**BitBake User Manual**

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BitBake Community

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**Chapter 1. Overview**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#bitbake-user-manual-intro)

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Welcome to the BitBake User Manual. This manual provides information on the BitBake tool. The information attempts to be as independent as possible regarding systems that use BitBake, such as OpenEmbedded and the Yocto Project. In some cases, scenarios or examples within the context of a build system are used in the manual to help with understanding. For these cases, the manual clearly states the context.

**1.1. Introduction**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#intro)

Fundamentally, BitBake is a generic task execution engine that allows shell and Python tasks to be run efficiently and in parallel while working within complex inter-task dependency constraints. One of BitBake's main users, OpenEmbedded, takes this core and builds embedded Linux software stacks using a task-oriented approach.

Conceptually, BitBake is similar to GNU Make in some regards but has significant differences:

* BitBake executes tasks according to provided metadata that builds up the tasks. Metadata is stored in recipe (.bb) and related recipe "append" (.bbappend) files, configuration (.conf) and underlying include (.inc) files, and in class (.bbclass) files. The metadata provides BitBake with instructions on what tasks to run and the dependencies between those tasks.
* BitBake includes a fetcher library for obtaining source code from various places such as local files, source control systems, or websites.
* The instructions for each unit to be built (e.g. a piece of software) are known as "recipe" files and contain all the information about the unit (dependencies, source file locations, checksums, description and so on).
* BitBake includes a client/server abstraction and can be used from a command line or used as a service over XML-RPC and has several different user interfaces.

**1.2. History and Goals**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#history-and-goals)

BitBake was originally a part of the OpenEmbedded project. It was inspired by the Portage package management system used by the Gentoo Linux distribution. On December 7, 2004, OpenEmbedded project team member Chris Larson split the project into two distinct pieces:

* BitBake, a generic task executor
* OpenEmbedded, a metadata set utilized by BitBake

Today, BitBake is the primary basis of the [OpenEmbedded](http://www.openembedded.org/) project, which is being used to build and maintain Linux distributions such as the [Angstrom Distribution](http://www.angstrom-distribution.org/), and which is also being used as the build tool for Linux projects such as the [Yocto Project](http://www.yoctoproject.org/).

Prior to BitBake, no other build tool adequately met the needs of an aspiring embedded Linux distribution. All of the build systems used by traditional desktop Linux distributions lacked important functionality, and none of the ad hoc Buildroot-based systems, prevalent in the embedded space, were scalable or maintainable.

Some important original goals for BitBake were:

* Handle cross-compilation.
* Handle inter-package dependencies (build time on target architecture, build time on native architecture, and runtime).
* Support running any number of tasks within a given package, including, but not limited to, fetching upstream sources, unpacking them, patching them, configuring them, and so forth.
* Be Linux distribution agnostic for both build and target systems.
* Be architecture agnostic.
* Support multiple build and target operating systems (e.g. Cygwin, the BSDs, and so forth).
* Be self contained, rather than tightly integrated into the build machine's root filesystem.
* Handle conditional metadata on the target architecture, operating system, distribution, and machine.
* Be easy to use the tools to supply local metadata and packages against which to operate.
* Be easy to use BitBake to collaborate between multiple projects for their builds.
* Provide an inheritance mechanism to share common metadata between many packages.

Over time it became apparent that some further requirements were necessary:

* Handle variants of a base recipe (e.g. native, sdk, and multilib).
* Split metadata into layers and allow layers to enhance or override other layers.
* Allow representation of a given set of input variables to a task as a checksum. Based on that checksum, allow acceleration of builds with prebuilt components.

BitBake satisfies all the original requirements and many more with extensions being made to the basic functionality to reflect the additional requirements. Flexibility and power have always been the priorities. BitBake is highly extensible and supports embedded Python code and execution of any arbitrary tasks.

**1.3. Concepts**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#Concepts)

BitBake is a program written in the Python language. At the highest level, BitBake interprets metadata, decides what tasks are required to run, and executes those tasks. Similar to GNU Make, BitBake controls how software is built. GNU Make achieves its control through "makefiles", while BitBake uses "recipes".

BitBake extends the capabilities of a simple tool like GNU Make by allowing for the definition of much more complex tasks, such as assembling entire embedded Linux distributions.

The remainder of this section introduces several concepts that should be understood in order to better leverage the power of BitBake.

**1.3.1. Recipes**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#recipes)

BitBake Recipes, which are denoted by the file extension .bb, are the most basic metadata files. These recipe files provide BitBake with the following:

* Descriptive information about the package (author, homepage, license, and so on)
* The version of the recipe
* Existing dependencies (both build and runtime dependencies)
* Where the source code resides and how to fetch it
* Whether the source code requires any patches, where to find them, and how to apply them
* How to configure and compile the source code
* Where on the target machine to install the package or packages created

Within the context of BitBake, or any project utilizing BitBake as its build system, files with the .bb extension are referred to as recipes.

**Note**

The term "package" is also commonly used to describe recipes. However, since the same word is used to describe packaged output from a project, it is best to maintain a single descriptive term - "recipes". Put another way, a single "recipe" file is quite capable of generating a number of related but separately installable "packages". In fact, that ability is fairly common.

**1.3.2. Configuration Files**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#configuration-files)

Configuration files, which are denoted by the .conf extension, define various configuration variables that govern the project's build process. These files fall into several areas that define machine configuration options, distribution configuration options, compiler tuning options, general common configuration options, and user configuration options. The main configuration file is the sample bitbake.conf file, which is located within the BitBake source tree confdirectory.

**1.3.3. Classes**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#classes)

Class files, which are denoted by the .bbclass extension, contain information that is useful to share between metadata files. The BitBake source tree currently comes with one class metadata file called base.bbclass. You can find this file in the classes directory. The base.bbclass class files is special since it is always included automatically for all recipes and classes. This class contains definitions for standard basic tasks such as fetching, unpacking, configuring (empty by default), compiling (runs any Makefile present), installing (empty by default) and packaging (empty by default). These tasks are often overridden or extended by other classes added during the project development process.

**1.3.4. Layers**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#layers)

Layers allow you to isolate different types of customizations from each other. While you might find it tempting to keep everything in one layer when working on a single project, the more modular you organize your metadata, the easier it is to cope with future changes.

To illustrate how you can use layers to keep things modular, consider customizations you might make to support a specific target machine. These types of customizations typically reside in a special layer, rather than a general layer, called a Board Support Package (BSP) Layer. Furthermore, the machine customizations should be isolated from recipes and metadata that support a new GUI environment, for example. This situation gives you a couple of layers: one for the machine configurations and one for the GUI environment. It is important to understand, however, that the BSP layer can still make machine-specific additions to recipes within the GUI environment layer without polluting the GUI layer itself with those machine-specific changes. You can accomplish this through a recipe that is a BitBake append (.bbappend) file.

**1.3.5. Append Files**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#append-bbappend-files)

Append files, which are files that have the .bbappend file extension, extend or override information in an existing recipe file.

BitBake expects every append file to have a corresponding recipe file. Furthermore, the append file and corresponding recipe file must use the same root filename. The filenames can differ only in the file type suffix used (e.g.formfactor\_0.0.bb and formfactor\_0.0.bbappend).

Information in append files extends or overrides the information in the underlying, similarly-named recipe files.

When you name an append file, you can use the wildcard character (%) to allow for matching recipe names. For example, suppose you have an append file named as follows:

busybox\_1.21.%.bbappend

That append file would match any busybox\_1.21.x.bb version of the recipe. So, the append file would match the following recipe names:

busybox\_1.21.1.bb

busybox\_1.21.2.bb

busybox\_1.21.3.bb

If the busybox recipe was updated to busybox\_1.3.0.bb, the append name would not match. However, if you named the append file busybox\_1.%.bbappend, then you would have a match.

In the most general case, you could name the append file something as simple as busybox\_%.bbappend to be entirely version independent.

**1.4. Obtaining BitBake**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#obtaining-bitbake)

You can obtain BitBake several different ways:

* ***Cloning BitBake:*** Using Git to clone the BitBake source code repository is the recommended method for obtaining BitBake. Cloning the repository makes it easy to get bug fixes and have access to stable branches and the master branch. Once you have cloned BitBake, you should use the latest stable branch for development since the master branch is for BitBake development and might contain less stable changes.

You usually need a version of BitBake that matches the metadata you are using. The metadata is generally backwards compatible but not forward compatible.

Here is an example that clones the BitBake repository:

$ git clone git://git.openembedded.org/bitbake

This command clones the BitBake Git repository into a directory called bitbake. Alternatively, you can designate a directory after the git clone command if you want to call the new directory something other than bitbake. Here is an example that names the directory bbdev:

$ git clone git://git.openembedded.org/bitbake bbdev

* ***Installation using your Distribution Package Management System:*** This method is not recommended because the BitBake version that is provided by your distribution, in most cases, is several releases behind a snapshot of the BitBake repository.
* ***Taking a snapshot of BitBake:*** Downloading a snapshot of BitBake from the source code repository gives you access to a known branch or release of BitBake.

**Note**

Cloning the Git repository, as described earlier, is the preferred method for getting BitBake. Cloning the repository makes it easier to update as patches are added to the stable branches.

The following example downloads a snapshot of BitBake version 1.17.0:

$ wget http://git.openembedded.org/bitbake/snapshot/bitbake-1.17.0.tar.gz

$ tar zxpvf bitbake-1.17.0.tar.gz

After extraction of the tarball using the tar utility, you have a directory entitled bitbake-1.17.0.

* ***Using the BitBake that Comes With Your Build Checkout:*** A final possibility for getting a copy of BitBake is that it already comes with your checkout of a larger Bitbake-based build system, such as Poky or Yocto Project. Rather than manually checking out individual layers and gluing them together yourself, you can check out an entire build system. The checkout will already include a version of BitBake that has been thoroughly tested for compatibility with the other components. For information on how to check out a particular BitBake-based build system, consult that build system's supporting documentation.

**1.5. The BitBake Command**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#bitbake-user-manual-command)

The bitbake command is the primary interface to the BitBake tool. This section presents the BitBake command syntax and provides several execution examples.

**1.5.1. Usage and syntax**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#usage-and-syntax)

Following is the usage and syntax for BitBake:

$ bitbake -h

Usage: bitbake [options] [recipename/target ...]

Executes the specified task (default is 'build') for a given set of target recipes (.bb files).

It is assumed there is a conf/bblayers.conf available in cwd or in BBPATH which

will provide the layer, BBFILES and other configuration information.

Options:

--version show program's version number and exit

-h, --help show this help message and exit

-b BUILDFILE, --buildfile=BUILDFILE

Execute tasks from a specific .bb recipe directly.

WARNING: Does not handle any dependencies from other

recipes.

-k, --continue Continue as much as possible after an error. While the

target that failed and anything depending on it cannot

be built, as much as possible will be built before

stopping.

-a, --tryaltconfigs Continue with builds by trying to use alternative

providers where possible.

-f, --force Force the specified targets/task to run (invalidating

any existing stamp file).

-c CMD, --cmd=CMD Specify the task to execute. The exact options

available depend on the metadata. Some examples might

be 'compile' or 'populate\_sysroot' or 'listtasks' may

give a list of the tasks available.

-C INVALIDATE\_STAMP, --clear-stamp=INVALIDATE\_STAMP

Invalidate the stamp for the specified task such as

'compile' and then run the default task for the

specified target(s).

-r PREFILE, --read=PREFILE

Read the specified file before bitbake.conf.

-R POSTFILE, --postread=POSTFILE

Read the specified file after bitbake.conf.

-v, --verbose Output more log message data to the terminal.

-D, --debug Increase the debug level. You can specify this more

than once.

-n, --dry-run Don't execute, just go through the motions.

-S SIGNATURE\_HANDLER, --dump-signatures=SIGNATURE\_HANDLER

Dump out the signature construction information, with

no task execution. The SIGNATURE\_HANDLER parameter is

passed to the handler. Two common values are none and

printdiff but the handler may define more/less. none

means only dump the signature, printdiff means compare

the dumped signature with the cached one.

-p, --parse-only Quit after parsing the BB recipes.

-s, --show-versions Show current and preferred versions of all recipes.

-e, --environment Show the global or per-recipe environment complete

with information about where variables were

set/changed.

-g, --graphviz Save dependency tree information for the specified

targets in the dot syntax.

-I EXTRA\_ASSUME\_PROVIDED, --ignore-deps=EXTRA\_ASSUME\_PROVIDED

Assume these dependencies don't exist and are already

provided (equivalent to ASSUME\_PROVIDED). Useful to

make dependency graphs more appealing

-l DEBUG\_DOMAINS, --log-domains=DEBUG\_DOMAINS

Show debug logging for the specified logging domains

-P, --profile Profile the command and save reports.

-u UI, --ui=UI The user interface to use (e.g. knotty, hob, depexp).

-t SERVERTYPE, --servertype=SERVERTYPE

Choose which server to use, process or xmlrpc.

--token=XMLRPCTOKEN Specify the connection token to be used when

connecting to a remote server.

--revisions-changed Set the exit code depending on whether upstream

floating revisions have changed or not.

--server-only Run bitbake without a UI, only starting a server

(cooker) process.

-B BIND, --bind=BIND The name/address for the bitbake server to bind to.

--no-setscene Do not run any setscene tasks. sstate will be ignored

and everything needed, built.

--remote-server=REMOTE\_SERVER

Connect to the specified server.

-m, --kill-server Terminate the remote server.

--observe-only Connect to a server as an observing-only client.

--status-only Check the status of the remote bitbake server.

**1.5.2. Examples**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#bitbake-examples)

This section presents some examples showing how to use BitBake.

**1.5.2.1. Executing a Task Against a Single Recipe**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#example-executing-a-task-against-a-single-recipe)

Executing tasks for a single recipe file is relatively simple. You specify the file in question, and BitBake parses it and executes the specified task. If you do not specify a task, BitBake executes the default task, which is "build”. BitBake obeys inter-task dependencies when doing so.

The following command runs the build task, which is the default task, on the foo\_1.0.bb recipe file:

$ bitbake -b foo\_1.0.bb

The following command runs the clean task on the foo.bb recipe file:

$ bitbake -b foo.bb -c clean

**Note**

The "-b" option explicitly does not handle recipe dependencies. Other than for debugging purposes, it is instead recommended that you use the syntax presented in the next section.

**1.5.2.2. Executing Tasks Against a Set of Recipe Files**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#executing-tasks-against-a-set-of-recipe-files)

There are a number of additional complexities introduced when one wants to manage multiple .bb files. Clearly there needs to be a way to tell BitBake what files are available and, of those, which you want to execute. There also needs to be a way for each recipe to express its dependencies, both for build-time and runtime. There must be a way for you to express recipe preferences when multiple recipes provide the same functionality, or when there are multiple versions of a recipe.

The bitbake command, when not using "--buildfile" or "-b" only accepts a "PROVIDES". You cannot provide anything else. By default, a recipe file generally "PROVIDES" its "packagename" as shown in the following example:

$ bitbake foo

This next example "PROVIDES" the package name and also uses the "-c" option to tell BitBake to just execute thedo\_clean task:

$ bitbake -c clean foo

**1.5.2.3. Generating Dependency Graphs**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#generating-dependency-graphs)

BitBake is able to generate dependency graphs using the dot syntax. You can convert these graphs into images using thedot tool from [Graphviz](http://www.graphviz.org/).

When you generate a dependency graph, BitBake writes four files to the current working directory:

* ***package-depends.dot:*** Shows BitBake's knowledge of dependencies between runtime targets.
* ***pn-depends.dot:*** Shows dependencies between build-time targets (i.e. recipes).
* ***task-depends.dot:*** Shows dependencies between tasks.
* ***pn-buildlist:*** Shows a simple list of targets that are to be built.

To stop depending on common depends, use the "-I" depend option and BitBake omits them from the graph. Leaving this information out can produce more readable graphs. This way, you can remove from the graph DEPENDS from inherited classes such as base.bbclass.

Here are two examples that create dependency graphs. The second example omits depends common in OpenEmbedded from the graph:

$ bitbake -g foo

$ bitbake -g -I virtual/kernel -I eglibc foo

**Chapter 2. Execution**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#bitbake-user-manual-execution)

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The primary purpose for running BitBake is to produce some kind of output such as a single installable package, a kernel, a software development kit, or even a full, board-specific bootable Linux image, complete with bootloader, kernel, and root filesystem. Of course, you can execute the bitbake command with options that cause it to execute single tasks, compile single recipe files, capture or clear data, or simply return information about the execution environment.

This chapter describes BitBake's execution process from start to finish when you use it to create an image. The execution process is launched using the following command form:

$ bitbake *target*

For information on the BitBake command and its options, see "[The BitBake Command](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#bitbake-user-manual-command)" section.

**Note**

Prior to executing BitBake, you should take advantage of available parallel thread execution on your build host by setting the [BB\_NUMBER\_THREADS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_NUMBER_THREADS) variable in your project's local.conf configuration file.

A common method to determine this value for your build host is to run the following:

$ grep processor /proc/cpuinfo

This command returns the number of processors, which takes into account hyper-threading. Thus, a quad-core build host with hyper-threading most likely shows eight processors, which is the value you would then assign to BB\_NUMBER\_THREADS.

A possibly simpler solution is that some Linux distributions (e.g. Debian and Ubuntu) provide thencpus command.

**2.1. Parsing the Base Configuration Metadata**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#parsing-the-base-configuration-metadata)

The first thing BitBake does is parse base configuration metadata. Base configuration metadata consists of your project'sbblayers.conf file to determine what layers BitBake needs to recognize, all necessary layer.conf files (one from each layer), and bitbake.conf. The data itself is of various types:

* ***Recipes:*** Details about particular pieces of software.
* ***Class Data:*** An abstraction of common build information (e.g. how to build a Linux kernel).
* ***Configuration Data:*** Machine-specific settings, policy decisions, and so forth. Configuration data acts as the glue to bind everything together.

The layer.conf files are used to construct key variables such as [BBPATH](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BBPATH) and [BBFILES](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BBFILES). BBPATH is used to search for configuration and class files under the conf and classes directories, respectively. BBFILES is used to locate both recipe and recipe append files (.bb and .bbappend). If there is no bblayers.conf file, it is assumed the user has set theBBPATH and BBFILES directly in the environment.

Next, the bitbake.conf file is located using the BBPATH variable that was just constructed. The bitbake.conf file may also include other configuration files using the include or require directives.

Prior to parsing configuration files, Bitbake looks at certain variables, including:

* [BB\_ENV\_WHITELIST](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_ENV_WHITELIST)
* [BB\_PRESERVE\_ENV](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_PRESERVE_ENV)
* [BB\_ENV\_EXTRAWHITE](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_ENV_EXTRAWHITE)
* [BITBAKE\_UI](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BITBAKE_UI)

You can find information on how to pass environment variables into the BitBake execution environment in the "[Passing Information Into the Build Task Environment](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#passing-information-into-the-build-task-environment)" section.

The base configuration metadata is global and therefore affects all recipes and tasks that are executed.

BitBake first searches the current working directory for an optional conf/bblayers.conf configuration file. This file is expected to contain a [BBLAYERS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BBLAYERS) variable that is a space-delimited list of 'layer' directories. Recall that if BitBake cannot find a bblayers.conf file, then it is assumed the user has set the BBPATH and BBFILES variables directly in the environment.

