FreeBSD Porter 手冊

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Chapter 1. 楔子

幾乎每個 FreeBSD 愛用者都是透過 FreeBSD Ports Collection 來裝各式應用程式("ports")。如同 FreeBSD 的其他部分一樣， 這些 ports 都主要來自許多志工的努力成果，所以在閱讀這份文件時，請務必感恩在心。

在 FreeBSD 上面，每個人都可以提交新的 port， 或假如該 port 並沒有人維護的話，可以自願維護 —— 這點並不需要任何 commit 的權限，就可以來做這件事情。

Chapter 2. 製作新的 Port

開始對製作新的 port 或更新現有 port 有一些興趣了嗎？太好囉！

下面將介紹一些建立 port 時該注意的事項。如果是想升級現有的 port ，那麼也請參閱 Upgrading a Port 說明。

因為這份文件可能講得不是十分詳細，可能需要參考 /usr/ports/Mk/bsd.port.mk 這檔是所有 port 的 Makefile 檔都會用到的。就算你不是每天不斷 hacking Makefile，也可以也可以從中獲得很多相關知識。此外，若有其他特定 port 的問題，也可以到 FreeBSD ports mailing list 來獲得答案。

本文內所提及的環境變數 (VAR)部份，
只有一些可以替換(overridden)。大部份的環境變數(非全部)通常都會寫在 /usr/ports/Mk/bsd.port.mk 內，其他的也是差不多。 請注意：該檔並非使用一般的 tab 設定值，而是採用 1 個 tab 等於 4 個 space。 Emacs 與 Vim
應該都會在載入該檔時順便讀取相關設定值。 vi(1) 及 ex(1) 這兩個程式也都可以打 :set tabstop=4 以修改設定值。

想要找簡單的開始上手嗎？ 到 請求協助的 ports 清單 瞧瞧，看看是否有你可以幫上忙的。

Chapter 3. 打造 Port 快速上手篇

本節主要介紹如何來快速打造 port，然而實際應用時這快速方法可能不足，完整的 "慢速打造 Port" 的步驟在 Slow Porting 詳述。

首先取得該應用程式的原始程式碼壓縮檔(tarball)，並把它放到 DISTDIR，預設路徑應該是 /usr/ports/distfiles.

這些步驟假設軟體可以直接編譯。也就是不需要任何修改就可以直接在 FreeBSD 上執行。如果需要修改，請參見Slow Porting。

在 porting 之前，建議在 /etc/make.conf 設定 DEVELOPER make(1) 變數。

```
# echo DEVELOPER=yes >> /etc/make.conf
```

這個設定開啟了 "developer mode" ，顯示已棄用警告並在使用 make 時檢查品質。

3.1. 編寫 Makefile

最簡單的 Makefile 大概是像這樣：

```
# $FreeBSD: head/zh_TW.UTF-8/books/porters-handbook/book.xml 48496 2016-03-29
01:37:53Z kevlo $

PORTNAME=   oneko
PORTVERSION=    1.1b
CATEGORIES= games
MASTER_SITES=   ftp://ftp.cs.columbia.edu/archives/X11R5/contrib/

MAINTAINER= youremail@example.com
COMMENT=    Cat chasing a mouse all over the screen

.include <bsd.port.mk>
```

嘗試了解此檔案，有關這點的細節部份，可以參閱 sample Makefile 章節。

3.2. 撰寫說明檔

無論是否打算再加工做成 package，有兩個檔案是任何 port 都必須要具備的。 這兩個檔分別是 pkg-descr 及 pkg-plist 。 他們檔名前面都有 pkg- 以跟其他檔案做區別。

3.2.1. pkg-descr

這是此 port 的詳細說明檔，請用一段或幾段文字來說明該 port 的作用

請注意，這檔_絕非_「該軟體的說明手冊」或是「如何編譯、使用該 port 的說明」！
若是從該軟體的 README 或 manpage 直接複製過來的話，請注意。他們常常不是正確的 port
描述或是格式並不適合。例如，manpage會對齊空白，這用monospace字型來看會特別

糟糕。

另一方面， pkg-descr 的內容必須比 COMMENT line from the Makefile 還要詳細，要能詳細解釋此 port 相關的內容。

一個良好的 pkg-descr 可以讓使用者清楚的了解軟體的功能而無須查詢文件或者訪問網站，提及特定的需求像是圖形工具、依賴、執行的環境跟實作的語言，能大大的幫助使用者了解這個 port 是怎麼運作的。

過去在 pkg-descr 文件最後一行引入的 URL 已經移到 Makefile 裡面了。

3.2.2. pkg-plist

這是該 port 所會裝的所有檔案清單，另外因為 package 會由這清單所產生，因此也被稱為『"packing list (打包清單)"』。路徑是相對於安裝的 prefix (通常是 /usr/local)。

這是一個簡單的例子：

```
bin/oneko
man/man1/oneko.1.gz
lib/X11/app-defaults/Oneko
lib/X11/oneko/cat1.xpm
lib/X11/oneko/cat2.xpm
lib/X11/oneko/mouse.xpm
```

關於 packing list 方面，可以詳閱 pkg-create(8) manual page 。

建議清單內的檔名，依照字母順序作排序，那麼下次要升級時，會比較清楚、方便來更新這份清單。

手動產生這份清單實在太苦了。尤其若該 port 會裝一大堆檔案的話， 請多善用 自動產生 packing list 會比較省時省力唷。

只有在一種情況下可以省略 pkg-plist 檔： 若安裝的 port 相當單純，只有裝一些檔案，那麼可以在 Makefile 內改用 PLIST_FILES 來取代。 比如，可以在上述的 oneko port 內不必附上 pkg-plist ，而只需在 Makefile 內加入下列幾行：

```
PLIST_FILES=    bin/oneko \
    man/man1/oneko.1.gz \
    lib/X11/app-defaults/Oneko \
    lib/X11/oneko/cat1.xpm \
    lib/X11/oneko/cat2.xpm \
    lib/X11/oneko/mouse.xpm
```

PLIST_FILES 的使用不應該被濫用，人們通常透過在 ports tree 的 pkg-plist 文件來了解 port ，在 Makefile 中使用 PLIST_FILES 敘述會增加搜尋的難度。

如果 port 需要創建空的目錄，或者安裝時在 ${PREFIX} 之外創建目錄，請參考 Cleaning Up Empty Directories 來獲得更多資訊。

因為 PLIST_FILES 是 make(1) 的變數，任何在此條目的 sapce 都必須被引入。舉例來說，如果使用 pkg-create(8) 和 Expanding Package List with Keywords 描述的關鍵字，以下的條目必須被引入。

```
PLIST_FILES=    "@sample ${ETCDIR}/oneko.conf.sample"
```

後面會介紹到如何運用 pkg-plist、 PLIST_FILES 這些技巧以因應更複雜的狀況。

3.3. 產生 checksum 檔

只要打 make makesum 就好了， 接下來就會自動產生相對應的 distinfo 檔了唷 。

3.4. 測試 Port

接下來，必須檢驗是否有符合 port 的遊戲規則，包括打包該 port 為 package。
以下有幾個需要確認的重要地方：

- 若該 port 沒裝的東西，不要列在 pkg-plist 內。
- 若該 port 有裝的東西，請務必列在 pkg-plist 內。
- port 可以透過 install 來安裝，這可以確保安裝的 script 是正常運作的。
- port 可以透過 uninstall 來移除，這可以確保安裝的 script 是正常運作的。
- port 只有在 featch 目標時才能使用網路，這對 package builders 很重要，像是 ports-mgmt/poudriere.
- 確保 make package 可以被一般使用者執行 (也就是說，非 root 使用者)，如果上述執行失敗，軟體很可能需要修改，請參考 fakeroot 和 uidfix。

Procedure: 建議的測試順序

1. make stage
2. make check-orphans
3. make package
4. make install
5. make deinstall
6. pkg add package-filename
7. make package (as user)

確認在任何階段都沒有任何警告出現。

可以透過 ports-mgmt/tinderbox 或者 Ports Collection 的 ports-mgmt/poudriere 工具來完成自動化測試，參考 Poudriere 獲得更多的資訊。她維護 jails ，可以在不影響系統的情況下執行上述所有的測試。

3.5. 以 portlint 來作檢查 Port

請用 portlint 來檢查該 port 是否有遵循我們的規則。 ports-mgmt/portlint 是 ports collection 的其中一個套件。 它主要可以用來檢驗 Makefile 內容是否正確以及 package 是否有正確命名。

不要盲目的相信 portlint 的輸出，他是一個 static lint 工具，並且有可能會出錯。

3.6. 提交新的 Port

提交新的 Port 前，請閱讀 DOs and DON’ Ts 章節。

現在你很高興終於打造出 port 來囉，唯一剩下要做的就是把它正式放到 FreeBSD ports tree 內，才能讓每個人都能分享使用這個 port。

我們不需要 work 目錄或是檔名像 pkgname.tgz 的 package ，請現在刪除他們。

下一步，創建一個 patch(1) ，一個文件，假設此 port 叫做 oneko 並且屬於 games 類別。

例 1. 為新的 Port 創建 .diff

透過 git add . 加入所有的檔案，然後透過 git diff 來檢查不同處，如下。

```
% git add .
% git diff --staged
```

確保所有需要的檔案都被引入了，將更改提交到你本地分支並使用 git format-patch 產生 patch。

```
% git commit
% git format-patch origin/main
```

使用 git format-patch 產生的 patch 會包含作者以及電子郵件，讓其他開發者更容易使用 (with git am) 以及給予回饋。

為了讓開發者更容易在他們的 ports tree 使用此 patch ，請基於你的 ports tree 來產生 .diff 。

透過 bug submission form 繳交 oneko.diff 。使用 "Ports & Packages" 產品和 "Individual Port(s)" 組件，然後跟著這裡的教學走，在 PR 的描述欄位 (也許是較短的 COMMENT) 加入簡短的敘述，並且記得在附件中加入 oneko.diff 。

在問題回報系統中給一個好的總結可以讓 port 開發者更輕鬆的處理此 port ，我們預期的描述形式為 "[NEW PORT] category/portname short description of the port" ，使用此形式能讓我們更快的部屬新的 port 。

送出 port 之後，請耐心等候佳音。 有時候可能需要等個幾天或幾個月時間，才會在 FreeBSD ports tree 上正式出現。 等待中的 port PR 清單可以在 http://www.FreeBSD.org/cgi/query-pr-summary.cgi?category=ports 查閱。

在搜尋表單中選擇 Open and Ports & Packages 來獲得 open port PRs 的清單。

在看過新的 port 之後，如果需要的話，我們會回覆您，然後會將它提交到 port tree 。 您的大名會被列在 Additional FreeBSD Contributors 列表上，以及其他檔案中。

也可以透過 shar(1) 檔案來提交 port ，請使用之前 oneko port 的例子。

例 2. 為新的 Port 創建 .shar

前往 port 所在的目錄，使用 `tar`創建 shar archive:

```
% cd ..
% tar cf oneko.shar --format shar oneko
```

可以使用跟提交 oneko.diff 一樣的方式來提交 oneko.shar 。

Chapter 4. Slow Porting

Ok…事實上並不太可能這麼簡單，port 方面可能需要作些修改才能正常使用。 因此，
本節將一步一步來介紹如何修改上一章的樣本以正常使用。

4.1. How Things Work

First, this is the sequence of events which occurs when the user first types make in the port’ s directory. Having bsd.port.mk in another window while reading this really helps to understand it.

別太擔心，不是很多人都真的了解 bsd.port.mk 在做什麼… :-)

1. The fetch target is run. The fetch target is responsible for making sure that the tarball exists locally in DISTDIR. If fetch cannot find the required files in DISTDIR it will look up the URL MASTER_SITES, which is set in the Makefile, as well as our FTP mirrors where we put distfiles as backup. It will then attempt to fetch the named distribution file with FETCH, assuming that the requesting site has direct access to the Internet. If that succeeds, it will save the file in DISTDIR for future use and proceed.
2. The extract target is run. It looks for the port’ s distribution file (typically a compressed tarball) in DISTDIR and unpacks it into a temporary subdirectory specified by WRKDIR (defaults to work).
3. The patch target is run. First, any patches defined in PATCHFILES are applied. Second, if any patch files named patch-* are found in PATCHDIR (defaults to the files subdirectory), they are applied at this time in alphabetical order.
4. The configure target is run. This can do any one of many different things.
   a. If it exists, scripts/configure is run.
   b. If HAS_CONFIGURE or GNU_CONFIGURE is set, WRKSRC/configure is run.
5. The build target is run. This is responsible for descending into the port’ s private working directory (WRKSRC) and building it.
6. The stage target is run. This puts the final set of built files into a temporary directory (STAGEDIR, see Staging). The hierarchy of this directory mirrors that of the system on which the package will be installed.
7. The package target is run. This creates a package using the files from the temporary directory created during the stage target and the port’ s pkg-plist.
8. The install target is run. This installs the package created during the package target into the host system.

The above are the default actions. In addition, define targets pre-something or post-something, or put scripts with those names, in the scripts subdirectory, and they will be run before or after the default actions are done.

For example, if there is a post-extract target defined in the Makefile, and a file pre-build in the scripts subdirectory, the post-extract target will be called after the regular extraction actions, and pre-build will be executed before the default build rules are done. It is recommended to use Makefile targets if the actions are simple enough, because it will be easier for someone to figure out what kind of non-default action the port requires.

The default actions are done by the do-something targets from bsd.port.mk. For example, the commands to extract a port are in the target do-extract. If the default target does not do the job right, redefine the do-something target in the Makefile.

The "main" targets (for example, extract, configure, etc.) do nothing more than make sure all the stages up to that one are completed and call the real targets or scripts, and they are not intended to be changed. To fix the extraction, fix do-

extract, but never ever change the way extract operates! Additionally, the target post-deinstall is invalid and is not run by the ports infrastructure.

Now that what goes on when the user types make install is better understood, let us go through the recommended steps to create the perfect port.

4.2. 取得原始碼

Get the original sources (normally) as a compressed tarball (foo.tar.gz or foo.tar.bz2) and copy it into DISTDIR. Always use mainstream sources when and where possible.

Set the variable MASTER_SITES to reflect where the original tarball resides. Shorthand definitions exist for most mainstream sites in bsd.sites.mk. Please use these sites-and the associated definitions-if at all possible, to help avoid the problem of having the same information repeated over again many times in the source base. As these sites tend to change over time, this becomes a maintenance nightmare for everyone involved. See MASTER_SITES for details.

If there is no FTP/HTTP site that is well-connected to the net, or can only find sites that have irritatingly non-standard formats, put a copy on a reliable FTP or HTTP server (for example, a home page).

If a convenient and reliable place to put the distfile cannot be found, we can "house" it ourselves on ftp.FreeBSD.org; however, this is the least-preferred solution. The distfile must be placed into ~/public_distfiles/ of someone's freefall account. Ask the person who commits the port to do this. This person will also set MASTER_SITES to LOCAL/username where username is their FreeBSD cluster login.

If the port's distfile changes all the time without any kind of version update by the author, consider putting the distfile on a home page and listing it as the first MASTER_SITES. Try to talk the port author out of doing this; it really does help to establish some kind of source code control. Hosting a specific version will prevent users from getting checksum mismatch errors, and also reduce the workload of maintainers of our FTP site. Also, if there is only one master site for the port, it is recommended to house a backup on a home page and list it as the second MASTER_SITES.

If the port requires additional patches that are available on the Internet, fetch them too and put them in DISTDIR. Do not worry if they come from a site other than where the main source tarball comes, we have a way to handle these situations (see the description of PATCHFILES below).

4.3. Modifying the Port

Unpack a copy of the tarball in a private directory and make whatever changes are necessary to get the port to compile properly under the current version of FreeBSD. Keep careful track of steps, as they will be needed to automate the process shortly. Everything, including the deletion, addition, or modification of files has to be doable using an automated script or patch file when the port is finished.

If the port requires significant user interaction/customization to compile or install, take a look at one of Larry Wall's classic Configure scripts and perhaps do something similar. The goal of the new ports collection is to make each port as "plug-and-play" as possible for the end-user while using a minimum of disk space.

Unless explicitly stated, patch files, scripts, and other files created and contributed to the FreeBSD ports collection are assumed to be covered by the standard BSD copyright conditions.

4.4. Patching

In the preparation of the port, files that have been added or changed can be recorded with diff(1) for later feeding to patch(1). Doing this with a typical file involves saving a copy of the original file

before making any changes using a .orig suffix.

```
% cp file file.orig
```

After all changes have been made, cd back to the port directory. Use make makepatch to generate updated patch files in the files directory.

Use BINARY_ALIAS to substitute hardcoded commands during the build and avoid patching build files. See Use BINARY_ALIAS to Rename Commands Instead of Patching the Build for more information.

4.4.1. General Rules for Patching

Patch files are stored in PATCHDIR, usually files/, from where they will be automatically applied. All patches must be relative to WRKSRC. Typically WRKSRC is a subdirectory of WRKDIR, the directory where the distfile is extracted. Use make -V WRKSRC to see the actual path. The patch names are to follow these rules:

- Avoid having more than one patch modify the same file. For example, having both patch-foobar.c and patch-foobar.c2 making changes to ${WRKSRC}/foobar.c makes them fragile and difficult to debug.
- When creating names for patch files, replace each underscore (_) with two underscores (__) and each slash (/) with one underscore (_). For example, to patch a file named src/freeglut_joystick.c, name the corresponding patch patch-src_freeglut__joystick.c. Do not name patches like patch-aa or patch-ab. Always use the path and file name in patch names. Using make makepatch automatically generates the correct names.
- A patch may modify multiple files if the changes are related and the patch is named appropriately. For example, patch-add-missing-stdlib.h.
- Only use characters [-+._a-zA-Z0-9] for naming patches. In particular, do not use :: as a path separator, use _ instead.

Minimize the amount of non-functional whitespace changes in patches. It is common in the Open Source world for projects to share large amounts of a code base, but obey different style and indenting rules. When taking a working piece of functionality from one project to fix similar areas in another, please be careful: the resulting patch may be full of non-functional changes. It not only increases the size of the ports repository but makes it hard to find out what exactly caused the problem and what was changed at all.

If a file must be deleted, do it in the post-extract target rather than as part of the patch.

4.4.2. Manual Patch Generation

Manual patch creation is usually not necessary. Automatic patch generation as described earlier in this section is the preferred method. However, manual patching may be required occasionally.

Patches are saved into files named patch-* where * indicates the pathname of the file that is patched, such as patch-Imakefile or patch-src-config.h.

After the file has been modified, diff(1) is used to record the differences between the original and the modified version. -u causes diff(1) to produce "unified" diffs, the preferred form.

```
% diff -u file.orig file > patch-pathname-file
```

When generating patches for new, added files, -N is used to tell diff(1) to treat the non-existent

original file as if it existed but was empty:

```
% diff -u -N newfile.orig newfile > patch-pathname-newfile
```

Do not add $FreeBSD$ RCS strings in patches. When patches are added to the Subversion repository with svn add, the fbsd:nokeywords property is set to yes automatically so keywords in the patch are not modified when committed. The property can be added manually with svn propset fbsd:nokeywords yes files…

Using the recurse (-r) option to diff(1) to generate patches is fine, but please look at the resulting patches to make sure there is no unnecessary junk in there. In particular, diffs between two backup files, Makefiles when the port uses Imake or GNU configure, etc., are unnecessary and have to be deleted. If it was necessary to edit configure.in and run autoconf to regenerate configure, do not take the diffs of configure (it often grows to a few thousand lines!). Instead, define USES=autoreconf and take the diffs of configure.in.

4.4.3. Simple Automatic Replacements

Simple replacements can be performed directly from the port Makefile using the in-place mode of sed(1). This is useful when changes use the value of a variable:

```
post-patch:
  @${REINPLACE_CMD} -e 's|/usr/local|${PREFIX}|g' ${WRKSRC}/Makefile
```

Only use sed(1) to replace variable content. You must use patch files instead of sed(1) to replace static content.

Quite often, software being ported uses the CR/LF convention in source files. This may cause problems with further patching, compiler warnings, or script execution (like /bin/sh^M not found.) To quickly convert all files from CR/LF to just LF, add this entry to the port Makefile:

```
USES=  dos2unix
```

A list of specific files to convert can be given:

```
USES=  dos2unix
DOS2UNIX_FILES= util.c util.h
```

Use DOS2UNIX_REGEX to convert a group of files across subdirectories. Its argument is a find(1) -compatible regular expression. More on the format is in re_format(7). This option is useful for converting all files of a given extension. For example, convert all source code files, leaving binary files intact:

```
USES=  dos2unix
DOS2UNIX_REGEX= .*\.([ch]|cpp)
```

A similar option is DOS2UNIX_GLOB, which runs find for each element listed in it.

```
USES=  dos2unix
```

```
DOS2UNIX_GLOB=  *.c *.cpp *.h
```

The base directory for the conversion can be set. This is useful when there are multiple distfiles and several contain files which require line-ending conversion.

```
USES=  dos2unix
DOS2UNIX_WRKSRC=  ${WRKDIR}
```

4.4.4. Patching Conditionally

Some ports need patches that are only applied for specific FreeBSD versions or when a particular option is enabled or disabled. Conditional patches are specified by placing the full paths to the patch files in EXTRA_PATCHES.

例 3. Applying a Patch for a Specific FreeBSD Version

```
.include <bsd.port.options.mk>

# Patch in the iconv const qualifier before this
.if ${OPSYS} == FreeBSD && ${OSVERSION} < 1100069
EXTRA_PATCHES=  ${PATCHDIR}/extra-patch-fbsd10
.endif

.include <bsd.port.mk>
```

例 4. Optionally Applying a Patch

When an option requires a patch, use opt_EXTRA_PATCHES and opt_EXTRA_PATCHES_OFF to make the patch conditional on the opt option. See Generic Variables Replacement for more information.

```
OPTIONS_DEFINE=  FOO BAR
FOO_EXTRA_PATCHES=  ${PATCHDIR}/extra-patch-foo
BAR_EXTRA_PATCHES_OFF=  ${PATCHDIR}/extra-patch-bar.c \
    ${PATCHDIR}/extra-patch-bar.h
```

例 5. Using EXTRA_PATCHES With a Directory

Sometime, there are many patches that are needed for a feature, in this case, it is possible to point EXTRA_PATCHES to a directory, and it will automatically apply all files named patch-* in it.

Create a subdirectory in ${PATCHDIR}, and move the patches in it. For example:

```
% ls -l files/foo-patches
-rw-r--r--  1 root  wheel   350 Jan 16 01:27 patch-Makefile.in
```

```
-rw-r--r--  1 root  wheel   3084 Jan 18 15:37 patch-configure
```

Then add this to the Makefile:

```
OPTIONS_DEFINE= FOO
FOO_EXTRA_PATCHES=  ${PATCHDIR}/foo-patches
```

The framework will then use all the files named patch-* in that directory.

4.5. 設定

Include any additional customization commands in the configure script and save it in the scripts subdirectory. As mentioned above, it is also possible do this with Makefile targets and/or scripts with the name pre-configure or post-configure.

4.6. 處理使用者輸入

If the port requires user input to build, configure, or install, set IS_INTERACTIVE in the Makefile. This will allow "overnight builds" to skip it. If the user sets the variable BATCH in their environment (and if the user sets the variable INTERACTIVE, then only those ports requiring interaction are built). This will save a lot of wasted time on the set of machines that continually build ports (see below).

It is also recommended that if there are reasonable default answers to the questions, PACKAGE_BUILDING be used to turn off the interactive script when it is set. This will allow us to build the packages for CDROMs and FTP.

Chapter 5. Configuring the Makefile

Configuring the Makefile is pretty simple, and again we suggest looking at existing examples before starting. Also, there is a sample Makefile in this handbook, so take a look and please follow the ordering of variables and sections in that template to make the port easier for others to read.

Consider these problems in sequence during the design of the new Makefile:

5.1. The Original Source

Does it live in DISTDIR as a standard gzipped tarball named something like foozolix-1.2.tar.gz? If so, go on to the next step. If not, the distribution file format might require overriding one or more of DISTVERSION, DISTNAME, EXTRACT_CMD, EXTRACT_BEFORE_ARGS, EXTRACT_AFTER_ARGS, EXTRACT_SUFX, or DISTFILES.

In the worst case, create a custom do-extract target to override the default. This is rarely, if ever, necessary.

5.2. Naming

The first part of the port’ s Makefile names the port, describes its version number, and lists it in the correct category.

5.2.1. PORTNAME

Set PORTNAME to the base name of the software. It is used as the base for the FreeBSD package, and for DISTNAME.

The package name must be unique across the entire ports tree. Make sure that the PORTNAME is not already in use by an existing port, and that no other port already has the same PKGBASE. If the name has already been used, add either PKGNAMEPREFIX or PKGNAMESUFFIX.

5.2.2. Versions, DISTVERSION or PORTVERSION

Set DISTVERSION to the version number of the software.

PORTVERSION is the version used for the FreeBSD package. It will be automatically derived from DISTVERSION to be compatible with FreeBSD’ s package versioning scheme. If the version contains letters, it might be needed to set PORTVERSION and not DISTVERSION.

Only one of PORTVERSION and DISTVERSION can be set at a time.

From time to time, some software will use a version scheme that is not compatible with how DISTVERSION translates in PORTVERSION.

When updating a port, it is possible to use pkg-version(8)'s -t argument to check if the new version is greater or lesser than before. See Using pkg-version(8) to Compare Versions.

例 6. Using pkg-version(8) to Compare Versions

pkg version -t takes two versions as arguments, it will respond with <, = or > if the first version is less, equal, or more than the second version, respectively.

```
% pkg version -t 1.2 1.3
```

```
< ①
% pkg version -t 1.2 1.2
= ②
% pkg version -t 1.2 1.2.0
= ③
% pkg version -t 1.2 1.2.p1
> ④
% pkg version -t 1.2.a1 1.2.b1
< ⑤
% pkg version -t 1.2 1.2p1
< ⑥
```

① 1.2 is before 1.3.

② 1.2 and 1.2 are equal as they have the same version.

③ 1.2 and 1.2.0 are equal as nothing equals zero.

④ 1.2 is after 1.2.p1 as .p1, think "pre-release 1".

⑤ 1.2.a1 is before 1.2.b1, think "alpha" and "beta", and a is before b.

⑥ 1.2 is before 1.2p1 as 2p1, think "2, patch level 1" which is a version after any 2.X but before 3.

In here, the a, b, and p are used as if meaning "alpha", "beta" or "pre-release" and "patch level", but they are only letters and are sorted alphabetically, so any letter can be used, and they will be sorted appropriately.

表 1. Examples of DISTVERSION and the Derived PORTVERSION

DISTVERSION	PORTVERSION
0.7.1d	0.7.1.d
10Alpha3	10.a3
3Beta7-pre2	3.b7.p2
8:f_17	8f.17

例 7. Using DISTVERSION

When the version only contains numbers separated by dots, dashes or underscores, use DISTVERSION.

```
PORTNAME=  nekoto
DISTVERSION=  1.2-4
```

It will generate a PORTVERSION of 1.2.4.

例 8. Using DISTVERSION When the Version Starts with a Letter or a Prefix

When the version starts or ends with a letter, or a prefix or a suffix that is not part of the version, use DISTVERSIONPREFIX, DISTVERSION, and DISTVERSIONSUFFIX.

If the version is v1.2-4:

```
PORTNAME=  nekoto
DISTVERSIONPREFIX= v
DISTVERSION=   1_2_4
```

Some of the time, projects using GitHub will use their name in their versions. For example, the version could be nekoto-1.2-4:

```
PORTNAME=  nekoto
DISTVERSIONPREFIX= nekoto-
DISTVERSION=   1.2_4
```

Those projects also sometimes use some string at the end of the version, for example, 1.2-4_RELEASE:

```
PORTNAME=  nekoto
DISTVERSION=   1.2-4
DISTVERSIONSUFFIX= _RELEASE
```

Or they do both, for example, nekoto-1.2-4_RELEASE:

```
PORTNAME=  nekoto
DISTVERSIONPREFIX= nekoto-
DISTVERSION=   1.2-4
DISTVERSIONSUFFIX= _RELEASE
```

DISTVERSIONPREFIX and DISTVERSIONSUFFIX will not be used while constructing PORTVERSION, but only used in DISTNAME.

All will generate a PORTVERSION of 1.2.4.

例 9. Using DISTVERSION When the Version Contains Letters Meaning "alpha", "beta", or "pre-release"

When the version contains numbers separated by dots, dashes or underscores, and letters are used to mean "alpha", "beta" or "pre-release", which is, before the version without the letters, use DISTVERSION.

```
PORTNAME=  nekoto
DISTVERSION=   1.2-pre4
```

```
PORTNAME=  nekoto
DISTVERSION=  1.2p4
```

Both will generate a PORTVERSION of 1.2.p4 which is before than 1.2. pkg-version(8) can be used to check that fact:

```
% pkg version -t 1.2.p4 1.2
<
```

例 10. Not Using DISTVERSION When the Version Contains Letters Meaning "Patch Level"

When the version contains letters that are not meant as "alpha", "beta", or "pre", but more in a "patch level", and meaning after the version without the letters, use PORTVERSION.

```
PORTNAME=  nekoto
PORTVERSION=  1.2p4
```

In this case, using DISTVERSION is not possible because it would generate a version of 1.2.p4 which would be before 1.2 and not after. pkg-version(8) will verify this:

```
% pkg version -t 1.2 1.2.p4
> ①
% pkg version -t 1.2 1.2p4
< ②
```

① 1.2 is after 1.2.p4, which is wrong in this case.

② 1.2 is before 1.2p4, which is what was needed.

For some more advanced examples of setting PORTVERSION, when the software's versioning is really not compatible with FreeBSD's, or DISTNAME when the distribution file does not contain the version itself, see DISTNAME.

5.2.3. PORTREVISION and PORTEPOCH

5.2.3.1. PORTREVISION

PORTREVISION is a monotonically increasing value which is reset to 0 with every increase of DISTVERSION, typically every time there is a new official vendor release. If PORTREVISION is non-zero, the value is appended to the package name. Changes to PORTREVISION are used by automated tools like pkg-version(8) to determine that a new package is available.

PORTREVISION must be increased each time a change is made to the port that changes the generated package in any way. That includes changes that only affect a package built with non-default options.

Examples of when PORTREVISION must be bumped:

- Addition of patches to correct security vulnerabilities, bugs, or to add new functionality to the port.

- Changes to the port Makefile to enable or disable compile-time options in the package.
- Changes in the packing list or the install-time behavior of the package. For example, a change to a script which generates initial data for the package, like ssh(1) host keys.
- Version bump of a port' s shared library dependency (in this case, someone trying to install the old package after installing a newer version of the dependency will fail since it will look for the old libfoo.x instead of libfoo.(x+1)).
- Silent changes to the port distfile which have significant functional differences. For example, changes to the distfile requiring a correction to distinfo with no corresponding change to DISTVERSION, where a diff -ru of the old and new versions shows non-trivial changes to the code.

Examples of changes which do not require a PORTREVISION bump:

- Style changes to the port skeleton with no functional change to what appears in the resulting package.
- Changes to MASTER_SITES or other functional changes to the port which do not affect the resulting package.
- Trivial patches to the distfile such as correction of typos, which are not important enough that users of the package have to go to the trouble of upgrading.
- Build fixes which cause a package to become compilable where it was previously failing. As long as the changes do not introduce any functional change on any other platforms on which the port did previously build. Since PORTREVISION reflects the content of the package, if the package was not previously buildable then there is no need to increase PORTREVISION to mark a change.

A rule of thumb is to decide whether a change committed to a port is something which some people would benefit from having. Either because of an enhancement, fix, or by virtue that the new package will actually work at all. Then weigh that against that fact that it will cause everyone who regularly updates their ports tree to be compelled to update. If yes, PORTREVISION must be bumped.

People using binary packages will never see the update if PORTREVISION is not bumped. Without increasing PORTREVISION, the package builders have no way to detect the change and thus, will not rebuild the package.

5.2.3.2. PORTEPOCH

From time to time a software vendor or FreeBSD porter will do something silly and release a version of their software which is actually numerically less than the previous version. An example of this is a port which goes from foo-20000801 to foo-1.0 (the former will be incorrectly treated as a newer version since 20000801 is a numerically greater value than 1).

The results of version number comparisons are not always obvious. pkg version (see pkg-version(8)) can be used to test the comparison of two version number strings. For example:

```
% pkg version -t 0.031 0.29
>
```

The > output indicates that version 0.031 is considered greater than version 0.29, which may not have been obvious to the porter.

In situations such as this, PORTEPOCH must be increased. If PORTEPOCH is nonzero it is appended to the package name as described in section 0 above. PORTEPOCH must never be decreased or reset to zero, because that would cause comparison to a package from an earlier epoch to fail. For example, the package would not be detected as out of date. The new version number, 1.0,1 in the

above example, is still numerically less than the previous version, 20000801, but the ,1 suffix is treated specially by automated tools and found to be greater than the implied suffix ,0 on the earlier package.

Dropping or resetting PORTEPOCH incorrectly leads to no end of grief. If the discussion above was not clear enough, please consult the FreeBSD ports 郵遞論壇.

It is expected that PORTEPOCH will not be used for the majority of ports, and that sensible use of DISTVERSION, or that use PORTVERSION carefully, can often preempt it becoming necessary if a future release of the software changes the version structure. However, care is needed by FreeBSD porters when a vendor release is made without an official version number - such as a code "snapshot" release. The temptation is to label the release with the release date, which will cause problems as in the example above when a new "official" release is made.

For example, if a snapshot release is made on the date 20000917, and the previous version of the software was version 1.2, do not use 20000917 for DISTVERSION. The correct way is a DISTVERSION of 1.2.20000917, or similar, so that the succeeding release, say 1.3, is still a numerically greater value.

5.2.3.3. Example of PORTREVISION and PORTEPOCH Usage

The gtkmumble port, version 0.10, is committed to the ports collection:

```
PORTNAME=  gtkmumble
DISTVERSION=   0.10
```

PKGNAME becomes gtkmumble-0.10.

A security hole is discovered which requires a local FreeBSD patch. PORTREVISION is bumped accordingly.

```
PORTNAME=  gtkmumble
DISTVERSION=   0.10
PORTREVISION=  1
```

PKGNAME becomes gtkmumble-0.10_1

A new version is released by the vendor, numbered 0.2 (it turns out the author actually intended 0.10 to actually mean 0.1.0, not "what comes after 0.9" - oops, too late now). Since the new minor version 2 is numerically less than the previous version 10, PORTEPOCH must be bumped to manually force the new package to be detected as "newer". Since it is a new vendor release of the code, PORTREVISION is reset to 0 (or removed from the Makefile).

```
PORTNAME=  gtkmumble
DISTVERSION=   0.2
PORTEPOCH= 1
```

PKGNAME becomes gtkmumble-0.2,1

The next release is 0.3. Since PORTEPOCH never decreases, the version variables are now:

```
PORTNAME=  gtkmumble
DISTVERSION=   0.3
```

```
PORTEPOCH= 1
```

PKGNAME becomes gtkmumble-0.3,1

If PORTEPOCH were reset to 0 with this upgrade, someone who had installed the gtkmumble-0.10_1 package would not detect the gtkmumble-0.3 package as newer, since 3 is still numerically less than 10. Remember, this is the whole point of PORTEPOCH in the first place.

5.2.4. PKGNAMEPREFIX and PKGNAMESUFFIX

Two optional variables, PKGNAMEPREFIX and PKGNAMESUFFIX, are combined with PORTNAME and PORTVERSION to form PKGNAME as ${PKGNAMEPREFIX}${PORTNAME}${PKGNAMESUFFIX}-${PORTVERSION}. Make sure this conforms to our guidelines for a good package name. In particular, the use of a hyphen (-) in PORTVERSION is not allowed. Also, if the package name has the language- or the -compiled.specifics part (see below), use PKGNAMEPREFIX and PKGNAMESUFFIX, respectively. Do not make them part of PORTNAME.

5.2.5. Package Naming Conventions

These are the conventions to follow when naming packages. This is to make the package directory easy to scan, as there are already thousands of packages and users are going to turn away if they hurt their eyes!

Package names take the form of language_region-name-compiled.specifics-version.numbers.

The package name is defined as ${PKGNAMEPREFIX}${PORTNAME}${PKGNAMESUFFIX}-${PORTVERSION}. Make sure to set the variables to conform to that format.

language_region-
: FreeBSD strives to support the native language of its users. The language- part is a two letter abbreviation of the natural language defined by ISO-639 when the port is specific to a certain language. Examples are ja for Japanese, ru for Russian, vi for Vietnamese, zh for Chinese, ko for Korean and de for German.

  If the port is specific to a certain region within the language area, add the two letter country code as well. Examples are en_US for US English and fr_CH for Swiss French.

  The language- part is set in PKGNAMEPREFIX.

name
: Make sure that the port’ s name and version are clearly separated and placed into PORTNAME and DISTVERSION. The only reason for PORTNAME to contain a version part is if the upstream distribution is really named that way, as in the textproc/libxml2 or japanese/kinput2-freewnn ports. Otherwise, PORTNAME cannot contain any version-specific information. It is quite normal for several ports to have the same PORTNAME, as the www/apache* ports do; in that case, different versions (and different index entries) are distinguished by PKGNAMEPREFIX and PKGNAMESUFFIX values.

  There is a tradition of naming Perl 5 modules by prepending p5- and converting the double-colon separator to a hyphen. For example, the Data::Dumper module becomes p5-Data-Dumper.

-compiled.specifics
: If the port can be built with different hardcoded defaults (usually part of the directory name in a family of ports), the -compiled.specifics part states the compiled-in defaults. The hyphen is optional. Examples are paper size and font units.

  The -compiled.specifics part is set in PKGNAMESUFFIX.

-version.numbers

The version string follows a dash (-) and is a period-separated list of integers and single lowercase alphabetics. In particular, it is not permissible to have another dash inside the version string. The only exception is the string pl (meaning "patchlevel"), which can be used only when there are no major and minor version numbers in the software. If the software version has strings like "alpha", "beta", "rc", or "pre", take the first letter and put it immediately after a period. If the version string continues after those names, the numbers follow the single alphabet without an extra period between them (for example, 1.0b2).

The idea is to make it easier to sort ports by looking at the version string. In particular, make sure version number components are always delimited by a period, and if the date is part of the string, use the dyyyy.mm.dd format, not dd.mm.yyyy or the non-Y2K compliant yy.mm.dd format. It is important to prefix the version with a letter, here d (for date), in case a release with an actual version number is made, which would be numerically less than yyyy.

Package name must be unique among all of the ports tree, check that there is not already a port with the same PORTNAME and if there is add one of PKGNAMEPREFIX or PKGNAMESUFFIX.

Here are some (real) examples on how to convert the name as called by the software authors to a suitable package name, for each line, only one of DISTVERSION or PORTVERSION is set in, depending on which would be used in the port's Makefile:

表 2. Package Naming Examples

Distribution Name	PKGNAMEPREFIX	PORTNAME	PKGNAMESUFFIX	DISTVERSION	PORTVERSION	Reason or comment
mule-2.2.2	(empty)	mule	(empty)	2.2.2		No changes required
mule-1.0.1	(empty)	mule	1	1.0.1		This is version 1 of mule, and version 2 already exists
EmiClock-1.0.2	(empty)	emiclock	(empty)	1.0.2		No uppercase names for single programs
rdist-1.3alpha	(empty)	rdist	(empty)	1.3alpha		Version will be 1.3.a
es-0.9-beta1	(empty)	es	(empty)	0.9-beta1		Version will be 0.9.b1
mailman-2.0rc3	(empty)	mailman	(empty)	2.0rc3		Version will be 2.0.r3
v3.3beta021.src	(empty)	tiff	(empty)		3.3	What the heck was that anyway?
tvtwm	(empty)	tvtwm	(empty)		p11	No version in the filename, use what upstream says it is

Distribution Name	PKGNAMEPREFIX	PORTNAME	PKGNAMESUFFIX	DISTVERSION	PORTVERSION	Reason or comment
piewm	(empty)	piewm	(empty)	1.0		No version in the filename, use what upstream says it is
xvgr-2.10pl1	(empty)	xvgr	(empty)		2.10.pl1	In that case, pl1 means patch level, so using DISTVERSION is not possible.
gawk-2.15.6	ja-	gawk	(empty)	2.15.6		Japanese language version
psutils-1.13	(empty)	psutils	-letter	1.13		Paper size hardcoded at package build time
pkfonts	(empty)	pkfonts	300	1.0		Package for 300dpi fonts

If there is absolutely no trace of version information in the original source and it is unlikely that the original author will ever release another version, just set the version string to 1.0 (like the piewm example above). Otherwise, ask the original author or use the date string the source file was released on (dyyyy.mm.dd, or dyyyymmdd) as the version.

Use any letter. Here, d here stands for date, if the source is a Git repository, g followed by the commit date is commonly used, using s for snapshot is also common.

5.3. Categorization

5.3.1. CATEGORIES

When a package is created, it is put under /usr/ports/packages/All and links are made from one or more subdirectories of /usr/ports/packages. The names of these subdirectories are specified by the variable CATEGORIES. It is intended to make life easier for the user when he is wading through the pile of packages on the FTP site or the CDROM. Please take a look at the current list of categories and pick the ones that are suitable for the port.

This list also determines where in the ports tree the port is imported. If there is more than one category here, the port files must be put in the subdirectory with the name of the first category. See below for more discussion about how to pick the right categories.

5.3.2. Current List of Categories

Here is the current list of port categories. Those marked with an asterisk (*) are virtual categories-those that do not have a corresponding subdirectory in the ports tree. They are only used as secondary categories, and only for search purposes.

For non-virtual categories, there is a one-line description in COMMENT in that subdirectory’ s Makefile.

Category	Description	Notes
accessibility	Ports to help disabled users.	
afterstep*	Ports to support the AfterStep window manager.	
arabic	Arabic language support.	
archivers	Archiving tools.	
astro	Astronomical ports.	
audio	Sound support.	
benchmarks	Benchmarking utilities.	
biology	Biology-related software.	
cad	Computer aided design tools.	
chinese	Chinese language support.	
comms	Communication software.	Mostly software to talk to the serial port.
converters	Character code converters.	
databases	Databases.	
deskutils	Things that used to be on the desktop before computers were invented.	
devel	Development utilities.	Do not put libraries here just because they are libraries. They should not be in this category unless they truly do not belong anywhere else.
dns	DNS-related software.	
docs*	Meta-ports for FreeBSD documentation.	
editors	General editors.	Specialized editors go in the section for those tools. For example, a mathematical-formula editor will go in math, and have editors as a second category.
education*	Education-related software.	This includes applications, utilities, or games primarily or substantially designed to help the user learn a specific topic or study in general. It also includes course-writing applications, course-delivery applications, and classroom or school management applications
elisp*	Emacs-lisp ports.	
emulators	Emulators for other operating systems.	Terminal emulators do not belong here. X-based ones go to x11 and text-based ones to either comms or misc, depending on the exact functionality.

Category	Description	Notes
enlightenment*	Ports related to the Enlightenment window manager.	
finance	Monetary, financial and related applications.	
french	French language support.	
ftp	FTP client and server utilities.	If the port speaks both FTP and HTTP, put it in ftp with a secondary category of www.
games	Games.	
geography*	Geography-related software.	
german	German language support.	
gnome*	Ports from the GNOME Project.	
gnustep*	Software related to the GNUstep desktop environment.	
graphics	Graphics utilities.	
hamradio*	Software for amateur radio.	
haskell*	Software related to the Haskell language.	
hebrew	Hebrew language support.	
hungarian	Hungarian language support.	
irc	Internet Relay Chat utilities.	
japanese	Japanese language support.	
java	Software related to the Java™ language.	The java category must not be the only one for a port. Save for ports directly related to the Java language, porters are also encouraged not to use java as the main category of a port.
kde*	Ports from the KDE Project (generic).	
kde-applications*	Applications from the KDE Project.	
kde-frameworks*	Add-on libraries from the KDE Project for programming with Qt.	
kde-plasma*	Desktop from the KDE Project.	
kld*	Kernel loadable modules.	
korean	Korean language support.	
lang	Programming languages.	
linux*	Linux applications and support utilities.	
lisp*	Software related to the Lisp language.	
mail	Mail software.	

Category	Description	Notes
mate*	Ports related to the MATE desktop environment, a fork of GNOME 2.	
math	Numerical computation software and other utilities for mathematics.	
mbone*	MBone applications.	
misc	Miscellaneous utilities	Things that do not belong anywhere else. If at all possible, try to find a better category for the port than misc, as ports tend to be overlooked in here.
multimedia	Multimedia software.	
net	Miscellaneous networking software.	
net-im	Instant messaging software.	
net-mgmt	Networking management software.	
net-p2p	Peer to peer network applications.	
net-vpn*	Virtual Private Network applications.	
news	USENET news software.	
parallel*	Applications dealing with parallelism in computing.	
pear*	Ports related to the Pear PHP framework.	
perl5*	Ports that require Perl version 5 to run.	
plan9*	Various programs from Plan9.	
polish	Polish language support.	
ports-mgmt	Ports for managing, installing and developing FreeBSD ports and packages.	
portuguese	Portuguese language support.	
print	Printing software.	Desktop publishing tools (previewers, etc.) belong here too.
python*	Software related to the Python language.	
ruby*	Software related to the Ruby language.	
rubygems*	Ports of RubyGems packages.	
russian	Russian language support.	
scheme*	Software related to the Scheme language.	
science	Scientific ports that do not fit into other categories such as astro, biology and math.	

Category	Description	Notes
security	Security utilities.	
shells	Command line shells.	
spanish*	Spanish language support.	
sysutils	System utilities.	
tcl*	Ports that use Tcl to run.	
textproc	Text processing utilities.	It does not include desktop publishing tools, which go to print.
tk*	Ports that use Tk to run.	
ukrainian	Ukrainian language support.	
vietnamese	Vietnamese language support.	
wayland*	Ports to support the Wayland display server.	
windowmaker*	Ports to support the Window Maker window manager.	
www	Software related to the World Wide Web.	HTML language support belongs here too.
x11	The X Window System and friends.	This category is only for software that directly supports the window system. Do not put regular X applications here. Most of them go into other x11-* categories (see below).
x11-clocks	X11 clocks.	
x11-drivers	X11 drivers.	
x11-fm	X11 file managers.	
x11-fonts	X11 fonts and font utilities.	
x11-servers	X11 servers.	
x11-themes	X11 themes.	
x11-toolkits	X11 toolkits.	
x11-wm	X11 window managers.	
xfce*	Ports related to the Xfce desktop environment.	
zope*	Zope support.	

5.3.3. Choosing the Right Category

As many of the categories overlap, choosing which of the categories will be the primary category of the port can be tedious. There are several rules that govern this issue. Here is the list of priorities, in decreasing order of precedence:

- The first category must be a physical category (see above). This is necessary to make the packaging work. Virtual categories and physical categories may be intermixed after that.
- Language specific categories always come first. For example, if the port installs Japanese X11 fonts, then the CATEGORIES line would read japanese x11-fonts.
- Specific categories are listed before less-specific ones. For instance, an HTML editor is listed as www editors, not the other way around. Also, do not list net when the port belongs to any of irc, mail, news, security, or www, as net is included implicitly.

- x11 is used as a secondary category only when the primary category is a natural language. In particular, do not put x11 in the category line for X applications.
- Emacs modes are placed in the same ports category as the application supported by the mode, not in editors. For example, an Emacs mode to edit source files of some programming language goes into lang.
- Ports installing loadable kernel modules also have the virtual category kld in their CATEGORIES line. This is one of the things handled automatically by adding USES=kmod.
- misc does not appear with any other non-virtual category. If there is misc with something else in CATEGORIES, that means misc can safely be deleted and the port placed only in the other subdirectory.
- If the port truly does not belong anywhere else, put it in misc.

If the category is not clearly defined, please put a comment to that effect in the port submission in the bug database so we can discuss it before we import it. As a committer, send a note to the FreeBSD ports 郵遞論壇 so we can discuss it first. Too often, new ports are imported to the wrong category only to be moved right away.

5.3.4. Proposing a New Category

As the Ports Collection has grown over time, various new categories have been introduced. New categories can either be virtual categories-those that do not have a corresponding subdirectory in the ports tree- or physical categories-those that do. This section discusses the issues involved in creating a new physical category. Read it thouroughly before proposing a new one.

Our existing practice has been to avoid creating a new physical category unless either a large number of ports would logically belong to it, or the ports that would belong to it are a logically distinct group that is of limited general interest (for instance, categories related to spoken human languages), or preferably both.

The rationale for this is that such a change creates a fair amount of work for both the committers and also for all users who track changes to the Ports Collection. In addition, proposed category changes just naturally seem to attract controversy. (Perhaps this is because there is no clear consensus on when a category is "too big", nor whether categories should lend themselves to browsing (and thus what number of categories would be an ideal number), and so forth.)

Here is the procedure:

1. Propose the new category on FreeBSD ports 郵遞論壇. Include a detailed rationale for the new category, including why the existing categories are not sufficient, and the list of existing ports proposed to move. (If there are new ports pending in Bugzilla that would fit this category, list them too.) If you are the maintainer and/or submitter, respectively, mention that as it may help the case.
2. Participate in the discussion.
3. If it seems that there is support for the idea, file a PR which includes both the rationale and the list of existing ports that need to be moved. Ideally, this PR would also include these patches:
   - Makefiles for the new ports once they are repocopied
   - Makefile for the new category
   - Makefile for the old ports' categories
   - Makefiles for ports that depend on the old ports
   - (for extra credit, include the other files that have to change, as per the procedure in the Committer’ s Guide.)
4. Since it affects the ports infrastructure and involves moving and patching many ports but also possibly running regression tests on the build cluster, assign the PR to the Ports Management Team <portmgr@FreeBSD.org>.
5. If that PR is approved, a committer will need to follow the rest of the procedure that is outlined in the Committer’ s Guide.

Proposing a new virtual category is similar to the above but much less involved, since no ports will actually have to move. In this case, the only patches to include in the PR would be those to add the new category to CATEGORIES of the affected ports.

5.3.5. Proposing Reorganizing All the Categories

Occasionally someone proposes reorganizing the categories with either a 2-level structure, or some other kind of keyword structure. To date, nothing has come of any of these proposals because, while they are very easy to make, the effort involved to retrofit the entire existing ports collection with any kind of reorganization is daunting to say the very least. Please read the history of these proposals in the mailing list archives before posting this idea. Furthermore, be prepared to be challenged to offer a working prototype.

5.4. The Distribution Files

The second part of the Makefile describes the files that must be downloaded to build the port, and where they can be downloaded.

5.4.1. DISTNAME

DISTNAME is the name of the port as called by the authors of the software. DISTNAME defaults to ${PORTNAME}-${DISTVERSIONPREFIX}${DISTVERSION}${DISTVERSIONSUFFIX}, and if not set, DISTVERSION defaults to ${PORTVERSION} so override DISTNAME only if necessary. DISTNAME is only used in two places. First, the distribution file list (DISTFILES) defaults to ${DISTNAME}${EXTRACT_SUFX}. Second, the distribution file is expected to extract into a subdirectory named WRKSRC, which defaults to work/${DISTNAME}.

Some vendor’ s distribution names which do not fit into the ${PORTNAME}-${PORTVERSION} -scheme can be handled automatically by setting DISTVERSIONPREFIX, DISTVERSION, and DISTVERSIONSUFFIX. PORTVERSION will be derived from DISTVERSION automatically.

Only one of PORTVERSION and DISTVERSION can be set at a time. If DISTVERSION does not derive a correct PORTVERSION, do not use DISTVERSION.

If the upstream version scheme can be derived into a ports-compatible version scheme, set some variable to the upstream version, do not use DISTVERSION as the variable name. Set PORTVERSION to the computed version based on the variable you created, and set DISTNAME accordingly.

If the upstream version scheme cannot easily be coerced into a ports-compatible value, set PORTVERSION to a sensible value, and set DISTNAME with PORTNAME with the verbatim upstream version.

例 11. Deriving PORTVERSION Manually

BIND9 uses a version scheme that is not compatible with the ports versions (it has - in its versions) and cannot be derived using DISTVERSION because after the 9.9.9 release, it will release a "patchlevels" in the form of 9.9.9-P1. DISTVERSION would translate that into 9.9.9.p1, which, in the ports versioning scheme means 9.9.9 pre-release 1, which is before 9.9.9 and not after. So PORTVERSION is manually derived from an ISCVERSION variable to output 9.9.9p1.

The order into which the ports framework, and pkg, will sort versions is checked using the -t argument of pkg-version(8):

```
% pkg version -t 9.9.9 9.9.9.p1
> ①
% pkg version -t 9.9.9 9.9.9p1
```

```
< ②
```

① The > sign means that the first argument passed to -t is greater than the second argument. 9.9.9 is after 9.9.9.p1.

② The < sign means that the first argument passed to -t is less than the second argument. 9.9.9 is before 9.9.9p1.

In the port Makefile, for example dns/bind99, it is achieved by:

```
PORTNAME=  bind
PORTVERSION=   ${ISCVERSION:S/-P/P/:S/b/.b/:S/a/.a/:S/rc/.rc/}
CATEGORIES= dns net
MASTER_SITES=  ISC/bind9/${ISCVERSION}
PKGNAMESUFFIX=  99
DISTNAME=  ${PORTNAME}-${ISCVERSION}

MAINTAINER= mat@FreeBSD.org
COMMENT=   BIND DNS suite with updated DNSSEC and DNS64

LICENSE=   ISCL

# ISC releases things like 9.8.0-P1 or 9.8.1rc1, which our versioning does not like
ISCVERSION= 9.9.9-P6
```

Define upstream version in ISCVERSION, with a comment saying why it is needed. Use ISCVERSION to get a ports-compatible PORTVERSION. Use ISCVERSION directly to get the correct URL for fetching the distribution file. Use ISCVERSION directly to name the distribution file.

例 12. Derive DISTNAME from PORTVERSION

From time to time, the distribution file name has little or no relation to the version of the software.

In comms/kermit, only the last element of the version is present in the distribution file:

```
PORTNAME=  kermit
PORTVERSION=   9.0.304
CATEGORIES= comms ftp net
MASTER_SITES=  ftp://ftp.kermitproject.org/kermit/test/tar/
DISTNAME=  cku${PORTVERSION:E}-dev20
```

The :E make(1) modifier returns the suffix of the variable, in this case, 304. The distribution file is correctly generated as cku304-dev20.tar.gz.

例 13. Exotic Case 1

Sometimes, there is no relation between the software name, its version, and the distribution file it is distributed in.

From audio/libworkman:

```
PORTNAME=     libworkman
PORTVERSION=  1.4
CATEGORIES=   audio
MASTER_SITES= LOCAL/jim
DISTNAME=     ${PORTNAME}-1999-06-20
```

例 14. Exotic Case 2

In comms/librs232, the distribution file is not versioned, so using DIST_SUBDIR is needed:

```
PORTNAME=     librs232
PORTVERSION=  20160710
CATEGORIES=   comms
MASTER_SITES= http://www.teuniz.net/RS-232/
DISTNAME=     RS-232
DIST_SUBDIR=  ${PORTNAME}-${PORTVERSION}
```

PKGNAMEPREFIX and PKGNAMESUFFIX do not affect DISTNAME. Also note that if WRKSRC is equal to ${WRKDIR}/${DISTNAME} while the original source archive is named something other than ${PORTNAME}-${PORTVERSION}${EXTRACT_SUFX}, leave DISTNAME alone- defining only DISTFILES is easier than both DISTNAME and WRKSRC (and possibly EXTRACT_SUFX).

5.4.2. MASTER_SITES

Record the directory part of the FTP/HTTP-URL pointing at the original tarball in MASTER_SITES. Do not forget the trailing slash (/)!

The make macros will try to use this specification for grabbing the distribution file with FETCH if they cannot find it already on the system.

It is recommended that multiple sites are included on this list, preferably from different continents. This will safeguard against wide-area network problems.

MASTER_SITES must not be blank. It must point to the actual site hosting the distribution files. It cannot point to web archives, or the FreeBSD distribution files cache sites. The only exception to this rule is ports that do not have any distribution files. For example, meta-ports do not have any distribution files, so MASTER_SITES does not need to be set.

5.4.2.1. Using MASTER_SITE_* Variables

Shortcut abbreviations are available for popular archives like SourceForge (SOURCEFORGE), GNU

(GNU), or Perl CPAN (PERL_CPAN). MASTER_SITES can use them directly:

```
MASTER_SITES=  GNU/make
```

The older expanded format still works, but all ports have been converted to the compact format. The expanded format looks like this:

```
MASTER_SITES=     ${MASTER_SITE_GNU}
MASTER_SITE_SUBDIR= make
```

These values and variables are defined in Mk/bsd.sites.mk. New entries are added often, so make sure to check the latest version of this file before submitting a port.

For any MASTER_SITE_FOO variable, the shorthand FOO can be used. For example, use:

```
MASTER_SITES=  FOO
```

If MASTER_SITE_SUBDIR is needed, use this:

```
MASTER_SITES=  FOO/bar
```

Some MASTER_SITE_* names are quite long, and for ease of use, shortcuts have been defined:

表 3. Shortcuts for MASTER_SITE_* Macros

Macro	Shortcut
PERL_CPAN	CPAN
GITHUB	GH
GITHUB_CLOUD	GHC
LIBREOFFICE_DEV	LODEV
NETLIB	NL
RUBYGEMS	RG
SOURCEFORGE	SF

5.4.2.2. Magic MASTER_SITES Macros

Several "magic" macros exist for popular sites with a predictable directory structure. For these, just use the abbreviation and the system will choose a subdirectory automatically. For a port named Stardict, of version 1.2.3, and hosted on SourceForge, adding this line:

```
MASTER_SITES=  SF
```

infers a subdirectory named /project/stardict/stardict/1.2.3. If the inferred directory is incorrect, it can be overridden:

```
MASTER_SITES=  SF/stardict/WyabdcRealPeopleTTS/${PORTVERSION}
```

This can also be written as

```
MASTER_SITES=  SF
MASTER_SITE_SUBDIR= stardict/WyabdcRealPeopleTTS/${PORTVERSION}
```

表 4. Magic MASTER_SITES Macros

Macro	Assumed subdirectory
APACHE_COMMONS_BINARIES	${PORTNAME:S,commons-,,}
APACHE_COMMONS_SOURCE	${PORTNAME:S,commons-,,}
APACHE_JAKARTA	${PORTNAME:S,-,/,}/source
BERLIOS	${PORTNAME:tl}.berlios
CHEESESHOP	source/${DISTNAME:C/(.).*/\1/}/${DISTNAME:C/(.*)-[0-9].*/\1/}
CPAN	${PORTNAME:C/-.*//}
DEBIAN	pool/main/${PORTNAME:C/^((lib)?.).*$/\1/}/${PORTNAME}
FARSIGHT	${PORTNAME}
FESTIVAL	${PORTREVISION}
GCC	releases/${DISTNAME}
GENTOO	distfiles
GIMP	${PORTNAME}/${PORTVERSION:R}/
GH	${GH_ACCOUNT}/${GH_PROJECT}/tar.gz/${GH_TAGNAME}?dummy=/
GHC	${GH_ACCOUNT}/${GH_PROJECT}/
GNOME	sources/${PORTNAME}/${PORTVERSION:C/^(\.[0-9]).*/\1/}
GNU	${PORTNAME}
GNUPG	${PORTNAME}
GNU_ALPHA	${PORTNAME}
HORDE	${PORTNAME}
LODEV	${PORTNAME}
MATE	${PORTVERSION:C/^(\.[0-9]).*/\1/}
MOZDEV	${PORTNAME:tl}
NL	${PORTNAME}
QT	archive/qt/${PORTVERSION:R}
SAMBA	${PORTNAME}
SAVANNAH	${PORTNAME:tl}
SF	${PORTNAME:tl}/${PORTNAME:tl}/${PORTVERSION}

5.4.3. USE_GITHUB

If the distribution file comes from a specific commit or tag on GitHub for which there is no officially released file, there is an easy way to set the right DISTNAME and MASTER_SITES automatically. These variables are available:

表 5. USE_GITHUB Description

Variable	Description	Default
GH_ACCOUNT	Account name of the GitHub user hosting the project	${PORTNAME}
GH_PROJECT	Name of the project on GitHub	${PORTNAME}
GH_TAGNAME	Name of the tag to download (2.0.1, hash, ⋯) Using the name of a branch here is incorrect. It is also possible to use the hash of a commit id to do a snapshot.	${DISTVERSIONPREFIX}${DISTVERSION}${DISTVERSIONSUFFIX}
GH_SUBDIR	When the software needs an additional distribution file to be extracted within ${WRKSRC}, this variable can be used. See the examples in Fetching Multiple Files from GitHub for more information.	(none)
GH_TUPLE	GH_TUPLE allows putting GH_ACCOUNT, GH_PROJECT, GH_TAGNAME, and GH_SUBDIR into a single variable. The format is account`:`project`:`tagname`:`group`/`subdir. The `/`subdir part is optional. It is helpful when there is more than one GitHub project from which to fetch.	(none)

Do not use GH_TUPLE for the default distribution file, as it has no default.

例 15. Simple Use of USE_GITHUB

While trying to make a port for version 1.2.7 of pkg from the FreeBSD user on github, at https://github.com/freebsd/pkg, The Makefile would end up looking like this (slightly stripped for the example):

```
PORTNAME=  pkg
DISTVERSION=  1.2.7

USE_GITHUB= yes
GH_ACCOUNT= freebsd
```

It will automatically have MASTER_SITES set to GH and WRKSRC to ${WRKDIR}/pkg-1.2.7.

例 16. More Complete Use of USE_GITHUB

While trying to make a port for the bleeding edge version of pkg from the FreeBSD user on

github, at https://github.com/freebsd/pkg, the Makefile ends up looking like this (slightly stripped for the example):

```
PORTNAME=  pkg-devel
DISTVERSION=   1.3.0.a.20140411

USE_GITHUB= yes
GH_ACCOUNT= freebsd
GH_PROJECT= pkg
GH_TAGNAME= 6dbb17b
```

It will automatically have MASTER_SITES set to GH and WRKSRC to ${WRKDIR}/pkg-6dbb17b.

> 20140411 is the date of the commit referenced in GH_TAGNAME, not the date the Makefile is edited, or the date the commit is made.

例 17. Use of USE_GITHUB with DISTVERSIONPREFIX

From time to time, GH_TAGNAME is a slight variation from DISTVERSION. For example, if the version is 1.0.2, the tag is v1.0.2. In those cases, it is possible to use DISTVERSIONPREFIX or DISTVERSIONSUFFIX:

```
PORTNAME=  foo
DISTVERSIONPREFIX= v
DISTVERSION=   1.0.2

USE_GITHUB= yes
```

It will automatically set GH_TAGNAME to v1.0.2, while WRKSRC will be kept to ${WRKDIR}/foo-1.0.2.

例 18. Using USE_GITHUB When Upstream Does Not Use Versions

If there never was a version upstream, do not invent one like 0.1 or 1.0. Create the port with a DISTVERSION of gYYYYMMDD, where g is for Git, and YYYYMMDD represents the date the commit referenced in GH_TAGNAME.

```
PORTNAME=  bar
DISTVERSION=   g20140411

USE_GITHUB= yes
GH_TAGNAME= c472d66b
```

This creates a versioning scheme that increases over time, and that is still before version 0 (see Using pkg-version(8) to Compare Versions for details on pkg-version(8)):

```
% pkg version -t g20140411 0
<
```

Which means using PORTEPOCH will not be needed in case upstream decides to cut versions in the future.

例 19. Using USE_GITHUB to Access a Commit Between Two Versions

If the current version of the software uses a Git tag, and the port needs to be updated to a newer, intermediate version, without a tag, use git-describe(1) to find out the version to use:

```
% git describe --tags f0038b1
v0.7.3-14-gf0038b1
```

v0.7.3-14-gf0038b1 can be split into three parts:

v0.7.3
: This is the last Git tag that appears in the commit history before the requested commit.

-14
: This means that the requested commit, f0038b1, is the 14th commit after the v0.7.3 tag.

-gf0038b1
: The -g means "Git", and the f0038b1 is the commit hash that this reference points to.

```
PORTNAME=  bar
DISTVERSIONPREFIX=  v
DISTVERSION=   0.7.3-14
DISTVERSIONSUFFIX=  -gf0038b1

USE_GITHUB= yes
```

This creates a versioning scheme that increases over time (well, over commits), and does not conflict with the creation of a 0.7.4 version. (See Using pkg-version(8) to Compare Versions for details on pkg-version(8)):

```
% pkg version -t 0.7.3 0.7.3.14
<
% pkg version -t 0.7.3.14 0.7.4
<
```

If the requested commit is the same as a tag, a shorter description is shown by default. The longer version is equivalent:

```
% git describe --tags c66c71d
v0.7.3
```

```
% git describe --tags --long c66c71d
v0.7.3-0-gc66c71d
```

5.4.3.1. Fetching Multiple Files from GitHub

The USE_GITHUB framework also supports fetching multiple distribution files from different places in GitHub. It works in a way very similar to Multiple Distribution or Patches Files from Multiple Locations.

Multiple values are added to GH_ACCOUNT, GH_PROJECT, and GH_TAGNAME. Each different value is assigned a group. The main value can either have no group, or the :DEFAULT group. A value can be omitted if it is the same as the default as listed in USE_GITHUB Description.

GH_TUPLE can also be used when there are a lot of distribution files. It helps keep the account, project, tagname, and group information at the same place.

For each group, a ${WRKSRC_group} helper variable is created, containing the directory into which the file has been extracted. The ${WRKSRC_group} variables can be used to move directories around during post-extract, or add to CONFIGURE_ARGS, or whatever is needed so that the software builds correctly.

The :group part must be used for only one distribution file. It is used as a unique key and using it more than once will overwrite the previous values.

As this is only syntactic sugar above DISTFILES and MASTER_SITES, the group names must adhere to the restrictions on group names outlined in Multiple Distribution or Patches Files from Multiple Locations

When fetching multiple files from GitHub, sometimes the default distribution file is not fetched from GitHub. To disable fetching the default distribution, set:

```
USE_GITHUB= nodefault
```

When using USE_GITHUB=nodefault, the Makefile must set DISTFILES in its top block. The definition should be:

```
DISTFILES=   ${DISTNAME}${EXTRACT_SUFX}
```

例 20. Use of USE_GITHUB with Multiple Distribution Files

From time to time, there is a need to fetch more than one distribution file. For example, when the upstream git repository uses submodules. This can be done easily using groups in the GH_* variables:

```
PORTNAME=   foo
DISTVERSION=   1.0.2

USE_GITHUB= yes
```

```
GH_ACCOUNT= bar:icons,contrib
GH_PROJECT= foo-icons:icons foo-contrib:contrib
GH_TAGNAME= 1.0:icons fa579bc:contrib
GH_SUBDIR=  ext/icons:icons

CONFIGURE_ARGS= --with-contrib=${WRKSRC_contrib}
```

This will fetch three distribution files from github. The default one comes from foo/foo and is version 1.0.2. The second one, with the icons group, comes from bar/foo-icons and is in version 1.0. The third one comes from bar/foo-contrib and uses the Git commit fa579bc. The distribution files are named foo-foo-1.0.2_GH0.tar.gz, bar-foo-icons-1.0_GH0.tar.gz, and bar-foo-contrib-fa579bc_GH0.tar.gz.

All the distribution files are extracted in ${WRKDIR} in their respective subdirectories. The default file is still extracted in ${WRKSRC}, in this case, ${WRKDIR}/foo-1.0.2. Each additional distribution file is extracted in ${WRKSRC_group}. Here, for the icons group, it is called ${WRKSRC_icons} and it contains ${WRKDIR}/foo-icons-1.0. The file with the contrib group is called ${WRKSRC_contrib} and contains ${WRKDIR}/foo-contrib-fa579bc.

The software’ s build system expects to find the icons in a ext/icons subdirectory in its sources, so GH_SUBDIR is used. GH_SUBDIR makes sure that ext exists, but that ext/icons does not already exist. Then it does this:

```
post-extract:
    @${MV} ${WRKSRC_icons} ${WRKSRC}/ext/icons
```

例 21. Use of USE_GITHUB with Multiple Distribution Files Using GH_TUPLE

This is functionally equivalent to Use of USE_GITHUB with Multiple Distribution Files, but using GH_TUPLE:

```
PORTNAME=  foo
DISTVERSION=   1.0.2

USE_GITHUB= yes
GH_TUPLE=  bar:foo-icons:1.0:icons/ext/icons \
     bar:foo-contrib:fa579bc:contrib

CONFIGURE_ARGS= --with-contrib=${WRKSRC_contrib}
```

Grouping was used in the previous example with bar:icons,contrib. Some redundant information is present with GH_TUPLE because grouping is not possible.

例 22. How to Use USE_GITHUB with Git Submodules?

Ports with GitHub as an upstream repository sometimes use submodules. See git-submodule(1) for more information.

The problem with submodules is that each is a separate repository. As such, they each must be

fetched separately.

Using finance/moneymanagerex as an example, its GitHub repository is https://github.com/moneymanagerex/moneymanagerex. It has a .gitmodules file at the root. This file describes all the submodules used in this repository, and lists additional repositories needed. This file will tell what additional repositories are needed:

```
[submodule "lib/wxsqlite3"]
   path = lib/wxsqlite3
   url = https://github.com/utelle/wxsqlite3.git
[submodule "3rd/mongoose"]
   path = 3rd/mongoose
   url = https://github.com/cesanta/mongoose.git
[submodule "3rd/LuaGlue"]
   path = 3rd/LuaGlue
   url = https://github.com/moneymanagerex/LuaGlue.git
[submodule "3rd/cgitemplate"]
   path = 3rd/cgitemplate
   url = https://github.com/moneymanagerex/html-template.git
[...]
```

The only information missing from that file is the commit hash or tag to use as a version. This information is found after cloning the repository:

```
% git clone --recurse-submodules
https://github.com/moneymanagerex/moneymanagerex.git
Cloning into 'moneymanagerex'...
remote: Counting objects: 32387, done.
[...]
Submodule '3rd/LuaGlue' (https://github.com/moneymanagerex/LuaGlue.git)
registered for path '3rd/LuaGlue'
Submodule '3rd/cgitemplate' (https://github.com/moneymanagerex/html-
template.git) registered for path '3rd/cgitemplate'
Submodule '3rd/mongoose' (https://github.com/cesanta/mongoose.git) registered
for path '3rd/mongoose'
Submodule 'lib/wxsqlite3' (https://github.com/utelle/wxsqlite3.git) registered for
path 'lib/wxsqlite3'
[...]
Cloning into
'/home/mat/work/freebsd/ports/finance/moneymanagerex/moneymanagerex/3rd/Lu
aGlue'...
Cloning into
'/home/mat/work/freebsd/ports/finance/moneymanagerex/moneymanagerex/3rd/cg
itemplate'...
Cloning into
'/home/mat/work/freebsd/ports/finance/moneymanagerex/moneymanagerex/3rd/m
```

```
ongoose'...
Cloning into
'/home/mat/work/freebsd/ports/finance/moneymanagerex/moneymanagerex/lib/wx
sqlite3'...
[...]
Submodule path '3rd/LuaGlue': checked out
'c51d11a247ee4d1e9817dfa2a8da8d9e2f97ae3b'
Submodule path '3rd/cgitemplate': checked out
'cd434eeeb35904ebcd3d718ba29c281a649b192c'
Submodule path '3rd/mongoose': checked out
'2140e5992ab9a3a9a34ce9a281abf57f00f95cda'
Submodule path 'lib/wxsqlite3': checked out
'fb66eb230d8aed21dec273b38c7c054dcb7d6b51'
[...]
% cd moneymanagerex
% git submodule status
 c51d11a247ee4d1e9817dfa2a8da8d9e2f97ae3b 3rd/LuaGlue (heads/master)
 cd434eeeb35904ebcd3d718ba29c281a649b192c 3rd/cgitemplate (cd434ee)
 2140e5992ab9a3a9a34ce9a281abf57f00f95cda 3rd/mongoose (6.2-138-g2140e59)
 fb66eb230d8aed21dec273b38c7c054dcb7d6b51 lib/wxsqlite3 (v3.4.0)
[...]
```

It can also be found on GitHub. Each subdirectory that is a submodule is shown as directory @ hash, for example, mongoose @ 2140e59.

