Build Sequence](#)

[Pitfalls](#)

[Resources](#)

[Summary](#)

[Question?](#)

[Special Thanks](#)

²http://wiki.openembedded.net/index.php/Versioning_Policy ↻ 🔍 ↺

Grouping packages into tasks for particular purpose.

- ▶ PACKAGES
- ▶ DEPENDS on other projects when build
- ▶ RDEPENDS on other projects when running

[Outline](#)

[Build it now !](#)

[Introduction](#)

[Directory Tree](#)

[Settings](#)

[Recipes](#)

[Task and Images](#)

[Build Sequence](#)

[Pitfalls](#)

[Resources](#)

[Summary](#)

[Question?](#)

[Special Thanks](#)

Creating rootfs for partical purpose.
Images install tasks and packages included, and package
the whole directory into rootfs image.

[Outline](#)

[Build it now !](#)

[Introduction](#)

[Directory Tree](#)

[Settings](#)

[Recipes](#)

[Task and Images](#)

[Build Sequence](#)

[Pitfalls](#)

[Resources](#)

[Summary](#)

[Question?](#)

[Special Thanks](#)

- ▶ OE will follow the depends of project and build whatever depended
- ▶ Deepest first
- ▶ Dependency will be checked iteratively
- ▶ What OE will build for a normal distribution?
 - ▶ Utils for building system
 - ▶ Native toolchain for building stuff
 - ▶ Cross compiler toolchain
 - ▶ packages depended. . .
 - ▶ target package

Outline

Build it now !

Introduction

Directory Tree

Settings

Recipes

Task and Images

Build Sequence

Pitfalls

Resources

Summary

Question?

Special Thanks

- ▶ Adding PR after modifying bb file.
- ▶ Editing conf/distro/include/sane-srcrevs.inc and select preferred version
- ▶ Adding conf/checksums.ini after you trying to download files from internet
- ▶ local.conf will overwrite original conf
- ▶ Remember source the environment before bitbake
- ▶ 'bitbake -c clean xxxx_package;bitbake xxxx_package' can make sure the package will be rebuilt

[Outline](#)

[Build it now !](#)

[Introduction](#)

[Directory Tree](#)

[Settings](#)

[Recipes](#)

[Task and Images](#)

[Build Sequence](#)

[Pitfalls](#)

[Resources](#)

[Summary](#)

[Question?](#)

[Special Thanks](#)

Happy Build with
OpenEmbedded

tick@0xlab.org

- ▶ wiki: http://wiki.openembedded.net/index.php/Main_Page
- ▶ git: <http://cgit.openembedded.org/>
- ▶ irc: [#oe](irc://irc.freenode.net)
- ▶ mailing list: openembedded-devel@lists.openembedded.org

Outline

Build it now !

Introduction

Directory Tree

Settings

Recipes

Task and Images

Build Sequence

Pitfalls

Resources

Summary

Question?

Special Thanks

How to join?



Happy Build with
OpenEmbedded

tick@0xlab.org

- ▶ **Subscribe the mailing list:**
http://wiki.openembedded.net/index.php/Mailing_lists
- ▶ **Reading the policies:**
<http://wiki.openembedded.net/index.php/Category:Policy>

Outline

Build it now !

Introduction

Directory Tree

Settings

Recipes

Task and Images

Build Sequence

Pitfalls

Resources

Summary

Question?

Special Thanks

- ▶ OE helps us reproduce the procedure of building distributions
- ▶ OE does not simplify development phase, it make the procedure reproducible and automatically
- ▶ Help us integrate packages, distributions, architectures, and machines
- ▶ OE trace the package dependency tree, and build code in sequence from deepest one
- ▶ You can overwrite variables and customize your own package/image
- ▶ It's flexible, and therefore you need to know how to use it more elegantly
- ▶ OE is a powerful resource to creating a new product

[Outline](#)

[Build it now !](#)

[Introduction](#)

[Directory Tree](#)

[Settings](#)

[Recipes](#)

[Task and Images](#)

[Build Sequence](#)

[Pitfalls](#)

[Resources](#)

[Summary](#)

[Question?](#)

[Special Thanks](#)

Questions?



Happy Build with
OpenEmbedded

tick@0xlab.org

Thank you.

Outline

Build it now !

Introduction

Directory Tree

Settings

Recipes

Task and Images

Build Sequence

Pitfalls

Resources

Summary

Question?

Special Thanks

Happy Build with
OpenEmbedded

tick@0xlab.org



[Outline](#)

[Build it now !](#)

[Introduction](#)

[Directory Tree](#)

[Settings](#)

[Recipes](#)

[Task and Images](#)

[Build Sequence](#)

[Pitfalls](#)

[Resources](#)

[Summary](#)

[Question?](#)

[Special Thanks](#)