For each directory (layer) in this list, a conf/layer.conf file is located and parsed with the [LAYERDIR](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-LAYERDIR) variable being set to the directory where the layer was found. The idea is these files automatically set up [BBPATH](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BBPATH) and other variables correctly for a given build directory.

BitBake then expects to find the conf/bitbake.conf file somewhere in the user-specified BBPATH. That configuration file generally has include directives to pull in any other metadata such as files specific to the architecture, the machine, the local environment, and so forth.

Only variable definitions and include directives are allowed in BitBake .conf files. Some variables directly influence BitBake's behavior. These variables might have been set from the environment depending on the environment variables previously mentioned or set in the configuration files. The "[Variables Glossary](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#ref-variables-glos)" chapter presents a full list of variables.

After parsing configuration files, BitBake uses its rudimentary inheritance mechanism, which is through class files, to inherit some standard classes. BitBake parses a class when the inherit directive responsible for getting that class is encountered.

The base.bbclass file is always included. Other classes that are specified in the configuration using the [INHERIT](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-INHERIT)variable are also included. BitBake searches for class files in a classes subdirectory under the paths in BBPATH in the same way as configuration files.

A good way to get an idea of the configuration files and the class files used in your execution environment is to run the following BitBake command:

$ bitbake -e > mybb.log

Examining the top of the mybb.log shows you the many configuration files and class files used in your execution environment.

**Note**

You need to be aware of how BitBake parses curly braces. If a recipe uses a closing curly brace within the function and the character has no leading spaces, BitBake produces a parsing error. If you use a pair of curly braces in a shell function, the closing curly brace must not be located at the start of the line without leading spaces.

Here is an example that causes BitBake to produce a parsing error:

fakeroot create\_shar() {

cat << "EOF" > ${SDK\_DEPLOY}/${TOOLCHAIN\_OUTPUTNAME}.sh

usage()

{

echo "test"

###### The following "}" at the start of the line causes a parsing error ######

}

EOF

}

Writing the recipe this way avoids the error:

fakeroot create\_shar() {

cat << "EOF" > ${SDK\_DEPLOY}/${TOOLCHAIN\_OUTPUTNAME}.sh

usage()

{

echo "test"

######The following "}" with a leading space at the start of the line avoids the error ######

}

EOF

}

**2.2. Locating and Parsing Recipes**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#locating-and-parsing-recipes)

During the configuration phase, BitBake will have set [BBFILES](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BBFILES). BitBake now uses it to construct a list of recipes to parse, along with any append files (.bbappend) to apply. BBFILES is a space-separated list of available files and supports wildcards. An example would be:

BBFILES = "/path/to/bbfiles/\*.bb /path/to/appends/\*.bbappend"

BitBake parses each recipe and append file located with BBFILES and stores the values of various variables into the datastore.

**Note**

Append files are applied in the order they are encountered in BBFILES.

For each file, a fresh copy of the base configuration is made, then the recipe is parsed line by line. Any inherit statements cause BitBake to find and then parse class files (.bbclass) using [BBPATH](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BBPATH) as the search path. Finally, BitBake parses in order any append files found in BBFILES.

One common convention is to use the recipe filename to define pieces of metadata. For example, in bitbake.conf the recipe name and version are used to set the variables [PN](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PN) and [PV](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PV):

PN = "${@bb.parse.BBHandler.vars\_from\_file(d.getVar('FILE'),d)[0] or 'defaultpkgname'}"

PV = "${@bb.parse.BBHandler.vars\_from\_file(d.getVar('FILE'),d)[1] or '1.0'}"

In this example, a recipe called "something\_1.2.3.bb" would set PN to "something" and PV to "1.2.3".

By the time parsing is complete for a recipe, BitBake has a list of tasks that the recipe defines and a set of data consisting of keys and values as well as dependency information about the tasks.

BitBake does not need all of this information. It only needs a small subset of the information to make decisions about the recipe. Consequently, BitBake caches the values in which it is interested and does not store the rest of the information. Experience has shown it is faster to re-parse the metadata than to try and write it out to the disk and then reload it.

Where possible, subsequent BitBake commands reuse this cache of recipe information. The validity of this cache is determined by first computing a checksum of the base configuration data (see [BB\_HASHCONFIG\_WHITELIST](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_HASHCONFIG_WHITELIST)) and then checking if the checksum matches. If that checksum matches what is in the cache and the recipe and class files have not changed, Bitbake is able to use the cache. BitBake then reloads the cached information about the recipe instead of reparsing it from scratch.

Recipe file collections exist to allow the user to have multiple repositories of .bb files that contain the same exact package. For example, one could easily use them to make one's own local copy of an upstream repository, but with custom modifications that one does not want upstream. Here is an example:

BBFILES = "/stuff/openembedded/\*/\*.bb /stuff/openembedded.modified/\*/\*.bb"

BBFILE\_COLLECTIONS = "upstream local"

BBFILE\_PATTERN\_upstream = "^/stuff/openembedded/"

BBFILE\_PATTERN\_local = "^/stuff/openembedded.modified/"

BBFILE\_PRIORITY\_upstream = "5"

BBFILE\_PRIORITY\_local = "10"

**Note**

The layers mechanism is now the preferred method of collecting code. While the collections code remains, its main use is to set layer priorities and to deal with overlap (conflicts) between layers.

**2.3. Providers**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#bb-bitbake-providers)

Assuming BitBake has been instructed to execute a target and that all the recipe files have been parsed, BitBake starts to figure out how to build the target. BitBake looks through the PROVIDES list for each of the recipes. A PROVIDES list is the list of names by which the recipe can be known. Each recipe's PROVIDES list is created implicitly through the recipe's[PN](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PN) variable and explicitly through the recipe's [PROVIDES](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PROVIDES) variable, which is optional.

When a recipe uses PROVIDES, that recipe's functionality can be found under an alternative name or names other than the implicit PN name. As an example, suppose a recipe named keyboard\_1.0.bb contained the following:

PROVIDES += "fullkeyboard"

The PROVIDES list for this recipe becomes "keyboard", which is implicit, and "fullkeyboard", which is explicit. Consequently, the functionality found in keyboard\_1.0.bb can be found under two different names.

**2.4. Preferences**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#bb-bitbake-preferences)

The PROVIDES list is only part of the solution for figuring out a target's recipes. Because targets might have multiple providers, BitBake needs to prioritize providers by determining provider preferences.

A common example in which a target has multiple providers is "virtual/kernel", which is on the PROVIDES list for each kernel recipe. Each machine often selects the best kernel provider by using a line similar to the following in the machine configuration file:

PREFERRED\_PROVIDER\_virtual/kernel = "linux-yocto"

The default [PREFERRED\_PROVIDER](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PREFERRED_PROVIDER) is the provider with the same name as the target. Bitbake iterates through each target it needs to build and resolves them and their dependencies using this process.

Understanding how providers are chosen is made complicated by the fact that multiple versions might exist for a given provider. BitBake defaults to the highest version of a provider. Version comparisons are made using the same method as Debian. You can use the [PREFERRED\_VERSION](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PREFERRED_VERSION) variable to specify a particular version. You can influence the order by using the [DEFAULT\_PREFERENCE](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-DEFAULT_PREFERENCE) variable.

By default, files have a preference of "0". Setting DEFAULT\_PREFERENCE to "-1" makes the recipe unlikely to be used unless it is explicitly referenced. Setting DEFAULT\_PREFERENCE to "1" makes it likely the recipe is used.PREFERRED\_VERSION overrides any DEFAULT\_PREFERENCE setting. DEFAULT\_PREFERENCE is often used to mark newer and more experimental recipe versions until they have undergone sufficient testing to be considered stable.

When there are multiple “versions” of a given recipe, BitBake defaults to selecting the most recent version, unless otherwise specified. If the recipe in question has a [DEFAULT\_PREFERENCE](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-DEFAULT_PREFERENCE) set lower than the other recipes (default is 0), then it will not be selected. This allows the person or persons maintaining the repository of recipe files to specify their preference for the default selected version. Additionally, the user can specify their preferred version.

If the first recipe is named a\_1.1.bb, then the [PN](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PN) variable will be set to “a”, and the [PV](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PV) variable will be set to 1.1.

Thus, if a recipe named a\_1.2.bb exists, BitBake will choose 1.2 by default. However, if you define the following variable in a .conf file that BitBake parses, you can change that preference:

PREFERRED\_VERSION\_a = "1.1"

**Note**

It is common for a recipe to provide two versions -- a stable, numbered (and preferred) version, and a version that is automatically checked out from a source code repository that is considered more "bleeding edge" but can be selected only explicitly.

For example, in the OpenEmbedded codebase, there is a standard, versioned recipe file for BusyBox,busybox\_1.22.1.bb, but there is also a Git-based version, busybox\_git.bb, which explicitly contains the line

DEFAULT\_PREFERENCE = "-1"

to ensure that the numbered, stable version is always preferred unless the developer selects otherwise.

**2.5. Dependencies**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#bb-bitbake-dependencies)

Each target BitBake builds consists of multiple tasks such as fetch, unpack, patch, configure, and compile. For best performance on multi-core systems, BitBake considers each task as an independent entity with its own set of dependencies.

Dependencies are defined through several variables. You can find information about variables BitBake uses in the[Variables Glossary](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#ref-variables-glos) near the end of this manual. At a basic level, it is sufficient to know that BitBake uses the [DEPENDS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-DEPENDS)and [RDEPENDS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-RDEPENDS) variables when calculating dependencies.

For more information on how BitBake handles dependencies, see the "[Dependencies](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#dependencies)" section.

**2.6. The Task List**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#ref-bitbake-tasklist)

Based on the generated list of providers and the dependency information, BitBake can now calculate exactly what tasks it needs to run and in what order it needs to run them. The "[Executing Tasks](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#executing-tasks)" section has more information on how BitBake chooses which task to execute next.

The build now starts with BitBake forking off threads up to the limit set in the [BB\_NUMBER\_THREADS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_NUMBER_THREADS) variable. BitBake continues to fork threads as long as there are tasks ready to run, those tasks have all their dependencies met, and the thread threshold has not been exceeded.

It is worth noting that you can greatly speed up the build time by properly setting the BB\_NUMBER\_THREADS variable.

As each task completes, a timestamp is written to the directory specified by the [STAMP](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-STAMP) variable. On subsequent runs, BitBake looks in the build directory within tmp/stamps and does not rerun tasks that are already completed unless a timestamp is found to be invalid. Currently, invalid timestamps are only considered on a per recipe file basis. So, for example, if the configure stamp has a timestamp greater than the compile timestamp for a given target, then the compile task would rerun. Running the compile task again, however, has no effect on other providers that depend on that target.

The exact format of the stamps is partly configurable. In modern versions of BitBake, a hash is appended to the stamp so that if the configuration changes, the stamp becomes invalid and the task is automatically rerun. This hash, or signature used, is governed by the signature policy that is configured (see the "[Checksums (Signatures)](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#checksums)" section for information). It is also possible to append extra metadata to the stamp using the "stamp-extra-info" task flag. For example, OpenEmbedded uses this flag to make some tasks machine-specific.

**Note**

Some tasks are marked as "nostamp" tasks. No timestamp file is created when these tasks are run. Consequently, "nostamp" tasks are always rerun.

For more information on tasks, see the "[Tasks](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#tasks)" section.

**2.7. Executing Tasks**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#executing-tasks)

Tasks can be either a shell task or a Python task. For shell tasks, BitBake writes a shell script to${[T](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-T)}/run.do\_taskname.pid and then executes the script. The generated shell script contains all the exported variables, and the shell functions with all variables expanded. Output from the shell script goes to the file${T}/log.do\_taskname.pid. Looking at the expanded shell functions in the run file and the output in the log files is a useful debugging technique.

For Python tasks, BitBake executes the task internally and logs information to the controlling terminal. Future versions of BitBake will write the functions to files similar to the way shell tasks are handled. Logging will be handled in a way similar to shell tasks as well.

The order in which BitBake runs the tasks is controlled by its task scheduler. It is possible to configure the scheduler and define custom implementations for specific use cases. For more information, see these variables that control the behavior:

* [BB\_SCHEDULER](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_SCHEDULER)
* [BB\_SCHEDULERS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_SCHEDULERS)

It is possible to have functions run before and after a task's main function. This is done using the "prefuncs" and "postfuncs" flags of the task that lists the functions to run.

**2.8. Checksums (Signatures)[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html" \l "checksums" \o "Permalink)**

A checksum is a unique signature of a task's inputs. The signature of a task can be used to determine if a task needs to be run. Because it is a change in a task's inputs that triggers running the task, BitBake needs to detect all the inputs to a given task. For shell tasks, this turns out to be fairly easy because BitBake generates a "run" shell script for each task and it is possible to create a checksum that gives you a good idea of when the task's data changes.

To complicate the problem, some things should not be included in the checksum. First, there is the actual specific build path of a given task - the working directory. It does not matter if the working directory changes because it should not affect the output for target packages. The simplistic approach for excluding the working directory is to set it to some fixed value and create the checksum for the "run" script. BitBake goes one step better and uses the[BB\_HASHBASE\_WHITELIST](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_HASHBASE_WHITELIST) variable to define a list of variables that should never be included when generating the signatures.

Another problem results from the "run" scripts containing functions that might or might not get called. The incremental build solution contains code that figures out dependencies between shell functions. This code is used to prune the "run" scripts down to the minimum set, thereby alleviating this problem and making the "run" scripts much more readable as a bonus.

So far we have solutions for shell scripts. What about Python tasks? The same approach applies even though these tasks are more difficult. The process needs to figure out what variables a Python function accesses and what functions it calls. Again, the incremental build solution contains code that first figures out the variable and function dependencies, and then creates a checksum for the data used as the input to the task.

Like the working directory case, situations exist where dependencies should be ignored. For these cases, you can instruct the build process to ignore a dependency by using a line like the following:

PACKAGE\_ARCHS[vardepsexclude] = "MACHINE"

This example ensures that the PACKAGE\_ARCHS variable does not depend on the value of MACHINE, even if it does reference it.

Equally, there are cases where we need to add dependencies BitBake is not able to find. You can accomplish this by using a line like the following:

PACKAGE\_ARCHS[vardeps] = "MACHINE"

This example explicitly adds the MACHINE variable as a dependency for PACKAGE\_ARCHS.

Consider a case with in-line Python, for example, where BitBake is not able to figure out dependencies. When running in debug mode (i.e. using -DDD), BitBake produces output when it discovers something for which it cannot figure out dependencies.

Thus far, this section has limited discussion to the direct inputs into a task. Information based on direct inputs is referred to as the "basehash" in the code. However, there is still the question of a task's indirect inputs - the things that were already built and present in the build directory. The checksum (or signature) for a particular task needs to add the hashes of all the tasks on which the particular task depends. Choosing which dependencies to add is a policy decision. However, the effect is to generate a master checksum that combines the basehash and the hashes of the task's dependencies.

At the code level, there are a variety of ways both the basehash and the dependent task hashes can be influenced. Within the BitBake configuration file, we can give BitBake some extra information to help it construct the basehash. The following statement effectively results in a list of global variable dependency excludes - variables never included in any checksum. This example uses variables from OpenEmbedded to help illustrate the concept:

BB\_HASHBASE\_WHITELIST ?= "TMPDIR FILE PATH PWD BB\_TASKHASH BBPATH DL\_DIR \

SSTATE\_DIR THISDIR FILESEXTRAPATHS FILE\_DIRNAME HOME LOGNAME SHELL TERM \

USER FILESPATH STAGING\_DIR\_HOST STAGING\_DIR\_TARGET COREBASE PRSERV\_HOST \

PRSERV\_DUMPDIR PRSERV\_DUMPFILE PRSERV\_LOCKDOWN PARALLEL\_MAKE \

CCACHE\_DIR EXTERNAL\_TOOLCHAIN CCACHE CCACHE\_DISABLE LICENSE\_PATH SDKPKGSUFFIX"

The previous example excludes the work directory, which is part of TMPDIR.

The rules for deciding which hashes of dependent tasks to include through dependency chains are more complex and are generally accomplished with a Python function. The code in meta/lib/oe/sstatesig.py shows two examples of this and also illustrates how you can insert your own policy into the system if so desired. This file defines the two basic signature generators OpenEmbedded Core uses: "OEBasic" and "OEBasicHash". By default, there is a dummy "noop" signature handler enabled in BitBake. This means that behavior is unchanged from previous versions. OE-Core uses the "OEBasicHash" signature handler by default through this setting in the bitbake.conf file:

BB\_SIGNATURE\_HANDLER ?= "OEBasicHash"

The "OEBasicHash" BB\_SIGNATURE\_HANDLER is the same as the "OEBasic" version but adds the task hash to the stamp files. This results in any metadata change that changes the task hash, automatically causing the task to be run again. This removes the need to bump [PR](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PR) values, and changes to metadata automatically ripple across the build.

It is also worth noting that the end result of these signature generators is to make some dependency and hash information available to the build. This information includes:

* BB\_BASEHASH\_task-*taskname*: The base hashes for each task in the recipe.
* BB\_BASEHASH\_*filename*:*taskname*: The base hashes for each dependent task.
* BBHASHDEPS\_*filename*:*taskname*: The task dependencies for each task.
* BB\_TASKHASH: The hash of the currently running task.

It is worth noting that BitBake's "-S" option lets you debug Bitbake's processing of signatures. The options passed to -S allow different debugging modes to be used, either using BitBake's own debug functions or possibly those defined in the metadata/signature handler itself. The simplest parameter to pass is "none", which causes a set of signature information to be written out into STAMP\_DIR corresponding to the targets specified. The other currently available parameter is "printdiff", which causes BitBake to try to establish the closest signature match it can (e.g. in the sstate cache) and then run bitbake-diffsigs over the matches to determine the stamps and delta where these two stamp trees diverge.

**Note**

It is likely that future versions of BitBake will provide other signature handlers triggered through additional "-S" parameters.

You can find more information on checksum metadata in the "[Task Checksums and Setscene](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#task-checksums-and-setscene)" section.

**2.9. Setscene**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#setscene)

The setscene process enables BitBake to handle "pre-built" artifacts. The ability to handle and reuse these artifacts allows BitBake the luxury of not having to build something from scratch every time. Instead, BitBake can use, when possible, existing build artifacts.

BitBake needs to have reliable data indicating whether or not an artifact is compatible. Signatures, described in the previous section, provide an ideal way of representing whether an artifact is compatible. If a signature is the same, an object can be reused.

If an object can be reused, the problem then becomes how to replace a given task or set of tasks with the pre-built artifact. BitBake solves the problem with the "setscene" process.

When BitBake is asked to build a given target, before building anything, it first asks whether cached information is available for any of the targets it's building, or any of the intermediate targets. If cached information is available, BitBake uses this information instead of running the main tasks.

BitBake first calls the function defined by the [BB\_HASHCHECK\_FUNCTION](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_HASHCHECK_FUNCTION) variable with a list of tasks and corresponding hashes it wants to build. This function is designed to be fast and returns a list of the tasks for which it believes in can obtain artifacts.

Next, for each of the tasks that were returned as possibilities, BitBake executes a setscene version of the task that the possible artifact covers. Setscene versions of a task have the string "\_setscene" appended to the task name. So, for example, the task with the name xxx has a setscene task named xxx\_setscene. The setscene version of the task executes and provides the necessary artifacts returning either success or failure.