> While getting the information from GitHub seems more straightforward, the information found using git submodule status will provide more meaningful information. For example, here, lib/wxsqlite3's commit hash fb66eb2 correspond to v3.4.0. Both can be used interchangeably, but when a tag is available, use it.

Now that all the required information has been gathered, the Makefile can be written (only GitHub-related lines are shown):

```
PORTNAME=  moneymanagerex
DISTVERSIONPREFIX= v
DISTVERSION=   1.3.0

USE_GITHUB= yes
GH_TUPLE=  utelle:wxsqlite3:v3.4.0:wxsqlite3/lib/wxsqlite3 \
    moneymanagerex:LuaGlue:c51d11a:lua_glue/3rd/LuaGlue \
    moneymanagerex:html-template:cd434ee:html_template/3rd/cgitemplate \
    cesanta:mongoose:2140e59:mongoose/3rd/mongoose \
    [...]
```

5.4.4. USE_GITLAB

Similar to GitHub, if the distribution file comes from gitlab.com or is hosting the GitLab software, these variables are available for use and might need to be set.

表 6. USE_GITLAB Description

Variable	Description	Default
GL_SITE	Site name hosting the GitLab project	https://gitlab.com
GL_ACCOUNT	Account name of the GitLab user hosting the project	${PORTNAME}
GL_PROJECT	Name of the project on GitLab	${PORTNAME}
GL_COMMIT	The commit hash to download. Must be the full 160 bit, 40 character hex sha1 hash. This is a required variable for GitLab.	(none)
GL_SUBDIR	When the software needs an additional distribution file to be extracted within ${WRKSRC}, this variable can be used. See the examples in Fetching Multiple Files from GitLab for more information.	(none)
GL_TUPLE	GL_TUPLE allows putting GL_SITE, GL_ACCOUNT, GL_PROJECT, GL_COMMIT, and GL_SUBDIR into a single variable. The format is site `:` account `:` project `:` commit `:` group `/subdir. The site:` and `/` subdir part is optional. It is helpful when there are more than one GitLab project from which to fetch.	(none)

例 23. Simple Use of USE_GITLAB

While trying to make a port for version 1.14 of libsignon-glib from the accounts-sso user on gitlab.com, at https://gitlab.com/accounts-sso/libsignon-glib, The Makefile would end up looking like this for fetching the distribution files:

```
PORTNAME=  libsignon-glib
DISTVERSION=  1.14

USE_GITLAB= yes
GL_ACCOUNT= accounts-sso
GL_COMMIT=  e90302e342bfd27bc8c9132ab9d0ea3d8723fd03
```

It will automatically have MASTER_SITES set to gitlab.com and WRKSRC to ${WRKDIR}/libsignon-glib-e90302e342bfd27bc8c9132ab9d0ea3d8723fd03-e90302e342bfd27bc8c9132ab9d0ea3d8723fd03.

例 24. More Complete Use of USE_GITLAB

A more complete use of the above if port had no versioning and foobar from the foo user on project bar on a self hosted GitLab site https://gitlab.example.com, the Makefile ends up looking like this for fetching distribution files:

```
PORTNAME=  foobar
DISTVERSION=  g20170906

USE_GITLAB= yes
GL_SITE=  https://gitlab.example.com
GL_ACCOUNT= foo
GL_PROJECT= bar
GL_COMMIT=  9c1669ce60c3f4f5eb43df874d7314483fb3f8a6
```

It will have MASTER_SITES set to "https://gitlab.example.com" and WRKSRC to ${WRKDIR}/bar-9c1669ce60c3f4f5eb43df874d7314483fb3f8a6-9c1669ce60c3f4f5eb43df874d7314483fb3f8a6.

20170906 is the date of the commit referenced in GL_COMMIT, not the date the Makefile is edited, or the date the commit to the FreeBSD ports tree is made.

GL_SITE's protocol, port and webroot can all be modified in the same variable.

5.4.4.1. Fetching Multiple Files from GitLab

The USE_GITLAB framework also supports fetching multiple distribution files from different places from GitLab and GitLab hosted sites. It works in a way very similar to Multiple Distribution or Patches Files from Multiple Locations and Fetching Multiple Files from GitLab.

Multiple values are added to GL_SITE, GL_ACCOUNT, GL_PROJECT and GL_COMMIT. Each different value is assigned a group. USE_GITLAB Description.

GL_TUPLE can also be used when there are a lot of distribution files. It helps keep the site, account, project, commit, and group information at the same place.

For each group, a ${WRKSRC_group} helper variable is created, containing the directory into which the file has been extracted. The ${WRKSRC_group} variables can be used to move directories around during post-extract, or add to CONFIGURE_ARGS, or whatever is needed so that the software builds correctly.

The :group part must be used for only one distribution file. It is used as a unique key and using it more than once will overwrite the previous values.

As this is only syntactic sugar above DISTFILES and MASTER_SITES, the group names must adhere to the restrictions on group names outlined in Multiple Distribution or Patches Files from Multiple Locations

When fetching multiple files using GitLab, sometimes the default distribution file is not fetched from a GitLab site. To disable fetching the default distribution, set:

```
USE_GITLAB= nodefault
```

When using USE_GITLAB=nodefault, the Makefile must set DISTFILES in its top block. The definition should be:

```
DISTFILES=   ${DISTNAME}${EXTRACT_SUFX}
```

例 25. Use of USE_GITLAB with Multiple Distribution Files

From time to time, there is a need to fetch more than one distribution file. For example, when the upstream git repository uses submodules. This can be done easily using groups in the GL_* variables:

```
PORTNAME=  foo
DISTVERSION=   1.0.2

USE_GITLAB= yes
GL_SITE=   https://gitlab.example.com:9434/gitlab:icons
GL_ACCOUNT= bar:icons,contrib
GL_PROJECT= foo-icons:icons foo-contrib:contrib
GL_COMMIT=  c189207a55da45305c884fe2b50e086fcad4724b
ae7368cab1ca7ca754b38d49da064df87968ffe4:icons
9e4dd76ad9b38f33fdb417a4c01935958d5acd2a:contrib
GL_SUBDIR=  ext/icons:icons

CONFIGURE_ARGS= --with-contrib=${WRKSRC_contrib}
```

This will fetch two distribution files from gitlab.com and one from gitlab.example.com hosting GitLab. The default one comes from https://gitlab.com/foo/foo and commit is c189207a55da45305c884fe2b50e086fcad4724b. The second one, with the icons group, comes from https://gitlab.example.com:9434/gitlab/bar/foo-icons and commit is ae7368cab1ca7ca754b38d49da064df87968ffe4. The third one comes from https://gitlab.com/bar/foo-contrib and is commit 9e4dd76ad9b38f33fdb417a4c01935958d5acd2a. The distribution files are named foo-foo-c189207a55da45305c884fe2b50e086fcad4724b_GL0.tar.gz, bar-foo-icons-ae7368cab1ca7ca754b38d49da064df87968ffe4_GL0.tar.gz, and bar-foo-contrib-9e4dd76ad9b38f33fdb417a4c01935958d5acd2a_GL0.tar.gz.

All the distribution files are extracted in ${WRKDIR} in their respective subdirectories. The default file is still extracted in ${WRKSRC}, in this case, ${WRKDIR}/foo-c189207a55da45305c884fe2b50e086fcad4724b-c189207a55da45305c884fe2b50e086fcad4724b. Each additional distribution file is extracted in ${WRKSRC_group}. Here, for the icons group, it is called ${WRKSRC_icons} and it contains ${WRKDIR}/foo-icons-ae7368cab1ca7ca754b38d49da064df87968ffe4-ae7368cab1ca7ca754b38d49da064df87968ffe4. The file with the contrib group is called ${WRKSRC_contrib} and contains ${WRKDIR}/foo-contrib-9e4dd76ad9b38f33fdb417a4c01935958d5acd2a-9e4dd76ad9b38f33fdb417a4c01935958d5acd2a.

The software’s build system expects to find the icons in a ext/icons subdirectory in its

sources, so GL_SUBDIR is used. GL_SUBDIR makes sure that ext exists, but that ext/icons does not already exist. Then it does this:

```
post-extract:
	@${MV} ${WRKSRC_icons} ${WRKSRC}/ext/icons
```

例 26. Use of USE_GITLAB with Multiple Distribution Files Using GL_TUPLE

This is functionally equivalent to Use of USE_GITLAB with Multiple Distribution Files, but using GL_TUPLE:

```
PORTNAME=  foo
DISTVERSION=  1.0.2

USE_GITLAB= yes
GL_COMMIT=  c189207a55da45305c884fe2b50e086fcad4724b
GL_TUPLE=  https://gitlab.example.com:9434/gitlab:bar:foo-
icons:ae7368cab1ca7ca754b38d49da064df87968ffe4:icons/ext/icons \
	bar:foo-contrib:9e4dd76ad9b38f33fdb417a4c01935958d5acd2a:contrib

CONFIGURE_ARGS= --with-contrib=${WRKSRC_contrib}
```

Grouping was used in the previous example with bar:icons,contrib. Some redundant information is present with GL_TUPLE because grouping is not possible.

5.4.5. EXTRACT_SUFX

If there is one distribution file, and it uses an odd suffix to indicate the compression mechanism, set EXTRACT_SUFX.

For example, if the distribution file was named foo.tar.gzip instead of the more normal foo.tar.gz, write:

```
DISTNAME=  foo
EXTRACT_SUFX=  .tar.gzip
```

The USES=tar[:xxx], USES=lha or USES=zip automatically set EXTRACT_SUFX to the most common archives extensions as necessary, see Using USES Macros for more details. If neither of these are set then EXTRACT_SUFX defaults to .tar.gz.

As EXTRACT_SUFX is only used in DISTFILES, only set one of them..

5.4.6. DISTFILES

Sometimes the names of the files to be downloaded have no resemblance to the name of the port. For example, it might be called source.tar.gz or similar. In other cases the application’ s source code might be in several different archives, all of which must be downloaded.

If this is the case, set DISTFILES to be a space separated list of all the files that must be downloaded.

```
DISTFILES=  source1.tar.gz source2.tar.gz
```

If not explicitly set, DISTFILES defaults to ${DISTNAME}${EXTRACT_SUFX}.

5.4.7. EXTRACT_ONLY

If only some of the DISTFILES must be extracted-for example, one of them is the source code, while another is an uncompressed document-list the filenames that must be extracted in EXTRACT_ONLY.

```
DISTFILES=  source.tar.gz manual.html
EXTRACT_ONLY=   source.tar.gz
```

When none of the DISTFILES need to be uncompressed, set EXTRACT_ONLY to the empty string.

```
EXTRACT_ONLY=
```

5.4.8. PATCHFILES

If the port requires some additional patches that are available by FTP or HTTP, set PATCHFILES to the names of the files and PATCH_SITES to the URL of the directory that contains them (the format is the same as MASTER_SITES).

If the patch is not relative to the top of the source tree (that is, WRKSRC) because it contains some extra pathnames, set PATCH_DIST_STRIP accordingly. For instance, if all the pathnames in the patch have an extra foozolix-1.0/ in front of the filenames, then set PATCH_DIST_STRIP=-p1.

Do not worry if the patches are compressed; they will be decompressed automatically if the filenames end with .Z, .gz, .bz2 or .xz.

If the patch is distributed with some other files, such as documentation, in a compressed tarball, using PATCHFILES is not possible. If that is the case, add the name and the location of the patch tarball to DISTFILES and MASTER_SITES. Then, use EXTRA_PATCHES to point to those files and bsd.port.mk will automatically apply them. In particular, do not copy patch files into ${PATCHDIR}. That directory may not be writable.

If there are multiple patches and they need mixed values for the strip parameter, it can be added alongside the patch name in PATCHFILES, e.g:

```
PATCHFILES= patch1 patch2:-p1
```

This does not conflict with the master site grouping feature, adding a group also works:

```
PATCHFILES= patch2:-p1:source2
```

The tarball will have been extracted alongside the regular source by then, so there is no need to explicitly extract it if it is a regular compressed tarball. Take extra care not to overwrite something that already exists in that directory if extracting it manually. Also, do not forget to add a command to remove the copied patch in the pre-clean target.

5.4.9. Multiple Distribution or Patches Files from Multiple Locations

(Consider this to be a somewhat "advanced topic"; those new to this document may wish to skip this section at first).

This section has information on the fetching mechanism known as both MASTER_SITES:n and MASTER_SITES_NN. We will refer to this mechanism as MASTER_SITES:n.

A little background first. OpenBSD has a neat feature inside DISTFILES and PATCHFILES which allows files and patches to be postfixed with :n identifiers. Here, n can be any word containing [0-9a-zA-Z_] and denote a group designation. For example:

```
DISTFILES=  alpha:0 beta:1
```

In OpenBSD, distribution file alpha will be associated with variable MASTER_SITES0 instead of our common MASTER_SITES and beta with MASTER_SITES1.

This is a very interesting feature which can decrease that endless search for the correct download site.

Just picture 2 files in DISTFILES and 20 sites in MASTER_SITES, the sites slow as hell where beta is carried by all sites in MASTER_SITES, and alpha can only be found in the 20th site. It would be such a waste to check all of them if the maintainer knew this beforehand, would it not? Not a good start for that lovely weekend!

Now that you have the idea, just imagine more DISTFILES and more MASTER_SITES. Surely our "distfiles survey meister" would appreciate the relief to network strain that this would bring.

In the next sections, information will follow on the FreeBSD implementation of this idea. We improved a bit on OpenBSD's concept.

The group names cannot have dashes in them (-), in fact, they cannot have any characters out of the [a-zA-Z0-9_] range. This is because, while make(1) is ok with variable names containing dashes, sh(1) is not.

5.4.9.1. Simplified Information

This section explains how to quickly prepare fine grained fetching of multiple distribution files and patches from different sites and subdirectories. We describe here a case of simplified MASTER_SITES:n usage. This will be sufficient for most scenarios. More detailed information are available in Detailed Information.

Some applications consist of multiple distribution files that must be downloaded from a number of different sites. For example, Ghostscript consists of the core of the program, and then a large number of driver files that are used depending on the user's printer. Some of these driver files are supplied with the core, but many others must be downloaded from a variety of different sites.

To support this, each entry in DISTFILES may be followed by a colon and a "group name". Each site listed in MASTER_SITES is then followed by a colon, and the group that indicates which distribution files are downloaded from this site.

For example, consider an application with the source split in two parts, source1.tar.gz and source2.tar.gz, which must be downloaded from two different sites. The port's Makefile would include lines like Simplified Use of MASTER_SITES:n with One File Per Site.

例 27. Simplified Use of MASTER_SITES:n with One File Per Site

```
MASTER_SITES=  ftp://ftp1.example.com/:source1 \
```

```
        http://www.example.com/:source2
DISTFILES=  source1.tar.gz:source1 \
        source2.tar.gz:source2
```

Multiple distribution files can have the same group. Continuing the previous example, suppose that there was a third distfile, source3.tar.gz, that is downloaded from ftp.example2.com. The Makefile would then be written like Simplified Use of MASTER_SITES:n with More Than One File Per Site.

例 28. Simplified Use of MASTER_SITES:n with More Than One File Per Site

```
MASTER_SITES=  ftp://ftp.example.com/:source1 \
        http://www.example.com/:source2
DISTFILES=  source1.tar.gz:source1 \
        source2.tar.gz:source2 \
        source3.tar.gz:source2
```

5.4.9.2. Detailed Information

Okay, so the previous example did not reflect the new port' s needs? In this section we will explain in detail how the fine grained fetching mechanism MASTER_SITES:n works and how it can be used.

1. Elements can be postfixed with :n where n is `, that is, _n_ could conceptually be any alphanumeric string but we will limit it to `[a-zA-Z_][0-9a-zA-Z_] for now.

   Moreover, string matching is case sensitive; that is, n is different from N.

   However, these words cannot be used for postfixing purposes since they yield special meaning: default, all and ALL (they are used internally in item ii). Furthermore, DEFAULT is a special purpose word (check item 3).

2. Elements postfixed with :n belong to the group n, :m belong to group m and so forth.
3. Elements without a postfix are groupless, they all belong to the special group DEFAULT. Any elements postfixed with DEFAULT, is just being redundant unless an element belongs to both DEFAULT and other groups at the same time (check item 5).

   These examples are equivalent but the first one is preferred:

   ```
   MASTER_SITES=  alpha
   ```

   ```
   MASTER_SITES=  alpha:DEFAULT
   ```

4. Groups are not exclusive, an element may belong to several different groups at the same time and a group can either have either several different elements or none at all.
5. When an element belongs to several groups at the same time, use the comma operator (,).

   Instead of repeating it several times, each time with a different postfix, we can list several groups at once in a single postfix. For instance, :m,n,o marks an element that belongs to group m, n and o.

   All these examples are equivalent but the last one is preferred:

```
MASTER_SITES=  alpha alpha:SOME_SITE
```

```
MASTER_SITES=  alpha:DEFAULT alpha:SOME_SITE
```

```
MASTER_SITES=  alpha:SOME_SITE,DEFAULT
```

```
MASTER_SITES=  alpha:DEFAULT,SOME_SITE
```

6. All sites within a given group are sorted according to MASTER_SORT_AWK. All groups within MASTER_SITES and PATCH_SITES are sorted as well.
7. Group semantics can be used in any of the variables MASTER_SITES, PATCH_SITES, MASTER_SITE_SUBDIR, PATCH_SITE_SUBDIR, DISTFILES, and PATCHFILES according to this syntax:
   a. All MASTER_SITES, PATCH_SITES, MASTER_SITE_SUBDIR and PATCH_SITE_SUBDIR elements must be terminated with the forward slash / character. If any elements belong to any groups, the group postfix :n must come right after the terminator /. The MASTER_SITES:n mechanism relies on the existence of the terminator / to avoid confusing elements where a :n is a valid part of the element with occurrences where :n denotes group n. For compatibility purposes, since the / terminator was not required before in both MASTER_SITE_SUBDIR and PATCH_SITE_SUBDIR elements, if the postfix immediate preceding character is not a / then :n will be considered a valid part of the element instead of a group postfix even if an element is postfixed with :n. See both Detailed Use of MASTER_SITES:n in MASTER_SITE_SUBDIR and Detailed Use of MASTER_SITES:n with Comma Operator, Multiple Files, Multiple Sites and Multiple Subdirectories.

例 29. Detailed Use of MASTER_SITES:n in MASTER_SITE_SUBDIR

```
MASTER_SITE_SUBDIR= old:n new/:NEW
```

- Directories within group DEFAULT → old:n
- Directories within group NEW → new

例 30. Detailed Use of MASTER_SITES:n with Comma Operator, Multiple Files, Multiple Sites and Multiple Subdirectories

```
MASTER_SITES=  http://site1/%SUBDIR%/ http://site2/:DEFAULT \
    http://site3/:group3 http://site4/:group4 \
    http://site5/:group5 http://site6/:group6 \
    http://site7/:DEFAULT,group6 \
    http://site8/%SUBDIR%/:group6,group7 \
    http://site9/:group8
DISTFILES=  file1 file2:DEFAULT file3:group3 \
    file4:group4,group5,group6 file5:grouping \
    file6:group7
```

```
MASTER_SITE_SUBDIR= directory-trial:1 directory-n/:groupn \
    directory-one/:group6,DEFAULT \
    directory
```

The previous example results in this fine grained fetching. Sites are listed in the exact order they will be used.

- file1 will be fetched from
  - MASTER_SITE_OVERRIDE
  - http://site1/directory-trial:1/
  - http://site1/directory-one/
  - http://site1/directory/
  - http://site2/
  - http://site7/
  - MASTER_SITE_BACKUP
- file2 will be fetched exactly as file1 since they both belong to the same group
  - MASTER_SITE_OVERRIDE
  - http://site1/directory-trial:1/
  - http://site1/directory-one/
  - http://site1/directory/
  - http://site2/
  - http://site7/
  - MASTER_SITE_BACKUP
- file3 will be fetched from
  - MASTER_SITE_OVERRIDE
  - http://site3/
  - MASTER_SITE_BACKUP
- file4 will be fetched from
  - MASTER_SITE_OVERRIDE
  - http://site4/
  - http://site5/
  - http://site6/
  - http://site7/
  - http://site8/directory-one/
  - MASTER_SITE_BACKUP
- file5 will be fetched from
  - MASTER_SITE_OVERRIDE
  - MASTER_SITE_BACKUP
- file6 will be fetched from
  - MASTER_SITE_OVERRIDE
  - http://site8/

- MASTER_SITE_BACKUP

8. How do I group one of the special macros from bsd.sites.mk, for example, SourceForge (SF)?

   This has been simplified as much as possible. See Detailed Use of MASTER_SITES:n with SourceForge (SF).

   例 31. Detailed Use of MASTER_SITES:n with SourceForge (SF)

   ```
   MASTER_SITES=  http://site1/ SF/something/1.0:sourceforge,TEST
   DISTFILES=  something.tar.gz:sourceforge
   ```

   something.tar.gz will be fetched from all sites within SourceForge.

9. How do I use this with PATCH*?

   All examples were done with MASTER* but they work exactly the same for PATCH* ones as can be seen in Simplified Use of MASTER_SITES:n with PATCH_SITES.

   例 32. Simplified Use of MASTER_SITES:n with PATCH_SITES

   ```
   PATCH_SITES=   http://site1/ http://site2/:test
   PATCHFILES= patch1:test
   ```

5.4.9.3. What Does Change for Ports? What Does Not?

i. All current ports remain the same. The MASTER_SITES:n feature code is only activated if there are elements postfixed with :n like elements according to the aforementioned syntax rules, especially as shown in item 7.

ii. The port targets remain the same: checksum, makesum, patch, configure, build, etc. With the obvious exceptions of do-fetch, fetch-list, master-sites and patch-sites.

   - do-fetch: deploys the new grouping postfixed DISTFILES and PATCHFILES with their matching group elements within both MASTER_SITES and PATCH_SITES which use matching group elements within both MASTER_SITE_SUBDIR and PATCH_SITE_SUBDIR. Check Detailed Use of MASTER_SITES:n with Comma Operator, Multiple Files, Multiple Sites and Multiple Subdirectories.
   - fetch-list: works like old fetch-list with the exception that it groups just like do-fetch.
   - master-sites and patch-sites: (incompatible with older versions) only return the elements of group DEFAULT; in fact, they execute targets master-sites-default and patch-sites-default respectively.

     Furthermore, using target either master-sites-all or patch-sites-all is preferred to directly checking either MASTER_SITES or PATCH_SITES. Also, directly checking is not guaranteed to work in any future versions. Check item B for more information on these new port targets.

iii. New port targets

   a. There are master-sites-n and patch-sites-n targets which will list the elements of the respective group n within MASTER_SITES and PATCH_SITES respectively. For instance, both master-sites-DEFAULT and patch-sites-DEFAULT will return the elements of group DEFAULT, master-sites-test and patch-sites-test of group test, and thereon.
   b. There are new targets master-sites-all and patch-sites-all which do the work of the old

master-sites and patch-sites ones. They return the elements of all groups as if they all belonged to the same group with the caveat that it lists as many MASTER_SITE_BACKUP and MASTER_SITE_OVERRIDE as there are groups defined within either DISTFILES or PATCHFILES; respectively for master-sites-all and patch-sites-all.

5.4.10. DIST_SUBDIR

Do not let the port clutter /usr/ports/distfiles. If the port requires a lot of files to be fetched, or contains a file that has a name that might conflict with other ports (for example, Makefile), set DIST_SUBDIR to the name of the port (${PORTNAME} or ${PKGNAMEPREFIX}${PORTNAME} are fine). This will change DISTDIR from the default /usr/ports/distfiles to /usr/ports/distfiles/${DIST_SUBDIR}, and in effect puts everything that is required for the port into that subdirectory.

It will also look at the subdirectory with the same name on the backup master site at http://distcache.FreeBSD.org (Setting DISTDIR explicitly in Makefile will not accomplish this, so please use DIST_SUBDIR.)

This does not affect MASTER_SITES defined in the Makefile.

5.5. MAINTAINER

Set your mail-address here. Please. :-)

Only a single address without the comment part is allowed as a MAINTAINER value. The format used is user@hostname.domain. Please do not include any descriptive text such as a real name in this entry. That merely confuses the Ports infrastructure and most tools using it.

The maintainer is responsible for keeping the port up to date and making sure that it works correctly. For a detailed description of the responsibilities of a port maintainer, refer to The challenge for port maintainers.

A maintainer volunteers to keep a port in good working order. Maintainers have the primary responsibility for their ports, but not exclusive ownership. Ports exist for the benefit of the community and, in reality, belong to the community. What this means is that people other than the maintainer can make changes to a port. Large changes to the Ports Collection might require changes to many ports. The FreeBSD Ports Management Team or members of other teams might modify ports to fix dependency issues or other problems, like a version bump for a shared library update.

Some types of fixes have "blanket approval" from the Ports Management Team <portmgr@FreeBSD.org>, allowing any committer to fix those categories of problems on any port. These fixes do not need approval from the maintainer.

Blanket approval for most ports applies to fixes like infrastructure changes, or trivial and tested build and runtime fixes. The current list is available in Ports section of the Committer's Guide.

Other changes to the port will be sent to the maintainer for review and approval before being committed. If the maintainer does not respond to an update request after two weeks (excluding major public holidays), then that is considered a maintainer timeout, and the update can be made without explicit maintainer approval. If the maintainer does not respond within three months, or if there have been three consecutive timeouts, then that maintainer is considered absent without leave, and all of their ports can be assigned back to the pool. Exceptions to this are anything maintained by the Ports Management Team <portmgr@FreeBSD.org>, or the Security Officer Team <security-officer@FreeBSD.org>. No unauthorized commits may ever be made to ports maintained by those groups.

We reserve the right to modify the maintainer's submission to better match existing policies and

style of the Ports Collection without explicit blessing from the submitter or the maintainer. Also, large infrastructural changes can result in a port being modified without the maintainer's consent. These kinds of changes will never affect the port's functionality.

The Ports Management Team <portmgr@FreeBSD.org> reserves the right to revoke or override anyone's maintainership for any reason, and the Security Officer Team <security-officer@FreeBSD.org> reserves the right to revoke or override maintainership for security reasons.

5.6. COMMENT

The comment is a one-line description of a port shown by pkg info. Please follow these rules when composing it:

1. The COMMENT string should be 70 characters or less.
2. Do not include the package name or version number of software.
3. The comment must begin with a capital and end without a period.
4. Do not start with an indefinite article (that is, A or An).
5. Capitalize names such as Apache, JavaScript, or Perl.
6. Use a serial comma for lists of words: "green, red, and blue."
7. Check for spelling errors.

Here is an example:

```
COMMENT=	Cat chasing a mouse all over the screen
```

The COMMENT variable immediately follows the MAINTAINER variable in the Makefile.

5.7. Licenses

Each port must document the license under which it is available. If it is not an OSI approved license it must also document any restrictions on redistribution.

5.7.1. LICENSE

A short name for the license or licenses if more than one license apply.

If it is one of the licenses listed in Predefined License List, only LICENSE_FILE and LICENSE_DISTFILES variables can be set.

If this is a license that has not been defined in the ports framework (see Predefined License List), the LICENSE_PERMS and LICENSE_NAME must be set, along with either LICENSE_FILE or LICENSE_TEXT. LICENSE_DISTFILES and LICENSE_GROUPS can also be set, but are not required.

The predefined licenses are shown in Predefined License List. The current list is always available in Mk/bsd.licenses.db.mk.

例 33. Simplest Usage, Predefined Licenses

When the README of some software says "This software is under the terms of the GNU Lesser General Public License as published by the Free Software Foundation; either version 2.1 of the License, or (at your option) any later version." but does not provide the license file, use this:

```
LICENSE=	LGPL21+
```

When the software provides the license file, use this:

```
LICENSE=   LGPL21+
LICENSE_FILE=   ${WRKSRC}/COPYING
```

For the predefined licenses, the default permissions are dist-mirror dist-sell pkg-mirror pkg-sell auto-accept.

表 7. Predefined License List

Short Name	Name	Group	Permissions
AGPLv3	GNU Affero General Public License version 3	FSF GPL OSI	(default)
AGPLv3+	GNU Affero General Public License version 3 (or later)	FSF GPL OSI	(default)
APACHE10	Apache License 1.0	FSF	(default)
APACHE11	Apache License 1.1	FSF OSI	(default)
APACHE20	Apache License 2.0	FSF OSI	(default)
ART10	Artistic License version 1.0	OSI	(default)
ART20	Artistic License version 2.0	FSF GPL OSI	(default)
ARTPERL10	Artistic License (perl) version 1.0	OSI	(default)
BSD	BSD license Generic Version (deprecated)	FSF OSI COPYFREE	(default)
BSD2CLAUSE	BSD 2-clause "Simplified" License	FSF OSI COPYFREE	(default)
BSD3CLAUSE	BSD 3-clause "New" or "Revised" License	FSF OSI COPYFREE	(default)
BSD4CLAUSE	BSD 4-clause "Original" or "Old" License	FSF	(default)
BSL	Boost Software License	FSF OSI COPYFREE	(default)
CC-BY-1.0	Creative Commons Attribution 1.0		(default)
CC-BY-2.0	Creative Commons Attribution 2.0		(default)
CC-BY-2.5	Creative Commons Attribution 2.5		(default)
CC-BY-3.0	Creative Commons Attribution 3.0		(default)
CC-BY-4.0	Creative Commons Attribution 4.0		(default)
CC-BY-NC-1.0	Creative Commons Attribution Non Commercial 1.0		dist-mirrorpkg-mirrorauto-accept
CC-BY-NC-2.0	Creative Commons Attribution Non Commercial 2.0		dist-mirrorpkg-mirrorauto-accept

Short Name	Name	Group	Permissions
CC-BY-NC-2.5	Creative Commons Attribution Non Commercial 2.5		dist-mirrorpkg-mirrorauto-accept
CC-BY-NC-3.0	Creative Commons Attribution Non Commercial 3.0		dist-mirrorpkg-mirrorauto-accept
CC-BY-NC-4.0	Creative Commons Attribution Non Commercial 4.0		dist-mirrorpkg-mirrorauto-accept
CC-BY-NC-ND-1.0	Creative Commons Attribution Non Commercial No Derivatives 1.0		dist-mirrorpkg-mirrorauto-accept
CC-BY-NC-ND-2.0	Creative Commons Attribution Non Commercial No Derivatives 2.0		dist-mirrorpkg-mirrorauto-accept
CC-BY-NC-ND-2.5	Creative Commons Attribution Non Commercial No Derivatives 2.5		dist-mirrorpkg-mirrorauto-accept
CC-BY-NC-ND-3.0	Creative Commons Attribution Non Commercial No Derivatives 3.0		dist-mirrorpkg-mirrorauto-accept
CC-BY-NC-ND-4.0	Creative Commons Attribution Non Commercial No Derivatives 4.0		dist-mirrorpkg-mirrorauto-accept
CC-BY-NC-SA-1.0	Creative Commons Attribution Non Commercial Share Alike 1.0		dist-mirrorpkg-mirrorauto-accept
CC-BY-NC-SA-2.0	Creative Commons Attribution Non Commercial Share Alike 2.0		dist-mirrorpkg-mirrorauto-accept
CC-BY-NC-SA-2.5	Creative Commons Attribution Non Commercial Share Alike 2.5		dist-mirrorpkg-mirrorauto-accept
CC-BY-NC-SA-3.0	Creative Commons Attribution Non Commercial Share Alike 3.0		dist-mirrorpkg-mirrorauto-accept
CC-BY-NC-SA-4.0	Creative Commons Attribution Non Commercial Share Alike 4.0		dist-mirrorpkg-mirrorauto-accept
CC-BY-ND-1.0	Creative Commons Attribution No Derivatives 1.0		(default)

Short Name	Name	Group	Permissions
CC-BY-ND-2.0	Creative Commons Attribution No Derivatives 2.0		(default)
CC-BY-ND-2.5	Creative Commons Attribution No Derivatives 2.5		(default)
CC-BY-ND-3.0	Creative Commons Attribution No Derivatives 3.0		(default)
CC-BY-ND-4.0	Creative Commons Attribution No Derivatives 4.0		(default)
CC-BY-SA-1.0	Creative Commons Attribution Share Alike 1.0		(default)
CC-BY-SA-2.0	Creative Commons Attribution Share Alike 2.0		(default)
CC-BY-SA-2.5	Creative Commons Attribution Share Alike 2.5		(default)
CC-BY-SA-3.0	Creative Commons Attribution Share Alike 3.0		(default)
CC-BY-SA-4.0	Creative Commons Attribution Share Alike 4.0		(default)
CC0-1.0	Creative Commons Zero v1.0 Universal	FSF GPL COPYFREE	(default)
CDDL	Common Development and Distribution License	FSF OSI	(default)
CPAL-1.0	Common Public Attribution License	FSF OSI	(default)
ClArtistic	Clarified Artistic License	FSF GPL OSI	(default)
EPL	Eclipse Public License	FSF OSI	(default)
GFDL	GNU Free Documentation License	FSF	(default)
GMGPL	GNAT Modified General Public License	FSF GPL OSI	(default)
GPLv1	GNU General Public License version 1	FSF GPL OSI	(default)
GPLv1+	GNU General Public License version 1 (or later)	FSF GPL OSI	(default)
GPLv2	GNU General Public License version 2	FSF GPL OSI	(default)
GPLv2+	GNU General Public License version 2 (or later)	FSF GPL OSI	(default)

Short Name	Name	Group	Permissions
GPLv3	GNU General Public License version 3	FSF GPL OSI	(default)
GPLv3+	GNU General Public License version 3 (or later)	FSF GPL OSI	(default)
GPLv3RLE	GNU GPL version 3 Runtime Library Exception	FSF GPL OSI	(default)
GPLv3RLE+	GNU GPL version 3 Runtime Library Exception (or later)	FSF GPL OSI	(default)
ISCL	Internet Systems Consortium License	FSF GPL OSI COPYFREE	(default)
LGPL20	GNU Library General Public License version 2.0	FSF GPL OSI	(default)
LGPL20+	GNU Library General Public License version 2.0 (or later)	FSF GPL OSI	(default)
LGPL21	GNU Lesser General Public License version 2.1	FSF GPL OSI	(default)
LGPL21+	GNU Lesser General Public License version 2.1 (or later)	FSF GPL OSI	(default)
LGPL3	GNU Lesser General Public License version 3	FSF GPL OSI	(default)
LGPL3+	GNU Lesser General Public License version 3 (or later)	FSF GPL OSI	(default)
LPPL10	LaTeX Project Public License version 1.0	FSF OSI	dist-mirror dist-sell
LPPL11	LaTeX Project Public License version 1.1	FSF OSI	dist-mirror dist-sell
LPPL12	LaTeX Project Public License version 1.2	FSF OSI	dist-mirror dist-sell
LPPL13	LaTeX Project Public License version 1.3	FSF OSI	dist-mirror dist-sell
LPPL13a	LaTeX Project Public License version 1.3a	FSF OSI	dist-mirror dist-sell
LPPL13b	LaTeX Project Public License version 1.3b	FSF OSI	dist-mirror dist-sell
LPPL13c	LaTeX Project Public License version 1.3c	FSF OSI	dist-mirror dist-sell
MIT	MIT license / X11 license	COPYFREE FSF GPL OSI	(default)
MPL10	Mozilla Public License version 1.0	FSF OSI	(default)
MPL11	Mozilla Public License version 1.1	FSF OSI	(default)

Short Name	Name	Group	Permissions
MPL20	Mozilla Public License version 2.0	FSF OSI	(default)
NCSA	University of Illinois/NCSA Open Source License	COPYFREE FSF GPL OSI	(default)
NONE	No license specified		none
OFL10	SIL Open Font License version 1.0 (http://scripts.sil.org/OFL)	FONTS	(default)
OFL11	SIL Open Font License version 1.1 (http://scripts.sil.org/OFL)	FONTS	(default)
OWL	Open Works License (owl.apotheon.org)	COPYFREE	(default)
OpenSSL	OpenSSL License	FSF	(default)
PD	Public Domain	GPL COPYFREE	(default)
PHP202	PHP License version 2.02	FSF OSI	(default)
PHP30	PHP License version 3.0	FSF OSI	(default)
PHP301	PHP License version 3.01	FSF OSI	(default)
PSFL	Python Software Foundation License	FSF GPL OSI	(default)
PostgreSQL	PostgreSQL License	FSF GPL OSI COPYFREE	(default)
RUBY	Ruby License	FSF	(default)
UNLICENSE	The Unlicense	COPYFREE FSF GPL	(default)
WTFPL	Do What the Fuck You Want To Public License version 2	GPL FSF COPYFREE	(default)
WTFPL1	Do What the Fuck You Want To Public License version 1	GPL FSF COPYFREE	(default)
ZLIB	zlib License	GPL FSF OSI	(default)
ZPL21	Zope Public License version 2.1	GPL OSI	(default)

5.7.2. LICENSE_PERMS and LICENSE_PERMS_NAME_

Permissions. use none if empty.

License Permissions List

dist-mirror

Redistribution of the distribution files is permitted. The distribution files will be added to the FreeBSD MASTER_SITE_BACKUP CDN.

no-dist-mirror

Redistribution of the distribution files is prohibited. This is equivalent to setting RESTRICTED. The distribution files will not be added to the FreeBSD MASTER_SITE_BACKUP CDN.

dist-sell
: Selling of distribution files is permitted. The distribution files will be present on the installer images.

no-dist-sell
: Selling of distribution files is prohibited. This is equivalent to setting NO_CDROM.

pkg-mirror
: Free redistribution of package is permitted. The package will be distributed on the FreeBSD package CDN https://pkg.freebsd.org/.

no-pkg-mirror
: Free redistribution of package is prohibited. Equivalent to setting NO_PACKAGE. The package will not be distributed from the FreeBSD package CDN https://pkg.freebsd.org/.

pkg-sell
: Selling of package is permitted. The package will be present on the installer images.

no-pkg-sell
: Selling of package is prohibited. This is equivalent to setting NO_CDROM. The package will not be present on the installer images.

auto-accept
: License is accepted by default. Prompts to accept a license are not displayed unless the user has defined LICENSES_ASK. Use this unless the license states the user must accept the terms of the license.

no-auto-accept
: License is not accepted by default. The user will always be asked to confirm the acceptance of this license. This must be used if the license states that the user must accept its terms.

When both permission and no-permission is present the no-permission will cancel permission.

When permission is not present, it is considered to be a no-permission.

Some missing permissions will prevent a port (and all ports depending on it) from being usable by package users:

A port without the auto-accept permission will never be be built and all the ports depending on it will be ignored.

A port without the pkg-mirror permission will be removed, as well as all the ports depending on it, after the build and they will ever end up being distributed.

例 34. Nonstandard License

Read the terms of the license and translate those using the available permissions.

```
LICENSE=      UNKNOWN
LICENSE_NAME=  unknown
LICENSE_TEXT=  This program is NOT in public domain.\
        It can be freely distributed for non-commercial purposes only.
LICENSE_PERMS=  dist-mirror no-dist-sell pkg-mirror no-pkg-sell auto-accept
```

例 35. Standard and Nonstandard Licenses

Read the terms of the license and express those using the available permissions. In case of doubt, please ask for guidance on the FreeBSD ports 郵遞論壇.

```
LICENSE=      WARSOW GPLv2
LICENSE_COMB=   multi
LICENSE_NAME_WARSOW=    Warsow Content License
LICENSE_FILE_WARSOW=    ${WRKSRC}/docs/license.txt
LICENSE_PERMS_WARSOW=   dist-mirror pkg-mirror auto-accept
```

When the permissions of the GPLv2 and the UNKNOWN licenses are mixed, the port ends up with dist-mirror dist-sell pkg-mirror pkg-sell auto-accept dist-mirror no-dist-sell pkg-mirror no-pkg-sell auto-accept. The no-permissions cancel the permissions. The resulting list of permissions are dist-mirror pkg-mirror auto-accept. The distribution files and the packages will not be available on the installer images.

5.7.3. LICENSE_GROUPS and LICENSE_GROUPS_NAME

Groups the license belongs.

Predefined License Groups List

FSF
: Free Software Foundation Approved, see the FSF Licensing & Compliance Team.

GPL
: GPL Compatible

OSI
: OSI Approved, see the Open Source Initiative Open Source Licenses page.

COPYFREE
: Comply with Copyfree Standard Definition, see the Copyfree Licenses page.

FONTS
: Font licenses

5.7.4. LICENSE_NAME and LICENSE_NAME_NAME

Full name of the license.

例 36. LICENSE_NAME

```
LICENSE=      UNRAR
LICENSE_NAME=   UnRAR License
LICENSE_FILE=   ${WRKSRC}/license.txt
LICENSE_PERMS=  dist-mirror dist-sell pkg-mirror pkg-sell auto-accept
```

5.7.5. LICENSE_FILE and LICENSE_FILE_NAME

Full path to the file containing the license text, usually ${WRKSRC}/some/file. If the file is not in the distfile, and its content is too long to be put in LICENSE_TEXT, put it in a new file in ${FILESDIR}.

例 37. LICENSE_FILE

```
LICENSE=   GPLv3+
LICENSE_FILE=  ${WRKSRC}/COPYING
```

5.7.6. LICENSE_TEXT and LICENSE_TEXT_NAME

Text to use as a license. Useful when the license is not in the distribution files and its text is short.

例 38. LICENSE_TEXT

```
LICENSE=      UNKNOWN
LICENSE_NAME=  unknown
LICENSE_TEXT=  This program is NOT in public domain.\
        It can be freely distributed for non-commercial purposes only,\
        and THERE IS NO WARRANTY FOR THIS PROGRAM.
LICENSE_PERMS=  dist-mirror no-dist-sell pkg-mirror no-pkg-sell auto-accept
```

5.7.7. LICENSE_DISTFILES and LICENSE_DISTFILES_NAME

The distribution files to which the licenses apply. Defaults to all the distribution files.

例 39. LICENSE_DISTFILES

Used when the distribution files do not all have the same license. For example, one has a code license, and another has some artwork that cannot be redistributed:

```
MASTER_SITES=  SF/some-game
DISTFILES=     ${DISTNAME}${EXTRACT_SUFX} artwork.zip

LICENSE=      BSD3CLAUSE ARTWORK
LICENSE_COMB=  dual
LICENSE_NAME_ARTWORK=     The game artwork license
LICENSE_TEXT_ARTWORK=     The README says that the files cannot be redistributed
LICENSE_PERMS_ARTWORK=    pkg-mirror pkg-sell auto-accept
LICENSE_DISTFILES_BSD3CLAUSE=  ${DISTNAME}${EXTRACT_SUFX}
LICENSE_DISTFILES_ARTWORK= artwork.zip
```

5.7.8. LICENSE_COMB

Set to multi if all licenses apply. Set to dual if any license applies. Defaults to single.

例 40. Dual Licenses

When a port says "This software may be distributed under the GNU General Public License or the Artistic License", it means that either license can be used. Use this:

```
LICENSE=   ART10 GPLv1
LICENSE_COMB=  dual
```

If license files are provided, use this:

```
LICENSE=   ART10 GPLv1
LICENSE_COMB=  dual
LICENSE_FILE_ART10=    ${WRKSRC}/Artistic
LICENSE_FILE_GPLv1=    ${WRKSRC}/Copying
```

例 41. Multiple Licenses

When part of a port has one license, and another part has a different license, use multi:

```
LICENSE=   GPLv2 LGPL21+
LICENSE_COMB=  multi
```

5.8. PORTSCOUT

Portscout is an automated distfile check utility for the FreeBSD Ports Collection, described in detail in Portscout: the FreeBSD Ports Distfile Scanner.

PORTSCOUT defines special conditions within which the Portscout distfile scanner is restricted.

Situations where PORTSCOUT is set include:

- When distfiles have to be ignored for specific versions. For example, to exclude version 8.2 and version 8.3 from distfile version checks because they are known to be broken, add:

  ```
  PORTSCOUT=  skipv:8.2,8.3
  ```

- When distfile version checks have to be disabled completely. For example, if a port is not going to be updated ever again, add:

  ```
  PORTSCOUT=  ignore:1
  ```

- When specific versions or specific major and minor revisions of a distfile must be checked. For example, if only version 0.6.4 must be monitored because newer versions have compatibility issues with FreeBSD, add:

```
PORTSCOUT= limit:^0\.6\.4
```

- When URLs listing the available versions differ from the download URLs. For example, to limit distfile version checks to the download page for the databases/pgtune port, add:

```
PORTSCOUT= site:http://pgfoundry.org/frs/?group_id=1000416
```

5.9. Dependencies

Many ports depend on other ports. This is a very convenient feature of most Unix-like operating systems, including FreeBSD. Multiple ports can share a common dependency, rather than bundling that dependency with every port or package that needs it. There are seven variables that can be used to ensure that all the required bits will be on the user's machine. There are also some pre-supported dependency variables for common cases, plus a few more to control the behavior of dependencies.

When software has extra dependencies that provide extra features, the base dependencies listed in *_DEPENDS should include the extra dependencies that would benefit most users. The base dependencies should never be a "minimal" dependency set. The goal is not to include every dependency possible. Only include those that will benefit most people.

5.9.1. LIB_DEPENDS

This variable specifies the shared libraries this port depends on. It is a list of lib:dir tuples where lib is the name of the shared library, dir is the directory in which to find it in case it is not available. For example,

```
LIB_DEPENDS= libjpeg.so:graphics/jpeg
```

will check for a shared jpeg library with any version, and descend into the graphics/jpeg subdirectory of the ports tree to build and install it if it is not found.

The dependency is checked twice, once from within the build target and then from within the install target. Also, the name of the dependency is put into the package so that pkg install (see pkg-install(8)) will automatically install it if it is not on the user's system.

5.9.2. RUN_DEPENDS

This variable specifies executables or files this port depends on during run-time. It is a list of path:dir[:target] tuples where path is the name of the executable or file, dir is the directory in which to find it in case it is not available, and target is the target to call in that directory. If path starts with a slash (/), it is treated as a file and its existence is tested with test -e; otherwise, it is assumed to be an executable, and which -s is used to determine if the program exists in the search path.

For example,

```
RUN_DEPENDS= ${LOCALBASE}/news/bin/innd:news/inn \
    xmlcatmgr:textproc/xmlcatmgr
```

will check if the file or directory /usr/local/news/bin/innd exists, and build and install it from the news/inn subdirectory of the ports tree if it is not found. It will also see if an executable called

xmlcatmgr is in the search path, and descend into textproc/xmlcatmgr to build and install it if it is not found.

In this case, innd is actually an executable; if an executable is in a place that is not expected to be in the search path, use the full pathname.

The official search PATH used on the ports build cluster is

```
/sbin:/bin:/usr/sbin:/usr/bin:/usr/local/sbin:/usr/local/bin
```

The dependency is checked from within the install target. Also, the name of the dependency is put into the package so that pkg install (see pkg-install(8)) will automatically install it if it is not on the user's system. The target part can be omitted if it is the same as DEPENDS_TARGET.

A quite common situation is when RUN_DEPENDS is literally the same as BUILD_DEPENDS, especially if ported software is written in a scripted language or if it requires the same build and run-time environment. In this case, it is both tempting and intuitive to directly assign one to the other:

```
RUN_DEPENDS=   ${BUILD_DEPENDS}
```

However, such assignment can pollute run-time dependencies with entries not defined in the port's original BUILD_DEPENDS. This happens because of make(1)'s lazy evaluation of variable assignment. Consider a Makefile with USE_*, which are processed by ports/Mk/bsd.*.mk to augment initial build dependencies. For example, USES= gmake adds devel/gmake to BUILD_DEPENDS. To prevent such additional dependencies from polluting RUN_DEPENDS, create another variable with the current content of BUILD_DEPENDS and assign it to both BUILD_DEPENDS and RUN_DEPENDS:

```
MY_DEPENDS= some:devel/some \
    other:lang/other
BUILD_DEPENDS=  ${MY_DEPENDS}
RUN_DEPENDS=   ${MY_DEPENDS}
```

Do not use := to assign BUILD_DEPENDS to RUN_DEPENDS or vice-versa. All variables are expanded immediately, which is exactly the wrong thing to do and almost always a failure.

5.9.3. BUILD_DEPENDS

This variable specifies executables or files this port requires to build. Like RUN_DEPENDS, it is a list of path:dir[:target] tuples. For example,

```
BUILD_DEPENDS=  unzip:archivers/unzip
```

will check for an executable called unzip, and descend into the archivers/unzip subdirectory of the ports tree to build and install it if it is not found.

"build" here means everything from extraction to compilation. The dependency is checked from within the extract target. The target part can be omitted if it is the

same as DEPENDS_TARGET

5.9.4. FETCH_DEPENDS

This variable specifies executables or files this port requires to fetch. Like the previous two, it is a list of path:dir[:target] tuples. For example,

```
FETCH_DEPENDS=  ncftp2:net/ncftp2
```

will check for an executable called ncftp2, and descend into the net/ncftp2 subdirectory of the ports tree to build and install it if it is not found.

The dependency is checked from within the fetch target. The target part can be omitted if it is the same as DEPENDS_TARGET.

5.9.5. EXTRACT_DEPENDS

This variable specifies executables or files this port requires for extraction. Like the previous, it is a list of path:dir[:target] tuples. For example,

```
EXTRACT_DEPENDS=   unzip:archivers/unzip
```

will check for an executable called unzip, and descend into the archivers/unzip subdirectory of the ports tree to build and install it if it is not found.

The dependency is checked from within the extract target. The target part can be omitted if it is the same as DEPENDS_TARGET.

Use this variable only if the extraction does not already work (the default assumes tar) and cannot be made to work using USES=tar, USES=lha or USES=zip described in Using USES Macros.

5.9.6. PATCH_DEPENDS

This variable specifies executables or files this port requires to patch. Like the previous, it is a list of path:dir[:target] tuples. For example,

```
PATCH_DEPENDS=  ${NONEXISTENT}:java/jfc:extract
```

will descend into the java/jfc subdirectory of the ports tree to extract it.

The dependency is checked from within the patch target. The target part can be omitted if it is the same as DEPENDS_TARGET.

5.9.7. USES

Parameters can be added to define different features and dependencies used by the port. They are specified by adding this line to the Makefile:

```
USES= feature[:arguments]
```

For the complete list of values, please see Using USES Macros.

USES cannot be assigned after inclusion of bsd.port.pre.mk.

5.9.8. USE_*

Several variables exist to define common dependencies shared by many ports. Their use is optional, but helps to reduce the verbosity of the port Makefiles. Each of them is styled as USE_*. These variables may be used only in the port Makefiles and ports/Mk/bsd.*.mk. They are not meant for user-settable options - use PORT_OPTIONS for that purpose.

It is always incorrect to set any USE_* in /etc/make.conf. For instance, setting

```
USE_GCC=X.Y
```

(where X.Y is version number) would add a dependency on gccXY for every port, including lang/gccXY itself!

表 8. USE_*

Variable	Means

USE_GCC	The port requires GCC (gcc or g++) to build. Some ports need a specific, old GCC version, some require modern, recent versions. It is typically set to yes (means always use stable, modern GCC from ports per GCC_DEFAULT in Mk/bsd.default-versions.mk). This is also the default value. The exact version can also be specified, with a value such as 10. The minimal required version can be specified as 10+. GCC from the base system is used when it satisfies the requested version, otherwise an appropriate compiler is built from ports, and CC and CXX are adjusted accordingly. The :build argument following the version specifier adds only a build time dependency to the port.
	
	For example:
	
	`USE_GCC=yes # port requires a current version of GCC`
	`USE_GCC=11+:build # port requires GCC 11 or later at build time only`
	
	USE_GCC=any is deprecated and should not be used in new ports

Variables related to gmake and configure are described in Building Mechanisms, while autoconf, automake and libtool are described in Using GNU Autotools. Perl related variables are described in Using Perl. X11 variables are listed in Using X11. Using Gnome deals with GNOME and Using KDE with KDE related variables. Using Java documents Java variables, while Web Applications contains information on Apache, PHP and PEAR modules. Python is discussed in Using Python, while Ruby in Using Ruby. Using SDL provides variables used for SDL applications and finally, Using Xfce contains information on Xfce.

5.9.9. Minimal Version of a Dependency

A minimal version of a dependency can be specified in any *_DEPENDS except LIB_DEPENDS using this syntax:

```
p5-Spiffy>=0.26:devel/p5-Spiffy
```

The first field contains a dependent package name, which must match the entry in the package database, a comparison sign, and a package version. The dependency is satisfied if p5-Spiffy-0.26 or newer is installed on the machine.

5.9.10. Notes on Dependencies

As mentioned above, the default target to call when a dependency is required is DEPENDS_TARGET. It defaults to install. This is a user variable; it is never defined in a port's Makefile. If the port needs a special way to handle a dependency, use the :target part of *_DEPENDS instead of redefining DEPENDS_TARGET.

When running make clean, the port dependencies are automatically cleaned too. If this is not desirable, define NOCLEANDEPENDS in the environment. This may be particularly desirable if the port has something that takes a long time to rebuild in its dependency list, such as KDE, GNOME or Mozilla.

To depend on another port unconditionally, use the variable ${NONEXISTENT} as the first field of BUILD_DEPENDS or RUN_DEPENDS. Use this only when the source of the other port is needed. Compilation time can be saved by specifying the target too. For instance

```
BUILD_DEPENDS=  ${NONEXISTENT}:graphics/jpeg:extract
```

will always descend to the jpeg port and extract it.

5.9.11. Circular Dependencies Are Fatal

Do not introduce any circular dependencies into the ports tree!

The ports building technology does not tolerate circular dependencies. If one is introduced, someone, somewhere in the world, will have their FreeBSD installation broken almost immediately, with many others quickly to follow. These can really be hard to detect. If in doubt, before making that change, make sure to run: cd /usr/ports; make index. That process can be quite slow on older machines, but it may be able to save a large number of people, including yourself, a lot of grief in the process.

5.9.12. Problems Caused by Automatic Dependencies

Dependencies must be declared either explicitly or by using the OPTIONS framework. Using other methods like automatic detection complicates indexing, which causes problems for port and package management.

例 42. Wrong Declaration of an Optional Dependency

```
.include <bsd.port.pre.mk>

.if exists(${LOCALBASE}/bin/foo)
LIB_DEPENDS=    libbar.so:foo/bar
```

```
.endif
```

The problem with trying to automatically add dependencies is that files and settings outside an individual port can change at any time. For example: an index is built, then a batch of ports are installed. But one of the ports installs the tested file. The index is now incorrect, because an installed port unexpectedly has a new dependency. The index may still be wrong even after rebuilding if other ports also determine their need for dependencies based on the existence of other files.

例 43. Correct Declaration of an Optional Dependency

```
OPTIONS_DEFINE= BAR
BAR_DESC=   Calling cellphones via bar

BAR_LIB_DEPENDS=    libbar.so:foo/bar
```

Testing option variables is the correct method. It will not cause inconsistencies in the index of a batch of ports, provided the options were defined prior to the index build. Simple scripts can then be used to automate the building, installation, and updating of these ports and their packages.

5.10. Slave Ports and MASTERDIR

If the port needs to build slightly different versions of packages by having a variable (for instance, resolution, or paper size) take different values, create one subdirectory per package to make it easier for users to see what to do, but try to share as many files as possible between ports. Typically, by using variables cleverly, only a very short Makefile is needed in all but one of the directories. In the sole Makefile, use MASTERDIR to specify the directory where the rest of the files are. Also, use a variable as part of PKGNAMESUFFIX so the packages will have different names.

This will be best demonstrated by an example. This is part of print/pkfonts300/Makefile;

```
PORTNAME=   pkfonts${RESOLUTION}
PORTVERSION=    1.0
DISTFILES=  pk${RESOLUTION}.tar.gz

PLIST=      ${PKGDIR}/pkg-plist.${RESOLUTION}

.if !defined(RESOLUTION)
RESOLUTION= 300
.else
.if ${RESOLUTION} != 118 && ${RESOLUTION} != 240 && \
   ${RESOLUTION} != 300 && ${RESOLUTION} != 360 && \
   ${RESOLUTION} != 400 && ${RESOLUTION} != 600
.BEGIN:
   @${ECHO_MSG} "Error: invalid value for RESOLUTION: \"${RESOLUTION}\""
   @${ECHO_MSG} "Possible values are: 118, 240, 300, 360, 400 and 600."
   @${FALSE}
```

```
.endif
.endif
```

print/pkfonts300 also has all the regular patches, package files, etc. Running make there, it will take the default value for the resolution (300) and build the port normally.

As for other resolutions, this is the entire print/pkfonts360/Makefile:

```
RESOLUTION= 360
MASTERDIR=  ${.CURDIR}/../pkfonts300

.include   "${MASTERDIR}/Makefile"
```

(print/pkfonts118/Makefile, print/pkfonts600/Makefile, and all the other are similar). MASTERDIR definition tells bsd.port.mk that the regular set of subdirectories like FILESDIR and SCRIPTDIR are to be found under pkfonts300. The RESOLUTION=360 line will override the RESOLUTION=300 line in pkfonts300/Makefile and the port will be built with resolution set to 360.

5.11. Man Pages

If the port anchors its man tree somewhere other than PREFIX, use MANDIRS to specify those directories. Note that the files corresponding to manual pages must be placed in pkg-plist along with the rest of the files. The purpose of MANDIRS is to enable automatic compression of manual pages, therefore the file names are suffixed with .gz.

5.12. Info Files

If the package needs to install GNU info files, list them in INFO (without the trailing .info), one entry per document. These files are assumed to be installed to PREFIX/INFO_PATH. Change INFO_PATH if the package uses a different location. However, this is not recommended. These entries contain just the path relative to PREFIX/INFO_PATH. For example, lang/gcc34 installs info files to PREFIX/INFO_PATH/gcc34, and INFO will be something like this:

```
INFO=  gcc34/cpp gcc34/cppinternals gcc34/g77 ...
```

Appropriate installation/de-installation code will be automatically added to the temporary pkg-plist before package registration.

5.13. Makefile Options

Many applications can be built with optional or differing configurations. Examples include choice of natural (human) language, GUI versus command-line, or type of database to support. Users may need a different configuration than the default, so the ports system provides hooks the port author can use to control which variant will be built. Supporting these options properly will make users happy, and effectively provide two or more ports for the price of one.

5.13.1. OPTIONS

5.13.1.1. Background

OPTIONS_* give the user installing the port a dialog showing the available options, and then saves those options to ${PORT_DBDIR}/${OPTIONS_NAME}/options. The next time the port is built, the options are reused. PORT_DBDIR defaults to /var/db/ports. OPTIONS_NAME is to the port origin

with an underscore as the space separator, for example, for dns/bind99 it will be dns_bind99.

When the user runs make config (or runs make build for the first time), the framework checks for ${PORT_DBDIR}/${OPTIONS_NAME}/options. If that file does not exist, the values of OPTIONS_* are used, and a dialog box is displayed where the options can be enabled or disabled. Then options is saved and the configured variables are used when building the port.

If a new version of the port adds new OPTIONS, the dialog will be presented to the user with the saved values of old OPTIONS prefilled.

make showconfig shows the saved configuration. Use make rmconfig to remove the saved configuration.

5.13.1.2. Syntax

OPTIONS_DEFINE contains a list of OPTIONS to be used. These are independent of each other and are not grouped:

```
OPTIONS_DEFINE= OPT1 OPT2
```

Once defined, OPTIONS are described (optional, but strongly recommended):

```
OPT1_DESC=  Describe OPT1
OPT2_DESC=  Describe OPT2
OPT3_DESC=  Describe OPT3
OPT4_DESC=  Describe OPT4
OPT5_DESC=  Describe OPT5
OPT6_DESC=  Describe OPT6
```

ports/Mk/bsd.options.desc.mk has descriptions for many common OPTIONS. While often useful, override them if the description is insufficient for the port.

When describing options, view it from the perspective of the user: "What functionality does it change?" and "Why would I want to enable this?" Do not just repeat the name. For example, describing the NLS option as "include NLS support" does not help the user, who can already see the option name but may not know what it means. Describing it as "Native Language Support via gettext utilities" is much more helpful.

Option names are always in all uppercase. They cannot use mixed case or lowercase.

OPTIONS can be grouped as radio choices, where only one choice from each group is allowed:

```
OPTIONS_SINGLE=    SG1
OPTIONS_SINGLE_SG1= OPT3 OPT4
```

There must be one of each OPTIONS_SINGLE group selected at all times for the options to be valid. One option of each group must be added to OPTIONS_DEFAULT.

OPTIONS can be grouped as radio choices, where none or only one choice from each group is

allowed:

```
OPTIONS_RADIO=    RG1
OPTIONS_RADIO_RG1=  OPT7 OPT8
```

OPTIONS can also be grouped as "multiple-choice" lists, where at least one option must be enabled:

```
OPTIONS_MULTI=    MG1
OPTIONS_MULTI_MG1=  OPT5 OPT6
```

OPTIONS can also be grouped as "multiple-choice" lists, where none or any option can be enabled:

```
OPTIONS_GROUP=    GG1
OPTIONS_GROUP_GG1=  OPT9 OPT10
```

OPTIONS are unset by default, unless they are listed in OPTIONS_DEFAULT:

```
OPTIONS_DEFAULT=   OPT1 OPT3 OPT6
```

OPTIONS definitions must appear before the inclusion of bsd.port.options.mk. PORT_OPTIONS values can only be tested after the inclusion of bsd.port.options.mk. Inclusion of bsd.port.pre.mk can be used instead, too, and is still widely used in ports written before the introduction of bsd.port.options.mk. But be aware that some variables will not work as expected after the inclusion of bsd.port.pre.mk, typically some USE_* flags.

例 44. Simple Use of OPTIONS

```
OPTIONS_DEFINE= FOO BAR
OPTIONS_DEFAULT=FOO

FOO_DESC=   Option foo support
BAR_DESC=   Feature bar support

# Will add --with-foo / --without-foo
FOO_CONFIGURE_WITH= foo
BAR_RUN_DEPENDS=    bar:bar/bar

.include <bsd.port.mk>
```

例 45. Check for Unset Port OPTIONS

```
.if ! ${PORT_OPTIONS:MEXAMPLES}
CONFIGURE_ARGS+=--without-examples
```

```
.endif
```

The form shown above is discouraged. The preferred method is using a configure knob to really enable and disable the feature to match the option:

```
# Will add --with-examples / --without-examples
EXAMPLES_CONFIGURE_WITH=    examples
```

例 46. Practical Use of OPTIONS

```
OPTIONS_DEFINE=    EXAMPLES
OPTIONS_DEFAULT=    PGSQL LDAP SSL

OPTIONS_SINGLE=    BACKEND
OPTIONS_SINGLE_BACKEND= MYSQL PGSQL BDB

OPTIONS_MULTI=     AUTH
OPTIONS_MULTI_AUTH= LDAP PAM SSL

EXAMPLES_DESC=     Install extra examples
MYSQL_DESC=    Use MySQL as backend
PGSQL_DESC=    Use PostgreSQL as backend
BDB_DESC=      Use Berkeley DB as backend
LDAP_DESC=     Build with LDAP authentication support
PAM_DESC=      Build with PAM support
SSL_DESC=      Build with OpenSSL support

# Will add USE_PGSQL=yes
PGSQL_USE=  pgsql=yes
# Will add --enable-postgres / --disable-postgres
PGSQL_CONFIGURE_ENABLE= postgres

ICU_LIB_DEPENDS=    libicuuc.so:devel/icu

# Will add --with-examples / --without-examples
EXAMPLES_CONFIGURE_WITH=    examples

# Check other OPTIONS

.include <bsd.port.mk>
```

5.13.1.3. Default Options

These options are always on by default.

- DOCS - build and install documentation.
- NLS - Native Language Support.
- EXAMPLES - build and install examples.
- IPV6 - IPv6 protocol support.

There is no need to add these to OPTIONS_DEFAULT. To have them active, and show up in the options selection dialog, however, they must be added to OPTIONS_DEFINE.

5.13.2. Feature Auto-Activation

When using a GNU configure script, keep an eye on which optional features are activated by auto-detection. Explicitly disable optional features that are not needed by adding --without-xxx or --disable-xxx in CONFIGURE_ARGS.

例 47. Wrong Handling of an Option

```
.if ${PORT_OPTIONS:MFOO}
LIB_DEPENDS+=     libfoo.so:devel/foo
CONFIGURE_ARGS+=  --enable-foo
.endif
```

In the example above, imagine a library libfoo is installed on the system. The user does not want this application to use libfoo, so he toggled the option off in the make config dialog. But the application’s configure script detects the library present in the system and includes its support in the resulting executable. Now when the user decides to remove libfoo from the system, the ports system does not protest (no dependency on libfoo was recorded) but the application breaks.

例 48. Correct Handling of an Option

```
FOO_LIB_DEPENDS=      libfoo.so:devel/foo
# Will add --enable-foo / --disable-foo
FOO_CONFIGURE_ENABLE=  foo
```

Under some circumstances, the shorthand conditional syntax can cause problems with complex constructs. The errors are usually Malformed conditional, an alternative syntax can be used.

```
.if !empty(VARIABLE:MVALUE)
```

as an alternative to

```
.if ${VARIABLE:MVALUE}
```

5.13.3. Options Helpers

There are some macros to help simplify conditional values which differ based on the options set. For easier access, a comprehensive list is provided:

PLIST_SUB, SUB_LIST
: For automatic %%OPT%% and %%NOOPT%% generation, see OPTIONS_SUB.

  For more complex usage, see Generic Variables Replacement, OPT_VARIABLE and OPT_VARIABLE_OFF.

CONFIGURE_ARGS
: For --enable-x and --disable-x, see OPT_CONFIGURE_ENABLE.

  For --with-x and --without-x, see OPT_CONFIGURE_WITH.

  For all other cases, see OPT_CONFIGURE_ON and OPT_CONFIGURE_OFF.

CMAKE_ARGS
: For arguments that are booleans (on, off, true, false, 0, 1) see OPT_CMAKE_BOOL and OPT_CMAKE_BOOL_OFF.

  For all other cases, see OPT_CMAKE_ON and OPT_CMAKE_OFF.

MESON_ARGS
: For arguments that take true or false, see OPT_MESON_TRUE and OPT_MESON_FALSE.

  For arguments that take yes or no, use OPT_MESON_YES and OPT_MESON_NO.

  For arguments that take enabled or disabled, see OPT_MESON_ENABLED and OPT_MESON_DISABLED.

  For all other cases, use OPT_MESON_ON and OPT_MESON_OFF.

QMAKE_ARGS
: See OPT_QMAKE_ON and OPT_QMAKE_OFF.

USE_*
: See OPT_USE and OPT_USE_OFF.

*_DEPENDS
: See Dependencies, OPT_DEPTYPE and OPT_DEPTYPE_OFF.

* (Any variable)
: The most used variables have direct helpers, see Generic Variables Replacement, OPT_VARIABLE and OPT_VARIABLE_OFF.

  For any variable without a specific helper, see OPT_VARS and OPT_VARS_OFF.

Options dependencies
: When an option need another option to work, see OPT_IMPLIES.

Options conflicts
: When an option cannot work if another is also enabled, see OPT_PREVENTS and OPT_PREVENTS_MSG.

Build targets
: When an option need some extra processing, see Additional Build Targets, target-OPT-on and target-OPT-off.

5.13.3.1. OPTIONS_SUB

If OPTIONS_SUB is set to yes then each of the options added to OPTIONS_DEFINE will be added to PLIST_SUB and SUB_LIST, for example:

```
OPTIONS_DEFINE= OPT1
OPTIONS_SUB=    yes
```

is equivalent to:

```
OPTIONS_DEFINE= OPT1

.include <bsd.port.options.mk>

.if ${PORT_OPTIONS:MOPT1}
PLIST_SUB+= OPT1="" NO_OPT1="@comment "
SUB_LIST+=  OPT1="" NO_OPT1="@comment "
.else
PLIST_SUB+= OPT1="@comment " NO_OPT1=""
SUB_LIST+=  OPT1="@comment " NO_OPT1=""
.endif
```

The value of OPTIONS_SUB is ignored. Setting it to any value will add PLIST_SUB and SUB_LIST entries for all options.

5.13.3.2. OPT_USE and OPT_USE_OFF

When option OPT is selected, for each key=value pair in OPT_USE, value is appended to the corresponding USE_KEY. If value has spaces in it, replace them with commas and they will be changed back to spaces during processing. OPT_USE_OFF works the same way, but when OPT is not selected. For example:

```
OPTIONS_DEFINE= OPT1
OPT1_USES=  xorg
OPT1_USE=   mysql=yes xorg=x11,xextproto,xext,xrandr
OPT1_USE_OFF=   openssl=yes
```

is equivalent to:

```
OPTIONS_DEFINE= OPT1

.include <bsd.port.options.mk>

.if ${PORT_OPTIONS:MOPT1}
USE_MYSQL=  yes
USES+=      xorg
```

```
USE_XORG=  x11 xextproto xext xrandr
.else
USE_OPENSSL=   yes
.endif
```

5.13.3.3. CONFIGURE_ARGS Helpers

5.13.3.3.1. OPT_CONFIGURE_ENABLE

When option OPT is selected, for each entry in OPT_CONFIGURE_ENABLE then --enable-entry is appended to CONFIGURE_ARGS. When option OPT is not selected, --disable-entry is appended to CONFIGURE_ARGS. An optional argument can be specified with an = symbol. This argument is only appended to the --enable-entry configure option. For example:

```
OPTIONS_DEFINE= OPT1 OPT2
OPT1_CONFIGURE_ENABLE=  test1 test2
OPT2_CONFIGURE_ENABLE=  test2=exhaustive
```

is equivalent to:

```
OPTIONS_DEFINE= OPT1

.include <bsd.port.options.mk>

.if ${PORT_OPTIONS:MOPT1}
CONFIGURE_ARGS+=   --enable-test1 --enable-test2
.else
CONFIGURE_ARGS+=   --disable-test1 --disable-test2
.endif

.if ${PORT_OPTIONS:MOPT2}
CONFIGURE_ARGS+=   --enable-test2=exhaustive
.else
CONFIGURE_ARGS+=   --disable-test2
.endif
```

5.13.3.3.2. OPT_CONFIGURE_WITH

When option OPT is selected, for each entry in OPT_CONFIGURE_WITH then --with-_entry is appended to CONFIGURE_ARGS. When option OPT is not selected, --without-entry is appended to CONFIGURE_ARGS. An optional argument can be specified with an = symbol. This argument is only appended to the --with-entry configure option. For example:

```
OPTIONS_DEFINE= OPT1 OPT2
OPT1_CONFIGURE_WITH=   test1
OPT2_CONFIGURE_WITH=   test2=exhaustive
```

is equivalent to:

```
OPTIONS_DEFINE= OPT1 OPT2

.include <bsd.port.options.mk>

.if ${PORT_OPTIONS:MOPT1}
CONFIGURE_ARGS+=   --with-test1
.else
CONFIGURE_ARGS+=   --without-test1
.endif

.if ${PORT_OPTIONS:MOPT2}
CONFIGURE_ARGS+=   --with-test2=exhaustive
.else
CONFIGURE_ARGS+=   --without-test2
.endif
```

5.13.3.3.3. OPT_CONFIGURE_ON and OPT_CONFIGURE_OFF

When option OPT is selected, the value of OPT_CONFIGURE_ON, if defined, is appended to CONFIGURE_ARGS. OPT_CONFIGURE_OFF works the same way, but when OPT is not selected. For example:

```
OPTIONS_DEFINE= OPT1
OPT1_CONFIGURE_ON=  --add-test
OPT1_CONFIGURE_OFF= --no-test
```

is equivalent to:

```
OPTIONS_DEFINE= OPT1

.include <bsd.port.options.mk>

.if ${PORT_OPTIONS:MOPT1}
CONFIGURE_ARGS+=   --add-test
.else
CONFIGURE_ARGS+=   --no-test
.endif
```

Most of the time, the helpers in OPT_CONFIGURE_ENABLE and OPT_CONFIGURE_WITH provide a shorter and more comprehensive functionality.

