# **OpenEmbedded - devtool**

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# 1 Overview

OpenEmbedded is a build system to generate distributions via images or to generate a SDK.

A tool is available on OpenEmbedded to step into development with your OpenEmbedded distribution, this tool is named devtool.

This tool allows to:

- add new recipe
- create append on actual recipe by creating bbappend file
- · update existing bbappend file



Official documentation of devool: Using devtool in your sdk workflow (from www.yoctoproject.org)

Display **devtool** help:

```
$ devtool --help
NOTE: Starting bitbake server...
usage: devtool [--basepath BASEPATH] [--bbpath BBPATH] [-d] [-q]
               [--color COLOR] [-h]
               <subcommand> ...
OpenEmbedded development tool
options:
  --basepath BASEPATH Base directory of SDK / build directory
  --bbpath BBPATH
                       Explicitly specify the BBPATH, rather than getting it
                       from the metadata
  -d, --debug
                       Enable debug output
  -q, --quiet
                       Print only errors
  --color COLOR
                       Colorize output (where COLOR is auto, always, never)
  -h, --help
                       show this help message and exit
subcommands:
  Beginning work on a recipe:
```

# 2 Examples

## 2.1 Add a new application or a new library

## 2.1.1 Goal

The goal is to integrate a new application or a new library on your OpenEmbedded build setup.

The application or library doesn't have any recipe available on any layer referenced by your OpenEmbedded build setup.

Devtool can help you to generate recipe in your OpenEmbedded build setup and more specifically in a layer you manage.

Devtool is able to detect some mandatory things to help you to integrate application or library like type of configuration (cmake, autotools) but not to define the parameters to pass for configuration. At least you must manually adapt the recipe to your needs:

- by populating correctly SRC\_URI,
  - by surcharging configure, compile, install command,
  - by specifying the list of files to install on target,

## 2.1.2 Way of working (step-by-step)

- 1. Create a source directory if does not exist (example 'mysources' in build dir)
  - \$> mkdir mysources/myapp
- 2. Get the source of application (git clone, extract tarball, ...) and put it in the source directory
- 3. Add the application to the workspace
  - \$> devtool add myapp mysources/myapp
    (devtool create on workspace a recipe for myapp, see description of command devtool add.)
- 4. Build it:
  - \$> devtool build myapp
- 5. Deploy to the target device build output (via network access)
  - \$> devtool deploy-target myapp root@<ip of board>
- 6. Edit source code & repeat 4-5 as necessary
- 7. Populate the layer with your new recipe

First, make sure to create/enable your custom layer **meta-my-custo-layer**. For that you can refer to <u>How to create a new open embedded layer</u> article.

- \$> mkdir ../meta-st/meta-my-custo-layer/recipes-custom/myapp
- \$> cp workspace/recipes/myapp/myapp.bb ../meta-st/meta-my-custo-layer/recipes-custom/myapp
- \$> mkdir ../meta-st/meta-my-custo-layer/recipes-custom/myapp/myapp
- \$> cp mysources/myapp/\* ../meta-st/meta-my-custo-layer/recipes-custom/myapp/myapp
- \$> cp <appropriated license file> ../meta-st/meta-my-custo-layer/recipes-custom/myapp/myapp

Note that all copied files into folder ../meta-st/meta-my-custo-layer/recipes-custom/myapp/myapp must be added in SRC\_URI field of myapp.bb

Then the new recipe (myapp.bb) must be added inside the custom image you compile

\$> cd meta-st/meta-my-custo-layer/recipes-samples/images/

Open my-custom-image.bb and add this line: IMAGE\_INSTALL += "myapp"

#### 2.1.3 Material

· content of recipe file

```
$> cat workspace/recipes/myapp/myapp.bb
# Recipe created by recipetool
# This is the basis of a recipe and may need further editing in order to be fully functional.
# (Feel free to remove these comments when editing.)
#
# WARNING: the following LICENSE and LIC_FILES_CHKSUM values are best guesses - it is
# your responsibility to verify that the values are complete and correct.
LICENSE = "Unknown"
LIC_FILES_CHKSUM = "file://LICENSE;md5 =6dc31330b6fcb6a82dea131bf3d33d33"
# No information for SRC_URI yet (only an external source tree was specified)
SRC_URI = ""
DEPENDS += "wayland"
inherit cmake
# Specify any options you want to pass to cmake using EXTRA_OECMAKE:
EXTRA_OECMAKE = ""
```

**Red text**: information detected automatically by devtool.

workspace tree

```
$> tree workspace/ mysources/
workspace/
|-- appends
| `-- myapp.bbappend
|-- conf
| `-- layer.conf
|-- README
`-- recipes
`-- myapp
`-- myapp.bb
mysources/
`-- myapp
```

# 2.2 modify an existing application or library managed by a recipe on which you have the ownership



devtool is based on external source (externalsrc) and is not able to work on recipes which are already using external source

## 2.2.1 Goal

The goal is to update a recipe owned by you.