As previously mentioned, an artifact can cover more than one task. For example, it is pointless to obtain a compiler if you already have the compiled binary. To handle this, BitBake calls the [BB\_SETSCENE\_DEPVALID](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_SETSCENE_DEPVALID) function for each successful setscene task to know whether or not it needs to obtain the dependencies of that task.

Finally, after all the setscene tasks have executed, BitBake calls the function listed in [BB\_SETSCENE\_VERIFY\_FUNCTION](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_SETSCENE_VERIFY_FUNCTION)with the list of tasks BitBake thinks has been "covered". The metadata can then ensure that this list is correct and can inform BitBake that it wants specific tasks to be run regardless of the setscene result.

You can find more information on setscene metadata in the "[Task Checksums and Setscene](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#task-checksums-and-setscene)" section.

**Chapter 3. Syntax and Operators**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#bitbake-user-manual-metadata)

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Bitbake files have their own syntax. The syntax has similarities to several other languages but also has some unique features. This section describes the available syntax and operators as well as provides examples.

**3.1. Basic Syntax**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#basic-syntax)

This section provides some basic syntax examples.

**3.1.1. Basic Variable Setting**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#basic-variable-setting)

The following example sets VARIABLE to "value". This assignment occurs immediately as the statement is parsed. It is a "hard" assignment.

VARIABLE = "value"

As expected, if you include leading or trailing spaces as part of an assignment, the spaces are retained:

VARIABLE = " value"

VARIABLE = "value "

Setting VARIABLE to "" sets it to an empty string, while setting the variable to " " sets it to a blank space (i.e. these are not the same values).

VARIABLE = ""

VARIABLE = " "

**3.1.2. Variable Expansion**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#variable-expansion)

BitBake supports variables referencing one another's contents using a syntax that is similar to shell scripting. Following is an example that results in A containing "aval" and B evaluating to "preavalpost" based on that current value of A.

A = "aval"

B = "pre${A}post"

You should realize that whenever B is referenced, its evaluation will depend on the state of A at that time. Thus, later evaluations of B in the previous example could result in different values depending on the value of A.

**3.1.3. Setting a default value (?=)**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#setting-a-default-value)

You can use the "?=" operator to achieve a "softer" assignment for a variable. This type of assignment allows you to define a variable if it is undefined when the statement is parsed, but to leave the value alone if the variable has a value. Here is an example:

A ?= "aval"

If A is set at the time this statement is parsed, the variable retains its value. However, if A is not set, the variable is set to "aval".

**Note**

This assignment is immediate. Consequently, if multiple "?=" assignments to a single variable exist, the first of those ends up getting used.

**3.1.4. Setting a weak default value (??=)**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#setting-a-weak-default-value)

It is possible to use a "weaker" assignment than in the previous section by using the "??=" operator. This assignment behaves identical to "?=" except that the assignment is made at the end of the parsing process rather than immediately. Consequently, when multiple "??=" assignments exist, the last one is used. Also, any "=" or "?=" assignment will override the value set with "??=". Here is an example:

A ??= "somevalue"

A ??= "someothervalue"

If A is set before the above statements are parsed, the variable retains its value. If A is not set, the variable is set to "someothervalue".

Again, this assignment is a "lazy" or "weak" assignment because it does not occur until the end of the parsing process.

**3.1.5. Immediate variable expansion (:=)[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html" \l "immediate-variable-expansion" \o "Permalink)**

The ":=" operator results in a variable's contents being expanded immediately, rather than when the variable is actually used:

T = "123"

A := "${B} ${A} test ${T}"

T = "456"

B = "${T} bval"

C = "cval"

C := "${C}append"

In this example, A contains "test 123" because ${B} and ${A} at the time of parsing are undefined, which leaves "test 123". And, the variable C contains "cvalappend" since ${C} immediately expands to "cval".

**3.1.6. Appending (+=) and prepending (=+) With Spaces**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#appending-and-prepending)

Appending and prepending values is common and can be accomplished using the "+=" and "=+" operators. These operators insert a space between the current value and prepended or appended value.

These operators take immediate effect during parsing. Here are some examples:

B = "bval"

B += "additionaldata"

C = "cval"

C =+ "test"

The variable B contains "bval additionaldata" and C contains "test cval".

**3.1.7. Appending (.=) and Prepending (=.) Without Spaces**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#appending-and-prepending-without-spaces)

If you want to append or prepend values without an inserted space, use the ".=" and "=." operators.

These operators take immediate effect during parsing. Here are some examples:

B = "bval"

B .= "additionaldata"

C = "cval"

C =. "test"

The variable B contains "bvaladditionaldata" and C contains "testcval".

**3.1.8. Appending and Prepending (Override Style Syntax)[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html" \l "appending-and-prepending-override-style-syntax" \o "Permalink)**

You can also append and prepend a variable's value using an override style syntax. When you use this syntax, no spaces are inserted.

These operators differ from the ":=", ".=", "=.", "+=", and "=+" operators in that their effects are deferred until after parsing completes rather than being immediately applied. Here are some examples:

B = "bval"

B\_append = " additional data"

C = "cval"

C\_prepend = "additional data "

D = "dval"

D\_append = "additional data"

The variable B becomes "bval additional data" and C becomes "additional data cval". The variable D becomes "dvaladditional data".

**Note**

You must control all spacing when you use the override syntax.

**3.1.9. Removal (Override Style Syntax)[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html" \l "removing-override-style-syntax" \o "Permalink)**

You can remove values from lists using the removal override style syntax. Specifying a value for removal causes all occurrences of that value to be removed from the variable.

When you use this syntax, BitBake expects one or more strings. Surrounding spaces are removed as well. Here is an example:

FOO = "123 456 789 123456 123 456 123 456"

FOO\_remove = "123"

FOO\_remove = "456"

FOO2 = "abc def ghi abcdef abc def abc def"

FOO2\_remove = "abc def"

The variable FOO becomes "789 123456" and FOO2 becomes "ghi abcdef".

**3.1.10. Variable Flag Syntax**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#variable-flag-syntax)

Variable flags are BitBake's implementation of variable properties or attributes. It is a way of tagging extra information onto a variable. You can find more out about variable flags in general in the "[Variable Flags](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#variable-flags)" section.

You can define, append, and prepend values to variable flags. All the standard syntax operations previously mentioned work for variable flags except for override style syntax (i.e. \_prepend, \_append, and \_remove).

Here are some examples showing how to set variable flags:

FOO[a] = "abc"

FOO[b] = "123"

FOO[a] += "456"

The variable FOO has two flags: a and b. The flags are immediately set to "abc" and "123", respectively. The a flag becomes "abc 456".

No need exists to pre-define variable flags. You can simply start using them. One extremely common application is to attach some brief documentation to a BitBake variable as follows:

CACHE[doc] = "The directory holding the cache of the metadata."

**3.1.11. Inline Python Variable Expansion**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#inline-python-variable-expansion)

You can use inline Python variable expansion to set variables. Here is an example:

DATE = "${@time.strftime('%Y%m%d',time.gmtime())}"

This example results in the DATE variable being set to the current date.

Probably the most common use of this feature is to extract the value of variables from BitBake's internal data dictionary,d. The following lines select the values of a package name and its version number, respectively:

PN = "${@bb.parse.BBHandler.vars\_from\_file(d.getVar('FILE'),d)[0] or 'defaultpkgname'}"

PV = "${@bb.parse.BBHandler.vars\_from\_file(d.getVar('FILE'),d)[1] or '1.0'}"

**3.1.12. Providing Pathnames**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#providing-pathnames)

When specifying pathnames for use with BitBake, do not use the tilde ("~") character as a shortcut for your home directory. Doing so might cause BitBake to not recognize the path since BitBake does not expand this character in the same way a shell would.

Instead, provide a fuller path as the following example illustrates:

BBLAYERS ?= " \

/home/scott-lenovo/LayerA \

"

**3.2. Conditional Syntax (Overrides)[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html" \l "conditional-syntax-overrides" \o "Permalink)**

BitBake uses [OVERRIDES](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-OVERRIDES) to control what variables are overridden after BitBake parses recipes and configuration files. This section describes how you can use OVERRIDES as conditional metadata, talks about key expansion in relationship toOVERRIDES, and provides some examples to help with understanding.

**3.2.1. Conditional Metadata**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#conditional-metadata)

You can use OVERRIDES to conditionally select a specific version of a variable and to conditionally append or prepend the value of a variable.

* ***Selecting a Variable:*** The OVERRIDES variable is a colon-character-separated list that contains items for which you want to satisfy conditions. Thus, if you have a variable that is conditional on “arm”, and “arm” is in OVERRIDES, then the “arm”-specific version of the variable is used rather than the non-conditional version. Here is an example:
* OVERRIDES = "architecture:os:machine"
* TEST = "default"
* TEST\_os = "osspecific"
* TEST\_nooverride = "othercondvalue"

In this example, the OVERRIDES variable lists three overrides: "architecture", "os", and "machine". The variable TESTby itself has a default value of "default". You select the os-specific version of the TEST variable by appending the "os" override to the variable (i.e.TEST\_os).

To better understand this, consider a practical example that assumes an OpenEmbedded metadata-based Linux kernel recipe file. The following lines from the recipe file first set the kernel branch variable KBRANCH to a default value, then conditionally override that value based on the architecture of the build:

KBRANCH = "standard/base"

KBRANCH\_qemuarm = "standard/arm-versatile-926ejs"

KBRANCH\_qemumips = "standard/mti-malta32"

KBRANCH\_qemuppc = "standard/qemuppc"

KBRANCH\_qemux86 = "standard/common-pc/base"

KBRANCH\_qemux86-64 = "standard/common-pc-64/base"

KBRANCH\_qemumips64 = "standard/mti-malta64"

* ***Appending and Prepending:*** BitBake also supports append and prepend operations to variable values based on whether a specific item is listed in OVERRIDES. Here is an example:
* DEPENDS = "glibc ncurses"
* OVERRIDES = "machine:local"
* DEPENDS\_append\_machine = "libmad"

In this example, DEPENDS becomes "glibc ncurses libmad".

Again, using an OpenEmbedded metadata-based kernel recipe file as an example, the following lines will conditionally append to the KERNEL\_FEATURES variable based on the architecture:

KERNEL\_FEATURES\_append = " ${KERNEL\_EXTRA\_FEATURES}"

KERNEL\_FEATURES\_append\_qemux86=" cfg/sound.scc cfg/paravirt\_kvm.scc"

KERNEL\_FEATURES\_append\_qemux86-64=" cfg/sound.scc cfg/paravirt\_kvm.scc"

**3.2.2. Key Expansion**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#key-expansion)

Key expansion happens when the BitBake datastore is finalized just before BitBake expands overrides. To better understand this, consider the following example:

A${B} = "X"

B = "2"

A2 = "Y"

In this case, after all the parsing is complete, and before any overrides are handled, BitBake expands ${B} into "2". This expansion causes A2, which was set to "Y" before the expansion, to become "X".

**3.2.3. Examples**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#variable-interaction-worked-examples)

Despite the previous explanations that show the different forms of variable definitions, it can be hard to work out exactly what happens when variable operators, conditional overrides, and unconditional overrides are combined. This section presents some common scenarios along with explanations for variable interactions that typically confuse users.

There is often confusion concerning the order in which overrides and various "append" operators take effect. Recall that an append or prepend operation using "\_append" and "\_prepend" does not result in an immediate assignment as would "+=", ".=", "=+", or "=.". Consider the following example:

OVERRIDES = "foo"

A = "Z"

A\_foo\_append = "X"

For this case, A is unconditionally set to "Z" and "X" is unconditionally and immediately appended to the variable A\_foo. Because overrides have not been applied yet, A\_foo is set to "X" due to the append and A simply equals "Z".

Applying overrides, however, changes things. Since "foo" is listed in OVERRIDES, the conditional variable A is replaced with the "foo" version, which is equal to "X". So effectively, A\_foo replaces A.

This next example changes the order of the override and the append:

OVERRIDES = "foo"

A = "Z"

A\_append\_foo = "X"

For this case, before overrides are handled, A is set to "Z" and A\_append\_foo is set to "X". Once the override for "foo" is applied, however, A gets appended with "X". Consequently, A becomes "ZX". Notice that spaces are not appended.

This next example has the order of the appends and overrides reversed back as in the first example:

OVERRIDES = "foo"

A = "Y"

A\_foo\_append = "Z"

A\_foo\_append += "X"

For this case, before any overrides are resolved, A is set to "Y" using an immediate assignment. After this immediate assignment, A\_foo is set to "Z", and then further appended with "X" leaving the variable set to "Z X". Finally, applying the override for "foo" results in the conditional variable A becoming "Z X" (i.e. A is replaced with A\_foo).

This final example mixes in some varying operators:

A = "1"

A\_append = "2"

A\_append = "3"

A += "4"

A .= "5"

For this case, the type of append operators are affecting the order of assignments as BitBake passes through the code multiple times. Initially, A is set to "1 45" because of the three statements that use immediate operators. After these assignments are made, BitBake applies the \_append operations. Those operations result in A becoming "1 4523".

**3.3. Sharing Functionality**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#sharing-functionality)

BitBake allows for metadata sharing through include files (.inc) and class files (.bbclass). For example, suppose you have a piece of common functionality such as a task definition that you want to share between more than one recipe. In this case, creating a .bbclass file that contains the common functionality and then using the inherit directive in your recipes to inherit the class would be a common way to share the task.

This section presents the mechanisms BitBake provides to allow you to share functionality between recipes. Specifically, the mechanisms include include, inherit, INHERIT, and require directives.

**3.3.1. Locating Include and Class Files**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#locating-include-and-class-files)

BitBake uses the [BBPATH](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BBPATH) variable to locate needed include and class files. The BBPATH variable is analogous to the environment variable PATH.

In order for include and class files to be found by BitBake, they need to be located in a "classes" subdirectory that can be found in BBPATH.

**3.3.2. inherit Directive**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#inherit-directive)

When writing a recipe or class file, you can use the inherit directive to inherit the functionality of a class (.bbclass). BitBake only supports this directive when used within recipe and class files (i.e. .bb and .bbclass).

The inherit directive is a rudimentary means of specifying what classes of functionality your recipes require. For example, you can easily abstract out the tasks involved in building a package that uses Autoconf and Automake and put those tasks into a class file that can be used by your recipe.

As an example, your recipes could use the following directive to inherit an autotools.bbclass file. The class file would contain common functionality for using Autotools that could be shared across recipes:

inherit autotools

In this case, BitBake would search for the directory classes/autotools.bbclass in BBPATH.

**Note**

You can override any values and functions of the inherited class within your recipe by doing so after the "inherit" statement.

**3.3.3. include Directive**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#include-directive)

BitBake understands the include directive. This directive causes BitBake to parse whatever file you specify, and to insert that file at that location. The directive is much like its equivalent in Make except that if the path specified on the include line is a relative path, BitBake locates the first file it can find within BBPATH.

As an example, suppose you needed a recipe to include some self-test definitions:

include test\_defs.inc

**Note**

The include directive does not produce an error when the file cannot be found. Consequently, it is recommended that if the file you are including is expected to exist, you should use [require](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#require-inclusion) instead ofinclude. Doing so makes sure that an error is produced if the file cannot be found.

**3.3.4. require Directive**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#require-inclusion)

BitBake understands the require directive. This directive behaves just like the include directive with the exception that BitBake raises a parsing error if the file to be included cannot be found. Thus, any file you require is inserted into the file that is being parsed at the location of the directive.

Similar to how BitBake handles [include](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#include-directive), if the path specified on the require line is a relative path, BitBake locates the first file it can find within BBPATH.

As an example, suppose you have two versions of a recipe (e.g. foo\_1.2.2.bb and foo\_2.0.0.bb) where each version contains some identical functionality that could be shared. You could create an include file named foo.inc that contains the common definitions needed to build "foo". You need to be sure foo.inc is located in the same directory as your two recipe files as well. Once these conditions are set up, you can share the functionality using a require directive from within each recipe:

require foo.inc

**3.3.5. INHERIT Configuration Directive**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#inherit-configuration-directive)

When creating a configuration file (.conf), you can use the INHERIT directive to inherit a class. BitBake only supports this directive when used within a configuration file.

As an example, suppose you needed to inherit a class file called abc.bbclass from a configuration file as follows:

INHERIT += "abc"

This configuration directive causes the named class to be inherited at the point of the directive during parsing. As with the inherit directive, the .bbclass file must be located in a "classes" subdirectory in one of the directories specified inBBPATH.

**Note**

Because .conf files are parsed first during BitBake's execution, using INHERIT to inherit a class effectively inherits the class globally (i.e. for all recipes).

**3.4. Functions**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#functions)

As with most languages, functions are the building blocks that are used to build up operations into tasks. BitBake supports these types of functions:

* ***Shell Functions:*** Functions written in shell script and executed either directly as functions, tasks, or both. They can also be called by other shell functions.
* ***BitBake Style Python Functions:*** Functions written in Python and executed by BitBake or other Python functions usingbb.build.exec\_func().
* ***Python Functions:*** Functions written in Python and executed by Python.
* ***Anonymous Python Functions:*** Python functions executed automatically during parsing.

Regardless of the type of function, you can only define them in class (.bbclass) and recipe (.bb or .inc) files.

**3.4.1. Shell Functions**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#shell-functions)

Functions written in shell script and executed either directly as functions, tasks, or both. They can also be called by other shell functions. Here is an example shell function definition:

some\_function () {

echo "Hello World"

}

When you create these types of functions in your recipe or class files, you need to follow the shell programming rules. The scripts are executed by /bin/sh, which may not be a bash shell but might be something such as dash. You should not use Bash-specific script (bashisms).

**3.4.2. BitBake Style Python Functions**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#bitbake-style-python-functions)

These functions are written in Python and executed by BitBake or other Python functions using bb.build.exec\_func().

An example BitBake function is:

python some\_python\_function () {

d.setVar("TEXT", "Hello World")

print d.getVar("TEXT", True)

}

Because the Python "bb" and "os" modules are already imported, you do not need to import these modules. Also in these types of functions, the datastore ("d") is a global variable and is always automatically available.

**3.4.3. Python Functions**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#python-functions)

These functions are written in Python and are executed by other Python code. Examples of Python functions are utility functions that you intend to call from in-line Python or from within other Python functions. Here is an example:

def get\_depends(d):

if d.getVar('SOMECONDITION', True):

return "dependencywithcond"

else:

return "dependency"

SOMECONDITION = "1"

DEPENDS = "${@get\_depends(d)}"

This would result in DEPENDS containing dependencywithcond.

Here are some things to know about Python functions:

* Python functions can take parameters.
* The BitBake datastore is not automatically available. Consequently, you must pass it in as a parameter to the function.
* The "bb" and "os" Python modules are automatically available. You do not need to import them.