5.13.3.4. CMAKE_ARGS Helpers

5.13.3.4.1. OPT_CMAKE_ON and OPT_CMAKE_OFF

When option OPT is selected, the value of OPT_CMAKE_ON, if defined, is appended to CMAKE_ARGS. OPT_CMAKE_OFF works the same way, but when OPT is not selected. For example:

```
OPTIONS_DEFINE= OPT1
OPT1_CMAKE_ON=  -DTEST:BOOL=true -DDEBUG:BOOL=true
OPT1_CMAKE_OFF= -DOPTIMIZE:BOOL=true
```

is equivalent to:

```
OPTIONS_DEFINE= OPT1

.include <bsd.port.options.mk>

.if ${PORT_OPTIONS:MOPT1}
CMAKE_ARGS+=    -DTEST:BOOL=true -DDEBUG:BOOL=true
.else
CMAKE_ARGS+=    -DOPTIMIZE:BOOL=true
.endif
```

See OPT_CMAKE_BOOL and OPT_CMAKE_BOOL_OFF for a shorter helper when the value is boolean.

5.13.3.4.2. OPT_CMAKE_BOOL and OPT_CMAKE_BOOL_OFF

When option OPT is selected, for each entry in OPT_CMAKE_BOOL then -D_entry_:BOOL=true is appended to CMAKE_ARGS. When option OPT is not selected, -D_entry_:BOOL=false is appended to CONFIGURE_ARGS. OPT_CMAKE_BOOL_OFF is the opposite, -D_entry_:BOOL=false is appended to CMAKE_ARGS when the option is selected, and -D_entry_:BOOL=true when the option is not selected. For example:

```
OPTIONS_DEFINE= OPT1
OPT1_CMAKE_BOOL=    TEST DEBUG
OPT1_CMAKE_BOOL_OFF=    OPTIMIZE
```

is equivalent to:

```
OPTIONS_DEFINE= OPT1

.include <bsd.port.options.mk>

.if ${PORT_OPTIONS:MOPT1}
CMAKE_ARGS+=    -DTEST:BOOL=true -DDEBUG:BOOL=true \
    -DOPTIMIZE:BOOL=false
```

```
.else
CMAKE_ARGS+=    -DTEST:BOOL=false -DDEBUG:BOOL=false \
      -DOPTIMIZE:BOOL=true
.endif
```

5.13.3.5. MESON_ARGS Helpers

5.13.3.5.1. OPT_MESON_ON and OPT_MESON_OFF

When option OPT is selected, the value of OPT_MESON_ON, if defined, is appended to MESON_ARGS. OPT_MESON_OFF works the same way, but when OPT is not selected. For example:

```
OPTIONS_DEFINE= OPT1
OPT1_MESON_ON=  -Dopt=1
OPT1_MESON_OFF= -Dopt=2
```

is equivalent to:

```
OPTIONS_DEFINE= OPT1

.include <bsd.port.options.mk>

.if ${PORT_OPTIONS:MOPT1}
MESON_ARGS+=    -Dopt=1
.else
MESON_ARGS+=    -Dopt=2
.endif
```

5.13.3.5.2. OPT_MESON_TRUE and OPT_MESON_FALSE

When option OPT is selected, for each entry in OPT_MESON_TRUE then -D_entry_=true is appended to MESON_ARGS. When option OPT is not selected, -D_entry_=false is appended to MESON_ARGS. OPT_MESON_FALSE is the opposite, -D_entry_=false is appended to MESON_ARGS when the option is selected, and -D_entry_=true when the option is not selected. For example:

```
OPTIONS_DEFINE= OPT1
OPT1_MESON_TRUE=   test debug
OPT1_MESON_FALSE=  optimize
```

is equivalent to:

```
OPTIONS_DEFINE= OPT1

.include <bsd.port.options.mk>

.if ${PORT_OPTIONS:MOPT1}
```

```
MESON_ARGS+=    -Dtest=true -Ddebug=true \
    -Doptimize=false
.else
MESON_ARGS+=    -Dtest=false -Ddebug=false \
    -Doptimize=true
.endif
```

5.13.3.5.3. OPT_MESON_YES and OPT_MESON_NO

When option OPT is selected, for each entry in OPT_MESON_YES then -D_entry_=yes is appended to MESON_ARGS. When option OPT is not selected, -D_entry_=no is appended to MESON_ARGS. OPT_MESON_NO is the opposite, -D_entry_=no is appended to MESON_ARGS when the option is selected, and -D_entry_=yes when the option is not selected. For example:

```
OPTIONS_DEFINE= OPT1
OPT1_MESON_YES= test debug
OPT1_MESON_NO=  optimize
```

is equivalent to:

```
OPTIONS_DEFINE= OPT1

.include <bsd.port.options.mk>

.if ${PORT_OPTIONS:MOPT1}
MESON_ARGS+=    -Dtest=yes -Ddebug=yes \
    -Doptimize=no
.else
MESON_ARGS+=    -Dtest=no -Ddebug=no \
    -Doptimize=yes
.endif
```

5.13.3.5.4. OPT_MESON_ENABLED and OPT_MESON_DISABLED

When option OPT is selected, for each entry in OPT_MESON_ENABLED then -D_entry_=enabled is appended to MESON_ARGS. When option OPT is not selected, -D_entry_=disabled is appended to MESON_ARGS. OPT_MESON_DISABLED is the opposite, -D_entry_=disabled is appended to MESON_ARGS when the option is selected, and -D_entry_=enabled when the option is not selected. For example:

```
OPTIONS_DEFINE= OPT1
OPT1_MESON_ENABLED= test
OPT1_MESON_DISABLED=    debug
```

is equivalent to:

```
OPTIONS_DEFINE= OPT1

.include <bsd.port.options.mk>

.if ${PORT_OPTIONS:MOPT1}
MESON_ARGS+=    -Dtest=enabled -Ddebug=disabled
.else
MESON_ARGS+=    -Dtest=disabled -Ddebug=enabled
.endif
```

5.13.3.6. OPT_QMAKE_ON and OPT_QMAKE_OFF

When option OPT is selected, the value of OPT_QMAKE_ON, if defined, is appended to QMAKE_ARGS. OPT_QMAKE_OFF works the same way, but when OPT is not selected. For example:

```
OPTIONS_DEFINE= OPT1
OPT1_QMAKE_ON=  -DTEST:BOOL=true
OPT1_QMAKE_OFF= -DPRODUCTION:BOOL=true
```

is equivalent to:

```
OPTIONS_DEFINE= OPT1

.include <bsd.port.options.mk>

.if ${PORT_OPTIONS:MOPT1}
QMAKE_ARGS+=    -DTEST:BOOL=true
.else
QMAKE_ARGS+=    -DPRODUCTION:BOOL=true
.endif
```

5.13.3.7. OPT_IMPLIES

Provides a way to add dependencies between options.

When OPT is selected, all the options listed in this variable will be selected too. Using the OPT_CONFIGURE_ENABLE described earlier to illustrate:

```
OPTIONS_DEFINE= OPT1 OPT2
OPT1_IMPLIES=   OPT2

OPT1_CONFIGURE_ENABLE=  opt1
OPT2_CONFIGURE_ENABLE=  opt2
```

Is equivalent to:

```
OPTIONS_DEFINE= OPT1 OPT2

.include <bsd.port.options.mk>

.if ${PORT_OPTIONS:MOPT1}
CONFIGURE_ARGS+=   --enable-opt1
.else
CONFIGURE_ARGS+=   --disable-opt1
.endif

.if ${PORT_OPTIONS:MOPT2} || ${PORT_OPTIONS:MOPT1}
CONFIGURE_ARGS+=   --enable-opt2
.else
CONFIGURE_ARGS+=   --disable-opt2
.endif
```

例 49. Simple Use of OPT_IMPLIES

This port has a X11 option, and a GNOME option that needs the X11 option to be selected to build.

```
OPTIONS_DEFINE= X11 GNOME
OPTIONS_DEFAULT=   X11

X11_USES=  xorg
X11_USE=   xorg=xi,xextproto
GNOME_USE=  gnome=gtk30
GNOME_IMPLIES=  X11
```

5.13.3.8. OPT_PREVENTS and OPT_PREVENTS_MSG

Provides a way to add conflicts between options.

When OPT is selected, all the options listed in OPT_PREVENTS must be un-selected. If OPT_PREVENTS_MSG is set and a conflict is triggered, its content will be shown explaining why they conflict. For example:

```
OPTIONS_DEFINE= OPT1 OPT2
OPT1_PREVENTS=  OPT2
OPT1_PREVENTS_MSG=  OPT1 and OPT2 enable conflicting options
```

Is roughly equivalent to:

```
OPTIONS_DEFINE= OPT1 OPT2
```

```
.include <bsd.port.options.mk>

.if ${PORT_OPTIONS:MOPT2} && ${PORT_OPTIONS:MOPT1}
BROKEN= Option OPT1 conflicts with OPT2 (select only one)
.endif
```

The only difference is that the first one will write an error after running make config, suggesting changing the selected options.

例 50. Simple Use of OPT_PREVENTS

This port has X509 and SCTP options. Both options add patches, but the patches conflict with each other, so they cannot be selected at the same time.

```
OPTIONS_DEFINE= X509 SCTP

SCTP_PATCHFILES=   ${PORTNAME}-6.8p1-sctp-2573.patch.gz:-p1
SCTP_CONFIGURE_WITH=   sctp

X509_PATCH_SITES=  http://www.roumenpetrov.info/openssh/x509/:x509
X509_PATCHFILES=   ${PORTNAME}-7.0p1+x509-8.5.diff.gz:-p1:x509
X509_PREVENTS=     SCTP
X509_PREVENTS_MSG=  X509 and SCTP patches conflict
```

5.13.3.9. OPT_VARS and OPT_VARS_OFF

Provides a generic way to set and append to variables.

Before using OPT_VARS and OPT_VARS_OFF, see if there is already a more specific helper available in Generic Variables Replacement, OPT_VARIABLE and OPT_VARIABLE_OFF.

When option OPT is selected, and OPT_VARS defined, key=value and key+=value pairs are evaluated from OPT_VARS. An = cause the existing value of KEY to be overwritten, an += appends to the value. OPT_VARS_OFF works the same way, but when OPT is not selected.

```
OPTIONS_DEFINE= OPT1 OPT2 OPT3
OPT1_VARS=  also_build+=bin1
OPT2_VARS=  also_build+=bin2
OPT3_VARS=  bin3_build=yes
OPT3_VARS_OFF=  bin3_build=no

MAKE_ARGS=  ALSO_BUILD="${ALSO_BUILD}" BIN3_BUILD="${BIN3_BUILD}"
```

is equivalent to:

```
OPTIONS_DEFINE= OPT1 OPT2

MAKE_ARGS=  ALSO_BUILD="${ALSO_BUILD}" BIN3_BUILD="${BIN3_BUILD}"

.include <bsd.port.options.mk>

.if ${PORT_OPTIONS:MOPT1}
ALSO_BUILD+=   bin1
.endif

.if ${PORT_OPTIONS:MOPT2}
ALSO_BUILD+=   bin2
.endif

.if ${PORT_OPTIONS:MOPT2}
BIN3_BUILD= yes
.else
BIN3_BUILD= no
.endif
```

Values containing whitespace must be enclosed in quotes:

```
OPT_VARS=  foo="bar baz"
```

This is due to the way make(1) variable expansion deals with whitespace. When OPT_VARS= foo=bar baz is expanded, the variable ends up containing two strings, foo=bar and baz. But the submitter probably intended there to be only one string, foo=bar baz. Quoting the value prevents whitespace from being used as a delimiter.

Also, do not add extra spaces after the var= sign and before the value, it would also be split into two strings. This will not work:

```
OPT_VARS=  foo=   bar
```

5.13.3.10. Dependencies, OPT_DEPTYPE and OPT_DEPTYPE_OFF

For any of these dependency types:

- PKG_DEPENDS
- EXTRACT_DEPENDS
- PATCH_DEPENDS
- FETCH_DEPENDS
- BUILD_DEPENDS
- LIB_DEPENDS

- RUN_DEPENDS

When option OPT is selected, the value of OPT_DEPTYPE, if defined, is appended to DEPTYPE. OPT_DEPTYPE_OFF works the same, but when OPT is not selected. For example:

```
OPTIONS_DEFINE= OPT1
OPT1_LIB_DEPENDS=   liba.so:devel/a
OPT1_LIB_DEPENDS_OFF=   libb.so:devel/b
```

is equivalent to:

```
OPTIONS_DEFINE= OPT1

.include <bsd.port.options.mk>

.if ${PORT_OPTIONS:MOPT1}
LIB_DEPENDS+=   liba.so:devel/a
.else
LIB_DEPENDS+=   libb.so:devel/b
.endif
```

5.13.3.11. Generic Variables Replacement, OPT_VARIABLE and OPT_VARIABLE_OFF

For any of these variables:

- ALL_TARGET
- BINARY_ALIAS
- BROKEN
- CATEGORIES
- CFLAGS
- CONFIGURE_ENV
- CONFLICTS
- CONFLICTS_BUILD
- CONFLICTS_INSTALL
- CPPFLAGS
- CXXFLAGS
- DESKTOP_ENTRIES
- DISTFILES
- EXTRACT_ONLY
- EXTRA_PATCHES
- GH_ACCOUNT
- GH_PROJECT
- GH_SUBDIR
- GH_TAGNAME

- GH_TUPLE
- GL_ACCOUNT
- GL_COMMIT
- GL_PROJECT
- GL_SITE
- GL_SUBDIR
- GL_TUPLE
- IGNORE
- INFO
- INSTALL_TARGET
- LDFLAGS
- LIBS
- MAKE_ARGS
- MAKE_ENV
- MASTER_SITES
- PATCHFILES
- PATCH_SITES
- PLIST_DIRS
- PLIST_FILES
- PLIST_SUB
- PORTDOCS
- PORTEXAMPLES
- SUB_FILES
- SUB_LIST
- TEST_TARGET
- USES

When option OPT is selected, the value of OPT_ABOVEVARIABLE, if defined, is appended to ABOVEVARIABLE. OPT_ABOVEVARIABLE_OFF works the same way, but when OPT is not selected. For example:

```
OPTIONS_DEFINE= OPT1
OPT1_USES=  gmake
OPT1_CFLAGS_OFF=   -DTEST
```

is equivalent to:

```
OPTIONS_DEFINE= OPT1

.include <bsd.port.options.mk>

.if ${PORT_OPTIONS:MOPT1}
USES+=     gmake
```

```
.else
CFLAGS+=   -DTEST
.endif
```

Some variables are not in this list, in particular PKGNAMEPREFIX and PKGNAMESUFFIX. This is intentional. A port must not change its name when its option set changes.

Some of these variables, at least ALL_TARGET, DISTFILES and INSTALL_TARGET, have their default values set after the options are processed.

With these lines in the Makefile:

```
ALL_TARGET= all

DOCS_ALL_TARGET=   doc
```

If the DOCS option is enabled, ALL_TARGET will have a final value of all doc; if the option is disabled, it would have a value of all.

With only the options helper line in the Makefile:

```
DOCS_ALL_TARGET=   doc
```

If the DOCS option is enabled, ALL_TARGET will have a final value of doc; if the option is disabled, it would have a value of all.

5.13.3.12. Additional Build Targets, target-OPT-on and target-OPT-off

These Makefile targets can accept optional extra build targets:

- pre-fetch
- do-fetch
- post-fetch
- pre-extract
- do-extract
- post-extract
- pre-patch
- do-patch
- post-patch
- pre-configure
- do-configure
- post-configure
- pre-build
- do-build
- post-build
- pre-install

- do-install
- post-install
- post-stage
- pre-package
- do-package
- post-package

When option OPT is selected, the target TARGET-OPT-on, if defined, is executed after TARGET. TARGET-OPT-off works the same way, but when OPT is not selected. For example:

```
OPTIONS_DEFINE= OPT1

post-patch-OPT1-on:
  @${REINPLACE_CMD} -e '/opt1/s|/usr/bin/|${EXAMPLESDIR}/|' ${WRKSRC}/Makefile

post-patch-OPT1-off:
  @${REINPLACE_CMD} -e '/opt1/s|/usr/bin/|${PREFIX}/bin/|' ${WRKSRC}/Makefile
```

is equivalent to:

```
OPTIONS_DEFINE= OPT1

.include <bsd.port.options.mk>

post-patch:
.if ${PORT_OPTIONS:MOPT1}
  @${REINPLACE_CMD} -e '/opt1/s|/usr/bin/|${EXAMPLESDIR}/|' ${WRKSRC}/Makefile
.else
  @${REINPLACE_CMD} -e '/opt1/s|/usr/bin/|${PREFIX}/bin/|' ${WRKSRC}/Makefile
.endif
```

5.14. Specifying the Working Directory

Each port is extracted into a working directory, which must be writable. The ports system defaults to having DISTFILES unpack in to a directory called ${DISTNAME}. In other words, if the Makefile has:

```
PORTNAME=  foo
DISTVERSION=  1.0
```

then the port's distribution files contain a top-level directory, foo-1.0, and the rest of the files are located under that directory.

A number of variables can be overridden if that is not the case.

5.14.1. WRKSRC

The variable lists the name of the directory that is created when the application's distfiles are extracted. If our previous example extracted into a directory called foo (and not foo-1.0) write:

```
WRKSRC= ${WRKDIR}/foo
```

or possibly

```
WRKSRC= ${WRKDIR}/${PORTNAME}
```

5.14.2. WRKSRC_SUBDIR

If the source files needed for the port are in a subdirectory of the extracted distribution file, set WRKSRC_SUBDIR to that directory.

```
WRKSRC_SUBDIR= src
```

5.14.3. NO_WRKSUBDIR

If the port does not extract in to a subdirectory at all, then set NO_WRKSUBDIR to indicate that.

```
NO_WRKSUBDIR= yes
```

Because WRKDIR is the only directory that is supposed to be writable during the build, and is used to store many files recording the status of the build, the port's extraction will be forced into a subdirectory.

5.15. Conflict Handling

There are three different variables to register a conflict between packages and ports: CONFLICTS, CONFLICTS_INSTALL and CONFLICTS_BUILD.

The conflict variables automatically set the variable IGNORE, which is more fully documented in Marking a Port Not Installable with BROKEN.

When removing one of several conflicting ports, it is advisable to retain CONFLICTS in those other ports for a few months to cater for users who only update once in a while.

CONFLICTS_INSTALL
: If the package cannot coexist with other packages (because of file conflicts, runtime incompatibilities, etc.). CONFLICTS_INSTALL check is done after the build stage and prior to the install stage.

CONFLICTS_BUILD
: If the port cannot be built when other specific ports are already installed. Build conflicts are not recorded in the resulting package.

CONFLICTS
: If the port cannot be built if a certain port is already installed and the resulting package cannot coexist with the other package. CONFLICTS check is done prior to the build stage and prior to the

install stage.

The most common content of one of these variable is the package base of another port. The package base is the package name without the appended version, it can be obtained by running make -V PKGBASE.

例 51. Basic usage of CONFLICTS*

dns/bind99 cannot be installed if dns/bind910 is present because they install same files. First gather the package base to use:

```
% make -C dns/bind99 -V PKGBASE
bind99
% make -C dns/bind910 -V PKGBASE
bind910
```

Then add to the Makefile of dns/bind99:

```
CONFLICTS_INSTALL= bind910
```

And add to the Makefile of dns/bind910:

```
CONFLICTS_INSTALL= bind99
```

Sometimes, only certain versions of another port are incompatible. When this is the case, use the full package name including the version. If necessary, use shell globs like * and ? so that all necessary versions are matched.

例 52. Using CONFLICTS* With Globs.

From versions from 2.0 and up-to 2.4.1_2, deskutils/gnotime used to install a bundled version of databases/qof.

To reflect this past, the Makefile of databases/qof contains:

```
CONFLICTS_INSTALL= gnotime-2.[0-3]* \
        gnotime-2.4.0* gnotime-2.4.1 \
        gnotime-2.4.1_[12]
```

The first entry match versions 2.0 through 2.3, the second all the revisions of 2.4.0, the third the exact 2.4.1 version, and the last the first and second revisions of the 2.4.1 version.

deskutils/gnotime does not have any conflicts line because its current version does not conflict with anything else.

The variable DISABLE_CONFLICTS may be temporarily set when making targets that are not affected by conflicts. The variable is not to be set in port Makefiles.

```
% make -DDISABLE_CONFLICTS patch
```

5.16. Installing Files

The install phase is very important to the end user because it adds files to their system. All the additional commands run in the port Makefile's *-install targets should be echoed to the screen. Do not silence these commands with @ or .SILENT.

5.16.1. INSTALL_* Macros

Use the macros provided in bsd.port.mk to ensure correct modes of files in the port's *-install targets. Set ownership directly in pkg-plist with the corresponding entries, such as @(owner, group,), @owner owner, and @group group. These operators work until overridden, or until the end of pkg-plist, so remember to reset them after they are no longer needed. The default ownership is root:wheel. See Base Keywords for more information.

- INSTALL_PROGRAM is a command to install binary executables.
- INSTALL_SCRIPT is a command to install executable scripts.
- INSTALL_LIB is a command to install shared libraries (but not static libraries).
- INSTALL_KLD is a command to install kernel loadable modules. Some architectures do not like having the modules stripped, so use this command instead of INSTALL_PROGRAM.
- INSTALL_DATA is a command to install sharable data, including static libraries.
- INSTALL_MAN is a command to install manpages and other documentation (it does not compress anything).

These variables are set to the install(1) command with the appropriate flags for each situation.

Do not use INSTALL_LIB to install static libraries, because stripping them renders them useless. Use INSTALL_DATA instead.

5.16.2. Stripping Binaries and Shared Libraries

Installed binaries should be stripped. Do not strip binaries manually unless absolutely required. The INSTALL_PROGRAM macro installs and strips a binary at the same time. The INSTALL_LIB macro does the same thing to shared libraries.

When a file must be stripped, but neither INSTALL_PROGRAM nor INSTALL_LIB macros are desirable, ${STRIP_CMD} strips the program or shared library. This is typically done within the post-install target. For example:

```
post-install:
  ${STRIP_CMD} ${STAGEDIR}${PREFIX}/bin/xdl
```

When multiple files need to be stripped:

```
post-install:
.for l in geometry media body track world
  ${STRIP_CMD} ${STAGEDIR}${PREFIX}/lib/lib${PORTNAME}-${l}.so.0
.endfor
```

Use file(1) on a file to determine if it has been stripped. Binaries are reported by file(1) as stripped, or not stripped. Additionally, strip(1) will detect programs that have already been stripped and exit cleanly.

When WITH_DEBUG is defined, elf files must not be stripped.

The variables (STRIP_CMD, INSTALL_PROGRAM, INSTALL_LIB, ⋯) and USES provided by the framework handle this automatically.

Some software, add -s to their LDFLAGS, in this case, either remove -s if WITH_DEBUG is set, or remove it unconditionally and use STRIP_CMD in post-install.

5.16.3. Installing a Whole Tree of Files

Sometimes, a large number of files must be installed while preserving their hierarchical organization. For example, copying over a whole directory tree from WRKSRC to a target directory under PREFIX. Note that PREFIX, EXAMPLESDIR, DATADIR, and other path variables must always be prepended with STAGEDIR to respect staging (see Staging).

Two macros exist for this situation. The advantage of using these macros instead of cp is that they guarantee proper file ownership and permissions on target files. The first macro, COPYTREE_BIN, will set all the installed files to be executable, thus being suitable for installing into PREFIX/bin. The second macro, COPYTREE_SHARE, does not set executable permissions on files, and is therefore suitable for installing files under PREFIX/share target.

```
post-install:
  ${MKDIR} ${STAGEDIR}${EXAMPLESDIR}
  (cd ${WRKSRC}/examples && ${COPYTREE_SHARE} . ${STAGEDIR}${EXAMPLESDIR})
```

This example will install the contents of the examples directory in the vendor distfile to the proper examples location of the port.

```
post-install:
  ${MKDIR} ${STAGEDIR}${DATADIR}/summer
  (cd ${WRKSRC}/temperatures && ${COPYTREE_SHARE} "June July August"
${STAGEDIR}${DATADIR}/summer)
```

And this example will install the data of summer months to the summer subdirectory of a DATADIR.

Additional find arguments can be passed via the third argument to COPYTREE_* macros. For example, to install all files from the first example except Makefiles, one can use these commands.

```
post-install:
  ${MKDIR} ${STAGEDIR}${EXAMPLESDIR}
  (cd ${WRKSRC}/examples && \
  ${COPYTREE_SHARE} . ${STAGEDIR}${EXAMPLESDIR} "! -name Makefile")
```

These macros do not add the installed files to pkg-plist. They must be added manually. For optional documentation (PORTDOCS, see Install Additional Documentation) and examples (PORTEXAMPLES), the %%PORTDOCS%% or %%PORTEXAMPLES%% prefixes must be prepended in pkg-plist.

5.16.4. Install Additional Documentation

If the software has some documentation other than the standard man and info pages that is useful for the user, install it under DOCSDIR. This can be done, like the previous item, in the post-install target.

Create a new directory for the port. The directory name is DOCSDIR. This usually equals PORTNAME. However, if the user might want different versions of the port to be installed at the same time, the whole PKGNAME can be used.

Since only the files listed in pkg-plist are installed, it is safe to always install documentation to STAGEDIR (see Staging). Hence .if blocks are only needed when the installed files are large enough to cause significant I/O overhead.

```
post-install:
  ${MKDIR} ${STAGEDIR}${DOCSDIR}
  ${INSTALL_MAN} ${WRKSRC}/docs/xvdocs.ps ${STAGEDIR}${DOCSDIR}
```

On the other hand, if there is a DOCS option in the port, install the documentation in a post-install-DOCS-on target. These targets are described in Additional Build Targets, target-OPT-on and target-OPT-off.

Here are some handy variables and how they are expanded by default when used in the Makefile:

- DATADIR gets expanded to PREFIX/shared/PORTNAME.
- DATADIR_REL gets expanded to share/PORTNAME.
- DOCSDIR gets expanded to PREFIX/shared/doc/PORTNAME.
- DOCSDIR_REL gets expanded to share/doc/PORTNAME.
- EXAMPLESDIR gets expanded to PREFIX/shared/examples/PORTNAME.
- EXAMPLESDIR_REL gets expanded to share/examples/PORTNAME.

The DOCS option only controls additional documentation installed in DOCSDIR. It does not apply to standard man pages and info pages. Things installed in EXAMPLESDIR are controlled by the EXAMPLES option.

These variables are exported to PLIST_SUB. Their values will appear there as pathnames relative to PREFIX if possible. That is, share/doc/PORTNAME will be substituted for %%DOCSDIR%% in the packing list by default, and so on. (See more on pkg-plist substitution here.)

All conditionally installed documentation files and directories are included in pkg-plist with the %%PORTDOCS%% prefix, for example:

```
%%PORTDOCS%%%%DOCSDIR%%/AUTHORS
%%PORTDOCS%%%%DOCSDIR%%/CONTACT
```

As an alternative to enumerating the documentation files in pkg-plist, a port can set the variable PORTDOCS to a list of file names and shell glob patterns to add to the final packing list. The names will be relative to DOCSDIR. Therefore, a port that utilizes PORTDOCS, and uses a non-default location for its documentation, must set DOCSDIR accordingly. If a directory is listed in PORTDOCS or matched by a glob pattern from this variable, the entire subtree of contained files and directories will be registered in the final packing list. If the DOCS option has been unset then files and directories listed in PORTDOCS would not be installed or added to port packing list. Installing the documentation at PORTDOCS as shown above remains up to the port itself. A typical example of utilizing PORTDOCS:

```
PORTDOCS=  README.* ChangeLog docs/*
```

The equivalents of PORTDOCS for files installed under DATADIR and EXAMPLESDIR are PORTDATA and PORTEXAMPLES, respectively.

The contents of pkg-message are displayed upon installation. See the section on using pkg-message for details. pkg-message does not need to be added to pkg-plist.

5.16.5. Subdirectories Under PREFIX

Try to let the port put things in the right subdirectories of PREFIX. Some ports lump everything and put it in the subdirectory with the port' s name, which is incorrect. Also, many ports put everything except binaries, header files and manual pages in a subdirectory of lib, which does not work well with the BSD paradigm. Many of the files must be moved to one of these directories: etc (setup/configuration files), libexec (executables started internally), sbin (executables for superusers/managers), info (documentation for info browser) or share (architecture independent files). See hier(7) for details; the rules governing /usr pretty much apply to /usr/local too. The exception are ports dealing with USENET "news". They may use PREFIX/news as a destination for their files.

5.17. Use BINARY_ALIAS to Rename Commands Instead of Patching the Build

When BINARY_ALIAS is defined it will create symlinks of the given commands in a directory which will be prepended to PATH.

Use it to substitute hardcoded commands the build phase relies on without having to patch any build files.

例 53. Using BINARY_ALIAS to Make gsed Available as sed

Some ports expect sed to behave like GNU sed and use features that sed(1) does not provide. GNU sed is available from textproc/gsed on FreeBSD.

Use BINARY_ALIAS to substitute sed with gsed for the duration of the build:

```
BUILD_DEPENDS=  gsed:textproc/gsed
...
BINARY_ALIAS=  sed=gsed
```

例 54. Using BINARY_ALIAS to Provide Aliases for Hardcoded python3 Commands

A port that has a hardcoded reference to python3 in its build scripts will need to have it available in PATH at build time. Use BINARY_ALIAS to create an alias that points to the right Python 3 binary:

```
USES=  python:3.4+,build
...
BINARY_ALIAS=  python3=${PYTHON_CMD}
```

See Using Python for more information about USES=python.

Binary aliases are created after the dependencies provided via BUILD_DEPENDS and LIB_DEPENDS are processed and before the configure target. This leads to various limitations. For example, programs installed via TEST_DEPENDS cannot be used to create a binary alias as test dependencies specified this way are processed after binary aliases are created.

Chapter 6. Special Considerations

This section explains the most common things to consider when creating a port.

6.1. Staging

bsd.port.mk expects ports to work with a "stage directory". This means that a port must not install files directly to the regular destination directories (that is, under PREFIX, for example) but instead into a separate directory from which the package is then built. In many cases, this does not require root privileges, making it possible to build packages as an unprivileged user. With staging, the port is built and installed into the stage directory, STAGEDIR. A package is created from the stage directory and then installed on the system. Automake tools refer to this concept as DESTDIR, but in FreeBSD, DESTDIR has a different meaning (see PREFIX and DESTDIR).

No port really needs to be root. It can mostly be avoided by using USES=uidfix. If the port still runs commands like chown(8), chgrp(1), or forces owner or group with install(1) then use USES=fakeroot to fake those calls. Some patching of the port's Makefiles will be needed.

Meta ports, or ports that do not install files themselves but only depend on other ports, must avoid needlessly extracting the mtree(8) to the stage directory. This is the basic directory layout of the package, and these empty directories will be seen as orphans. To prevent mtree(8) extraction, add this line:

```
NO_MTREE=  yes
```

Metaports should use USES=metaport. It sets up defaults for ports that do not fetch, build, or install anything.

Staging is enabled by prepending STAGEDIR to paths used in the pre-install, do-install, and post-install targets (see the examples through the book). Typically, this includes PREFIX, ETCDIR, DATADIR, EXAMPLESDIR, MANPREFIX, DOCSDIR, and so on. Directories should be created as part of the post-install target. Avoid using absolute paths whenever possible.

Ports that install kernel modules must prepend STAGEDIR to their destination, by default /boot/modules.

6.1.1. Handling Symbolic Links

When creating a symbolic link, relative ones are strongly recommended. Use ${RLN} to create relative symbolic links. It uses install(1) under the hood to automatically figure out the relative link to create.

例 55. Create Relative Symbolic Links Automatically

${RLN} uses install(1)'s relative symbolic feature which frees the porter of computing the relative path.

```
${RLN} ${STAGEDIR}${PREFIX}/lib/libfoo.so.42 ${STAGEDIR}${PREFIX}/lib/libfoo.so
${RLN} ${STAGEDIR}${PREFIX}/libexec/foo/bar ${STAGEDIR}${PREFIX}/bin/bar
${RLN} ${STAGEDIR}/var/cache/foo ${STAGEDIR}${PREFIX}/share/foo
```

Will generate:

```
% ls -lF ${STAGEDIR}${PREFIX}/lib
lrwxr-xr-x  1 nobody  nobody   181 Aug  3 11:27 libfoo.so@ -> libfoo.so.42
-rwxr-xr-x  1 nobody  nobody    15 Aug  3 11:24 libfoo.so.42*
% ls -lF ${STAGEDIR}${PREFIX}/bin
lrwxr-xr-x  1 nobody  nobody   181 Aug  3 11:27 bar@ -> ../libexec/foo/bar
% ls -lF ${STAGEDIRDIR}${PREFIX}/share
lrwxr-xr-x  1 nobody  nobody   181 Aug  3 11:27 foo@ -> ../../../var/cache/foo
```

6.2. Bundled Libraries

This section explains why bundled dependencies are considered bad and what to do about them.

6.2.1. Why Bundled Libraries Are Bad

Some software requires the porter to locate third-party libraries and add the required dependencies to the port. Other software bundles all necessary libraries into the distribution file. The second approach seems easier at first, but there are some serious drawbacks:

This list is loosely based on the Fedora and Gentoo wikis, both licensed under the CC-BY-SA 3.0 license.

Security
: If vulnerabilities are found in the upstream library and fixed there, they might not be fixed in the library bundled with the port. One reason could be that the author is not aware of the problem. This means that the porter must fix them, or upgrade to a non-vulnerable version, and send a patch to the author. This all takes time, which results in software being vulnerable longer than necessary. This in turn makes it harder to coordinate a fix without unnecessarily leaking information about the vulnerability.

Bugs
: This problem is similar to the problem with security in the last paragraph, but generally less severe.

Forking
: It is easier for the author to fork the upstream library once it is bundled. While convenient on first sight, it means that the code diverges from upstream making it harder to address security or other problems with the software. A reason for this is that patching becomes harder.

  Another problem of forking is that because code diverges from upstream, bugs get solved over and over again instead of just once at a central location. This defeats the idea of open source software in the first place.

Symbol collision
: When a library is installed on the system, it might collide with the bundled version. This can cause immediate errors at compile or link time. It can also cause errors when running the program which might be harder to track down. The latter problem could be caused because the versions of the two libraries are incompatible.

Licensing
: When bundling projects from different sources, license issues can arise more easily, especially when licenses are incompatible.

Waste of resources
: Bundled libraries waste resources on several levels. It takes longer to build the actual

application, especially if these libraries are already present on the system. At run-time, they can take up unnecessary memory when the system-wide library is already loaded by one program and the bundled library is loaded by another program.

Waste of effort
: When a library needs patches for FreeBSD, these patches have to be duplicated again in the bundled library. This wastes developer time because the patches might not apply cleanly. It can also be hard to notice that these patches are required in the first place.

6.2.2. What to do About Bundled Libraries

Whenever possible, use the unbundled version of the library by adding a LIB_DEPENDS to the port. If such a port does not exist yet, consider creating it.

Only use bundled libraries if the upstream has a good track record on security and using unbundled versions leads to overly complex patches.

In some very special cases, for example emulators, like Wine, a port has to bundle libraries, because they are in a different architecture, or they have been modified to fit the software's use. In that case, those libraries should not be exposed to other ports for linking. Add BUNDLE_LIBS=yes to the port's Makefile. This will tell pkg(8) to not compute provided libraries. Always ask the Ports Management Team <portmgr@FreeBSD.org> before adding this to a port.

6.3. Shared Libraries

If the port installs one or more shared libraries, define a USE_LDCONFIG make variable, which will instruct a bsd.port.mk to run ${LDCONFIG} -m on the directory where the new library is installed (usually PREFIX/lib) during post-install target to register it into the shared library cache. This variable, when defined, will also facilitate addition of an appropriate @exec /sbin/ldconfig -m and @unexec /sbin/ldconfig -R pair into pkg-plist, so that a user who installed the package can start using the shared library immediately and de-installation will not cause the system to still believe the library is there.

```
USE_LDCONFIG=  yes
```

The default directory can be overridden by setting USE_LDCONFIG to a list of directories into which shared libraries are to be installed. For example, if the port installs shared libraries into PREFIX/lib/foo and PREFIX/lib/bar use this in Makefile:

```
USE_LDCONFIG=  ${PREFIX}/lib/foo ${PREFIX}/lib/bar
```

Please double-check, often this is not necessary at all or can be avoided through -rpath or setting LD_RUN_PATH during linking (see lang/mosml for an example), or through a shell-wrapper which sets LD_LIBRARY_PATH before invoking the binary, like www/seamonkey does.

When installing 32-bit libraries on a 64-bit system, use USE_LDCONFIG32 instead.

If the software uses autotools, and specifically libtool, add USES=libtool.

When the major library version number increments in the update to the new port version, all other ports that link to the affected library must have their PORTREVISION incremented, to force recompilation with the new library version.

6.4. Ports with Distribution Restrictions or Legal Concerns

Licenses vary, and some of them place restrictions on how the application can be packaged, whether it can be sold for profit, and so on.

It is the responsibility of a porter to read the licensing terms of the software and make sure that the FreeBSD project will not be held accountable for violating them by redistributing the source or compiled binaries either via FTP/HTTP or CD-ROM. If in doubt, please contact the FreeBSD ports 郵遞論壇.

In situations like this, the variables described in the next sections can be set.

6.4.1. NO_PACKAGE

This variable indicates that we may not generate a binary package of the application. For instance, the license may disallow binary redistribution, or it may prohibit distribution of packages created from patched sources.

However, the port's DISTFILES may be freely mirrored on FTP/HTTP. They may also be distributed on a CD-ROM (or similar media) unless NO_CDROM is set as well.

If the binary package is not generally useful, and the application must always be compiled from the source code, use NO_PACKAGE. For example, if the application has configuration information that is site specific hard coded into it at compile time, set NO_PACKAGE.

Set NO_PACKAGE to a string describing the reason why the package cannot be generated.

6.4.2. NO_CDROM

This variable alone indicates that, although we are allowed to generate binary packages, we may put neither those packages nor the port's DISTFILES onto a CD-ROM (or similar media) for resale. However, the binary packages and the port's DISTFILES will still be available via FTP/HTTP.

If this variable is set along with NO_PACKAGE, then only the port's DISTFILES will be available, and only via FTP/HTTP.

Set NO_CDROM to a string describing the reason why the port cannot be redistributed on CD-ROM. For instance, use this if the port's license is for "non-commercial" use only.

6.4.3. NOFETCHFILES

Files defined in NOFETCHFILES are not fetchable from any of MASTER_SITES. An example of such a file is when the file is supplied on CD-ROM by the vendor.

Tools which check for the availability of these files on MASTER_SITES have to ignore these files and not report about them.

6.4.4. RESTRICTED

Set this variable alone if the application's license permits neither mirroring the application's DISTFILES nor distributing the binary package in any way.

Do not set NO_CDROM or NO_PACKAGE along with RESTRICTED, since the latter variable implies the former ones.

Set RESTRICTED to a string describing the reason why the port cannot be redistributed. Typically, this indicates that the port contains proprietary software and that the user will need to manually download the DISTFILES, possibly after registering for the software or agreeing to accept the terms of an EULA.

6.4.5. RESTRICTED_FILES

When RESTRICTED or NO_CDROM is set, this variable defaults to ${DISTFILES} ${PATCHFILES}, otherwise it is empty. If only some of the distribution files are restricted, then set this variable to list them.

6.4.6. LEGAL_TEXT

If the port has legal concerns not addressed by the above variables, set LEGAL_TEXT to a string explaining the concern. For example, if special permission was obtained for FreeBSD to redistribute the binary, this variable must indicate so.

6.4.7. /usr/ports/LEGAL and LEGAL

A port which sets any of the above variables must also be added to /usr/ports/LEGAL. The first column is a glob which matches the restricted distfiles. The second column is the port's origin. The third column is the output of make -VLEGAL.

6.4.8. Examples

The preferred way to state "the distfiles for this port must be fetched manually" is as follows:

```
.if !exists(${DISTDIR}/${DISTNAME}${EXTRACT_SUFX})
IGNORE= may not be redistributed because of licensing reasons. Please visit some-website
to accept their license and download ${DISTFILES} into ${DISTDIR}
.endif
```

This both informs the user, and sets the proper metadata on the user's machine for use by automated programs.

Note that this stanza must be preceded by an inclusion of bsd.port.pre.mk.

6.5. Building Mechanisms

6.5.1. Building Ports in Parallel

The FreeBSD ports framework supports parallel building using multiple make sub-processes, which allows SMP systems to utilize all of their available CPU power, allowing port builds to be faster and more effective.

This is achieved by passing -jX flag to make(1) running on vendor code. This is the default build behavior of ports. Unfortunately, not all ports handle parallel building well and it may be required to explicitly disable this feature by adding the MAKE_JOBS_UNSAFE=yes variable. It is used when a port is known to be broken with -jX due to race conditions causing intermittent build failures.

When setting MAKE_JOBS_UNSAFE, it is very important to explain either with a comment in the Makefile, or at least in the commit message, why the port does not build when enabling. Otherwise, it is almost impossible to either fix the problem, or test if it has been fixed when committing an update at a later date.

6.5.2. make, gmake, and imake

Several differing make implementations exist. Ported software often requires a particular implementation, like GNU`make`, known in FreeBSD as gmake.

If the port uses GNU make, add gmake to USES.

MAKE_CMD can be used to reference the specific command configured by the USES setting in the port's Makefile. Only use MAKE_CMD within the application Makefiles in WRKSRC to call the make implementation expected by the ported software.

If the port is an X application that uses imake to create Makefiles from Imakefiles, set USES= imake. See the USES=imake section of Using USES Macros for more details.

If the port's source Makefile has something other than all as the main build target, set ALL_TARGET accordingly. The same goes for install and INSTALL_TARGET.

6.5.3. configure Script

If the port uses the configure script to generate Makefile from Makefile.in, set GNU_CONFIGURE=yes. To give extra arguments to the configure script (the default argument is --prefix=${PREFIX} --infodir=${PREFIX}/${INFO_PATH} --mandir=${MANPREFIX}/man --build=${CONFIGURE_TARGET}), set those extra arguments in CONFIGURE_ARGS. Extra environment variables can be passed using CONFIGURE_ENV.

表 9. Variables for Ports That Use configure

Variable	Means
GNU_CONFIGURE	The port uses configure script to prepare build.
HAS_CONFIGURE	Same as GNU_CONFIGURE, except default configure target is not added to CONFIGURE_ARGS.
CONFIGURE_ARGS	Additional arguments passed to configure script.
CONFIGURE_ENV	Additional environment variables to be set for configure script run.
CONFIGURE_TARGET	Override default configure target. Default value is ${MACHINE_ARCH}-portbld-freebsd${OSREL}.

6.5.4. Using cmake

For ports that use CMake, define USES= cmake.

表 10. Variables for Ports That Use cmake

Variable	Means
CMAKE_ARGS	Port specific CMake flags to be passed to the cmake binary.
CMAKE_ON	For each entry in CMAKE_ON, an enabled boolean value is added to CMAKE_ARGS. See CMAKE_ON and CMAKE_OFF.
CMAKE_OFF	For each entry in CMAKE_OFF, a disabled boolean value is added to CMAKE_ARGS. See CMAKE_ON and CMAKE_OFF.
CMAKE_BUILD_TYPE	Type of build (CMake predefined build profiles). Default is Release, or Debug if WITH_DEBUG is set.
CMAKE_SOURCE_PATH	Path to the source directory. Default is ${WRKSRC}.
CONFIGURE_ENV	Additional environment variables to be set for the cmake binary.

表 11. Variables the Users Can Define for cmake Builds

Variable	Means
CMAKE_NOCOLOR	Disables color build output. Default not set, unless BATCH or PACKAGE_BUILDING are set.

CMake supports these build profiles: Debug, Release, RelWithDebInfo and MinSizeRel. Debug and Release profiles respect system *FLAGS, RelWithDebInfo and MinSizeRel will set CFLAGS to -O2 -g and -Os -DNDEBUG correspondingly. The lower-cased value of CMAKE_BUILD_TYPE is exported to PLIST_SUB and must be used if the port installs *.cmake depending on the build type (see devel/kf5-kcrash for an example). Please note that some projects may define their own build profiles and/or force particular build type by setting CMAKE_BUILD_TYPE in CMakeLists.txt. To make a port for such a project respect CFLAGS and WITH_DEBUG, the CMAKE_BUILD_TYPE definitions must be removed from those files.

Most CMake-based projects support an out-of-source method of building. The out-of-source build for a port is the default setting. An in-source build can be requested by using the :insource suffix. With out-of-source builds, CONFIGURE_WRKSRC, BUILD_WRKSRC and INSTALL_WRKSRC will be set to ${WRKDIR}/.build and this directory will be used to keep all files generated during configuration and build stages, leaving the source directory intact.

例 56. USES= cmake Example

This snippet demonstrates the use of CMake for a port. CMAKE_SOURCE_PATH is not usually required, but can be set when the sources are not located in the top directory, or if only a subset of the project is intended to be built by the port.

```
USES=       cmake
CMAKE_SOURCE_PATH=  ${WRKSRC}/subproject
```

例 57. CMAKE_ON and CMAKE_OFF

When adding boolean values to CMAKE_ARGS, it is easier to use the CMAKE_ON and CMAKE_OFF variables instead. This:

```
CMAKE_ON=  VAR1 VAR2
CMAKE_OFF=  VAR3
```

Is equivalent to:

```
CMAKE_ARGS= -DVAR1:BOOL=TRUE -DVAR2:BOOL=TRUE -DVAR3:BOOL=FALSE
```

This is only for the default values off CMAKE_ARGS. The helpers described in OPT_CMAKE_BOOL and OPT_CMAKE_BOOL_OFF use the same semantics, but for optional values.

6.5.5. Using scons

If the port uses SCons, define USES=scons.

To make third party SConstruct respect everything that is passed to SCons in the environment (that is, most importantly, CC/CXX/CFLAGS/CXXFLAGS), patch SConstruct so build Environment is constructed like this:

```
env = Environment(**ARGUMENTS)
```

It may be then modified with env.Append and env.Replace.

6.5.6. Building Rust Applications with cargo

For ports that use Cargo, define USES=cargo.

表 12. Variables the Users Can Define for cargo Builds

Variable	Default	Description
CARGO_CRATES		List of crates the port depends on. Each entry needs to have a format like cratename-semver for example, libc-0.2.40. Port maintainers can generate this list from Cargo.lock using make cargo-crates. Manually bumping crate versions is possible but be mindful of transitive dependencies.
CARGO_FEATURES		List of application features to build (space separated list). To deactivate all default features add the special token --no -default-features to CARGO_FEATURES. Manually passing it to CARGO_BUILD_ARGS, CARGO_INSTALL_ARGS, and CARGO_TEST_ARGS is not needed.
CARGO_CARGOTOML	${WRKSRC}/Cargo.toml	The path to the Cargo.toml to use.
CARGO_CARGOLOCK	${WRKSRC}/Cargo.lock	The path to the Cargo.lock to use for make cargo-crates. It is possible to specify more than one lock file when necessary.
CARGO_ENV		A list of environment variables to pass to Cargo similar to MAKE_ENV.
RUSTFLAGS		Flags to pass to the Rust compiler.
CARGO_CONFIGURE	yes	Use the default do-configure.
CARGO_UPDATE_ARGS		Extra arguments to pass to Cargo during the configure phase. Valid arguments can be looked up with cargo update --help.
CARGO_BUILDDEP	yes	Add a build dependency on lang/rust.
CARGO_CARGO_BIN	${LOCALBASE}/bin/cargo	Location of the cargo binary.
CARGO_BUILD	yes	Use the default do-build.

Variable	Default	Description
CARGO_BUILD_ARGS		Extra arguments to pass to Cargo during the build phase. Valid arguments can be looked up with cargo build --help.
CARGO_INSTALL	yes	Use the default do-install.
CARGO_INSTALL_ARGS		Extra arguments to pass to Cargo during the install phase. Valid arguments can be looked up with cargo install --help.
CARGO_INSTALL_PATH	.	Path to the crate to install. This is passed to cargo install via its --path argument. When multiple paths are specified cargo install is run multiple times.
CARGO_TEST	yes	Use the default do-test.
CARGO_TEST_ARGS		Extra arguments to pass to Cargo during the test phase. Valid arguments can be looked up with cargo test --help.
CARGO_TARGET_DIR	${WRKDIR}/target	Location of the cargo output directory.
CARGO_DIST_SUBDIR	rust/crates	Directory relative to DISTDIR where the crate distribution files will be stored.
CARGO_VENDOR_DIR	${WRKSRC}/cargo-crates	Location of the vendor directory where all crates will be extracted to. Try to keep this under PATCH_WRKSRC, so that patches can be applied easily.
CARGO_USE_GITHUB	no	Enable fetching of crates locked to specific Git commits on GitHub via GH_TUPLE. This will try to patch all Cargo.toml under WRKDIR to point to the offline sources instead of fetching them from a Git repository during the build.
CARGO_USE_GITLAB	no	Same as CARGO_USE_GITHUB but for GitLab instances and GL_TUPLE.

例 58. Creating a Port for a Simple Rust Application

Creating a Cargo based port is a three stage process. First we need to provide a ports template that fetches the application distribution file:

```
PORTNAME=  tokei
DISTVERSIONPREFIX= v
DISTVERSION=   7.0.2
CATEGORIES= devel
```

```
MAINTAINER= tobik@FreeBSD.org
COMMENT=    Display statistics about your code

USES=       cargo
USE_GITHUB= yes
GH_ACCOUNT= Aaronepower

.include <bsd.port.mk>
```

Generate an initial distinfo:

```
% make makesum
=> Aaronepower-tokei-v7.0.2_GH0.tar.gz doesn't seem to exist in /usr/ports/distfiles/.
=> Attempting to fetch
https://codeload.github.com/Aaronepower/tokei/tar.gz/v7.0.2?dummy=/Aaronepower-tokei-v7.0.2_GH0.tar.gz
fetch:
https://codeload.github.com/Aaronepower/tokei/tar.gz/v7.0.2?dummy=/Aaronepower-tokei-v7.0.2_GH0.tar.gz: size of remote file is not known
Aaronepower-tokei-v7.0.2_GH0.tar.gz              45 kB  239 kBps 00m00s
```

Now the distribution file is ready to use and we can go ahead and extract crate dependencies from the bundled Cargo.lock:

```
% make cargo-crates
CARGO_CRATES=   aho-corasick-0.6.4 \
                ansi_term-0.11.0 \
                arrayvec-0.4.7 \
                atty-0.2.9 \
                bitflags-1.0.1 \
                byteorder-1.2.2 \
                [...]
```

The output of this command needs to be pasted directly into the Makefile:

```
PORTNAME=   tokei
DISTVERSIONPREFIX=  v
DISTVERSION=    7.0.2
CATEGORIES= devel

MAINTAINER= tobik@FreeBSD.org
COMMENT=    Display statistics about your code

USES=       cargo
```

```
USE_GITHUB= yes
GH_ACCOUNT= Aaronepower

CARGO_CRATES=   aho-corasick-0.6.4 \
            ansi_term-0.11.0 \
            arrayvec-0.4.7 \
            atty-0.2.9 \
            bitflags-1.0.1 \
            byteorder-1.2.2 \
            [...]

.include <bsd.port.mk>
```

distinfo needs to be regenerated to contain all the crate distribution files:

```
% make makesum
=> rust/crates/aho-corasick-0.6.4.tar.gz doesn't seem to exist in /usr/ports/distfiles/.
=> Attempting to fetch https://crates.io/api/v1/crates/aho-
corasick/0.6.4/download?dummy=/rust/crates/aho-corasick-0.6.4.tar.gz
rust/crates/aho-corasick-0.6.4.tar.gz       100% of   24 kB 6139 kBps 00m00s
=> rust/crates/ansi_term-0.11.0.tar.gz doesn't seem to exist in /usr/ports/distfiles/.
=> Attempting to fetch
https://crates.io/api/v1/crates/ansi_term/0.11.0/download?dummy=/rust/crates/ansi
_term-0.11.0.tar.gz
rust/crates/ansi_term-0.11.0.tar.gz        100% of   16 kB   21 MBps 00m00s
=> rust/crates/arrayvec-0.4.7.tar.gz doesn't seem to exist in /usr/ports/distfiles/.
=> Attempting to fetch
https://crates.io/api/v1/crates/arrayvec/0.4.7/download?dummy=/rust/crates/arrayv
ec-0.4.7.tar.gz
rust/crates/arrayvec-0.4.7.tar.gz          100% of   22 kB 3237 kBps 00m00s
=> rust/crates/atty-0.2.9.tar.gz doesn't seem to exist in /usr/ports/distfiles/.
=> Attempting to fetch https://crates.io/api/v1/crates/atty/0.2.9/download?dummy
=/rust/crates/atty-0.2.9.tar.gz
rust/crates/atty-0.2.9.tar.gz              100% of 5898  B   81 MBps 00m00s
=> rust/crates/bitflags-1.0.1.tar.gz doesn't seem to exist in /usr/ports/distfiles/.
[...]
```

The port is now ready for a test build and further adjustments like creating a plist, writing a description, adding license information, options, etc. as normal.

If you are not testing your port in a clean environment like with Poudriere, remember to run make clean before any testing.

例 59. Enabling Additional Application Features

Some applications define additional features in their Cargo.toml. They can be compiled in by

setting CARGO_FEATURES in the port.

Here we enable Tokei’ s json and yaml features:

```
CARGO_FEATURES= json yaml
```

例 60. Encoding Application Features As Port Options

An example [features] section in Cargo.toml could look like this:

```
[features]
pulseaudio_backend = ["librespot-playback/pulseaudio-backend"]
portaudio_backend = ["librespot-playback/portaudio-backend"]
default = ["pulseaudio_backend"]
```

pulseaudio_backend is a default feature. It is always enabled unless we explicitly turn off default features by adding --no-default-features to CARGO_FEATURES. Here we turn the portaudio_backend and pulseaudio_backend features into port options:

```
CARGO_FEATURES= --no-default-features

OPTIONS_DEFINE= PORTAUDIO PULSEAUDIO

PORTAUDIO_VARS=    CARGO_FEATURES+=portaudio_backend
PULSEAUDIO_VARS=   CARGO_FEATURES+=pulseaudio_backend
```

例 61. Listing Crate Licenses

Crates have their own licenses. It is important to know what they are when adding a LICENSE block to the port (see Licenses). The helper target cargo-crates-licenses will try to list all the licenses of all crates defined in CARGO_CRATES.

```
% make cargo-crates-licenses
aho-corasick-0.6.4  Unlicense/MIT
ansi_term-0.11.0    MIT
arrayvec-0.4.7      MIT/Apache-2.0
atty-0.2.9          MIT
bitflags-1.0.1      MIT/Apache-2.0
byteorder-1.2.2     Unlicense/MIT
[...]
```

The license names make cargo-crates-licenses outputs are SPDX 2.1 licenses expression which do not match the license names defined in the ports framework. They need to be translated to the names from Predefined License List.

6.5.7. Using meson

For ports that use Meson, define USES=meson.

表 13. Variables for Ports That Use meson

Variable	Description
MESON_ARGS	Port specific Meson flags to be passed to the meson binary.
MESON_BUILD_DIR	Path to the build directory relative to WRKSRC. Default is _build.

例 62. USES=meson Example

This snippet demonstrates the use of Meson for a port.

```
USES=     meson
MESON_ARGS= -Dfoo=enabled
```

6.5.8. Building Go Applications

For ports that use Go, define USES=go. Refer to go for a list of variables that can be set to control the build process.

例 63. Creating a Port for a Go Modules Based Application

In most cases, it is sufficient to set the GO_MODULE variable to the value specified by the module directive in go.mod:

```
PORTNAME=     hey
PORTVERSION=   0.1.4
DISTVERSIONPREFIX=    v
CATEGORIES=    benchmarks

MAINTAINER=    dmgk@FreeBSD.org
COMMENT=      Tiny program that sends some load to a web application

LICENSE=      APACHE20
LICENSE_FILE=  ${WRKSRC}/LICENSE

USES=       go:modules
GO_MODULE=     github.com/rakyll/hey

PLIST_FILES=   bin/hey

.include <bsd.port.mk>
```

If the "easy" way is not adequate or more control over dependencies is needed, the full porting

process is described below.

Creating a Go based port is a five stage process. First we need to provide a ports template that fetches the application distribution file:

```
PORTNAME=  ghq
DISTVERSIONPREFIX=  v
DISTVERSION=   0.12.5
CATEGORIES= devel

MAINTAINER= tobik@FreeBSD.org
COMMENT=   Remote repository management made easy

USES=     go:modules
USE_GITHUB= yes
GH_ACCOUNT= motemen

.include <bsd.port.mk>
```

Generate an initial distinfo:

```
% make makesum
===>  License MIT accepted by the user
=> motemen-ghq-v0.12.5_GH0.tar.gz doesn't seem to exist in /usr/ports/distfiles/.
=> Attempting to fetch
https://codeload.github.com/motemen/ghq/tar.gz/v0.12.5?dummy=/motemen-ghq-
v0.12.5_GH0.tar.gz
fetch:
https://codeload.github.com/motemen/ghq/tar.gz/v0.12.5?dummy=/motemen-ghq-
v0.12.5_GH0.tar.gz: size of remote file is not known
motemen-ghq-v0.12.5_GH0.tar.gz                32 kB  177 kBps    00s
```

Now the distribution file is ready to use and we can extract the required Go module dependencies. This step requires having ports-mgmt/modules2tuple installed:

```
% make gomod-vendor
[...]
GH_TUPLE=  \
    Songmu:gitconfig:v0.0.2:songmu_gitconfig/vendor/github.com/Songmu/gitconfig
\
    daviddengcn:go-
colortext:186a3d44e920:daviddengcn_go_colortext/vendor/github.com/daviddengcn
/go-colortext \
    go-yaml:yaml:v2.2.2:go_yaml_yaml/vendor/gopkg.in/yaml.v2 \
    golang:net:3ec191127204:golang_net/vendor/golang.org/x/net \
```

```
    golang:sync:112230192c58:golang_sync/vendor/golang.org/x/sync \
    golang:xerrors:3ee3066db522:golang_xerrors/vendor/golang.org/x/xerrors \
    motemen:go-
colorine:45d19169413a:motemen_go_colorine/vendor/github.com/motemen/go-
colorine \
    urfave:cli:v1.20.0:urfave_cli/vendor/github.com/urfave/cli
```

The output of this command needs to be pasted directly into the Makefile:

```
PORTNAME=  ghq
DISTVERSIONPREFIX=  v
DISTVERSION=   0.12.5
CATEGORIES= devel

MAINTAINER= tobik@FreeBSD.org
COMMENT=   Remote repository management made easy

USES=     go:modules
USE_GITHUB= yes
GH_ACCOUNT= motemen
GH_TUPLE=
Songmu:gitconfig:v0.0.2:songmu_gitconfig/vendor/github.com/Songmu/gitconfig \
    daviddengcn:go-
colortext:186a3d44e920:daviddengcn_go_colortext/vendor/github.com/daviddengcn
/go-colortext \
    go-yaml:yaml:v2.2.2:go_yaml_yaml/vendor/gopkg.in/yaml.v2 \
    golang:net:3ec191127204:golang_net/vendor/golang.org/x/net \
    golang:sync:112230192c58:golang_sync/vendor/golang.org/x/sync \
    golang:xerrors:3ee3066db522:golang_xerrors/vendor/golang.org/x/xerrors \
    motemen:go-
colorine:45d19169413a:motemen_go_colorine/vendor/github.com/motemen/go-
colorine \
    urfave:cli:v1.20.0:urfave_cli/vendor/github.com/urfave/cli

.include <bsd.port.mk>
```

distinfo needs to be regenerated to contain all the distribution files:

```
% make makesum
=> Songmu-gitconfig-v0.0.2_GH0.tar.gz doesn't seem to exist in /usr/ports/distfiles/.
=> Attempting to fetch
https://codeload.github.com/Songmu/gitconfig/tar.gz/v0.0.2?dummy=/Songmu-
gitconfig-v0.0.2_GH0.tar.gz
fetch:
https://codeload.github.com/Songmu/gitconfig/tar.gz/v0.0.2?dummy=/Songmu-
```

```
gitconfig-v0.0.2_GH0.tar.gz: size of remote file is not known
Songmu-gitconfig-v0.0.2_GH0.tar.gz              5662  B  936 kBps    00s
=> daviddengcn-go-colortext-186a3d44e920_GH0.tar.gz doesn't seem to exist in
/usr/ports/distfiles/.
=> Attempting to fetch https://codeload.github.com/daviddengcn/go-
colortext/tar.gz/186a3d44e920?dummy=/daviddengcn-go-colortext-
186a3d44e920_GH0.tar.gz
fetch: https://codeload.github.com/daviddengcn/go-
colortext/tar.gz/186a3d44e920?dummy=/daviddengcn-go-colortext-
186a3d44e920_GH0.tar.gz: size of remote file is not known
daviddengcn-go-colortext-186a3d44e920_GH0.tar.      4534  B 1098 kBps    00s
[...]
```

The port is now ready for a test build and further adjustments like creating a plist, writing a description, adding license information, options, etc. as normal.

If you are not testing your port in a clean environment like with Poudriere, remember to run make clean before any testing.

例 64. Setting Output Binary Name or Installation Path

Some ports need to install the resulting binary under a different name or to a path other than the default ${PREFIX}/bin. This can be done by using GO_TARGET tuple syntax, for example:

```
GO_TARGET= ./cmd/ipfs:ipfs-go
```

will install ipfs binary as ${PREFIX}/bin/ipfs-go and

```
GO_TARGET= ./dnscrypt-proxy:${PREFIX}/sbin/dnscrypt-proxy
```

will install dnscrypt-proxy to ${PREFIX}/sbin.

6.5.9. Building Haskell Applications with cabal

For ports that use Cabal, build system defines USES=cabal. Refer to cabal for a list of variables that can be set to control the build process.

例 65. Creating a Port for a Hackage-hosted Haskell Application

When preparing a Haskell Cabal port, the devel/hs-cabal-install program is required, so make sure it is installed beforehand. First we need to define common ports variables that allows cabal-install to fetch the package distribution file:

```
PORTNAME=  ShellCheck
DISTVERSION=   0.6.0
CATEGORIES= devel

MAINTAINER= haskell@FreeBSD.org
```

```
COMMENT=    Shell script analysis tool

USES=       cabal

.include <bsd.port.mk>
```

This minimal Makefile allows us to fetch the distribution file:

```
% make cabal-extract
[...]
Downloading the latest package list from hackage.haskell.org
cabal get ShellCheck-0.6.0
Downloading  ShellCheck-0.6.0
Downloaded   ShellCheck-0.6.0
Unpacking to ShellCheck-0.6.0/
```

Now we have ShellCheck.cabal package description file, which allows us to fetch all package's dependencies, including transitive ones:

```
% make cabal-extract-deps
[...]
Resolving dependencies...
Downloading  base-orphans-0.8.2
Downloaded   base-orphans-0.8.2
Downloading  primitive-0.7.0.0
Starting     base-orphans-0.8.2 (lib)
Building     base-orphans-0.8.2 (lib)
Downloaded   primitive-0.7.0.0
Downloading  dlist-0.8.0.7
[...]
```

As a side effect, the package's dependencies are also compiled, so the command may take some time. Once done, a list of required dependencies can generated:

```
% make make-use-cabal
USE_CABAL=QuickCheck-2.12.6.1 \
hashable-1.3.0.0 \
integer-logarithms-1.0.3 \
[...]
```

Haskell packages may contain revisions, just like FreeBSD ports. Revisions can affect only .cabal files, but it is still important to pull them in. To check USE_CABAL items for available revision updates, run following command:

```
% make make-use-cabal-revs
USE_CABAL=QuickCheck-2.12.6.1_1 \
hashable-1.3.0.0 \
integer-logarithms-1.0.3_2 \
[...]
```

Note additional version numbers after _ symbol. Put newly generated USE_CABAL list instead of an old one.

Finally, distinfo needs to be regenerated to contain all the distribution files:

```
% make makesum
=> ShellCheck-0.6.0.tar.gz doesn't seem to exist in
/usr/local/poudriere/ports/git/distfiles/cabal.
=> Attempting to fetch https://hackage.haskell.org/package/ShellCheck-
0.6.0/ShellCheck-0.6.0.tar.gz
ShellCheck-0.6.0.tar.gz                    136 kB  642 kBps    00s
=> QuickCheck-2.12.6.1/QuickCheck-2.12.6.1.tar.gz doesn't seem to exist in
/usr/local/poudriere/ports/git/distfiles/cabal.
=> Attempting to fetch https://hackage.haskell.org/package/QuickCheck-
2.12.6.1/QuickCheck-2.12.6.1.tar.gz
QuickCheck-2.12.6.1/QuickCheck-2.12.6.1.tar.gz      65 kB  361 kBps    00s
[...]
```

The port is now ready for a test build and further adjustments like creating a plist, writing a description, adding license information, options, etc. as normal.

If you are not testing your port in a clean environment like with Poudriere, remember to run make clean before any testing.

6.6. Using GNU Autotools

If a port needs any of the GNU Autotools software, add USES=autoreconf. See autoreconf for more information.

6.7. Using GNU gettext

6.7.1. Basic Usage

If the port requires gettext, set USES= gettext, and the port will inherit a dependency on libintl.so from devel/gettext. Other values for gettext usage are listed in USES=gettext.

A rather common case is a port using gettext and configure. Generally, GNU configure should be able to locate gettext automatically.

```
USES=  gettext
GNU_CONFIGURE=  yes
```

If it ever fails to, hints at the location of gettext can be passed in CPPFLAGS and LDFLAGS using localbase as follows:

```
USES=  gettext localbase:ldflags
GNU_CONFIGURE=  yes
```

6.7.2. Optional Usage

Some software products allow for disabling NLS. For example, through passing --disable-nls to configure. In that case, the port must use gettext conditionally, depending on the status of the NLS option. For ports of low to medium complexity, use this idiom:

```
GNU_CONFIGURE=    yes

OPTIONS_DEFINE=   NLS
OPTIONS_SUB=      yes

NLS_USES=     gettext
NLS_CONFIGURE_ENABLE=  nls

.include <bsd.port.mk>
```

Or using the older way of using options:

```
GNU_CONFIGURE=    yes

OPTIONS_DEFINE=   NLS

.include <bsd.port.options.mk>

.if ${PORT_OPTIONS:MNLS}
USES+=        gettext
PLIST_SUB+=   NLS=""
.else
CONFIGURE_ARGS+=  --disable-nls
PLIST_SUB+=   NLS="@comment "
.endif

.include <bsd.port.mk>
```

The next item on the to-do list is to arrange so that the message catalog files are included in the packing list conditionally. The Makefile part of this task is already provided by the idiom. It is explained in the section on advanced pkg-plist practices. In a nutshell, each occurrence of %%NLS%% in pkg-plist will be replaced by "`@comment " if NLS is disabled, or by a null string if NLS is enabled. Consequently, the lines prefixed by `%%NLS%% will become mere comments in the final packing list if NLS is off; otherwise the prefix will be just left out. Then insert %%NLS%%

before each path to a message catalog file in pkg-plist. For example:

```
%%NLS%%share/locale/fr/LC_MESSAGES/foobar.mo
%%NLS%%share/locale/no/LC_MESSAGES/foobar.mo
```

In high complexity cases, more advanced techniques may be needed, such as dynamic packing list generation.

6.7.3. Handling Message Catalog Directories

There is a point to note about installing message catalog files. The target directories for them, which reside under LOCALBASE/share/locale, must not be created and removed by a port. The most popular languages have their respective directories listed in PORTSDIR/Templates/BSD.local.dist. The directories for many other languages are governed by the devel/gettext port. Consult its pkg-plist and see whether the port is going to install a message catalog file for a unique language.

6.8. Using Perl

If MASTER_SITES is set to CPAN, the correct subdirectory is usually selected automatically. If the default subdirectory is wrong, CPAN/Module can be used to change it. MASTER_SITES can also be set to the old MASTER_SITE_PERL_CPAN, then the preferred value of MASTER_SITE_SUBDIR is the top-level hierarchy name. For example, the recommended value for p5-Module-Name is Module. The top-level hierarchy can be examined at cpan.org. This keeps the port working when the author of the module changes.

The exception to this rule is when the relevant directory does not exist or the distfile does not exist in that directory. In such case, using author’ s id as MASTER_SITE_SUBDIR is allowed. The CPAN:AUTHOR macro can be used, which will be translated to the hashed author directory. For example, CPAN:AUTHOR will be converted to authors/id/A/AU/AUTHOR.

When a port needs Perl support, it must set USES=perl5 with the optional USE_PERL5 described in the perl5 USES description.

表 14. Read-Only Variables for Ports That Use Perl

Read only variables	Means
PERL	The full path of the Perl 5 interpreter, either in the system or installed from a port, but without the version number. Use this when the software needs the path to the Perl interpreter. To replace "#!"lines in scripts, use shebangfix.
PERL_VERSION	The full version of Perl installed (for example, 5.8.9).
PERL_LEVEL	The installed Perl version as an integer of the form MNNNPP (for example, 500809).
PERL_ARCH	Where Perl stores architecture dependent libraries. Defaults to ${ARCH}-freebsd.
PERL_PORT	Name of the Perl port that is installed (for example, perl5).
SITE_PERL	Directory name where site specific Perl packages go. This value is added to PLIST_SUB.

Ports of Perl modules which do not have an official website must link to cpan.org in the WWW line of pkg-descr. The preferred URL form is http://search.cpan.org/dist/Module-Name/ (including the trailing slash).

Do not use ${SITE_PERL} in dependency declarations. Doing so assumes that perl5.mk has been included, which is not always true. Ports depending on this port will have incorrect dependencies if this port's files move later in an upgrade. The right way to declare Perl module dependencies is shown in the example below.

例 66. Perl Dependency Example

```
p5-IO-Tee>=0.64:devel/p5-IO-Tee
```

For Perl ports that install manual pages, the macro PERL5_MAN3 and PERL5_MAN1 can be used inside pkg-plist. For example,

```
lib/perl5/5.14/man/man1/event.1.gz
lib/perl5/5.14/man/man3/AnyEvent::I3.3.gz
```

can be replaced with

```
%%PERL5_MAN1%%/event.1.gz
%%PERL5_MAN3%%/AnyEvent::I3.3.gz
```

There are no PERL5_MAN_x_ macros for the other sections (x in 2 and 4 to 9) because those get installed in the regular directories.

例 67. A Port Which Only Requires Perl to Build

As the default USE_PERL5 value is build and run, set it to:

```
USES=     perl5
USE_PERL5=  build
```

例 68. A Port Which Also Requires Perl to Patch

From time to time, using sed(1) for patching is not enough. When using perl(1) is easier, use:

```
USES=     perl5
USE_PERL5=  patch build run
```

例 69. A Perl Module Which Needs ExtUtils::MakeMaker to Build

Most Perl modules come with a Makefile.PL configure script. In this case, set:

```
USES=     perl5
USE_PERL5=  configure
```

例 70. A Perl Module Which Needs Module::Build to Build

When a Perl module comes with a Build.PL configure script, it can require Module::Build, in which case, set

```
USES=     perl5
USE_PERL5=  modbuild
```

If it instead requires Module::Build::Tiny, set

```
USES=     perl5
USE_PERL5=  modbuildtiny
```

6.9. Using X11

6.9.1. X.Org Components

The X11 implementation available in The Ports Collection is X.Org. If the application depends on X components, add USES= xorg and set USE_XORG to the list of required components. A full list can be found in xorg.