On the following example, we take the library libsmaf on which we would like to apply some modifications.

## 2.2.2 Way of working (step-by-step)

1. Create a source directory (example 'mysources' in build dir)

```
$> mkdir mysources
```

2. Extract source

```
$> devtool modify -x libsmaf mysources/libsmaf
(option -x: request to devtool to extract the source code and patch it following
the rules available on libsmaf recipe.)
```

- 3. Edit the code and/or commit your changes on local git repository
- 4. Build it:

```
$> devtool build libsmaf
```

5. Deploy to the target device build output (via network access)

```
$> devtool deploy-target libsmaf root@<ip of board>
```

- 6. Edit source code & repeat 3-5 as necessary
- 7. Write as patches on top of recipe

```
$> devtool update-recipe -a ../meta-st/meta-my-custo-layer libsmaf
```

First, make sure to create/enable your custom layer **meta-my-custo-layer**. For that you can refer to <u>How to create a new open embedded layer</u> article.

8. Come back to normal (remove the component from workspace)

```
$> devtool reset libsmaf
```

#### 2.2.3 Material

modification made by devtool on libsmaf.bb

Red text: information automatically modified by devtool

\$> ls recipessecurity/smaf/libsmaf
0001Someschanges.patch

Red text: patch file added by devtool

# 2.3 Create/update an append on application or library



devtool are based on external source (externalsrc) and are not able to work on recipe which are already using external source

#### 2.3.1 Goal

The goal are to update (or create) an append made for a specific recipe.

On this example, we take the library pixman on which we are would like to apply some modification.

## 2.3.2 Way of working (step by step)

- 1. Create a source directory if not exist (here mysources on build dir)
  - \$> mkdir mysources
- 2. Extract source
  - \$> devtool modify -x pixman mysources/pixman
- 3. Edit the code and/or commit your change on local git repository
- 4. Build it:
  - \$> devtool build pixman
- 5. Deploy to target device build output (via network access)
  - \$> devtool deploy-target pixman root@<ip of board>
- 6. Edit source code & repeat 3-5 as necessary
- 7. Write as patches on top of recipe append file
  - \$> devtool update-recipe -a ../meta-st/meta-my-custo-layer pixman

First, make sure to create/enable your custom layer **meta-my-custo-layer**. For that you can refer to <u>How to create a new open embedded layer</u> article. Then:

8. Come back to normal (remove the component of workspace)

```
$> devtool reset pixman
```

#### 2.3.3 Material

· content of created append file: pixman.bbapend

```
$> cat meta-st/meta-st-framework/recipes-graphics/xorg-lib/pixman_0.32.6.bbappend
# look for files in the layer first
FILESEXTRAPATHS_prepend := "${THISDIR}/${PN}:"
SRC_URI += "file://0001-NV12-format-support.patch \
file://0001-Somes-Changes.patch \
"
```

• tree of append made in your layer

```
$> tree meta-st/meta-st-framework/recipes-graphics/xorg-lib
|-- pixman
| |-- 0001-NV12-format-support.patch
| `-- 0001-Somes-Changes.patch
`-- pixman_0.32.6.bbappend
```

## 3 List of devtool commands

## 3.1 Beginning to work on a recipe

### 3.1.1 devtool add

Add a new recipe to the workspace

· Help command:

```
$ devtool add --help
NOTE: Starting bitbake server...
usage: devtool add [-h] [--same-dir | --no-same-dir] [--fetch URI]
                   [--fetch-dev] [--version VERSION] [--no-git]
                   [--srcrev SRCREV | --autorev] [--srcbranch SRCBRANCH]
                   [--binary] [--also-native] [--src-subdir SUBDIR]
                   [--mirrors] [--provides PROVIDES]
                   [recipename] [srctree] [fetchuri]
Adds a new recipe to the workspace to build a specified source tree. Can
optionally fetch a remote URI and unpack it to create the source tree.
arguments:
  recipename
                        Name for new recipe to add (just name - no version,
                        path or extension). If not specified, will attempt to
                        auto-detect it.
  srctree
                        Path to external source tree. If not specified, a
                        subdirectory of
                        <WORKSPACE_LAYER_PATH>/workspace/sources will be used.
```