**3.4.4. Anonymous Python Functions**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#anonymous-python-functions)

Sometimes it is useful to run some code during parsing to set variables or to perform other operations programmatically. To do this, you can define an anonymous Python function. Here is an example that conditionally sets a variable based on the value of another variable:

python \_\_anonymous () {

if d.getVar('SOMEVAR', True) == 'value':

d.setVar('ANOTHERVAR', 'value2')

}

The "\_\_anonymous" function name is optional, so the following example is functionally equivalent to the above:

python () {

if d.getVar('SOMEVAR', True) == 'value':

d.setVar('ANOTHERVAR', 'value2')

}

Because unlike other Python functions anonymous Python functions are executed during parsing, the "d" variable within an anonymous Python function represents the datastore for the entire recipe. Consequently, you can set variable values here and those values can be picked up by other functions.

**3.4.5. Flexible Inheritance for Class Functions**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#flexible-inheritance-for-class-functions)

Through coding techniques and the use of EXPORT\_FUNCTIONS, BitBake supports exporting a function from a class such that the class function appears as the default implementation of the function, but can still be called if a recipe inheriting the class needs to define its own version of the function.

To understand the benefits of this feature, consider the basic scenario where a class defines a task function and your recipe inherits the class. In this basic scenario, your recipe inherits the task function as defined in the class. If desired, your recipe can add to the start and end of the function by using the "\_prepend" or "\_append" operations respectively, or it can redefine the function completely. However, if it redefines the function, there is no means for it to call the class version of the function. EXPORT\_FUNCTIONS provides a mechanism that enables the recipe's version of the function to call the original version of the function.

To make use of this technique, you need the following things in place:

* The class needs to define the function as follows:
* *classname*\_*functionname*

For example, if you have a class file bar.bbclass and a function named do\_foo, the class must define the function as follows:

bar\_do\_foo

* The class needs to contain the EXPORT\_FUNCTIONS statement as follows:
* EXPORT\_FUNCTIONS *functionname*

For example, continuing with the same example, the statement in the bar.bbclass would be as follows:

EXPORT\_FUNCTIONS do\_foo

* You need to call the function appropriately from within your recipe. Continuing with the same example, if your recipe needs to call the class version of the function, it should call bar\_do\_foo. Assuming do\_foo was a shell function andEXPORT\_FUNCTIONS was used as above, the recipe's function could conditionally call the class version of the function as follows:
* do\_foo() {
* if [ somecondition ] ; then
* bar\_do\_foo
* else
* # Do something else
* fi
* }

To call your modified version of the function as defined in your recipe, call it as do\_foo.

With these conditions met, your single recipe can freely choose between the original function as defined in the class file and the modified function in your recipe. If you do not set up these conditions, you are limited to using one function or the other.

**3.5. Tasks**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#tasks)

Tasks are BitBake execution units that originate as functions and make up the steps that BitBake needs to run for given recipe. Tasks are only supported in recipe (.bb or .inc) and class (.bbclass) files. By convention, task names begin with the string "do\_".

Here is an example of a task that prints out the date:

python do\_printdate () {

import time

print time.strftime('%Y%m%d', time.gmtime())

}

addtask printdate after do\_fetch before do\_build

**3.5.1. Promoting a Function to a Task**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#promoting-a-function-to-a-task)

Any function can be promoted to a task by applying the addtask command. The addtask command also describes inter-task dependencies. Here is the function from the previous section but with the addtask command promoting it to a task and defining some dependencies:

python do\_printdate () {

import time

print time.strftime('%Y%m%d', time.gmtime())

}

addtask printdate after do\_fetch before do\_build

In the example, the function is defined and then promoted as a task. The do\_printdate task becomes a dependency of the do\_build task, which is the default task. And, the do\_printdate task is dependent upon the do\_fetch task. Execution of the do\_build task results in the do\_printdate task running first.

**3.5.2. Deleting a Task**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#deleting-a-task)

As well as being able to add tasks, you can delete them. Simply use the deltask command to delete a task. For example, to delete the example task used in the previous sections, you would use:

deltask printdate

If you delete a task using the deltask command and the task has dependencies, the dependencies are not reconnected. For example, suppose you have three tasks named do\_a, do\_b, and do\_c. Furthermore, do\_c is dependent on do\_b, which in turn is dependent on do\_a. Given this scenario, if you use deltask to delete do\_b, the implicit dependency relationship between do\_c and do\_a through do\_b no longer exists, and do\_c dependencies are not updated to includedo\_a. Thus, do\_c is free to run before do\_a.

If you want dependencies such as these to remain intact, use the noexec varflag to disable the task instead of using thedeltask command to delete it:

do\_b[noexec] = "1"

**3.5.3. Passing Information Into the Build Task Environment**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#passing-information-into-the-build-task-environment)

When running a task, BitBake tightly controls the execution environment of the build tasks to make sure unwanted contamination from the build machine cannot influence the build. Consequently, if you do want something to get passed into the build task environment, you must take these two steps:

1. Tell BitBake to load what you want from the environment into the datastore. You can do so through the[BB\_ENV\_EXTRAWHITE](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_ENV_EXTRAWHITE) variable. For example, assume you want to prevent the build system from accessing your$HOME/.ccache directory. The following command tells BitBake to load CCACHE\_DIR from the environment into the datastore:
2. export BB\_ENV\_EXTRAWHITE="$BB\_ENV\_EXTRAWHITE CCACHE\_DIR"

1. Tell BitBake to export what you have loaded into the datastore to the task environment of every running task. Loading something from the environment into the datastore (previous step) only makes it available in the datastore. To export it to the task environment of every running task, use a command similar to the following in your local configuration file local.conf or your distribution configuration file:
2. export CCACHE\_DIR

**Note**

A side effect of the previous steps is that BitBake records the variable as a dependency of the build process in things like the setscene checksums. If doing so results in unnecessary rebuilds of tasks, you can whitelist the variable so that the setscene code ignores the dependency when it creates checksums.

Sometimes, it is useful to be able to obtain information from the original execution environment. Bitbake saves a copy of the original environment into a special variable named [BB\_ORIGENV](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_ORIGENV).

The BB\_ORIGENV variable returns a datastore object that can be queried using the standard datastore operators such asgetVar(). The datastore object is useful, for example, to find the original DISPLAY variable. Here is an example:

origenv = d.getVar("BB\_ORIGENV", False)

bar = origenv.getVar("BAR", False)

The previous example returns BAR from the original execution environment.

By default, BitBake cleans the environment to include only those things exported or listed in its whitelist to ensure that the build environment is reproducible and consistent.

**3.6. Variable Flags**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#variable-flags)

Variable flags (varflags) help control a task's functionality and dependencies. BitBake reads and writes varflags to the datastore using the following command forms:

*variable* = d.getVarFlags("*variable*")

self.d.setVarFlags("FOO", {"func": True})

When working with varflags, the same syntax, with the exception of overrides, applies. In other words, you can set, append, and prepend varflags just like variables. See the "[Variable Flag Syntax](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#variable-flag-syntax)" section for details.

BitBake has a defined set of varflags available for recipes and classes. Tasks support a number of these flags which control various functionality of the task:

* ***cleandirs:*** Empty directories that should created before the task runs.
* ***depends:*** Controls inter-task dependencies. See the [DEPENDS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-DEPENDS) variable and the "[Inter-Task Dependencies](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#inter-task-dependencies)" section for more information.
* ***deptask:*** Controls task build-time dependencies. See the [DEPENDS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-DEPENDS) variable and the "[Build Dependencies](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#build-dependencies)" section for more information.
* ***dirs:*** Directories that should be created before the task runs.
* ***lockfiles:*** Specifies one or more lockfiles to lock while the task executes. Only one task may hold a lockfile, and any task that attempts to lock an already locked file will block until the lock is released. You can use this variable flag to accomplish mutual exclusion.
* ***noexec:*** Marks the tasks as being empty and no execution required. The noexec flag can be used to set up tasks as dependency placeholders, or to disable tasks defined elsewhere that are not needed in a particular recipe.
* ***nostamp:*** Tells BitBake to not generate a stamp file for a task, which implies the task should always be executed.
* ***postfuncs:*** List of functions to call after the completion of the task.
* ***prefuncs:*** List of functions to call before the task executes.
* ***rdepends:*** Controls inter-task runtime dependencies. See the [RDEPENDS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-RDEPENDS) variable, the [RRECOMMENDS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-RRECOMMENDS) variable, and the "[Inter-Task Dependencies](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#inter-task-dependencies)" section for more information.
* ***rdeptask:*** Controls task runtime dependencies. See the [RDEPENDS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-RDEPENDS) variable, the [RRECOMMENDS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-RRECOMMENDS) variable, and the "[Runtime Dependencies](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#runtime-dependencies)" section for more information.
* ***recideptask:*** When set in conjunction with recrdeptask, specifies a task that should be inspected for additional dependencies.
* ***recrdeptask:*** Controls task recursive runtime dependencies. See the [RDEPENDS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-RDEPENDS) variable, the [RRECOMMENDS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-RRECOMMENDS) variable, and the "[Recursive Dependencies](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#recursive-dependencies)" section for more information.
* ***stamp-extra-info:*** Extra stamp information to append to the task's stamp. As an example, OpenEmbedded uses this flag to allow machine-specific tasks.
* ***umask:*** The umask to run the task under.

Several varflags are useful for controlling how signatures are calculated for variables. For more information on this process, see the "[Checksums (Signatures)](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#checksums)" section.

* ***vardeps:*** Specifies a space-separated list of additional variables to add to a variable's dependencies for the purposes of calculating its signature. Adding variables to this list is useful, for example, when a function refers to a variable in a manner that does not allow BitBake to automatically determine that the variable is referred to.
* ***vardepsexclude:*** Specifies a space-separated list of variables that should be excluded from a variable's dependencies for the purposes of calculating its signature.
* ***vardepvalue:*** If set, instructs BitBake to ignore the actual value of the variable and instead use the specified value when calculating the variable's signature.
* ***vardepvalueexclude:*** Specifies a pipe-separated list of strings to exclude from the variable's value when calculating the variable's signature.

**3.7. Events**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#events)

BitBake allows installation of event handlers within recipe and class files. Events are triggered at certain points during operation, such as the beginning of an operation against a given recipe (\*.bb file), the start of a given task, task failure, task success, and so forth. The intent is to make it easy to do things like email notification on build failure.

Following is an example event handler that prints the name of the event and the content of the FILE variable:

addhandler myclass\_eventhandler

python myclass\_eventhandler() {

from bb.event import getName

from bb import data

print("The name of the Event is %s" % getName(e))

print("The file we run for is %s" % data.getVar('FILE', e.data, True))

}

This event handler gets called every time an event is triggered. A global variable "e" is defined and "e.data" contains an instance of "bb.data". With the getName(e) method, one can get the name of the triggered event.

Because you probably are only interested in a subset of events, you would likely use the [eventmask] flag for your event handler to be sure that only certain events trigger the handler. Given the previous example, suppose you only wanted thebb.build.TaskFailed event to trigger that event handler. Use the flag as follows:

addhandler myclass\_eventhandler

myclass\_eventhandler[eventmask] = "bb.build.TaskFailed"

python myclass\_eventhandler() {

from bb.event import getName

from bb import data

print("The name of the Event is %s" % getName(e))

print("The file we run for is %s" % data.getVar('FILE', e.data, True))

}

During a standard build, the following common events might occur:

* bb.event.ConfigParsed()
* bb.event.ParseStarted()
* bb.event.ParseProgress()
* bb.event.ParseCompleted()
* bb.event.BuildStarted()
* bb.build.TaskStarted()
* bb.build.TaskInvalid()
* bb.build.TaskFailedSilent()
* bb.build.TaskFailed()
* bb.build.TaskSucceeded()
* bb.event.BuildCompleted()
* bb.cooker.CookerExit()

Here is a list of other events that occur based on specific requests to the server:

* bb.event.TreeDataPreparationStarted()
* bb.event.TreeDataPreparationProgress
* bb.event.TreeDataPreparationCompleted
* bb.event.DepTreeGenerated
* bb.event.CoreBaseFilesFound
* bb.event.ConfigFilePathFound
* bb.event.FilesMatchingFound
* bb.event.ConfigFilesFound
* bb.event.TargetsTreeGenerated

**3.8. Variants - Class Extension Mechanism**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#variants-class-extension-mechanism)

BitBake supports two features that facilitate creating from a single recipe file multiple incarnations of that recipe file where all incarnations are buildable. These features are enabled through the [BBCLASSEXTEND](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BBCLASSEXTEND) and [BBVERSIONS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BBVERSIONS) variables.

**Note**

The mechanism for this class extension is extremely specific to the implementation. Usually, the recipe's[PROVIDES](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PROVIDES), [PN](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PN), and [DEPENDS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-DEPENDS) variables would need to be modified by the extension class. For specific examples, see the OE-Core native, nativesdk, and multilib classes.

* ***BBCLASSEXTEND:*** This variable is a space separated list of classes used to "extend" the recipe for each variant. Here is an example that results in a second incarnation of the current recipe being available. This second incarnation will have the "native" class inherited.
* BBCLASSEXTEND = "native"

* ***BBVERSIONS:*** This variable allows a single recipe to build multiple versions of a project from a single recipe file. You can also specify conditional metadata (using the [OVERRIDES](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-OVERRIDES) mechanism) for a single version, or an optionally named range of versions. Here is an example:
* BBVERSIONS = "1.0 2.0 git"
* SRC\_URI\_git = "git://someurl/somepath.git"
* BBVERSIONS = "1.0.[0-6]:1.0.0+ \ 1.0.[7-9]:1.0.7+"
* SRC\_URI\_append\_1.0.7+ = "file://some\_patch\_which\_the\_new\_versions\_need.patch;patch=1"

The name of the range defaults to the original version of the recipe. For example, in OpenEmbedded, the recipe filefoo\_1.0.0+.bb creates a default name range of 1.0.0+. This is useful because the range name is not only placed into overrides, but it is also made available for the metadata to use in the variable that defines the base recipe versions for use in file:// search paths ([FILESPATH](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-FILESPATH)).

**3.9. Dependencies**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#dependencies)

To allow for efficient operation given multiple processes executing in parallel, BitBake handles dependencies at the task level. BitBake supports a robust method to handle these dependencies.

This section describes several types of dependency mechanisms.

**3.9.1. Dependencies Internal to the .bb File**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#dependencies-internal-to-the-bb-file)

BitBake uses the addtask directive to manage dependencies that are internal to a given recipe file. You can use theaddtask directive to indicate when a task is dependent on other tasks or when other tasks depend on that recipe. Here is an example:

addtask printdate after do\_fetch before do\_build

In this example, the printdate task is depends on the completion of the do\_fetch task. And, the do\_build depends on the completion of the printdate task.

**3.9.2. Build Dependencies**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#build-dependencies)

BitBake uses the [DEPENDS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-DEPENDS) variable to manage build time dependencies. The "deptask" varflag for tasks signifies the task of each item listed in DEPENDS that must complete before that task can be executed. Here is an example:

do\_configure[deptask] = "do\_populate\_sysroot"

In this example, the do\_populate\_sysroot task of each item in DEPENDS must complete before do\_configure can execute.

**3.9.3. Runtime Dependencies**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#runtime-dependencies)

BitBake uses the [PACKAGES](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PACKAGES), [RDEPENDS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-RDEPENDS), and [RRECOMMENDS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-RRECOMMENDS) variables to manage runtime dependencies.

The PACKAGES variable lists runtime packages. Each of those packages can have RDEPENDS and RRECOMMENDS runtime dependencies. The "rdeptask" flag for tasks is used to signify the task of each item runtime dependency which must have completed before that task can be executed.

do\_package\_qa[rdeptask] = "do\_packagedata"

In the previous example, the do\_packagedata task of each item in RDEPENDS must have completed beforedo\_package\_qa can execute.

**3.9.4. Recursive Dependencies**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#recursive-dependencies)

BitBake uses the "recrdeptask" flag to manage recursive task dependencies. BitBake looks through the build-time and runtime dependencies of the current recipe, looks through the task's inter-task dependencies, and then adds dependencies for the listed task. Once BitBake has accomplished this, it recursively works through the dependencies of those tasks. Iterative passes continue until all dependencies are discovered and added.

You might want to not only have BitBake look for dependencies of those tasks, but also have BitBake look for build-time and runtime dependencies of the dependent tasks as well. If that is the case, you need to reference the task name itself in the task list:

do\_a[recrdeptask] = "do\_a do\_b"

**3.9.5. Inter-Task Dependencies**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#inter-task-dependencies)

BitBake uses the "depends" flag in a more generic form to manage inter-task dependencies. This more generic form allows for inter-dependency checks for specific tasks rather than checks for the data in DEPENDS. Here is an example:

do\_patch[depends] = "quilt-native:do\_populate\_sysroot"

In this example, the do\_populate\_sysroot task of the target quilt-native must have completed before the do\_patchtask can execute.

The "rdepends" flag works in a similar way but takes targets in the runtime namespace instead of the build-time dependency namespace.

**3.10. Accessing Datastore Variables Using Python**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#accessing-datastore-variables-using-python)

It is often necessary to access variables in the BitBake datastore using Python functions. The Bitbake datastore has an API that allows you this access. Here is a list of available operations:

| ***Operation*** | ***Description*** |
| --- | --- |
| d.getVar("X", expand=False) | Returns the value of variable "X". Using "expand=True" expands the value. |
| d.setVar("X", "value") | Sets the variable "X" to "value". |
| d.appendVar("X", "value") | Adds "value" to the end of the variable "X". |
| d.prependVar("X", "value") | Adds "value" to the start of the variable "X". |
| d.delVar("X") | Deletes the variable "X" from the datastore. |
| d.renameVar("X", "Y") | Renames the variable "X" to "Y". |
| d.getVarFlag("X", flag, expand=False) | Gets then named flag from the variable "X". Using "expand=True" expands the named flag. |
| d.setVarFlag("X", flag, "value") | Sets the named flag for variable "X" to "value". |
| d.appendVarFlag("X", flag, "value") | Appends "value" to the named flag on the variable "X". |
| d.prependVarFlag("X", flag, "value") | Prepends "value" to the named flag on the variable "X". |
| d.delVarFlag("X", flag) | Deletes the named flag on the variable "X" from the datastore. |
| d.setVarFlags("X", flagsdict) | Sets the flags specified in the flagsdict() parameter. setVarFlags does not clear previous flags. Think of this operation as addVarFlags. |
| d.getVarFlags("X") | Returns a flagsdict of the flags for the variable "X". |
| d.delVarFlags("X") | Deletes all the flags for the variable "X". |

**3.11. Task Checksums and Setscene**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#task-checksums-and-setscene)

BitBake uses checksums (or signatures) along with the setscene to determine if a task needs to be run. This section describes the process. To help understand how BitBake does this, the section assumes an OpenEmbedded metadata-based example.

This list is a place holder of content existed from previous work on the manual. Some or all of it probably needs integrated into the subsections that make up this section. For now, I have just provided a short glossary-like description for each variable. Ultimately, this list goes away.

* STAMP: The base path to create stamp files.
* STAMPCLEAN Again, the base path to create stamp files but can use wildcards for matching a range of files for clean operations.
* BB\_STAMP\_WHITELIST Lists stamp files that are looked at when the stamp policy is "whitelist".
* BB\_STAMP\_POLICY Defines the mode for comparing timestamps of stamp files.
* BB\_HASHCHECK\_FUNCTION Specifies the name of the function to call during the "setscene" part of the task's execution in order to validate the list of task hashes.
* BB\_SETSCENE\_VERIFY\_FUNCTION Specifies a function to call that verifies the list of planned task execution before the main task execution happens.
* BB\_SETSCENE\_DEPVALID Specifies a function BitBake calls that determines whether BitBake requires a setscene dependency to be met.
* BB\_TASKHASH Within an executing task, this variable holds the hash of the task as returned by the currently enabled signature generator.