The Mesa Project is an effort to provide free OpenGL implementation. To specify a dependency on various components of this project, use USES= gl and USE_GL. See gl for a full list of available components. For backwards compatibility, the value of yes maps to glu.

例 71. USE_XORG Example

```
USES=     gl xorg
USE_GL=    glu
USE_XORG=   xrender xft xkbfile xt xaw
```

表 15. Variables for Ports That Use X

USES= imake	The port uses imake.
XMKMF	Set to the path of xmkmf if not in the PATH. Defaults to xmkmf -a.

例 72. Using X11-Related Variables

```
# Use some X11 libraries
USES=     xorg
USE_XORG=   x11 xpm
```

6.9.2. Ports That Require Motif

If the port requires a Motif library, define USES= motif in the Makefile. Default Motif implementation is x11-toolkits/open-motif. Users can choose x11-toolkits/lesstif instead by setting WANT_LESSTIF

in their make.conf.

MOTIFLIB will be set by motif.mk to reference the appropriate Motif library. Please patch the source of the port to use ${MOTIFLIB} wherever the Motif library is referenced in the original Makefile or Imakefile.

There are two common cases:

- If the port refers to the Motif library as -lXm in its Makefile or Imakefile, substitute ${MOTIFLIB} for it.
- If the port uses XmClientLibs in its Imakefile, change it to ${MOTIFLIB} ${XTOOLLIB} ${XLIB}.

Note that MOTIFLIB (usually) expands to -L/usr/local/lib -lXm -lXp or /usr/local/lib/libXm.a, so there is no need to add -L or -l in front.

6.9.3. X11 Fonts

If the port installs fonts for the X Window System, put them in LOCALBASE/lib/X11/fonts/local.

6.9.4. Getting a Fake DISPLAY with Xvfb

Some applications require a working X11 display for compilation to succeed. This poses a problem for machines that operate headless. When this variable is used, the build infrastructure will start the virtual framebuffer X server. The working DISPLAY is then passed to the build. See USES=display for the possible arguments.

```
USES=  display
```

6.9.5. Desktop Entries

Desktop entries (a Freedesktop standard) provide a way to automatically adjust desktop features when a new program is installed, without requiring user intervention. For example, newly-installed programs automatically appear in the application menus of compatible desktop environments. Desktop entries originated in the GNOME desktop environment, but are now a standard and also work with KDE and Xfce. This bit of automation provides a real benefit to the user, and desktop entries are encouraged for applications which can be used in a desktop environment.

6.9.5.1. Using Predefined .desktop Files

Ports that include predefined *.desktop must include those files in pkg-plist and install them in the $LOCALBASE/share/applications directory. The INSTALL_DATA macro is useful for installing these files.

6.9.5.2. Updating Desktop Database

If a port has a MimeType entry in its portname.desktop, the desktop database must be updated after install and deinstall. To do this, define USES= desktop-file-utils.

6.9.5.3. Creating Desktop Entries with DESKTOP_ENTRIES

Desktop entries can be easily created for applications by using DESKTOP_ENTRIES. A file named name.desktop will be created, installed, and added to pkg-plist automatically. Syntax is:

```
DESKTOP_ENTRIES=   "NAME" "COMMENT" "ICON" "COMMAND" "CATEGORY"
StartupNotify
```

The list of possible categories is available on the Freedesktop website. StartupNotify indicates whether the application is compatible with startup notifications. These are typically a graphic indicator like a clock that appear at the mouse pointer, menu, or panel to give the user an indication when a program is starting. A program that is compatible with startup notifications clears the indicator after it has started. Programs that are not compatible with startup notifications would never clear the indicator (potentially confusing and infuriating the user), and must have StartupNotify set to false so the indicator is not shown at all.

Example:

```
DESKTOP_ENTRIES=   "ToME" "Roguelike game based on JRR Tolkien's work" \
        "${DATADIR}/xtra/graf/tome-128.png" \
        "tome -v -g" "Application;Game;RolePlaying;" \
        false
```

6.10. Using GNOME

6.10.1. Introduction

This chapter explains the GNOME framework as used by ports. The framework can be loosely divided into the base components, GNOME desktop components, and a few special macros that simplify the work of port maintainers.

6.10.2. Using USE_GNOME

Adding this variable to the port allows the use of the macros and components defined in bsd.gnome.mk. The code in bsd.gnome.mk adds the needed build-time, run-time or library dependencies or the handling of special files. GNOME applications under FreeBSD use the USE_GNOME infrastructure. Include all the needed components as a space-separated list. The USE_GNOME components are divided into these virtual lists: basic components, GNOME 3 components and legacy components. If the port needs only GTK3 libraries, this is the shortest way to define it:

```
USE_GNOME= gtk30
```

USE_GNOME components automatically add the dependencies they need. Please see GNOME Components for an exhaustive list of all USE_GNOME components and which other components they imply and their dependencies.

Here is an example Makefile for a GNOME port that uses many of the techniques outlined in this document. Please use it as a guide for creating new ports.

```
# $FreeBSD$

PORTNAME=   regexxer
DISTVERSION=    0.10
CATEGORIES= devel textproc gnome
MASTER_SITES=   GNOME

MAINTAINER= kwm@FreeBSD.org
COMMENT=    Interactive tool for performing search and replace operations
```

```
USES=     gettext gmake localbase:ldflags pathfix pkgconfig tar:xz
GNU_CONFIGURE=  yes
USE_GNOME=  gnomeprefix intlhack gtksourceviewmm3

GLIB_SCHEMAS=   org.regexxer.gschema.xml

.include <bsd.port.mk>
```

The USE_GNOME macro without any arguments does not add any dependencies to the port. USE_GNOME cannot be set after bsd.port.pre.mk.

6.10.3. Variables

This section explains which macros are available and how they are used. Like they are used in the above example. The GNOME Components has a more in-depth explanation. USE_GNOME has to be set for these macros to be of use.

GLIB_SCHEMAS

List of all the glib schema files the port installs. The macro will add the files to the port plist and handle the registration of these files on install and deinstall.

The glib schema files are written in XML and end with the gschema.xml extension. They are installed in the share/glib-2.0/schemas/ directory. These schema files contain all application config values with their default settings. The actual database used by the applications is built by glib-compile-schema, which is run by the GLIB_SCHEMAS macro.

```
GLIB_SCHEMAS=foo.gschema.xml
```

Do not add glib schemas to the pkg-plist. If they are listed in pkg-plist, they will not be registered and the applications might not work properly.

GCONF_SCHEMAS

List all the gconf schema files. The macro will add the schema files to the port plist and will handle their registration on install and deinstall.

GConf is the XML-based database that virtually all GNOME applications use for storing their settings. These files are installed into the etc/gconf/schemas directory. This database is defined by installed schema files that are used to generate %gconf.xml key files. For each schema file installed by the port, there must be an entry in the Makefile:

```
GCONF_SCHEMAS=my_app.schemas my_app2.schemas my_app3.schemas
```

Gconf schemas are listed in the GCONF_SCHEMAS macro rather than pkg-plist. If they are listed in pkg-plist, they will not be registered and the applications might not work properly.

INSTALLS_OMF

Open Source Metadata Framework (OMF) files are commonly used by GNOME 2 applications. These files contain the application help file information, and require special processing by ScrollKeeper/rarian. To properly register OMF files when installing GNOME applications from

packages, make sure that omf files are listed in pkg-plist and that the port Makefile has INSTALLS_OMF defined:

```
INSTALLS_OMF=yes
```

When set, bsd.gnome.mk automatically scans pkg-plist and adds appropriate @exec and @unexec directives for each .omf to track in the OMF registration database.

6.11. GNOME Components

For further help with a GNOME port, look at some of the existing ports for examples. The FreeBSD GNOME page has contact information if more help is needed. The components are divided into GNOME components that are currently in use and legacy components. If the component supports argument, they are listed between parenthesis in the description. The first is the default. "Both" is shown if the component defaults to adding to both build and run dependencies.

表 16. GNOME Components

Component	Associated program	Description
atk	accessibility/atk	Accessibility toolkit (ATK)
atkmm	accessibility/atkmm	c++ bindings for atk
cairo	graphics/cairo	Vector graphics library with cross-device output support
cairomm	graphics/cairomm	c++ bindings for cairo
dconf	devel/dconf	Configuration database system (both, build, run)
evolutiondataserver3	databases/evolution-data-server	Data backends for the Evolution integrated mail/PIM suite
gdkpixbuf2	graphics/gdk-pixbuf2	Graphics library for GTK+
glib20	devel/glib20	GNOME core library glib20
glibmm	devel/glibmm	c++ bindings for glib20
gnomecontrolcenter3	sysutils/gnome-control-center	GNOME 3 Control Center
gnomedesktop3	x11/gnome-desktop	GNOME 3 desktop UI library
gsound	audio/gsound	GObject library for playing system sounds (both, build, run)
gtk-update-icon-cache	graphics/gtk-update-icon-cache	Gtk-update-icon-cache utility from the Gtk+ toolkit
gtk20	x11-toolkits/gtk20	Gtk+ 2 toolkit
gtk30	x11-toolkits/gtk30	Gtk+ 3 toolkit
gtkmm20	x11-toolkits/gtkmm20	c++ bindings 2.0 for the gtk20 toolkit
gtkmm24	x11-toolkits/gtkmm24	c++ bindings 2.4 for the gtk20 toolkit
gtkmm30	x11-toolkits/gtkmm30	c++ bindings 3.0 for the gtk30 toolkit
gtksourceview2	x11-toolkits/gtksourceview2	Widget that adds syntax highlighting to GtkTextView

Component	Associated program	Description
gtksourceview3	x11-toolkits/gtksourceview3	Text widget that adds syntax highlighting to the GtkTextView widget
gtksourceviewmm3	x11-toolkits/gtksourceviewmm3	c++ bindings for the gtksourceview3 library
gvfs	devel/gvfs	GNOME virtual file system
intltool	textproc/intltool	Tool for internationalization (also see intlhack)
introspection	devel/gobject-introspection	Basic introspection bindings and tools to generate introspection bindings. Most of the time :build is enough, :both/:run is only need for applications that use introspection bindings. (both, build, run)
libgda5	databases/libgda5	Provides uniform access to different kinds of data sources
libgda5-ui	databases/libgda5-ui	UI library from the libgda5 library
libgdamm5	databases/libgdamm5	c++ bindings for the libgda5 library
libgsf	devel/libgsf	Extensible I/O abstraction for dealing with structured file formats
librsvg2	graphics/librsvg2	Library for parsing and rendering SVG vector-graphic files
libsigc++20	devel/libsigc++20	Callback Framework for C++
libxml++26	textproc/libxml++26	c++ bindings for the libxml2 library
libxml2	textproc/libxml2	XML parser library (both, build, run)
libxslt	textproc/libxslt	XSLT C library (both, build, run)
metacity	x11-wm/metacity	Window manager from GNOME
nautilus3	x11-fm/nautilus	GNOME file manager
pango	x11-toolkits/pango	Open-source framework for the layout and rendering of i18n text
pangomm	x11-toolkits/pangomm	c++ bindings for the pango library
py3gobject3	devel/py3-gobject3	Python 3, GObject 3.0 bindings
pygobject3	devel/py-gobject3	Python 2, GObject 3.0 bindings
vte3	x11-toolkits/vte3	Terminal widget with improved accessibility and I18N support

表 17. GNOME Macro Components

Component	Description
gnomeprefix	Supply configure with some default locations.

Component	Description
intlhack	Same as intltool, but patches to make sure share/locale/ is used. Please only use when intltool alone is not enough.
referencehack	This macro is there to help splitting of the API or reference documentation into its own port.

表 18. GNOME Legacy Components

Component	Associated program	Description
atspi	accessibility/at-spi	Assistive Technology Service Provider Interface
esound	audio/esound	Enlightenment sound package
gal2	x11-toolkits/gal2	Collection of widgets taken from GNOME 2 gnumeric
gconf2	devel/gconf2	Configuration database system for GNOME 2
gconfmm26	devel/gconfmm26	c++ bindings for gconf2
gdkpixbuf	graphics/gdk-pixbuf	Graphics library for GTK+
glib12	devel/glib12	glib 1.2 core library
gnomedocutils	textproc/gnome-doc-utils	GNOME doc utils
gnomemimedata	misc/gnome-mime-data	MIME and Application database for GNOME 2
gnomesharp20	x11-toolkits/gnome-sharp20	GNOME 2 interfaces for the .NET runtime
gnomespeech	accessibility/gnome-speech	GNOME 2 text-to-speech API
gnomevfs2	devel/gnome-vfs	GNOME 2 Virtual File System
gtk12	x11-toolkits/gtk12	Gtk+ 1.2 toolkit
gtkhtml3	www/gtkhtml3	Lightweight HTML rendering/printing/editing engine
gtkhtml4	www/gtkhtml4	Lightweight HTML rendering/printing/editing engine
gtksharp20	x11-toolkits/gtk-sharp20	GTK+ and GNOME 2 interfaces for the .NET runtime
gtksourceview	x11-toolkits/gtksourceview	Widget that adds syntax highlighting to GtkTextView
libartgpl2	graphics/libart_lgpl	Library for high-performance 2D graphics
libbonobo	devel/libbonobo	Component and compound document system for GNOME 2
libbonoboui	x11-toolkits/libbonoboui	GUI frontend to the libbonobo component of GNOME 2
libgda4	databases/libgda4	Provides uniform access to different kinds of data sources
libglade2	devel/libglade2	GNOME 2 glade library
libgnome	x11/libgnome	Libraries for GNOME 2, a GNU desktop environment

Component	Associated program	Description
libgnomecanvas	graphics/libgnomecanvas	Graphics library for GNOME 2
libgnomekbd	x11/libgnomekbd	GNOME 2 keyboard shared library
libgnomeprint	print/libgnomeprint	Gnome 2 print support library
libgnomeprintui	x11-toolkits/libgnomeprintui	Gnome 2 print support library
libgnomeui	x11-toolkits/libgnomeui	Libraries for the GNOME 2 GUI, a GNU desktop environment
libgtkhtml	www/libgtkhtml	Lightweight HTML rendering/printing/editing engine
libgtksourceviewmm	x11-toolkits/libgtksourceviewmm	c++ binding of GtkSourceView
libidl	devel/libIDL	Library for creating trees of CORBA IDL file
libsigc++12	devel/libsigc++12	Callback Framework for C++
libwnck	x11-toolkits/libwnck	Library used for writing pagers and tasklists
libwnck3	x11-toolkits/libwnck3	Library used for writing pagers and tasklists
orbit2	devel/ORBit2	High-performance CORBA ORB with support for the C language
pygnome2	x11-toolkits/py-gnome2	Python bindings for GNOME 2
pygobject	devel/py-gobject	Python 2, GObject 2.0 bindings
pygtk2	x11-toolkits/py-gtk2	Set of Python bindings for GTK+
pygtksourceview	x11-toolkits/py-gtksourceview	Python bindings for GtkSourceView 2
vte	x11-toolkits/vte	Terminal widget with improved accessibility and I18N support

表 19. Deprecated Components: Do Not Use

Component	Description
pangox-compat	pangox-compat has been deprecated and split off from the pango package.

6.12. Using Qt

For ports that are part of Qt itself, see qt-dist.

6.12.1. Ports That Require Qt

The Ports Collection provides support for Qt 5 with USES+=qt:5. Set USE_QT to the list of required Qt components (libraries, tools, plugins).

The Qt framework exports a number of variables which can be used by ports, some of them listed below:

表 20. Variables Provided to Ports That Use Qt

QMAKE	Full path to qmake binary.

LRELEASE	Full path to lrelease utility.
MOC	Full path to moc.
RCC	Full path to rcc.
UIC	Full path to uic.
QT_INCDIR	Qt include directory.
QT_LIBDIR	Qt libraries path.
QT_PLUGINDIR	Qt plugins path.

6.12.2. Component Selection

Individual Qt tool and library dependencies must be specified in USE_QT. Every component can be suffixed with _build or _run, the suffix indicating whether the dependency on the component is at buildtime or runtime. If unsuffixed, the component will be depended on at both build- and runtime. Usually, library components are specified unsuffixed, tool components are mostly specified with the _build suffix and plugin components are specified with the _run suffix. The most commonly used components are listed below (all available components are listed in _USE_QT_ALL, and _USE_QT5_ONLY in /usr/ports/Mk/Uses/qt.mk):

表 21. Available Qt Library Components

Name	Description
3d	Qt3D module
assistant	Qt 5 documentation browser
canvas3d	Qt canvas3d module
charts	Qt 5 charts module
concurrent	Qt multi-threading module
connectivity	Qt connectivity (Bluetooth/NFC) module
core	Qt core non-graphical module
datavis3d	Qt 5 3D data visualization module
dbus	Qt D-Bus inter-process communication module
declarative	Qt declarative framework for dynamic user interfaces
designer	Qt 5 graphical user interface designer
diag	Tool for reporting diagnostic information about Qt and its environment
doc	Qt 5 documentation
examples	Qt 5 examples sourcecode
gamepad	Qt 5 Gamepad Module
graphicaleffects	Qt Quick graphical effects
gui	Qt graphical user interface module
help	Qt online help integration module
l10n	Qt localized messages
linguist	Qt 5 translation tool
location	Qt location module
multimedia	Qt audio, video, radio and camera support module
network	Qt network module

Name	Description
networkauth	Qt network auth module
opengl	Qt 5-compatible OpenGL support module
paths	Command line client to QStandardPaths
phonon4	KDE multimedia framework
pixeltool	Qt 5 screen magnifier
plugininfo	Qt5 plugin metadata dumper
printsupport	Qt print support module
qdbus	Qt command-line interface to D-Bus
qdbusviewer	Qt 5 graphical interface to D-Bus
qdoc	Qt documentation generator
qdoc-data	QDoc configuration files
qev	Qt QWidget events introspection tool
qmake	Qt Makefile generator
quickcontrols	Set of controls for building complete interfaces in Qt Quick
quickcontrols2	Set of controls for building complete interfaces in Qt Quick
remoteobjects	Qt5 SXCML module
script	Qt 4-compatible scripting module
scripttools	Qt Script additional components
scxml	Qt5 SXCML module
sensors	Qt sensors module
serialbus	Qt functions to access industrial bus systems
serialport	Qt functions to access serial ports
speech	Accessibilty features for Qt5
sql	Qt SQL database integration module
sql-ibase	Qt InterBase/Firebird database plugin
sql-mysql	Qt MySQL database plugin
sql-odbc	Qt Open Database Connectivity plugin
sql-pgsql	Qt PostgreSQL database plugin
sql-sqlite2	Qt SQLite 2 database plugin
sql-sqlite3	Qt SQLite 3 database plugin
sql-tds	Qt TDS Database Connectivity database plugin
svg	Qt SVG support module
testlib	Qt unit testing module
uiplugin	Custom Qt widget plugin interface for Qt Designer
uitools	Qt Designer UI forms support module
virtualkeyboard	Qt 5 Virtual Keyboard Module
wayland	Qt5 wrapper for Wayland
webchannel	Qt 5 library for integration of C++/QML with HTML/js clients

Name	Description
webengine	Qt 5 library to render web content
webkit	QtWebKit with a more modern WebKit code base
websockets	Qt implementation of WebSocket protocol
websockets-qml	Qt implementation of WebSocket protocol (QML bindings)
webview	Qt component for displaying web content
widgets	Qt C++ widgets module
x11extras	Qt platform-specific features for X11-based systems
xml	Qt SAX and DOM implementations
xmlpatterns	Qt support for XPath, XQuery, XSLT and XML Schema

To determine the libraries an application depends on, run ldd on the main executable after a successful compilation.

表 22. Available Qt Tool Components

Name	Description
buildtools	build tools (moc, rcc), needed for almost every Qt application.
linguisttools	localization tools: lrelease, lupdate
qmake	Makefile generator/build utility

表 23. Available Qt Plugin Components

Name	Description
imageformats	plugins for TGA, TIFF, and MNG image formats

例 73. Selecting Qt 5 Components

In this example, the ported application uses the Qt 5 graphical user interface library, the Qt 5 core library, all of the Qt 5 code generation tools and Qt 5’ s Makefile generator. Since the gui library implies a dependency on the core library, core does not need to be specified. The Qt 5 code generation tools moc, uic and rcc, as well as the Makefile generator qmake are only needed at buildtime, thus they are specified with the _build suffix:

```
USES=  qt:5
USE_QT= gui buildtools_build qmake_build
```

6.12.3. Using qmake

If the application provides a qmake project file (*.pro), define USES= qmake along with USE_QT. USES= qmake already implies a build dependency on qmake, therefore the qmake component can be omitted from USE_QT. Similar to CMake, qmake supports out-of-source builds, which can be enabled by specifying the outsource argument (see USES= qmake example). Also see Possible Arguments for USES= qmake.

表 24. Possible Arguments for USES= qmake

Variable	Description
no_configure	Do not add the configure target. This is implied by HAS_CONFIGURE=yes and GNU_CONFIGURE=yes. It is required when the build only needs the environment setup from USES= qmake, but otherwise runs qmake on its own.
no_env	Suppress modification of the configure and make environments. It is only required when qmake is used to configure the software and the build fails to understand the environment setup by USES= qmake.
norecursive	Do not pass the -recursive argument to qmake.
outsource	Perform an out-of-source build.

表 25. Variables for Ports That Use qmake

Variable	Description
QMAKE_ARGS	Port specific qmake flags to be passed to the qmake binary.
QMAKE_ENV	Environment variables to be set for the qmake binary. The default is ${CONFIGURE_ENV}.
QMAKE_SOURCE_PATH	Path to qmake project files (.pro). The default is ${WRKSRC} if an out-of-source build is requested, empty otherwise.

When using USES= qmake, these settings are deployed:

```
CONFIGURE_ARGS+=   --with-qt-includes=${QT_INCDIR} \
        --with-qt-libraries=${QT_LIBDIR} \
        --with-extra-libs=${LOCALBASE}/lib \
        --with-extra-includes=${LOCALBASE}/include

CONFIGURE_ENV+= QTDIR="${QT_PREFIX}" QMAKE="${QMAKE}" \
     MOC="${MOC}" RCC="${RCC}" UIC="${UIC}" \
     QMAKESPEC="${QMAKESPEC}"

PLIST_SUB+= QT_INCDIR=${QT_INCDIR_REL} \
     QT_LIBDIR=${QT_LIBDIR_REL} \
     QT_PLUGINDIR=${QT_PLUGINDIR_REL}
```

Some configure scripts do not support the arguments above. To suppress modification of CONFIGURE_ENV and CONFIGURE_ARGS, set USES= qmake:no_env.

例 74. USES= qmake Example

This snippet demonstrates the use of qmake for a Qt 5 port:

```
USES=   qmake:outsource qt:5
```

```
USE_QT= buildtools_build
```

Qt applications are often written to be cross-platform and often X11/Unix is not the platform they are developed on, which in turn leads to certain loose ends, like:

- Missing additional include paths. Many applications come with system tray icon support, but neglect to look for includes and/or libraries in the X11 directories. To add directories to `qmake's include and library search paths via the command line, use:

```
QMAKE_ARGS+=    INCLUDEPATH+=${LOCALBASE}/include \
    LIBS+=-L${LOCALBASE}/lib
```

- Bogus installation paths. Sometimes data such as icons or .desktop files are by default installed into directories which are not scanned by XDG-compatible applications. editors/texmaker is an example for this - look at patch-texmaker.pro in the files directory of that port for a template on how to remedy this directly in the qmake project file.

6.13. Using KDE

6.13.1. KDE Variable Definitions

If the application depends on KDE, set USES+=kde:5 and USE_KDE to the list of required components. _build and _run suffixes can be used to force components dependency type (for example, baseapps_run). If no suffix is set, a default dependency type will be used. To force both types, add the component twice with both suffixes (for example, ecm_build ecm_run). Available components are listed below (up-to-date components are also listed in /usr/ports/Mk/Uses/kde.mk):

表 26. Available KDE Components

Name	Description
activities	KF5 runtime and library to organize work in separate activities
activities-stats	KF5 statistics for activities
activitymanagerd	System service to manage user's activities, track the usage patterns
akonadi	Storage server for KDE-Pim
akonadicalendar	Akonadi Calendar Integration
akonadiconsole	Akonadi management and debugging console
akonadicontacts	Libraries and daemons to implement Contact Management in Akonadi
akonadiimportwizard	Import data from other mail clients to KMail
akonadimime	Libraries and daemons to implement basic email handling
akonadinotes	KDE library for accessing mail storages in MBox format
akonadisearch	Libraries and daemons to implement searching in Akonadi
akregator	A Feed Reader by KDE
alarmcalendar	KDE API for KAlarm alarms

Name	Description
apidox	KF5 API Documentation Tools
archive	KF5 library that provides classes for handling archive formats
attica	Open Collaboration Services API library KDE5 version
attica5	Open Collaboration Services API library KDE5 version
auth	KF5 abstraction to system policy and authentication features
baloo	KF5 Framework for searching and managing user metadata
baloo-widgets	BalooWidgets library
baloo5	KF5 Framework for searching and managing user metadata
blog	KDE API for weblogging access
bookmarks	KF5 library for bookmarks and the XBEL format
breeze	Plasma5 artwork, styles and assets for the Breeze visual style
breeze-gtk	Plasma5 Breeze visual style for Gtk
breeze-icons	Breeze icon theme for KDE
calendarcore	KDE calendar access library
calendarsupport	Calendar support libraries for KDEPim
calendarutils	KDE utility and user interface functions for accessing calendar
codecs	KF5 library for string manipulation
completion	KF5 text completion helpers and widgets
config	KF5 widgets for configuration dialogs
configwidgets	KF5 widgets for configuration dialogs
contacts	KDE api to manage contact information
coreaddons	KF5 addons to QtCore
crash	KF5 library to handle crash analysis and bug report from apps
dbusaddons	KF5 addons to QtDBus
decoration	Plasma5 library to create window decorations
designerplugin	KF5 integration of Frameworks widgets in Qt Designer/Creator
discover	Plasma5 package management tools
dnssd	KF5 abstraction to system DNSSD features
doctools	KF5 documentation generation from docbook
drkonqi	Plasma5 crash handler
ecm	Extra modules and scripts for CMake
emoticons	KF5 library to convert emoticons
eventviews	Event view libriares for KDEPim
filemetadata	KF5 library for extracting file metadata

Name	Description
frameworkintegration	KF5 workspace and cross-framework integration plugins
gapi	KDE based library to access google services
globalaccel	KF5 library to add support for global workspace shortcuts
grantlee-editor	Editor for Grantlee themes
grantleetheme	KDE PIM grantleetheme
gravatar	Library for gravatar support
guiaddons	KF5 addons to QtGui
holidays	KDE library for calendar holidays
hotkeys	Plasma5 library for hotkeys
i18n	KF5 advanced internationalization framework
iconthemes	KF5 library for handling icons in applications
identitymanagement	KDE pim identities
idletime	KF5 library for monitoring user activity
imap	KDE API for IMAP support
incidenceeditor	Incidence editor libriares for KDEPim
infocenter	Plasma5 utility providing system information
init	KF5 process launcher to speed up launching KDE applications
itemmodels	KF5 models for Qt Model/View system
itemviews	KF5 widget addons for Qt Model/View
jobwidgets	KF5 widgets for tracking KJob instance
js	KF5 library providing an ECMAScript interpreter
jsembed	KF5 library for binding JavaScript objects to QObjects
kaddressbook	KDE contact manager
kalarm	Personal alarm scheduler
kalarm	Personal alarm scheduler
kate	Basic editor framework for the KDE system
kcmutils	KF5 utilities for working with KCModules
kde-cli-tools	Plasma5 non-interactive system tools
kde-gtk-config	Plasma5 GTK2 and GTK3 configurator
kdeclarative	KF5 library providing integration of QML and KDE Frameworks
kded	KF5 extensible daemon for providing system level services
kdelibs4support	KF5 porting aid from KDELibs4
kdepim-addons	KDE PIM addons
kdepim-apps-libs	KDE PIM mail related libraries
kdepim-runtime5	KDE PIM tools and services
kdeplasma-addons	Plasma5 addons to improve the Plasma experience

Name	Description
kdesu	KF5 integration with su for elevated privileges
kdewebkit	KF5 library providing integration of QtWebKit
kgamma5	Plasma5 monitor’ s gamma settings
khtml	KF5 KTHML rendering engine
kimageformats	KF5 library providing support for additional image formats
kio	KF5 resource and network access abstraction
kirigami2	QtQuick based components set
kitinerary	Data Model and Extraction System for Travel Reservation information
kmail	KDE mail client
kmail	KDE mail client
kmail-account-wizard	KDE mail account wizard
kmenuedit	Plasma5 menu editor
knotes	Popup notes
kontact	KDE Personal Information Manager
kontact	KDE Personal Information Manager
kontactinterface	KDE glue for embedding KParts into Kontact
korganizer	Calendar and scheduling Program
kpimdav	A DAV protocol implementation with KJobs
kpkpass	Library to deal with Apple Wallet pass files
kross	KF5 multi-language application scripting
kscreen	Plasma5 screen management library
kscreenlocker	Plasma5 secure lock screen architecture
ksmtp	Job-based library to send email through an SMTP server
ksshaskpass	Plasma5 ssh-add frontend
ksysguard	Plasma5 utility to track and control the running processes
kwallet-pam	Plasma5 KWallet PAM Integration
kwayland-integration	Integration plugins for a Wayland-based desktop
kwin	Plasma5 window manager
kwrited	Plasma5 daemon listening for wall and write messages
ldap	LDAP access API for KDE
libkcddb	KDE CDDB library
libkcompactdisc	KDE library for interfacing with audio CDs
libkdcraw	LibRaw interface for KDE
libkdegames	Libraries used by KDE games
libkdepim	KDE PIM Libraries
libkeduvocdocument	Library for reading and writing vocabulary files
libkexiv2	Exiv2 library interface for KDE

Name	Description
libkipi	KDE Image Plugin Interface
libkleo	Certificate manager for KDE
libksane	SANE library interface for KDE
libkscreen	Plasma5 screen management library
libksieve	Sieve libriares for KDEPim
libksysguard	Plasma5 library to track and control running processes
mailcommon	Common libriares for KDEPim
mailimporter	Import mbox files to KMail
mailtransport	KDE library to managing mail transport
marble	Virtual globe and world atlas for KDE
mbox	KDE library for accessing mail storages in MBox format
mbox-importer	Import mbox files to KMail
mediaplayer	KF5 plugin interface for media player features
messagelib	Library for handling messages
milou	Plasma5 Plasmoid for search
mime	Library for handling MIME data
newstuff	KF5 library for downloading application assets from the network
notifications	KF5 abstraction for system notifications
notifyconfig	KF5 configuration system for KNotify
okular	KDE universal document viewer
oxygen	Plasma5 Oxygen style
oxygen-icons5	The Oxygen icon theme for KDE
package	KF5 library to load and install packages
parts	KF5 document centric plugin system
people	KF5 library providing access to contacts
pim-data-exporter	Import and export KDE PIM settings
pimcommon	Common libriares for KDEPim
pimtextedit	KDE library for PIM-specific text editing utilities
plasma-browser-integration	Plasma5 components to integrate browsers into the desktop
plasma-desktop	Plasma5 plasma desktop
plasma-framework	KF5 plugin based UI runtime used to write user interfaces
plasma-integration	Qt Platform Theme integration plugins for the Plasma workspaces
plasma-pa	Plasma5 Plasma pulse audio mixer
plasma-sdk	Plasma5 applications useful for Plasma development
plasma-workspace	Plasma5 Plasma workspace
plasma-workspace-wallpapers	Plasma5 wallpapers

Name	Description
plotting	KF5 lightweight plotting framework
polkit-kde-agent-1	Plasma5 daemon providing a polkit authentication UI
powerdevil	Plasma5 tool to manage the power consumption settings
prison	API to produce barcodes
pty	KF5 pty abstraction
purpose	Offers available actions for a specific purpose
qqc2-desktop-style	Qt QuickControl2 style for KDE
runner	KF5 parallelized query system
service	KF5 advanced plugin and service introspection
solid	KF5 hardware integration and detection
sonnet	KF5 plugin-based spell checking library
syndication	KDE RSS feed handling library
syntaxhighlighting	KF5 syntax highlighting engine for structured text and code
systemsettings	Plasma5 system settings
texteditor	KF5 advanced embeddable text editor
textwidgets	KF5 advanced text editing widgets
threadweaver	KF5 addons to QtDBus
tnef	KDE API for the handling of TNEF data
unitconversion	KF5 library for unit conversion
user-manager	Plasma5 user manager
wallet	KF5 secure and unified container for user passwords
wayland	KF5 Client and Server library wrapper for the Wayland libraries
widgetsaddons	KF5 addons to QtWidgets
windowsystem	KF5 library for access to the windowing system
xmlgui	KF5 user configurable main windows
xmlrpcclient	KF5 interaction with XMLRPC services

例 75. USE_KDE Example

This is a simple example for a KDE port. USES= cmake instructs the port to utilize CMake, a configuration tool widely used by KDE projects (see Using cmake for detailed usage). USE_KDE brings dependency on KDE libraries. Required KDE components and other dependencies can be determined through the configure log. USE_KDE does not imply USE_QT. If a port requires some Qt components, specify them in USE_QT.

```
USES=     cmake kde:5 qt:5
USE_KDE=  ecm
USE_QT=   core buildtools_build qmake_build
```

6.14. Using LXQt

Applications depending on LXQt should set USES+= lxqt and set USE_LXQT to the list of required components from the table below

表 27. Available LXQt Components

Name	Description
buildtools	Helpers for additional CMake modules
libfmqt	Libfm Qt bindings
lxqt	LXQt core library
qtxdg	Qt implementation of freedesktop.org XDG specifications

例 76. USE_LXQT Example

This is a simple example, USE_LXQT adds a dependency on LXQt libraries. Required LXQt components and other dependencies can be determined from the configure log.

```
USES=   cmake lxqt qt:5 tar:xz
USE_QT=    core dbus widgets buildtools_build qmake_build
USE_LXQT=   buildtools libfmqt
```

6.15. Using Java

6.15.1. Variable Definitions

If the port needs a Java™ Development Kit (JDK™) to either build, run or even extract the distfile, then define USE_JAVA.

There are several JDKs in the ports collection, from various vendors, and in several versions. If the port must use a particular version, specify it using the JAVA_VERSION variable. The most current version is java/openjdk16, with java/openjdk15, java/openjdk14, java/openjdk13, java/openjdk12, java/openjdk11, java/openjdk8, and java/openjdk7 also available.

表 28. Variables Which May be Set by Ports That Use Java

Variable	Means
USE_JAVA	Define for the remaining variables to have any effect.
JAVA_VERSION	List of space-separated suitable Java versions for the port. An optional "" ` allows specifying a range of versions (allowed values: ` 7[] 8[] 11[] 12[] 13[] 14[] 15[] 16[+]).
JAVA_OS	List of space-separated suitable JDK port operating systems for the port (allowed values: native linux).
JAVA_VENDOR	List of space-separated suitable JDK port vendors for the port (allowed values: openjdk oracle).
JAVA_BUILD	When set, add the selected JDK port to the build dependencies.

Variable	Means
JAVA_RUN	When set, add the selected JDK port to the run dependencies.
JAVA_EXTRACT	When set, add the selected JDK port to the extract dependencies.

Below is the list of all settings a port will receive after setting USE_JAVA:

表 29. Variables Provided to Ports That Use Java

Variable	Value
JAVA_PORT	The name of the JDK port (for example, java/openjdk6).
JAVA_PORT_VERSION	The full version of the JDK port (for example, 1.6.0). Only the first two digits of this version number are needed, use ${JAVA_PORT_VERSION:C/^([0-9])\.([0-9])(.*)$/\1.\2/}.
JAVA_PORT_OS	The operating system used by the JDK port (for example, 'native').
JAVA_PORT_VENDOR	The vendor of the JDK port (for example, 'openjdk').
JAVA_PORT_OS_DESCRIPTION	Description of the operating system used by the JDK port (for example, 'Native').
JAVA_PORT_VENDOR_DESCRIPTION	Description of the vendor of the JDK port (for example, 'OpenJDK BSD Porting Team').
JAVA_HOME	Path to the installation directory of the JDK (for example, '/usr/local/openjdk6').
JAVAC	Path to the Java compiler to use (for example, '/usr/local/openjdk6/bin/javac').
JAR	Path to the jar tool to use (for example, '/usr/local/openjdk6/bin/jar' or '/usr/local/bin/fastjar').
APPLETVIEWER	Path to the appletviewer utility (for example, '/usr/local/openjdk6/bin/appletviewer').
JAVA	Path to the java executable. Use this for executing Java programs (for example, '/usr/local/openjdk6/bin/java').
JAVADOC	Path to the javadoc utility program.
JAVAH	Path to the javah program.
JAVAP	Path to the javap program.
JAVA_KEYTOOL	Path to the keytool utility program.
JAVA_N2A	Path to the native2ascii tool.
JAVA_POLICYTOOL	Path to the policytool program.
JAVA_SERIALVER	Path to the serialver utility program.
RMIC	Path to the RMI stub/skeleton generator, rmic.
RMIREGISTRY	Path to the RMI registry program, rmiregistry.
RMID	Path to the RMI daemon program rmid.
JAVA_CLASSES	Path to the archive that contains the JDK class files, ${JAVA_HOME}/jre/lib/rt.jar.

Use the java-debug make target to get information for debugging the port. It will display the value of many of the previously listed variables.

Additionally, these constants are defined so all Java ports may be installed in a consistent way:

表 30. Constants Defined for Ports That Use Java

Constant	Value
JAVASHAREDIR	The base directory for everything related to Java. Default: ${PREFIX}/share/java.
JAVAJARDIR	The directory where JAR files is installed. Default: ${JAVASHAREDIR}/classes.
JAVALIBDIR	The directory where JAR files installed by other ports are located. Default: ${LOCALBASE}/share/java/classes.

The related entries are defined in both PLIST_SUB (documented in Changing pkg-plist Based on Make Variables) and SUB_LIST.

6.15.2. Building with Ant

When the port is to be built using Apache Ant, it has to define USE_ANT. Ant is thus considered to be the sub-make command. When no do-build target is defined by the port, a default one will be set that runs Ant according to MAKE_ENV, MAKE_ARGS and ALL_TARGET. This is similar to the USES=gmake mechanism, which is documented in Building Mechanisms.

6.15.3. Best Practices

When porting a Java library, the port has to install the JAR file(s) in ${JAVAJARDIR}, and everything else under ${JAVASHAREDIR}/${PORTNAME} (except for the documentation, see below). To reduce the packing file size, reference the JAR file(s) directly in the Makefile. Use this statement (where myport.jar is the name of the JAR file installed as part of the port):

```
PLIST_FILES+=  ${JAVAJARDIR}/myport.jar
```

When porting a Java application, the port usually installs everything under a single directory (including its JAR dependencies). The use of ${JAVASHAREDIR}/${PORTNAME} is strongly encouraged in this regard. It is up the porter to decide whether the port installs the additional JAR dependencies under this directory or uses the already installed ones (from ${JAVAJARDIR}).

When porting a Java™ application that requires an application server such as www/tomcat7 to run the service, it is quite common for a vendor to distribute a .war. A .war is a Web application ARchive and is extracted when called by the application. Avoid adding a .war to pkg-plist. It is not considered best practice. An application server will expand war archive, but not clean it up properly if the port is removed. A more desirable way of working with this file is to extract the archive, then install the files, and lastly add these files to pkg-plist.

```
TOMCATDIR=  ${LOCALBASE}/apache-tomcat-7.0
WEBAPPDIR=  myapplication

post-extract:
  @${MKDIR} ${WRKDIR}/${PORTDIRNAME}
  @${TAR} xf ${WRKDIR}/myapplication.war -C ${WRKDIR}/${PORTDIRNAME}
```

```
do-install:
  cd ${WRKDIR} && \
  ${INSTALL} -d -o ${WWWOWN} -g ${WWWGRP} ${TOMCATDIR}/webapps/${PORTDIRNAME}
  cd ${WRKDIR}/${PORTDIRNAME} && ${COPYTREE_SHARE} \*
${WEBAPPDIR}/${PORTDIRNAME}
```

Regardless of the type of port (library or application), the additional documentation is installed in the same location as for any other port. The Javadoc tool is known to produce a different set of files depending on the version of the JDK that is used. For ports that do not enforce the use of a particular JDK, it is therefore a complex task to specify the packing list (pkg-plist). This is one reason why porters are strongly encouraged to use PORTDOCS. Moreover, even if the set of files that will be generated by javadoc can be predicted, the size of the resulting pkg-plist advocates for the use of PORTDOCS.

The default value for DATADIR is ${PREFIX}/share/${PORTNAME}. It is a good idea to override DATADIR to ${JAVASHAREDIR}/${PORTNAME} for Java ports. Indeed, DATADIR is automatically added to PLIST_SUB (documented in Changing pkg-plist Based on Make Variables) so use %%DATADIR%% directly in pkg-plist.

As for the choice of building Java ports from source or directly installing them from a binary distribution, there is no defined policy at the time of writing. However, people from the FreeBSD Java Project encourage porters to have their ports built from source whenever it is a trivial task.

All the features that have been presented in this section are implemented in bsd.java.mk. If the port needs more sophisticated Java support, please first have a look at the bsd.java.mk Git log as it usually takes some time to document the latest features. Then, if the needed support that is lacking would be beneficial to many other Java ports, feel free to discuss it on the freebsd-java.

Although there is a java category for PRs, it refers to the JDK porting effort from the FreeBSD Java project. Therefore, submit the Java port in the ports category as for any other port, unless the issue is related to either a JDK implementation or bsd.java.mk.

Similarly, there is a defined policy regarding the CATEGORIES of a Java port, which is detailed in Categorization.

6.16. Web Applications, Apache and PHP

6.16.1. Apache

表 31. Variables for Ports That Use Apache

USE_APACHE	The port requires Apache. Possible values: yes (gets any version), 22, 24, 22-24, 22+, etc. The default APACHE version is 22. More details are available in ports/Mk/bsd.apache.mk and at wiki.freebsd.org/Apache/.
APXS	Full path to the apxs binary. Can be overridden in the port.
HTTPD	Full path to the httpd binary. Can be overridden in the port.
APACHE_VERSION	The version of present Apache installation (read-only variable). This variable is only available after inclusion of bsd.port.pre.mk. Possible values: 22, 24.
APACHEMODDIR	Directory for Apache modules. This variable is automatically expanded in pkg-plist.

APACHEINCLUDEDIR	Directory for Apache headers. This variable is automatically expanded in pkg-plist.
APACHEETCDIR	Directory for Apache configuration files. This variable is automatically expanded in pkg-plist.

表 32. Useful Variables for Porting Apache Modules

MODULENAME	Name of the module. Default value is PORTNAME. Example: mod_hello
SHORTMODNAME	Short name of the module. Automatically derived from MODULENAME, but can be overridden. Example: hello
AP_FAST_BUILD	Use apxs to compile and install the module.
AP_GENPLIST	Also automatically creates a pkg-plist.
AP_INC	Adds a directory to a header search path during compilation.
AP_LIB	Adds a directory to a library search path during compilation.
AP_EXTRAS	Additional flags to pass to apxs.

6.16.2. Web Applications

Web applications must be installed into PREFIX/www/appname. This path is available both in Makefile and in pkg-plist as WWWDIR, and the path relative to PREFIX is available in Makefile as WWWDIR_REL.

The user and group of web server process are available as WWWOWN and WWWGRP, in case the ownership of some files needs to be changed. The default values of both are www. Use WWWOWN?= myuser and WWWGRP?= mygroup if the port needs different values. This allows the user to override them easily.

Use WWWOWN and WWWGRP sparingly. Remember that every file the web server can write to is a security risk waiting to happen.

Do not depend on Apache unless the web app explicitly needs Apache. Respect that users may wish to run a web application on a web server other than Apache.

6.16.3. PHP

PHP web applications declare their dependency on it with USES=php. See php for more information.

6.16.4. PEAR Modules

Porting PEAR modules is a very simple process.

Add USES=pear to the port’ s Makefile. The framework will install the relevant files in the right places and automatically generate the plist at install time.

例 77. Example Makefile for PEAR Class

```
PORTNAME=     Date
DISTVERSION=  1.4.3
CATEGORIES= devel www pear
```

```
MAINTAINER= example@domain.com
COMMENT=    PEAR Date and Time Zone Classes

USES=   pear

.include <bsd.port.mk>
```

PEAR modules will automatically be flavorized using PHP flavors.

If a non default PEAR_CHANNEL is used, the build and run-time dependencies will automatically be added.

PEAR modules do not need to defined PKGNAMESUFFIX it is automatically filled in using PEAR_PKGNAMEPREFIX. If a port needs to add to PKGNAMEPREFIX, it must also use PEAR_PKGNAMEPREFIX to differentiate between different flavors.

6.16.4.1. Horde Modules

In the same way, porting Horde modules is a simple process.

Add USES=horde to the port’ s Makefile. The framework will install the relevant files in the right places and automatically generate the plist at install time.

The USE_HORDE_BUILD and USE_HORDE_RUN variables can be used to add buildtime and runtime dependencies on other Horde modules. See Mk/Uses/horde.mk for a complete list of available modules.

例 78. Example Makefile for Horde Module

```
PORTNAME=   Horde_Core
DISTVERSION=    2.14.0
CATEGORIES= devel www pear

MAINTAINER= horde@FreeBSD.org
COMMENT=    Horde Core Framework libraries

OPTIONS_DEFINE= KOLAB SOCKETS
KOLAB_DESC= Enable Kolab server support
SOCKETS_DESC=   Depend on sockets PHP extension

USES=   horde
USE_PHP=    session

USE_HORDE_BUILD=    Horde_Role
USE_HORDE_RUN=  Horde_Role Horde_History Horde_Pack \
    Horde_Text_Filter Horde_View
```

```
KOLAB_USE=  HORDE_RUN=Horde_Kolab_Server,Horde_Kolab_Session
SOCKETS_USE=   PHP=sockets

.include <bsd.port.mk>
```

As Horde modules are also PEAR modules they will also automatically be flavorized using PHP flavors.

6.17. Using Python

The Ports Collection supports parallel installation of multiple Python versions. Ports must use a correct python interpreter, according to the user-settable PYTHON_VERSION. Most prominently, this means replacing the path to python executable in scripts with the value of PYTHON_CMD.

Ports that install files under PYTHON_SITELIBDIR must use the pyXY- package name prefix, so their package name embeds the version of Python they are installed into.

```
PKGNAMEPREFIX=  ${PYTHON_PKGNAMEPREFIX}
```

表 33. Most Useful Variables for Ports That Use Python

USES=python	The port needs Python. The minimal required version can be specified with values such as 2.7+. Version ranges can also be specified by separating two version numbers with a dash: USES=python:3.2-3.3
USE_PYTHON=distutils	Use Python distutils for configuring, compiling, and installing. This is required when the port comes with setup.py. This overrides the do-build and do-install targets and may also override do-configure if GNU_CONFIGURE is not defined. Additionally, it implies USE_PYTHON=flavors.
USE_PYTHON=autoplist	Create the packaging list automatically. This also requires USE_PYTHON=distutils to be set.
USE_PYTHON=concurrent	The port will use an unique prefix, typically PYTHON_PKGNAMEPREFIX for certain directories, such as EXAMPLESDIR and DOCSDIR and also will append a suffix, the python version from PYTHON_VER, to binaries and scripts to be installed. This allows ports to be installed for different Python versions at the same time, which otherwise would install conflicting files.
USE_PYTHON=flavors	The port does not use distutils but still supports multiple Python versions. FLAVORS will be set to the supported Python versions. See USES=python and Flavors for more information.
USE_PYTHON=optsuffix	If the current Python version is not the default version, the port will gain PKGNAMESUFFIX=${PYTHON_PKGNAMESUFFIX}. Only useful with flavors.

PYTHON_PKGNAMEPREFIX	Used as a PKGNAMEPREFIX to distinguish packages for different Python versions. Example: py27-
PYTHON_SITELIBDIR	Location of the site-packages tree, that contains installation path of Python (usually LOCALBASE). PYTHON_SITELIBDIR can be very useful when installing Python modules.
PYTHONPREFIX_SITELIBDIR	The PREFIX-clean variant of PYTHON_SITELIBDIR. Always use %%PYTHON_SITELIBDIR%% in pkg-plist when possible. The default value of %%PYTHON_SITELIBDIR%% is lib/python%%PYTHON_VERSION%%/site-packages
PYTHON_CMD	Python interpreter command line, including version number.

表 34. Python Module Dependency Helpers

PYNUMERIC	Dependency line for numeric extension.
PYNUMPY	Dependency line for the new numeric extension, numpy. (PYNUMERIC is deprecated by upstream vendor).
PYXML	Dependency line for XML extension (not needed for Python 2.0 and higher as it is also in base distribution).
PY_ENUM34	Conditional dependency on devel/py-enum34 depending on the Python version.
PY_ENUM_COMPAT	Conditional dependency on devel/py-enum-compat depending on the Python version.
PY_PATHLIB	Conditional dependency on devel/py-pathlib depending on the Python version.
PY_IPADDRESS	Conditional dependency on net/py-ipaddress depending on the Python version.
PY_FUTURES	Conditional dependency on devel/py-futures depending on the Python version.

A complete list of available variables can be found in /usr/ports/Mk/Uses/python.mk.

All dependencies to Python ports using Python flavors (either with USE_PYTHON=distutils or USE_PYTHON=flavors) must have the Python flavor appended to their origin using @${PY_FLAVOR}. See Makefile for a Simple Python Module.

例 79. Makefile for a Simple Python Module

```
PORTNAME=  sample
DISTVERSION=  1.2.3
CATEGORIES= devel

MAINTAINER= john@doe.tld
COMMENT=  Python sample module
```

```
RUN_DEPENDS=   ${PYTHON_PKGNAMEPREFIX}six>0:devel/py-six@${PY_FLAVOR}

USES=      python
USE_PYTHON= autoplist distutils

.include <bsd.port.mk>
```

Some Python applications claim to have DESTDIR support (which would be required for staging) but it is broken (Mailman up to 2.1.16, for instance). This can be worked around by recompiling the scripts. This can be done, for example, in the post-build target. Assuming the Python scripts are supposed to reside in PYTHONPREFIX_SITELIBDIR after installation, this solution can be applied:

```
(cd ${STAGEDIR}${PREFIX} \
 && ${PYTHON_CMD} ${PYTHON_LIBDIR}/compileall.py \
  -d ${PREFIX} -f ${PYTHONPREFIX_SITELIBDIR:S;${PREFIX}/;;})
```

This recompiles the sources with a path relative to the stage directory, and prepends the value of PREFIX to the file name recorded in the byte-compiled output file by -d. -f is required to force recompilation, and the :S;${PREFIX}/;; strips prefixes from the value of PYTHONPREFIX_SITELIBDIR to make it relative to PREFIX.

6.18. Using Tcl/Tk

The Ports Collection supports parallel installation of multiple Tcl/Tk versions. Ports should try to support at least the default Tcl/Tk version and higher with USES=tcl. It is possible to specify the desired version of tcl by appending :_xx_, for example, USES=tcl:85.

表 35. The Most Useful Read-Only Variables for Ports That Use Tcl/Tk

TCL_VER	chosen major.minor version of Tcl
TCLSH	full path of the Tcl interpreter
TCL_LIBDIR	path of the Tcl libraries
TCL_INCLUDEDIR	path of the Tcl C header files
TK_VER	chosen major.minor version of Tk
WISH	full path of the Tk interpreter
TK_LIBDIR	path of the Tk libraries
TK_INCLUDEDIR	path of the Tk C header files

See the USES=tcl and USES=tk of Using USES Macros for a full description of those variables. A complete list of those variables is available in /usr/ports/Mk/Uses/tcl.mk.

6.19. Using Ruby

表 36. Useful Variables for Ports That Use Ruby

Variable	Description
USE_RUBY	Adds build and run dependencies on Ruby.
USE_RUBY_EXTCONF	The port uses extconf.rb to configure.

Variable	Description
USE_RUBY_SETUP	The port uses setup.rb to configure.
RUBY_SETUP	Override the name of the setup script from setup.rb. Another common value is install.rb.

This table shows the selected variables available to port authors via the ports infrastructure. These variables are used to install files into their proper locations. Use them in pkg-plist as much as possible. Do not redefine these variables in the port.

表 37. Selected Read-Only Variables for Ports That Use Ruby

Variable	Description	Example value
RUBY_PKGNAMEPREFIX	Used as a PKGNAMEPREFIX to distinguish packages for different Ruby versions.	ruby19-
RUBY_VERSION	Full version of Ruby in the form of x.y.z[.p].	1.9.3.484
RUBY_SITELIBDIR	Architecture independent libraries installation path.	/usr/local/lib/ruby/site_ruby/1.9
RUBY_SITEARCHLIBDIR	Architecture dependent libraries installation path.	/usr/local/lib/ruby/site_ruby/1.9/amd64-freebsd10
RUBY_MODDOCDIR	Module documentation installation path.	/usr/local/share/doc/ruby19/patsy
RUBY_MODEXAMPLESDIR	Module examples installation path.	/usr/local/share/examples/ruby19/patsy

A complete list of available variables can be found in /usr/ports/Mk/bsd.ruby.mk.

6.20. Using SDL

USE_SDL is used to autoconfigure the dependencies for ports which use an SDL based library like devel/sdl12 and graphics/sdl_image.

These SDL libraries for version 1.2 are recognized:

- sdl: devel/sdl12
- console: devel/sdl_console
- gfx: graphics/sdl_gfx
- image: graphics/sdl_image
- mixer: audio/sdl_mixer
- mm: devel/sdlmm
- net: net/sdl_net
- pango: x11-toolkits/sdl_pango
- sound: audio/sdl_sound
- ttf: graphics/sdl_ttf

These SDL libraries for version 2.0 are recognized:

- sdl: devel/sdl20
- gfx: graphics/sdl2_gfx
- image: graphics/sdl2_image

- mixer: audio/sdl2_mixer
- net: net/sdl2_net
- ttf: graphics/sdl2_ttf

Therefore, if a port has a dependency on net/sdl_net and audio/sdl_mixer, the syntax will be:

```
USE_SDL=    net mixer
```

The dependency devel/sdl12, which is required by net/sdl_net and audio/sdl_mixer, is automatically added as well.

Using USE_SDL with entries for SDL 1.2, it will automatically:

- Add a dependency on sdl12-config to BUILD_DEPENDS
- Add the variable SDL_CONFIG to CONFIGURE_ENV
- Add the dependencies of the selected libraries to LIB_DEPENDS

Using USE_SDL with entries for SDL 2.0, it will automatically:

- Add a dependency on sdl2-config to BUILD_DEPENDS
- Add the variable SDL2_CONFIG to CONFIGURE_ENV
- Add the dependencies of the selected libraries to LIB_DEPENDS

6.21. Using wxWidgets

This section describes the status of the wxWidgets libraries in the ports tree and its integration with the ports system.

6.21.1. Introduction

There are many versions of the wxWidgets libraries which conflict between them (install files under the same name). In the ports tree this problem has been solved by installing each version under a different name using version number suffixes.

The obvious disadvantage of this is that each application has to be modified to find the expected version. Fortunately, most of the applications call the wx-config script to determine the necessary compiler and linker flags. The script is named differently for every available version. Majority of applications respect an environment variable, or accept a configure argument, to specify which wx-config script to call. Otherwise they have to be patched.

6.21.2. Version Selection

To make the port use a specific version of wxWidgets there are two variables available for defining (if only one is defined the other will be set to a default value):

表 38. Variables to Select wxWidgets Versions

Variable	Description	Default value
USE_WX	List of versions the port can use	All available versions
USE_WX_NOT	List of versions the port cannot use	None

The available wxWidgets versions and the corresponding ports in the tree are:

表 39. Available wxWidgets Versions

Version	Port
2.8	x11-toolkits/wxgtk28
3.0	x11-toolkits/wxgtk30

The variables in Variables to Select wxWidgets Versions can be set to one or more of these combinations separated by spaces:

表 40. wxWidgets Version Specifications

Description	Example
Single version	2.8
Ascending range	2.8+
Descending range	3.0-
Full range (must be ascending)	2.8-3.0

There are also some variables to select the preferred versions from the available ones. They can be set to a list of versions, the first ones will have higher priority.

表 41. Variables to Select Preferred wxWidgets Versions

Name	Designed for
WANT_WX_VER	the port
WITH_WX_VER	the user

6.21.3. Component Selection

There are other applications that, while not being wxWidgets libraries, are related to them. These applications can be specified in WX_COMPS. These components are available:

表 42. Available wxWidgets Components

Name	Description	Version restriction
wx	main library	none
contrib	contributed libraries	none
python	wxPython (Python bindings)	2.8-3.0

The dependency type can be selected for each component by adding a suffix separated by a semicolon. If not present then a default type will be used (see Default wxWidgets Dependency Types). These types are available:

表 43. Available wxWidgets Dependency Types

Name	Description
build	Component is required for building, equivalent to BUILD_DEPENDS
run	Component is required for running, equivalent to RUN_DEPENDS
lib	Component is required for building and running, equivalent to LIB_DEPENDS

The default values for the components are detailed in this table:

表 44. Default wxWidgets Dependency Types

Component	Dependency type
wx	lib
contrib	lib
python	run
mozilla	lib
svg	lib

例 80. Selecting wxWidgets Components

This fragment corresponds to a port which uses wxWidgets version 2.4 and its contributed libraries.

```
USE_WX=    2.8
WX_COMPS=   wx contrib
```

6.21.4. Detecting Installed Versions

To detect an installed version, define WANT_WX. If it is not set to a specific version then the components will have a version suffix. HAVE_WX will be filled after detection.

例 81. Detecting Installed wxWidgets Versions and Components

This fragment can be used in a port that uses wxWidgets if it is installed, or an option is selected.

```
WANT_WX=    yes

.include <bsd.port.pre.mk>

.if defined(WITH_WX) || !empty(PORT_OPTIONS:MWX) || !empty(HAVE_WX:Mwx-2.8)
USE_WX=       2.8
CONFIGURE_ARGS+=    --enable-wx
.endif
```

This fragment can be used in a port that enables wxPython support if it is installed or if an option is selected, in addition to wxWidgets, both version 2.8.

```
USE_WX=    2.8
WX_COMPS=   wx
WANT_WX=    2.8

.include <bsd.port.pre.mk>

.if defined(WITH_WXPYTHON) || !empty(PORT_OPTIONS:MWXPYTHON) ||
!empty(HAVE_WX:Mpython)
```

```
WX_COMPS+=    python
CONFIGURE_ARGS+=   --enable-wxpython
.endif
```

6.21.5. Defined Variables

These variables are available in the port (after defining one from Variables to Select wxWidgets Versions).

表 45. Variables Defined for Ports That Use wxWidgets

Name	Description
WX_CONFIG	The path to the wxWidgets`wx-config` script (with different name)
WXRC_CMD	The path to the wxWidgets`wxrc` program (with different name)
WX_VERSION	The wxWidgets version that is going to be used (for example, 2.6)

6.21.6. Processing in bsd.port.pre.mk

Define WX_PREMK to be able to use the variables right after including bsd.port.pre.mk.

When defining WX_PREMK, then the version, dependencies, components and defined variables will not change if modifying the wxWidgets port variables after including bsd.port.pre.mk.

例 82. Using wxWidgets Variables in Commands

This fragment illustrates the use of WX_PREMK by running the wx-config script to obtain the full version string, assign it to a variable and pass it to the program.

```
USE_WX=    2.8
WX_PREMK=  yes

.include <bsd.port.pre.mk>

.if exists(${WX_CONFIG})
VER_STR!=  ${WX_CONFIG} --release

PLIST_SUB+= VERSION="${VER_STR}"
.endif
```

The wxWidgets variables can be safely used in commands when they are inside targets without the need of WX_PREMK.

6.21.7. Additional configure Arguments

Some GNU configure scripts cannot find wxWidgets with just the WX_CONFIG environment variable set, requiring additional arguments. WX_CONF_ARGS can be used for provide them.

表 46. Legal Values for WX_CONF_ARGS

Possible value	Resulting argument
absolute	--with-wx-config=${WX_CONFIG}
relative	--with-wx=${LOCALBASE} --with-wx-config=${WX_CONFIG:T}

6.22. Using Lua

This section describes the status of the Lua libraries in the ports tree and its integration with the ports system.

6.22.1. Introduction

There are many versions of the Lua libraries and corresponding interpreters, which conflict between them (install files under the same name). In the ports tree this problem has been solved by installing each version under a different name using version number suffixes.

The obvious disadvantage of this is that each application has to be modified to find the expected version. But it can be solved by adding some additional flags to the compiler and linker.

Applications that use Lua should normally build for just one version. However, loadable modules for Lua are built in a separate flavor for each Lua version that they support, and dependencies on such modules should specify the flavor using the @${LUA_FLAVOR} suffix on the port origin.

6.22.2. Version Selection

A port using Lua should have a line of this form:

```
USES=  lua
```

If a specific version of Lua, or range of versions, is needed, it can be specified as a parameter in the form XY (which may be used multiple times), XY+, -XY, or XY-ZA. The default version of Lua as set via DEFAULT_VERSIONS will be used if it falls in the requested range, otherwise the closest requested version to the default will be used. For example:

```
USES=  lua:52-53
```

Note that no attempt is made to adjust the version selection based on the presence of any already-installed Lua version.

The XY+ form of version specification should not be used without careful consideration; the Lua API changes to some extent in every version, and configuration tools like CMake or Autoconf will often fail to work on future versions of Lua until updated to do so.

6.22.3. Configuration and Compiler flags

Software that uses Lua may have been written to auto-detect the Lua version in use. In general ports should override this assumption, and force the use of the specific Lua version selected as

described above. Depending on the software being ported, this might require any or all of:

- Using LUA_VER as part of a parameter to the software's configuration script via CONFIGURE_ARGS or CONFIGURE_ENV (or equivalent for other build systems);
- Adding -I${LUA_INCDIR}, -L${LUA_LIBDIR}, and -llua-${LUA_VER} to CFLAGS, LDFLAGS, LIBS respectively as appropriate;
- Patch the software's configuration or build files to select the correct version.

6.22.4. Version Flavors

A port which installs a Lua module (rather than an application that simply makes use of Lua) should build a separate flavor for each supported Lua version. This is done by adding the module parameter:

```
USES=  lua:module
```

A version number or range of versions can be specified as well; use a comma to separate parameters.

Since each flavor must have a different package name, the variable LUA_PKGNAMEPREFIX is provided which will be set to an appropriate value; the intended usage is:

```
PKGNAMEPREFIX=  ${LUA_PKGNAMEPREFIX}
```

Module ports should normally install files only to LUA_MODLIBDIR, LUA_MODSHAREDIR, LUA_DOCSDIR, and LUA_EXAMPLESDIR, all of which are set up to refer to version-specific subdirectories. Installing any other files must be done with care to avoid conflicts between versions.

A port (other than a Lua module) which wishes to build a separate package for each Lua version should use the flavors parameter:

```
USES=  lua:flavors
```

This operates the same way as the module parameter described above, but without the assumption that the package should be documented as a Lua module (so LUA_DOCSDIR and LUA_EXAMPLESDIR are not defined by default). However, the port may choose to define LUA_DOCSUBDIR as a suitable subdirectory name (usually the port's PORTNAME as long as this does not conflict with the PORTNAME of any module), in which case the framework will define both LUA_DOCSDIR and LUA_EXAMPLESDIR.

As with module ports, a flavored port should avoid installing files that would conflict between versions. Typically this is done by adding LUA_VER_STR as a suffix to program names (e.g. using uniquefiles), and otherwise using either LUA_VER or LUA_VER_STR as part of any other files or subdirectories used outside of LUA_MODLIBDIR and LUA_MODSHAREDIR.

6.22.5. Defined Variables

These variables are available in the port.

表 47. Variables Defined for Ports That Use Lua

Name	Description
LUA_VER	The Lua version that is going to be used (for example, 5.1)

Name	Description
LUA_VER_STR	The Lua version without the dots (for example, 51)
LUA_FLAVOR	The flavor name corresponding to the selected Lua version, to be used for specifying dependencies
LUA_BASE	The prefix that should be used to locate Lua (and components) that are already installed
LUA_PREFIX	The prefix where Lua (and components) are to be installed by this port
LUA_INCDIR	The directory where Lua header files are installed
LUA_LIBDIR	The directory where Lua libraries are installed
LUA_REFMODLIBDIR	The directory where Lua module libraries (.so) that are already installed are to be found
LUA_REFMODSHAREDIR	The directory where Lua modules (.lua) that are already installed are to be found
LUA_MODLIBDIR	The directory where Lua module libraries (.so) are to be installed by this port
LUA_MODSHAREDIR	The directory where Lua modules (.lua) are to be installed by this port
LUA_PKGNAMEPREFIX	The package name prefix used by Lua modules
LUA_CMD	The name of the Lua interpreter (e.g. lua53)
LUAC_CMD	The name of the Lua compiler (e.g. luac53)

These additional variables are available for ports that specified the module parameter:

表 48. Variables Defined for Lua Module Ports

Name	Description
LUA_DOCSDIR	the directory to which the module’ s documentation should be installed.
LUA_EXAMPLESDIR	the directory to which the module’ s example files should be installed.

6.22.6. Examples

例 83. Makefile for an application using Lua

This example shows how to reference a Lua module required at run time. Notice that the reference must specify a flavor.

```
PORTNAME=  sample
DISTVERSION=  1.2.3
CATEGORIES= whatever

MAINTAINER= john@doe.tld
COMMENT=  Sample

RUN_DEPENDS=  ${LUA_REFMODLIBDIR}/lpeg.so:devel/lua-lpeg@${LUA_FLAVOR}
```

```
USES=     lua

.include <bsd.port.mk>
```

例 84. Makefile for a simple Lua module

```
PORTNAME=  sample
DISTVERSION=   1.2.3
CATEGORIES= whatever
PKGNAMEPREFIX=  ${LUA_PKGNAMEPREFIX}

MAINTAINER= john@doe.tld
COMMENT=   Sample

USES=     lua:module

DOCSDIR=   ${LUA_DOCSDIR}

.include <bsd.port.mk>
```

6.23. Using iconv

FreeBSD has a native iconv in the operating system.

For software that needs iconv, define USES=iconv.

When a port defines USES=iconv, these variables will be available:

Variable name	Purpose	Port iconv (when using WCHAR_T or //TRANSLIT extensions)	Base iconv
ICONV_CMD	Directory where the iconv binary resides	${LOCALBASE}/bin/iconv	/usr/bin/iconv
ICONV_LIB	ld argument to link to libiconv (if needed)	-liconv	(empty)
ICONV_PREFIX	Directory where the iconv implementation resides (useful for configure scripts)	${LOCALBASE}	/usr
ICONV_CONFIGURE_ARG	Preconstructed configure argument for configure scripts	--with-libiconv-prefix=${LOCALBASE}	(empty)
ICONV_CONFIGURE_BASE	Preconstructed configure argument for configure scripts	--with-libiconv=${LOCALBASE}	(empty)

These two examples automatically populate the variables with the correct value for systems using converters/libiconv or the native iconv respectively:

例 85. Simple iconv Usage

```
USES=     iconv
LDFLAGS+=  -L${LOCALBASE}/lib ${ICONV_LIB}
```

例 86. iconv Usage with configure

```
USES=     iconv
CONFIGURE_ARGS+=${ICONV_CONFIGURE_ARG}
```

As shown above, ICONV_LIB is empty when a native iconv is present. This can be used to detect the native iconv and respond appropriately.

Sometimes a program has an ld argument or search path hardcoded in a Makefile or configure script. This approach can be used to solve that problem:

例 87. Fixing Hardcoded -liconv

```
USES=     iconv

post-patch:
   @${REINPLACE_CMD} -e 's/-liconv/${ICONV_LIB}/' ${WRKSRC}/Makefile
```

In some cases it is necessary to set alternate values or perform operations depending on whether there is a native iconv. bsd.port.pre.mk must be included before testing the value of ICONV_LIB:

例 88. Checking for Native iconv Availability

```
USES=     iconv

.include <bsd.port.pre.mk>

post-patch:
.if empty(ICONV_LIB)
   # native iconv detected
   @${REINPLACE_CMD} -e 's|iconv||' ${WRKSRC}/Config.sh
.endif

.include <bsd.port.post.mk>
```

6.24. Using Xfce

Ports that need Xfce libraries or applications set USES=xfce.

Specific Xfce library and application dependencies are set with values assigned to USE_XFCE. They are defined in /usr/ports/Mk/Uses/xfce.mk. The possible values are:

Values of USE_XFCE

garcon
: sysutils/garcon

libexo
: x11/libexo

libgui
: x11-toolkits/libxfce4gui

libmenu
: x11/libxfce4menu

libutil
: x11/libxfce4util

panel
: x11-wm/xfce4-panel

thunar
: x11-fm/thunar

xfconf
: x11/xfce4-conf

例 89. USES=xfce Example

```
USES=     xfce
USE_XFCE=  libmenu
```

例 90. Using Xfce’s Own GTK2 Widgets

In this example, the ported application uses the GTK2-specific widgets x11/libxfce4menu and x11/xfce4-conf.

```
USES=     xfce:gtk2
USE_XFCE=  libmenu xfconf
```

Xfce components included this way will automatically include any dependencies they need. It is no longer necessary to specify the entire list. If the port only needs x11-wm/xfce4-panel, use:

```
USES=     xfce
```

```
USE_XFCE=  panel
```

There is no need to list the components x11-wm/xfce4-panel needs itself like this:

```
USES=     xfce
USE_XFCE=  libexo libmenu libutil panel
```

However, Xfce components and non-Xfce dependencies of the port must be included explicitly. Do not count on an Xfce component to provide a sub-dependency other than itself for the main port.

6.25. Using Databases

Use one of the USES macros from Database USES Macros to add a dependency on a database.

表 49. Database USES Macros

Database	USES Macro
Berkeley DB	bdb
MariaDB, MySQL, Percona	mysql
PostgreSQL	pgsql
SQLite	sqlite

例 91. Using Berkeley DB 6

```
USES=  bdb:6
```

See bdb for more information.

例 92. Using MySQL

When a port needs the MySQL client library add

```
USES=  mysql
```

See mysql for more information.

例 93. Using PostgreSQL

When a port needs the PostgreSQL server version 9.6 or later add

```
USES=     pgsql:9.6+
WANT_PGSQL= server
```

See pgsql for more information.

例 94. Using SQLite 3

```
USES=  sqlite:3
```

See sqlite for more information.

6.26. Starting and Stopping Services (rc Scripts)

rc.d scripts are used to start services on system startup, and to give administrators a standard way of stopping, starting and restarting the service. Ports integrate into the system rc.d framework. Details on its usage can be found in the rc.d Handbook chapter. Detailed explanation of the available commands is provided in rc(8) and rc.subr(8). Finally, there is an article on practical aspects of rc.d scripting.

With a mythical port called doorman, which needs to start a doormand daemon. Add the following to the Makefile:

```
USE_RC_SUBR=  doormand
```

Multiple scripts may be listed and will be installed. Scripts must be placed in the files subdirectory and a .in suffix must be added to their filename. Standard SUB_LIST expansions will be ran against this file. Use of the %%PREFIX%% and %%LOCALBASE%% expansions is strongly encouraged as well. More on SUB_LIST in the relevant section.

As of FreeBSD 6.1-RELEASE, local rc.d scripts (including those installed by ports) are included in the overall rcorder(8) of the base system.