Example

## \$ devtool add mylibrary <source path/mylibrary>

• Workspace: result of add command

```
$ tree workspaceworkspace/
|-- appends
| `-- mylibrary.bbappend
|-- conf
| `-- layer.conf
|-- README
`-- recipes
   `-- mylibrary
   `-- mylibrary.bb
```

.bb: recipe file of mylibrary automatically filled with the information found in mysource/mylibrary directory .bbappend: recipe file for managing source code of mylibrary via externalsrc class.

## 3.1.2 devtool modify

Modify the source for an existing recipe and add to the workspace.

· Help command:

```
$ devtool modify --help
NOTE: Starting bitbake server...
usage: devtool modify [-h] [--wildcard] [--extract | --no-extract]
                      [--same-dir | --no-same-dir] [--branch BRANCH]
                      [--keep-temp]
                      recipename [srctree]
Sets up the build environment to modify the source for an existing recipe. The
default behaviour is to extract the source being fetched by the recipe into a
git tree so you can work on it; alternatively if you already have your own
pre-prepared source tree you can specify -n/--no-extract.
arguments:
                        Name of existing recipe to edit (just name - no
  recipename
                        version, path or extension)
  srctree
                        Path to external source tree. If not specified, a
                        subdirectory of
                        <WORKSPACE_LAYER_PATH>//workspace/sources will be used.
```

Example

```
$ devtool modify -x mylibrary <source path/mylibrary>
(option -x: request to devtool to extract the source code and patch it on <source path/mylibrary>
following the rule available on mylibrary recipe.
```

• Workspace:

```
$ tree workspace
workspace/
|-- appends
| `-- mylibrary_<version>.bbappend
|-- conf
| `-- layer.conf
|-- README
`-- recipes
```

## 3.1.3 devtool upgrade

Upgrade the source of an existing recipe to a new version

• Help command:

```
$ devtool upgrade --help
NOTE: Starting bitbake server...
usage: devtool upgrade [-h] [--version VERSION] [--srcrev SRCREV]
                       [--srcbranch SRCBRANCH] [--branch BRANCH] [--no-patch]
                       [--same-dir | --no-same-dir] [--keep-temp]
                       recipename [srctree]
Upgrades an existing recipe to a new upstream version. Puts the upgraded
recipe file into the workspace along with any associated files, and extracts
the source tree to a specified location (in case patches need rebasing or
adding to as a result of the upgrade).
arguments:
  recipename
                        Name of recipe to upgrade (just name - no version,
                        path or extension)
                        Path to where to extract the source tree. If not
  srctree
                        specified, a subdirectory of
                        <WORKSPACE_LAYER_PATH>/workspace/sources will be used.
```

Example

```
$ devtool upgrade mylib --srcrev <NEW SHA1>
```

## 3.2 Getting information

#### 3.2.1 devtool status

Show workspace status (list of recipe(s) on workspace).

· Help command:

```
$ devtool status --help
NOTE: Starting bitbake server...
usage: devtool status [-h]
Lists recipes currently in your workspace and the paths to their respective
external source trees

options:
   -h, --help show this help message and exit
```

```
$ devtool status
```

## 3.2.2 devtool search

Search available recipes (same as bitbake -s but with matching pattern).

• Help command:

```
$ devtool search --help
NOTE: Starting bitbake server...
usage: devtool search [-h] keyword

Searches for available target recipes. Matches on recipe name, package name,
description and installed files, and prints the recipe name on match.

arguments:
    keyword    Keyword to search for (regular expression syntax allowed)

options:
    -h, --help show this help message and exit
```

Example

#### \$ devtool search weston

glibc GLIBC (GNU C Library)

weston Weston, a Wayland compositor libgcc GNU cc and gcc C compilers gcc-runtime Runtime libraries from GCC

weston-init Startup script and systemd unit file for the Weston Wayland compositor

# 3.3 Working on a recipe in the workspace

## 3.3.1 devtool build

Build a recipe, request to devtool to perform do\_configure, do\_compile and do\_install for a specific package managed in the workspace.

· Help command:

```
$ devtool build myapp
```

#### 3.3.2 devtool rename

Rename the recipe file name with a new name.