**Chapter 4. File Download Support**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#idm140029332677792)

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[4.3.8. Other Fetchers](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#other-fetchers)

[4.4. Auto Revisions](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#auto-revisions)

BitBake's fetch module is a standalone piece of library code that deals with the intricacies of downloading source code and files from remote systems. Fetching source code is one of the cornerstones of building software. As such, this module forms an important part of BitBake.

The current fetch module is called "fetch2" and refers to the fact that it is the second major version of the API. The original version is obsolete and has been removed from the codebase. Thus, in all cases, "fetch" refers to "fetch2" in this manual.

**4.1. The Download (Fetch)[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html" \l "the-download-fetch" \o "Permalink)**

BitBake takes several steps when fetching source code or files. The fetcher codebase deals with two distinct processes in order: obtaining the files from somewhere (cached or otherwise) and then unpacking those files into a specific location and perhaps in a specific way. Getting and unpacking the files is often optionally followed by patching. Patching, however, is not covered by this module.

The code to execute the first part of this process, a fetch, looks something like the following:

src\_uri = (d.getVar('SRC\_URI', True) or "").split()

fetcher = bb.fetch2.Fetch(src\_uri, d)

fetcher.download()

This code sets up an instance of the fetch class. The instance uses a space-separated list of URLs from the [SRC\_URI](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-SRC_URI)variable and then calls the download method to download the files.

The instantiation of the fetch class is usually followed by:

rootdir = l.getVar('WORKDIR', True)

fetcher.unpack(rootdir)

This code unpacks the downloaded files to the specified by WORKDIR.

**Note**

For convenience, the naming in these examples matches the variables used by OpenEmbedded. If you want to see the above code in action, examine the OpenEmbedded class file base.bbclass.

The SRC\_URI and WORKDIR variables are not hardcoded into the fetcher, since those fetcher methods can be (and are) called with different variable names. In OpenEmbedded for example, the shared state (sstate) code uses the fetch module to fetch the sstate files.

When the download() method is called, BitBake tries to resolve the URLs by looking for source files in a specific search order:

* ***Pre-mirror Sites:*** BitBake first uses pre-mirrors to try and find source files. These locations are defined using the[PREMIRRORS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PREMIRRORS) variable.
* ***Source URI:*** If pre-mirrors fail, BitBake uses the original URL (e.g from SRC\_URI).
* ***Mirror Sites:*** If fetch failures occur, BitBake next uses mirror locations as defined by the [MIRRORS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-MIRRORS) variable.

For each URL passed to the fetcher, the fetcher calls the submodule that handles that particular URL type. This behavior can be the source of some confusion when you are providing URLs for the SRC\_URI variable. Consider the following two URLs:

http://git.yoctoproject.org/git/poky;protocol=git

git://git.yoctoproject.org/git/poky;protocol=http

In the former case, the URL is passed to the wget fetcher, which does not understand "git". Therefore, the latter case is the correct form since the Git fetcher does know how to use HTTP as a transport.

Here are some examples that show commonly used mirror definitions:

PREMIRRORS ?= "\

bzr://.\*/.\* http://somemirror.org/sources/ \n \

cvs://.\*/.\* http://somemirror.org/sources/ \n \

git://.\*/.\* http://somemirror.org/sources/ \n \

hg://.\*/.\* http://somemirror.org/sources/ \n \

osc://.\*/.\* http://somemirror.org/sources/ \n \

p4://.\*/.\* http://somemirror.org/sources/ \n \

svn://.\*/.\* http://somemirror.org/sources/ \n"

MIRRORS =+ "\

ftp://.\*/.\* http://somemirror.org/sources/ \n \

http://.\*/.\* http://somemirror.org/sources/ \n \

https://.\*/.\* http://somemirror.org/sources/ \n"

It is useful to note that BitBake supports cross-URLs. It is possible to mirror a Git repository on an HTTP server as a tarball. This is what the git:// mapping in the previous example does.

Since network accesses are slow, Bitbake maintains a cache of files downloaded from the network. Any source files that are not local (i.e. downloaded from the Internet) are placed into the download directory, which is specified by the [DL\_DIR](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-DL_DIR)variable.

File integrity is of key importance for reproducing builds. For non-local archive downloads, the fetcher code can verify SHA-256 and MD5 checksums to ensure the archives have been downloaded correctly. You can specify these checksums by using the SRC\_URI variable with the appropriate varflags as follows:

SRC\_URI[md5sum] = "*value*"

SRC\_URI[sha256sum] = "*value*"

You can also specify the checksums as parameters on the SRC\_URI as shown below:

SRC\_URI = "http://example.com/foobar.tar.bz2;md5sum=4a8e0f237e961fd7785d19d07fdb994d"

If multiple URIs exist, you can specify the checksums either directly as in the previous example, or you can name the URLs. The following syntax shows how you name the URIs:

SRC\_URI = "http://example.com/foobar.tar.bz2;name=foo"

SRC\_URI[foo.md5sum] = 4a8e0f237e961fd7785d19d07fdb994d

After a file has been downloaded and has had its checksum checked, a ".done" stamp is placed in DL\_DIR. BitBake uses this stamp during subsequent builds to avoid downloading or comparing a checksum for the file again.

**Note**

It is assumed that local storage is safe from data corruption. If this were not the case, there would be bigger issues to worry about.

If [BB\_STRICT\_CHECKSUM](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_STRICT_CHECKSUM) is set, any download without a checksum triggers an error message. The [BB\_NO\_NETWORK](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_NO_NETWORK)variable can be used to make any attempted network access a fatal error, which is useful for checking that mirrors are complete as well as other things.

**4.2. The Unpack**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#bb-the-unpack)

The unpack process usually immediately follows the download. For all URLs except Git URLs, BitBake uses the commonunpack method.

A number of parameters exist that you can specify within the URL to govern the behavior of the unpack stage:

* ***unpack:*** Controls whether the URL components are unpacked. If set to "1", which is the default, the components are unpacked. If set to "0", the unpack stage leaves the file alone. This parameter is useful when you want an archive to be copied in and not be unpacked.
* ***dos:*** Applies to .zip and .jar files and specifies whether to use DOS line ending conversion on text files.
* ***basepath:*** Instructs the unpack stage to strip the specified directories from the source path when unpacking.
* ***subdir:*** Unpacks the specific URL to the specified subdirectory within the root directory.

The unpack call automatically decompresses and extracts files with ".Z", ".z", ".gz", ".xz", ".zip", ".jar", ".ipk", ".rpm". ".srpm", ".deb" and ".bz2" extensions as well as various combinations of tarball extensions.

As mentioned, the Git fetcher has its own unpack method that is optimized to work with Git trees. Basically, this method works by cloning the tree into the final directory. The process is completed using references so that there is only one central copy of the Git metadata needed.

**4.3. Fetchers**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#bb-fetchers)

As mentioned earlier, the URL prefix determines which fetcher submodule BitBake uses. Each submodule can support different URL parameters, which are described in the following sections.

**4.3.1. Local file fetcher (file://)**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#local-file-fetcher)

This submodule handles URLs that begin with file://. The filename you specify within the URL can be either an absolute or relative path to a file. If the filename is relative, the contents of the [FILESPATH](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-FILESPATH) variable is used in the same way PATH is used to find executables. Failing that, [FILESDIR](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-FILESDIR) is used to find the appropriate relative file.

**Note**

FILESDIR is deprecated and can be replaced with FILESPATH. Because FILESDIR is likely to be removed, you should not use this variable in any new code.

If the file cannot be found, it is assumed that it is available in [DL\_DIR](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-DL_DIR) by the time the download() method is called.

If you specify a directory, the entire directory is unpacked.

Here are a couple of example URLs, the first relative and the second absolute:

SRC\_URI = "file://relativefile.patch"

SRC\_URI = "file:///Users/ich/very\_important\_software"

**4.3.2. HTTP/FTP wget fetcher (http://, ftp://, https://)**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#http-ftp-fetcher)

This fetcher obtains files from web and FTP servers. Internally, the fetcher uses the wget utility.

The executable and parameters used are specified by the FETCHCMD\_wget variable, which defaults to sensible values. The fetcher supports a parameter "downloadfilename" that allows the name of the downloaded file to be specified. Specifying the name of the downloaded file is useful for avoiding collisions in [DL\_DIR](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-DL_DIR) when dealing with multiple files that have the same name.

Some example URLs are as follows:

SRC\_URI = "http://oe.handhelds.org/not\_there.aac"

SRC\_URI = "ftp://oe.handhelds.org/not\_there\_as\_well.aac"

SRC\_URI = "ftp://you@oe.handhelds.org/home/you/secret.plan"

**4.3.3. CVS fetcher ((cvs://)**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#cvs-fetcher)

This submodule handles checking out files from the CVS version control system. You can configure it using a number of different variables:

* ***FETCHCMD\_cvs:*** The name of the executable to use when running the cvs command. This name is usually "cvs".
* ***SRCDATE:*** The date to use when fetching the CVS source code. A special value of "now" causes the checkout to be updated on every build.
* [***CVSDIR***](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-CVSDIR)***:*** Specifies where a temporary checkout is saved. The location is often DL\_DIR/cvs.
* ***CVS\_PROXY\_HOST:*** The name to use as a "proxy=" parameter to the cvs command.
* ***CVS\_PROXY\_PORT:*** The port number to use as a "proxyport=" parameter to the cvs command.

As well as the standard username and password URL syntax, you can also configure the fetcher with various URL parameters:

The supported parameters are as follows:

* ***"method":*** The protocol over which to communicate with the CVS server. By default, this protocol is "pserver". If "method" is set to "ext", BitBake examines the "rsh" parameter and sets CVS\_RSH. You can use "dir" for local directories.
* ***"module":*** Specifies the module to check out. You must supply this parameter.
* ***"tag":*** Describes which CVS TAG should be used for the checkout. By default, the TAG is empty.
* ***"date":*** Specifies a date. If no "date" is specified, the [SRCDATE](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-SRCDATE) of the configuration is used to checkout a specific date. The special value of "now" causes the checkout to be updated on every build.
* ***"localdir":*** Used to rename the module. Effectively, you are renaming the output directory to which the module is unpacked. You are forcing the module into a special directory relative to [CVSDIR](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-CVSDIR).
* ***"rsh"*** Used in conjunction with the "method" parameter.
* ***"scmdata":*** Causes the CVS metadata to be maintained in the tarball the fetcher creates when set to "keep". The tarball is expanded into the work directory. By default, the CVS metadata is removed.
* ***"fullpath":*** Controls whether the resulting checkout is at the module level, which is the default, or is at deeper paths.
* ***"norecurse":*** Causes the fetcher to only checkout the specified directory with no recurse into any subdirectories.
* ***"port":*** The port to which the CVS server connects.

Some example URLs are as follows:

SRC\_URI = "cvs://CVSROOT;module=mymodule;tag=some-version;method=ext"

SRC\_URI = "cvs://CVSROOT;module=mymodule;date=20060126;localdir=usethat"

**4.3.4. Subversion (SVN) Fetcher (svn://)**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#svn-fetcher)

This fetcher submodule fetches code from the Subversion source control system. The executable used is specified byFETCHCMD\_svn, which defaults to "svn". The fetcher's temporary working directory is set by [SVNDIR](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-SVNDIR), which is usuallyDL\_DIR/svn.

The supported parameters are as follows:

* ***"module":*** The name of the svn module to checkout. You must provide this parameter. You can think of this parameter as the top-level directory of the repository data you want.
* ***"protocol":*** The protocol to use, which defaults to "svn". Other options are "svn+ssh" and "rsh". For "rsh", the "rsh" parameter is also used.
* ***"rev":*** The revision of the source code to checkout.
* ***"date":*** The date of the source code to checkout. Specific revisions are generally much safer to checkout rather than by date as they do not involve timezones (e.g. they are much more deterministic).
* ***"scmdata":*** Causes the “.svn” directories to be available during compile-time when set to "keep". By default, these directories are removed.
* ***"transportuser":*** When required, sets the username for the transport. By default, this parameter is empty. The transport username is different than the username used in the main URL, which is passed to the subversion command.

Following are two examples using svn:

SRC\_URI = "svn://svn.oe.handhelds.org/svn;module=vip;proto=http;rev=667"

SRC\_URI = "svn://svn.oe.handhelds.org/svn/;module=opie;proto=svn+ssh;date=20060126"

**4.3.5. Git Fetcher (git://)**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#git-fetcher)

This fetcher submodule fetches code from the Git source control system. The fetcher works by creating a bare clone of the remote into [GITDIR](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-GITDIR), which is usually DL\_DIR/git2. This bare clone is then cloned into the work directory during the unpack stage when a specific tree is checked out. This is done using alternates and by reference to minimize the amount of duplicate data on the disk and make the unpack process fast. The executable used can be set with FETCHCMD\_git.

This fetcher supports the following parameters:

* ***"protocol":*** The protocol used to fetch the files. The default is "git" when a hostname is set. If a hostname is not set, the Git protocol is "file". You can also use "http", "https", "ssh" and "rsync".
* ***"nocheckout":*** Tells the fetcher to not checkout source code when unpacking when set to "1". Set this option for the URL where there is a custom routine to checkout code. The default is "0".
* ***"rebaseable":*** Indicates that the upstream Git repository can be rebased. You should set this parameter to "1" if revisions can become detached from branches. In this case, the source mirror tarball is done per revision, which has a loss of efficiency. Rebasing the upstream Git repository could cause the current revision to disappear from the upstream repository. This option reminds the fetcher to preserve the local cache carefully for future use. The default value for this parameter is "0".
* ***"nobranch":*** Tells the fetcher to not check the SHA validation for the branch when set to "1". The default is "0". Set this option for the recipe that refers to the commit that is valid for a tag instead of the branch.
* ***"bareclone":*** Tells the fetcher to clone a bare clone into the destination directory without checking out a working tree. Only the raw Git metadata is provided. This parameter implies the "nocheckout" parameter as well.
* ***"branch":*** The branch(es) of the Git tree to clone. If unset, this is assumed to be "master". The number of branch parameters much match the number of name parameters.
* ***"rev":*** The revision to use for the checkout. The default is "master".
* ***"tag":*** Specifies a tag to use for the checkout. To correctly resolve tags, BitBake must access the network. For that reason, tags are often not used. As far as Git is concerned, the "tag" parameter behaves effectively the same as the "rev" parameter.
* ***"subpath":*** Limits the checkout to a specific subpath of the tree. By default, the whole tree is checked out.
* ***"destsuffix":*** The name of the path in which to place the checkout. By default, the path is git/.

Here are some example URLs:

SRC\_URI = "git://git.oe.handhelds.org/git/vip.git;tag=version-1"

SRC\_URI = "git://git.oe.handhelds.org/git/vip.git;protocol=http"

**4.3.6. Git Submodule Fetcher (gitsm://)**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#gitsm-fetcher)

This fetcher submodule inherits from the [Git fetcher](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#git-fetcher) and extends that fetcher's behavior by fetching a repository's submodules. [SRC\_URI](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-SRC_URI) is passed to the Git fetcher as described in the "[Git Fetcher (git://)](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#git-fetcher)" section.

**Notes and Warnings**

You must clean a recipe when switching between 'git://' and 'gitsm://' URLs.

The Git Submodules fetcher is not a complete fetcher implementation. The fetcher has known issues where it does not use the normal source mirroring infrastructure properly.

**4.3.7. ClearCase Fetcher (ccrc://)**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#clearcase-fetcher)

This fetcher submodule fetches code from a [ClearCase](http://en.wikipedia.org/wiki/Rational_ClearCase) repository.

To use this fetcher, make sure your recipe has proper [SRC\_URI](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-SRC_URI), [SRCREV](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-SRCREV), and [PV](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PV) settings. Here is an example:

SRC\_URI = "ccrc://cc.example.org/ccrc;vob=/example\_vob;module=/example\_module"

SRCREV = "EXAMPLE\_CLEARCASE\_TAG"

PV = "${@d.getVar("SRCREV").replace("/", "+")}"

The fetcher uses the rcleartool or cleartool remote client, depending on which one is available.

Following are options for the SRC\_URI statement:

* ***vob***: The name, which must include the prepending "/" character, of the ClearCase VOB. This option is required.
* ***module***: The module, which must include the prepending "/" character, in the selected VOB.

**Note**

The module and vob options are combined to create the load rule in the view config spec. As an example, consider the vob and module values from the SRC\_URI statement at the start of this section. Combining those values results in the following:

load /example\_vob/example\_module

* ***proto***: The protocol, which can be either http or https.

By default, the fetcher creates a configuration specification. If you want this specification written to an area other than the default, use the CCASE\_CUSTOM\_CONFIG\_SPEC variable in your recipe to define where the specification is written.

**Note**

the SRCREV loses its functionality if you specify this variable. However, SRCREV is still used to label the archive after a fetch even though it does not define what is fetched.

Here are a couple of other behaviors worth mentioning:

* When using cleartool, the login of cleartool is handled by the system. The login require no special steps.
* In order to use rcleartool with authenticated users, an "rcleartool login" is necessary before using the fetcher.

**4.3.8. Other Fetchers**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#other-fetchers)

Fetch submodules also exist for the following:

* Bazaar (bzr://)
* Perforce (p4://)
* Trees using Git Annex (gitannex://)
* Secure FTP (sftp://)
* Secure Shell (ssh://)
* Repo (repo://)
* OSC (osc://)
* Mercurial (hg://)

No documentation currently exists for these lesser used fetcher submodules. However, you might find the code helpful and readable.

**4.4. Auto Revisions**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#auto-revisions)

We need to document AUTOREV and SRCREV\_FORMAT here.

**Chapter 5. Variables Glossary**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#ref-variables-glos)

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[Glossary](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#ref-variables-glossary)

This chapter lists common variables used by BitBake and gives an overview of their function and contents.

**Note**

Following are some points regarding the variables listed in this glossary:

* The variables listed in this glossary are specific to BitBake. Consequently, the descriptions are limited to that context.
* Also, variables exist in other systems that use BitBake (e.g. The Yocto Project and OpenEmbedded) that have names identical to those found in this glossary. For such cases, the variables in those systems extend the functionality of the variable as it is described here in this glossary.
* Finally, there are variables mentioned in this glossary that do not appear in the BitBake glossary. These other variables are variables used in systems that use BitBake.

**Glossary**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#ref-variables-glossary)

[A](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-ASSUME_PROVIDED) [B](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-B) [C](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-CACHE) [D](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-DEFAULT_PREFERENCE) [E](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-EXCLUDE_FROM_WORLD) [F](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-FAKEROOT) [G](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-GITDIR) [H](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-HGDIR) [L](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-LAYERDEPENDS) [M](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-MIRRORS) [O](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-OVERRIDES) [P](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PACKAGES) [R](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-RDEPENDS) [S](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-SECTION) [T](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-T)

**A**

ASSUME\_PROVIDED[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-ASSUME_PROVIDED)

Lists recipe names ([PN](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PN) values) BitBake does not attempt to build. Instead, BitBake assumes these recipes have already been built.