An example simple rc.d script to start the doormand daemon:

```
#!/bin/sh

# $FreeBSD$
#
# PROVIDE: doormand
# REQUIRE: LOGIN
# KEYWORD: shutdown
#
# Add these lines to /etc/rc.conf.local or /etc/rc.conf
# to enable this service:
#
# doormand_enable (bool):   Set to NO by default.
#           Set it to YES to enable doormand.
# doormand_config (path):   Set to %%PREFIX%%/etc/doormand/doormand.cf
#           by default.

. /etc/rc.subr
```

```
name=doormand
rcvar=doormand_enable

load_rc_config $name

: ${doormand_enable:="NO"}
: ${doormand_config="%%PREFIX%%/etc/doormand/doormand.cf"}

command=%%PREFIX%%/sbin/${name}
pidfile=/var/run/${name}.pid

command_args="-p $pidfile -f $doormand_config"

run_rc_command "$1"
```

Unless there is a very good reason to start the service earlier, or it runs as a particular user (other than root), all ports scripts must use:

```
REQUIRE: LOGIN
```

If the startup script launches a daemon that must be shutdown, the following will trigger a stop of the service on system shutdown:

```
KEYWORD: shutdown
```

If the script is not starting a persistent service this is not necessary.

For optional configuration elements the "=" style of default variable assignment is preferable to the ":=" style here, since the former sets a default value only if the variable is unset, and the latter sets one if the variable is unset or null. A user might very well include something like:

```
doormand_flags=""
```

in their rc.conf.local, and a variable substitution using ":=" would inappropriately override the user's intention. The _enable variable is not optional, and must use the ":" for the default.

Ports must not start and stop their services when installing and deinstalling. Do not abuse the plist keywords described in the @preexec command,@postexec command,@preunexec command,@postunexec command section by running commands that modify the currently running system, including starting or stopping services.

6.26.1. Pre-Commit Checklist

Before contributing a port with an rc.d script, and more importantly, before committing one, please consult this checklist to be sure that it is ready.

The devel/rclint port can check for most of these, but it is not a substitute for proper review.

1. If this is a new file, does it have a .sh extension? If so, that must be changed to just file.in since rc.d files may not end with that extension.
2. Does the file have a $FreeBSD$ tag?
3. Do the name of the file (minus .in), the PROVIDE line, and $ name all match? The file name matching PROVIDE makes debugging easier, especially for rcorder(8) issues. Matching the file name and `$` name makes it easier to figure out which variables are relevant in rc.conf[.local]. It is also a policy for all new scripts, including those in the base system.
4. Is the REQUIRE line set to LOGIN? This is mandatory for scripts that run as a non-root user. If it runs as root, is there a good reason for it to run prior to LOGIN? If not, it must run after so that local scrips can be loosely grouped to a point in rcorder(8) after most everything in the base is already running.
5. Does the script start a persistent service? If so, it must have KEYWORD: shutdown.
6. Make sure there is no KEYWORD: FreeBSD present. This has not been necessary nor desirable for years. It is also an indication that the new script was copy/pasted from an old script, so extra caution must be given to the review.
7. If the script uses an interpreted language like perl, python, or ruby, make certain that command_interpreter is set appropriately, for example, for Perl, by adding PERL=${PERL} to SUB_LIST and using %%PERL%%. Otherwise,

   ```
   # service name stop
   ```

   will probably not work properly. See service(8) for more information.
8. Have all occurrences of /usr/local been replaced with %%PREFIX%%?
9. Do the default variable assignments come after load_rc_config?
10. Are there default assignments to empty strings? They should be removed, but double-check that the option is documented in the comments at the top of the file.
11. Are things that are set in variables actually used in the script?
12. Are options listed in the default name`_flags` things that are actually mandatory? If so, they must be in command_args. -d is a red flag (pardon the pun) here, since it is usually the option to "daemonize" the process, and therefore is actually mandatory.
13. _name__flags must never be included in command_args (and vice versa, although that error is less common).
14. Does the script execute any code unconditionally? This is frowned on. Usually these things must be dealt with through a start_precmd.
15. All boolean tests must use the checkyesno function. No hand-rolled tests for [Yy][Ee][Ss], etc.
16. If there is a loop (for example, waiting for something to start) does it have a counter to terminate the loop? We do not want the boot to be stuck forever if there is an error.
17. Does the script create files or directories that need specific permissions, for example, a pid that needs to be owned by the user that runs the process? Rather than the traditional touch(1) /chown(8)/chmod(1) routine, consider using install(1) with the proper command line arguments to do the whole procedure with one step.

6.27. Adding Users and Groups

Some ports require a particular user account to be present, usually for daemons that run as that user. For these ports, choose a unique UID from 50 to 999 and register it in ports/UIDs (for users) and ports/GIDs (for groups). The unique identification should be the same for users and groups.

Please include a patch against these two files when requiring a new user or group to be created for the port.

Then use USERS and GROUPS in Makefile, and the user will be automatically created when installing the port.

```
USERS=  pulse
GROUPS= pulse pulse-access pulse-rt
```

The current list of reserved UIDs and GIDs can be found in ports/UIDs and ports/GIDs.

6.28. Ports That Rely on Kernel Sources

Some ports (such as kernel loadable modules) need the kernel source files so that the port can compile. Here is the correct way to determine if the user has them installed:

```
USES=  kmod
```

Apart from this check, the kmod feature takes care of most items that these ports need to take into account.

6.29. Go Libraries

Ports must not package or install Go libs or source code. Go ports must fetch the required deps at the normal fetch time and should only install the programs and things users need, not the things Go developers would need.

Ports should (in order of preference):

- Use vendored dependencies included with the package source.
- Fetch the versions of deps specified by upstream (in the case of go.mod, vendor.json or similar).
- As a last resort (deps are not included nor versions specified exactly) fetch versions of dependencies available at the time of upstream development/release.

6.30. Haskell Libraries

Just like in case of Go language, Ports must not package or install Haskell libraries. Haskell ports must link statically to their dependencies and fetch all distribution files on fetch stage.

6.31. Shell Completion Files

Many modern shells (including bash, fish, tcsh and zsh) support parameter and/or option tab-completion. This support usually comes from completion files, which contain the definitions for how tab completion will work for a certain command. Ports sometimes ship with their own completion files, or porters may have created them themselves.

When available, completion files should always be installed. It is not necessary to make an option for it. If an option is used, though, always enable it in OPTIONS_DEFAULT.

表 50. Shell completion file paths

bash	${PREFIX}/etc/bash_completion.d
fish	${PREFIX}/share/fish/vendor_completions.d
zsh	${PREFIX}/share/zsh/site-functions

Do not register any dependencies on the shells themselves.

Chapter 7. Flavors

7.1. An Introduction to Flavors

Flavors are a way to have multiple variations of a port. The port is built multiple times, with variations.

For example, a port can have a normal version with many features and quite a few dependencies, and a light "lite" version with only basic features and minimal dependencies.

Another example could be, a port can have a GTK flavor and a QT flavor, depending on which toolkit it uses.

7.2. Using FLAVORS

To declare a port having multiple flavors, add FLAVORS to its Makefile. The first flavor in FLAVORS is the default flavor.

It can help simplify the logic of the Makefile to also define FLAVOR as:

```
FLAVOR?=  ${FLAVORS:[1]}
```

To distinguish flavors from options, which are always uppercase letters, flavor names can only contain lowercase letters, numbers, and the underscore _.

例 95. Basic Flavors Usage

If a port has a "lite" slave port, the slave port can be removed, and the port can be converted to flavors with:

```
FLAVORS=  default lite
lite_PKGNAMESUFFIX= -lite
[...]
.if ${FLAVOR:U} != lite
[enable non lite features]
.endif
```

例 96. Another Basic Flavors Usage

If a port has a -nox11 slave port, the slave port can be removed, and the port can be converted to flavors with:

```
FLAVORS=  x11 nox11
FLAVOR?=  ${FLAVORS:[1]}
nox11_PKGNAMESUFFIX=  -nox11
[...]
.if ${FLAVOR} == x11
[enable x11 features]
```

```
.endif
```

例 97. More Complex Flavors Usage

Here is a slightly edited excerpt of what is present in devel/libpeas, a port that uses the Python flavors. With the default Python 2 and 3 versions being 2.7 and 3.6, it will automatically get FLAVORS=py27 py36

```
USES=      gnome python
USE_PYTHON= flavors

.if ${FLAVOR:Upy27:Mpy2*}
USE_GNOME=  pygobject3

CONFIGURE_ARGS+=    --enable-python2 --disable-python3

BUILD_WRKSRC=   ${WRKSRC}/loaders/python
INSTALL_WRKSRC= ${WRKSRC}/loaders/python
.else # py3*
USE_GNOME+= py3gobject3

CONFIGURE_ARGS+=    --disable-python2 --enable-python3 \
        ac_cv_path_PYTHON3_CONFIG=${LOCALBASE}/bin/python${PYTHON_VER}-
config

BUILD_WRKSRC=   ${WRKSRC}/loaders/python3
INSTALL_WRKSRC= ${WRKSRC}/loaders/python3
.endif

py34_PLIST= ${.CURDIR}/pkg-plist-py3
py35_PLIST= ${.CURDIR}/pkg-plist-py3
py36_PLIST= ${.CURDIR}/pkg-plist-py3
```

This port does not use USE_PYTHON=distutils but needs Python flavors anyway. To guard against FLAVOR being empty, which would cause a make(1) error, use ${FLAVOR:U} in string comparisons instead of ${FLAVOR}. The Gnome Python gobject3 bindings have two different names, one for Python 2, pygobject3 and one for Python 3, py3gobject3. The configure script has to run in ${WRKSRC}, but we are only interested in building and installing the Python 2 or Python 3 parts of the software, so set the build and install base directories appropriately. Hint about the correct Python 3 config script path name. The packing list is different when the built with Python 3. As there are three possible Python 3 versions, set PLIST for all three using the helper.

7.2.1. Flavors Helpers

To make the Makefile easier to write, a few flavors helpers exist.

This list of helpers will set their variable:

- _flavor__PKGNAMEPREFIX
- _flavor__PKGNAMESUFFIX
- _flavor__PLIST
- _flavor__DESCR

This list of helpers will append to their variable:

- _flavor__CONFLICTS
- _flavor__CONFLICTS_BUILD
- _flavor__CONFLICTS_INSTALL
- _flavor__PKG_DEPENDS
- _flavor__EXTRACT_DEPENDS
- _flavor__PATCH_DEPENDS
- _flavor__FETCH_DEPENDS
- _flavor__BUILD_DEPENDS
- _flavor__LIB_DEPENDS
- _flavor__RUN_DEPENDS
- _flavor__TEST_DEPENDS

例 98. Flavor Specific PKGNAME

As all packages must have a different package name, flavors must change theirs, using _flavorPKGNAMEPREFIX and _flavorPKGNAMESUFFIX makes this easy:

```
FLAVORS=    normal lite
lite_PKGNAMESUFFIX= -lite
```

7.3. USES=php and Flavors

When using php with one of these arguments, phpize, ext, zend, or pecl, the port will automatically have FLAVORS filled in with the PHP versions it supports.

例 99. Simple USES=php Extension

This will generate package for all the supported versions:

```
PORTNAME=  some-ext
PORTVERSION=   0.0.1
PKGNAMEPREFIX=  ${PHP_PKGNAMEPREFIX}

USES=      php:ext
```

This will generate package for all the supported versions but 7.2:

```
PORTNAME=  some-ext
PORTVERSION=  0.0.1
PKGNAMEPREFIX=  ${PHP_PKGNAMEPREFIX}

USES=  php:ext
IGNORE_WITH_PHP=  72
```

7.3.1. PHP Flavors with PHP Applications

PHP applications can also be flavorized.

This allows generating packages for all PHP versions, so that users can use them with whatever version they need on their servers.

PHP applications that are flavorized must append PHP_PKGNAMESUFFIX to their package names.

例 100. Flavorizing a PHP Application

Adding Flavors support to a PHP application is straightforward:

```
PKGNAMESUFFIX=  ${PHP_PKGNAMESUFFIX}

USES=  php:flavors
```

When adding a dependency on a PHP flavored port, use @${PHP_FLAVOR}. Never use FLAVOR directly.

7.4. USES=python and Flavors

When using python and USE_PYTHON=distutils, the port will automatically have FLAVORS filled in with the Python versions it supports.

例 101. Simple USES=python

Supposing the current Python supported versions are 2.7, 3.4, 3.5, and 3.6, and the default Python 2 and 3 versions are 2.7 and 3.6, a port with:

```
USES=  python
USE_PYTHON= distutils
```

Will get these flavors: py27, and py36.

```
USES=  python
USE_PYTHON= distutils allflavors
```

Will get these flavors: py27, py34, py35 and py36.

例 102. USES=python with Version Requirements

Supposing the current Python supported versions are 2.7, 3.4, 3.5, and 3.6, and the default Python 2 and 3 versions are 2.7 and 3.6, a port with:

```
USES=   python:-3.5
USE_PYTHON= distutils
```

Will get this flavor: py27.

```
USES=   python:-3.5
USE_PYTHON= distutils allflavors
```

Will get these flavors: py27, py34, and py35.

```
USES=   python:3.4+
USE_PYTHON= distutils
```

Will get this flavor: py36.

```
USES=   python:3.4+
USE_PYTHON= distutils allflavors
```

Will get these flavors: py34, py35, and py36.

PY_FLAVOR is available to depend on the correct version of Python modules. All dependencies on flavored Python ports should use PY_FLAVOR, and not FLAVOR directly..

例 103. For a Port Not Using distutils

If the default Python 3 version is 3.6, the following will set PY_FLAVOR to py36:

```
RUN_DEPENDS=    ${PYTHON_PKGNAMEPREFIX}mutagen>0:audio/py-
mutagen@${PY_FLAVOR}

USES=   python:3.5+
```

7.5. USES=lua and Flavors

When using lua:module or lua:flavors, the port will automatically have FLAVORS filled in with the Lua versions it supports. However, it is not expected that ordinary applications (rather than Lua modules) should use this feature; most applications that embed or otherwise use Lua should simply use USES=lua.

LUA_FLAVOR is available (and must be used) to depend on the correct version of dependencies regardless of whether the port used the flavors or module parameters.

See Using Lua for further information.

Chapter 8. Advanced pkg-plist Practices

8.1. Changing pkg-plist Based on Make Variables

Some ports, particularly the p5- ports, need to change their pkg-plist depending on what options they are configured with (or version of perl, in the case of p5- ports). To make this easy, any instances in pkg-plist of %%OSREL%%, %%PERL_VER%%, and %%PERL_VERSION%% will be substituted appropriately. The value of %%OSREL%% is the numeric revision of the operating system (for example, 4.9). %%PERL_VERSION%% and %%PERL_VER%% is the full version number of perl (for example, 5.8.9). Several other %%VARS%% related to port's documentation files are described in the relevant section.

To make other substitutions, set PLIST_SUB with a list of VAR=VALUE pairs and instances of %%VAR%% will be substituted with VALUE in pkg-plist.

For instance, if a port installs many files in a version-specific subdirectory, use a placeholder for the version so that pkg-plist does not have to be regenerated every time the port is updated. For example, set:

```
OCTAVE_VERSION= ${PORTREVISION}
PLIST_SUB=  OCTAVE_VERSION=${OCTAVE_VERSION}
```

in the Makefile and use %%OCTAVE_VERSION%% wherever the version shows up in pkg-plist. When the port is upgraded, it will not be necessary to edit dozens (or in some cases, hundreds) of lines in pkg-plist.

If files are installed conditionally on the options set in the port, the usual way of handling it is prefixing pkg-plist lines with a %%OPT%% for lines needed when the option is enabled, or %%NO_OPT%% when the option is disabled, and adding OPTIONS_SUB=yes to the Makefile. See OPTIONS_SUB for more information.

For instance, if there are files that are only installed when the X11 option is enabled, and Makefile has:

```
OPTIONS_DEFINE= X11
OPTIONS_SUB=    yes
```

In pkg-plist, put %%X11%% in front of the lines only being installed when the option is enabled, like this :

```
%%X11%%bin/foo-gui
```

This substitution will be done between the pre-install and do-install targets, by reading from PLIST and writing to TMPPLIST (default: WRKDIR/.PLIST.mktmp). So if the port builds PLIST on the fly, do so in or before pre-install. Also, if the port needs to edit the resulting file, do so in post-install to a file named TMPPLIST.

Another way of modifying a port's packing list is based on setting the variables PLIST_FILES and PLIST_DIRS. The value of each variable is regarded as a list of pathnames to write to TMPPLIST along with PLIST contents. While names listed in PLIST_FILES and PLIST_DIRS are subject to %%VAR%% substitution as described above, it is better to use the ${VAR} directly. Except for that, names from PLIST_FILES will appear in the final packing list unchanged, while @dir will be prepended to names from PLIST_DIRS. To take effect, PLIST_FILES and PLIST_DIRS must be set before TMPPLIST is written, that is, in pre-install or earlier.

From time to time, using OPTIONS_SUB is not enough. In those cases, adding a specific TAG to PLIST_SUB inside the Makefile with a special value of @comment, makes package tools to ignore the line. For instance, if some files are only installed when the X11 option is on and the architecture is i386:

```
.include <bsd.port.pre.mk>

.if ${PORT_OPTIONS:MX11} && ${ARCH} == "i386"
PLIST_SUB+= X11I386=""
.else
PLIST_SUB+= X11I386="@comment "
.endif
```

8.2. Empty Directories

8.2.1. Cleaning Up Empty Directories

When being de-installed, a port has to remove empty directories it created. Most of these directories are removed automatically by pkg(8), but for directories created outside of ${PREFIX}, or empty directories, some more work needs to be done. This is usually accomplished by adding @dir lines for those directories. Subdirectories must be deleted before deleting parent directories.

```
[...]
@dir /var/games/oneko/saved-games
@dir /var/games/oneko
```

8.2.2. Creating Empty Directories

Empty directories created during port installation need special attention. They must be present when the package is created. If they are not created by the port code, create them in the Makefile:

```
post-install:
  ${MKDIR} ${STAGEDIR}${PREFIX}/some/directory
```

Add the directory to pkg-plist like any other. For example:

```
@dir some/directory
```

8.3. Configuration Files

If the port installs configuration files to PREFIX/etc (or elsewhere) do not list them in pkg-plist. That will cause pkg delete to remove files that have been carefully edited by the user, and a re-installation will wipe them out.

Instead, install sample files with a filename.sample extension. The @sample macro automates this, see @sample file [file] for what it does exactly. For each sample file, add a line to pkg-plist:

```
@sample etc/orbit.conf.sample
```

If there is a very good reason not to install a working configuration file by default, only list the sample filename in pkg-plist, without the @sample followed by a space part, and add a message pointing out that the user must copy and edit the file before the software will work.

When a port installs its configuration in a subdirectory of ${PREFIX}/etc, use ETCDIR, which defaults to ${PREFIX}/etc/${PORTNAME}, it can be overridden in the ports Makefile if there is a convention for the port to use some other directory. The %%ETCDIR%% macro will be used in its stead in pkg-plist.

The sample configuration files should always have the .sample suffix. If for some historical reason using the standard suffix is not possible, or if the sample files come from some other directory, use this construct:

```
@sample etc/orbit.conf-dist etc/orbit.conf
```

or

```
@sample %%EXAMPLESDIR%%/orbit.conf etc/orbit.conf
```

The format is @sample sample-file actual-config-file.

8.4. Dynamic Versus Static Package List

A static package list is a package list which is available in the Ports Collection either as pkg-plist (with or without variable substitution), or embedded into the Makefile via PLIST_FILES and PLIST_DIRS. Even if the contents are auto-generated by a tool or a target in the Makefile before the inclusion into the Ports Collection by a committer (for example, using make makeplist), this is still considered a static list, since it is possible to examine it without having to download or compile the distfile.

A dynamic package list is a package list which is generated at the time the port is compiled based upon the files and directories which are installed. It is not possible to examine it before the source code of the ported application is downloaded and compiled, or after running a make clean.

While the use of dynamic package lists is not forbidden, maintainers should use static package lists wherever possible, as it enables users to grep(1) through available ports to discover, for example, which port installs a certain file. Dynamic lists should be primarily used for complex ports where the package list changes drastically based upon optional features of the port (and thus maintaining a static package list is infeasible), or ports which change the package list based upon the version of dependent software used. For example, ports which generate docs with Javadoc.

8.5. Automated Package List Creation

First, make sure the port is almost complete, with only pkg-plist missing. Running make makeplist will show an example for pkg-plist. The output of makeplist must be double checked for correctness as it tries to automatically guess a few things, and can get it wrong.

User configuration files should be installed as filename.sample, as it is described in Configuration Files. info/dir must not be listed and appropriate install-info lines must be added as noted in the info files section. Any libraries installed by the port must be listed as specified in the shared libraries section.

8.5.1. Expanding PLIST_SUB with Regular Expressions

Strings to be replaced sometimes need to be very specific to avoid undesired replacements. This is a common problem with shorter values.

To address this problem, for each PLACEHOLDER=value, a PLACEHOLDER_regex=regex can be set, with the regex part matching value more precisely.

例 104. Using PLIST_SUB with Regular Expressions

Perl ports can install architecture dependent files in a specific tree. On FreeBSD to ease porting, this tree is called mach. For example, a port that installs a file whose path contains mach could have that part of the path string replaced with the wrong values. Consider this Makefile:

```
PORTNAME=  Machine-Build
DISTVERSION=   1
CATEGORIES= devel perl5
MASTER_SITES=  CPAN
PKGNAMEPREFIX=  p5-

MAINTAINER= perl@FreeBSD.org
COMMENT=   Building machine

USES=     perl5
USE_PERL5=  configure

PLIST_SUB=  PERL_ARCH=mach
```

The files installed by the port are:

```
/usr/local/bin/machine-build
/usr/local/lib/perl5/site_perl/man/man1/machine-build.1.gz
/usr/local/lib/perl5/site_perl/man/man3/Machine::Build.3.gz
/usr/local/lib/perl5/site_perl/Machine/Build.pm
/usr/local/lib/perl5/site_perl/mach/5.20/Machine/Build/Build.so
```

Running make makeplist wrongly generates:

```
bin/%%PERL_ARCH%%ine-build
%%PERL5_MAN1%%/%%PERL_ARCH%%ine-build.1.gz
%%PERL5_MAN3%%/Machine::Build.3.gz
%%SITE_PERL%%/Machine/Build.pm
%%SITE_PERL%%/%%PERL_ARCH%%/%%PERL_VER%%/Machine/Build/Build.so
```

Change the PLIST_SUB line from the Makefile to:

```
PLIST_SUB=  PERL_ARCH=mach \
    PERL_ARCH_regex=\bmach\b
```

Now make makeplist correctly generates:

```
bin/machine-build
%%PERL5_MAN1%%/machine-build.1.gz
%%PERL5_MAN3%%/Machine::Build.3.gz
%%SITE_PERL%%/Machine/Build.pm
%%SITE_PERL%%/%%PERL_ARCH%%/%%PERL_VER%%/Machine/Build/Build.so
```

8.6. Expanding Package List with Keywords

All keywords can also take optional arguments in parentheses. The arguments are owner, group, and mode. This argument is used on the file or directory referenced. To change the owner, group, and mode of a configuration file, use:

```
@sample(games,games,640) etc/config.sample
```

The arguments are optional. If only the group and mode need to be changed, use:

```
@sample(,games,660) etc/config.sample
```

If a keyword is used on an optional entry, it must to be added after the helper:

```
%%FOO%%@sample etc/orbit.conf.sample
```

This is because the options plist helpers are used to comment out the line, so they need to be put first. See OPTIONS_SUB for more information.

8.6.1. @desktop-file-utils

Will run update-desktop-database -q after installation and deinstallation. Never use directly, add USES=desktop-file-utils to the Makefile.

8.6.2. @fc directory

Add a @dir entry for the directory passed as an argument, and run fc-cache -fs on that directory after installation and deinstallation.

8.6.3. @fcfontsdir directory

Add a @dir entry for the directory passed as an argument, and run fc-cache -fs, mkfontscale and mkfontdir on that directory after installation and deinstallation. Additionally, on deinstallation, it removes the fonts.scale and fonts.dir cache files if they are empty. This keyword is equivalent to adding both @fc directory and @fontsdir directory.

8.6.4. @fontsdir directory

Add a @dir entry for the directory passed as an argument, and run mkfontscale and mkfontdir on that directory after installation and deinstallation. Additionally, on deinstallation, it removes the fonts.scale and fonts.dir cache files if they are empty.

8.6.5. @glib-schemas

Runs glib-compile-schemas on installation and deinstallation.

8.6.6. @info file

Add the file passed as argument to the plist, and updates the info document index on installation and deinstallation. Additionally, it removes the index if empty on deinstallation. This should never be used manually, but always through INFO. See Info Files for more information.

8.6.7. @kld directory

Runs kldxref on the directory on installation and deinstallation. Additionally, on deinstallation, it will remove the directory if empty.

8.6.8. @rmtry file

Will remove the file on deinstallation, and not give an error if the file is not there.

8.6.9. @sample file [file]

This is used to handle installation of configuration files, through example files bundled with the package. The "actual", non-sample, file is either the second filename, if present, or the first filename without the .sample extension.

This does three things. First, add the first file passed as argument, the sample file, to the plist. Then, on installation, if the actual file is not found, copy the sample file to the actual file. And finally, on deinstallation, remove the actual file if it has not been modified. See Configuration Files for more information.

8.6.10. @shared-mime-info directory

Runs update-mime-database on the directory on installation and deinstallation.

8.6.11. @shell file

Add the file passed as argument to the plist.

On installation, add the full path to file to /etc/shells, while making sure it is not added twice. On deinstallation, remove it from /etc/shells.

8.6.12. @terminfo

Do not use by itself. If the port installs *.terminfo files, add USES=terminfo to its Makefile.

On installation and deinstallation, if tic is present, refresh ${PREFIX}/shared/misc/terminfo.db from the *.terminfo files in ${PREFIX}/shared/misc.

8.6.13. Base Keywords

There are a few keywords that are hardcoded, and documented in pkg-create(8). For the sake of completeness, they are also documented here.

8.6.13.1. @ [file]

The empty keyword is a placeholder to use when the file's owner, group, or mode need to be changed. For example, to set the group of the file to games and add the setgid bit, add:

```
@(,games,2755) sbin/daemon
```

8.6.13.2. @preexec command, @postexec command, @preunexec command, @postunexec command

Execute command as part of the package installation or deinstallation process.

@preexec command
: Execute command as part of the pre-install scripts.

@postexec command
: Execute command as part of the post-install scripts.

@preunexec command
: Execute command as part of the pre-deinstall scripts.

@postunexec command
: Execute command as part of the post-deinstall scripts.

If command contains any of these sequences somewhere in it, they are expanded inline. For these examples, assume that @cwd is set to /usr/local and the last extracted file was bin/emacs.

%F
: Expand to the last filename extracted (as specified). In the example case bin/emacs.

%D
: Expand to the current directory prefix, as set with @cwd. In the example case /usr/local.

%B
: Expand to the basename of the fully qualified filename, that is, the current directory prefix plus the last filespec, minus the trailing filename. In the example case, that would be /usr/local/bin.

%f
: Expand to the filename part of the fully qualified name, or the converse of %B. In the example case, emacs.

These keywords are here to help you set up the package so that it is as ready to use as possible. They must not be abused to start services, stop services, or run any other commands that will modify the currently running system.

8.6.13.3. @mode mode

Set default permission for all subsequently extracted files to mode. Format is the same as that used by chmod(1). Use without an arg to set back to default permissions (mode of the file while being packed).

This must be a numeric mode, like 644, 4755, or 600. It cannot be a relative mode like u+s.

8.6.13.4. @owner user

Set default ownership for all subsequent files to user. Use without an argument to set back to

default ownership (root).

8.6.13.5. @group group

Set default group ownership for all subsequent files to group. Use without an arg to set back to default group ownership (wheel).

8.6.13.6. @comment string

This line is ignored when packing.

8.6.13.7. @dir directory

Declare directory name. By default, directories created under PREFIX by a package installation are automatically removed. Use this when an empty directory under PREFIX needs to be created, or when the directory needs to have non default owner, group, or mode. Directories outside of PREFIX need to be registered. For example, /var/db/${PORTNAME} needs to have a @dir entry whereas ${PREFIX}/shared/${PORTNAME} does not if it contains files or uses the default owner, group, and mode.

8.6.13.8. @exec command, @unexec command (Deprecated)

Execute command as part of the installation or deinstallation process. Please use @preexec command, @postexec command, @preunexec command, @postunexec command instead.

8.6.13.9. @dirrm directory (Deprecated)

Declare directory name to be deleted at deinstall time. By default, directories created under PREFIX by a package installation are deleted when the package is deinstalled.

8.6.13.10. @dirrmtry directory (Deprecated)

Declare directory name to be removed, as for @dirrm, but does not issue a warning if the directory cannot be removed.

8.6.14. Creating New Keywords

Package list files can be extended by keywords that are defined in the ${PORTSDIR}/Keywords directory. The settings for each keyword are stored in a UCL file named keyword.ucl. The file must contain at least one of these sections:

- attributes
- action
- pre-install
- post-install
- pre-deinstall
- post-deinstall
- pre-upgrade
- post-upgrade

8.6.14.1. attributes

Changes the owner, group, or mode used by the keyword. Contains an associative array where the possible keys are owner, group, and mode. The values are, respectively, a user name, a group name, and a file mode. For example:

```
attributes: { owner: "games", group: "games", mode: 0555 }
```

8.6.14.2. action

Defines what happens to the keyword' s parameter. Contains an array where the possible values are:

setprefix
: Set the prefix for the next plist entries.

dir
: Register a directory to be created on install and removed on deinstall.

dirrm
: Register a directory to be deleted on deinstall. Deprecated.

dirrmtry
: Register a directory to try and deleted on deinstall. Deprecated.

file
: Register a file.

setmode
: Set the mode for the next plist entries.

setowner
: Set the owner for the next plist entries.

setgroup
: Set the group for the next plist entries.

comment
: Does not do anything, equivalent to not entering an action section.

ignore_next
: Ignore the next entry in the plist.

8.6.14.3. arguments

If set to true, adds argument handling, splitting the whole line, %@, into numbered arguments, %1, %2, and so on. For example, for this line:

```
@foo some.content other.content
```

%1 and %2 will contain:

```
some.content
other.content
```

It also affects how the action entry works. When there is more than one argument, the argument number must be specified. For example:

```
actions: [file(1)]
```

8.6.14.4. pre-install, post-install, pre-deinstall, post-deinstall, pre-upgrade, post-upgrade

These keywords contains a sh(1) script to be executed before or after installation, deinstallation, or upgrade of the package. In addition to the usual @exec %foo placeholders described in @preexec command, @postexec command, @preunexec command, @postunexec command, there is a new one, %@, which represents the argument of the keyword.

8.6.14.5. Custom Keyword Examples

例 105. Example of a @dirrmtryecho Keyword

This keyword does two things, it adds a @dirrmtry directory line to the packing list, and echoes the fact that the directory is removed when deinstalling the package.

```
actions: [dirrmtry]
post-deinstall: <<EOD
 echo "Directory %D/%@ removed."
EOD
```

例 106. Real Life Example, How @sample is Implemented

This keyword does three things. It adds the first filename passed as an argument to @sample to the packing list, it adds to the post-install script instructions to copy the sample to the actual configuration file if it does not already exist, and it adds to the post-deinstall instructions to remove the configuration file if it has not been modified.

```
actions: [file(1)]
arguments: true
post-install: <<EOD
 case "%1" in
 /*) sample_file="%1" ;;
 *) sample_file="%D/%1" ;;
 esac
 target_file="${sample_file%.sample}"
 set -- %@
 if [ $# -eq 2 ]; then
    target_file=${2}
 fi
 case "${target_file}" in
 /*) target_file="${target_file}" ;;
 *) target_file="%D/${target_file}" ;;
 esac
 if ! [ -f "${target_file}" ]; then
  /bin/cp -p "${sample_file}" "${target_file}" && \
```

```
    /bin/chmod u+w "${target_file}"
  fi
EOD
pre-deinstall: <<EOD
  case "%1" in
  /*) sample_file="%1" ;;
  *) sample_file="%D/%1" ;;
  esac
  target_file="${sample_file%.sample}"
  set -- %@
  if [ $# -eq 2 ]; then
    set -- %@
    target_file=${2}
  fi
  case "${target_file}" in
  /*) target_file="${target_file}" ;;
  *) target_file="%D/${target_file}" ;;
  esac
  if cmp -s "${target_file}" "${sample_file}"; then
   rm -f "${target_file}"
  else
   echo "You may need to manually remove ${target_file} if it is no longer needed."
  fi
EOD
```

Chapter 9. pkg-*

There are some tricks we have not mentioned yet about the pkg-* files that come in handy sometimes.

9.1. pkg-message

To display a message when the package is installed, place the message in pkg-message. This capability is often useful to display additional installation steps to be taken after a pkg install or pkg upgrade.

- pkg-message must contain only information that is vital to setup and operation on FreeBSD, and that is unique to the port in question.
- Setup information should only be shown on initial install. Upgrade instructions should be shown only when upgrading from the relevant version.
- Do not surround the messages with either whitespace or lines of symbols (like ----------, , or ==========). Leave the formatting to pkg(8).
- Committers have blanket approval to constrain existing messages to install or upgrade ranges using the UCL format specifications.

pkg-message supports two formats:

raw
: A regular plain text file. Its message is only displayed on install.

UCL
: If the file starts with "[" then it is considered to be a UCL file. The UCL format is described on libucl's GitHub page.

Do not add an entry for pkg-message in pkg-plist.

9.1.1. UCL in pkg-message

The format is the following. It should be an array of objects. The objects themselves can have these keywords:

message
: The actual message to be displayed. This keyword is mandatory.

type
: When the message should be displayed.

maximum_version
: Only if type is upgrade. Display if upgrading from a version strictly lower than the version specified.

minimum_version
: Only if type is upgrade. Display if upgrading from a version stictly greater than the version specified.

The maximum_version and minimum_version keywords can be combined.

The type keyword can have three values:

install
: The message should only be displayed when the package is installed.

remove
: The message should only be displayed when the package is removed.

upgrade
: the message should only be displayed during an upgrade of the package..

To preserve the compatibility with non UCL pkg-message files, the first line of a UCL pkg-message MUST be a single “[”, and the last line MUST be a single “]”.

例 107. UCL Short Strings

The message is delimited by double quotes ", this is used for simple single line strings:

```
[
{ type: install
  message: "Simple message"
}
]
```

例 108. UCL Multiline Strings

Multiline strings use the standard here document notation. The multiline delimiter must start just after << symbols without any whitespace and it must consist of capital letters only. To finish a multiline string, add the delimiter string on a line of its own without any whitespace. The message from UCL Short Strings can be written as:

```
[
{ type: install
  message: <<EOM
Simple message
EOM
}
]
```

例 109. Display a Message on Install/Deinstall

When a message only needs to be displayed on installation or uninstallation, set the type:

```
[
{
  type: remove
  message: "package being removed."
}
{ type: install, message: "package being installed."}
]
```

例 110. Display a Message on Upgrade

When a port is upgraded, the message displayed can be even more tailored to the port’s needs.

```
[
{
 type: upgrade
 message: "Package is being upgraded."
}
{
 type: upgrade
 maximum_version: "1.0"
 message: "Upgrading from before 1.0 need to do this."
}
{
 type: upgrade
 minimum_version: "1.0"
 message: "Upgrading from after 1.0 should do that."
}
{
 type: upgrade
 maximum_version: "3.0"
 minimum_version: "1.0"
 message: "Upgrading from > 1.0 and < 3.0 remove that file."
}
]
```

When displaying a message on upgrade, it is important to limit when it is being shown to the user. Most of the time it is by using maximum_version to limit its usage to upgrades from before a certain version when something specific needs to be done.

9.2. pkg-install

If the port needs to execute commands when the binary package is installed with pkg add or pkg install, use pkg-install. This script will automatically be added to the package. It will be run twice by pkg, the first time as ${SH} pkg-install ${PKGNAME} PRE-INSTALL before the package is installed, and the second time as ${SH} pkg-install ${PKGNAME} POST-INSTALL after it has been installed. $2 can be tested to determine which mode the script is being run in. The PKG_PREFIX environmental variable will be set to the package installation directory.

This script is here to help you set up the package so that it is as ready to use as possible. It must not be abused to start services, stop services, or run any other commands that will modify the currently running system.

9.3. pkg-deinstall

This script executes when a package is removed.

This script will be run twice by pkg delete. The first time as ${SH} pkg-deinstall ${PKGNAME} DEINSTALL before the port is de-installed and the second time as ${SH} pkg-deinstall ${PKGNAME} POST-DEINSTALL after the port has been de-installed. $2 can be tested to determine which mode the script is being run in. The PKG_PREFIX environmental variable will be set to the package installation directory

This script is here to help you set up the package so that it is as ready to use as possible. It must not be abused to start services, stop services, or run any other commands that will modify the currently running system.

9.4. Changing the Names of pkg-*

All the names of pkg-* are defined using variables that can be changed in the Makefile if needed. This is especially useful when sharing the same pkg-* files among several ports or when it is necessary to write to one of these files. See writing to places other than WRKDIR for why it is a bad idea to write directly into the directory containing the pkg-* files.

Here is a list of variable names and their default values. (PKGDIR defaults to ${MASTERDIR}.)

Variable	Default value
DESCR	${PKGDIR}/pkg-descr
PLIST	${PKGDIR}/pkg-plist
PKGINSTALL	${PKGDIR}/pkg-install
PKGDEINSTALL	${PKGDIR}/pkg-deinstall
PKGMESSAGE	${PKGDIR}/pkg-message

9.5. Making Use of SUB_FILES and SUB_LIST

SUB_FILES and SUB_LIST are useful for dynamic values in port files, such as the installation PREFIX in pkg-message.

SUB_FILES specifies a list of files to be automatically modified. Each file in the SUB_FILES list must have a corresponding file.in present in FILESDIR. A modified version will be created as ${WRKDIR}/file. Files defined as a value of USE_RC_SUBR are automatically added to SUB_FILES. For the files pkg-message, pkg-install, and pkg-deinstall, the corresponding Makefile variable is automatically set to point to the processed version.

SUB_LIST is a list of VAR=VALUE pairs. For each pair, %%VAR%% will be replaced with VALUE in each file listed in SUB_FILES. Several common pairs are automatically defined: PREFIX, LOCALBASE, DATADIR, DOCSDIR, EXAMPLESDIR, WWWDIR, and ETCDIR. Any line beginning with @comment followed by a space, will be deleted from resulting files after a variable substitution.

This example replaces %%ARCH%% with the system architecture in a pkg-message:

```
SUB_FILES= pkg-message
SUB_LIST=  ARCH=${ARCH}
```

Note that for this example, pkg-message.in must exist in FILESDIR.

Example of a good pkg-message.in:

Now it is time to configure this package.

Copy %%PREFIX%%/shared/examples/putsy/%%ARCH%%.conf into your home directory as .putsy.conf and edit it.

Chapter 10. Testing the Port

10.1. Running make describe

Several of the FreeBSD port maintenance tools, such as portupgrade(1), rely on a database called /usr/ports/INDEX which keeps track of such items as port dependencies. INDEX is created by the top-level ports/Makefile via make index, which descends into each port subdirectory and executes make describe there. Thus, if make describe fails in any port, no one can generate INDEX, and many people will quickly become unhappy.

It is important to be able to generate this file no matter what options are present in make.conf, so please avoid doing things such as using .error statements when (for instance) a dependency is not satisfied. (See Avoid Use of the .error Construct.)

If make describe produces a string rather than an error message, everything is probably safe. See bsd.port.mk for the meaning of the string produced.

Also note that running a recent version of portlint (as specified in the next section) will cause make describe to be run automatically.

10.2. Portclippy / Portfmt

Those tools come from ports-mgmt/portfmt.

Portclippy is a linter that checks if variables in the Makefile are in the correct order according to Order of Variables in Port Makefiles.

Portfmt is a tool for automatically formatting Makefile.

10.3. Portlint

Do check the port with portlint before submitting or committing it. portlint warns about many common errors, both functional and stylistic. For a new (or repocopied) port, portlint -A is the most thorough; for an existing port, portlint -C is sufficient.

Since portlint uses heuristics to try to figure out errors, it can produce false positive warnings. In addition, occasionally something that is flagged as a problem really cannot be done in any other way due to limitations in the ports framework. When in doubt, the best thing to do is ask on FreeBSD ports 郵遞論壇.

10.4. Port Tools

The ports-mgmt/porttools program is part of the Ports Collection.

port is the front-end script, which can help simplify the testing job. Whenever a new port or an update to an existing one needs testing, use port test to test the port, including the portlint checking. This command also detects and lists any files that are not listed in pkg-plist. For example:

```
# port test /usr/ports/net/csup
```

10.5. PREFIX and DESTDIR

PREFIX determines where the port will be installed. It defaults to /usr/local, but can be set by the user to a custom path like /opt. The port must respect the value of this variable.

DESTDIR, if set by the user, determines the complete alternative environment, usually a jail or an installed system mounted somewhere other than /. A port will actually install into DESTDIR/PREFIX, and register with the package database in DESTDIR/var/db/pkg. DESTDIR is handled automatically by the ports infrastructure with chroot(8). There is no need for modifications or any extra care to write DESTDIR-compliant ports.

The value of PREFIX will be set to LOCALBASE (defaulting to /usr/local). If USE_LINUX_PREFIX is set, PREFIX will be LINUXBASE (defaulting to /compat/linux).

Avoiding hard-coded /usr/local paths in the source makes the port much more flexible and able to cater to the needs of other sites. Often, this can be accomplished by replacing occurrences of /usr/local in the port's various Makefiles with ${PREFIX}. This variable is automatically passed down to every stage of the build and install processes.

Make sure the application is not installing things in /usr/local instead of PREFIX. A quick test for such hard-coded paths is:

```
% make clean; make package PREFIX=/var/tmp/`make -V PORTNAME`
```

If anything is installed outside of PREFIX, the package creation process will complain that it cannot find the files.

In addition, it is worth checking the same with the stage directory support (see Staging):

```
% make stage && make check-plist && make stage-qa && make package
```

- check-plist checks for files missing from the plist, and files in the plist that are not installed by the port.
- stage-qa checks for common problems like bad shebang, symlinks pointing outside the stage directory, setuid files, and non-stripped libraries…

These tests will not find hard-coded paths inside the port's files, nor will it verify that LOCALBASE is being used to correctly refer to files from other ports. The temporarily-installed port in /var/tmp/make -V PORTNAME must be tested for proper operation to make sure there are no problems with paths.

PREFIX must not be set explicitly in a port's Makefile. Users installing the port may have set PREFIX to a custom location, and the port must respect that setting.

Refer to programs and files from other ports with the variables mentioned above, not explicit pathnames. For instance, if the port requires a macro PAGER to have the full pathname of less, do not use a literal path of /usr/local/bin/less. Instead, use ${LOCALBASE}:

```
-DPAGER=\"${LOCALBASE}/bin/less\"
```

The path with LOCALBASE is more likely to still work if the system administrator has moved the whole /usr/local tree somewhere else.

All these tests are done automatically when running poudriere testport or poudriere bulk -t. It is highly recommended that every ports contributor install and test their ports with it. See Poudriere for more information.

10.6. Poudriere

For a ports contributor, Poudriere is one of the most important and helpful testing and build tools. Its main features include:

- Bulk building of the entire ports tree, specific subsets of the ports tree, or a single port including its dependencies
- Automatic packaging of build results
- Generation of build log files per port
- Providing a signed pkg(8) repository
- Testing of port builds before submitting a patch to the FreeBSD bug tracker or committing to the ports tree
- Testing for successful ports builds using different options

Because Poudriere performs its building in a clean jail(8) environment and uses zfs(8) features, it has several advantages over traditional testing on the host system:

- No pollution of the host environment: No leftover files, no accidental removals, no changes of existing configuration files.
- Verify pkg-plist for missing or superfluous entries
- Ports committers sometimes ask for a Poudriere log alongside a patch submission to assess whether the patch is ready for integration into the ports tree

It is also quite straightforward to set up and use, has no dependencies, and will run on any supported FreeBSD release. This section shows how to install, configure, and run Poudriere as part of the normal workflow of a ports contributor.

The examples in this section show a default file layout, as standard in FreeBSD. Substitute any local changes accordingly. The ports tree, represented by ${PORTSDIR}, is located in /usr/ports. Both ${LOCALBASE} and ${PREFIX} are /usr/local by default.

10.6.1. Installing Poudriere

Poudriere is available in the ports tree in ports-mgmt/poudriere. It can be installed using pkg(8) or from ports:

```
# pkg install poudriere
```

or

```
# make -C /usr/ports/ports-mgmt/poudriere install clean
```

There is also a work-in-progress version of Poudriere which will eventually become the next release. It is available in ports-mgmt/poudriere-devel. This development version is used for the official FreeBSD package builds, so it is well tested. It often has newer interesting features. A ports committer will want to use the development version because it is what is used in production, and has all the new features that will make sure everything is exactly right. A contributor will not necessarily need those as the most important fixes are backported to released version. The main reason for the use of the development version to build the official package is because it is faster, in a way that will shorten a full build from 18 hours to 17 hours when using a high end 32 CPU server with 128GB of RAM. Those optimizations will not matter a lot when building ports on a desktop machine.

10.6.2. Setting Up Poudriere

The port installs a default configuration file, /usr/local/etc/poudriere.conf. Each parameter is documented in the configuration file and in poudriere(8). Here is a minimal example config file:

```
ZPOOL=tank
ZROOTFS=/poudriere
BASEFS=/poudriere
DISTFILES_CACHE=/usr/ports/distfiles
RESOLV_CONF=/etc/resolv.conf
FREEBSD_HOST=ftp://ftp.freebsd.org
SVN_HOST=svn.FreeBSD.org
```

ZPOOL
: The name of the ZFS storage pool which Poudriere shall use. Must be listed in the output of zpool status.

ZROOTFS
: The root of Poudriere-managed file systems. This entry will cause Poudriere to create zfs(8) file systems under tank/poudriere.

BASEFS
: The root mount point for Poudriere file systems. This entry will cause Poudriere to mount tank/poudriere to /poudriere.

DISTFILES_CACHE
: Defines where distfiles are stored. In this example, Poudriere and the host share the distfiles storage directory. This avoids downloading tarballs which are already present on the system. Please create this directory if it does not already exist so that Poudriere can find it.

RESOLV_CONF
: Use the host /etc/resolv.conf inside jails for DNS. This is needed so jails can resolve the URLs of distfiles when downloading. It is not needed when using a proxy. Refer to the default configuration file for proxy configuration.

FREEBSD_HOST
: The FTP/HTTP server to use when the jails are installed from FreeBSD releases and updated with freebsd-update(8). Choose a server location which is close, for example if the machine is located in Australia, use ftp.au.freebsd.org.

SVN_HOST
: The server from where jails are installed and updated when using Subversion. Also used for ports tree when not using portsnap(8). Again, choose a nearby location. A list of official Subversion mirrors can be found in the FreeBSD Handbook Subversion section.

10.6.3. Creating Poudriere Jails

Create the base jails which Poudriere will use for building:

```
# poudriere jail -c -j 114Ramd64 -v 11.4-RELEASE -a amd64
```

Fetch a 11.4-RELEASE for amd64 from the FTP server given by FREEBSD_HOST in poudriere.conf, create the zfs file system tank/poudriere/jails/114Ramd64, mount it on /poudriere/jails/114Ramd64 and extract the 11.4-RELEASE tarballs into this file system.

```
# poudriere jail -c -j 11i386 -v stable/11 -a i386 -m git+https
```

Create tank/poudriere/jails/11i386, mount it on /poudriere/jails/11i386, then check out the tip of the Subversion branch of FreeBSD-11-STABLE from SVN_HOST in poudriere.conf into /poudriere/jails/11i386/usr/src, then complete a buildworld and install it into /poudriere/jails/11i386.

If a specific Subversion revision is needed, append it to the version string. For example:

```
# poudriere jail -c -j 11i386 -v stable/11@123456 -a i386 -m git+https
```

While it is possible to build a newer version of FreeBSD on an older version, most of the time it will not run. For example, if a stable/11 jail is needed, the host will have to run stable/11 too. Running 11.4-RELEASE is not enough.

To create a Poudriere jail for 14.0-CURRENT:

```
# poudriere jail -c -j 14amd64 -v main -a amd64 -m git+https
```

In order to run a 14.0-CURRENT Poudriere jail you must be running 14.0-CURRENT. In general, newer kernels can build and run older jails. For instance, a 14.0-CURRENT kernel can build and run a 11.4-STABLE. Poudriere jail if the COMPAT_FREEBSD11 kernel option was compiled in (on by default in 14.0-CURRENTGENERIC kernel config).

The default svn protocol works but is not very secure. Using svn+https along with verifying the remote server’ s SSL fingerprint is advised. It will ensure that the files used for building the jail are from a trusted source.

A list of jails currently known to Poudriere can be shown with poudriere jail -l:

```
# poudriere jail -l
JAILNAME        VERSION         ARCH    METHOD
114Ramd64       11.4-RELEASE    amd64   ftp
11i386          11.4-STABLE     i386    svn+https
```

10.6.4. Keeping Poudriere Jails Updated

Managing updates is very straightforward. The command:

```
# poudriere jail -u -j JAILNAME
```

updates the specified jail to the latest version available. For FreeBSD releases, update to the latest patchlevel with freebsd-update(8). For FreeBSD versions built from source, update to the latest Subversion revision in the branch.

For jails employing a git+* method, it is helpful to add -J

NumberOfParallelBuildJobs to speed up the build by increasing the number of parallel compile jobs used. For example, if the building machine has 6 CPUs, use:

```
# poudriere jail -u -J 6 -j JAILNAME
```

10.6.5. Setting Up Ports Trees for Use with Poudriere

There are multiple ways to use ports trees in Poudriere. The most straightforward way is to have Poudriere create a default ports tree for itself, using either portsnap(8) (if running FreeBSD 12.1 or 11.4) or Git (if running FreeBSD-CURRENT):

```
# poudriere ports -c -m portsnap
```

or

```
# poudriere ports -c -m git+https -B main
```

These commands create tank/poudriere/ports/default, mount it on /poudriere/ports/default, and populate it using Git, portsnap(8), or Subversion. Afterward it is included in the list of known ports trees:

```
# poudriere ports -l
PORTSTREE METHOD    TIMESTAMP           PATH
default   git+https 2020-07-20 04:23:56 /poudriere/ports/default
```

Note that the "default" ports tree is special. Each of the build commands explained later will implicitly use this ports tree unless specifically specified otherwise. To use another tree, add -p treename to the commands.

While useful for regular bulk builds, having this default ports tree with the portsnap(8) method may not be the best way to deal with local modifications for a ports contributor. As with the creation of jails, it is possible to use a different method for creating the ports tree. To add an additional ports tree for testing local modifications and ports development, checking out the tree via Subversion (as described above) is preferable.

The http and https methods need devel/subversion built with the SERF option enabled. It is enabled by default.

The svn method allows extra qualifiers to tell Subversion exactly how to fetch data. This is explained in poudriere(8). For instance, poudriere ports -c -m svn+ssh -p subversive uses SSH for the checkout.

10.6.6. Using Manually Managed Ports Trees with Poudriere

Depending on the workflow, it can be extremely helpful to use ports trees which are maintained manually. For instance, if there is a local copy of the ports tree in /work/ports, point Poudriere to the location:

- For Poudriere older than version 3.1.20:

```
# poudriere ports -c -F -f none -M /work/ports -p development
```

- For Poudriere version 3.1.20 and later:

```
# poudriere ports -c -m null -M /work/ports -p development
```

This will be listed in the table of known trees:

```
# poudriere ports -l
PORTSTREE   METHOD    TIMESTAMP         PATH
development null      2020-07-20 05:06:33 /work/ports
```

The dash or null in the METHOD column means that Poudriere will not update or change this ports tree, ever. It is completely up to the user to maintain this tree, including all local modifications that may be used for testing new ports and submitting patches.

10.6.7. Keeping Poudriere Ports Trees Updated

As straightforward as with jails described earlier:

```
# poudriere ports -u -p PORTSTREE
```

Will update the given PORTSTREE, one tree given by the output of poudriere -l, to the latest revision available on the official servers.

Ports trees without a method, see Using Manually Managed Ports Trees with Poudriere, cannot be updated like this. They must be updated manually by the porter.

10.6.8. Testing Ports

After jails and ports trees have been set up, the result of a contributor’ s modifications to the ports tree can be tested.

For example, local modifications to the www/firefox port located in /work/ports/www/firefox can be tested in the previously created 11.4-RELEASE jail:

```
# poudriere testport -j 114Ramd64 -p development -o www/firefox
```

This will build all dependencies of Firefox. If a dependency has been built previously and is still up-to-date, the pre-built package is installed. If a dependency has no up-to-date package, one will be built with default options in a jail. Then Firefox itself is built.

The complete build of every port is logged to /poudriere/data/logs/bulk/114Ri386-development/build-time/logs.

The directory name 114Ri386-development is derived from the arguments to -j and -p, respectively. For convenience, a symbolic link /poudriere/data/logs/bulk/114Ri386-development/latest is also maintained. The link points to the latest build-time directory. Also in this directory is an index.html

for observing the build process with a web browser.

By default, Poudriere cleans up the jails and leaves log files in the directories mentioned above. To ease investigation, jails can be kept running after the build by adding -i to testport:

```
# poudriere testport -j 114Ramd64 -p development -i -o www/firefox
```

After the build completes, and regardless of whether it was successful, a shell is provided within the jail. The shell is used to investigate further. Poudriere can be told to leave the jail running after the build finishes with -I. Poudriere will show the command to run when the jail is no longer needed. It is then possible to jexec(8) into it:

```
# poudriere testport -j 114Ramd64 -p development -I -o www/firefox
[...]
====>> Installing local Pkg repository to /usr/local/etc/pkg/repos
====>> Leaving jail 114Ramd64-development-n running, mounted at
/poudriere/data/.m/114Ramd64-development/ref for interactive run testing
====>> To enter jail: jexec 114Ramd64-development-n env -i TERM=$TERM /usr/bin/login
-fp root
====>> To stop jail: poudriere jail -k -j 114Ramd64 -p development
# jexec 114Ramd64-development-n env -i TERM=$TERM /usr/bin/login -fp root
# [do some stuff in the jail]
# exit
# poudriere jail -k -j 114Ramd64 -p development
====>> Umounting file systems
```

An integral part of the FreeBSD ports build infrastructure is the ability to tweak ports to personal preferences with options. These can be tested with Poudriere as well. Adding the -c:

```
# poudriere testport -c -o www/firefox
```

Presents the port configuration dialog before the port is built. The ports given after -o in the format category/portname will use the specified options, all dependencies will use the default options. Testing dependent ports with non-default options can be accomplished using sets, see Using Sets.

When testing ports where pkg-plist is altered during build depending on the selected options, it is recommended to perform a test run with all options selected and one with all options deselected.

10.6.9. Using Sets

For all actions involving builds, a so-called set can be specified using -z setname. A set refers to a fully independent build. This allows, for instance, usage of testport with non-standard options for the dependent ports.

To use sets, Poudriere expects an existing directory structure similar to PORT_DBDIR, defaults to /var/db/ports in its configuration directory. This directory is then nullfs(5)-mounted into the jails where the ports and their dependencies are built. Usually a suitable starting point can be obtained by recursively copying the existing PORT_DBDIR to /usr/local/etc/poudriere.d/jailname-portname-setname-options. This is described in detail in poudriere(8). For instance, testing www/firefox in a specific set named devset, add the -z devset parameter to the testport command:

```
# poudriere testport -j 114Ramd64 -p development -z devset -o www/firefox
```

This will look for the existence of these directories in this order:

- /usr/local/etc/poudriere.d/114Ramd64-development-devset-options
- /usr/local/etc/poudriere.d/114Ramd64-devset-options
- /usr/local/etc/poudriere.d/114Ramd64-development-options
- /usr/local/etc/poudriere.d/devset-options
- /usr/local/etc/poudriere.d/development-options
- /usr/local/etc/poudriere.d/114Ramd64-options
- /usr/local/etc/poudriere.d/options

From this list, Poudriere nullfs(5)-mounts the first existing directory tree into the /var/db/ports directory of the build jails. Hence, all custom options are used for all the ports during this run of testport.

After the directory structure for a set is provided, the options for a particular port can be altered. For example:

```
# poudriere options -c www/firefox -z devset
```

The configuration dialog for www/firefox is shown, and options can be edited. The selected options are saved to the devset set.

Poudriere is very flexible in the option configuration. They can be set for particular jails, ports trees, and for multiple ports by one command. Refer to poudriere(8) for details.

10.6.10. Providing a Custom make.conf File

Similar to using sets, Poudriere will also use a custom make.conf if it is provided. No special command line argument is necessary. Instead, Poudriere looks for existing files matching a name scheme derived from the command line. For instance:

```
# poudriere testport -j 114Ramd64 -p development -z devset -o www/firefox
```

causes Poudriere to check for the existence of these files in this order:

- /usr/local/etc/poudriere.d/make.conf
- /usr/local/etc/poudriere.d/devset-make.conf
- /usr/local/etc/poudriere.d/development-make.conf
- /usr/local/etc/poudriere.d/114Ramd64-make.conf
- /usr/local/etc/poudriere.d/114Ramd64-development-make.conf
- /usr/local/etc/poudriere.d/114Ramd64-devset-make.conf
- /usr/local/etc/poudriere.d/114Ramd64-development-devset-make.conf

Unlike with sets, all of the found files will be appended, in that order, into one make.conf inside the build jails. It is hence possible to have general make variables, intended to affect all builds in /usr/local/etc/poudriere.d/make.conf. Special variables, intended to affect only certain jails or sets can be set in specialised make.conf files, such as /usr/local/etc/poudriere.d/114Ramd64-

development-devset-make.conf.

例 111. Using make.conf to Change Default Perl

To build a set with a non default Perl version, for example, 5.20, using a set named perl5-20, create a perl5-20-make.conf with this line:

```
DEFAULT_VERSIONS+= perl=5.20
```

Note the use of += so that if the variable is already set in the default make.conf its content will not be overwritten.

10.6.11. Pruning no Longer Needed Distfiles

Poudriere comes with a built-in mechanism to remove outdated distfiles that are no longer used by any port of a given tree. The command

```
# poudriere distclean -p portstree
```

will scan the distfiles folder, DISTFILES_CACHE in poudriere.conf, versus the ports tree given by the -p portstree argument and prompt for removal of those distfiles. To skip the prompt and remove all unused files unconditionally, the -y argument can be added:

```
# poudriere distclean -p portstree -y
```

Chapter 11. Upgrading a Port

When a port is not the most recent version available from the authors, update the local working copy of /usr/ports. The port might have already been updated to the new version.

When working with more than a few ports, it will probably be easier to use Git to keep the whole ports collection up-to-date, as described in the Handbook. This will have the added benefit of tracking all the port's dependencies.

The next step is to see if there is an update already pending. To do this, there are two options. There is a searchable interface to the FreeBSD Problem Report (PR) or bug database. Select Ports & Packages in the Product multiple select menu, and enter the name of the port in the Summary field.

However, sometimes people forget to put the name of the port into the Summary field in an unambiguous fashion. In that case, try searching in the Comment field in the Detailled Bug Information section, or try the FreeBSD Ports Monitoring System (also known as portsmon). This system attempts to classify port PRs by portname. To search for PRs about a particular port, use the Overview of One Port.

The FreeBSD Ports Monitoring System (portsmon) is currently not working due to latest Python updates.

If there is no pending PR, the next step is to send an email to the port's maintainer, as shown by make maintainer. That person may already be working on an upgrade, or have a reason to not upgrade the port right now (because of, for example, stability problems of the new version), and there is no need to duplicate their work. Note that unmaintained ports are listed with a maintainer of ports@FreeBSD.org, which is just the general ports mailing list, so sending mail there probably will not help in this case.

If the maintainer asks you to do the upgrade or there is no maintainer, then help out FreeBSD by preparing the update! Please do this by using the diff(1) command in the base system.

To create a suitable diff for a single patch, copy the file that needs patching to something.orig, save the changes to something and then create the patch:

```
% diff -u something.orig something > something.diff
```

Otherwise, either use the git diff method (Using Git to Make Patches) or copy the contents of the port to an entire different directory and use the result of the recursive diff(1) output of the new and old ports directories (for example, if the modified port directory is called superedit and the original is in our tree as superedit.bak, then save the result of diff -ruN superedit.bak superedit). Either unified or context diff is fine, but port committers generally prefer unified diffs. Note the use of the -N option-this is the accepted way to force diff to properly deal with the case of new files being added or old files being deleted. Before sending us the diff, please examine the output to make sure all the changes make sense. (In particular, make sure to first clean out the work directories with make clean).

If some files have been added, copied, moved, or removed, add this information to the problem report so that the committer picking up the patch will know what git(1) commands to run.

To simplify common operations with patch files, use make makepatch as described in Patching. Other tools exists, like /usr/ports/Tools/scripts/patchtool.py. Before using it, please read /usr/ports/Tools/scripts/README.patchtool.

If the port is unmaintained, and you are actively using it, please consider volunteering to become its maintainer. FreeBSD has over 4000 ports without maintainers, and this is an area where more volunteers are always needed. (For a detailed description of the responsibilities of maintainers, refer to the section in the Developer's Handbook.)

To submit the diff, use the bug submit form (product Ports & Packages, component Individual Port(s)). Always include the category with the port name, followed by colon, and brief descripton of the issue. Examples: category/portname: add FOO option; category/portname: Update to X.Y. Please mention any added or deleted files in the message, as they have to be explicitly specified to git(1) when doing a commit. Do not compress or encode the diff.

Before submitting the bug, review the Writing the problem report section in the Problem Reports article. It contains far more information about how to write useful problem reports.

If the upgrade is motivated by security concerns or a serious fault in the currently committed port, please notify the Ports Management Team <portmgr@FreeBSD.org> to request immediate rebuilding and redistribution of the port's package. Unsuspecting users of pkg will otherwise continue to install the old version via pkg install for several weeks.

Please use diff(1) or git diff to create updates to existing ports. Other formats include the whole file and make it impossible to see just what has changed. When diffs are not included, the entire update might be ignored.

Now that all of that is done, read about how to keep up-to-date in Keeping Up.

11.1. Using Git to Make Patches

When possible, please submit a git(1) patch or diff. They are easier to handle than diffs between "new and old" directories. It is easier to see what has changed, and to update the diff if something was modified in the Ports Collection since the work on it began, or if the committer asks for something to be fixed. Also, a patch generated with git-format-patch(1) or git-diff(1) can be easily applied with git-am(1) or git-apply(1) and will save some time for the committer. Finally, the git patch generated by git-format-patch(1) includes your author information and commit messages. These will be recorded in the log of the repository and this is the recommended way to submit your changes.

```
% git clone https://git.FreeBSD.org/ports.git ~/my_wrkdir ① ②
% cd ~/my_wrkdir
```

① This can be anywhere, of course. Building ports is not limited to within /usr/ports/.

② git.FreeBSD.org is the FreeBSD public Git server. See FreeBSD Git Repository URL Table for more information.

While in the port directory, make any changes that are needed. If adding, moving, or removing a file, use git to track these changes:

```
% git add new_file
% git mv old_name new_name
% git rm deleted_file
```

Make sure to check the port using the checklist in Testing the Port and Checking the Port with portlint.

Before making the patch, fetch the latest repository and rebase the changes on top of it. Watch and follow the output carefully. If any of the files failed to rebase, it means that the upstream files changed while you were editing the same file, and the conflicts need to be resolved manually.

```
% git fetch origin main
```

```
% git rebase origin/main
```

Check the changes staged for the patch:

```
% git status
% git diff --staged
```

The last step is to make an unified diff or patch of the changes:

To generate an unified diff with git-diff(1):

```
% git diff --staged > ../`make -VPKGNAME`.diff
```

This will generate a diff named like foo-1.2.3.diff. Where foo is replaced with the first line of the commit message, i.e., the subject of the commit message.

To generate a patch with git-format-patch(1):

```
% git checkout -b my_branch
% git commit
% git format-patch main
```

This will generate a patch named like 0001-foo.patch.

After patch has been created, you can switch to the main branch for starting other developments.

```
% git checkout main
```

Once the patch is accepted and merged, you can delete the local development branch if you want:

```
% git branch -D my_branch
```

If files have been added, moved, or removed, include the git(1) add, mv, and rm commands that were used. git mv must be run before the patch can be applied. git add or git rm must be run after the patch is applied.

Send the patch following the problem report submission guidelines.

11.2. UPDATING and MOVED

11.2.1. /usr/ports/UPDATING

If upgrading the port requires special steps like changing configuration files or running a specific program, it must be documented in this file. The format of an entry in this file is:

```
YYYYMMDD:
  AFFECTS: users of portcategory/portname
```

```
AUTHOR: Your name <Your email address>

Special instructions
```

When including exact portmaster, portupgrade, and/or pkg instructions, please make sure to get the shell escaping right. For example, do not use:

```
# pkg delete -g -f docbook-xml* docbook-sk* docbook[2345]??-* docbook-4*
```

As shown, the command will only work with bourne shells. Instead, use the form shown below, which will work with both bourne shell and c-shell:

```
# pkg delete -g -f docbook-xml\* docbook-sk\* docbook\[2345\]\?\?-\* docbook-4\*
```

It is recommended that the AFFECTS line contains a glob matching all the ports affected by the entry so that automated tools can parse it as easily as possible. If an update concerns all the existing BIND 9 versions the AFFECTS content must be users of dns/bind9*, it must not be users of BIND 9

11.2.2. /usr/ports/MOVED

This file is used to list moved or removed ports. Each line in the file is made up of the name of the port, where the port was moved, when, and why. If the port was removed, the section detailing where it was moved can be left blank. Each section must be separated by the | (pipe) character, like so:

```
old name|new name (blank for deleted)|date of move|reason
```

The date must be entered in the form YYYY-MM-DD. New entries are added to the end of the list to keep it in chronological order, with the oldest entry at the top of the list.

If a port was removed but has since been restored, delete the line in this file that states that it was removed.

If a port was renamed and then renamed back to its original name, add a new one with the intermediate name to the old name, and remove the old entry as to not create a loop.

Any changes must be validated with Tools/scripts/MOVEDlint.awk.

If using a ports directory other than /usr/ports, use:

```
% cd /home/user/ports
% env PORTSDIR=$PWD Tools/scripts/MOVEDlint.awk
```

Chapter 12. Security

12.1. Why Security is So Important

Bugs are occasionally introduced to the software. Arguably, the most dangerous of them are those opening security vulnerabilities. From the technical viewpoint, such vulnerabilities are to be closed by exterminating the bugs that caused them. However, the policies for handling mere bugs and security vulnerabilities are very different.

A typical small bug affects only those users who have enabled some combination of options triggering the bug. The developer will eventually release a patch followed by a new version of the software, free of the bug, but the majority of users will not take the trouble of upgrading immediately because the bug has never vexed them. A critical bug that may cause data loss represents a graver issue. Nevertheless, prudent users know that a lot of possible accidents, besides software bugs, are likely to lead to data loss, and so they make backups of important data; in addition, a critical bug will be discovered really soon.

A security vulnerability is all different. First, it may remain unnoticed for years because often it does not cause software malfunction. Second, a malicious party can use it to gain unauthorized access to a vulnerable system, to destroy or alter sensitive data; and in the worst case the user will not even notice the harm caused. Third, exposing a vulnerable system often assists attackers to break into other systems that could not be compromised otherwise. Therefore closing a vulnerability alone is not enough: notify the audience of it in the most clear and comprehensive manner, which will allow them to evaluate the danger and take appropriate action.

12.2. Fixing Security Vulnerabilities

While on the subject of ports and packages, a security vulnerability may initially appear in the original distribution or in the port files. In the former case, the original software developer is likely to release a patch or a new version instantly. Update the port promptly with respect to the author's fix. If the fix is delayed for some reason, either mark the port as FORBIDDEN or introduce a patch file to the port. In the case of a vulnerable port, just fix the port as soon as possible. In either case, follow the standard procedure for submitting changes unless having rights to commit it directly to the ports tree.

Being a ports committer is not enough to commit to an arbitrary port. Remember that ports usually have maintainers, must be respected.

Please make sure that the port's revision is bumped as soon as the vulnerability has been closed. That is how the users who upgrade installed packages on a regular basis will see they need to run an update. Besides, a new package will be built and distributed over FTP and WWW mirrors, replacing the vulnerable one. Bump PORTREVISION unless DISTVERSION has changed in the course of correcting the vulnerability. That is, bump PORTREVISION if adding a patch file to the port, but do not bump it if updating the port to the latest software version and thus already touched DISTVERSION. Please refer to the corresponding section for more information.

12.3. Keeping the Community Informed

12.3.1. The VuXML Database

A very important and urgent step to take as early after a security vulnerability is discovered as possible is to notify the community of port users about the jeopardy. Such notification serves two purposes. First, if the danger is really severe it will be wise to apply an instant workaround. For example, stop the affected network service or even deinstall the port completely until the vulnerability is closed. Second, a lot of users tend to upgrade installed packages only occasionally. They will know from the notification that they must update the package without delay as soon as a corrected version is available.

Given the huge number of ports in the tree, a security advisory cannot be issued on each incident

without creating a flood and losing the attention of the audience when it comes to really serious matters. Therefore security vulnerabilities found in ports are recorded in the FreeBSD VuXML database. The Security Officer Team members also monitor it for issues requiring their intervention.

Committers can update the VuXML database themselves, assisting the Security Officer Team and delivering crucial information to the community more quickly. Those who are not committers or have discovered an exceptionally severe vulnerability should not hesitate to contact the Security Officer Team directly, as described on the FreeBSD Security Information page.

The VuXML database is an XML document. Its source file vuln.xml is kept right inside the port security/vuxml. Therefore the file's full pathname will be PORTSDIR/security/vuxml/vuln.xml. Each time a security vulnerability is discovered in a port, please add an entry for it to that file. Until familiar with VuXML, the best thing to do is to find an existing entry fitting the case at hand, then copy it and use it as a template.

12.3.2. A Short Introduction to VuXML

The full-blown XML format is complex, and far beyond the scope of this book. However, to gain basic insight on the structure of a VuXML entry only the notion of tags is needed. XML tag names are enclosed in angle brackets. Each opening <tag> must have a matching closing </tag>. Tags may be nested. If nesting, the inner tags must be closed before the outer ones. There is a hierarchy of tags, that is, more complex rules of nesting them. This is similar to HTML. The major difference is that XML is eXtensible, that is, based on defining custom tags. Due to its intrinsic structure XML puts otherwise amorphous data into shape. VuXML is particularly tailored to mark up descriptions of security vulnerabilities.