• Help command:

```
$ devtool rename --help
NOTE: Starting bitbake server...
usage: devtool rename [-h] [--version VERSION] [--no-srctree]
                      recipename [newname]
Renames the recipe file for a recipe in the workspace, changing the name or
version part or both, ensuring that all references within the workspace are
updated at the same time. Only works when the recipe file itself is in the
workspace, e.g. after devtool add. Particularly useful when devtool add did
not automatically determine the correct name.
arguments:
  recipename
                        Current name of recipe to rename
                        New name for recipe (optional, not needed if you only
  newname
                        want to change the version)
options:
  -h, --help
                        show this help message and exit
  --version VERSION, -V VERSION
```

Example

# \$ devtool rename mylib mylib\_newname



This commands only works after usage of 'devtool add' or 'devtool upgrade' command as it needs the recipe file itself to be in the workspace.

### 3.3.3 devtool edit-recipe

Edit recipe file in the configured editor

· Help command:

Example

```
$ devtool edit-recipe mylib
```

## 3.3.4 devtool find-recipe

Find any recipe file

Help command:

Example

```
$ devtool find-recipe mylib
```

# 3.3.5 devtool configure-help

Display the configure help for a recipe using such script.

• Help command:

```
$ devtool configure-help --help
NOTE: Starting bitbake server...
usage: devtool configure-help [options] recipename [--arg ...]
Displays the help for the configure script for the specified recipe (i.e. runs
./configure --help) prefaced by a header describing the current options being
specified. Output is piped through less (or whatever PAGER is set to, if set)
for easy browsing.
arguments:
  recipename
                   Recipe to show configure help for
options:
  -h, --help
                   show this help message and exit
  -p, --no-pager
                   Disable paged output
  -n, --no-header Disable explanatory header text
                   Pass remaining arguments to the configure script instead of
  --arg ...
                   --help (useful if the script has additional help options)
```

Example

```
$ devtool configure-help mylib
```

## 3.3.6 devtool update-recipe

Apply changes from external source tree to recipe:

- by updating bb file
- by updating or creating bbappend file
  - Help command:

```
$ devtool update-recipe --help
NOTE: Starting bitbake server...
usage: devtool update-recipe [-h] [--mode MODE] [--initial-rev INITIAL_REV]
                             [--append LAYERDIR] [--wildcard-version]
                             [--no-remove]
                             recipename
Applies changes from external source tree to a recipe
(updating/adding/removing patches as necessary, or by updating SRCREV). Note
that these changes need to have been committed to the git repository in order
to be recognised.
arguments:
  recipename
                       Name of recipe to update
options:
  -h, --help
                        show this help message and exit
  --mode MODE, -m MODE Update mode (where MODE is patch, srcrev, auto;
                        default is auto)
```

Example

Create a bbappend for a specific recipe, here pixman

```
$ devtool update-recipe -a ../meta-st/meta-st-framework pixman
```

Update the recipe libsmaf

```
$ devtool update-recipe libsmaf
```

#### 3.3.7 devtool reset

Remove a recipe from your workspace (only on workspace).

· Help command:

Example

```
$ devtool reset myapp
```

#### 3.3.8 devtool finish

Allow to complete the development done through devtool by updating layer(s) with the work done.

• Help command:

```
$ devtool finish --help
```

NOTE: Starting bitbake server...

usage: devtool finish [-h] [--mode MODE] [--initial-rev INITIAL\_REV]

recipename destination

Pushes any committed changes to the specified recipe to the specified layer and removes it from your workspace. Roughly equivalent to an update-recipe followed by reset, except the update-recipe step will do the "right thing" depending on the recipe and the destination layer specified.

arguments:

recipename Recipe to finish

destination Layer/path to put recipe into. Can be the name of a

layer configured in your bblayers.conf, the path to the base of a layer, or a partial path inside a layer. devtool finish will attempt to complete the path based

on the layer's structure.

options:

Example

\$ devtool finish mylib Layer/path

## 3.4 Testing changes on target

#### 3.4.1 devtool deploy-target

Deploy recipe output files to live target machine.

· Help command:

Deploys a recipe's build output (i.e. the output of the do\_install task) to a live target machine over ssh. By default, any existing files will be preserved instead of being overwritten and will be restored if you run devtool undeploytarget. Note: this only deploys the recipe itself and not any runtime dependencies, so it is assumed that those have been installed on the target beforehand.

arguments:

recipename Recipe to deploy

target Live target machine running an ssh server:

user@hostname[:destdir]

options:

Example

\$ devtool deploy-target myapp root@<ip of board>



If your package depends on an other package on runtime (RDEPENDS), it will not force the installation of the dependent package in your rootfs. Therefore you will need to use "devtool build-image" to make sure your rootfs is updated.