In OpenEmbedded Core, ASSUME\_PROVIDED mostly specifies native tools that should not be built. An example is git-native, which when specified allows for the Git binary from the host to be used rather than building git-native.

**B**

B[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-B)

The directory in which BitBake executes functions during a recipe's build process.

BB\_ALLOWED\_NETWORKS[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_ALLOWED_NETWORKS)

Specifies a space-delimited list of hosts that the fetcher is allowed to use to obtain the required source code. Following are considerations surrounding this variable:

* This host list is only used if [BB\_NO\_NETWORK](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_NO_NETWORK) is either not set or set to "0".
* Limited support for wildcard matching against the beginning of host names exists. For example, the following setting matchesgit.gnu.org, ftp.gnu.org, and foo.git.gnu.org.
* BB\_ALLOWED\_NETWORKS = "\*.gnu.org"

* Mirrors not in the host list are skipped and logged in debug.
* Attempts to access networks not in the host list cause a failure.

Using BB\_ALLOWED\_NETWORKS in conjunction with [PREMIRRORS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PREMIRRORS) is very useful. Adding the host you want to use to PREMIRRORS results in the source code being fetched from an allowed location and avoids raising an error when a host that is not allowed is in a [SRC\_URI](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-SRC_URI) statement. This is because the fetcher does not attempt to use the host listed inSRC\_URI after a successful fetch from the PREMIRRORS occurs. BB\_CONSOLELOG[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_CONSOLELOG)

Specifies the path to a log file into which BitBake's user interface writes output during the build.

BB\_CURRENTTASK[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_CURRENTTASK)

Contains the name of the currently running task. The name does not include the do\_ prefix.

BB\_DANGLINGAPPENDS\_WARNONLY[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_DANGLINGAPPENDS_WARNONLY)

Defines how BitBake handles situations where an append file (.bbappend) has no corresponding recipe file (.bb). This condition often occurs when layers get out of sync (e.g. oe-core bumps a recipe version and the old recipe no longer exists and the other layer has not been updated to the new version of the recipe yet).

The default fatal behavior is safest because it is the sane reaction given something is out of sync. It is important to realize when your changes are no longer being applied.

BB\_DEFAULT\_TASK[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_DEFAULT_TASK)

The default task to use when none is specified (e.g. with the -ccommand line option). The task name specified should not include thedo\_ prefix.

BB\_DISKMON\_DIRS[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_DISKMON_DIRS)

Monitors disk space and available inodes during the build and allows you to control the build based on these parameters.

Disk space monitoring is disabled by default. When setting this variable, use the following form:

BB\_DISKMON\_DIRS = "<action>,<dir>,<threshold> [...]"

where:

<action> is:

ABORT: Immediately abort the build when

a threshold is broken.

STOPTASKS: Stop the build after the currently

executing tasks have finished when

a threshold is broken.

WARN: Issue a warning but continue the

build when a threshold is broken.

Subsequent warnings are issued as

defined by the

[BB\_DISKMON\_WARNINTERVAL](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_DISKMON_WARNINTERVAL) variable,

which must be defined.

<dir> is:

Any directory you choose. You can specify one or

more directories to monitor by separating the

groupings with a space. If two directories are

on the same device, only the first directory

is monitored.

<threshold> is:

Either the minimum available disk space,

the minimum number of free inodes, or

both. You must specify at least one. To

omit one or the other, simply omit the value.

Specify the threshold using G, M, K for Gbytes,

Mbytes, and Kbytes, respectively. If you do

not specify G, M, or K, Kbytes is assumed by

default. Do not use GB, MB, or KB.

Here are some examples:

BB\_DISKMON\_DIRS = "ABORT,${TMPDIR},1G,100K WARN,${SSTATE\_DIR},1G,100K"

BB\_DISKMON\_DIRS = "STOPTASKS,${TMPDIR},1G"

BB\_DISKMON\_DIRS = "ABORT,${TMPDIR},,100K"

The first example works only if you also set the[BB\_DISKMON\_WARNINTERVAL](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_DISKMON_WARNINTERVAL) variable. This example causes the build system to immediately abort when either the disk space in ${TMPDIR}drops below 1 Gbyte or the available free inodes drops below 100 Kbytes. Because two directories are provided with the variable, the build system also issues a warning when the disk space in the${SSTATE\_DIR} directory drops below 1 Gbyte or the number of free inodes drops below 100 Kbytes. Subsequent warnings are issued during intervals as defined by the BB\_DISKMON\_WARNINTERVAL variable.

The second example stops the build after all currently executing tasks complete when the minimum disk space in the ${TMPDIR} directory drops below 1 Gbyte. No disk monitoring occurs for the free inodes in this case.

The final example immediately aborts the build when the number of free inodes in the ${TMPDIR} directory drops below 100 Kbytes. No disk space monitoring for the directory itself occurs in this case.

BB\_DISKMON\_WARNINTERVAL[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_DISKMON_WARNINTERVAL)

Defines the disk space and free inode warning intervals.

If you are going to use the BB\_DISKMON\_WARNINTERVAL variable, you must also use the [BB\_DISKMON\_DIRS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_DISKMON_DIRS) variable and define its action as "WARN". During the build, subsequent warnings are issued each time disk space or number of free inodes further reduces by the respective interval.

If you do not provide a BB\_DISKMON\_WARNINTERVAL variable and you do use BB\_DISKMON\_DIRS with the "WARN" action, the disk monitoring interval defaults to the following:

BB\_DISKMON\_WARNINTERVAL = "50M,5K"

When specifying the variable in your configuration file, use the following form:

BB\_DISKMON\_WARNINTERVAL = "<disk\_space\_interval>,<disk\_inode\_interval>"

where:

<disk\_space\_interval> is:

An interval of memory expressed in either

G, M, or K for Gbytes, Mbytes, or Kbytes,

respectively. You cannot use GB, MB, or KB.

<disk\_inode\_interval> is:

An interval of free inodes expressed in either

G, M, or K for Gbytes, Mbytes, or Kbytes,

respectively. You cannot use GB, MB, or KB.

Here is an example:

BB\_DISKMON\_DIRS = "WARN,${SSTATE\_DIR},1G,100K"

BB\_DISKMON\_WARNINTERVAL = "50M,5K"

These variables cause BitBake to issue subsequent warnings each time the available disk space further reduces by 50 Mbytes or the number of free inodes further reduces by 5 Kbytes in the ${SSTATE\_DIR} directory. Subsequent warnings based on the interval occur each time a respective interval is reached beyond the initial warning (i.e. 1 Gbytes and 100 Kbytes).

BB\_ENV\_WHITELIST[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_ENV_WHITELIST)

Specifies the internal whitelist of variables to allow through from the external environment into BitBake's datastore. If the value of this variable is not specified (which is the default), the following list is used:[BBPATH](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BBPATH), [BB\_PRESERVE\_ENV](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_PRESERVE_ENV), [BB\_ENV\_WHITELIST](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_ENV_WHITELIST), and[BB\_ENV\_EXTRAWHITE](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_ENV_EXTRAWHITE).

**Note**

You must set this variable in the external environment in order for it to work.

BB\_ENV\_EXTRAWHITE[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_ENV_EXTRAWHITE)

Specifies an additional set of variables to allow through (whitelist) from the external environment into BitBake's datastore. This list of variables are on top of the internal list set in [BB\_ENV\_WHITELIST](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_ENV_WHITELIST).

**Note**

You must set this variable in the external environment in order for it to work.

BB\_FETCH\_PREMIRRORONLY[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_FETCH_PREMIRRORONLY)

When set to "1", causes BitBake's fetcher module to only search[PREMIRRORS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PREMIRRORS) for files. BitBake will not search the main [SRC\_URI](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-SRC_URI) or[MIRRORS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-MIRRORS).

BB\_FILENAME[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_FILENAME)

Contains the filename of the recipe that owns the currently running task. For example, if the do\_fetch task that resides in the my-recipe.bb is executing, the BB\_FILENAME variable contains "/foo/path/my-recipe.bb".

BB\_GENERATE\_MIRROR\_TARBALLS[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_GENERATE_MIRROR_TARBALLS)

Causes tarballs of the Git repositories, including the Git metadata, to be placed in the [DL\_DIR](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-DL_DIR) directory. Anyone wishing to create a source mirror would want to enable this variable.

For performance reasons, creating and placing tarballs of the Git repositories is not the default action by BitBake.

BB\_GENERATE\_MIRROR\_TARBALLS = "1"

BB\_HASHCONFIG\_WHITELIST[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_HASHCONFIG_WHITELIST)

Lists variables that are excluded from base configuration checksum, which is used to determine if the cache can be reused.

One of the ways BitBake determines whether to re-parse the main metadata is through checksums of the variables in the datastore of the base configuration data. There are variables that you typically want to exclude when checking whether or not to re-parse and thus rebuild the cache. As an example, you would usually exclude TIME and DATEbecause these variables are always changing. If you did not exclude them, BitBake would never reuse the cache.

BB\_HASHBASE\_WHITELIST[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_HASHBASE_WHITELIST)

Lists variables that are excluded from checksum and dependency data. Variables that are excluded can therefore change without affecting the checksum mechanism. A common example would be the variable for the path of the build. BitBake's output should not (and usually does not) depend on the directory in which it was built.

BB\_HASHCHECK\_FUNCTION[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_HASHCHECK_FUNCTION)

Specifies the name of the function to call during the "setscene" part of the task's execution in order to validate the list of task hashes. The function returns the list of setscene tasks that should be executed.

At this point in the execution of the code, the objective is to quickly verify if a given setscene function is likely to work or not. It's easier to check the list of setscene functions in one pass than to call many individual tasks. The returned list need not be completely accurate. A given setscene task can still later fail. However, the more accurate the data returned, the more efficient the build will be.

BB\_INVALIDCONF[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_INVALIDCONF)

Used in combination with the ConfigParsed event to trigger re-parsing the base metadata (i.e. all the recipes). The ConfigParsed event can set the variable to trigger the re-parse. You must be careful to avoid recursive loops with this functionality.

BB\_LOGFMT[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_LOGFMT)

Specifies the name of the log files saved into ${[T](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-T)}. By default, theBB\_LOGFMT variable is undefined and the log file names get created using the following form:

log.{task}.{pid}

If you want to force log files to take a specific name, you can set this variable in a configuration file.

BB\_NICE\_LEVEL[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_NICE_LEVEL)

Allows BitBake to run at a specific priority (i.e. nice level). System permissions usually mean that BitBake can reduce its priority but not raise it again. See [BB\_TASK\_NICE\_LEVEL](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_TASK_NICE_LEVEL) for additional information.

BB\_NO\_NETWORK[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_NO_NETWORK)

Disables network access in the BitBake fetcher modules. With this access disabled, any command that attempts to access the network becomes an error.

Disabling network access is useful for testing source mirrors, running builds when not connected to the Internet, and when operating in certain kinds of firewall environments.

BB\_NUMBER\_THREADS[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_NUMBER_THREADS)

The maximum number of tasks BitBake should run in parallel at any one time. If your host development system supports multiple cores, a good rule of thumb is to set this variable to twice the number of cores.

BB\_NUMBER\_PARSE\_THREADS[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_NUMBER_PARSE_THREADS)

Sets the number of threads BitBake uses when parsing. By default, the number of threads is equal to the number of cores on the system.

BB\_ORIGENV[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_ORIGENV)

Contains a copy of the original external environment in which BitBake was run. The copy is taken before any whitelisted variable values are filtered into BitBake's datastore.

**Note**

The contents of this variable is a datastore object that can be queried using the normal datastore operations.

BB\_PRESERVE\_ENV[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_PRESERVE_ENV)

Disables whitelisting and instead allows all variables through from the external environment into BitBake's datastore.

**Note**

You must set this variable in the external environment in order for it to work.

BB\_RUNFMT[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_RUNFMT)

Specifies the name of the executable script files (i.e. run files) saved into ${[T](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-T)}. By default, the BB\_RUNFMT variable is undefined and the run file names get created using the following form:

run.{task}.{pid}

If you want to force run files to take a specific name, you can set this variable in a configuration file.

BB\_RUNTASK[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_RUNTASK)

Contains the name of the currently executing task. The value does not include the "do\_" prefix. For example, if the currently executing task isdo\_config, the value is "config".

BB\_SCHEDULER[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_SCHEDULER)

Selects the name of the scheduler to use for the scheduling of BitBake tasks. Three options exist:

* ***basic*** - The basic framework from which everything derives. Using this option causes tasks to be ordered numerically as they are parsed.
* ***speed*** - Executes tasks first that have more tasks depending on them. The "speed" option is the default.
* ***completion*** - Causes the scheduler to try to complete a given recipe once its build has started.

BB\_SCHEDULERS[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_SCHEDULERS)

Defines custom schedulers to import. Custom schedulers need to be derived from the RunQueueScheduler class.

For information how to select a scheduler, see the [BB\_SCHEDULER](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_SCHEDULER)variable.

BB\_SETSCENE\_DEPVALID[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_SETSCENE_DEPVALID)

Specifies a function BitBake calls that determines whether BitBake requires a setscene dependency to be met.

When running a setscene task, BitBake needs to know which dependencies of that setscene task also need to be run. Whether dependencies also need to be run is highly dependent on the metadata. The function specified by this variable returns a "True" or "False" depending on whether the dependency needs to be met.

BB\_SETSCENE\_VERIFY\_FUNCTION[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_SETSCENE_VERIFY_FUNCTION)

Specifies a function to call that verifies the list of planned task execution before the main task execution happens. The function is called once BitBake has a list of setscene tasks that have run and either succeeded or failed.

The function allows for a task list check to see if they make sense. Even if BitBake was planning to skip a task, the returned value of the function can force BitBake to run the task, which is necessary under certain metadata defined circumstances.

BB\_SIGNATURE\_EXCLUDE\_FLAGS[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_SIGNATURE_EXCLUDE_FLAGS)

Lists variable flags (varflags) that can be safely excluded from checksum and dependency data for keys in the datastore. When generating checksum or dependency data for keys in the datastore, the flags set against that key are normally included in the checksum.

For more information on varflags, see the "[Variable Flags](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#variable-flags)" section.

BB\_SIGNATURE\_HANDLER[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_SIGNATURE_HANDLER)

Defines the name of the signature handler BitBake uses. The signature handler defines the way stamp files are created and handled, if and how the signature is incorporated into the stamps, and how the signature itself is generated.

A new signature handler can be added by injecting a class derived from the SignatureGenerator class into the global namespace.

BB\_SRCREV\_POLICY[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_SRCREV_POLICY)

Defines the behavior of the fetcher when it interacts with source control systems and dynamic source revisions. The BB\_SRCREV\_POLICY variable is useful when working without a network.

The variable can be set using one of two policies:

* ***cache*** - Retains the value the system obtained previously rather than querying the source control system each time.
* ***clear*** - Queries the source controls system every time. With this policy, there is no cache. The "clear" policy is the default.

BB\_STAMP\_POLICY[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_STAMP_POLICY)

Defines the mode used for how timestamps of stamp files are compared. You can set the variable to one of the following modes:

* ***perfile*** - Timestamp comparisons are only made between timestamps of a specific recipe. This is the default mode.
* ***full*** - Timestamp comparisons are made for all dependencies.
* ***whitelist*** - Identical to "full" mode except timestamp comparisons are made for recipes listed in the [BB\_STAMP\_WHITELIST](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_STAMP_WHITELIST) variable.

**Note**

Stamp policies are largely obsolete with the introduction of setscene tasks.

BB\_STAMP\_WHITELIST[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_STAMP_WHITELIST)

Lists files whose stamp file timestamps are compared when the stamp policy mode is set to "whitelist". For information on stamp policies, see the [BB\_STAMP\_POLICY](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_STAMP_POLICY) variable.

BB\_STRICT\_CHECKSUM[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_STRICT_CHECKSUM)

Sets a more strict checksum mechanism for non-local URLs. Setting this variable to a value causes BitBake to report an error if it encounters a non-local URL that does not have at least one checksum specified.

BB\_TASK\_NICE\_LEVEL[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_TASK_NICE_LEVEL)

Allows specific tasks to change their priority (i.e. nice level).

You can use this variable in combination with task overrides to raise or lower priorities of specific tasks. For example, on the [Yocto Project](http://www.yoctoproject.org/)autobuilder, QEMU emulation in images is given a higher priority as compared to build tasks to ensure that images do not suffer timeouts on loaded systems.

BB\_TASKHASH[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_TASKHASH)

Within an executing task, this variable holds the hash of the task as returned by the currently enabled signature generator.

BB\_VERBOSE\_LOGS[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_VERBOSE_LOGS)

Controls how verbose BitBake is during builds. If set, shell scripts echo commands and shell script output appears on standard out (stdout).

BB\_WORKERCONTEXT[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_WORKERCONTEXT)

Specifies if the current context is executing a task. BitBake sets this variable to "1" when a task is being executed. The value is not set when the task is in server context during parsing or event handling.

BBCLASSEXTEND[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BBCLASSEXTEND)

Allows you to extend a recipe so that it builds variants of the software. Some examples of these variants for recipes from the OpenEmbedded Core metadata are "natives" such as quilt-native, which is a copy of Quilt built to run on the build system; "crosses" such as gcc-cross, which is a compiler built to run on the build machine but produces binaries that run on the target MACHINE; "nativesdk", which targets the SDK machine instead of MACHINE; and "mulitlibs" in the form "multilib:*multilib\_name*".

To build a different variant of the recipe with a minimal amount of code, it usually is as simple as adding the variable to your recipe. Here are two examples. The "native" variants are from the OpenEmbedded Core metadata:

BBCLASSEXTEND =+ "native nativesdk"

BBCLASSEXTEND =+ "multilib:*multilib\_name*"

BBDEBUG[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BBDEBUG)

Sets the BitBake debug output level to a specific value as incremented by the -d command line option.

**Note**

You must set this variable in the external environment in order for it to work.

BBFILE\_COLLECTIONS[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BBFILE_COLLECTIONS)

Lists the names of configured layers. These names are used to find the other BBFILE\_\* variables. Typically, each layer appends its name to this variable in its conf/layer.conf file.

BBFILE\_PATTERN[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BBFILE_PATTERN)

Variable that expands to match files from [BBFILES](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BBFILES) in a particular layer. This variable is used in the conf/layer.conf file and must be suffixed with the name of the specific layer (e.g. BBFILE\_PATTERN\_emenlow).

BBFILE\_PRIORITY[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BBFILE_PRIORITY)

Assigns the priority for recipe files in each layer.

This variable is useful in situations where the same recipe appears in more than one layer. Setting this variable allows you to prioritize a layer against other layers that contain the same recipe - effectively letting you control the precedence for the multiple layers. The precedence established through this variable stands regardless of a recipe's version ([PV](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PV) variable). For example, a layer that has a recipe with a higher PVvalue but for which the BBFILE\_PRIORITY is set to have a lower precedence still has a lower precedence.

A larger value for the BBFILE\_PRIORITY variable results in a higher precedence. For example, the value 6 has a higher precedence than the value 5. If not specified, the BBFILE\_PRIORITY variable is set based on layer dependencies (see the [LAYERDEPENDS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-LAYERDEPENDS) variable for more information. The default priority, if unspecified for a layer with no dependencies, is the lowest defined priority + 1 (or 1 if no priorities are defined).