Now consider a realistic VuXML entry:

```
<vuln vid="f4bc80f4-da62-11d8-90ea-0004ac98a7b9"> ①
 <topic>Several vulnerabilities found in Foo</topic> ②
 <affects>
  <package>
   <name>foo</name> ③
   <name>foo-devel</name>
   <name>ja-foo</name>
   <range><ge>1.6</ge><lt>1.9</lt></range> ④
   <range><ge>2.*</ge><lt>2.4_1</lt></range>
   <range><eq>3.0b1</eq></range>
  </package>
  <package>
   <name>openfoo</name> ⑤
   <range><lt>1.10_7</lt></range> ⑥
   <range><ge>1.2,1</ge><lt>1.3_1,1</lt></range>
  </package>
 </affects>
 <description>
  <body xmlns="http://www.w3.org/1999/xhtml">
   <p>J. Random Hacker reports:</p> ⑦
   <blockquote
    cite="http://j.r.hacker.com/advisories/1">
```

```
      <p>Several issues in the Foo software may be exploited
        via carefully crafted QUUX requests.  These requests will
        permit the injection of Bar code, mumble theft, and the
        readability of the Foo administrator account.</p>
     </blockquote>
    </body>
   </description>
   <references> ⑧
    <freebsdsa>SA-10:75.foo</freebsdsa> ⑨
    <freebsdpr>ports/987654</freebsdpr> ⑩
    <cvename>CAN-2010-0201</cvename> ⑪
    <cvename>CAN-2010-0466</cvename>
    <bid>96298</bid> ⑫
    <certsa>CA-2010-99</certsa> ⑬
    <certvu>740169</certvu> ⑭
    <uscertsa>SA10-99A</uscertsa> ⑮
    <uscertta>SA10-99A</uscertta> ⑯
    <mlist
msgid="201075606@hacker.com">http://marc.theaimsgroup.com/?l=bugtraq&amp;m=20
3886607825605</mlist> ⑰
    <url>http://j.r.hacker.com/advisories/1</url> ⑱
   </references>
   <dates>
    <discovery>2010-05-25</discovery> ⑲
    <entry>2010-07-13</entry> ⑳
    <modified>2010-09-17</modified>
   </dates>
</vuln>
```

The tag names are supposed to be self-explanatory so we shall take a closer look only at fields which needs to be filled in:

① This is the top-level tag of a VuXML entry. It has a mandatory attribute, vid, specifying a universally unique identifier (UUID) for this entry (in quotes). Generate a UUID for each new VuXML entry (and do not forget to substitute it for the template UUID unless writing the entry from scratch). Use uuidgen(1) to generate a VuXML UUID.

② This is a one-line description of the issue found.

③ The names of packages affected are listed there. Multiple names can be given since several packages may be based on a single master port or software product. This may include stable and development branches, localized versions, and slave ports featuring different choices of important build-time configuration options.

④ Affected versions of the package(s) are specified there as one or more ranges using a combination of <lt>, <le>, <eq>, <ge>, and <gt> elements. Check that the version ranges given do not overlap.
In a range specification, * (asterisk) denotes the smallest version number. In particular, 2.* is less than 2.a. Therefore an asterisk may be used for a range to match all possible alpha, beta, and RC versions. For instance, <ge>2.</ge><lt>3.</lt> will selectively match every 2.x version

while <ge>2.0</ge><lt>3.0</lt> will not since the latter misses 2.r3 and matches 3.b.
The above example specifies that affected are versions 1.6 and up to but not including 1.9, versions 2.x before 2.4_1, and version 3.0b1.

⑤ Several related package groups (essentially, ports) can be listed in the <affected> section. This can be used if several software products (say FooBar, FreeBar and OpenBar) grow from the same code base and still share its bugs and vulnerabilities. Note the difference from listing multiple names within a single <package> section.

⑥ The version ranges have to allow for PORTEPOCH and PORTREVISION if applicable. Please remember that according to the collation rules, a version with a non-zero PORTEPOCH is greater than any version without PORTEPOCH, for example, 3.0,1 is greater than 3.1 or even than 8.9.

⑦ This is a summary of the issue. XHTML is used in this field. At least enclosing and has to appear. More complex mark-up may be used, but only for the sake of accuracy and clarity: No eye candy please.

⑧ This section contains references to relevant documents. As many references as apply are encouraged.

⑨ This is a FreeBSD security advisory.

⑩ This is a FreeBSD problem report.

⑪ This is a MITRE CVE identifier.

⑫ This is a SecurityFocus Bug ID.

⑬ This is a US-CERT security advisory.

⑭ This is a US-CERT vulnerability note.

⑮ This is a US-CERT Cyber Security Alert.

⑯ This is a US-CERT Technical Cyber Security Alert.

⑰ This is a URL to an archived posting in a mailing list. The attribute msgid is optional and may specify the message ID of the posting.

⑱ This is a generic URL. Only it if none of the other reference categories apply.

⑲ This is the date when the issue was disclosed (YYYY-MM-DD).

⑳ This is the date when the entry was added (YYYY-MM-DD).

This is the date when any information in the entry was last modified (YYYY-MM-DD). New entries must not include this field. Add it when editing an existing entry.

12.3.3. Testing Changes to the VuXML Database

This example describes a new entry for a vulnerability in the package dropbear that has been fixed in version dropbear-2013.59.

As a prerequisite, install a fresh version of security/vuxml port.

First, check whether there already is an entry for this vulnerability. If there were such an entry, it would match the previous version of the package, 2013.58:

```
% pkg audit dropbear-2013.58
```

If there is none found, add a new entry for this vulnerability.

```
% cd ${PORTSDIR}/security/vuxml
% make newentry
```

Verify its syntax and formatting:

```
% make validate
```

The previous command generates the vuln-flat.xml file. It can also be generated with:

```
% make vuln-flat.xml
```

At least one of these packages needs to be installed: textproc/libxml2, textproc/jade.

Verify that the <affected> section of the entry will match the correct packages:

```
% pkg audit -f ${PORTSDIR}/security/vuxml/vuln-flat.xml dropbear-2013.58
```

Make sure that the entry produces no spurious matches in the output.

Now check whether the right package versions are matched by the entry:

```
% pkg audit -f ${PORTSDIR}/security/vuxml/vuln-flat.xml dropbear-2013.58 dropbear-
2013.59
dropbear-2012.58 is vulnerable:
dropbear -- exposure of sensitive information, DoS
CVE: CVE-2013-4434
CVE: CVE-2013-4421
WWW: http://portaudit.FreeBSD.org/8c9b48d1-3715-11e3-a624-00262d8b701d.html

1 problem(s) in the installed packages found.
```

The former version matches while the latter one does not.

Chapter 13. Dos and Don’ts

13.1. Introduction

Here is a list of common dos and don’ts that are encountered during the porting process. Check the port against this list, but also check ports in the PR database that others have submitted. Submit any comments on ports as described in Bug Reports and General Commentary. Checking ports in the PR database will both make it faster for us to commit them, and prove that you know what you are doing.

13.2. WRKDIR

Do not write anything to files outside WRKDIR. WRKDIR is the only place that is guaranteed to be writable during the port build (see installing ports from a CDROM for an example of building ports from a read-only tree). The pkg-* files can be modified by redefining a variable rather than overwriting the file.

13.3. WRKDIRPREFIX

Make sure the port honors WRKDIRPREFIX. Most ports do not have to worry about this. In particular, when referring to a WRKDIR of another port, note that the correct location is ${WRKDIRPREFIX}${PORTSDIR}/subdir/name/work not ${PORTSDIR}/subdir/name/work or ${.CURDIR}/../../subdir/name/work or some such.

13.4. Differentiating Operating Systems and OS Versions

Some code needs modifications or conditional compilation based upon what version of FreeBSD Unix it is running under. The preferred way to tell FreeBSD versions apart are the __FreeBSD_version and __FreeBSD__ macros defined in sys/param.h. If this file is not included add the code,

```
#include <sys/param.h>
```

to the proper place in the .c file.

__FreeBSD__ is defined in all versions of FreeBSD as their major version number. For example, in FreeBSD 9.x, __FreeBSD__ is defined to be 9.

```
#if __FreeBSD__ >= 9
#  if __FreeBSD_version >= 901000
    /* 9.1+ release specific code here */
#  endif
#endif
```

A complete list of __FreeBSD_version values is available in __FreeBSD_version Values.

13.5. Writing Something After bsd.port.mk

Do not write anything after the .include <bsd.port.mk> line. It usually can be avoided by including bsd.port.pre.mk somewhere in the middle of the Makefile and bsd.port.post.mk at the end.

Include either the bsd.port.pre.mk/bsd.port.post.mk pair or bsd.port.mk only; do

not mix these two usages.

bsd.port.pre.mk only defines a few variables, which can be used in tests in the Makefile, bsd.port.post.mk defines the rest.

Here are some important variables defined in bsd.port.pre.mk (this is not the complete list, please read bsd.port.mk for the complete list).

Variable	Description
ARCH	The architecture as returned by uname -m (for example, i386)
OPSYS	The operating system type, as returned by uname -s (for example, FreeBSD)
OSREL	The release version of the operating system (for example, 2.1.5 or 2.2.7)
OSVERSION	The numeric version of the operating system; the same as __FreeBSD_version.
LOCALBASE	The base of the "local" tree (for example, /usr/local)
PREFIX	Where the port installs itself (see more on PREFIX).

When MASTERDIR is needed, always define it before including bsd.port.pre.mk.

Here are some examples of things that can be added after bsd.port.pre.mk:

```
# no need to compile lang/perl5 if perl5 is already in system
.if ${OSVERSION} > 300003
BROKEN= perl is in system
.endif
```

Always use tab instead of spaces after BROKEN=.

13.6. Use the exec Statement in Wrapper Scripts

If the port installs a shell script whose purpose is to launch another program, and if launching that program is the last action performed by the script, make sure to launch the program using the exec statement, for instance:

```
#!/bin/sh
exec %%LOCALBASE%%/bin/java -jar %%DATADIR%%/foo.jar "$@"
```

The exec statement replaces the shell process with the specified program. If exec is omitted, the shell process remains in memory while the program is executing, and needlessly consumes system resources.

13.7. Do Things Rationally

The Makefile should do things in a simple and reasonable manner. Making it a couple of lines shorter or more readable is always better. Examples include using a make .if construct instead of a shell if construct, not redefining do-extract if redefining EXTRACT* is enough, and using

GNU_CONFIGURE instead of CONFIGURE_ARGS += --prefix=${PREFIX}.

If a lot of new code is needed to do something, there may already be an implementation of it in bsd.port.mk. While hard to read, there are a great many seemingly-hard problems for which bsd.port.mk already provides a shorthand solution.

13.8. Respect Both CC and CXX

The port must respect both CC and CXX. What we mean by this is that the port must not set the values of these variables absolutely, overriding existing values; instead, it may append whatever values it needs to the existing values. This is so that build options that affect all ports can be set globally.

If the port does not respect these variables, please add NO_PACKAGE=ignores either cc or cxx to the Makefile.

Here is an example of a Makefile respecting both CC and CXX. Note the ?=:

```
CC?= gcc
```

```
CXX?= g++
```

Here is an example which respects neither CC nor CXX:

```
CC= gcc
```

```
CXX= g++
```

Both CC and CXX can be defined on FreeBSD systems in /etc/make.conf. The first example defines a value if it was not previously set in /etc/make.conf, preserving any system-wide definitions. The second example clobbers anything previously defined.

13.9. Respect CFLAGS

The port must respect CFLAGS. What we mean by this is that the port must not set the value of this variable absolutely, overriding the existing value. Instead, it may append whatever values it needs to the existing value. This is so that build options that affect all ports can be set globally.

If it does not, please add NO_PACKAGE=ignores cflags to the Makefile.

Here is an example of a Makefile respecting CFLAGS. Note the +=:

```
CFLAGS+= -Wall -Werror
```

Here is an example which does not respect CFLAGS:

```
CFLAGS= -Wall -Werror
```

CFLAGS is defined on FreeBSD systems in /etc/make.conf. The first example appends additional

flags to CFLAGS, preserving any system-wide definitions. The second example clobbers anything previously defined.

Remove optimization flags from the third party Makefiles. The system CFLAGS contains system-wide optimization flags. An example from an unmodified Makefile:

```
CFLAGS= -O3 -funroll-loops -DHAVE_SOUND
```

Using system optimization flags, the Makefile would look similar to this example:

```
CFLAGS+= -DHAVE_SOUND
```

13.10. Verbose Build Logs

Make the port build system display all commands executed during the build stage. Complete build logs are crucial to debugging port problems.

Non-informative build log example (bad):

```
CC    source1.o
CC    source2.o
CCLD  someprogram
```

Verbose build log example (good):

```
cc -O2 -pipe -I/usr/local/include -c -o source1.o source1.c
cc -O2 -pipe -I/usr/local/include -c -o source2.o source2.c
cc -o someprogram source1.o source2.o -L/usr/local/lib -lsomelib
```

Some build systems such as CMake, ninja, and GNU configure are set up for verbose logging by the ports framework. In other cases, ports might need individual tweaks.

13.11. Feedback

Do send applicable changes and patches to the upstream maintainer for inclusion in the next release of the code. This makes updating to the next release that much easier.

13.12. README.html

README.html is not part of the port, but generated by make readme. Do not include this file in patches or commits.

If make readme fails, make sure that the default value of ECHO_MSG has not been modified by the port.

13.13. Marking a Port Not Installable with BROKEN, FORBIDDEN, or IGNORE

In certain cases, users must be prevented from installing a port. There are several variables that can be used in a port's Makefile to tell the user that the port cannot be installed. The value of these make variables will be the reason that is shown to users for why the port refuses to install itself. Please use the correct make variable. Each variable conveys radically different meanings, both to users and to automated systems that depend on Makefiles, such as the ports build cluster, FreshPorts, and portsmon.

13.13.1. Variables

- BROKEN is reserved for ports that currently do not compile, install, deinstall, or run correctly. Use it for ports where the problem is believed to be temporary.

  If instructed, the build cluster will still attempt to try to build them to see if the underlying problem has been resolved. (However, in general, the cluster is run without this.)

  For instance, use BROKEN when a port:

  - does not compile
  - fails its configuration or installation process
  - installs files outside of ${PREFIX}
  - does not remove all its files cleanly upon deinstall (however, it may be acceptable, and desirable, for the port to leave user-modified files behind)
  - has runtime issues on systems where it is supposed to run fine.
- FORBIDDEN is used for ports that contain a security vulnerability or induce grave concern regarding the security of a FreeBSD system with a given port installed (for example, a reputably insecure program or a program that provides easily exploitable services). Mark ports as FORBIDDEN as soon as a particular piece of software has a vulnerability and there is no released upgrade. Ideally upgrade ports as soon as possible when a security vulnerability is discovered so as to reduce the number of vulnerable FreeBSD hosts (we like being known for being secure), however sometimes there is a noticeable time gap between disclosure of a vulnerability and an updated release of the vulnerable software. Do not mark a port FORBIDDEN for any reason other than security.
- IGNORE is reserved for ports that must not be built for some other reason. Use it for ports where the problem is believed to be structural. The build cluster will not, under any circumstances, build ports marked as IGNORE. For instance, use IGNORE when a port:
  - does not work on the installed version of FreeBSD
  - has a distfile which may not be automatically fetched due to licensing restrictions
  - does not work with some other currently installed port (for instance, the port depends on www/apache20 but www/apache22 is installed)

If a port would conflict with a currently installed port (for example, if they install a file in the same place that performs a different function), use CONFLICTS instead. CONFLICTS will set IGNORE by itself.

13.13.2. Implementation Notes

Do not quote the values of BROKEN, IGNORE, and related variables. Due to the way the information is shown to the user, the wording of messages for each variable differ:

```
BROKEN= fails to link with base -lcrypto
```

```
IGNORE= unsupported on recent versions
```

resulting in this output from make describe:

```
===>  foobar-0.1 is marked as broken: fails to link with base -lcrypto.
```

```
===>  foobar-0.1 is unsupported on recent versions.
```

13.14. Architectural Considerations

13.14.1. General Notes on Architectures

FreeBSD runs on many more processor architectures than just the well-known x86-based ones. Some ports have constraints which are particular to one or more of these architectures.

For the list of supported architectures, run:

```
cd ${SRCDIR}; make targets
```

The values are shown in the form TARGET/TARGET_ARCH. The ports read-only makevar ARCH is set based on the value of TARGET_ARCH. Port Makefiles should test the value of this Makevar.

13.14.2. Marking a Port as Architecture Neutral

Ports that do not have any architecture-dependent files or requirements are identified by setting NO_ARCH=yes.

NO_ARCH is meant to indicate that there is no need to build a package for each of the supported architectures. The goal is to reduce the amount of resources spent on building and distributing the packages such as network bandwidth and disk space on mirrors and on distribution media. Currently, however, our package infrastructure (e.g., package managers, mirrors, and package builders) is not set up to fully benefit from NO_ARCH.

13.14.3. Marking a Port as Ignored Only On Certain Architectures

- To mark a port as IGNOREd only on certain architectures, there are two other convenience variables that will automatically set IGNORE: ONLY_FOR_ARCHS and NOT_FOR_ARCHS. Examples:

  ```
  ONLY_FOR_ARCHS= i386 amd64
  ```

  ```
  NOT_FOR_ARCHS=  ia64 sparc64
  ```

  A custom IGNORE message can be set using ONLY_FOR_ARCHS_REASON and NOT_FOR_ARCHS_REASON. Per architecture entries are possible with ONLY_FOR_ARCHS_REASON_ARCH and NOT_FOR_ARCHS_REASON_ARCH.

- If a port fetches i386 binaries and installs them, set IA32_BINARY_PORT. If this variable is set, /usr/lib32 must be present for IA32 versions of libraries and the kernel must support IA32 compatibility. If one of these two dependencies is not satisfied, IGNORE will be set automatically.

13.14.4. Cluster-Specific Considerations

- Some ports attempt to tune themselves to the exact machine they are being built on by specifying -march=native to the compiler. This should be avoided: either list it under an off-by-default option, or delete it entirely.

  Otherwise, the default package produced by the build cluster might not run on every single machine of that ARCH.

13.15. Marking a Port for Removal with DEPRECATED or EXPIRATION_DATE

Do remember that BROKEN and FORBIDDEN are to be used as a temporary resort if a port is not working. Permanently broken ports will be removed from the tree entirely.

When it makes sense to do so, users can be warned about a pending port removal with DEPRECATED and EXPIRATION_DATE. The former is a string stating why the port is scheduled for removal; the latter is a string in ISO 8601 format (YYYY-MM-DD). Both will be shown to the user.

It is possible to set DEPRECATED without an EXPIRATION_DATE (for instance, recommending a newer version of the port), but the converse does not make any sense.

There is no set policy on how much notice to give. Current practice seems to be one month for security-related issues and two months for build issues. This also gives any interested committers a little time to fix the problems.

13.16. Avoid Use of the .error Construct

The correct way for a Makefile to signal that the port cannot be installed due to some external factor (for instance, the user has specified an illegal combination of build options) is to set a non-blank value to IGNORE. This value will be formatted and shown to the user by make install.

It is a common mistake to use .error for this purpose. The problem with this is that many automated tools that work with the ports tree will fail in this situation. The most common occurrence of this is seen when trying to build /usr/ports/INDEX (see Running make describe). However, even more trivial commands such as make maintainer also fail in this scenario. This is not acceptable.

例 112. How to Avoid Using .error

The first of the next two Makefile snippets will cause make index to fail, while the second one will not:

```
.error "option is not supported"
```

```
IGNORE=option is not supported
```

13.17. Usage of sysctl

The usage of sysctl is discouraged except in targets. This is because the evaluation of any makevars, such as used during make index, then has to run the command, further slowing down that process.

Only use sysctl(8) through SYSCTL, as it contains the fully qualified path and can be overridden, if one has such a special need.

13.18. Rerolling Distfiles

Sometimes the authors of software change the content of released distfiles without changing the file's name. Verify that the changes are official and have been performed by the author. It has happened in the past that the distfile was silently altered on the download servers with the intent to cause harm or compromise end user security.

Put the old distfile aside, download the new one, unpack them and compare the content with diff(1). If there is nothing suspicious, update distinfo.

Be sure to summarize the differences in the PR and commit log, so that other people know that nothing bad has happened.

Contact the authors of the software and confirm the changes with them.

13.19. Use POSIX Standards

FreeBSD ports generally expect POSIX compliance. Some software and build systems make assumptions based on a particular operating system or environment that can cause problems when used in a port.

Do not use /proc if there are any other ways of getting the information. For example, setprogname(argv[0]) in main() and then getprogname(3) to know the executable name.

Do not rely on behavior that is undocumented by POSIX.

Do not record timestamps in the critical path of the application if it also works without. Getting timestamps may be slow, depending on the accuracy of timestamps in the OS. If timestamps are really needed, determine how precise they have to be and use an API which is documented to just deliver the needed precision.

A number of simple syscalls (for example gettimeofday(2), getpid(2)) are much faster on Linux® than on any other operating system due to caching and the vsyscall performance optimizations. Do not rely on them being cheap in performance-critical applications. In general, try hard to avoid syscalls if possible.

Do not rely on Linux®-specific socket behavior. In particular, default socket buffer sizes are different (call setsockopt(2) with SO_SNDBUF and SO_RCVBUF, and while Linux®'s send(2) blocks when the socket buffer is full, FreeBSD's will fail and set ENOBUFS in errno.

If relying on non-standard behavior is required, encapsulate it properly into a generic API, do a check for the behavior in the configure stage, and stop if it is missing.

Check the man pages to see if the function used is a POSIX interface (in the "STANDARDS" section of the man page).

Do not assume that /bin/sh is bash. Ensure that a command line passed to system(3) will work with a POSIX compliant shell.

A list of common bashisms is available here.

Check that headers are included in the POSIX or man page recommended way. For example,

sys/types.h is often forgotten, which is not as much of a problem for Linux® as it is for FreeBSD.

13.20. Miscellanea

Always double-check pkg-descr and pkg-plist. If reviewing a port and a better wording can be achieved, do so.

Do not copy more copies of the GNU General Public License into our system, please.

Please be careful to note any legal issues! Do not let us illegally distribute software!

Chapter 14. A Sample Makefile

Here is a sample Makefile that can be used to create a new port. Make sure to remove all the extra comments (ones between brackets).

The format shown is the recommended one for ordering variables, empty lines between sections, and so on. This format is designed so that the most important information is easy to locate. We recommend using portlint to check the Makefile.

```
[section to describe the port itself and the master site - PORTNAME
 and PORTVERSION or the DISTVERSION* variables are always first,
 followed by CATEGORIES, and then MASTER_SITES, which can be followed
 by MASTER_SITE_SUBDIR.  PKGNAMEPREFIX and PKGNAMESUFFIX, if needed,
 will be after that.  Then comes DISTNAME, EXTRACT_SUFX and/or
 DISTFILES, and then EXTRACT_ONLY, as necessary.]
PORTNAME=   xdvi
DISTVERSION=    18.2
CATEGORIES= print
[do not forget the trailing slash ("/")!
 if not using MASTER_SITE_* macros]
MASTER_SITES=   ${MASTER_SITE_XCONTRIB}
MASTER_SITE_SUBDIR= applications
PKGNAMEPREFIX=  ja-
DISTNAME=   xdvi-pl18
[set this if the source is not in the standard ".tar.gz" form]
EXTRACT_SUFX=   .tar.Z

[section for distributed patches -- can be empty]
PATCH_SITES=    ftp://ftp.sra.co.jp/pub/X11/japanese/
PATCHFILES= xdvi-18.patch1.gz xdvi-18.patch2.gz
[If the distributed patches were not made relative to ${WRKSRC},
 this may need to be tweaked]
PATCH_DIST_STRIP=   -p1

[maintainer; *mandatory*!  This is the person who is volunteering to
 handle port updates, build breakages, and to whom a users can direct
 questions and bug reports.  To keep the quality of the Ports Collection
 as high as possible, we do not accept new ports that are assigned to
 "ports@FreeBSD.org".]
MAINTAINER= asami@FreeBSD.org
COMMENT=    DVI Previewer for the X Window System

[license -- should not be empty]
LICENSE=    BSD2CLAUSE
```

```
LICENSE_FILE=  ${WRKSRC}/LICENSE

[dependencies -- can be empty]
RUN_DEPENDS=   gs:print/ghostscript

[If it requires GNU make, not /usr/bin/make, to build...]
USES= gmake
[If it is an X application and requires "xmkmf -a" to be run...]
USES= imake

[this section is for other standard bsd.port.mk variables that do not]
 belong to any of the above]
[If it asks questions during configure, build, install...]
IS_INTERACTIVE= yes
[If it extracts to a directory other than ${DISTNAME}...]
WRKSRC=    ${WRKDIR}/xdvi-new
[If it requires a "configure" script generated by GNU autoconf to be run]
GNU_CONFIGURE=  yes
[et cetera.]

[If it requires options, this section is for options]
OPTIONS_DEFINE= DOCS EXAMPLES FOO
OPTIONS_DEFAULT=   FOO
[If options will change the files in plist]
OPTIONS_SUB=yes

FOO_DESC=      Enable foo support

FOO_CONFIGURE_ENABLE=  foo

[non-standard variables to be used in the rules below]
MY_FAVORITE_RESPONSE=  "yeah, right"

[then the special rules, in the order they are called]
pre-fetch:
   i go fetch something, yeah

post-patch:
   i need to do something after patch, great

pre-install:
   and then some more stuff before installing, wow
```

```
[and then the epilogue]

.include <bsd.port.mk>
```

Chapter 15. Order of Variables in Port Makefiles

The first sections of the Makefile must always come in the same order. This standard makes it so everyone can easily read any port without having to search for variables in a random order.

The sections and variables described here are mandatory in a ordinary port. In a slave port, many sections and variables can be skipped.

Each following block must be separated from the previous block by a single blank line.

In the following blocks, only set the variables that are required by the port. Define these variables in the order they are shown here.

15.1. PORTNAME Block

This block is the most important. It defines the port name, version, distribution file location, and category. The variables must be in this order:

- PORTNAME
- PORTVERSION[1]
- DISTVERSIONPREFIX
- DISTVERSION[1]
- DISTVERSIONSUFFIX
- PORTREVISION
- PORTEPOCH
- CATEGORIES
- MASTER_SITES
- MASTER_SITE_SUBDIR (deprecated)
- PKGNAMEPREFIX
- PKGNAMESUFFIX
- DISTNAME
- EXTRACT_SUFX
- DISTFILES
- DIST_SUBDIR
- EXTRACT_ONLY

Only one of PORTVERSION and DISTVERSION can be used.

15.2. PATCHFILES Block

This block is optional. The variables are:

- PATCH_SITES
- PATCHFILES
- PATCH_DIST_STRIP

15.3. MAINTAINER Block

This block is mandatory. The variables are:

- MAINTAINER
- COMMENT

15.4. LICENSE Block

This block is optional, although it is highly recommended. The variables are:

- LICENSE
- LICENSE_COMB
- LICENSE_GROUPS or LICENSE_GROUPS_NAME
- LICENSE_NAME or LICENSE_NAME_NAME
- LICENSE_TEXT or LICENSE_TEXT_NAME
- LICENSE_FILE or LICENSE_FILE_NAME
- LICENSE_PERMS or LICENSE_PERMS_NAME_
- LICENSE_DISTFILES or LICENSE_DISTFILES_NAME

If there are multiple licenses, sort the different LICENSE_VAR_NAME variables by license name.

15.5. Generic BROKEN/IGNORE/DEPRECATED Messages

This block is optional. The variables are:

- DEPRECATED
- EXPIRATION_DATE
- FORBIDDEN
- BROKEN
- BROKEN_*
- IGNORE
- IGNORE_*
- ONLY_FOR_ARCHS
- ONLY_FOR_ARCHS_REASON*
- NOT_FOR_ARCHS
- NOT_FOR_ARCHS_REASON*

BROKEN_* and IGNORE_* can be any generic variables, for example, IGNORE_amd64, BROKEN_FreeBSD_10, etc. With the exception of variables that depend on a USES, place those in USES and USE_x. For instance, IGNORE_WITH_PHP only works if php is set, and BROKEN_SSL only if ssl is set.

If the port is marked BROKEN when some conditions are met, and such conditions can only be tested after including bsd.port.options.mk or bsd.port.pre.mk, then those variables should be set later, in The Rest of the Variables.

15.6. The Dependencies Block

This block is optional. The variables are:

- FETCH_DEPENDS
- EXTRACT_DEPENDS
- PATCH_DEPENDS
- BUILD_DEPENDS
- LIB_DEPENDS
- RUN_DEPENDS
- TEST_DEPENDS

15.7. Flavors

This block is optional.

Start this section with defining FLAVORS. Continue with the possible Flavors helpers. See Using FLAVORS for more Information.

Constructs setting variables not available as helpers using .if ${FLAVOR:U} == foo should go in their respective sections below.

15.8. USES and USE_x

Start this section with defining USES, and then possible USE_x.

Keep related variables close together. For example, if using USE_GITHUB, always put the GH_* variables right after it.

15.9. Standard bsd.port.mk Variables

This section block is for variables that can be defined in bsd.port.mk that do not belong in any of the previous section blocks.

Order is not important, however try to keep similar variables together. For example uid and gid variables USERS and GROUPS. Configuration variables CONFIGURE_* and *_CONFIGURE. List of files, and directories PORTDOCS and PORTEXAMPLES.

15.10. Options and Helpers

If the port uses the options framework, define OPTIONS_DEFINE and OPTIONS_DEFAULT first, then the other OPTIONS_* variables first, then the *_DESC descriptions, then the options helpers. Try and sort all of those alphabetically.

例 113. Options Variables Order Example

The FOO and BAR options do not have a standard description, so one need to be written. The other options already have one in Mk/bsd.options.desc.mk so writing one is not needed. The DOCS and EXAMPLES use target helpers to install their files, they are shown here for completeness, though they belong in The Targets, so other variables and targets could be inserted before them.

```
OPTIONS_DEFINE= DOCS EXAMPLES FOO BAR
OPTIONS_DEFAULT=   FOO
OPTIONS_RADIO= SSL
OPTIONS_RADIO_SSL=   OPENSSL GNUTLS
OPTIONS_SUB=   yes
```

```
BAR_DESC=     Enable bar support
FOO_DESC=     Enable foo support

BAR_CONFIGURE_WITH= bar=${LOCALBASE}
FOO_CONFIGURE_ENABLE=   foo
GNUTLS_CONFIGURE_ON=    --with-ssl=gnutls
OPENSSL_CONFIGURE_ON=   --with-ssl=openssl

post-install-DOCS-on:
    ${MKDIR} ${STAGEDIR}${DOCSDIR}
    cd ${WRKSRC}/doc && ${COPYTREE_SHARE} . ${STAGEDIR}${DOCSDIR}

post-install-EXAMPLES-on:
    ${MKDIR} ${STAGEDIR}${EXAMPLESDIR}
    cd ${WRKSRC}/ex && ${COPYTREE_SHARE} . ${STAGEDIR}${EXAMPLESDIR}
```

15.11. The Rest of the Variables

And then, the rest of the variables that are not mentioned in the previous blocks.

15.12. The Targets

After all the variables are defined, the optional make(1) targets can be defined. Keep pre- before post- and in the same order as the different stages run:

- fetch
- extract
- patch
- configure
- build
- install
- test

When using options helpers target keep them alphabetically sorted, but keep the -on before the-off. When also using the main target, keep the main target before the optional ones:

```
post-install:
    # install generic bits

post-install-DOCS-on:
    # Install documentation

post-install-X11-on:
```

```
    # Install X11 related bits


post-install-X11-off:
    # Install bits that should be there if X11 is disabled
```

Chapter 16. Keeping Up

The FreeBSD Ports Collection is constantly changing. Here is some information on how to keep up.

16.1. FreshPorts

One of the easiest ways to learn about updates that have already been committed is by subscribing to FreshPorts. Multiple ports can be monitored. Maintainers are strongly encouraged to subscribe, because they will receive notification of not only their own changes, but also any changes that any other FreeBSD committer has made. (These are often necessary to keep up with changes in the underlying ports framework-although it would be most polite to receive an advance heads-up from those committing such changes, sometimes this is overlooked or impractical. Also, in some cases, the changes are very minor in nature. We expect everyone to use their best judgement in these cases.)

To use FreshPorts, an account is required. Those with registered email addresses at @FreeBSD.org will see the opt-in link on the right-hand side of the web pages. Those who already have a FreshPorts account but are not using a @FreeBSD.org email address can change the email to @FreeBSD.org, subscribe, then change it back again.

FreshPorts also has a sanity test feature which automatically tests each commit to the FreeBSD ports tree. If subscribed to this service, a committer will receive notifications of any errors which FreshPorts detects during sanity testing of their commits.

16.2. The Web Interface to the Source Repository

It is possible to browse the files in the source repository by using a web interface. Changes that affect the entire port system are now documented in the CHANGES file. Changes that affect individual ports are now documented in the UPDATING file. However, the definitive answer to any question is undoubtedly to read the source code of bsd.port.mk, and associated files.

16.3. The FreeBSD Ports Mailing List

As a ports maintainer, consider subscribing to FreeBSD ports 郵遞論壇. Important changes to the way ports work will be announced there, and then committed to CHANGES.

If the volume of messages on this mailing list is too high, consider following FreeBSD ports announce mailing list which contains only announcements.

16.4. The FreeBSD Port Building Cluster

One of the least-publicized strengths of FreeBSD is that an entire cluster of machines is dedicated to continually building the Ports Collection, for each of the major OS releases and for each Tier-1 architecture.

Individual ports are built unless they are specifically marked with IGNORE. Ports that are marked with BROKEN will still be attempted, to see if the underlying problem has been resolved. (This is done by passing TRYBROKEN to the port’ s Makefile.)

16.5. Portscout: the FreeBSD Ports Distfile Scanner

The build cluster is dedicated to building the latest release of each port with distfiles that have already been fetched. However, as the Internet continually changes, distfiles can quickly go missing. Portscout, the FreeBSD Ports distfile scanner, attempts to query every download site for every port to find out if each distfile is still available. Portscout can generate HTML reports and send emails about newly available ports to those who request them. Unless not otherwise subscribed, maintainers are asked to check periodically for changes, either by hand or using the RSS feed.

Portscout’ s first page gives the email address of the port maintainer, the number of ports the maintainer is responsible for, the number of those ports with new distfiles, and the percentage of those ports that are out-of-date. The search function allows for searching by email address for a specific maintainer, and for selecting whether only out-of-date ports are shown.

Upon clicking on a maintainer’ s email address, a list of all of their ports is displayed, along with port category, current version number, whether or not there is a new version, when the port was last updated, and finally when it was last checked. A search function on this page allows the user to search for a specific port.

Clicking on a port name in the list displays the FreshPorts port information.

Additional documentation is available in the Portscout repository.

16.6. The FreeBSD Ports Monitoring System

Another handy resource is the FreeBSD Ports Monitoring System (also known as portsmon). This system comprises a database that processes information from several sources and allows it to be browsed via a web interface. Currently, the ports Problem Reports (PRs), the error logs from the build cluster, and individual files from the ports collection are used. In the future, this will be expanded to include the distfile survey, as well as other sources.

To get started, use the Overview of One Port search page to find all the information about a port.

This is the only resource available that maps PR entries to portnames. PR submitters do not always include the portname in their Synopsis, although we would prefer that they did. So, portsmon is a good place to find out whether an existing port has any PRs filed against it, any build errors, or if a new port the porter is considering creating has already been submitted.

The FreeBSD Ports Monitoring System (portsmon) is currently not working due to latest Python updates.

Chapter 17. Using USES Macros

17.1. An Introduction to USES

USES macros make it easy to declare requirements and settings for a port. They can add dependencies, change building behavior, add metadata to packages, and so on, all by selecting simple, preset values.

Each section in this chapter describes a possible value for USES, along with its possible arguments. Arguments are appended to the value after a colon (:). Multiple arguments are separated by commas (,).

例 114. Using Multiple Values

```
USES=	bison perl
```

例 115. Adding an Argument

```
USES=	tar:xz
```

例 116. Adding Multiple Arguments

```
USES=	drupal:7,theme
```

例 117. Mixing it All Together

```
USES=	pgsql:9.3+ cpe python:2.7,build
```

17.2. 7z

Possible arguments: (none), p7zip, partial

Extract using 7z(1) instead of bsdtar(1) and sets EXTRACT_SUFX=.7z. The p7zip option forces a dependency on the 7z from archivers/p7zip if the one from the base system is not able to extract the files. EXTRACT_SUFX is not changed if the partial option is used, this can be used if the main distribution file does not have a .7z extension.

17.3. ada

Possible arguments: (none), 5, 6

Depends on an Ada-capable compiler, and sets CC accordingly. Defaults to use gcc 5 from ports. Use the :_X_ version option to force building with a different version.

17.4. autoreconf

Possible arguments: (none), build

Runs autoreconf. It encapsulates the aclocal, autoconf, autoheader, automake, autopoint, and libtoolize commands. Each command applies to ${AUTORECONF_WRKSRC}/configure.ac or its old name, ${AUTORECONF_WRKSRC}/configure.in. If configure.ac defines subdirectories with their own configure.ac using AC_CONFIG_SUBDIRS, autoreconf will recursively update those as well. The :build argument only adds build time dependencies on those tools but does not run autoreconf. A port can set AUTORECONF_WRKSRC if WRKSRC does not contain the path to configure.ac.

17.5. blaslapack

Possible arguments: (none), atlas, netlib (default), gotoblas, openblas

Adds dependencies on Blas / Lapack libraries.

17.6. bdb

Possible arguments: (none), 48, 5 (default), 6

Add dependency on the Berkeley DB library. Default to databases/db5. It can also depend on databases/db48 when using the :48 argument or databases/db6 with :6. It is possible to declare a range of acceptable values, :48+ finds the highest installed version, and falls back to 4.8 if nothing else is installed. INVALID_BDB_VER can be used to specify versions which do not work with this port. The framework exposes the following variables to the port:

BDB_LIB_NAME
: The name of the Berkeley DB library. For example, when using databases/db5, it contains db-5.3.

BDB_LIB_CXX_NAME
: The name of the Berkeley DBC++ library. For example, when using databases/db5, it contains db_cxx-5.3.

BDB_INCLUDE_DIR
: The location of the Berkeley DB include directory. For example, when using databases/db5, it will contain ${LOCALBASE}/include/db5.

BDB_LIB_DIR
: The location of the Berkeley DB library directory. For example, when using databases/db5, it contains ${LOCALBASE}/lib.

BDB_VER
: The detected Berkeley DB version. For example, if using USES=bdb:48+ and Berkeley DB 5 is installed, it contains 5.

databases/db48 is deprecated and unsupported. It must not be used by any port.

17.7. bison

Possible arguments: (none), build, run, both

Uses devel/bison By default, with no arguments or with the build argument, it implies bison is a build-time dependency, run implies a run-time dependency, and both implies both run-time and build-time dependencies.

17.8. cabal

Ports should not be created for Haskell libraries, see Haskell Libraries for more information.

Possible arguments: (none), hpack

Sets default values and targets used to build Haskell software using Cabal. A build dependency on the Haskell compiler port (GHC) is added. If hpack argument is given, a build dependency on devel/hs-hpack is added and hpack is invoked at configuration step to generate. cabal file.

The framework provides the following variables:

USE_CABAL
: If the software uses Haskell dependencies, list them in this variable. Each item should be present on Hackage and be listed in form packagename-0.1.2. Dependencies can have revisions, which are specified after the _ symbol. Automatic generation of dependency list is supported, see Building Haskell Applications with cabal.

CABAL_FLAGS
: List of flags to be passed to cabal-install during the configuring and building stage. The flags are passed verbatim.

EXECUTABLES
: List of executable files installed by the port. Default value: ${PORTNAME}. Items from this list are automatically added to pkg-plist.

SKIP_CABAL_PLIST
: If defined, do not add items from ${EXECUTABLES} to pkg-plist.

opt_USE_CABAL
: Adds items to ${USE_CABAL} depending on opt option.

opt_EXECUTABLES
: Adds items to ${EXECUTABLES} depending on opt option.

opt_CABAL_FLAGS
: If opt is enabled, append the value to ${CABAL_FLAGS}. Otherwise, append -value to disable the flag.

FOO_DATADIR_VARS
: For an executable named FOO list Haskell packages, whose data files should be accessible by the executable.

17.9. cargo

Possible arguments: (none)

Uses Cargo for configuring, building, and testing. It can be used to port Rust applications that use the Cargo build system. For more information see Building Rust Applications with cargo.

17.10. charsetfix

Possible arguments: (none)

Prevents the port from installing charset.alias. This must be installed only by converters/libiconv. CHARSETFIX_MAKEFILEIN can be set to a path relative to WRKSRC if charset.alias is not installed by ${WRKSRC}/Makefile.in.

17.11. cmake

Possible arguments: (none), insource, noninja, run, testing

Use CMake for configuring the port and generating a build system.

By default an out-of-source build is performed, leaving the sources in WRKSRC free from build artifacts. With the insource argument, an in-source build will be performed instead. This argument should be an exception, used only when a regular out-of-source build does not work.

By default Ninja (devel/ninja) is used for the build. In some cases this does not work correctly. With the noninja argument, the build will use regular make for builds. This argument should only be used if a Ninja-based build does not work.

With the run argument, a run dependency is registered in addition to a build dependency.

With the testing argument, a test-target is added that uses CTest. When running tests the port will be re-configured for testing and re-built.

For more information see Using cmake.

17.12. compiler

Possible arguments: (none), env (default, implicit), {c-plus-plus}17-lang, {c-plus-plus}14-lang, {c-plus-plus}11-lang, gcc-{c-plus-plus}11-lib, {c-plus-plus}11-lib, {c-plus-plus}0x, c11, nestedfct, features

Determines which compiler to use based on any given wishes. Use {c-plus-plus}17-lang if the port needs a {c-plus-plus}17-capable compiler, {c-plus-plus}14-lang if the port needs a {c-plus-plus}14-capable compiler, {c-plus-plus}11-lang if the port needs a {c-plus-plus}11-capable compiler, gcc-{c-plus-plus}11-lib if the port needs the g++ compiler with a {c-plus-plus}11 library, or {c-plus-plus}11-lib if the port needs a {c-plus-plus}11-ready standard library. If the port needs a compiler understanding {c-plus-plus}0X, C11 or nested functions, the corresponding parameters should be used.

Use features to request a list of features supported by the default compiler. After including bsd.port.pre.mk the port can inspect the results using these variables:

- COMPILER_TYPE: the default compiler on the system, either gcc or clang
- ALT_COMPILER_TYPE: the alternative compiler on the system, either gcc or clang. Only set if two compilers are present in the base system.
- COMPILER_VERSION: the first two digits of the version of the default compiler.
- ALT_COMPILER_VERSION: the first two digits of the version of the alternative compiler, if present.
- CHOSEN_COMPILER_TYPE: the chosen compiler, either gcc or clang
- COMPILER_FEATURES: the features supported by the default compiler. It currently lists the {c-plus-plus} library.

17.13. cpe

Possible arguments: (none)

Include Common Platform Enumeration (CPE) information in package manifest as a CPE 2.3 formatted string. See the CPE specification for details. To add CPE information to a port, follow these steps:

1. Search for the official CPE entry for the software product either by using the NVD's CPE search engine or in the official CPE dictionary (warning, very large XML file). Do not ever make up CPE

data.

2. Add cpe to USES and compare the result of make -V CPE_STR to the CPE dictionary entry. Continue one step at a time until make -V CPE_STR is correct.
3. If the product name (second field, defaults to PORTNAME) is incorrect, define CPE_PRODUCT.
4. If the vendor name (first field, defaults to CPE_PRODUCT) is incorrect, define CPE_VENDOR.
5. If the version field (third field, defaults to PORTVERSION) is incorrect, define CPE_VERSION.
6. If the update field (fourth field, defaults to empty) is incorrect, define CPE_UPDATE.
7. If it is still not correct, check Mk/Uses/cpe.mk for additional details, or contact the Ports Security Team <ports-secteam@FreeBSD.org>.
8. Derive as much as possible of the CPE name from existing variables such as PORTNAME and PORTVERSION. Use variable modifiers to extract the relevant portions from these variables rather than hardcoding the name.
9. Always run make -V CPE_STR and check the output before committing anything that changes PORTNAME or PORTVERSION or any other variable which is used to derive CPE_STR.

17.14. cran

Possible arguments: (none), auto-plist, compiles

Uses the Comprehensive R Archive Network. Specify auto-plist to automatically generate pkg-plist. Specify compiles if the port has code that need to be compiled.

17.15. desktop-file-utils

Possible arguments: (none)

Uses update-desktop-database from devel/desktop-file-utils. An extra post-install step will be run without interfering with any post-install steps already in the port Makefile. A line with @desktop-file-utils will be added to the plist.

17.16. desthack

Possible arguments: (none)

Changes the behavior of GNU configure to properly support DESTDIR in case the original software does not.

17.17. display

Possible arguments: (none), ARGS

Set up a virtual display environment. If the environment variable DISPLAY is not set, then Xvfb is added as a build dependency, and CONFIGURE_ENV is extended with the port number of the currently running instance of Xvfb. The ARGS parameter defaults to install and controls the phase around which to start and stop the virtual display.

17.18. dos2unix

Possible arguments: (none)

The port has files with line endings in DOS format which need to be converted. Several variables can be set to control which files will be converted. The default is to convert all files, including binaries. See Simple Automatic Replacements for examples.

- DOS2UNIX_REGEX: match file names based on a regular expression.
- DOS2UNIX_FILES: match literal file names.
- DOS2UNIX_GLOB: match file names based on a glob pattern.
- DOS2UNIX_WRKSRC: the directory from which to start the conversions. Defaults to ${WRKSRC}.

17.19. drupal

Possible arguments: 7, module, theme

Automate installation of a port that is a Drupal theme or module. Use with the version of Drupal that the port is expecting. For example, USES=drupal:7,module says that this port creates a Drupal 6 module. A Drupal 7 theme can be specified with USES=drupal:7,theme.

17.20. eigen

Possible arguments: 2, 3, build (default), run

Add dependency on math/eigen.

17.21. fakeroot

Possible arguments: (none)

Changes some default behavior of build systems to allow installing as a user. See https://wiki.debian.org/FakeRoot for more information on fakeroot.

17.22. fam

Possible arguments: (none), fam, gamin

Uses a File Alteration Monitor as a library dependency, either devel/fam or devel/gamin. End users can set WITH_FAM_SYSTEM to specify their preference.

17.23. firebird

Possible arguments: (none), 25

Add a dependency to the client library of the Firebird database.

17.24. fonts

Possible arguments: (none), fc, fcfontsdir (default), fontsdir, none

Adds a runtime dependency on tools needed to register fonts. Depending on the argument, add a @fc ${FONTSDIR} line, @fcfontsdir ${FONTSDIR} line, @fontsdir ${FONTSDIR} line, or no line if the argument is none, to the plist. FONTSDIR defaults to ${PREFIX}/share/fonts/${FONTNAME} and FONTNAME to ${PORTNAME}. Add FONTSDIR to PLIST_SUB and SUB_LIST

17.25. fortran

Possible arguments: gcc (default)

Uses the GNU Fortran compiler.

17.26. fuse

Possible arguments: 2 (default), 3

The port will depend on the FUSE library and handle the dependency on the kernel module depending on the version of FreeBSD.

17.27. gem

Possible arguments: (none), noautoplist

Handle building with RubyGems. If noautoplist is used, the packing list is not generated automatically.

17.28. gettext

Possible arguments: (none)

Deprecated. Will include both gettext-runtime and gettext-tools.

17.29. gettext-runtime

Possible arguments: (none), lib (default), build, run

Uses devel/gettext-runtime. By default, with no arguments or with the lib argument, implies a library dependency on libintl.so. build and run implies, respectively a build-time and a run-time dependency on gettext.

17.30. gettext-tools

Possible arguments: (none), build (default), run

Uses devel/gettext-tools. By default, with no argument, or with the build argument, a build time dependency on msgfmt is registered. With the run argument, a run-time dependency is registered.

17.31. ghostscript

Possible arguments: X, build, run, nox11

A specific version X can be used. Possible versions are 7, 8, 9, and agpl (default). nox11 indicates that the -nox11 version of the port is required. build and run add build- and run-time dependencies on Ghostscript. The default is both build- and run-time dependencies.

17.32. gl

Possible arguments: (none)

Provides an easy way to depend on GL components. The components should be listed in USE_GL. The available components are:

egl
: add a library dependency on libEGL.so from graphics/libglvnd

gbm
: Add a library dependency on libgbm.so from graphics/mesa-libs

gl
: Add a library dependency on libGL.so from graphics/libglvnd

glesv2
: Add a library dependency on libGLESv2.so from graphics/libglvnd

glew
: Add a library dependency on libGLEW.so from graphics/glew

glu
: Add a library dependency on libGLU.so from graphics/libGLU

glut
: Add a library dependency on libglut.so from graphics/freeglut

opengl
: Add a library dependency on libOpenGL.so from graphics/libglvnd

17.33. gmake

Possible arguments: (none)

Uses devel/gmake as a build-time dependency and sets up the environment to use gmake as the default make for the build.

17.34. gnome

Possible arguments: (none)

Provides an easy way to depend on GNOME components. The components should be listed in USE_GNOME. The available components are:

- atk
- atkmm
- cairo
- cairomm
- dconf
- esound
- evolutiondataserver3
- gconf2
- gconfmm26
- gdkpixbuf
- gdkpixbuf2
- glib12
- glib20
- glibmm
- gnomecontrolcenter3
- gnomedesktop3
- gnomedocutils
- gnomemenus3

- gnomemimedata
- gnomeprefix
- gnomesharp20
- gnomevfs2
- gsound
- gtk-update-icon-cache
- gtk12
- gtk20
- gtk30
- gtkhtml3
- gtkhtml4
- gtkmm20
- gtkmm24
- gtkmm30
- gtksharp20
- gtksourceview
- gtksourceview2
- gtksourceview3
- gtksourceviewmm3
- gvfs
- intlhack
- intltool
- introspection
- libartlgpl2
- libbonobo
- libbonoboui
- libgda5
- libgda5-ui
- libgdamm5
- libglade2
- libgnome
- libgnomecanvas
- libgnomekbd
- libgnomeprint
- libgnomeprintui
- libgnomeui
- libgsf
- libgtkhtml
- libgtksourceviewmm
- libidl
- librsvg2
- libsigc++12

- libsigc++20
- libwnck
- libwnck3
- libxml++26
- libxml2
- libxslt
- metacity
- nautilus3
- orbit2
- pango
- pangomm
- pangox-compat
- py3gobject3
- pygnome2
- pygobject
- pygobject3
- pygtk2
- pygtksourceview
- referencehack
- vte
- vte3

The default dependency is build- and run-time, it can be changed with :build or :run. For example:

```
USES=     gnome
USE_GNOME= gnomemenus3:build intlhack
```

See Using GNOME for more information.

17.35. go

Ports should not be created for Go libs, see Go Libraries for more information.

Possible arguments: (none), modules, no_targets, run

Sets default values and targets used to build Go software. A build dependency on the Go compiler port selected via GO_PORT is added. By default the build is performed in GOPATH mode. If Go software uses modules, the modules-aware mode can be switched on with modules argument. no_targets will setup build environment like GO_ENV, GO_BUILDFLAGS but skip creating post-extract and do-{build,install,test} targets. run will also add a run dependency on what is in GO_PORT.

The build process is controlled by several variables:

GO_MODULE
: The name of the application module as specified by the module directive in go.mod. In most cases, this is the only required variable for ports that use Go modules.

GO_PKGNAME
: The name of the Go package when building in GOPATH mode. This is the directory that will be created in ${GOPATH}/src. If not set explicitly and GH_SUBDIR or GL_SUBDIR is present, GO_PKGNAME will be inferred from it. It is not needed when building in modules-aware mode.

GO_TARGET
: The packages to build. The default value is ${GO_PKGNAME}. GO_TARGET can also be a tuple in the form package:path where path can be either a simple filename or a full path starting with ${PREFIX}.

GO_TESTTARGET
: The packages to test. The default value is ./⋯ (the current package and all subpackages).

CGO_CFLAGS
: Additional CFLAGS values to be passed to the C compiler by go.

CGO_LDFLAGS
: Additional LDFLAGS values to be passed to the C compiler by go.

GO_BUILDFLAGS
: Additional build arguments to be passed to go build.

GO_TESTFLAGS
: Additional build arguments to be passed to go test.

GO_PORT
: The Go compiler port to use. By default this is lang/go but can be set to lang/go-devel in make.conf for testing with future Go versions.

This variable must not be set by individual ports!

See Building Go Applications for usage examples.

17.36. gperf

Possible arguments: (none)

Add a buildtime dependency on devel/gperf if gperf is not present in the base system.

17.37. grantlee

Possible arguments: 5, selfbuild

Handle dependency on Grantlee. Specify 5 to depend on the Qt5 based version, devel/grantlee5. selfbuild is used internally by devel/grantlee5 to get their versions numbers.

17.38. groff

Possible arguments: build, run, both

Registers a dependency on textproc/groff if not present in the base system.

17.39. gssapi

Possible arguments: (none), base (default), heimdal, mit, flags, bootstrap

Handle dependencies needed by consumers of the GSS-API. Only libraries that provide the Kerberos

mechanism are available. By default, or set to base, the GSS-API library from the base system is used. Can also be set to heimdal to use security/heimdal, or mit to use security/krb5.

When the local Kerberos installation is not in LOCALBASE, set HEIMDAL_HOME (for heimdal) or KRB5_HOME (for krb5) to the location of the Kerberos installation.

These variables are exported for the ports to use:

- GSSAPIBASEDIR
- GSSAPICPPFLAGS
- GSSAPIINCDIR
- GSSAPILDFLAGS
- GSSAPILIBDIR
- GSSAPILIBS
- GSSAPI_CONFIGURE_ARGS

The flags option can be given alongside base, heimdal, or mit to automatically add GSSAPICPPFLAGS, GSSAPILDFLAGS, and GSSAPILIBS to CFLAGS, LDFLAGS, and LDADD, respectively. For example, use base,flags.

The bootstrap option is a special prefix only for use by security/krb5 and security/heimdal. For example, use bootstrap,mit.

例 118. Typical Use

```
OPTIONS_SINGLE= GSSAPI
OPTIONS_SINGLE_GSSAPI=  GSSAPI_BASE GSSAPI_HEIMDAL GSSAPI_MIT
GSSAPI_NONE

GSSAPI_BASE_USES=  gssapi
GSSAPI_BASE_CONFIGURE_ON=  --with-gssapi=${GSSAPIBASEDIR}
${GSSAPI_CONFIGURE_ARGS}
GSSAPI_HEIMDAL_USES=  gssapi:heimdal
GSSAPI_HEIMDAL_CONFIGURE_ON=  --with-gssapi=${GSSAPIBASEDIR}
${GSSAPI_CONFIGURE_ARGS}
GSSAPI_MIT_USES=  gssapi:mit
GSSAPI_MIT_CONFIGURE_ON=  --with-gssapi=${GSSAPIBASEDIR}
${GSSAPI_CONFIGURE_ARGS}
GSSAPI_NONE_CONFIGURE_ON=  --without-gssapi
```

17.40. horde

Possible arguments: (none)

Add buildtime and runtime dependencies on devel/pear-channel-horde. Other Horde dependencies can be added with USE_HORDE_BUILD and USE_HORDE_RUN. See Horde Modules for more information.

17.41. iconv

Possible arguments: (none), lib, build, patch, translit, wchar_t

Uses iconv functions, either from the port converters/libiconv as a build-time and run-time dependency, or from the base system. By default, with no arguments or with the lib argument, implies iconv with build-time and run-time dependencies. build implies a build-time dependency, and patch implies a patch-time dependency. If the port uses the WCHAR_T or //TRANSLIT iconv extensions, add the relevant arguments so that the correct iconv is used. For more information see Using iconv.

17.42. imake

Possible arguments: (none), env, notall, noman

Add devel/imake as a build-time dependency and run xmkmf -a during the configure stage. If the env argument is given, the configure target is not set. If the -a flag is a problem for the port, add the notall argument. If xmkmf does not generate a install.man target, add the noman argument.

17.43. kde

Possible arguments: 5

Add dependency on KDE components. See Using KDE for more information.

17.44. kmod

Possible arguments: (none), debug

Fills in the boilerplate for kernel module ports, currently:

- Add kld to CATEGORIES.
- Set SSP_UNSAFE.
- Set IGNORE if the kernel sources are not found in SRC_BASE.
- Define KMODDIR to /boot/modules by default, add it to PLIST_SUB and MAKE_ENV, and create it upon installation. If KMODDIR is set to /boot/kernel, it will be rewritten to /boot/modules. This prevents breaking packages when upgrading the kernel due to /boot/kernel being renamed to /boot/kernel.old in the process.
- Handle cross-referencing kernel modules upon installation and deinstallation, using @kld.
- If the debug argument is given, the port can install a debug version of the module into KERN_DEBUGDIR/KMODDIR. By default, KERN_DEBUGDIR is copied from DEBUGDIR and set to /usr/lib/debug. The framework will take care of creating and removing any required directories.

17.45. lha

Possible arguments: (none)

Set EXTRACT_SUFX to .lzh

17.46. libarchive

Possible arguments: (none)

Registers a dependency on archivers/libarchive. Any ports depending on libarchive must include USES=libarchive.

17.47. libedit

Possible arguments: (none)

Registers a dependency on devel/libedit. Any ports depending on libedit must include USES=libedit.

17.48. libtool

Possible arguments: (none), keepla, build

Patches libtool scripts. This must be added to all ports that use libtool. The keepla argument can be used to keep .la files. Some ports do not ship with their own copy of libtool and need a build time dependency on devel/libtool, use the :build argument to add such dependency.

17.49. linux

Possible arguments: c6, c7

Ports Linux compatibility framework. Specify c6 to depend on CentOS 6 packags. Specify c7 to depend on CentOS 7 packages. The available packages are:

- allegro
- alsa-plugins-oss
- alsa-plugins-pulseaudio
- alsalib
- atk
- avahi-libs
- base
- cairo
- cups-libs
- curl
- cyrus-sasl2
- dbusglib
- dbuslibs
- devtools
- dri
- expat
- flac
- fontconfig
- gdkpixbuf2
- gnutls
- graphite2
- gtk2
- harfbuzz
- jasper
- jbigkit
- jpeg

- libasyncns
- libaudiofile
- libelf
- libgcrypt
- libgfortran
- libgpg-error
- libmng
- libogg
- libpciaccess
- libsndfile
- libsoup
- libssh2
- libtasn1
- libthai
- libtheora
- libv4l
- libvorbis
- libxml2
- mikmod
- naslibs
- ncurses-base
- nspr
- nss
- openal
- openal-soft
- openldap
- openmotif
- openssl
- pango
- pixman
- png
- pulseaudio-libs
- qt
- qt-x11
- qtwebkit
- scimlibs
- sdl12
- sdlimage
- sdlmixer
- sqlite3
- tcl85
- tcp_wrappers-libs

- tiff
- tk85
- ucl
- xorglibs

17.50. localbase

Possible arguments: (none), ldflags

Ensures that libraries from dependencies in LOCALBASE are used instead of the ones from the base system. Specify ldflags to add -L${LOCALBASE}/lib to LDFLAGS instead of LIBS. Ports that depend on libraries that are also present in the base system should use this. It is also used internally by a few other USES.

17.51. lua

Possible arguments: (none), XY, XY+, -XY, XY-ZA, module, flavors, build, run, env

Adds a dependency on Lua. By default this is a library dependency, unless overridden by the build and/or run option. The env option prevents the addition of any dependency, while still defining all the usual variables.

The default version is set by the usual DEFAULT_VERSIONS mechanism, unless a version or range of versions is specified as an argument, for example, 51 or 51-53.

Applications using Lua are normally built for only a single Lua version. However, library modules intended to be loaded by Lua code should use the module option to build with multiple flavors.

For more information see Using Lua.

17.52. lxqt

Possible arguments: (none)

Handle dependencies for the LXQt Desktop Environment. Use USE_LXQT to select the components needed for the port. See Using LXQt for more information.

17.53. makeinfo

Possible arguments: (none)

Add a build-time dependency on makeinfo if it is not present in the base system.

17.54. makeself

Possible arguments: (none)

Indicates that the distribution files are makeself archives and sets the appropriate dependencies.

17.55. mate

Possible arguments: (none)

Provides an easy way to depend on MATE components. The components should be listed in USE_MATE. The available components are:

- autogen
- caja
- common
- controlcenter
- desktop
- dialogs
- docutils
- icontheme
- intlhack
- intltool
- libmatekbd
- libmateweather
- marco
- menus
- notificationdaemon
- panel
- pluma
- polkit
- session
- settingsdaemon

The default dependency is build- and run-time, it can be changed with :build or :run. For example:

```
USES=     mate
USE_MATE=  menus:build intlhack
```

17.56. meson

Possible arguments: (none)

Provide support for Meson based projects. For more information see Using meson.

17.57. metaport

Possible arguments: (none)

Sets the following variables to make it easier to create a metaport: MASTER_SITES, DISTFILES, EXTRACT_ONLY, NO_BUILD, NO_INSTALL, NO_MTREE, NO_ARCH.

17.58. mysql

Possible arguments: (none), version, client (default), server, embedded

Provide support for MySQL If no version is given, try to find the current installed version. Fall back to the default version, MySQL-5.6. The possible versions are 55, 55m, 55p, 56, 56p, 56w, 57, 57p, 80, 100m, 101m, and 102m. The m and p suffixes are for the MariaDB and Percona variants of MySQL. server and embedded add a build- and run-time dependency on the MySQL server. When using server or embedded, add client to also add a dependency on libmysqlclient.so. A port can set IGNORE_WITH_MYSQL if some versions are not supported.

The framework sets MYSQL_VER to the detected MySQL version.

17.59. mono

Possible arguments: (none), nuget

Adds a dependency on the Mono (currently only C#) framework by setting the appropriate dependencies.

Specify nuget when the port uses nuget packages. NUGET_DEPENDS needs to be set with the names and versions of the nuget packages in the format name=version. An optional package origin can be added using name=version:_origin_.

The helper target, buildnuget, will output the content of the NUGET_DEPENDS based on the provided packages.config.

17.60. motif

Possible arguments: (none)

Uses x11-toolkits/open-motif as a library dependency. End users can set WANT_LESSTIF for the dependency to be on x11-toolkits/lesstif instead of x11-toolkits/open-motif.

17.61. ncurses

Possible arguments: (none), base, port

Uses ncurses, and causes some useful variables to be set.

17.62. ninja

Possible arguments: (none)

Uses ninja to build the port.

17.63. objc

Possible arguments: (none)

Add objective C dependencies (compiler, runtime library) if the base system does not support it.

17.64. openal

Possible arguments: al, soft (default), si, alut

Uses OpenAL. The backend can be specified, with the software implementation as the default. The user can specify a preferred backend with WANT_OPENAL. Valid values for this knob are soft (default) and si.

17.65. pathfix

Possible arguments: (none)

Look for Makefile.in and configure in PATHFIX_WRKSRC (defaults to WRKSRC) and fix common paths to make sure they respect the FreeBSD hierarchy. For example, it fixes the installation directory of pkgconfig' s .pc files to ${PREFIX}/libdata/pkgconfig. If the port uses `USES=autoreconf, Makefile.am will be added to PATHFIX_MAKEFILEIN automatically.

If the port USES=cmake it will look for CMakeLists.txt in PATHFIX_WRKSRC. If needed, that default filename can be changed with PATHFIX_CMAKELISTSTXT.

17.66. pear

Possible arguments: env

Adds a dependency on devel/pear. It will setup default behavior for software using the PHP Extension and Application Repository. Using the env arguments only sets up the PEAR environment variables. See PEAR Modules for more information.

17.67. perl5

Possible arguments: (none)

Depends on Perl. The configuration is done using USE_PERL5.

USE_PERL5 can contain the phases in which to use Perl, can be extract, patch, build, run, or test.

USE_PERL5 can also contain configure, modbuild, or modbuildtiny when Makefile.PL, Build.PL, or Module::Build::Tiny's flavor of Build.PL is required.

USE_PERL5 defaults to build run. When using configure, modbuild, or modbuildtiny, build and run are implied.

See Using Perl for more information.

17.68. pgsql

Possible arguments: (none), X.Y, X.Y+, X.Y-, X.Y-Z.A

Provide support for PostgreSQL. Port maintainer can set version required. Minimum and maximum versions or a range can be specified; for example, 9.0-, 8.4+, 8.4-9.2.

By default, the added dependency will be the client, but if the port requires additional components, this can be done using WANT_PGSQL=component[:target]; for example, WANT_PGSQL=server:configure pltcl plperl. The available components are:

- client
- contrib
- docs
- pgtcl
- plperl
- plpython
- pltcl
- server

17.69. php

Possible arguments: (none), phpize, ext, zend, build, cli, cgi, mod, web, embed, pecl, flavors, noflavors

Provide support for PHP. Add a runtime dependency on the default PHP version, lang/php56.

phpize
: Use to build a PHP extension. Enables flavors.

ext
: Use to build, install and register a PHP extension. Enables flavors.

zend
: Use to build, install and register a Zend extension. Enables flavors.

build
: Set PHP also as a build-time dependency.

cli
: Needs the CLI version of PHP.

cgi
: Needs the CGI version of PHP.

mod
: Needs the Apache module for PHP.

web
: Needs the Apache module or the CGI version of PHP.

embed
: Needs the embedded library version of PHP.

pecl
: Provide defaults for fetching PHP extensions from the PECL repository. Enables flavors.

flavors
: Enable automatic PHP flavors generation. Flavors will be generated for all PHP versions, except the ones present in IGNORE_WITH_PHP.

noflavors
: Disable automatic PHP flavors generation. Must only be used with extensions provided by PHP itself.

Variables are used to specify which PHP modules are required, as well as which version of PHP are supported.

USE_PHP
: The list of required PHP extensions at run-time. Add :build to the extension name to add a build-time dependency. Example: pcre xml:build gettext

IGNORE_WITH_PHP
: The port does not work with PHP of the given version. For possible values look at the content of _ALL_PHP_VERSIONS in Mk/Uses/php.mk.

When building a PHP or Zend extension with :ext or :zend, these variables can be set:

PHP_MODNAME
: The name of the PHP or Zend extension. Default value is ${PORTNAME}.

PHP_HEADER_DIRS
: A list of subdirectories from which to install header files. The framework will always install the header files that are present in the same directory as the extension.

PHP_MOD_PRIO
: The priority at which to load the extension. It is a number between 00 and 99.

  For extensions that do not depend on any extension, the priority is automatically set to 20, for

extensions that depend on another extension, the priority is automatically set to 30. Some extensions may need to be loaded before every other extension, for example www/php56-opcache. Some may need to be loaded after an extension with a priority of 30. In that case, add PHP_MOD_PRIO=XX in the port's Makefile. For example:

```
USES=     php:ext
USE_PHP=  wddx
PHP_MOD_PRIO=  40
```

These variables are available to use in PKGNAMEPREFIX or PKGNAMESUFFIX:

PHP_PKGNAMEPREFIX
: Contains php_XY_- where XY is the current flavor's PHP version. Use with PHP extensions and modules.

PHP_PKGNAMESUFFIX
: Contains -php_XY_ where XY is the current flavor's PHP version. Use with PHP applications.

PECL_PKGNAMEPREFIX
: Contains php_XY_-pecl- where XY is the current flavor's PHP version. Use with PECL modules.

With flavors, all PHP extensions, PECL extensions, PEAR modules must have a different package name, so they must all use one of these three variables in their PKGNAMEPREFIX or PKGNAMESUFFIX.

17.70. pkgconfig

Possible arguments: (none), build (default), run, both

Uses devel/pkgconf. With no arguments or with the build argument, it implies pkg-config as a build-time dependency. run implies a run-time dependency and both implies both run-time and build-time dependencies.

17.71. pure

Possible arguments: (none), ffi

Uses lang/pure. Largely used for building related pure ports. With the ffi argument, it implies devel/pure-ffi as a run-time dependency.

17.72. pyqt

Possible arguments: (none), 4, 5

Uses PyQt. If the port is part of PyQT itself, set PYQT_DIST. Use USE_PYQT to select the components the port needs. The available components are:

- core
- dbus
- dbussupport
- demo
- designer
- designerplugin

- doc
- gui
- multimedia
- network
- opengl
- qscintilla2
- sip
- sql
- svg
- test
- webkit
- xml
- xmlpatterns

These components are only available with PyQT4:

- assistant
- declarative
- help
- phonon
- script
- scripttools

These components are only available with PyQT5:

- multimediawidgets
- printsupport
- qml
- serialport
- webkitwidgets
- widgets

The default dependency for each component is build- and run-time, to select only build or run, add _build or _run to the component name. For example:

```
USES=     pyqt
USE_PYQT=  core doc_build designer_run
```

17.73. python

Possible arguments: (none), X.Y, X.Y+, -X.Y, X.Y-Z.A, patch, build, run, test

Uses Python. A supported version or version range can be specified. If Python is only needed at build time, run time or for the tests, it can be set as a build, run or test dependency with build, run, or test. If Python is also needed during the patch phase, use patch. See Using Python for more information.

PYTHON_NO_DEPENDS=yes can be used when the variables exported by the framework are needed but a dependency on Python is not. It can happen when using with USES=shebangfix, and the goal

is only to fix the shebangs but not add a dependency on Python.

17.74. qmail

Possible arguments: (none), build, run, both, vars

Uses mail/qmail. With the build argument, it implies qmail as a build-time dependency. run implies a run-time dependency. Using no argument or the both argument implies both run-time and build-time dependencies. vars will only set QMAIL variables for the port to use.

17.75. qmake

Possible arguments: (none), norecursive, outsource, no_env, no_configure

Uses QMake for configuring. For more information see Using qmake.

17.76. qt

Possible arguments: 5, no_env

Add dependency on Qt components. no_env is passed directly to USES= qmake. See Using Qt for more information.

17.77. qt-dist

Possible arguments: (none) or 5 and (none) or one of 3d, activeqt, androidextras, base, canvas3d, charts, connectivity, datavis3d, declarative, doc, gamepad, graphicaleffects, imageformats, location, macextras, multimedia, networkauth, purchasing, quickcontrols2, quickcontrols, remoteobjects, script, scxml, sensors, serialbus, serialport, speech, svg, tools, translations, virtualkeyboard, wayland, webchannel, webengine, websockets, webview, winextras, x11extras, xmlpatterns

Provides support for building Qt 5 components. It takes care of setting up the appropriate configuration environment for the port to build.

例 119. Building Qt 5 Components

The port is Qt 5’s networkauth component, which is part of the networkauth distribution file.

```
PORTNAME=  networkauth
DISTVERSION=  ${QT5_VERSION}

USES=  qt-dist:5
```

If PORTNAME does not match the component name, it can be passed as an argument to qt-dist.

例 120. Building Qt 5 Components with Different Names

The port is Qt 5’s gui component, which is part of the base distribution file.

```
PORTNAME=  gui
DISTVERSION=  ${QT5_VERSION}
```

```
USES=    qt-dist:5,base
```

17.78. readline

Possible arguments: (none), port

Uses readline as a library dependency, and sets CPPFLAGS and LDFLAGS as necessary. If the port argument is used or if readline is not present in the base system, add a dependency on devel/readline

17.79. samba

Possible arguments: build, env, lib, run

Handle dependency on Samba. env will not add any dependency and only set up the variables. build and run will add build-time and run-time dependency on smbd. lib will add a dependency on libsmbclient.so. The variables that are exported are:

SAMBAPORT
: The origin of the default Samba port.

SAMBAINCLUDES
: The location of the Samba header files.

SAMBALIBS
: The directory where the Samba shared libraries are available.

17.80. scons

Possible arguments: (none)

Provide support for the use of devel/scons. See Using scons for more information.

17.81. shared-mime-info

Possible arguments: (none)

Uses update-mime-database from misc/shared-mime-info. This uses will automatically add a post-install step in such a way that the port itself still can specify there own post-install step if needed. It also add an @shared-mime-info entry to the plist.

17.82. shebangfix

Possible arguments: (none)

A lot of software uses incorrect locations for script interpreters, most notably /usr/bin/perl and /bin/bash. The shebangfix macro fixes shebang lines in scripts listed in SHEBANG_REGEX, SHEBANG_GLOB, or SHEBANG_FILES.

SHEBANG_REGEX
: Contains one extended regular expressions, and is used with the -iregex argument of find(1). See USES=shebangfix with SHEBANG_REGEX.

SHEBANG_GLOB
: Contains a list of patterns used with the -name argument of find(1). See USES=shebangfix with SHEBANG_GLOB.

SHEBANG_FILES
: Contains a list of files or sh(1) globs. The shebangfix macro is run from ${WRKSRC}, so SHEBANG_FILES can contain paths that are relative to ${WRKSRC}. It can also deal with absolute paths if files outside of ${WRKSRC} require patching. See USES=shebangfix with SHEBANG_FILES.