'deploy-target' copies 'D' directory. It contains all files generated by the recipe. So its content depends on which recipe packages are installed on the target. However 'D' could contain files that do not need to be installed on target.

▲ This is the case in particular for virtual/kernel recipe that generates the file 'vmlinux' which is not installed on target. So by doing a 'deploy-target' with kernel recipe, it could generate some 'no space left' errors (that can be solved by manually removing 'vmlinux' before launching the deploy command)

#### 3.4.2 devtool undeploy-target

Remove recipe output files from live target machine.

· Help command:

```
$ devtool undeploy-target --help
NOTE: Starting bitbake server...
usage: devtool undeploy-target [-h] [-c] [-s] [-a] [-n] [-P PORT]
                               [recipename] target
Un-deploys recipe output files previously deployed to a live target machine by
devtool deploy-target.
arguments:
                        Recipe to undeploy (if not using -a/--all)
  recipename
  target
                        Live target machine running an ssh server:
                        user@hostname
options:
  -h, --help
                        show this help message and exit
  -c, --no-host-check Disable ssh host key checking
  -s, --show-status
                        Show progress/status output
                        Undeploy all recipes deployed on the target
  -a, --all
  -n, --dry-run
                        List files to be undeployed only
```

Example

\$ devtool undeploy-target myapp root@<ip of board>



this command may permanently remove the files from the live target machine

## 3.4.3 devtool build-image

Build image including workspace recipe packages.

· Help command:

```
$ devtool build-image st-image-weston
```

#### 3.5 Advanced

### 3.5.1 devtool create-workspace

Create a specific workspace folder instead of the default one

· Help command:

Example

```
$ devtool create-workspace NewWorkspace/path
```

#### 3.5.2 devtool import

Import any exported workspace into the workspace.

• Help command:

```
$ devtool import ExportedWorkspaceFileName
```

#### 3.5.3 devtool extract

Extract the source for an existing recipe:

- extract of source code (do\_unpack).
- patch it (do\_patch).
  - · Help command:

```
$ devtool extract --help
NOTE: Starting bitbake server...
usage: devtool extract [-h] [--branch BRANCH] [--keep-temp] recipename srctree
Extracts the source for an existing recipe
arguments:
                        Name of recipe to extract the source for
  recipename
  srctree
                        Path to where to extract the source tree
options:
  -h, --help
                        show this help message and exit
  --branch BRANCH, -b BRANCH
                        Name for development branch to checkout (default
  --keep-temp
                        Keep temporary directory (for debugging)
```

Example

```
$ devtool extract pixman <source path/pixman>
```

#### 3.5.4 devtool sync

Synchronize extracted sources

• Help command:

```
$ devtool sync --help
NOTE: Starting bitbake server...
usage: devtool sync [-h] [--branch BRANCH] [--keep-temp] recipename srctree
Synchronize the previously extracted source tree for an existing recipe
arguments:
  recipename
                        Name of recipe to sync the source for
  srctree
                        Path to the source tree
options:
  -h, --help
                        show this help message and exit
  --branch BRANCH, -b BRANCH
                        Name for development branch to checkout (default:
                        Keep temporary directory (for debugging) (default:
  --keep-temp
                        False)
```

```
$ devtool sync libsmaf mysources/libsmaf
```

## 3.5.5 devtool export

Export the workspace as tarball.

· Help command:

```
$ devtool export --help
NOTE: Starting bitbake server...
usage: devtool export [-h] [--file FILE] [--overwrite]
                      [--include INCLUDE [INCLUDE ...] | --exclude EXCLUDE
                      [EXCLUDE ...]]
Export one or more recipes from current workspace into a tar archive
options:
  -h, --help
                        show this help message and exit
  --file FILE, -f FILE Output archive file name
  --overwrite, -o
                        Overwrite previous export tar archive
  --include INCLUDE [INCLUDE ...], -i INCLUDE [INCLUDE ...]
                        Include recipes into the tar archive
  --exclude EXCLUDE [EXCLUDE ...], -e EXCLUDE [EXCLUDE ...]
                        Exclude recipes into the tar archive
```

Example

```
$ devtool export ExportWokspaceFileName
```