**Tip**

You can use the command bitbake-layers show-layers to list all configured layers along with their priorities.

BBFILES[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BBFILES)

List of recipe files BitBake uses to build software.

BBINCLUDED[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BBINCLUDED)

Contains a space-separated list of all of all files that BitBake's parser included during parsing of the current file.

BBINCLUDELOGS[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BBINCLUDELOGS)

If set to a value, enables printing the task log when reporting a failed task.

BBINCLUDELOGS\_LINES[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BBINCLUDELOGS_LINES)

If [BBINCLUDELOGS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BBINCLUDELOGS) is set, specifies the maximum number of lines from the task log file to print when reporting a failed task. If you do not setBBINCLUDELOGS\_LINES, the entire log is printed.

BBLAYERS[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BBLAYERS)

Lists the layers to enable during the build. This variable is defined in the bblayers.conf configuration file in the build directory. Here is an example:

BBLAYERS = " \

/home/scottrif/poky/meta \

/home/scottrif/poky/meta-yocto \

/home/scottrif/poky/meta-yocto-bsp \

/home/scottrif/poky/meta-mykernel \

"

This example enables four layers, one of which is a custom, user-defined layer named meta-mykernel.

BBLAYERS\_FETCH\_DIR[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BBLAYERS_FETCH_DIR)

Sets the base location where layers are stored. By default, this location is set to ${COREBASE}. This setting is used in conjunction withbitbake-layers layerindex-fetch and tells bitbake-layers where to place the fetched layers.

BBMASK[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BBMASK)

Prevents BitBake from processing recipes and recipe append files.

You can use the BBMASK variable to "hide" these .bb and .bbappendfiles. BitBake ignores any recipe or recipe append files that match the expression. It is as if BitBake does not see them at all. Consequently, matching files are not parsed or otherwise used by BitBake.

The value you provide is passed to Python's regular expression compiler. The expression is compared against the full paths to the files. For complete syntax information, see Python's documentation at<http://docs.python.org/release/2.3/lib/re-syntax.html>.

The following example uses a complete regular expression to tell BitBake to ignore all recipe and recipe append files in the meta-ti/recipes-misc/ directory:

BBMASK = "meta-ti/recipes-misc/"

If you want to mask out multiple directories or recipes, use the vertical bar to separate the regular expression fragments. This next example masks out multiple directories and individual recipes:

BBMASK = "meta-ti/recipes-misc/|meta-ti/recipes-ti/packagegroup/"

BBMASK .= "|.\*meta-oe/recipes-support/"

BBMASK .= "|.\*openldap"

BBMASK .= "|.\*opencv"

BBMASK .= "|.\*lzma"

Notice how the vertical bar is used to append the fragments.

**Note**

When specifying a directory name, use the trailing slash character to ensure you match just that directory name.

BBPATH[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BBPATH)

Used by BitBake to locate class (.bbclass) and configuration (.conf) files. This variable is analogous to the PATH variable.

If you run BitBake from a directory outside of the build directory, you must be sure to set BBPATH to point to the build directory. Set the variable as you would any environment variable and then run BitBake:

$ BBPATH="*build\_directory*"

$ export BBPATH

$ bitbake *target*

BBSERVER[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BBSERVER)

Points to the server that runs memory-resident BitBake. The variable is only used when you employ memory-resident BitBake.

BBVERSIONS[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BBVERSIONS)

Allows a single recipe to build multiple versions of a project from a single recipe file. You also able to specify conditional metadata using the [OVERRIDES](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-OVERRIDES) mechanism for a single version or for an optionally named range of versions.

For more information on BBVERSIONS, see the "[Variants - Class Extension Mechanism](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#variants-class-extension-mechanism)" section.

BITBAKE\_UI[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BITBAKE_UI)

Used to specify the UI module to use when running BitBake. Using this variable is equivalent to using the -u command-line option.

**Note**

You must set this variable in the external environment in order for it to work.

BUILDNAME[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BUILDNAME)

A name assigned to the build. The name defaults to a datetime stamp of when the build was started but can be defined by the metadata.

BZRDIR[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BZRDIR)

The directory in which files checked out of a Bazaar system are stored.

**C**

CACHE[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-CACHE)

Specifies the directory BitBake uses to store a cache of the metadata so it does not need to be parsed every time BitBake is started.

CVSDIR[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-CVSDIR)

The directory in which files checked out under the CVS system are stored.

**D**

DEFAULT\_PREFERENCE[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-DEFAULT_PREFERENCE)

Specifies a weak bias for recipe selection priority.

The most common usage of this is variable is to set it to "-1" within a recipe for a development version of a piece of software. Using the variable in this way causes the stable version of the recipe to build by default in the absence of [PREFERRED\_VERSION](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PREFERRED_VERSION) being used to build the development version.

**Note**

The bias provided by DEFAULT\_PREFERENCE is weak and is overridden by [BBFILE\_PRIORITY](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BBFILE_PRIORITY) if that variable is different between two layers that contain different versions of the same recipe.

DEPENDS[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-DEPENDS)

Lists a recipe's build-time dependencies (i.e. other recipe files).

Consider this simple example for two recipes named "a" and "b" that produce similarly named packages. In this example, the DEPENDSstatement appears in the "a" recipe:

DEPENDS = "b"

Here, the dependency is such that the do\_configure task for recipe "a" depends on the do\_populate\_sysroot task of recipe "b". This means anything that recipe "b" puts into sysroot is available when recipe "a" is configuring itself.

For information on runtime dependencies, see the [RDEPENDS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-RDEPENDS) variable.

DESCRIPTION[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-DESCRIPTION)

A long description for the recipe.

DL\_DIR[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-DL_DIR)

The central download directory used by the build process to store downloads. By default, DL\_DIR gets files suitable for mirroring for everything except Git repositories. If you want tarballs of Git repositories, use the [BB\_GENERATE\_MIRROR\_TARBALLS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BB_GENERATE_MIRROR_TARBALLS) variable.

**E**

EXCLUDE\_FROM\_WORLD[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-EXCLUDE_FROM_WORLD)

Directs BitBake to exclude a recipe from world builds (i.e. bitbake world). During world builds, BitBake locates, parses and builds all recipes found in every layer exposed in the bblayers.confconfiguration file.

To exclude a recipe from a world build using this variable, set the variable to "1" in the recipe.

**Note**

Recipes added to EXCLUDE\_FROM\_WORLD may still be built during a world build in order to satisfy dependencies of other recipes. Adding a recipe toEXCLUDE\_FROM\_WORLD only ensures that the recipe is not explicitly added to the list of build targets in a world build.

**F**

FAKEROOT[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-FAKEROOT)

Contains the command to use when running a shell script in a fakeroot environment. The FAKEROOT variable is obsolete and has been replaced by the other FAKEROOT\* variables. See these entries in the glossary for more information.

FAKEROOTBASEENV[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-FAKEROOTBASEENV)

Lists environment variables to set when executing the command defined by [FAKEROOTCMD](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-FAKEROOTCMD) that starts the bitbake-worker process in the fakeroot environment.

FAKEROOTCMD[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-FAKEROOTCMD)

Contains the command that starts the bitbake-worker process in the fakeroot environment.

FAKEROOTDIRS[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-FAKEROOTDIRS)

Lists directories to create before running a task in the fakeroot environment.

FAKEROOTENV[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-FAKEROOTENV)

Lists environment variables to set when running a task in the fakeroot environment. For additional information on environment variables and the fakeroot environment, see the [FAKEROOTBASEENV](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-FAKEROOTBASEENV) variable.

FAKEROOTNOENV[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-FAKEROOTNOENV)

Lists environment variables to set when running a task that is not in the fakeroot environment. For additional information on environment variables and the fakeroot environment, see the [FAKEROOTENV](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-FAKEROOTENV) variable.

FETCHCMD[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-FETCHCMD)

Defines the command the BitBake fetcher module executes when running fetch operations. You need to use an override suffix when you use the variable (e.g. FETCHCMD\_git or FETCHCMD\_svn).

FILE[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-FILE)

Points at the current file. BitBake sets this variable during the parsing process to identify the file being parsed. BitBake also sets this variable when a recipe is being executed to identify the recipe file.

FILESDIR[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-FILESDIR)

Specifies directories BitBake uses when searching for patches and files. The "local" fetcher module uses these directories when handlingfile:// URLs if the file was not found using [FILESPATH](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-FILESPATH).

**Note**

The FILESDIR variable is deprecated and you should use FILESPATH in all new code.

FILESPATH[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-FILESPATH)

Specifies directories BitBake uses when searching for patches and files. The "local" fetcher module uses these directories when handlingfile:// URLs. The variable behaves like a shell PATH environment variable. The value is a colon-separated list of directories that are searched left-to-right in order.

**G**

GITDIR[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-GITDIR)

The directory in which a local copy of a Git repository is stored when it is cloned.

**H**

HGDIR[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-HGDIR)

The directory in which files checked out of a Mercurial system are stored.

HOMEPAGE[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-HOMEPAGE)

Website where more information about the software the recipe is building can be found.

**I**

INHERIT[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-INHERIT)

Causes the named class to be inherited at this point during parsing. The variable is only valid in configuration files.

**L**

LAYERDEPENDS[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-LAYERDEPENDS)

Lists the layers, separated by spaces, upon which this recipe depends. Optionally, you can specify a specific layer version for a dependency by adding it to the end of the layer name with a colon, (e.g. "anotherlayer:3" to be compared against [LAYERVERSION](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-LAYERVERSION)\_anotherlayerin this case). BitBake produces an error if any dependency is missing or the version numbers do not match exactly (if specified).

You use this variable in the conf/layer.conf file. You must also use the specific layer name as a suffix to the variable (e.g.LAYERDEPENDS\_mylayer).

LAYERDIR[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-LAYERDIR)

When used inside the layer.conf configuration file, this variable provides the path of the current layer. This variable is not available outside of layer.conf and references are expanded immediately when parsing of the file completes.

LAYERVERSION[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-LAYERVERSION)

Optionally specifies the version of a layer as a single number. You can use this variable within [LAYERDEPENDS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-LAYERDEPENDS) for another layer in order to depend on a specific version of the layer.

You use this variable in the conf/layer.conf file. You must also use the specific layer name as a suffix to the variable (e.g.LAYERDEPENDS\_mylayer).

LICENSE[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-LICENSE)

The list of source licenses for the recipe.

**M**

MIRRORS[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-MIRRORS)

Specifies additional paths from which BitBake gets source code. When the build system searches for source code, it first tries the local download directory. If that location fails, the build system tries locations defined by [PREMIRRORS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PREMIRRORS), the upstream source, and then locations specified by MIRRORS in that order.

MULTI\_PROVIDER\_WHITELIST[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-MULTI_PROVIDER_WHITELIST)

Allows you to suppress BitBake warnings caused when building two separate recipes that provide the same output.

Bitbake normally issues a warning when building two different recipes where each provides the same output. This scenario is usually something the user does not want. However, cases do exist where it makes sense, particularly in the virtual/\* namespace. You can use this variable to suppress BitBake's warnings.

To use the variable, list provider names (e.g. recipe names,virtual/kernel, and so forth).

**O**

OVERRIDES[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-OVERRIDES)

BitBake uses OVERRIDES to control what variables are overridden after BitBake parses recipes and configuration files.

Following is a simple example that uses an overrides list based on machine architectures:

OVERRIDES = "arm:x86:mips:powerpc"

You can find information on how to use OVERRIDES in the "[Conditional Syntax (Overrides)](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#conditional-syntax-overrides)" section.

**P**

PACKAGES[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PACKAGES)

The list of packages the recipe creates.

PACKAGES\_DYNAMIC[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PACKAGES_DYNAMIC)

A promise that your recipe satisfies runtime dependencies for optional modules that are found in other recipes. PACKAGES\_DYNAMIC does not actually satisfy the dependencies, it only states that they should be satisfied. For example, if a hard, runtime dependency ([RDEPENDS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-RDEPENDS)) of another package is satisfied during the build through thePACKAGES\_DYNAMIC variable, but a package with the module name is never actually produced, then the other package will be broken.

PE[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PE)

The epoch of the recipe. By default, this variable is unset. The variable is used to make upgrades possible when the versioning scheme changes in some backwards incompatible way.

PERSISTENT\_DIR[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PERSISTENT_DIR)

Specifies the directory BitBake uses to store data that should be preserved between builds. In particular, the data stored is the data that uses BitBake's persistent data API and the data used by the PR Server and PR Service.

PF[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PF)

Specifies the recipe or package name and includes all version and revision numbers (i.e. eglibc-2.13-r20+svnr15508/ and bash-4.2-r1/).

PN[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PN)

The recipe name.

PR[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PR)

The revision of the recipe.

PREFERRED\_PROVIDER[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PREFERRED_PROVIDER)

Determines which recipe should be given preference when multiple recipes provide the same item. You should always suffix the variable with the name of the provided item, and you should set it to the [PN](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PN) of the recipe to which you want to give precedence. Some examples:

PREFERRED\_PROVIDER\_virtual/kernel ?= "linux-yocto"

PREFERRED\_PROVIDER\_virtual/xserver = "xserver-xf86"

PREFERRED\_PROVIDER\_virtual/libgl ?= "mesa"

PREFERRED\_PROVIDERS[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PREFERRED_PROVIDERS)

Determines which recipe should be given preference for cases where multiple recipes provide the same item. Functionally,PREFERRED\_PROVIDERS is identical to [PREFERRED\_PROVIDER](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PREFERRED_PROVIDER). However, the PREFERRED\_PROVIDERS variable lets you define preferences for multiple situations using the following form:

PREFERRED\_PROVIDERS = "xxx:yyy aaa:bbb ..."

This form is a convenient replacement for the following:

PREFERRED\_PROVIDER\_xxx = "yyy"

PREFERRED\_PROVIDER\_aaa = "bbb"

PREFERRED\_VERSION[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PREFERRED_VERSION)

If there are multiple versions of recipes available, this variable determines which recipe should be given preference. You must always suffix the variable with the [PN](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PN) you want to select, and you should set [PV](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PV)accordingly for precedence. You can use the "%" character as a wildcard to match any number of characters, which can be useful when specifying versions that contain long revision numbers that could potentially change. Here are two examples:

PREFERRED\_VERSION\_python = "2.7.3"

PREFERRED\_VERSION\_linux-yocto = "3.10%"

PREMIRRORS[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PREMIRRORS)

Specifies additional paths from which BitBake gets source code. When the build system searches for source code, it first tries the local download directory. If that location fails, the build system tries locations defined by PREMIRRORS, the upstream source, and then locations specified by [MIRRORS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-MIRRORS) in that order.

Typically, you would add a specific server for the build system to attempt before any others by adding something like the following to your configuration:

PREMIRRORS\_prepend = "\

git://.\*/.\* http://www.yoctoproject.org/sources/ \n \

ftp://.\*/.\* http://www.yoctoproject.org/sources/ \n \

http://.\*/.\* http://www.yoctoproject.org/sources/ \n \

https://.\*/.\* http://www.yoctoproject.org/sources/ \n"

These changes cause the build system to intercept Git, FTP, HTTP, and HTTPS requests and direct them to the http:// sources mirror. You can use file:// URLs to point to local directories or network shares as well.

PROVIDES[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PROVIDES)

A list of aliases by which a particular recipe can be known. By default, a recipe's own [PN](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PN) is implicitly already in its PROVIDES list. If a recipe usesPROVIDES, the additional aliases are synonyms for the recipe and can be useful satisfying dependencies of other recipes during the build as specified by [DEPENDS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-DEPENDS).

Consider the following example PROVIDES statement from a recipe filelibav\_0.8.11.bb:

PROVIDES += "libpostproc"

The PROVIDES statement results in the "libav" recipe also being known as "libpostproc".

PRSERV\_HOST[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PRSERV_HOST)

The network based [PR](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PR) service host and port.

Following is an example of how the PRSERV\_HOST variable is set:

PRSERV\_HOST = "localhost:0"

You must set the variable if you want to automatically start a local PR service. You can set PRSERV\_HOST to other values to use a remote PR service.

PV[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PV)

The version of the recipe.

**R**

RDEPENDS[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-RDEPENDS)

Lists a package's runtime dependencies (i.e. other packages) that must be installed in order for the built package to run correctly. If a package in this list cannot be found during the build, you will get a build error.

Because the RDEPENDS variable applies to packages being built, you should always use the variable in a form with an attached package name. For example, suppose you are building a development package that depends on the perl package. In this case, you would use the following RDEPENDS statement:

RDEPENDS\_${PN}-dev += "perl"

In the example, the development package depends on the perlpackage. Thus, the RDEPENDS variable has the ${PN}-dev package name as part of the variable.

BitBake supports specifying versioned dependencies. Although the syntax varies depending on the packaging format, BitBake hides these differences from you. Here is the general syntax to specify versions with the RDEPENDS variable:

RDEPENDS\_${PN} = "*package* (*operator* *version*)"

For operator, you can specify the following:

=

<

>

<=

>=

For example, the following sets up a dependency on version 1.2 or greater of the package foo:

RDEPENDS\_${PN} = "foo (>= 1.2)"

For information on build-time dependencies, see the [DEPENDS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-DEPENDS) variable.

RPROVIDES[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-RPROVIDES)

A list of package name aliases that a package also provides. These aliases are useful for satisfying runtime dependencies of other packages both during the build and on the target (as specified by [RDEPENDS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-RDEPENDS)).

As with all package-controlling variables, you must always use the variable in conjunction with a package name override. Here is an example:

RPROVIDES\_${PN} = "widget-abi-2"

RRECOMMENDS[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-RRECOMMENDS)

A list of packages that extends the usability of a package being built. The package being built does not depend on this list of packages in order to successfully build, but needs them for the extended usability. To specify runtime dependencies for packages, see the [RDEPENDS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-RDEPENDS)variable.

BitBake supports specifying versioned recommends. Although the syntax varies depending on the packaging format, BitBake hides these differences from you. Here is the general syntax to specify versions with the RRECOMMENDS variable:

RRECOMMENDS\_${PN} = "*package* (*operator* *version*)"

For operator, you can specify the following:

=

<

>

<=

>=

For example, the following sets up a recommend on version 1.2 or greater of the package foo:

RRECOMMENDS\_${PN} = "foo (>= 1.2)"

**S**

SECTION[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-SECTION)

The section in which packages should be categorized.

SRC\_URI[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-SRC_URI)

The list of source files - local or remote. This variable tells BitBake which bits to pull for the build and how to pull them. For example, if the recipe or append file needs to fetch a single tarball from the Internet, the recipe or append file uses a SRC\_URI entry that specifies that tarball. On the other hand, if the recipe or append file needs to fetch a tarball and include a custom file, the recipe or append file needs anSRC\_URI variable that specifies all those sources.

The following list explains the available URI protocols:

* ***file:// -*** Fetches files, which are usually files shipped with the metadata, from the local machine. The path is relative to the[FILESPATH](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-FILESPATH) variable.
* ***bzr:// -*** Fetches files from a Bazaar revision control repository.
* ***git:// -*** Fetches files from a Git revision control repository.
* ***osc:// -*** Fetches files from an OSC (OpenSUSE Build service) revision control repository.
* ***repo:// -*** Fetches files from a repo (Git) repository.
* ***http:// -*** Fetches files from the Internet using HTTP.
* ***https:// -*** Fetches files from the Internet using HTTPS.
* ***ftp:// -*** Fetches files from the Internet using FTP.
* ***cvs:// -*** Fetches files from a CVS revision control repository.
* ***hg:// -*** Fetches files from a Mercurial (hg) revision control repository.
* ***p4:// -*** Fetches files from a Perforce (p4) revision control repository.
* ***ssh:// -*** Fetches files from a secure shell.
* ***svn:// -*** Fetches files from a Subversion (svn) revision control repository.