Currently Bash, Java, Ksh, Lua, Perl, PHP, Python, Ruby, Tcl, and Tk are supported by default.

There are three configuration variables:

SHEBANG_LANG
: The list of supported interpreters.

_interp__CMD
: The path to the command interpreter on FreeBSD. The default value is ${LOCALBASE}/bin/interp.

_interp__OLD_CMD
: The list of wrong invocations of interpreters. These are typically obsolete paths, or paths used on other operating systems that are incorrect on FreeBSD. They will be replaced by the correct path in _interp__CMD.

These will always be part of interp__OLD_CMD: "/usr/bin/env _interp" /bin/interp /usr/bin/interp /usr/local/bin/interp.

_interp__OLD_CMD contain multiple values. Any entry with spaces must be quoted. See Specifying all the Paths When Adding an Interpreter to USES=shebangfix.

The fixing of shebangs is done during the patch phase. If scripts are created with incorrect shebangs during the build phase, the build process (for example, the configure script, or the Makefiles) must be patched or given the right path (for example, with CONFIGURE_ENV, CONFIGURE_ARGS, MAKE_ENV, or MAKE_ARGS) to generate the right shebangs.

Correct paths for supported interpreters are available in _interp__CMD.

When used with USES=python, and the aim is only to fix the shebangs but a dependency on Python itself is not wanted, use PYTHON_NO_DEPENDS=yes.

例 121. Adding Another Interpreter to USES=shebangfix

To add another interpreter, set SHEBANG_LANG. For example:

```
SHEBANG_LANG=  lua
```

例 122. Specifying all the Paths When Adding an Interpreter to USES=shebangfix

If it was not already defined, and there were no default values for _interpOLD_CMD and _interpCMD the Ksh entry could be defined as:

```
SHEBANG_LANG=  ksh
ksh_OLD_CMD=   "/usr/bin/env ksh" /bin/ksh /usr/bin/ksh
ksh_CMD=   ${LOCALBASE}/bin/ksh
```

例 123. Adding a Strange Location for an Interpreter

Some software uses strange locations for an interpreter. For example, an application might expect Python to be located in /opt/bin/python2.7. The strange path to be replaced can be declared in the port Makefile:

```
python_OLD_CMD= /opt/bin/python2.7
```

例 124. USES=shebangfix with SHEBANG_REGEX

To fix all the files in ${WRKSRC}/scripts ending in .pl, .sh, or .cgi do:

```
USES=  shebangfix
SHEBANG_REGEX=  ./scripts/.*\.(sh|pl|cgi)
```

SHEBANG_REGEX is used by running find -E, which uses modern regular expressions also known as extended regular expressions. See re_format(7) for more information.

例 125. USES=shebangfix with SHEBANG_GLOB

To fix all the files in ${WRKSRC} ending in .pl or .sh, do:

```
USES=  shebangfix
SHEBANG_GLOB=  *.sh *.pl
```

例 126. USES=shebangfix with SHEBANG_FILES

To fix the files script/foobar.pl and script/*.sh in ${WRKSRC}, do:

```
USES=  shebangfix
SHEBANG_FILES=  scripts/foobar.pl scripts/*.sh
```

17.83. sqlite

Possible arguments: (none), 2, 3

Add a dependency on SQLite. The default version used is 3, but version 2 is also possible using the :2 modifier.

17.84. ssl

Possible arguments: (none), build, run

Provide support for OpenSSL. A build- or run-time only dependency can be specified using build or run. These variables are available for the port's use, they are also added to MAKE_ENV:

OPENSSLBASE
: Path to the OpenSSL installation base.

OPENSSLDIR
: Path to OpenSSL's configuration files.

OPENSSLLIB
: Path to the OpenSSL libraries.

OPENSSLINC
: Path to the OpenSSL includes.

OPENSSLRPATH
: If defined, the path the linker needs to use to find the OpenSSL libraries.

If a port does not build with an OpenSSL flavor, set the BROKEN_SSL variable, and possibly the BROKEN_SSL_REASON__flavor_:

```
BROKEN_SSL= libressl
BROKEN_SSL_REASON_libressl= needs features only available in OpenSSL
```

17.85. tar

Possible arguments: (none), Z, bz2, bzip2, lzma, tbz, tbz2, tgz, txz, xz

Set EXTRACT_SUFX to .tar, .tar.Z, .tar.bz2, .tar.bz2, .tar.lzma, .tbz, .tbz2, .tgz, .txz or .tar.xz respectively.

17.86. tcl

Possible arguments: version, wrapper, build, run, tea

Add a dependency on Tcl. A specific version can be requested using version. The version can be empty, one or more exact version numbers (currently 84, 85, or 86), or a minimal version number (currently 84+, 85+ or 86+). To only request a non version specific wrapper, use wrapper. A build- or run-time only dependency can be specified using build or run. To build the port using the Tcl Extension Architecture, use tea. After including bsd.port.pre.mk the port can inspect the results using these variables:

- TCL_VER: chosen major.minor version of Tcl
- TCLSH: full path of the Tcl interpreter
- TCL_LIBDIR: path of the Tcl libraries
- TCL_INCLUDEDIR: path of the Tcl C header files
- TK_VER: chosen major.minor version of Tk
- WISH: full path of the Tk interpreter
- TK_LIBDIR: path of the Tk libraries

- TK_INCLUDEDIR: path of the Tk C header files

17.87. terminfo

Possible arguments: (none)

Adds @terminfo to the plist. Use when the port installs *.terminfo files in ${PREFIX}/share/misc.

17.88. tk

Same as arguments for tcl

Small wrapper when using both Tcl and Tk. The same variables are returned as when using Tcl.

17.89. uidfix

Possible arguments: (none)

Changes some default behavior (mostly variables) of the build system to allow installing this port as a normal user. Try this in the port before using USES=fakeroot or patching.

17.90. uniquefiles

Possible arguments: (none), dirs

Make files or directories 'unique', by adding a prefix or suffix. If the dirs argument is used, the port needs a prefix (and only a prefix) based on UNIQUE_PREFIX for standard directories DOCSDIR, EXAMPLESDIR, DATADIR, WWWDIR, ETCDIR. These variables are available for ports:

- UNIQUE_PREFIX: The prefix to be used for directories and files. Default: ${PKGNAMEPREFIX}.
- UNIQUE_PREFIX_FILES: A list of files that need to be prefixed. Default: empty.
- UNIQUE_SUFFIX: The suffix to be used for files. Default: ${PKGNAMESUFFIX}.
- UNIQUE_SUFFIX_FILES: A list of files that need to be suffixed. Default: empty.

17.91. varnish

Possible arguments: 4, 6

Handle dependencies on Varnish Cache. 4 will add a dependency on www/varnish4. 6 will add a dependency on www/varnish6.

17.92. webplugin

Possible arguments: (none), ARGS

Automatically create and remove symbolic links for each application that supports the webplugin framework. ARGS can be one of:

- gecko: support plug-ins based on Gecko
- native: support plug-ins for Gecko, Opera, and WebKit-GTK
- linux: support Linux plug-ins
- all (default, implicit): support all plug-in types
- (individual entries): support only the browsers listed

These variables can be adjusted:

- WEBPLUGIN_FILES: No default, must be set manually. The plug-in files to install.
- WEBPLUGIN_DIR: The directory to install the plug-in files to, default PREFIX/lib/browser_plugins/WEBPLUGIN_NAME. Set this if the port installs plug-in files outside of the default directory to prevent broken symbolic links.
- WEBPLUGIN_NAME: The final directory to install the plug-in files into, default PKGBASE.

17.93. xfce

Possible arguments: (none), gtk2

Provide support for Xfce related ports. See Using Xfce for details.

The gtk2 argument specifies that the port requires GTK2 support. It adds additional features provided by some core components, for example, x11/libxfce4menu and x11-wm/xfce4-panel.

17.94. xorg

Possible arguments: (none)

Provides an easy way to depend on X.org components. The components should be listed in USE_XORG. The available components are:

表 51. Available X.Org Components

Name	Description
dmx	DMX extension library
fontenc	The fontenc Library
fontutil	Create an index of X font files in a directory
ice	Inter Client Exchange library for X11
libfs	The FS library
pciaccess	Generic PCI access library
pixman	Low-level pixel manipulation library
sm	Session Management library for X11
x11	X11 library
xau	Authentication Protocol library for X11
xaw	X Athena Widgets library
xaw6	X Athena Widgets library
xaw7	X Athena Widgets library
xbitmaps	X.Org bitmaps data
xcb	The X protocol C-language Binding (XCB) library
xcomposite	X Composite extension library
xcursor	X client-side cursor loading library
xdamage	X Damage extension library
xdmcp	X Display Manager Control Protocol library
xext	X11 Extension library
xfixes	X Fixes extension library
xfont	X font library

Name	Description
xfont2	X font library
xft	Client-sided font API for X applications
xi	X Input extension library
xinerama	X11 Xinerama library
xkbfile	XKB file library
xmu	X Miscellaneous Utilities libraries
xmuu	X Miscellaneous Utilities libraries
xorg-macros	X.Org development aclocal macros
xorg-server	X.Org X server and related programs
xorgproto	xorg protocol headers
xpm	X Pixmap library
xpresent	X Present Extension library
xrandr	X Resize and Rotate extension library
xrender	X Render extension library
xres	X Resource usage library
xscrnsaver	The XScrnSaver library
xshmfence	Shared memory 'SyncFence' synchronization primitive
xt	X Toolkit library
xtrans	Abstract network code for X
xtst	X Test extension
xv	X Video Extension library
xvmc	X Video Extension Motion Compensation library
xxf86dga	X DGA Extension
xxf86vm	X Vidmode Extension

17.95. xorg-cat

Possible arguments: app, data, doc, driver, font, lib, proto, util, xserver and (none) or one off autotools (default), meson

Provide support for building Xorg components. It takes care of setting up common dependencies and an appropriate configuration environment needed. This is intended only for Xorg components.

The category has to match upstream categories.

The second argument is the build system to use. autotools is the default, but meson is also supported.

17.96. zip

Possible arguments: (none), infozip

Indicates that the distribution files use the ZIP compression algorithm. For files using the InfoZip algorithm the infozip argument must be passed to set the appropriate dependencies.

Chapter 18. __FreeBSD_version Values

Here is a convenient list of __FreeBSD_version values as defined in sys/param.h:

18.1. FreeBSD 14 Versions

表 52. FreeBSD 14 __FreeBSD_version Values

Value	Revision	Date	Release
1400000	a53ce3fc4938	January 22, 2021	14.0-CURRENT.
1400001	739ecbcf1c4f	January 23, 2021	14.0-CURRENT after adding symlink support to lockless lookup.
1400002	2cf84258922f	January 26, 2021	14.0-CURRENT after fixing a clang assertion when building the devel/onetbb port.
1400003	d386f3a3c32f	January 28, 2021	14.0-CURRENT after adding various LinuxKPI bits conflicting with drm-kmod.
1400004	68f6800ce05c	February 8, 2021	14.0-CURRENT after kernel interfaces for dispatching cryptographic operations were changed.
1400005	45eabf5754ac	February 17, 2021	14.0-CURRENT after changing the API of ptrace(2) PT_GETDBREGS/PT_SETDBREGS on arm64.
1400006	c96151d33509	March 17, 2021	14.0-CURRENT after adding sndstat(4) enumeration ioctls.
1400007	d36d68161517	April 6, 2021	14.0-CURRENT after fixing wrong dlpi_tls_data.
1400008	e152bbecb221	April 11, 2021	14.0-CURRENT after changing the internal KAPI between the krpc and NFS modules.
1400009	9ca874cf740e	April 20, 2021	14.0-CURRENT after adding TCP LRO support for VLAN and VxLAN.
1400010	a3a02acde100	April 21, 2021	14.0-CURRENT after changing the sndstat(4) ioctls nvlist schema and definitions.

Value	Revision	Date	Release
1400015	d72cd275187c	May 25, 2021	14.0-CURRENT after adding more LinuxKPI changes needing adjustments to drm-kmod.
1400016	21e3c1fbe246	May 25, 2021	14.0-CURRENT after removing support for KTLS software backends.
1400017	beb817edfe22	May 25, 2021	14.0-CURRENT after adding crypto_cursor_segment().
1400018	a4b07a2701f5	May 30, 2021	14.0-CURRENT after allowing the VFS_QUOTACTL(9) implementation to indicate busy state changes.
1400019	37d64dcdfa51	Jun 7, 2021	14.0-CURRENT after including pr_err_once() in the LinuxKPI printk.h.
1400020	8a1a42b2a7a4	Jun 9, 2021	14.0-CURRENT after adding macros for might_lock_nested() and lockdep_(re/un/)pin_lock() to the LinuxKPI.
1400021	b47f461c8e67	Jun 10, 2021	14.0-CURRENT after adding a list_for_each_entry_lockless() macro to the LinuxKPI.
1400022	40cc9a3a6b81	Jun 11, 2021	14.0-CURRENT after commit e1a907a25cfa changed the internal KAPI between the krpc and nfsserver modules.
1400023	d409305fa383	Jun 13, 2021	14.0-CURRENT after upgrading llvm, clang, compiler-rt, libc++, libunwind, lld, lldb and openmp to llvmorg-12.0.0-0-gd28af7c654d8, a.k.a. 12.0.0 release.
1400024	41dfd8bd6466	Jun 18, 2021	14.0-CURRENT after various additions to LinuxKPI.
1400025	5fa1eb1cd927	Jul 5, 2021	14.0-CURRENT after various additions to LinuxKPI.

Value	Revision	Date	Release
1400026	fad3f322efb5	Jul 16, 2021	14.0-CURRENT after changing the internal KAPI between the nfscommon and nfsd modules.
1400027	cc55ee8009a5	Jul 28, 2021	14.0-CURRENT after adding out-of-line LSE atomics helpers to libcompiler_rt.a on aarch64.
1400028	792b602a337d	Jul 31, 2021	14.0-CURRENT after making FPU sections thread-safe in the LinuxKPI.
1400029	245ec7651e42	Aug 5, 2021	14.0-CURRENT after adding fspacectl(2), vn_deallocate(9) and VOP_DEALLOCATE(9).
1400030	95941b963606	Aug 12, 2021	14.0-CURRENT after VOP_DEALLOCATE(9) parameter changes and addition of fspacectl(2) support to POSIX shared memory.
1400031	1a4c5061fc5b	Aug 24, 2021	14.0-CURRENT after changing fspacectl(2), vn_deallocate(9) and VOP_DEALLOCATE(9) to update rmsr.r_offset to a meaningful value.
1400032	76321d2d432e	Aug 25, 2021	14.0-CURRENT after changing fspacectl(2), vn_deallocate(9) and VOP_DEALLOCATE(9) to make calculating the number of bytes zeroed easier.
1400033	c751d067c166	Sep 7, 2021	14.0-CURRENT after moving the socket buffer locks into the containing socket and renaming sb(un)lock to SOCK_IO_RECV_LOCK, SOCK_IO_RECV_UNLOCK, SOCK_IO_SEND_LOCK, and SOCK_IO_SEND_UNLOCK.
1400034	c751d067c166	Sep 29, 2021	14.0-CURRENT after LinuxKPI changes.
1400035	16f1ee11e657	Oct 4, 2021	14.0-CURRENT after splitting libtinfow from libncurses.

Value	Revision	Date	Release
1400036	ac847dbf7368	Oct 6, 2021	14.0-CURRENT after extending the AES-CCM and Chacha20-Poly1305 ciphers in OCF to support multiple nonce lengths.
1400037	2b68eb8e1dbb	Oct 11, 2021	14.0-CURRENT after removal of thread argument from VOP_STAT(9) and fo_stat.
1400038	0d6516b45346	Oct 17, 2021	14.0-CURRENT after LinuxKPI gained support of lazy BAR allocation.
1400039	bd49c454ca62	Oct 19, 2021	14.0-CURRENT after page allocator changes.
1400040	f38bef2ce417	Oct 30, 2021	14.0-CURRENT after libdialog shared library version number bump.
1400041	0c276dee030b	Nov 6, 2021	14.0-CURRENT after changing the arguments for VOP_ALLOCATE(9).
1400042	20aa359773be	Nov 13, 2021	14.0-CURRENT after upgrading llvm, clang, compiler-rt, libc++, libunwind, lld, lldb and openmp to llvmorg-13.0.0-0-gd7b669b3a303, a.k.a. 13.0.0 release.

18.2. FreeBSD 13 Versions

表 53. FreeBSD 13 __FreeBSD_version Values

Value	Revision	Date	Release
1300000	339436	October 19, 2018	13.0-CURRENT.
1300001	339730	October 25, 2018	13.0-CURRENT after bumping OpenSSL shared library version numbers.
1300002	339765	October 25, 2018	13.0-CURRENT after restoration of sys/joystick.h.
1300003	340055	November 2, 2018	13.0-CURRENT after vop_symlink API change (a_target is now const.)
1300004	340841	November 23, 2018	13.0-CURRENT after enabling crtbegin and crtend code.

Value	Revision	Date	Release
1300005	341836	December 11, 2018	13.0-CURRENT after enabling UFS inode checksums.
1300006	342398	December 24, 2018	13.0-CURRENT after fixing sys/random.h include to be usable from C++.
1300007	342629	December 30, 2018	13.0-CURRENT after changing the size of struct linux_cdev on 32-bit platforms.
1300008	342772	January 4, 2019	13.0-CURRENT after adding kern.smp.threads_per_core and kern.smp.cores sysctls.
1300009	343213	January 20, 2019	13.0-CURRENT after struct ieee80211vap structure change to resolve ioctl/detach race for ieee80211com structure.
1300010	343485	January 27, 2019	13.0-CURRENT after increasing SPECNAMELEN from 63 to MAXNAMELEN (255).
1300011	344041	February 12, 2019	13.0-CURRENT after renameat(2) has been corrected to work with kernels built with the CAPABILITIES option.
1300012	344062	February 12, 2019	13.0-CURRENT after taskqgroup_attach() and taskqgroup_attach_cpu() take a device_t and a struct resource pointer as arguments for denoting device interrupts.
1300013	344300	February 19, 2019	13.0-CURRENT after the removal of drm and drm2.
1300014	344779	March 4, 2019	13.0-CURRENT after upgrading clang, llvm, lld, lldb, compiler-rt and libc++ to 8.0.0 rc3.
1300015	345196	March 15, 2019	13.0-CURRENT after deanonymizing thread and proc state enums, so userland applications can use them without redefining the value names.

Value	Revision	Date	Release
1300016	345236	March 16, 2019	13.0-CURRENT after enabling LLVM OpenMP 8.0.0 rc5 on amd64 by default.
1300017	345305	March 19, 2019	13.0-CURRENT after exposing the Rx mbuf buffer size to drivers in iflib.
1300018	346012	March 16, 2019	13.0-CURRENT after introduction of funlinkat syscall in 345982.
1300019	346282	April 16, 2019	13.0-CURRENT after addition of is_random_seeded(9) to random(4).
1300020	346358	April 18, 2019	13.0-CURRENT after restoring random(4) availability tradeoff prior to 346250 and adding new tunables and diagnostic sysctls for programmatically discovering early seeding problems after boot.
1300021	346645	April 24, 2019	13.0-CURRENT after LinuxKPI uses bus_dma(9) to be compatible with an IOMMU.
1300022	347089	May 4, 2019	13.0-CURRENT after fixing regression issue after 346645 in the LinuxKPI.
1300023	347192	May 6, 2019	13.0-CURRENT after list-ifying kernel dump device configuration.
1300024	347325	May 8, 2019	13.0-CURRENT after bumping the Mellanox driver version numbers (mlx4en(4); mlx5en(4)).
1300025	347532	May 13, 2019	13.0-CURRENT after renaming vm.max_wired to vm.max_user_wired and changing its type.
1300026	347596	May 14, 2019	13.0-CURRENT after adding context member to ww_mutex in LinuxKPI.
1300027	347601	May 14, 2019	13.0-CURRENT after adding prepare to pm_ops in LinuxKPI.

Value	Revision	Date	Release
1300028	347925	May 17, 2019	13.0-CURRENT after removal of bm, cs, de, ed, ep, ex, fe, pcn, sf, sn, tl, tx, txp, vx, wb, and xe drivers.
1300029	347984	May 20, 2019	13.0-CURRENT after removing some header pollution due to sys/eventhandler.h. Affected files may now need to explicitly include one or more of sys/eventhandler.h, sys/ktr.h, sys/lock.h, or sys/mutex.h, when the missing header may have been included implicitly prior to 1300029.
1300030	348350	May 29, 2019	13.0-CURRENT after adding relocation support to libdwarf on powerpc64 to fix handling of DWARF information on unlinked objects. Original commit in 348347.
1300031	348808	June 8, 2019	13.0-CURRENT after adding dpcpu and vnet section fixes to i386 kernel modules to avoid panics in certain conditions. i386 kernel modules need to be recompiled with the linker script magic in place or they will refuse to load.
1300032	349151	June 17, 2019	13.0-CURRENT after separating kernel crc32() implementation to its own header (gsb_crc32.h) and renaming the source to gsb_crc32.c.
1300033	349277	June 21, 2019	13.0-CURRENT after additions to LinuxKPI’ s rcu list.
1300034	349352	June 24, 2019	13.0-CURRENT after NAND and NANDFS removal.
1300035	349846	July 8, 2019	13.0-CURRENT after merging the vm_page hold and wire mechanisms.

Value	Revision	Date	Release
1300036	349972	July 13, 2019	13.0-CURRENT after adding arm_drain_writebuf() and arm_sync_icache() for compatibility with NetBSD and OpenBSD.
1300037	350307	July 24, 2019	13.0-CURRENT after removal of libcap_random(3).
1300038	350437	July 30, 2019	13.0-CURRENT after removal of gzip’ed a.out support.
1300039	350665	August 7, 2019	13.0-CURRENT after merge of fusefs from projects/fuse2.
1300040	351140	August 16, 2019	13.0-CURRENT after deletion of sys/dir.h which has been deprecated since 1997.
(not changed)	351423	August 23, 2019	13.0-CURRENT after changing most arguments to ping6(8).
1300041	351480	August 25, 2019	13.0-CURRENT after removal of zlib 1.0.4 after the completion of kernel zlib unification.
1300042	351522	August 27, 2019	13.0-CURRENT after addition of kernel-side support for in-kernel TLS.
1300043	351698	September 2, 2019	13.0-CURRENT after removal of gets(3).
1300044	351701	September 2, 2019	13.0-CURRENT after adding sysfs create/remove functions that handles multiple files in one call to the LinuxKPI.
1300045	351729	September 3, 2019	13.0-CURRENT after adding sysctlbyname(3) system call.
1300046	351937	September 6, 2019	13.0-CURRENT after LinuxKPI sysfs improvements.
1300047	352110	September 9, 2019	13.0-CURRENT after changing the synchonization rules for vm_page reference counting..

Value	Revision	Date	Release
1300048	352700	September 25, 2019	13.0-CURRENT after adding a shm_open2 syscall to support the upcoming memfd_create(2) syscall.
1300049	353274	October 7, 2019	13.0-CURRENT after factoring out the VNET shutdown check into an own vnet structure field.
1300050	353358	October 9, 2019	13.0-CURRENT after updating llvm, clang, compiler-rt, libc++, libunwind, lld, lldb and openmp to 9.0.0 final release r372316.
1300051	353685	October 17, 2019	13.0-CURRENT after splitting out a more generic debugnet(4) from netdump(4).
1300052	353698	October 17, 2019	13.0-CURRENT after promoting the page busy field to a first class lock that no longer requires the object lock for consistency.
1300053	353700	October 17, 2019	13.0-CURRENT after implementing NetGDB.
1300054	353868	October 21, 2019	13.0-CURRENT after removing obsoleted KPIs that were used to access interface address lists.
1300055	354335	November 4, 2019	13.0-CURRENT after enabling device class group attributes in the LinuxKPI.
1300056	354460	November 7, 2019	13.0-CURRENT after fixing a potential OOB read security issue in libc++.
1300057	354694	November 13, 2019	13.0-CURRENT after adding support for AT_EXECPATH to elf_aux_info(3).
1300058	354820	November 18, 2019	13.0-CURRENT after widening the vm_page aflags field to 16 bits.
1300059	354835	November 18, 2019	13.0-CURRENT after converting the in-tree sysent targets to use the new makesyscalls.lua.

Value	Revision	Date	Release
1300060	354922	November 20, 2019	13.0-CURRENT after adding /etc/os-release as a symbolic link to /var/run/os-release.
1300061	354977	November 21, 2019	13.0-CURRENT after adding functions to bitstring(3) to find contiguous sequences of set or unset bits.
1300062	355309	December 2, 2019	13.0-CURRENT after adding TCP_STATS support.
1300063	355537	December 8, 2019	13.0-CURRENT after removal of VI_DOOMED (use VN_IS_DOOMED instead).
1300064	355658	December 9, 2019	13.0-CURRENT after correcting the C++ version check for declaring timespec_get(3).
1300065	355643	December 12, 2019	13.0-CURRENT after adding sigsetop extensions commonly found in musl libc and glibc.
1300066	355679	December 12, 2019	13.0-CURRENT after changing the internal interface between the NFS modules as part of the introduction of NFS 4.2.
1300067	355732	December 13, 2019	13.0-CURRENT after removing the deprecated callout_handle_init, timeout, and untimeout functions.
1300068	355828	December 16, 2019	13.0-CURRENT after doubling the value of ARG_MAX, for 64 bit platforms.
1300069	356051	December 24, 2019	13.0-CURRENT after the addition of busdma templates.
1300070	356113	December 27, 2019	13.0-CURRENT after eliminating the last MI difference in AT_* definitions (for powerpc).
1300071	356135	December 27, 2019	13.0-CURRENT after making USB statistics be per-device instead of per bus.

Value	Revision	Date	Release
1300072	356185	December 29, 2019	13.0-CURRENT after removal of GEOM_SCHED class and gsched tool.
1300073	356263	January 2, 2020	13.0-CURRENT after removing arm/arm as a valid target.
1300074	356337	January 3, 2020	13.0-CURRENT after removing flags argument from VOP_UNLOCK.
1300075	356409	January 6, 2020	13.0-CURRENT after adding own counter for cancelled USB transfers.
1300076	356511	January 8, 2020	13.0-CURRENT after pushing vnop implementation into the fileop layer in posix_fallocate(2).
(not changed)	357396	February 2, 2020	13.0-CURRENT after removal of armv5 architecture code from the src tree.
1300077	357455	February 3, 2020	13.0-CURRENT after removal of sparc64 architecture code from the src tree.
1300078	358020	February 17, 2020	13.0-CURRENT after changing struct vnet and the VNET magic cookie.
1300079	358164	February 20, 2020	13.0-CURRENT after upgrading ncurses to 6.2.x
1300080	358172	February 20, 2020	13.0-CURRENT after adding realpathat syscall to VFS.
1300081	358218	February 21, 2020	13.0-CURRENT after recent linuxkpi changes.
1300082	358497	March 1, 2020	13.0-CURRENT after removal of bktr(4).
1300083	358834	March 10, 2020	13.0-CURRENT after removal of amd(8), r358821.
1300084	358851	March 10, 2020	13.0-CURRENT after updating llvm, clang, compiler-rt, libc++, libunwind, lld, lldb and openmp to 10.0.0-rc3 c290cb61fdc.

Value	Revision	Date	Release
1300085	359261	March 23, 2020	13.0-CURRENT after the import of the kyua test framework.
1300086	359347	March 26, 2020	13.0-CURRENT after switching powerpc and powerpcspe to the lld linker.
1300087	359374	March 27, 2020	13.0-CURRENT after refactoring the driver and consumer interfaces for in-kernel cryptography.
1300088	359530	April 1, 2020	13.0-CURRENT after removing support for procfs process debugging.
1300089	359727	April 8, 2020	13.0-CURRENT after cloning the RCU interface into a sleepable and a non-sleepable part in the LinuxKPI.
1300090	359747	April 9, 2020	13.0-CURRENT after removing the old NFS lock device driver that uses Giant.
1300091	359839	April 12, 2020	13.0-CURRENT after implementing a close_range(2) syscall.
1300092	359920	April 14, 2020	13.0-CURRENT after reworking unmapped mbufs in KTLS to carry ext_pgs in the mbuf itself.
1300093	360418	April 27, 2020	13.0-CURRENT after adding support for kernel TLS receive offload.
1300094	360796	May 7, 2020	13.0-CURRENT after linuxkpi changes.
1300095	361275	May 20, 2020	13.0-CURRENT after adding HyperV socket support for FreeBSD guests.
1300096	361410	May 23, 2020	13.0-CURRENT after updating llvm, clang, compiler-rt, libc++, libunwind, lld, lldb and openmp to 10.0.1 rc1 f79cd71e145.
1300097	361724	June 2, 2020	13.0-CURRENT after implementing __is_constexpr() function macro in the LinuxKPI.

Value	Revision	Date	Release
1300098	362159	June 14, 2020	13.0-CURRENT after changing the export_args ex_flags field so that is 64bits.
1300099	362453	June 20, 2020	13.0-CURRENT after making liblzma use libmd implementation of SHA256.
1300100	362640	June 26, 2020	13.0-CURRENT after changing the internal API between the NFS kernel modules.
1300101	363077	July 10, 2020	13.0-CURRENT after implementing the array_size() function in the LinuxKPI.
1300102	363562	July 26, 2020	13.0-CURRENT after implementing lockless lookup in the VFS layer.
1300103	363757	August 1, 2020	13.0-CURRENT after making rights mandatory for NDINIT_ALL.
1300104	363783	August 2, 2020	13.0-CURRENT after vnode layout changes.
1300105	363894	August 5, 2020	13.0-CURRENT after vaccess() change.
1300106	364092	August 11, 2020	13.0-CURRENT after adding an argument to newnfs_connect() that indicates use TLS for the connection.
1300107	364109	August 11, 2020	13.0-CURRENT after change to clone the task struct fields related to RCU.
1300108	364233	August 14, 2020	13.0-CURRENT after adding a few wait_bit functions to the linuxkpi, which are needed for DRM from Linux v5.4.
1300109	364274	August 16, 2020	13.0-CURRENT after vget() argument removal and namei flags renumbering.
(not changed)	364284	August 16, 2020	13.0-CURRENT after updating llvm, clang, compiler-rt, libc++, libunwind, lld, lldb and openmp to release/11.x llvmorg-11.0.0-rc1-47-gff47911ddfc.

Value	Revision	Date	Release
1300110	364331	August 18, 2020	13.0-CURRENT after deleting the unused use_ext argument to nfscl_reqstart().
1300111	364476	August 22, 2020	13.0-CURRENT after adding TLS support to the kernel RPC.
1300112	364747	August 25, 2020	13.0-CURRENT after merging OpenZFS support.
1300113	364753	August 25, 2020	13.0-CURRENT after adding atomic and bswap functions to libcompiler_rt.
1300114	365459	September 8, 2020	13.0-CURRENT after changing arm64 AT_HWCAP definitions for elf_aux_info(3).
1300115	365705	September 14, 2020	13.0-CURRENT after fixing crunchgen(1) application build with WARNS=6.
1300116	366062	September 22, 2020	13.0-CURRENT after the introduction of the powerpc64le ARCH.
1300117	366070	September 23, 2020	13.0-CURRENT after reimplementing purgevfs to iterate vnodes instead of the entire hash.
1300118	366374	October 2, 2020	13.0-CURRENT after adding backlight support and dmi_* functions to the linuxkpi.
1300119	366432	October 6, 2020	13.0-CURRENT after populating the acquire context field of a ww_mutex in the LinuxKPI.
1300120	366666	October 13, 2020	13.0-CURRENT after the fix to arm64 write-only mappings.
1300121	366719	October 15, 2020	13.0-CURRENT after the addition of VOP_EAGAIN.
1300122	366782	October 17, 2020	13.0-CURRENT after the addition of ptsname_r.
1300123	366871	October 20, 2020	13.0-CURRENT after VOP, VPTOCNP, and INACTIVE changes.

Value	Revision	Date	Release
1300124	367162	October 30, 2020	13.0-CURRENT after adding cache_vop_mkdir and renaming cache_rename to cache_vop_rename.
1300125	367347	November 4, 2020	13.0-CURRENT after using a rms lock for teardown handling in zfs.
1300126	367384	November 5, 2020	13.0-CURRENT after rationalizing per-cpu zones.
1300127	367432	November 6, 2020	13.0-CURRENT after moving malloc_type_internal into malloc_type.
1300128	367522	November 9, 2020	13.0-CURRENT after LinuxKPI additions to implement ACPI bits required by drm-kmod in the base system.
1300129	367627	November 12, 2020	13.0-CURRENT after retiring malloc_last_fail.
1300130	367777	November 17, 2020	13.0-CURRENT after p_pd / pwddesc split from p_fd / filedesc.
1300131	368417	December 7, 2020	13.0-CURRENT after removal of crypto file descriptors.
1300132	368659	December 15, 2020	13.0-CURRENT after improving handling of alternate settings in the USB stack.
1300133	2ed0c8d801f5	December 23, 2020	13.0-CURRENT after changing the internal API between the NFS and kernel RPC modules.
1300134	a84b0e94cdbf	January 7, 2021	13.0-CURRENT after factoring out the hardware-independent part of USB HID support to a new module.
1300135	35a39dc5b349	January 12, 2021	13.0-CURRENT after adding kernel_fpu_begin/kernel_fpu_end to the LinuxKPI.

Value	Revision	Date	Release
1300136	72c551930be1	January 17, 2021	13.0-CURRENT after reimplementing LinuxKPI's irq_work queue on top of fast taskqueue.
1300137	010196adcfaf	January 30, 2021	13.0-CURRENT after fixing a clang assertion when building the devel/onetbb port.
1300138	dcee9964238b	February 1, 2021	13.0-ALPHA3 after adding lockless symlink lookup to vfs cache.
1300139	91a07ed50ffc	February 2, 2021	13.0-ALPHA3 after adding various LinuxKPI bits conflicting with drm-kmod.
1300500	3c6a89748a01	February 5, 2021	13.0-STABLE after releng/13.0 was branched.
1300501	c3f97dd75a1c	April 23, 2021	13.0-STABLE after fixing rtld's dl_iterate_phdr().
1300501	c3f97dd75a1c	April 23, 2021	13.0-STABLE after fixing rtld's dl_iterate_phdr().
1300502	da6a8ccfa293	April 23, 2021	13.0-STABLE after implementing atomic_dec_and_lock_irqsave() in the LinuxKPI.
1300503	d60c6dc8f69b	April 23, 2021	13.0-STABLE after changing the internal KAPI between the krpc and NFS.
1300504	fb34817c686c	April 30, 2021	13.0-STABLE after updating the LinuxKPI to accommodate the drm-kmod 5.5 update.
1300505	8f81f190a640	May 10, 2021	13.0-STABLE after changing the internal KAPI between the nscl.ko and nfscommon.ko modules.
1300506	e31579b8558d	June 2, 2021	13.0-STABLE after adding TCP LRO support for VLAN and VxLAN.
1300507	c64d1bd7145b	June 2, 2021	13.0-STABLE after adding a new member to the EPOCH(9) tracker structure.

Value	Revision	Date	Release
1300508	658f5eed38c3	June 11, 2021	13.0-STABLE after adding macros for might_lock_nested() and lockdep_(re/un/)pin_lock() to the LinuxKPI.
1300509	210349325af9	June 14, 2021	13.0-STABLE after adding a macro for list_for_each_entry_lockless() to the LinuxKPI.
1300510	eb3397588e1b	June 26, 2021	13.0-STABLE after changing the internal KAPI between the krpc and nfsd modules.
1300511	2622570aeb3d	July 7, 2021	13.0-STABLE after changing softdep_prelink() to only do sync if another thread changed the vnode metadata since previous prelink.
1300512	f72db34d2295	July 18, 2021	13.0-STABLE after various merges to LinuxKPI, OFED, net80211, and drivers.
1300513	af732203b8f7	July 31, 2021	13.0-STABLE after upgrading llvm, clang, compiler-rt, libc++, libunwind, lld, lldb and openmp to llvmorg-12.0.1-0-gfed41342a82f, a.k.a. 12.0.1 release.
1300514	53d162819c20	August 3, 2021	Incompatible changes to the KBI of internal interfaces between NFS requires rebuilding modules.
1300515	0437d10e359e	September 22, 2021	13.0-STABLE returning to 13.0 KBI for linuxkpi.
1300518	a017868e2818	October 21, 2021	13.0-STABLE after adding crypto_cursor_segment().
1300519	fe2827f1678b	October 21, 2021	13.0-STABLE after extending the AES-CCM and Chacha20-Poly1305 ciphers in OCF to support multiple nonce lengths.
1300521	29745cf91cfc	November 19, 2021	13.0-STABLE after various merges to LinuxKPI and net80211.

18.3. FreeBSD 12 Versions

表 54. FreeBSD 12 __FreeBSD_version Values

Value	Revision	Date	Release
1200000	302409	July 7, 2016	12.0-CURRENT.
1200001	302628	July 12, 2016	12.0-CURRENT after removing collation from [a-z]-type ranges.
1200002	304395	August 18, 2016	12.0-CURRENT after removing unused and obsolete openbsd_poll system call.
1200003	304608	August 22, 2016	12.0-CURRENT after adding C++11 thread_local support in rev 303795.
1200004	304752	August 24, 2016	12.0-CURRENT after fixing LC*MASK for newlocale(3) and querylocale(3) (rev 304703).
1200005	304789	August 25, 2016	12.0-CURRENT after changing some ioctl interfaces in rev 304787 between the iSCSI userspace programs and the kernel.
1200006	305256	September 1, 2016	12.0-CURRENT after crunchgen(1) META_MODE fix in 305254.
1200007	305421	September 5, 2016	12.0-CURRENT after resolving a deadlock between device_detach() and usbd_do_request_flags (9).
1200008	305833	September 15, 2016	12.0-CURRENT after removing the 4.3BSD compatible macro m_copy() in 305824.
1200009	306077	September 21, 2016	12.0-CURRENT after removing bio_taskqueue() in 305988.
1200010	306276	September 23, 2016	12.0-CURRENT after mounting msdosfs(5) with longnames support by default.
1200011	306556	October 1, 2016	12.0-CURRENT after adding fb_memattr field to fb_info in 306555.

Value	Revision	Date	Release
1200012	306592	October 2, 2016	12.0-CURRENT after net80211(4) changes (rev 306590, 306591).
1200013	307140	October 12, 2016	12.0-CURRENT after installing header files required development with libzfs_core.
1200014	307529	October 17, 2016	12.0-CURRENT after merging common code in rtwn(4) and urtwn(4), and adding support for 802.11ac devices.
1200015	308874	November 20, 2016	12.0-CURRENT after some ABI change for unbreaking powerpc.
1200016	309017	November 22, 2016	12.0-CURRENT after removing PG_CACHED -related fields from vmmeter.
1200017	309124	November 25, 2016	12.0-CURRENT after upgrading our copies of clang, llvm, lldb, compiler-rt and libc++ to 3.9.0 release, and adding lld 3.9.0.
1200018	309676	December 7, 2016	12.0-CURRENT after adding the ki_moretdname member to struct kinfo_proc and struct kinfo_proc32 to export the whole thread name to user-space utilities.
1200019	310149	December 16, 2016	12.0-CURRENT after starting to lay down the foundation for 11ac support.
1200020	312087	January 13, 2017	12.0-CURRENT after removing fgetsock and fputsock.
1200021	313858	February 16, 2017	12.0-CURRENT after removing MCA and EISA support.
1200022	314040	February 21, 2017	12.0-CURRENT after making the LinuxKPI task struct persistent across system calls.
(not changed)	314373	March 2, 2017	12.0-CURRENT after removing System V Release 4 binary compatibility support.

Value	Revision	Date	Release
1200023	314564	March 2, 2017	12.0-CURRENT after upgrading our copies of clang, llvm, lld, lldb, compiler-rt and libc++ to 4.0.0.
1200024	314865	March 7, 2017	12.0-CURRENT after removal of pcap-int.h
1200025	315430	March 16, 2017	12.0-CURRENT after addition of the <dev/mmc/mmc_ioctl.h> header.
1200026	315662	March 16, 2017	12.0-CURRENT after hiding struct inpcb and struct tcpcb from userland.
1200027	315673	March 21, 2017	12.0-CURRENT after making CAM SIM lock optional.
1200028	316683	April 10, 2017	12.0-CURRENT after renaming smp_no_rendevous_barrier() to smp_no_rendezvous_barrier() in 316648.
1200029	317176	April 19, 2017	12.0-CURRENT after the removal of struct vmmeter from struct pcpu from 317061.
1200030	317383	April 24, 2017	12.0-CURRENT after removing NATM support including en(4), fatm(4), hatm(4), and patm(4).
1200031	318736	May 23, 2017	12.0-CURRENT after types ino_t, dev_t, nlink_t were extended to 64bit and struct dirent changed layout (also known as ino64).
1200032	319664	June 8, 2017	12.0-CURRENT after removal of groff.
1200033	320043	June 17, 2017	12.0-CURRENT after the type of the struct event member data was increased to 64bit, and ext structure members added.
1200034	320085	June 19, 2017	12.0-CURRENT after the NFS client and server were changed so that they actually use the 64bit ino_t.
1200035	320317	June 24, 2017	12.0-CURRENT after the MAP_GUARD mmap(2) flag was added.

Value	Revision	Date	Release
1200036	320347	June 26, 2017	12.0-CURRENT after changing time_t to 64 bits on powerpc (32-bit version).
1200037	320545	July 1, 2017	12.0-CURRENT after the cleanup and inlining of bus_dmamap* functions (320528).
1200038	320879	July 10, 2017	12.0-CURRENT after MMC CAM committed. (320844).
1200039	321369	July 22, 2017	12.0-CURRENT after upgrade of copies of clang, llvm, lld, lldb, compiler-rt and libc++ to 5.0.0 (trunk r308421).
1200040	321688	July 29, 2017	12.0-CURRENT after adding NFS client forced dismount support umount -N.
1200041	322762	August 21, 2017	12.0-CURRENT after WRFSBASE instruction become operational on amd64.
1200042	322900	August 25, 2017	12.0-CURRENT after PLPMTUD counters were changed to use counter(9).
1200043	322989	August 28, 2017	12.0-CURRENT after dropping x86 CACHE_LINE_SIZE down to 64 bytes.
1200044	323349	September 8, 2017	12.0-CURRENT after implementing poll_wait() in the LinuxKPI.
1200045	323706	September 18, 2017	12.0-CURRENT after adding shared memory support to LinuxKPI. (323703).
1200046	323910	September 22, 2017	12.0-CURRENT after adding support for 32-bit compatibility IOCTLs to LinuxKPI.
1200047	324053	September 26, 2017	12.0-CURRENT after removing M_HASHTYPE_RSS_UDP_IPV4_EX. (324052).
1200048	324227	October 2, 2017	12.0-CURRENT after hiding struct socket and struct unpcb from userland.

Value	Revision	Date	Release
1200049	324281	October 4, 2017	12.0-CURRENT after adding the value.u16 field to struct diocgattr_arg.
1200050	324342	October 5, 2017	12.0-CURRENT after adding the armv7 MACHINE_ARCH. (324340).
1200051	324455	October 9, 2017	12.0-CURRENT after removing libstand.a as a public interface. (324454).
1200052	325028	October 26, 2017	12.0-CURRENT after fixing ptrace() to always clear the correct thread event when resuming.
1200053	325506	November 7, 2017	12.0-CURRENT after changing struct mbuf layout to add optional hardware timestamps for receive packets.
1200054	325852	November 15, 2017	12.0-CURRENT after changing the layout of struct vmtotal to allow for reporting large memory counters.
1200055	327740	January 9, 2018	12.0-CURRENT after adding cpucontrol -e support.
1200056	327952	January 14, 2018	12.0-CURRENT after upgrading clang, llvm, lld, lldb, compiler-rt and libc++ to 6.0.0 (branches/release_60 r321788).
1200057	329033	February 8, 2018	12.0-CURRENT after applying a clang 6.0.0 fix to make the wine ports build correctly.
1200058	329166	February 12, 2018	12.0-CURRENT after the lua loader was committed.
1200059	330299	March 2, 2018	12.0-CURRENT after removing the declaration of union semun unless _WANT_SEMUN is defined. Also the removal of struct mymsg and the renaming of kernel-only members of struct semid_ds and struct msgid_ds.

Value	Revision	Date	Release
1200060	330384	March 4, 2018	12.0-CURRENT after upgrading clang, llvm, lld, lldb, compiler-rt and libc++ to 6.0.0 release.
1200061	332100	April 6, 2018	12.0-CURRENT after changing syslog(3) to emit RFC 5424 formatted messages.
1200062	332423	April 12, 2018	12.0-CURRENT after changing the Netmap API.
1200063	333446	May 10, 2018	12.0-CURRENT after reworking CTL frontend and backend options to use nv(3), allow creating multiple ioctl frontend ports.
1200064	334074	May 22, 2018	12.0-CURRENT after changing the ifnet address and multicast address TAILQ to CK_STAILQ.
1200065	334290	May 28, 2018	12.0-CURRENT after changing dwatch(1) to allow '-E code' to override profile EVENT_DETAILS.
1200066	334466	June 1, 2018	12.0-CURRENT after removal of in-kernel pmc tables for Intel.
1200067	334892	June 9, 2018	12.0-CURRENT after adding DW_LANG constants to libdwarf.
1200068	334930	June 12, 2018	12.0-CURRENT after changing the interface between the NFS modules.
1200069	335237	June 15, 2018	12.0-CURRENT after changing struct kerneldumpheader to version 4 (similar to version 2 in 11-STABLE and previous).
1200070	335873	July 2, 2018	12.0-CURRENT after inlining atomic(9) in modules on amd64 and i386 requiring all modules of consumers to be rebuilt for these architectures.

Value	Revision	Date	Release
1200071	335930	July 4, 2018	12.0-CURRENT after changing the ABI and API of epoch(9) (335924) requiring modules of consumers to be rebuilt.
1200072	335979	July 5, 2018	12.0-CURRENT after changing the ABI and API of struct xinpcb and friends.
1200073	336313	July 15, 2018	12.0-CURRENT after changing the ABI and API of struct if_shared_ctx and struct if_softc_ctx requiring modules of iflib(9) consumers to be rebuilt.
1200074	336360	July 16, 2018	12.0-CURRENT after updating the configuration of libstdc++ to make use of C99 functions.
1200075	336538	July 19, 2018	12.0-CURRENT after zfsloader being folded into loader, and after adding ntpd:ntpd as uid:gid 123:123, and after removing arm big-endian support (MACHINE_ARCH=armeb).
1200076	336914	July 30, 2018	12.0-CURRENT after KPI changes to timespecadd.
1200077	337576	August 10, 2018	12.0-CURRENT after timespec_get(3) was added to the system.
1200078	337863	August 15, 2018	12.0-CURRENT after exec.created hook for jails.
1200079	338061	August 19, 2018	12.0-CURRENT after converting arc4random to using the Chacha20 algorithm and deprecating arc4random_stir and arc4random_addrandom.
1200080	338172	August 22, 2018	12.0-CURRENT after removing the drm drivers.
1200081	338182	August 21, 2018	12.0-CURRENT after KPI changes to NVMe.

Value	Revision	Date	Release
1200082	338285	August 24, 2018	12.0-CURRENT after reverting the removal of the drm drivers.
1200083	338331	August 26, 2018	12.0-CURRENT after removing arc4random_stir and arc4random_addrandom.
1200084	338478	September 5, 2018	12.0-CURRENT after updating objcopy(1) to properly handle little-endian MIPS64 object files.
1200085	339270	October 19, 2018	12.0-STABLE after updating OpenSSL to version 1.1.1.
1200086	339732	October 25, 2018	12.0-STABLE after updating OpenSSL shared library version numbers.
1200500	340471	November 16, 2018	12-STABLE after releng/12.0 was branched.
1200501	342801	January 6, 2019	12-STABLE after merge of fixing linux_destroy_dev() behaviour when there are still files open from the destroying cdev.
1200502	343126	January 17, 2019	12-STABLE after enabling sys/random.h #include from C++.
1200503	344152	Febrary 15, 2019	12-STABLE after merge of fixing renameat(2) for CAPABILITIES kernels.
1200504	345169	March 15, 2019	12-STABLE after merging CCM for the benefit of the ZoF port.
1200505	345327	March 20, 2019	12-STABLE after merging support for selectively disabling ZFS without disabling loader.
1200506	346168	April 12, 2019	12-STABLE after merging llvm, clang, compiler-rt, libc++, libunwind, lld, lldb and openmp 8.0.0 final release r356365.
1200507	346337	April 17, 2019	12-STABLE after MFC of iflib changes in 345303, 345658, and partially of 345305.

Value	Revision	Date	Release
1200508	346784	April 27, 2019	12-STABLE after ether_gen_addr availability.
1200509	347790	May 16, 2019	12-STABLE after bumping the Mellanox driver version numbers (mlx4en(4); mlx5en(4)).
1200510	348036	May 21, 2019	12-STABLE after change to struct in linuxkpi from 348035.
1200511	348243	May 24, 2019	12-STABLE after MFC of 347843: adding group_leader member to struct task_struct to the LinuxKPI.
1200512	348245	May 24, 2019	12-STABLE after adding context member to ww_mutex in LinuxKPI.
1200513	349763	July 5, 2019	12-STABLE after MFC of epoch(9) changes: 349763, 340404, 340415, 340417, 340419, 340420.
1200514	350083	July 17, 2019	12-STABLE after additions to LinuxKPI’ s rcu list.
1200515	350877	August 11, 2019	12-STABLE after MFC of 349891 (reorganize the SRCS lists as one file per line, and then alphabetize them) and 349972 (add arm_sync_icache() and arm_drain_writebuf() sysarch syscall wrappers).
1200516	351276	August 20, 2019	12-STABLE after MFC of various changes to iflib 351276.
1200517	352076	September 9, 2019	12-STABLE after adding sysfs create/remove functions that handles multiple files in one call to the LinuxKPI.
1200518	352114	September 10, 2019	12-STABLE after additional updates to LinuxKPI’ s sysfs.
1200519	352351	September 15, 2019	12-STABLE after MFC of the new fusefs driver.
1201000	352546	September 20, 2019	releng/12.1 branched from stable/12@r352480.
1201500	352547	September 20, 2019	12-STABLE after branching releng/12.1.

Value	Revision	Date	Release
1201501	354598	November 10, 2019	12-STABLE after fixing a potential OOB read security issue in libc++.
1201502	354613	November 11, 2019	12-STABLE after enabling device class group attributes in the LinuxKPI.
1201503	354928	November 21, 2019	12-STABLE after adding support for AT_EXECPATH to elf_aux_info(3).
1201504	355658	November 10, 2019	12-STABLE after correcting the C++ version check for declaring timespec_get(3).
1201505	355899	December 19, 2019	12-STABLE after adding sigsetop extensions commonly found in musl libc and glibc.
1201506	355968	December 21, 2019	12-STABLE after doubling the value of ARG_MAX, for 64 bit platforms.
1201507	356306	January 2, 2020	12-STABLE after adding functions to bitstring(3) to find contiguous sequences of set or unset bits.
1201508	356394	January 6, 2020	12-STABLE after making USB statistics be per-device instead of per bus.
1201509	356460	January 7, 2020	12-STABLE after updating llvm, clang, compiler-rt, libc++, libunwind, lld, lldb and openmp to 9.0.0 final release r372316.
1201510	356679	January 13, 2020	12-STABLE after adding own counter for cancelled USB transfers.
1201511	357333	January 31, 2020	12-STABLE after adding /etc/os-release as a symbolic link to /var/run/os-release.
1201512	357612	February 6, 2020	12-STABLE after recent LinuxKPI changes.
1201513	359957	Apr 15, 2020	12-STABLE after cloning the RCU interface into a sleepable and a non-sleepable part in the LinuxKPI.

Value	Revision	Date	Release
1201514	360525	May 1, 2020	12-STABLE after implementing full bus_dma(9) support in the LinuxKPI and pulling in all dependencies.
1201515	360545	May 1, 2020	12-STABLE after updating llvm, clang, compiler-rt, libc++, libunwind, lld, lldb and openmp to 10.0.0 release.
1201516	360620	May 4, 2020	12-STABLE after moving id_mapped to end of bus_dma_impl structure to preserve KPI.
1201517	361350	May 21, 2020	12-STABLE after renaming vm.max_wired to vm.max_user_wired and changing its type.
1201518	362319	June 18, 2020	12-STABLE after implementing __is_constexpr() function macro in the LinuxKPI.
1201519	362916	July 4, 2020	12-STABLE after making liblzma use libmd implementation of SHA256.
1201520	363494	July 24, 2020	12-STABLE after updating llvm, clang, compiler-rt, libc++, libunwind, lld, lldb and openmp to 10.0.1 release.
1201521	363790	August 3, 2020	12-STABLE after implementing the array_size() function in the LinuxKPI.
1201522	363832	August 4, 2020	12-STABLE after adding sysctlbyname system call.
1201523	364390	August 19, 2020	12-STABLE after change to clone the task struct fields related to RCU.
1201524	365356	September 5, 2020	12-STABLE after splitting XDR off into a separate kernel module, to minimize ZFS dependencies.

Value	Revision	Date	Release
1201525	365471	September 8, 2020	12-STABLE after adding atomic and bswap functions to libcompiler_rt.
1201526	365608	September 10, 2020	12-STABLE after updating net80211 and kernel privilege checking API changes.
1202000	365618	September 11, 2020	releng/12.2 branched from stable/12@r365618.
1202500	365619	September 11, 2020	12-STABLE after branching releng/12.2.
1202501	365661	September 12, 2020	12-STABLE after followup commits to libcompiler_rt.
1202502	365816	September 16, 2020	12-STABLE after fixing crunchgen(1) application build with WARNS=6.
1202503	366878	October 20, 2020	12-STABLE after populating the acquire context field of a ww_mutex in the LinuxKPI.
1202504	367511	November 9, 2020	12-STABLE after the addition of ptsname_r(3).
1202505	f3d75bed5475	December 28, 2020	12-STABLE after improving handling of alternate settings in the USB stack.
1202506	d36cc12ddfe3	April 30, 2021	12-STABLE after changing the internal KAPI between the krpc and NFS.
1202507	1e279fe9deae	May 10, 2021	12-STABLE after changing the internal KAPI between the nscl.ko and nfscommon.ko modules.

18.4. FreeBSD 11 Versions

表 55. FreeBSD 11 __FreeBSD_version Values

Value	Revision	Date	Release
1100000	256284	October 10, 2013	11.0-CURRENT.
1100001	256776	October 19, 2013	11.0-CURRENT after addition of support for "first boot" rc.d scripts, so ports can make use of this.

Value	Revision	Date	Release
1100002	257696	November 5, 2013	11.0-CURRENT after dropping support for historic ioctls.
1100003	258284	November 17, 2013	11.0-CURRENT after iconv changes.
1100004	259424	December 15, 2013	11.0-CURRENT after the behavior change of gss_pseudo_random introduced in 259286.
1100005	260010	December 28, 2013	11.0-CURRENT after 259951 - Do not coalesce entries in vm_map_stack(9).
1100006	261246	January 28, 2014	11.0-CURRENT after upgrades of libelf and libdwarf.
1100007	261283	January 30, 2014	11.0-CURRENT after upgrade of libc++ to 3.4 release.
1100008	261881	February 14, 2014	11.0-CURRENT after libc++ 3.4 ABI compatibility fix.
1100009	261991	February 16, 2014	11.0-CURRENT after upgrade of llvm/clang to 3.4 release.
1100010	262630	February 28, 2014	11.0-CURRENT after upgrade of ncurses to 5.9 release (rev 262629).
1100011	263102	March 13, 2014	11.0-CURRENT after ABI change in struct if_data.
1100012	263140	March 14, 2014	11.0-CURRENT after removal of Novell IPX protocol support.
1100013	263152	March 14, 2014	11.0-CURRENT after removal of AppleTalk protocol support.
1100014	263235	March 16, 2014	11.0-CURRENT after renaming <sys/capability.h> to <sys/capsicum.h> to avoid a clash with similarly named headers in other operating systems. A compatibility header is left in place to limit build breakage, but will be deprecated in due course.
1100015	263620	March 22, 2014	11.0-CURRENT after cnt rename to vm_cnt.

Value	Revision	Date	Release
1100016	263660	March 23, 2014	11.0-CURRENT after addition of armv6hf TARGET_ARCH.
1100017	264121	April 4, 2014	11.0-CURRENT after GCC support for __block definition.
1100018	264212	April 6, 2014	11.0-CURRENT after support for UDP-Lite protocol (RFC 3828).
1100019	264289	April 8, 2014	11.0-CURRENT after FreeBSD-SA-14:06.openssl (rev 264265).
1100020	265215	May 1, 2014	11.0-CURRENT after removing lindev in favor of having /dev/full by default (rev 265212).
1100021	266151	May 6, 2014	11.0-CURRENT after src.opts.mk changes, decoupling make.conf(5) from buildworld (rev 265419).
1100022	266904	May 30, 2014	11.0-CURRENT after changes to strcasecmp(3), moving strcasecmp_l(3) and strncasecmp_l(3) from <string.h> to <strings.h> for POSIX 2008 compliance (rev 266865).
1100023	267440	June 13, 2014	11.0-CURRENT after the CUSE library and kernel module have been attached to the build by default.
1100024	267992	June 27, 2014	11.0-CURRENT after sysctl(3) API change.
1100025	268066	June 30, 2014	11.0-CURRENT after regex(3) library update to add ">" and "<" delimiters.
1100026	268118	July 1, 2014	11.0-CURRENT after the internal interface between the NFS modules, including the krpc, was changed by (rev 268115).
1100027	268441	July 8, 2014	11.0-CURRENT after FreeBSD-SA-14:17.kmem (rev 268431).

Value	Revision	Date	Release
1100028	268945	July 21, 2014	11.0-CURRENT after hdestroy(3) compliance fix changed ABI.
1100029	270173	August 3, 2014	11.0-CURRENT after SOCK_DGRAM bug fix (rev 269489).
1100030	270929	September 1, 2014	11.0-CURRENT after SOCK_RAW sockets were changed to not modify packets at all.
1100031	271341	September 9, 2014	11.0-CURRENT after FreeBSD-SA-14:18.openssl (rev 269686).
1100032	271438	September 11, 2014	11.0-CURRENT after API changes to ifa_ifwithbroadaddr, ifa_ifwithdstaddr, ifa_ifwithnet, and ifa_ifwithroute.
1100033	271657	September 9, 2014	11.0-CURRENT after changing access, eaccess, and faccessat to validate the mode argument.
1100034	271686	September 16, 2014	11.0-CURRENT after FreeBSD-SA-14:19.tcp (rev 271666).
1100035	271705	September 17, 2014	11.0-CURRENT after i915 HW context support.
1100036	271724	September 17, 2014	Version bump to have ABI note distinguish binaries ready for strict mmap(2) flags checking (rev 271724).
1100037	272674	October 6, 2014	11.0-CURRENT after addition of explicit_bzero(3) (rev 272673).
1100038	272951	October 11, 2014	11.0-CURRENT after cleanup of TCP wrapper headers.
1100039	273250	October 18, 2014	11.0-CURRENT after removal of MAP_RENAME and MAP_NORESERVE.
1100040	273432	October 21, 2014	11.0-CURRENT after FreeBSD-SA-14:23 (rev 273146).

Value	Revision	Date	Release
1100041	273875	October 30, 2014	11.0-CURRENT after API changes to syscall_register, syscall32_register, syscall_register_helper and syscall32_register_helper (rev 273707).
1100042	274046	November 3, 2014	11.0-CURRENT after a change to struct tcpcb.
1100043	274085	November 4, 2014	11.0-CURRENT after enabling vt(4) by default.
1100044	274116	November 4, 2014	11.0-CURRENT after adding new libraries/utilities (dpv and figpar) for data throughput visualization.
1100045	274162	November 4, 2014	11.0-CURRENT after FreeBSD-SA-14:23, FreeBSD-SA-14:24, and FreeBSD-SA-14:25.
1100046	274470	November 13, 2014	11.0-CURRENT after kern_poll signature change (rev 274462).
1100047	274476	November 13, 2014	11.0-CURRENT after removal of no-at version of VFS syscalls helpers, like kern_open.
1100048	275358	December 1, 2014	11.0-CURRENT after starting the process of removing the use of the deprecated "M_FLOWID" flag from the network code.
1100049	275633	December 9, 2014	11.0-CURRENT after importing an important fix to the LLVM vectorizer, which could lead to buffer overruns in some cases.
1100050	275732	December 12, 2014	11.0-CURRENT after adding AES-ICM and AES-GCM to OpenCrypto.
1100051	276096	December 23, 2014	11.0-CURRENT after removing old NFS client and server code from the kernel.
1100052	276479	December 31, 2014	11.0-CURRENT after upgrade of clang, llvm and lldb to 3.5.0 release.

Value	Revision	Date	Release
1100053	276781	January 7, 2015	11.0-CURRENT after MCLGET(9) gained a return value (rev 276750).
1100054	277213	January 15, 2015	11.0-CURRENT after rewrite of callout subsystem.
1100055	277528	January 22, 2015	11.0-CURRENT after reverting callout changes in 277213.
1100056	277610	January 23, 2015	11.0-CURRENT after addition of futimens and utimensat system calls.
1100057	277897	January 29, 2015	11.0-CURRENT after removal of d_thread_t.
1100058	278228	February 5, 2015	11.0-CURRENT after addition of support for probing the SCSI VPD Extended Inquiry page (0x86).
1100059	278442	February 9, 2015	11.0-CURRENT after import of xz 5.2.0, which added multi-threaded compression and lzma gained libthr dependency (rev 278433).
1100060	278846	February 16, 2015	11.0-CURRENT after forwarding FBIO_BLANK to framebuffer clients.
1100061	278964	February 18, 2015	11.0-CURRENT after CDAI_FLAG_NONE addition.
1100062	279221	February 23, 2015	11.0-CURRENT after mtio(4) and sa(4) API and ioctl(2) additions.
1100063	279728	March 7, 2015	11.0-CURRENT after adding mutex support to the pps_ioctl() API in the kernel.
1100064	279729	March 7, 2015	11.0-CURRENT after adding PPS support to USB serial drivers.
1100065	280031	March 15, 2015	11.0-CURRENT after upgrading clang, llvm and lldb to 3.6.0.
1100066	280306	March 20, 2015	11.0-CURRENT after removal of SSLv2 support from OpenSSL.

Value	Revision	Date	Release
1100067	280630	March 25, 2015	11.0-CURRENT after removal of SSLv2 support from fetch(1) and fetch(3).
1100068	281172	April 6, 2015	11.0-CURRENT after change to net.inet6.ip6.mif6table sysctl.
1100069	281550	April 15, 2015	11.0-CURRENT after removal of const qualifier from iconv(3).
1100070	281613	April 16, 2015	11.0-CURRENT after moving ALTQ from contrib to net/altq.
1100071	282256	April 29, 2015	11.0-CURRENT after API/ABI change to smb(4) (rev 281985).
1100072	282319	May 1, 2015	11.0-CURRENT after adding reallocarray(3) in libc (rev 282314).
1100073	282650	May 8, 2015	11.0-CURRENT after extending the maximum number of allowed PCM channels in a PCM stream to 127 and decreasing the maximum number of sub-channels to 1.
1100074	283526	May 25, 2015	11.0-CURRENT after adding preliminary support for x86-64 Linux binaries (rev 283424), and upgrading clang and llvm to 3.6.1.
1100075	283623	May 27, 2015	11.0-CURRENT after dounmount() requiring a reference on the passed struct mount (rev 283602).
1100076	283983	June 4, 2015	11.0-CURRENT after disabled generation of legacy formatted password databases entries by default.
1100077	284233	June 10, 2015	11.0-CURRENT after API changes to lim_cur, lim_max, and lim_rlimit (rev 284215).
1100078	286672	August 12, 2015	11.0-CURRENT after crunchgen(1) changes from 284356 to 285986.
1100079	286874	August 18, 2015	11.0-CURRENT after import of jemalloc 4.0.0 (rev 286866).

Value	Revision	Date	Release
1100080	288943	October 5, 2015	11.0-CURRENT after upgrading clang, llvm, lldb, compiler-rt and libc++ to 3.7.0.
1100081	289415	October 16, 2015	11.0-CURRENT after undating ZFS to support resumable send/receive (rev 289362).
1100082	289594	October 19, 2015	11.0-CURRENT after Linux KPI updates.
1100083	289749	October 22, 2015	11.0-CURRENT after renaming linuxapi.ko to linuxkpi.ko.
1100084	290135	October 29, 2015	11.0-CURRENT after moving the LinuxKPI module into the default kernel build.
1100085	290207	October 30, 2015	11.0-CURRENT after import of OpenSSL 1.0.2d.
1100086	290275	November 2, 2015	11.0-CURRENT after making figpar(3) macros more unique.
1100087	290479	November 7, 2015	11.0-CURRENT after changing sysctl_add_oid(9)'s ABI.
1100088	290495	November 7, 2015	11.0-CURRENT after string collation and locales rework.
1100089	290505	November 7, 2015	11.0-CURRENT after API change to sysctl_add_oid(9) (rev 290475).
1100090	290715	November 10, 2015	11.0-CURRENT after API change to callout_stop macro; (rev 290664).
1100091	291537	November 30, 2015	11.0-CURRENT after changing the interface between the nfsd.ko and nfscommon.ko modules in 291527.
1100092	292499	December 19, 2015	11.0-CURRENT after removal of vm_pageout_grow_cache (rev 292469).
1100093	292966	December 30, 2015	11.0-CURRENT after removal of sys/crypto/sha2.h (rev 292782).
1100094	294086	January 15, 2016	11.0-CURRENT after LinuxKPI PCI changes (rev 294086).

Value	Revision	Date	Release
1100095	294327	January 19, 2016	11.0-CURRENT after LRO optimizations.
1100096	294505	January 21, 2016	11.0-CURRENT after LinuxKPI idr_* additions.
1100097	294860	January 26, 2016	11.0-CURRENT after API change to dpv(3).
1100098	295682	February 16, 2016	11.0-CURRENT after API change to rman (rev 294883).
1100099	295739	February 18, 2016	11.0-CURRENT after allowing drivers to set the TCP ACK/data segment aggregation limit.
1100100	296136	February 26, 2016	11.0-CURRENT after bus_alloc_resource_any(9) API addition.
1100101	296417	March 5, 2016	11.0-CURRENT after upgrading our copies of clang, llvm, lldb and compiler-rt to 3.8.0 release.
1100102	296749	March 12, 2016	11.0-CURRENT after libelf cross-endian fix in rev 296685.
1100103	297000	March 18, 2016	11.0-CURRENT after using uintmax_t for rman ranges.
1100104	297156	March 21, 2016	11.0-CURRENT after tracking filemon usage via a proc.p_filemon pointer rather than its own lists.
1100105	297602	April 6, 2016	11.0-CURRENT after fixing sed functions i and a from discarding leading white space.
1100106	298486	April 22, 2016	11.0-CURRENT after fixes for using IPv6 addresses with RDMA.
1100107	299090	May 4, 2016	11.0-CURRENT after improving performance and functionality of the bitstring(3) api.
1100108	299530	May 12, 2016	11.0-CURRENT after fixing handling of IOCTLs in the LinuxKPI.
1100109	299933	May 16, 2016	11.0-CURRENT after implementing more Linux device related functions in the LinuxKPI.

Value	Revision	Date	Release
1100110	300207	May 19, 2016	11.0-CURRENT after adding support for managing Shingled Magnetic Recording (SMR) drives.
1100111	300303	May 20, 2016	11.0-CURRENT after removing brk and sbrk from arm64.
1100112	300539	May 23, 2016	11.0-CURRENT after adding bit_count to the bitstring(3) API.
1100113	300701	May 26, 2016	11.0-CURRENT after disabling alignment faults on armv6.
1100114	300806	May 26, 2016	11.0-CURRENT after fixing crunchgen(1) usage with MAKEOBJDIRPREFIX.
1100115	300982	May 30, 2016	11.0-CURRENT after adding an mbuf flag for M_HASHTYPE_.
1100116	301011	May 31, 2016	11.0-CURRENT after SHA-512t256 (rev 300903) and Skein (rev 300966) where added to libmd, libcrypt, the kernel, and ZFS (rev 301010).
1100117	301892	June 6, 2016	11.0-CURRENT after libpam was synced with stock 301602, bumping library version.
1100118	302071	June 21, 2016	11.0-CURRENT after breaking binary compatibility of struct disk 302069.
1100119	302150	June 23, 2016	11.0-CURRENT after switching geom_disk to using a pool mutex.
1100120	302153	June 23, 2016	11.0-CURRENT after adding spares to struct ifnet.
1100121	303979	August 12, 2015	11-STABLE after releng/11.0 branched from 11-STABLE (rev 303975).
1100500	303979	August 12, 2016	11.0-STABLE adding branched 303976.
1100501	304609	August 22, 2016	11.0-STABLE after adding C++11 thread_local support.
1100502	304865	August 26, 2016	11.0-STABLE after LC_*_MASK fix.

Value	Revision	Date	Release
1100503	305733	September 12, 2016	11.0-STABLE after resolving a deadlock between device_detach() and usbd_do_request_flags (9).
1100504	307330	October 14, 2016	11.0-STABLE after ZFS merges.
1100505	307590	October 19, 2016	11.0-STABLE after struct fb_info change.
1100506	308048	October 28, 2016	11.0-STABLE after installing header files required development with libzfs_core.
1100507	310120	December 15, 2016	11.0-STABLE after adding the ki_moretdname member to struct kinfo_proc and struct kinfo_proc32 to export the whole thread name to user-space utilities.
1100508	310618	December 26, 2016	11.0-STABLE after upgrading our copies of clang, llvm, lldb, compiler-rt and libc++ to 3.9.1 release, and adding lld 3.9.1.
1100509	311186	January 3, 2017	11.0-STABLE after crunchgen(1) META_MODE fix (rev 311185).
1100510	315312	March 15, 2017	11.0-STABLE after MFC of fget_cap, getsock_cap, and related changes.
1100511	316423	April 2, 2017	11.0-STABLE after multiple MFCs updating clang, llvm, lld, lldb, compiler-rt and libc++ to 4.0.0 release.
1100512	316498	April 4, 2017	11.0-STABLE after making CAM SIM lock optional (revs 315673, 315674).
1100513	318197	May 11, 2017	11.0-STABLE after merging the addition of the <dev/mmc/mmc_ioctl.h> header.

Value	Revision	Date	Release
1100514	319279	May 31, 2017	11.0-STABLE after multiple MFCs of libpcap, WITHOUT_INET6, and a few other minor changes.
1101000	320486	June 30, 2017	releng/11.1 branched from stable/11.
1101001	320763	June 30, 2017	11.1-RC1 After merging the MAP_GUARD mmap(2) flag addition.
1101500	320487	June 30, 2017	11-STABLE after releng/11.1 branched.
1101501	320666	July 5, 2017	11-STABLE after merging the MAP_GUARD mmap(2) flag addition.
1101502	321688	July 29, 2017	11-STABLE after merging the NFS client forced dismount support umount -N addition.
1101503	323431	September 11, 2017	11-STABLE after merging changes making the WRFSBASE instruction operational on amd64.
1101504	324006	September 26, 2017	11-STABLE after merging libm from head, which adds cacoshl(3), cacosl(3), casinhl(3), casinl(3), catanl(3), catanhl(3), sincos(3), sincosf(3), and sincosl(3).
1101505	324023	September 26, 2017	11-STABLE after merging clang, llvm, lld, lldb, compiler-rt and libc++ 5.0.0 release.
1101506	325003	October 25, 2017	11-STABLE after merging 324281, adding the value.u16 field to struct diocgattr_arg.
1101507	328379	January 24, 2018	11-STABLE after merging 325028, fixing ptrace() to always clear the correct thread event when resuming.