Here are some additional options worth mentioning:

* ***unpack -*** Controls whether or not to unpack the file if it is an archive. The default action is to unpack the file.
* ***subdir -*** Places the file (or extracts its contents) into the specified subdirectory. This option is useful for unusual tarballs or other archives that do not have their files already in a subdirectory within the archive.
* ***name -*** Specifies a name to be used for association with SRC\_URIchecksums when you have more than one file specified in SRC\_URI.
* ***downloadfilename -*** Specifies the filename used when storing the downloaded file.

SRCDATE[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-SRCDATE)

The date of the source code used to build the package. This variable applies only if the source was fetched from a Source Code Manager (SCM).

SRCREV[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-SRCREV)

The revision of the source code used to build the package. This variable applies only when using Subversion, Git, Mercurial and Bazaar. If you want to build a fixed revision and you want to avoid performing a query on the remote repository every time BitBake parses your recipe, you should specify a SRCREV that is a full revision identifier and not just a tag.

SRCREV\_FORMAT[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-SRCREV_FORMAT)

Helps construct valid [SRCREV](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-SRCREV) values when multiple source controlled URLs are used in [SRC\_URI](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-SRC_URI).

The system needs help constructing these values under these circumstances. Each component in the SRC\_URI is assigned a name and these are referenced in the SRCREV\_FORMAT variable. Consider an example with URLs named "machine" and "meta". In this case,SRCREV\_FORMAT could look like "machine\_meta" and those names would have the SCM versions substituted into each position. Only one AUTOINCplaceholder is added and if needed. And, this placeholder is placed at the start of the returned string.

STAMP[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-STAMP)

Specifies the base path used to create recipe stamp files. The path to an actual stamp file is constructed by evaluating this string and then appending additional information.

STAMPCLEAN[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-STAMPCLEAN)

Specifies the base path used to create recipe stamp files. Unlike the[STAMP](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-STAMP) variable, STAMPCLEAN can contain wildcards to match the range of files a clean operation should remove. BitBake uses a clean operation to remove any other stamps it should be removing when creating a new stamp.

SUMMARY[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-SUMMARY)

A short summary for the recipe, which is 72 characters or less.

SVNDIR[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-SVNDIR)

The directory in which files checked out of a Subversion system are stored.

**T**

T[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-T)

Points to a directory were BitBake places temporary files, which consist mostly of task logs and scripts, when building a particular recipe.

TOPDIR[¶](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-TOPDIR)

Points to the build directory. BitBake automatically sets this variable.

**Appendix A. Hello World Example**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#hello-world-example)

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**A.1. BitBake Hello World**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#bitbake-hello-world)

The simplest example commonly used to demonstrate any new programming language or tool is the "[Hello World](http://en.wikipedia.org/wiki/Hello_world_program)" example. This appendix demonstrates, in tutorial form, Hello World within the context of BitBake. The tutorial describes how to create a new project and the applicable metadata files necessary to allow BitBake to build it.

**A.2. Obtaining BitBake**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#example-obtaining-bitbake)

See the "[Obtaining BitBake](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#obtaining-bitbake)" section for information on how to obtain BitBake. Once you have the source code on your machine, the BitBake directory appears as follows:

$ ls -al

total 100

drwxrwxr-x. 9 wmat wmat 4096 Jan 31 13:44 .

drwxrwxr-x. 3 wmat wmat 4096 Feb 4 10:45 ..

-rw-rw-r--. 1 wmat wmat 365 Nov 26 04:55 AUTHORS

drwxrwxr-x. 2 wmat wmat 4096 Nov 26 04:55 bin

drwxrwxr-x. 4 wmat wmat 4096 Jan 31 13:44 build

-rw-rw-r--. 1 wmat wmat 16501 Nov 26 04:55 ChangeLog

drwxrwxr-x. 2 wmat wmat 4096 Nov 26 04:55 classes

drwxrwxr-x. 2 wmat wmat 4096 Nov 26 04:55 conf

drwxrwxr-x. 3 wmat wmat 4096 Nov 26 04:55 contrib

-rw-rw-r--. 1 wmat wmat 17987 Nov 26 04:55 COPYING

drwxrwxr-x. 3 wmat wmat 4096 Nov 26 04:55 doc

-rw-rw-r--. 1 wmat wmat 69 Nov 26 04:55 .gitignore

-rw-rw-r--. 1 wmat wmat 849 Nov 26 04:55 HEADER

drwxrwxr-x. 5 wmat wmat 4096 Jan 31 13:44 lib

-rw-rw-r--. 1 wmat wmat 195 Nov 26 04:55 MANIFEST.in

-rwxrwxr-x. 1 wmat wmat 3195 Jan 31 11:57 setup.py

-rw-rw-r--. 1 wmat wmat 2887 Nov 26 04:55 TODO

At this point, you should have BitBake cloned to a directory that matches the previous listing except for dates and user names.

**A.3. Setting Up the BitBake Environment**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#setting-up-the-bitbake-environment)

First, you need to be sure that you can run BitBake. Set your working directory to where your local BitBake files are and run the following command:

$ ./bin/bitbake --version

BitBake Build Tool Core version 1.23.0, bitbake version 1.23.0

The console output tells you what version you are running.

The recommended method to run BitBake is from a directory of your choice. To be able to run BitBake from any directory, you need to add the executable binary to your binary to your shell's environment PATH variable. First, look at your currentPATH variable by entering the following:

$ echo $PATH

Next, add the directory location for the BitBake binary to the PATH. Here is an example that adds the /home/scott-lenovo/bitbake/bin directory to the front of the PATH variable:

$ export PATH=/home/scott-lenovo/bitbake/bin:$PATH

You should now be able to enter the bitbake command from the command line while working from any directory.

**A.4. The Hello World Example**[**¶**](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#the-hello-world-example)

The overall goal of this exercise is to build a complete "Hello World" example utilizing task and layer concepts. Because this is how modern projects such as OpenEmbedded and the Yocto Project utilize BitBake, the example provides an excellent starting point for understanding BitBake.

To help you understand how to use BitBake to build targets, the example starts with nothing but the bitbake command, which causes BitBake to fail and report problems. The example progresses by adding pieces to the build to eventually conclude with a working, minimal "Hello World" example.

While every attempt is made to explain what is happening during the example, the descriptions cannot cover everything. You can find further information throughout this manual. Also, you can actively participate in the<http://lists.openembedded.org/mailman/listinfo/bitbake-devel> discussion mailing list about the BitBake build tool.

**Note**

This example was inspired by and drew heavily from these sources:

* [Mailing List post - The BitBake equivalent of "Hello, World!"](http://www.mail-archive.com/yocto@yoctoproject.org/msg09379.html)
* [Hambedded Linux blog post - From Bitbake Hello World to an Image](http://hambedded.org/blog/2012/11/24/from-bitbake-hello-world-to-an-image/)

As stated earlier, the goal of this example is to eventually compile "Hello World". However, it is unknown what BitBake needs and what you have to provide in order to achieve that goal. Recall that BitBake utilizes three types of metadata files: [Configuration Files](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#configuration-files), [Classes](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#classes), and [Recipes](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#recipes). But where do they go? How does BitBake find them? BitBake's error messaging helps you answer these types of questions and helps you better understand exactly what is going on.

Following is the complete "Hello World" example.

1. ***Create a Project Directory:*** First, set up a directory for the "Hello World" project. Here is how you can do so in your home directory:
2. $ mkdir ~/hello
3. $ cd ~/hello

This is the directory that BitBake will use to do all of its work. You can use this directory to keep all the metafiles needed by BitBake. Having a project directory is a good way to isolate your project.

1. ***Run Bitbake:*** At this point, you have nothing but a project directory. Run the bitbake command and see what it does:
2. $ bitbake
3. The BBPATH variable is not set and bitbake did not
4. find a conf/bblayers.conf file in the expected location.
5. Maybe you accidentally invoked bitbake from the wrong directory?
6. DEBUG: Removed the following variables from the environment:
7. GNOME\_DESKTOP\_SESSION\_ID, XDG\_CURRENT\_DESKTOP,
8. GNOME\_KEYRING\_CONTROL, DISPLAY, SSH\_AGENT\_PID, LANG, no\_proxy,
9. XDG\_SESSION\_PATH, XAUTHORITY, SESSION\_MANAGER, SHLVL,
10. MANDATORY\_PATH, COMPIZ\_CONFIG\_PROFILE, WINDOWID, EDITOR,
11. GPG\_AGENT\_INFO, SSH\_AUTH\_SOCK, GDMSESSION, GNOME\_KEYRING\_PID,
12. XDG\_SEAT\_PATH, XDG\_CONFIG\_DIRS, LESSOPEN, DBUS\_SESSION\_BUS\_ADDRESS,
13. \_, XDG\_SESSION\_COOKIE, DESKTOP\_SESSION, LESSCLOSE, DEFAULTS\_PATH,
14. UBUNTU\_MENUPROXY, OLDPWD, XDG\_DATA\_DIRS, COLORTERM, LS\_COLORS

The majority of this output is specific to environment variables that are not directly relevant to BitBake. However, the very first message regarding the BBPATH variable and the conf/bblayers.conf file is relevant.

When you run BitBake, it begins looking for metadata files. The [BBPATH](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BBPATH) variable is what tells BitBake where to look for those files. BBPATH is not set and you need to set it. Without BBPATH, Bitbake cannot find any configuration files (.conf) or recipe files (.bb) at all. BitBake also cannot find the bitbake.conf file.

1. ***Setting BBPATH:*** For this example, you can set BBPATH in the same manner that you set PATH earlier in the appendix. You should realize, though, that it is much more flexible to set the BBPATH variable up in a configuration file for each project.

From your shell, enter the following commands to set and export the BBPATH variable:

$ BBPATH="*projectdirectory*"

$ export BBPATH

Use your actual project directory in the command. BitBake uses that directory to find the metadata it needs for your project.

**Note**

When specifying your project directory, do not use the tilde ("~") character as BitBake does not expand that character as the shell would.

1. ***Run Bitbake:*** Now that you have BBPATH defined, run the bitbake command again:
2. $ bitbake
3. ERROR: Traceback (most recent call last):
4. File "/home/scott-lenovo/bitbake/lib/bb/cookerdata.py", line 163, in wrapped
5. return func(fn, \*args)
6. File "/home/scott-lenovo/bitbake/lib/bb/cookerdata.py", line 173, in parse\_config\_file
7. return bb.parse.handle(fn, data, include)
8. File "/home/scott-lenovo/bitbake/lib/bb/parse/\_\_init\_\_.py", line 99, in handle
9. return h['handle'](fn, data, include)
10. File "/home/scott-lenovo/bitbake/lib/bb/parse/parse\_py/ConfHandler.py", line 120, in handle
11. abs\_fn = resolve\_file(fn, data)
12. File "/home/scott-lenovo/bitbake/lib/bb/parse/\_\_init\_\_.py", line 117, in resolve\_file
13. raise IOError("file %s not found in %s" % (fn, bbpath))
14. IOError: file conf/bitbake.conf not found in /home/scott-lenovo/hello
15. ERROR: Unable to parse conf/bitbake.conf: file conf/bitbake.conf not found in /home/scott-lenovo/hello

This sample output shows that BitBake could not find the conf/bitbake.conf file in the project directory. This file is the first thing BitBake must find in order to build a target. And, since the project directory for this example is empty, you need to provide a conf/bitbake.conf file.

1. ***Creating conf/bitbake.conf:*** The conf/bitbake.conf includes a number of configuration variables BitBake uses for metadata and recipe files. For this example, you need to create the file in your project directory and define some key BitBake variables. For more information on the bitbake.conf, see <http://hambedded.org/blog/2012/11/24/from-bitbake-hello-world-to-an-image/#an-overview-of-bitbakeconf>

Use the following commands to create the conf directory in the project directory:

$ mkdir conf

From within the conf directory, use some editor to create the bitbake.conf so that it contains the following:

TMPDIR = "${[TOPDIR](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-TOPDIR)}/tmp"

[CACHE](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-CACHE) = "${TMPDIR}/cache"

[STAMP](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-STAMP) = "${TMPDIR}/stamps"

[T](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-T) = "${TMPDIR}/work"

[B](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-B) = "${TMPDIR}"

The TMPDIR variable establishes a directory that BitBake uses for build output and intermediate files (other than the cached information used by the [Setscene](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#setscene) process. Here, the TMPDIR directory is set to hello/tmp.

**Tip**

You can always safely delete the tmp directory in order to rebuild a BitBake target. The build process creates the directory for you when you run BitBake.

For information about each of the other variables defined in this example, click on the links to take you to the definitions in the glossary.

1. ***Run Bitbake:*** After making sure that the conf/bitbake.conf file exists, you can run the bitbake command again:
2. $ bitbake
3. ERROR: Traceback (most recent call last):
4. File "/home/scott-lenovo/bitbake/lib/bb/cookerdata.py", line 163, in wrapped
5. return func(fn, \*args)
6. File "/home/scott-lenovo/bitbake/lib/bb/cookerdata.py", line 177, in \_inherit
7. bb.parse.BBHandler.inherit(bbclass, "configuration INHERITs", 0, data)
8. File "/home/scott-lenovo/bitbake/lib/bb/parse/parse\_py/BBHandler.py", line 92, in inherit
9. include(fn, file, lineno, d, "inherit")
10. File "/home/scott-lenovo/bitbake/lib/bb/parse/parse\_py/ConfHandler.py", line 100, in include
11. raise ParseError("Could not %(error\_out)s file %(fn)s" % vars(), oldfn, lineno)
12. ParseError: ParseError in configuration INHERITs: Could not inherit file classes/base.bbclass
13. ERROR: Unable to parse base: ParseError in configuration INHERITs: Could not inherit file classes/base.bbclass

In the sample output, BitBake could not find the classes/base.bbclass file. You need to create that file next.

1. ***Creating classes/base.bbclass:*** BitBake uses class files to provide common code and functionality. The minimally required class for BitBake is the classes/base.bbclass file. The base class is implicitly inherited by every recipe. BitBake looks for the class in the classes directory of the project (i.e hello/classes in this example).

Create the classes directory as follows:

$ cd $HOME/hello

$ mkdir classes

Move to the classes directory and then create the base.bbclass file by inserting this single line:

addtask build

The minimal task that BitBake runs is the do\_build task. This is all the example needs in order to build the project. Of course, the base.bbclass can have much more depending on which build environments BitBake is supporting. For more information on the base.bbclass file, you can look at <http://hambedded.org/blog/2012/11/24/from-bitbake-hello-world-to-an-image/#tasks>.

1. ***Run Bitbake:*** After making sure that the classes/base.bbclass file exists, you can run the bitbake command again:
2. $ bitbake
3. Nothing to do. Use 'bitbake world' to build everything, or run 'bitbake --help' for usage information.

BitBake is finally reporting no errors. However, you can see that it really does not have anything to do. You need to create a recipe that gives BitBake something to do.

1. ***Creating a Layer:*** While it is not really necessary for such a small example, it is good practice to create a layer in which to keep your code separate from the general metadata used by BitBake. Thus, this example creates and uses a layer called "mylayer".

**Note**

You can find additional information on adding a layer at<http://hambedded.org/blog/2012/11/24/from-bitbake-hello-world-to-an-image/#adding-an-example-layer>.

Minimally, you need a recipe file and a layer configuration file in your layer. The configuration file needs to be in theconf directory inside the layer. Use these commands to set up the layer and the conf directory:

$ cd $HOME

$ mkdir mylayer

$ cd mylayer

$ mkdir conf

Move to the conf directory and create a layer.conf file that has the following:

BBPATH .= ":${[LAYERDIR](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-LAYERDIR)}"

[BBFILES](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BBFILES) += "${LAYERDIR}/\*.bb"

[BBFILE\_COLLECTIONS](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BBFILE_COLLECTIONS) += "mylayer"

[BBFILE\_PATTERN\_mylayer](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-BBFILE_PATTERN) := "^${LAYERDIR}/"

For information on these variables, click the links to go to the definitions in the glossary.

You need to create the recipe file next. Inside your layer at the top-level, use an editor and create a recipe file named printhello.bb that has the following:

[DESCRIPTION](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-DESCRIPTION) = "Prints Hello World"

[PN](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PN) = 'printhello'

[PV](http://www.yoctoproject.org/docs/1.8/bitbake-user-manual/bitbake-user-manual.html#var-PV) = '1'

python do\_build() {

bb.plain("\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*");

bb.plain("\* \*");

bb.plain("\* Hello, World! \*");

bb.plain("\* \*");

bb.plain("\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*");

}

The recipe file simply provides a description of the recipe, the name, version, and the do\_build task, which prints out "Hello World" to the console. For more information on these variables, follow the links to the glossary.

1. ***Run Bitbake With a Target:*** Now that a BitBake target exists, run the command and provide that target:
2. $ cd $HOME/hello
3. $ bitbake printhello
4. ERROR: no recipe files to build, check your BBPATH and BBFILES?
5. Summary: There was 1 ERROR message shown, returning a non-zero exit code.

We have created the layer with the recipe and the layer configuration file but it still seems that BitBake cannot find the recipe. BitBake needs a conf/bblayers.conf that lists the layers for the project. Without this file, BitBake cannot find the recipe.

1. ***Creating conf/bblayers.conf:*** BitBake uses the conf/bblayers.conf file to locate layers needed for the project. This file must reside in the conf directory of the project (i.e. hello/conf for this example).

Set your working directory to the hello/conf directory and then create the bblayers.conf file so that it contains the following:

BBLAYERS ?= " \

/home/<you>/mylayer \

"

You need to provide your own information for you in the file.

1. ***Run Bitbake With a Target:*** Now that you have supplied the bblayers.conf file, run the bitbake command and provide the target:
2. $ bitbake printhello
3. Parsing recipes: 100% |##################################################################################|
4. Time: 00:00:00
5. Parsing of 1 .bb files complete (0 cached, 1 parsed). 1 targets, 0 skipped, 0 masked, 0 errors.
6. NOTE: Resolving any missing task queue dependencies
7. NOTE: Preparing RunQueue
8. NOTE: Executing RunQueue Tasks
9. \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*
10. \* \*
11. \* Hello, World! \*
12. \* \*
13. \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*
14. NOTE: Tasks Summary: Attempted 1 tasks of which 0 didn't need to be rerun and all succeeded.

BitBake finds the printhello recipe and successfully runs the task.

**Note**

After the first execution, re-running bitbake printhello again will not result in a BitBake run that prints the same console output. The reason for this is that the first time the printhello.bbrecipe's do\_build task executes successfully, BitBake writes a stamp file for the task. Thus, the next time you attempt to run the task using that same bitbake command, BitBake notices the stamp and therefore determines that the task does not need to be re-run. If you delete the tmpdirectory or run bitbake -c clean printhello and then re-run the build, the "Hello, World!" message will be printed again.