Value	Revision	Date	Release
1101508	328386	January 24, 2018	11-STABLE after merging 316648, renaming smp_no_rendevous_barrier() to smp_no_rendezvous_barrier().
1101509	328653	February 1, 2018	11-STABLE after an overwrite merge backport of the LinuxKPI from FreeBSD-head.
1101510	329450	February 17, 2018	11-STABLE after the cmpxchg() macro is now fully functional in the LinuxKPI.
1101511	329981	February 25, 2018	11-STABLE after concluding the recent LinuxKPI related updates.
1101512	331219	March 19, 2018	11-STABLE after merging retpoline support from the upstream llvm, clang and lld 5.0 branches.
1101513	331838	March 31, 2018	11-STABLE after merging clang, llvm, lld, lldb, compiler-rt and libc++ 6.0.0 release, and several follow-up fixes.
1101514	332089	April 5, 2018	11-STABLE after merging 328331, adding a new and incompatible interpretation of ${name}_limits in rc scripts.
1101515	332363	April 10, 2018	11-STABLE after reverting 331880, removing the new and incompatible interpretation of ${name}_limits in rc scripts.
1101516	334392	May 30, 2018	11-STABLE after dwatch(1) touch-ups.
1102000	334459	June 1, 2018	releng/11.2 branched from stable/11.
1102500	334461	June 1, 2018	11-STABLE after releng/11.2 branched.

Value	Revision	Date	Release
1102501	335436	June 20, 2018	11-STABLE after LinuxKPI updates requiring recompilation of external kernel modules.
1102502	338617	September 12, 2018	11-STABLE after adding a socket option SO_TS_CLOCK and fixing recvmsg32() system call to properly down-convert layout of the 64-bit structures to match what 32-bit app(s) expect.
1102503	338931	September 25, 2018	11-STABLE after merging a TCP checksum fix to iflib(9) and adding new media types to if_media.h
1102504	340309	November 9, 2018	11-STABLE after several MFCs: updating objcopy(1) to properly handle little-endian MIPS64 object; correcting mips64el test to use ELF header; adding test for 64-bit ELF in _libelf_is_mips64el.
1102505	342804	January 6, 2019	11-STABLE after merge of fixing linux_destroy_dev() behaviour when there are still files open from the destroying cdev.
1102506	344220	February 17, 2019	11-STABLE after merging multiple commits to lualoader.
1102507	346296	April 16, 2019	11-STABLE after merging llvm, clang, compiler-rt, libc++, libunwind, lld, lldb and openmp 8.0.0 final release r356365.
1102508	346784	April 27, 2019	11-STABLE after ether_gen_addr availability.
1102509	347212	May 6, 2019	11-STABLE after MFC of 345303, 345658, and partially of 345305.
1102510	347883	May 16, 2019	11-STABLE after bumping the Mellanox driver version numbers (mlx4en(4); mlx5en(4)).

Value	Revision	Date	Release
1103000	349026	June 14, 2019	releng/11.3 branched from stable/11.
1103500	349027	June 14, 2019	11-STABLE after releng/11.3 branched.
1103501	354598	November 10, 2019	11-STABLE after fixing a potential OOB read security issue in libc++.
1103502	354614	November 11, 2019	11-STABLE after adding sysfs create/remove functions that handles multiple files in one call to the LinuxKPI.
1103503	354615	November 11, 2019	11-STABLE after LinuxKPI sysfs improvements.
1103504	354616	November 11, 2019	11-STABLE after enabling device class group attributes in the LinuxKPI.
1103505	355899	December 19, 2019	11-STABLE after adding sigsetop extensions commonly found in musl libc and glibc.
1103506	356395	January 6, 2020	11-STABLE after making USB statistics be per-device instead of per bus.
1103507	356680	January 13, 2020	11-STABLE after adding own counter for cancelled USB transfers.
1103508	357613	February 6, 2020	11-STABLE after recent LinuxKPI changes.
1103509	359958	April 15, 2020	11-STABLE after moving id_mapped to end of bus_dma_impl structure to preserve KPI.
1103510	360658	May 5, 2020	11-STABLE after updating llvm, clang, compiler-rt, libc++, libunwind, lld, lldb and openmp to 9.0.0 final release r372316.
1103511	360784	May 7, 2020	11-STABLE after updating llvm, clang, compiler-rt, libc++, libunwind, lld, lldb and openmp to 10.0.0 release.
1104000	360804	May 8, 2020	releng/11.4 branched from stable/11.

Value	Revision	Date	Release
1104001	360822	May 8, 2020	11.4-BETA1 after updating llvm, clang, compiler-rt, libc++, libunwind, lld, lldb and openmp to 10.0.0 release.
1104500	360805	May 8, 2020	11-STABLE after releng/11.4 branched.
1104501	362320	June 18, 2020	11-STABLE after implementing __is_constexpr() function macro in the LinuxKPI.
1104502	362919	July 4, 2020	11-STABLE after making liblzma use libmd implementation of SHA256.
1104503	363496	July 24, 2020	11-STABLE after updating llvm, clang, compiler-rt, libc++, libunwind, lld, lldb and openmp to 10.0.1 release.
1104504	363792	August 3, 2020	11-STABLE after implementing the array_size() function in the LinuxKPI.
1104505	364391	August 19, 2020	11-STABLE after change to clone the task struct fields related to RCU.
1104506	365471	September 8, 2020	11-STABLE after adding atomic and bswap functions to libcompiler_rt.
1104507	365661	September 12, 2020	11-STABLE after followup commits to libcompiler_rt.
1104508	366879	October 20, 2020	11-STABLE after populating the acquire context field of a ww_mutex in the LinuxKPI.
1104509	366889	October 20, 2020	11-STABLE after additions to LinuxKPI’ s RCU list.
1104510	367513	November 9, 2020	11-STABLE after the addition of ptsname_r.

18.5. FreeBSD 10 Versions

表 56. FreeBSD 10 __FreeBSD_version Values

Value	Revision	Date	Release
1000000	225757	September 26, 2011	10.0-CURRENT.

Value	Revision	Date	Release
1000001	227070	November 4, 2011	10-CURRENT after addition of the posix_fadvise(2) system call.
1000002	228444	December 12, 2011	10-CURRENT after defining boolean true/false in sys/types.h, sizeof(bool) may have changed (rev 228444). 10-CURRENT after xlocale.h was introduced (rev 227753).
1000003	228571	December 16, 2011	10-CURRENT after major changes to carp(4), changing size of struct in_aliasreq, struct in6_aliasreq (rev 228571) and straitening arguments check of SIOCAIFADDR (rev 228574).
1000004	229204	January 1, 2012	10-CURRENT after the removal of skpc() and the addition of memcchr(9) (rev 229200).
1000005	230207	January 16, 2012	10-CURRENT after the removal of support for SIOCSIFADDR, SIOCSIFNETMASK, SIOCSIFBRDADDR, SIOCSIFDSTADDR ioctls.
1000006	230590	January 26, 2012	10-CURRENT after introduction of read capacity data asynchronous notification in the cam(4) layer.
1000007	231025	February 5, 2012	10-CURRENT after introduction of new tcp(4) socket options: TCP_KEEPINIT, TCP_KEEPIDLE, TCP_KEEPINTVL, and TCP_KEEPCNT.
1000008	231505	February 11, 2012	10-CURRENT after introduction of the new extensible sysctl(3) interface NET_RT_IFLISTL to query address lists.
1000009	232154	February 25, 2012	10-CURRENT after import of libarchive 3.0.3 (rev 232153).

Value	Revision	Date	Release
1000010	233757	March 31, 2012	10-CURRENT after xlocale cleanup.
1000011	234355	April 16, 2012	10-CURRENT import of LLVM/Clang 3.1 trunk 154661 (rev 234353).
1000012	234924	May 2, 2012	10-CURRENT jemalloc import.
1000013	235788	May 22, 2012	10-CURRENT after byacc import.
1000014	237631	June 27, 2012	10-CURRENT after BSD sort becoming the default sort (rev 237629).
1000015	238405	July 12, 2012	10-CURRENT after import of OpenSSL 1.0.1c.
(not changed)	238429	July 13, 2012	10-CURRENT after the fix for LLVM/Clang 3.1 regression.
1000016	239179	August 8, 2012	10-CURRENT after KBI change in ucom(4).
1000017	239214	August 8, 2012	10-CURRENT after adding streams feature to the USB stack.
1000018	240233	September 8, 2012	10-CURRENT after major rewrite of pf(4).
1000019	241245	October 6, 2012	10-CURRENT after pfil(9) KBI/KPI changed to supply packets in net byte order to AF_INET filter hooks.
1000020	241610	October 16, 2012	10-CURRENT after the network interface cloning KPI changed and struct if_clone becoming opaque.
1000021	241897	October 22, 2012	10-CURRENT after removal of support for non-MPSAFE filesystems and addition of support for FUSEFS (rev 241519).
1000022	241913	October 22, 2012	10-CURRENT after the entire IPv4 stack switched to network byte order for IP packet header storage.

Value	Revision	Date	Release
1000023	242619	November 5, 2012	10-CURRENT after jitter buffer in the common USB serial driver code, to temporarily store characters if the TTY buffer is full. Add flow stop and start signals when this happens.
1000024	242624	November 5, 2012	10-CURRENT after clang was made the default compiler on i386 and amd64.
1000025	243443	November 17, 2012	10-CURRENT after the sin6_scope_id member variable in struct sockaddr_in6 was changed to being filled by the kernel before passing the structure to the userland via sysctl or routing socket. This means the KAME-specific embedded scope id in sin6_addr.s6_addr[2] is always cleared in userland application.
1000026	245313	January 11, 2013	10-CURRENT after install gained the -N flag. May also be used to indicate the presence of nmtree.
1000027	246084	January 29, 2013	10-CURRENT after cat gained the -l flag (rev 246083).
1000028	246759	February 13, 2013	10-CURRENT after USB moved to the driver structure requiring a rebuild of all USB modules.
1000029	247821	March 4, 2013	10-CURRENT after the introduction of tickless callout facility which also changed the layout of struct callout (rev 247777).
1000030	248210	March 12, 2013	10-CURRENT after KPI breakage introduced in the VM subsystem to support read/write locking (rev 248084).
1000031	249943	April 26, 2013	10-CURRENT after the dst parameter of the ifnet if_output method was changed to take const qualifier (rev 249925).

Value	Revision	Date	Release
1000032	250163	May 1, 2013	10-CURRENT after the introduction of the accept4(2) (rev 250154) and pipe2(2) (rev 250159) system calls.
1000033	250881	May 21, 2013	10-CURRENT after flex 2.5.37 import.
1000034	251294	June 3, 2013	10-CURRENT after the addition of these functions to libm: cacos(3), cacosf(3), cacosh(3), cacoshf(3), casin(3), casinf(3), casinh(3), casinhf(3), catan(3), catanf(3), catanh(3), catanhf(3), logl(3), log2l(3), log10l(3), log1pl(3), expm1l(3).
1000035	251527	June 8, 2013	10-CURRENT after the introduction of the aio_mlock(2) system call (rev 251526).
1000036	253049	July 9, 2013	10-CURRENT after the addition of a new function to the kernel GSSAPI module’ s function call interface.
1000037	253089	July 9, 2013	10-CURRENT after the migration of statistics structures to PCPU counters. Changed structures include: ahstat, arpstat, espstat, icmp6_ifstat, icmp6stat, in6_ifstat, ip6stat, ipcompstat, ipipstat, ipsecstat, mrt6stat, mrtstat, pfkeystat, pim6stat, pimstat, rip6stat, udpstat (rev 253081).
1000038	253396	July 16, 2013	10-CURRENT after making ARM EABI the default ABI on arm, armeb, armv6, and armv6eb architectures.
1000039	253549	July 22, 2013	10-CURRENT after CAM and mps(4) driver scanning changes.
1000040	253638	July 24, 2013	10-CURRENT after addition of libusb pkgconf files.

Value	Revision	Date	Release
1000041	253970	August 5, 2013	10-CURRENT after change from time_second to time_uptime in PF_INET6.
1000042	254138	August 9, 2013	10-CURRENT after VM subsystem change to unify soft and hard busy mechanisms.
1000043	254273	August 13, 2013	10-CURRENT after WITH_ICONV is enabled by default. A new src.conf(5) option, WITH_LIBICONV_COMPAT (disabled by default) adds libiconv_open to provide compatibility with the converters/libiconv port.
1000044	254358	August 15, 2013	10-CURRENT after libc.so conversion to an ld(1) script (rev 251668).
1000045	254389	August 15, 2013	10-CURRENT after devfs programming interface change by replacing the cdevsw flag D_UNMAPPED_IO with the struct cdev flag SI_UNMAPPED.
1000046	254537	August 19, 2013	10-CURRENT after addition of M_PROTO[9-12] and removal of M_FRAG|M_FIRSTFRAG|M_LASTFRAG mbuf flags (rev 254524, 254526).
1000047	254627	August 21, 2013	10-CURRENT after stat(2) update to allow storing some Windows/DOS and CIFS file attributes as stat(2) flags.
1000048	254672	August 22, 2013	10-CURRENT after modification of structure xsctp_inpcb.
1000049	254760	August 24, 2013	10-CURRENT after physio(9) support for devices that do not function properly with split I/O, such as sa(4).

Value	Revision	Date	Release
1000050	254844	August 24, 2013	10-CURRENT after modifications of structure mbuf (rev 254780, 254799, 254804, 254807 254842).
1000051	254887	August 25, 2013	10-CURRENT after Radeon KMS driver import (rev 254885).
1000052	255180	September 3, 2013	10-CURRENT after import of NetBSD libexecinfo is connected to the build.
1000053	255305	September 6, 2013	10-CURRENT after API and ABI changes to the Capsicum framework.
1000054	255321	September 6, 2013	10-CURRENT after gcc and libstdc++ are no longer built by default.
1000055	255449	September 6, 2013	10-CURRENT after addition of MMAP_32BIT mmap(2) flag (rev 255426).
1000100	259065	December 7, 2013	releng/10.0 branched from stable/10.
1000500	256283	October 10, 2013	10-STABLE after branch from head/.
1000501	256916	October 22, 2013	10-STABLE after addition of first-boot rc(8) support.
1000502	258398	November 20, 2013	10-STABLE after removal of iconv symbols from libc.so.7.
1000510	259067	December 7, 2013	releng/10.0 __FreeBSD_version update to prevent the value from going backwards.
1000700	259069	December 7, 2013	10-STABLE after releng/10.0 branch.
1000701	259447	December 15, 2013	10.0-STABLE after Heimdal encoding fix.
1000702	260135	December 31, 2013	10-STABLE after MAP_STACK fixes.
1000703	262801	March 5, 2014	10-STABLE after upgrade of libc++ to 3.4 release.
1000704	262889	March 7, 2014	10-STABLE after MFC of the vt(4) driver (rev 262861).
1000705	263508	March 21, 2014	10-STABLE after upgrade of llvm/clang to 3.4 release.

Value	Revision	Date	Release
1000706	264214	April 6, 2014	10-STABLE after GCC support for __block definition.
1000707	264289	April 8, 2014	10-STABLE after FreeBSD-SA-14:06.openssl.
1000708	265122	April 30, 2014	10-STABLE after FreeBSD-SA-14:07.devfs, FreeBSD-SA-14:08.tcp, and FreeBSD-SA-14:09.openssl.
1000709	265946	May 13, 2014	10-STABLE after support for UDP-Lite protocol (RFC 3828).
1000710	267465	June 13, 2014	10-STABLE after changes to strcasecmp(3), moving strcasecmp_l(3) and strncasecmp_l(3) from <string.h> to <strings.h> for POSIX 2008 compliance.
1000711	268442	July 8, 2014	10-STABLE after FreeBSD-SA-14:17.kmem (rev 268432).
1000712	269400	August 1, 2014	10-STABLE after nfsd(8) 4.1 merge (rev 269398).
1000713	269484	August 3, 2014	10-STABLE after regex(3) library update to add ">" and "<" delimiters.
1000714	270174	August 3, 2014	10-STABLE after SOCK_DGRAM bug fix (rev 269490).
1000715	271341	September 9, 2014	10-STABLE after FreeBSD-SA-14:18 (rev 269686).
1000716	271686	September 16, 2014	10-STABLE after FreeBSD-SA-14:19 (rev 271667).
1000717	271816	September 18, 2014	10-STABLE after i915 HW context support.
1001000	272463	October 2, 2014	10.1-RC1 after releng/10.1 branch.
1001500	272464	October 2, 2014	10-STABLE after releng/10.1 branch.
1001501	273432	October 21, 2014	10-STABLE after FreeBSD-SA-14:20, FreeBSD-SA-14:22, and FreeBSD-SA-14:23 (rev 273411).

Value	Revision	Date	Release
1001502	274162	November 4, 2014	10-STABLE after FreeBSD-SA-14:23, FreeBSD-SA-14:24, and FreeBSD-SA-14:25.
1001503	275040	November 25, 2014	10-STABLE after merging new libraries/utilities (dpv(1) dpv(3), and figpar(3)) for data throughput visualization.
1001504	275742	December 13, 2014	10-STABLE after merging an important fix to the LLVM vectorizer, which could lead to buffer overruns in some cases.
1001505	276633	January 3, 2015	10-STABLE after merging some arm constants in 276312.
1001506	277087	January 12, 2015	10-STABLE after merging max table size update for yacc.
1001507	277790	January 27, 2015	10-STABLE after changes to the UDP tunneling callback to provide a context pointer and the source sockaddr.
1001508	278974	February 18, 2015	10-STABLE after addition of the CDAI_TYPE_EXT_INQ request type.
1001509	279287	February 25, 2015	10-STABLE after FreeBSD-EN-15:01.vt, FreeBSD-EN-15:02.openssl, FreeBSD-EN-15:03.freebsd-update, FreeBSD-SA-15:04.igmp, and FreeBSD-SA-15:05.bind.
1001510	279329	February 26, 2015	10-STABLE after MFC of rev 278964.
1001511	280246	19 March, 2015	10-STABLE after sys/capability.h is renamed to sys/capsicum.h (rev 280224/).
1001512	280438	24 March, 2015	10-STABLE after addition of new mtio(4), sa(4) ioctls.

Value	Revision	Date	Release
1001513	281955	24 April, 2015	10-STABLE after starting the process of removing the use of the deprecated "M_FLOWID" flag from the network code.
1001514	282275	April 30, 2015	10-STABLE after MFC of iconv(3) fixes.
1001515	282781	May 11, 2015	10-STABLE after adding back M_FLOWID.
1001516	283341	May 24, 2015	10-STABLE after MFC of many USB things.
1001517	283950	June 3, 2015	10-STABLE after MFC of sound related things.
1001518	284204	June 10, 2015	10-STABLE after MFC of zfs vfs fixes (rev 284203).
1001519	284720	June 23, 2015	10-STABLE after reverting bumping MAXCPU on amd64.
1002000	285830	24 July, 2015	releng/10.2 branched from 10-STABLE.
1002500	285831	24 July, 2015	10-STABLE after releng/10.2 branched from 10-STABLE.
1002501	289005	8 October, 2015	10-STABLE after merge of ZFS changes that affected the internal interface of zfeature_info structure (rev 288572).
1002502	291243	24 November, 2015	10-STABLE after merge of dump device changes that affected the arguments of g_dev_setdumpdev()(rev 291215).
1002503	292224	14 December, 2015	10-STABLE after merge of changes to the internal interface between the nfsd.ko and nfscommon.ko modules, requiring them to be upgraded together (rev 292223).
1002504	292589	22 December, 2015	10-STABLE after merge of xz 5.2.2 merge (multithread support) (rev 292588).
1002505	292908	30 December, 2015	10-STABLE after merge of changes to pci(4) (rev 292907).

Value	Revision	Date	Release
1002506	293476	9 January, 2016	10-STABLE after merge of utimensat(2) (rev 293473).
1002507	293610	9 January, 2016	10-STABLE after merge of changes to linux(4) (rev 293477 through 293609).
1002508	293619	9 January, 2016	10-STABLE after merge of changes to figpar(3) types/macros (rev 290275).
1002509	295107	1 February, 2016	10-STABLE after merge of API change to dpv(3).
1003000	296373	4 March, 2016	releng/10.3 branched from 10-STABLE.
1003500	296374	4 March, 2016	10-STABLE after releng/10.3 branched from 10-STABLE.
1003501	298299	19 June, 2016	10-STABLE after adding kdbcontrol’ s -P option (rev 298297).
1003502	299966	19 June, 2016	10-STABLE after libcrypto.so was made position independent.
1003503	300235	19 June, 2016	10-STABLE after allowing MK_ overrides (rev 300233).
1003504	302066	21 June, 2016	10-STABLE after MFC of filemon changes from 11-CURRENT.
1003505	302228	27 June, 2016	10-STABLE after converting sed to use REG_STARTEND, fixing a Mesa issue.
1003506	304611	August 22, 2016	10-STABLE after adding C++11 thread_local support.
1003507	304864	August 26, 2016	10-STABLE after LC_*_MASK fix.
1003508	305734	September 12, 2016	10-STABLE after resolving a deadlock between device_detach() and usbd_do_request_flags (9).
1003509	307331	October 14, 2016	10-STABLE after ZFS merges.
1003510	308047	October 28, 2016	10-STABLE after installing header files required development with libzfs_core.

Value	Revision	Date	Release
1003511	310121	December 15, 2016	10-STABLE after exporting whole thread name in kinfo_proc (rev 309676).
1003512	315730	March 22, 2017	10-STABLE after libmd changes (rev 314143).
1003513	316499	April 4, 2017	10-STABLE after making CAM SIM lock optional (revs 315673, 315674).
1003514	318198	May 11, 2017	10-STABLE after merging the addition of the <dev/mmc/mmc_ioctl.h> header.
1003515	321222	July 19, 2017	10-STABLE after adding C14 sized deallocation functions to libc.
1003516	321717	July 30, 2017	10-STABLE after merging the MAP_GUARD mmap(2) flag addition.
1004000	323604	September 15, 2017	releng/10.4 branched from 10-STABLE.
1004500	323605	September 15, 2017	10-STABLE after releng/10.4 branched from 10-STABLE.
1004501	328379	January 24, 2018	10-STABLE after merging 325028, fixing ptrace() to always clear the correct thread event when resuming.
1004502	356396	January 6, 2020	10-STABLE after making USB statistics be per-device instead of per bus.
1004503	356681	January 13, 2020	10-STABLE after adding own counter for cancelled USB transfers.

18.6. FreeBSD 9 Versions

表 57. FreeBSD 9 __FreeBSD_version Values

Value	Revision	Date	Release
900000	196432	August 22, 2009	9.0-CURRENT.
900001	197019	September 8, 2009	9.0-CURRENT after importing x86emu, a software emulator for real mode x86 CPU from OpenBSD.

Value	Revision	Date	Release
900002	197430	September 23, 2009	9.0-CURRENT after implementing the EVFILT_USER kevent filter functionality.
900003	200039	December 2, 2009	9.0-CURRENT after addition of sigpause(2) and PIE support in csu.
900004	200185	December 6, 2009	9.0-CURRENT after addition of libulog and its libutempter compatibility interface.
900005	200447	December 12, 2009	9.0-CURRENT after addition of sleepq_sleepcnt(9), which can be used to query the number of waiters on a specific waiting queue.
900006	201513	January 4, 2010	9.0-CURRENT after change of the scandir(3) and alphasort(3) prototypes to conform to SUSv4.
900007	202219	January 13, 2010	9.0-CURRENT after the removal of utmp(5) and the addition of utmpx (see getutxent(3)) for improved logging of user logins and system events.
900008	202722	January 20, 2010	9.0-CURRENT after the import of BSDL bc/dc and the deprecation of GNU bc/dc.
900009	203052	January 26, 2010	9.0-CURRENT after the addition of SIOCGIFDESCR and SIOCSIFDESCR ioctls to network interfaces. These ioctl can be used to manipulate interface description, as inspired by OpenBSD.
900010	205471	March 22, 2010	9.0-CURRENT after the import of zlib 1.2.4.
900011	207410	April 24, 2010	9.0-CURRENT after adding soft-updates journalling.
900012	207842	May 10, 2010	9.0-CURRENT after adding liblzma, xz, xzdec, and lzmainfo.
900013	208486	May 24, 2010	9.0-CURRENT after bringing in USB fixes for linux(4).

Value	Revision	Date	Release
900014	208973	June 10, 2010	9.0-CURRENT after adding Clang.
900015	210390	July 22, 2010	9.0-CURRENT after the import of BSD grep.
900016	210565	July 28, 2010	9.0-CURRENT after adding mti_zone to struct malloc_type_internal.
900017	211701	August 23, 2010	9.0-CURRENT after changing back default grep to GNU grep and adding WITH_BSD_GREP knob.
900018	211735	August 24, 2010	9.0-CURRENT after the pthread_kill(3) -generated signal is identified as SI_LWP in si_code. Previously, si_code was SI_USER.
900019	211937	August 28, 2010	9.0-CURRENT after addition of the MAP_PREFAULT_READ flag to mmap(2).
900020	212381	September 9, 2010	9.0-CURRENT after adding drain functionality to sbufs, which also changed the layout of struct sbuf.
900021	212568	September 13, 2010	9.0-CURRENT after DTrace has grown support for userland tracing.
900022	213395	October 2, 2010	9.0-CURRENT after addition of the BSDL man utilities and retirement of GNU/GPL man utilities.
900023	213700	October 11, 2010	9.0-CURRENT after updating xz to git 20101010 snapshot.
900024	215127	November 11, 2010	9.0-CURRENT after libgcc.a was replaced by libcompiler_rt.a.
900025	215166	November 12, 2010	9.0-CURRENT after the introduction of the modularised congestion control.
900026	216088	November 30, 2010	9.0-CURRENT after the introduction of Serial Management Protocol (SMP) passthrough and the XPT_SMP_IO and XPT_GDEV_ADVINFO CAM CCBs.

Value	Revision	Date	Release
900027	216212	December 5, 2010	9.0-CURRENT after the addition of log2 to libm.
900028	216615	December 21, 2010	9.0-CURRENT after the addition of the Hhook (Helper Hook), Khelp (Kernel Helpers) and Object Specific Data (OSD) KPIs.
900029	216758	December 28, 2010	9.0-CURRENT after the modification of the TCP stack to allow Khelp modules to interact with it via helper hook points and store per-connection data in the TCP control block.
900030	217309	January 12, 2011	9.0-CURRENT after the update of libdialog to version 20100428.
900031	218414	February 7, 2011	9.0-CURRENT after the addition of pthread_getthreadid_np(3).
900032	218425	February 8, 2011	9.0-CURRENT after the removal of the uio_yield prototype and symbol.
900033	218822	February 18, 2011	9.0-CURRENT after the update of binutils to version 2.17.50.
900034	219406	March 8, 2011	9.0-CURRENT after the struct sysvec (sv_schedtail) changes.
900035	220150	March 29, 2011	9.0-CURRENT after the update of base gcc and libstdc++ to the last GPLv2 licensed revision.
900036	220770	April 18, 2011	9.0-CURRENT after the removal of libobjc and Objective-C support from the base system.
900037	221862	May 13, 2011	9.0-CURRENT after importing the libprocstat(3) library and fuser(1) utility to the base system.
900038	222167	May 22, 2011	9.0-CURRENT after adding a lock flag argument to VFS_FHTOVP(9).
900039	223637	June 28, 2011	9.0-CURRENT after importing pf from OpenBSD 4.5.

Value	Revision	Date	Release
900040	224217	July 19, 2011	Increase default MAXCPU for FreeBSD to 64 on amd64 and ia64 and to 128 for XLP (mips).
900041	224834	August 13, 2011	9.0-CURRENT after the implementation of Capsicum capabilities; fget(9) gains a rights argument.
900042	225350	August 28, 2011	Bump shared libraries' version numbers for libraries whose ABI has changed in preparation for 9.0.
900043	225350	September 2, 2011	Add automatic detection of USB mass storage devices which do not support the no synchronize cache SCSI command.
900044	225469	September 10, 2011	Re-factor auto-quirk. 9.0-RELEASE.
900045	229285	January 2, 2012	9-STABLE after MFC of true/false from 1000002.
900500	229318	January 2, 2012	9.0-STABLE.
900501	229723	January 6, 2012	9.0-STABLE after merging of addition of the posix_fadvise(2) system call.
900502	230237	January 16, 2012	9.0-STABLE after merging gperf 3.0.3
900503	231768	February 15, 2012	9.0-STABLE after introduction of the new extensible sysctl(3) interface NET_RT_IFLISTL to query address lists.
900504	232728	March 3, 2012	9.0-STABLE after changes related to mounting of filesystem inside a jail.
900505	232945	March 13, 2012	9.0-STABLE after introduction of new tcp(4) socket options: TCP_KEEPINIT, TCP_KEEPIDLE, TCP_KEEPINTVL, and TCP_KEEPCNT.
900506	235786	May 22, 2012	9.0-STABLE after introduction of the quick_exit function and related changes required for C++11.

Value	Revision	Date	Release
901000	239082	August 5, 2012	9.1-RELEASE.
901500	239081	August 6, 2012	9.1-STABLE after branching releng/9.1 (RELENG_9_1).
901501	240659	November 11, 2012	9.1-STABLE after LIST_PREV(3) added to queue.h (rev 242893) and KBI change in USB serial devices.
901502	243656	November 28, 2012	9.1-STABLE after USB serial jitter buffer requires rebuild of USB serial device modules.
901503	247090	February 21, 2013	9.1-STABLE after USB moved to the driver structure requiring a rebuild of all USB modules. Also indicates the presence of nmtree.
901504	248338	March 15, 2013	9.1-STABLE after install gained -l, -M, -N and related flags and cat gained the -l option.
901505	251687	June 13, 2013	9.1-STABLE after fixes in ctfmerge bootstrapping (rev 249243).
902001	253912	August 3, 2013	releng/9.2 branched from stable/9.
902501	253913	August 2, 2013	9.2-STABLE after creation of releng/9.2 branch.
902502	254938	August 26, 2013	9.2-STABLE after inclusion of the PIM_RESCAN CAM path inquiry flag.
902503	254979	August 27, 2013	9.2-STABLE after inclusion of the SI_UNMAPPED cdev flag.
902504	256917	October 22, 2013	9.2-STABLE after inclusion of support for "first boot" rc(8) scripts.
902505	259448	December 12, 2013	9.2-STABLE after Heimdal encoding fix.
902506	260136	December 31, 2013	9-STABLE after MAP_STACK fixes (rev 260082).
902507	262801	March 5, 2014	9-STABLE after upgrade of libc++ to 3.4 release.

Value	Revision	Date	Release
902508	263171	March 14, 2014	9-STABLE after merge of the Radeon KMS driver (rev 263170).
902509	263509	March 21, 2014	9-STABLE after upgrade of llvm/clang to 3.4 release.
902510	263818	March 27, 2014	9-STABLE after merge of the vt(4) driver.
902511	264289	March 27, 2014	9-STABLE after FreeBSD-SA-14:06.openssl.
902512	265123	April 30, 2014	9-STABLE after FreeBSD-SA-14:08.tcp.
903000	267656	June 20, 2014	9-RC1 releng/9.3 branch.
903500	267657	June 20, 2014	9.3-STABLE releng/9.3 branch.
903501	268443	July 8, 2014	9-STABLE after FreeBSD-SA-14:17.kmem (rev 268433).
903502	270175	August 19, 2014	9-STABLE after SOCK_DGRAM bug fix (rev 269789).
903503	271341	September 9, 2014	9-STABLE after FreeBSD-SA-14:18 (rev 269687).
903504	271686	September 16, 2014	9-STABLE after FreeBSD-SA-14:19 (rev 271668).
903505	273432	October 21, 2014	9-STABLE after FreeBSD-SA-14:20, FreeBSD-SA-14:21, and FreeBSD-SA-14:22 (rev 273412).
903506	274162	November 4, 2014	9-STABLE after FreeBSD-SA-14:23, FreeBSD-SA-14:24, and FreeBSD-SA-14:25.
903507	275742	December 13, 2014	9-STABLE after merging an important fix to the LLVM vectorizer, which could lead to buffer overruns in some cases.
903508	279287	February 25, 2015	9-STABLE after FreeBSD-EN-15:01.vt, FreeBSD-EN-15:02.openssl, FreeBSD-EN-15:03.freebsd-update, FreeBSD-SA-15:04.igmp, and FreeBSD-SA-15:05.bind.

Value	Revision	Date	Release
903509	296219	February 29, 2016	9-STABLE after bumping the default value of compat.linux.osrelease to 2.6.18 to support the linux-c6-* ports out of the box.
903510	300236	May 19, 2016	9-STABLE after System Binary Interface (SBI) page was moved in latest version of Berkeley Boot Loader (BBL) due to code size increase in 300234.
903511	305735	September 12, 2016	9-STABLE after resolving a deadlock between device_detach() and usbd_do_request_flags (9).

18.7. FreeBSD 8 Versions

表 58. FreeBSD 8 __FreeBSD_version Values

Value	Revision	Date	Release
800000	172531	October 11, 2007	8.0-CURRENT. Separating wide and single byte ctype.
800001	172688	October 16, 2007	8.0-CURRENT after libpcap 0.9.8 and tcpdump 3.9.8 import.
800002	172841	October 21, 2007	8.0-CURRENT after renaming kthread_create(9) and friends to kproc_create(9) etc.
800003	172932	October 24, 2007	8.0-CURRENT after ABI backwards compatibility to the FreeBSD 4/5/6 versions of the PCIOCGETCONF, PCIOCREAD and PCIOCWRITE IOCTLs was added, which required the ABI of the PCIOCGETCONF IOCTL to be broken again
800004	173573	November 12, 2007	8.0-CURRENT after agp(4) driver moved from src/sys/pci to src/sys/dev/agp
800005	174261	December 4, 2007	8.0-CURRENT after changes to the jumbo frame allocator (rev 174247).

Value	Revision	Date	Release
800006	174399	December 7, 2007	8.0-CURRENT after the addition of callgraph capture functionality to hwpmc(4).
800007	174901	December 25, 2007	8.0-CURRENT after kdb_enter() gains a "why" argument.
800008	174951	December 28, 2007	8.0-CURRENT after LK_EXCLUPGRADE option removal.
800009	175168	January 9, 2008	8.0-CURRENT after introduction of lockmgr_disown(9)
800010	175204	January 10, 2008	8.0-CURRENT after the vn_lock(9) prototype change.
800011	175295	January 13, 2008	8.0-CURRENT after the VOP_LOCK(9) and VOP_UNLOCK(9) prototype changes.
800012	175487	January 19, 2008	8.0-CURRENT after introduction of lockmgr_recursed(9), BUF_RECURSED(9) and BUF_ISLOCKED(9) and the removal of BUF_REFCNT().
800013	175581	January 23, 2008	8.0-CURRENT after introduction of the "ASCII" encoding.
800014	175636	January 24, 2008	8.0-CURRENT after changing the prototype of lockmgr(9) and removal of lockcount() and LOCKMGR_ASSERT().
800015	175688	January 26, 2008	8.0-CURRENT after extending the types of the fts(3) structures.
800016	175872	February 1, 2008	8.0-CURRENT after adding an argument to MEXTADD(9)
800017	176015	February 6, 2008	8.0-CURRENT after the introduction of LK_NODUP and LK_NOWITNESS options in the lockmgr(9) space.
800018	176112	February 8, 2008	8.0-CURRENT after the addition of m_collapse.

Value	Revision	Date	Release
800019	176124	February 9, 2008	8.0-CURRENT after the addition of current working directory, root directory, and jail directory support to the kern.proc.filedesc sysctl.
800020	176251	February 13, 2008	8.0-CURRENT after introduction of lockmgr_assert(9) and BUF_ASSERT functions.
800021	176321	February 15, 2008	8.0-CURRENT after introduction of lockmgr_args(9) and LK_INTERNAL flag removal.
800022	176556	(backed out)	8.0-CURRENT after changing the default system ar to BSD ar(1).
800023	176560	February 25, 2008	8.0-CURRENT after changing the prototypes of lockstatus(9) and VOP_ISLOCKED(9);, more specifically retiring the struct thread argument.
800024	176709	March 1, 2008	8.0-CURRENT after axing out the lockwaiters and BUF_LOCKWAITERS functions, changing the return value of brelvp from void to int and introducing new flags for lockinit(9).
800025	176958	March 8, 2008	8.0-CURRENT after adding F_DUP2FD command to fcntl(2).
800026	177086	March 12, 2008	8.0-CURRENT after changing the priority parameter to cv_broadcastpri such that 0 means no priority.
800027	177551	March 24, 2008	8.0-CURRENT after changing the bpf monitoring ABI when zerocopy bpf buffers were added.
800028	177637	March 26, 2008	8.0-CURRENT after adding l_sysid to struct flock.

Value	Revision	Date	Release
800029	177688	March 28, 2008	8.0-CURRENT after reintegration of the BUF_LOCKWAITERS function and the addition of lockmgr_waiters(9).
800030	177844	April 1, 2008	8.0-CURRENT after the introduction of the rw_try_rlock(9) and rw_try_wlock(9) functions.
800031	177958	April 6, 2008	8.0-CURRENT after the introduction of the lockmgr_rw and lockmgr_args_rw functions.
800032	178006	April 8, 2008	8.0-CURRENT after the implementation of the openat and related syscalls, introduction of the O_EXEC flag for the open(2), and providing the corresponding linux compatibility syscalls.
800033	178017	April 8, 2008	8.0-CURRENT after added write(2) support for psm(4) in native operation level. Now arbitrary commands can be written to /dev/psm%d and status can be read back from it.
800034	178051	April 10, 2008	8.0-CURRENT after introduction of the memrchr function.
800035	178256	April 16, 2008	8.0-CURRENT after introduction of the fdopendir function.
800036	178362	April 20, 2008	8.0-CURRENT after switchover of 802.11 wireless to multi-bss support (aka vaps).
800037	178892	May 9, 2008	8.0-CURRENT after addition of multi routing table support (aka setfib(1), setfib(2)).
800038	179316	May 26, 2008	8.0-CURRENT after removal of netatm and ISDN4BSD. Also, the addition of the Compact C Type (CTF) tools.

Value	Revision	Date	Release
800039	179784	June 14, 2008	8.0-CURRENT after removal of sgtty.
800040	180025	June 26, 2008	8.0-CURRENT with kernel NFS lockd client.
800041	180691	July 22, 2008	8.0-CURRENT after addition of arc4random_buf(3) and arc4random_uniform(3).
800042	181439	August 8, 2008	8.0-CURRENT after addition of cpuctl(4).
800043	181694	August 13, 2008	8.0-CURRENT after changing bpf(4) to use a single device node, instead of device cloning.
800044	181803	August 17, 2008	8.0-CURRENT after the commit of the first step of the vimage project renaming global variables to be virtualized with a V_ prefix with macros to map them back to their global names.
800045	181905	August 20, 2008	8.0-CURRENT after the integration of the MPSAFE TTY layer, including changes to various drivers and utilities that interact with it.
800046	182869	September 8, 2008	8.0-CURRENT after the separation of the GDT per CPU on amd64 architecture.
800047	182905	September 10, 2008	8.0-CURRENT after removal of VSVTX, VSGID and VSUID.
800048	183091	September 16, 2008	8.0-CURRENT after converting the kernel NFS mount code to accept individual mount options in the nmount(2) iovec, not just one big struct nfs_args.
800049	183114	September 17, 2008	8.0-CURRENT after the removal of suser(9) and suser_cred(9).
800050	184099	October 20, 2008	8.0-CURRENT after buffer cache API change.

Value	Revision	Date	Release
800051	184205	October 23, 2008	8.0-CURRENT after the removal of the MALLOC(9) and FREE(9) macros.
800052	184419	October 28, 2008	8.0-CURRENT after the introduction of accmode_t and renaming of VOP_ACCESS 'a_mode' argument to 'a_accmode'.
800053	184555	November 2, 2008	8.0-CURRENT after the prototype change of vfs_busy(9) and the introduction of its MBF_NOWAIT and MBF_MNTLSTLOCK flags.
800054	185162	November 22, 2008	8.0-CURRENT after the addition of buf_ring, memory barriers and ifnet functions to facilitate multiple hardware transmit queues for cards that support them, and a lockless ring-buffer implementation to enable drivers to more efficiently manage queuing of packets.
800055	185363	November 27, 2008	8.0-CURRENT after the addition of Intel™ Core, Core2, and Atom support to hwpmc(4).
800056	185435	November 29, 2008	8.0-CURRENT after the introduction of multi-/no-IPv4/v6 jails.
800057	185522	December 1, 2008	8.0-CURRENT after the switch to the ath hal source code.
800058	185968	December 12, 2008	8.0-CURRENT after the introduction of the VOP_VPTOCNP operation.
800059	186119	December 15, 2008	8.0-CURRENT incorporates the new arp-v2 rewrite.
800060	186344	December 19, 2008	8.0-CURRENT after the addition of makefs.
800061	187289	January 15, 2009	8.0-CURRENT after TCP Appropriate Byte Counting.

Value	Revision	Date	Release
800062	187830	January 28, 2009	8.0-CURRENT after removal of minor(), minor2unit(), unit2minor(), etc.
800063	188745	February 18, 2009	8.0-CURRENT after GENERIC config change to use the USB2 stack, but also the addition of fdevname(3).
800064	188946	February 23, 2009	8.0-CURRENT after the USB2 stack is moved to and replaces dev/usb.
800065	189092	February 26, 2009	8.0-CURRENT after the renaming of all functions in libmp(3).
800066	189110	February 27, 2009	8.0-CURRENT after changing USB devfs handling and layout.
800067	189136	February 28, 2009	8.0-CURRENT after adding getdelim(), getline(), stpncpy(), strnlen(), wcsnlen(), wcscasecmp(), and wcsncasecmp().
800068	189276	March 2, 2009	8.0-CURRENT after renaming the ushub devclass to uhub.
800069	189585	March 9, 2009	8.0-CURRENT after libusb20.so.1 was renamed to libusb.so.1.
800070	189592	March 9, 2009	8.0-CURRENT after merging IGMPv3 and Source-Specific Multicast (SSM) to the IPv4 stack.
800071	189825	March 14, 2009	8.0-CURRENT after gcc was patched to use C99 inline semantics in c99 and gnu99 mode.
800072	189853	March 15, 2009	8.0-CURRENT after the IFF_NEEDSGIANT flag has been removed; non-MPSAFE network device drivers are no longer supported.
800073	190265	March 18, 2009	8.0-CURRENT after the dynamic string token substitution has been implemented for rpath and needed paths.
800074	190373	March 24, 2009	8.0-CURRENT after tcpdump 4.0.0 and libpcap 1.0.0 import.

Value	Revision	Date	Release
800075	190787	April 6, 2009	8.0-CURRENT after layout of structs vnet_net, vnet_inet and vnet_ipfw has been changed.
800076	190866	April 9, 2009	8.0-CURRENT after adding delay profiles in dummynet.
800077	190914	April 14, 2009	8.0-CURRENT after removing VOP_LEASE() and vop_vector.vop_lease.
800078	191080	April 15, 2009	8.0-CURRENT after struct rt_weight fields have been added to struct rt_metrics and struct rt_metrics_lite, changing the layout of struct rt_metrics_lite. A bump to RTM_VERSION was made, but backed out.
800079	191117	April 15, 2009	8.0-CURRENT after struct llentry pointers are added to struct route and struct route_in6.
800080	191126	April 15, 2009	8.0-CURRENT after layout of struct inpcb has been changed.
800081	191267	April 19, 2009	8.0-CURRENT after the layout of struct malloc_type has been changed.
800082	191368	April 21, 2009	8.0-CURRENT after the layout of struct ifnet has changed, and with if_ref() and if_rele() ifnet refcounting.
800083	191389	April 22, 2009	8.0-CURRENT after the implementation of a low-level Bluetooth HCI API.
800084	191672	April 29, 2009	8.0-CURRENT after IPv6 SSM and MLDv2 changes.
800085	191688	April 30, 2009	8.0-CURRENT after enabling support for VIMAGE kernel builds with one active image.
800086	191910	May 8, 2009	8.0-CURRENT after adding support for input lines of arbitrarily length in patch(1).

Value	Revision	Date	Release
800087	191990	May 11, 2009	8.0-CURRENT after some VFS KPI changes. The thread argument has been removed from the FSD parts of the VFS. VFS_* functions do not need the context any more because it always refers to curthread. In some special cases, the old behavior is retained.
800088	192470	May 20, 2009	8.0-CURRENT after net80211 monitor mode changes.
800089	192649	May 23, 2009	8.0-CURRENT after adding UDP control block support.
800090	192669	May 23, 2009	8.0-CURRENT after virtualizing interface cloning.
800091	192895	May 27, 2009	8.0-CURRENT after adding hierarchical jails and removing global securelevel.
800092	193011	May 29, 2009	8.0-CURRENT after changing sx_init_flags() KPI. The SX_ADAPTIVESPIN is retired and a new SX_NOADAPTIVE flag is introduced to handle the reversed logic.
800093	193047	May 29, 2009	8.0-CURRENT after adding mnt_xflag to struct mount.
800094	193093	May 30, 2009	8.0-CURRENT after adding VOP_ACCESSX(9).
800095	193096	May 30, 2009	8.0-CURRENT after changing the polling KPI. The polling handlers now return the number of packets processed. A new IFCAP_POLLING_NOCOUNT is also introduced to specify that the return value is not significant and the counting should be skipped.

Value	Revision	Date	Release
800096	193219	June 1, 2009	8.0-CURRENT after updating to the new netisr implementation and after changing the way we store and access FIBs.
800097	193731	June 8, 2009	8.0-CURRENT after the introduction of vnet destructor hooks and infrastructure.
(not changed)	194012	June 11, 2009	8.0-CURRENT after the introduction of netgraph outbound to inbound path call detection and queuing, which also changed the layout of struct thread.
800098	194210	June 14, 2009	8.0-CURRENT after OpenSSL 0.9.8k import.
800099	194675	June 22, 2009	8.0-CURRENT after NGROUPS update and moving route virtualization into its own VImage module.
800100	194920	June 24, 2009	8.0-CURRENT after SYSVIPC ABI change.
800101	195175	June 29, 2009	8.0-CURRENT after the removal of the /dev/net/* per-interface character devices.
800102	195634	July 12, 2009	8.0-CURRENT after padding was added to struct sackhint, struct tcpcb, and struct tcpstat.
800103	195654	July 13, 2009	8.0-CURRENT after replacing struct tcpopt with struct toeopt in the TOE driver interface to the TCP syncache.
800104	195699	July 14, 2009	8.0-CURRENT after the addition of the linker-set based per-vnet allocator.
800105	195767	July 19, 2009	8.0-CURRENT after version bump for all shared libraries that do not have symbol versioning turned on.
800106	195852	July 24, 2009	8.0-CURRENT after introduction of OBJT_SG VM object type.

Value	Revision	Date	Release
800107	196037	August 2, 2009	8.0-CURRENT after making the newbus subsystem Giant free by adding the newbus sxlock and 8.0-RELEASE.
800108	199627	November 21, 2009	8.0-STABLE after implementing EVFILT_USER kevent filter.
800500	201749	January 7, 2010	8.0-STABLE after __FreeBSD_version bump to make pkg_add -r use packages-8-stable.
800501	202922	January 24, 2010	8.0-STABLE after change of the scandir(3) and alphasort(3) prototypes to conform to SUSv4.
800502	203299	January 31, 2010	8.0-STABLE after addition of sigpause(2).
800503	204344	February 25, 2010	8.0-STABLE after addition of SIOCGIFDESCR and SIOCSIFDESCR ioctls to network interfaces. These ioctl can be used to manipulate interface description, as inspired by OpenBSD.
800504	204546	March 1, 2010	8.0-STABLE after MFC of importing x86emu, a software emulator for real mode x86 CPU from OpenBSD.
800505	208259	May 18, 2010	8.0-STABLE after MFC of adding liblzma, xz, xzdec, and lzmainfo.
801000	209150	June 14, 2010	8.1-RELEASE
801500	209146	June 14, 2010	8.1-STABLE after 8.1-RELEASE.
801501	214762	November 3, 2010	8.1-STABLE after KBI change in struct sysentvec, and implementation of PL_FLAG_SCE/SCX/EXEC/SI and pl_siginfo for ptrace(PT_LWPINFO) .
802000	216639	December 22, 2010	8.2-RELEASE
802500	216654	December 22, 2010	8.2-STABLE after 8.2-RELEASE.

Value	Revision	Date	Release
802501	219107	February 28, 2011	8.2-STABLE after merging DTrace changes, including support for userland tracing.
802502	219324	March 6, 2011	8.2-STABLE after merging log2 and log2f into libm.
802503	221275	May 1, 2011	8.2-STABLE after upgrade of the gcc to the last GPLv2 version from the FSF gcc-4_2-branch.
802504	222401	May 28, 2011	8.2-STABLE after introduction of the KPI and supporting infrastructure for modular congestion control.
802505	222406	May 28, 2011	8.2-STABLE after introduction of Hhook and Khelp KPIs.
802506	222408	May 28, 2011	8.2-STABLE after addition of OSD to struct tcpcb.
802507	222741	June 6, 2011	8.2-STABLE after ZFS v28 import.
802508	222846	June 8, 2011	8.2-STABLE after removal of the schedtail event handler and addition of the sv_schedtail method to struct sysvec.
802509	224017	July 14, 2011	8.2-STABLE after merging the SSSE3 support into binutils.
802510	224214	July 19, 2011	8.2-STABLE after addition of RFTSIGZMB flag for rfork(2).
802511	225458	September 9, 2011	8.2-STABLE after addition of automatic detection of USB mass storage devices which do not support the no synchronize cache SCSI command.
802512	225470	September 10, 2011	8.2-STABLE after merging of re-factoring of auto-quirk.
802513	226763	October 25, 2011	8.2-STABLE after merging of the MAP_PREFAULT_READ flag to mmap(2).

Value	Revision	Date	Release
802514	227573	November 16, 2011	8.2-STABLE after merging of addition of posix_fallocate(2) syscall.
802515	229725	January 6, 2012	8.2-STABLE after merging of addition of the posix_fadvise(2) system call.
802516	230239	January 16, 2012	8.2-STABLE after merging gperf 3.0.3
802517	231769	February 15, 2012	8.2-STABLE after introduction of the new extensible sysctl(3) interface NET_RT_IFLISTL to query address lists.
803000	232446	March 3, 2012	8.3-RELEASE.
803500	232439	March 3, 2012	8.3-STABLE after branching releng/8.3 (RELENG_8_3).
803501	247091	February 21, 2013	8.3-STABLE after MFC of two USB fixes (rev 246616 and 246759).
804000	248850	March 28, 2013	8.4-RELEASE.
804500	248819	March 28, 2013	8.4-STABLE after 8.4-RELEASE.
804501	259449	December 16, 2013	8.4-STABLE after MFC of upstream Heimdal encoding fix.
804502	265123	April 30, 2014	8.4-STABLE after FreeBSD-SA-14:08.tcp.
804503	268444	July 9, 2014	8.4-STABLE after FreeBSD-SA-14:17.kmem.
804504	271341	September 9, 2014	8.4-STABLE after FreeBSD-SA-14:18 (rev 271305).
804505	271686	September 16, 2014	8.4-STABLE after FreeBSD-SA-14:19 (rev 271668).
804506	273432	October 21, 2014	8.4-STABLE after FreeBSD-SA-14:21 (rev 273413).
804507	274162	November 4, 2014	8.4-STABLE after FreeBSD-SA-14:23, FreeBSD-SA-14:24, and FreeBSD-SA-14:25.

Value	Revision	Date	Release
804508	279287	February 25, 2015	8-STABLE after FreeBSD-EN-15:01.vt, FreeBSD-EN-15:02.openssl, FreeBSD-EN-15:03.freebsd-update, FreeBSD-SA-15:04.igmp, and FreeBSD-SA-15:05.bind.
804509	305736	September 12, 2016	8-STABLE after resolving a deadlock between device_detach() and usbd_do_request_flags (9).

18.8. FreeBSD 7 Versions

表 59. FreeBSD 7 __FreeBSD_version Values

Value	Revision	Date	Release
700000	147925	July 11, 2005	7.0-CURRENT.
700001	148341	July 23, 2005	7.0-CURRENT after bump of all shared library versions that had not been changed since RELENG_5.
700002	149039	August 13, 2005	7.0-CURRENT after credential argument is added to dev_clone event handler.
700003	149470	August 25, 2005	7.0-CURRENT after memmem(3) is added to libc.
700004	151888	October 30, 2005	7.0-CURRENT after solisten(9) kernel arguments are modified to accept a backlog parameter.
700005	152296	November 11, 2005	7.0-CURRENT after IFP2ENADDR() was changed to return a pointer to IF_LLADDR().
700006	152315	November 11, 2005	7.0-CURRENT after addition of if_addr member to struct ifnet and IFP2ENADDR() removal.
700007	153027	December 2, 2005	7.0-CURRENT after incorporating scripts from the local_startup directories into the base rcorder(8).

Value	Revision	Date	Release
700008	153107	December 5, 2005	7.0-CURRENT after removal of MNT_NODEV mount option.
700009	153519	December 19, 2005	7.0-CURRENT after ELF-64 type changes and symbol versioning.
700010	153579	December 20, 2005	7.0-CURRENT after addition of hostb and vgapci drivers, addition of pci_find_extcap(), and changing the AGP drivers to no longer map the aperture.
700011	153936	December 31, 2005	7.0-CURRENT after tv_sec was made time_t on all platforms but Alpha.
700012	154114	January 8, 2006	7.0-CURRENT after ldconfig_local_dirs change.
700013	154269	January 12, 2006	7.0-CURRENT after changes to /etc/rc.d/abi to support /compat/linux/etc/ld.so.cache being a symlink in a readonly filesystem.
700014	154863	January 26, 2006	7.0-CURRENT after pts import.
700015	157144	March 26, 2006	7.0-CURRENT after the introduction of version 2 of hwpmc(4)'s ABI.
700016	157962	April 22, 2006	7.0-CURRENT after addition of fcloseall(3) to libc.
700017	158513	May 13, 2006	7.0-CURRENT after removal of ip6fw.
700018	160386	July 15, 2006	7.0-CURRENT after import of snd_emu10kx.
700019	160821	July 29, 2006	7.0-CURRENT after import of OpenSSL 0.9.8b.
700020	161931	September 3, 2006	7.0-CURRENT after addition of bus_dma_get_tag function
700021	162023	September 4, 2006	7.0-CURRENT after libpcap 0.9.4 and tcpdump 3.9.4 import.

Value	Revision	Date	Release
700022	162170	September 9, 2006	7.0-CURRENT after dlsym change to look for a requested symbol both in specified dso and its implicit dependencies.
700023	162588	September 23, 2006	7.0-CURRENT after adding new sound IOCTLs for the OSSv4 mixer API.
700024	162919	September 28, 2006	7.0-CURRENT after import of OpenSSL 0.9.8d.
700025	164190	November 11, 2006	7.0-CURRENT after the addition of libelf.
700026	164614	November 26, 2006	7.0-CURRENT after major changes on sound sysctls.
700027	164770	November 30, 2006	7.0-CURRENT after the addition of Wi-Spy quirk.
700028	165242	December 15, 2006	7.0-CURRENT after the addition of sctp calls to libc
700029	166259	January 26, 2007	7.0-CURRENT after the GNU gzip(1) implementation was replaced with a BSD licensed version ported from NetBSD.
700030	166549	February 7, 2007	7.0-CURRENT after the removal of IPIP tunnel encapsulation (VIFF_TUNNEL) from the IPv4 multicast forwarding code.
700031	166907	February 23, 2007	7.0-CURRENT after the modification of bus_setup_intr() (newbus).
700032	167165	March 2, 2007	7.0-CURRENT after the inclusion of ipw(4) and iwi(4) firmware.
700033	167360	March 9, 2007	7.0-CURRENT after the inclusion of ncurses wide character support.
700034	167684	March 19, 2007	7.0-CURRENT after changes to how insmntque(), getnewvnode(), and vfs_hash_insert() work.

Value	Revision	Date	Release
700035	167906	March 26, 2007	7.0-CURRENT after addition of a notify mechanism for CPU frequency changes.
700036	168413	April 6, 2007	7.0-CURRENT after import of the ZFS filesystem.
700037	168504	April 8, 2007	7.0-CURRENT after addition of CAM 'SG' peripheral device, which implements a subset of Linux SCSI SG passthrough device API.
700038	169151	April 30, 2007	7.0-CURRENT after changing getenv(3), putenv(3), setenv(3) and unsetenv(3) to be POSIX conformant.
700039	169190	May 1, 2007	7.0-CURRENT after the changes in 700038 were backed out.
700040	169453	May 10, 2007	7.0-CURRENT after the addition of flopen(3) to libutil.
700041	169526	May 13, 2007	7.0-CURRENT after enabling symbol versioning, and changing the default thread library to libthr.
700042	169758	May 19, 2007	7.0-CURRENT after the import of gcc 4.2.0.
700043	169830	May 21, 2007	7.0-CURRENT after bump of all shared library versions that had not been changed since RELENG_6.
700044	170395	June 7, 2007	7.0-CURRENT after changing the argument for vn_open() /VOP_OPEN() from file descriptor index to the struct file *.
700045	170510	June 10, 2007	7.0-CURRENT after changing pam_nologin(8) to provide an account management function instead of an authentication function to the PAM framework.
700046	170530	June 11, 2007	7.0-CURRENT after updated 802.11 wireless support.

Value	Revision	Date	Release
700047	170579	June 11, 2007	7.0-CURRENT after adding TCP LRO interface capabilities.
700048	170613	June 12, 2007	7.0-CURRENT after RFC 3678 API support added to the IPv4 stack. Legacy RFC 1724 behavior of the IP_MULTICAST_IF ioctl has now been removed; 0.0.0.0/8 may no longer be used to specify an interface index. Use struct ipmreqn instead.
700049	171175	July 3, 2007	7.0-CURRENT after importing pf from OpenBSD 4.1
(not changed)	171167		7.0-CURRENT after adding IPv6 support for FAST_IPSEC, deleting KAME IPSEC, and renaming FAST_IPSEC to IPSEC.
700050	171195	July 4, 2007	7.0-CURRENT after converting setenv/putenv/etc. calls from traditional BSD to POSIX.
700051	171211	July 4, 2007	7.0-CURRENT after adding new mmap/lseek/etc syscalls.
700052	171275	July 6, 2007	7.0-CURRENT after moving I4B headers to include/i4b.
700053	172394	September 30, 2007	7.0-CURRENT after the addition of support for PCI domains
700054	172988	October 25, 2007	7.0-STABLE after MFC of wide and single byte ctype separation.
700055	173104	October 28, 2007	7.0-RELEASE, and 7.0-CURRENT after ABI backwards compatibility to the FreeBSD 4/5/6 versions of the PCIOCGETCONF, PCIOCREAD and PCIOCWRITE IOCTLs was MFCed, which required the ABI of the PCIOCGETCONF IOCTL to be broken again
700100	174864	December 22, 2007	7.0-STABLE after 7.0-RELEASE

Value	Revision	Date	Release
700101	176111	February 8, 2008	7.0-STABLE after the MFC of m_collapse().
700102	177735	March 30, 2008	7.0-STABLE after the MFC of kdb_enter_why().
700103	178061	April 10, 2008	7.0-STABLE after adding l_sysid to struct flock.
700104	178108	April 11, 2008	7.0-STABLE after the MFC of procstat(1).
700105	178120	April 11, 2008	7.0-STABLE after the MFC of umtx features.
700106	178225	April 15, 2008	7.0-STABLE after the MFC of write(2) support to psm(4).
700107	178353	April 20, 2008	7.0-STABLE after the MFC of F_DUP2FD command to fcntl(2).
700108	178783	May 5, 2008	7.0-STABLE after some lockmgr(9) changes, which makes it necessary to include sys/lock.h to use lockmgr(9).
700109	179367	May 27, 2008	7.0-STABLE after MFC of the memrchr(3) function.
700110	181328	August 5, 2008	7.0-STABLE after MFC of kernel NFS lockd client.
700111	181940	August 20, 2008	7.0-STABLE after addition of physically contiguous jumbo frame support.
700112	182294	August 27, 2008	7.0-STABLE after MFC of kernel DTrace support.
701000	185315	November 25, 2008	7.1-RELEASE
701100	185302	November 25, 2008	7.1-STABLE after 7.1-RELEASE.
701101	187023	January 10, 2009	7.1-STABLE after strndup(3) merge.
701102	187370	January 17, 2009	7.1-STABLE after cpuctl(4) support added.
701103	188281	February 7, 2009	7.1-STABLE after the merge of multi-/no-IPv4/v6 jails.

Value	Revision	Date	Release
701104	188625	February 14, 2009	7.1-STABLE after the store of the suspension owner in the struct mount, and introduction of vfs_susp_clean method into the struct vfsops.
701105	189740	March 12, 2009	7.1-STABLE after the incompatible change to the kern.ipc.shmsegs sysctl to allow allocating larger SysV shared memory segments on 64bit architectures.
701106	189786	March 14, 2009	7.1-STABLE after the merge of a fix for POSIX semaphore wait operations.
702000	191099	April 15, 2009	7.2-RELEASE
702100	191091	April 15, 2009	7.2-STABLE after 7.2-RELEASE.
702101	192149	May 15, 2009	7.2-STABLE after ichsmb(4) was changed to use left-adjusted slave addressing to match other SMBus controller drivers.
702102	193020	May 28, 2009	7.2-STABLE after MFC of the fdopendir(3) function.
702103	193638	June 6, 2009	7.2-STABLE after MFC of PmcTools.
702104	195694	July 14, 2009	7.2-STABLE after MFC of the closefrom(2) system call.
702105	196006	July 31, 2009	7.2-STABLE after MFC of the SYSVIPC ABI change.
702106	197198	September 14, 2009	7.2-STABLE after MFC of the x86 PAT enhancements and addition of d_mmap_single() and the scatter/gather list VM object type.
703000	203740	February 9, 2010	7.3-RELEASE
703100	203742	February 9, 2010	7.3-STABLE after 7.3-RELEASE.
704000	216647	December 22, 2010	7.4-RELEASE
704100	216658	December 22, 2010	7.4-STABLE after 7.4-RELEASE.

Value	Revision	Date	Release
704101	221318	May 2, 2011	7.4-STABLE after the gcc MFC in rev 221317.

18.9. FreeBSD 6 Versions

表 60. FreeBSD 6 __FreeBSD_version Values

Value	Revision	Date	Release
600000	133921	August 18, 2004	6.0-CURRENT
600001	134396	August 27, 2004	6.0-CURRENT after permanently enabling PFIL_HOOKS in the kernel.
600002	134514	August 30, 2004	6.0-CURRENT after initial addition of ifi_epoch to struct if_data. Backed out after a few days. Do not use this value.
600003	134933	September 8, 2004	6.0-CURRENT after the re-addition of the ifi_epoch member of struct if_data.
600004	135920	September 29, 2004	6.0-CURRENT after addition of the struct inpcb argument to the pfil API.
600005	136172	October 5, 2004	6.0-CURRENT after addition of the "-d DESTDIR" argument to newsyslog.
600006	137192	November 4, 2004	6.0-CURRENT after addition of glibc style strftime(3) padding options.
600007	138760	December 12, 2004	6.0-CURRENT after addition of 802.11 framework updates.
600008	140809	January 25, 2005	6.0-CURRENT after changes to VOP_*VOBJECT() functions and introduction of MNTK_MPSAFE flag for Giantfree filesystems.
600009	141250	February 4, 2005	6.0-CURRENT after addition of the cpufreq framework and drivers.
600010	141394	February 6, 2005	6.0-CURRENT after importing OpenBSD’s nc(1).

Value	Revision	Date	Release
600011	141727	February 12, 2005	6.0-CURRENT after removing semblance of SVID2 matherr() support.
600012	141940	February 15, 2005	6.0-CURRENT after increase of default thread stacks' size.
600013	142089	February 19, 2005	6.0-CURRENT after fixes in <src/include/stdbool.h> and <src/sys/i386/include/_types.h> for using the GCC-compatibility of the Intel C/C++ compiler.
600014	142184	February 21, 2005	6.0-CURRENT after EOVERFLOW checks in vswprintf(3) fixed.
600015	142501	February 25, 2005	6.0-CURRENT after changing the struct if_data member, ifi_epoch, from wall clock time to uptime.
600016	142582	February 26, 2005	6.0-CURRENT after LC_CTYPE disk format changed.
600017	142683	February 27, 2005	6.0-CURRENT after NLS catalogs disk format changed.
600018	142686	February 27, 2005	6.0-CURRENT after LC_COLLATE disk format changed.
600019	142752	February 28, 2005	Installation of acpica includes into /usr/include.
600020	143308	March 9, 2005	Addition of MSG_NOSIGNAL flag to send(2) API.
600021	143746	March 17, 2005	Addition of fields to cdevsw
600022	143901	March 21, 2005	Removed gtar from base system.
600023	144980	April 13, 2005	LOCAL_CREDS, LOCAL_CONNWAIT socket options added to unix(4).
600024	145565	April 19, 2005	hwpmc(4) and related tools added to 6.0-CURRENT.
600025	145565	April 26, 2005	struct icmphdr added to 6.0-CURRENT.
600026	145843	May 3, 2005	pf updated to 3.7.

Value	Revision	Date	Release
600027	145966	May 6, 2005	Kernel libalias and ng_nat introduced.
600028	146191	May 13, 2005	POSIX ttyname_r(3) made available through unistd.h and libc.
600029	146780	May 29, 2005	6.0-CURRENT after libpcap updated to v0.9.1 alpha 096.
600030	146988	June 5, 2005	6.0-CURRENT after importing NetBSD's if_bridge(4).
600031	147256	June 10, 2005	6.0-CURRENT after struct ifnet was broken out of the driver softcs.
600032	147898	July 11, 2005	6.0-CURRENT after the import of libpcap v0.9.1.
600033	148388	July 25, 2005	6.0-STABLE after bump of all shared library versions that had not been changed since RELENG_5.
600034	149040	August 13, 2005	6.0-STABLE after credential argument is added to dev_clone event handler. 6.0-RELEASE.
600100	151958	November 1, 2005	6.0-STABLE after 6.0-RELEASE
600101	153601	December 21, 2005	6.0-STABLE after incorporating scripts from the local_startup directories into the base rcorder(8).
600102	153912	December 30, 2005	6.0-STABLE after updating the ELF types and constants.
600103	154396	January 15, 2006	6.0-STABLE after MFC of pidfile(3) API.
600104	154453	January 17, 2006	6.0-STABLE after MFC of ldconfig_local_dirs change.
600105	156019	February 26, 2006	6.0-STABLE after NLS catalog support of csh(1).
601000	158330	May 6, 2006	6.1-RELEASE
601100	158331	May 6, 2006	6.1-STABLE after 6.1-RELEASE.
601101	159861	June 22, 2006	6.1-STABLE after the import of csup.
601102	160253	July 11, 2006	6.1-STABLE after the iwi(4) update.

Value	Revision	Date	Release
601103	160429	July 17, 2006	6.1-STABLE after the resolver update to BIND9, and exposure of reentrant version of netdb functions.
601104	161098	August 8, 2006	6.1-STABLE after DSO (dynamic shared objects) support has been enabled in OpenSSL.
601105	161900	September 2, 2006	6.1-STABLE after 802.11 fixups changed the api for the IEEE80211_IOC_STA_INFO ioctl.
602000	164312	November 15, 2006	6.2-RELEASE
602100	162329	September 15, 2006	6.2-STABLE after 6.2-RELEASE.
602101	165122	December 12, 2006	6.2-STABLE after the addition of Wi-Spy quirk.
602102	165596	December 28, 2006	6.2-STABLE after pci_find_extcap() addition.
602103	166039	January 16, 2007	6.2-STABLE after MFC of dlsym change to look for a requested symbol both in specified dso and its implicit dependencies.
602104	166314	January 28, 2007	6.2-STABLE after MFC of ng_deflate(4) and ng_pred1(4) netgraph nodes and new compression and encryption modes for ng_ppp(4) node.
602105	166840	February 20, 2007	6.2-STABLE after MFC of BSD licensed version of gzip(1) ported from NetBSD.
602106	168133	March 31, 2007	6.2-STABLE after MFC of PCI MSI and MSI-X support.
602107	168438	April 6, 2007	6.2-STABLE after MFC of ncurses 5.6 and wide character support.
602108	168611	April 11, 2007	6.2-STABLE after MFC of CAM 'SG' peripheral device, which implements a subset of Linux SCSI SG passthrough device API.

Value	Revision	Date	Release
602109	168805	April 17, 2007	6.2-STABLE after MFC of readline 5.2 patchset 002.
602110	169222	May 2, 2007	6.2-STABLE after MFC of pmap_invalidate_cache(), pmap_change_attr(), pmap_mapbios(), pmap_mapdev_attr(), and pmap_unmapbios() for amd64 and i386.
602111	170556	June 11, 2007	6.2-STABLE after MFC of BOP_BDFLUSH and caused breakage of the filesystem modules KBI.
602112	172284	September 21, 2007	6.2-STABLE after libutil(3) MFC's.
602113	172986	October 25, 2007	6.2-STABLE after MFC of wide and single byte ctype separation. Newly compiled binary that references to ctype.h may require a new symbol, __mb_sb_limit, which is not available on older systems.
602114	173170	October 30, 2007	6.2-STABLE after ctype ABI forward compatibility restored.
602115	173794	November 21, 2007	6.2-STABLE after back out of wide and single byte ctype separation.
603000	173897	November 25, 2007	6.3-RELEASE
603100	173891	November 25, 2007	6.3-STABLE after 6.3-RELEASE.
(not changed)	174434	December 7, 2007	6.3-STABLE after fixing multibyte type support in bit macro.
603102	178459	April 24, 2008	6.3-STABLE after adding l_sysid to struct flock.
603103	179367	May 27, 2008	6.3-STABLE after MFC of the memrchr(3) function.
603104	179810	June 15, 2008	6.3-STABLE after MFC of support for :u variable modifier in make(1).
604000	183583	October 4, 2008	6.4-RELEASE

Value	Revision	Date	Release
604100	183584	October 4, 2008	6.4-STABLE after 6.4-RELEASE.

18.10. FreeBSD 5 Versions

表 61. FreeBSD 5 __FreeBSD_version Values

Value	Revision	Date	Release
500000	58009	March 13, 2000	5.0-CURRENT
500001	59348	April 18, 2000	5.0-CURRENT after adding addition ELF header fields, and changing our ELF binary branding method.
500002	59906	May 2, 2000	5.0-CURRENT after kld metadata changes.
500003	60688	May 18, 2000	5.0-CURRENT after buf/bio changes.
500004	60936	May 26, 2000	5.0-CURRENT after binutils upgrade.
500005	61221	June 3, 2000	5.0-CURRENT after merging libxpg4 code into libc and after TASKQ interface introduction.
500006	61500	June 10, 2000	5.0-CURRENT after the addition of AGP interfaces.
500007	62235	June 29, 2000	5.0-CURRENT after Perl upgrade to 5.6.0
500008	62764	July 7, 2000	5.0-CURRENT after the update of KAME code to 2000/07 sources.
500009	63154	July 14, 2000	5.0-CURRENT after ether_ifattach() and ether_ifdetach() changes.
500010	63265	July 16, 2000	5.0-CURRENT after changing mtree defaults back to original variant, adding -L to follow symlinks.
500011	63459	July 18, 2000	5.0-CURRENT after kqueue API changed.
500012	65353	September 2, 2000	5.0-CURRENT after setproctitle(3) moved from libutil to libc.
500013	65671	September 10, 2000	5.0-CURRENT after the first SMPng commit.
500014	70650	January 4, 2001	5.0-CURRENT after <sys/select.h> moved to <sys/selinfo.h>.

Value	Revision	Date	Release
500015	70894	January 10, 2001	5.0-CURRENT after combining libgcc.a and libgcc_r.a, and associated GCC linkage changes.
500016	71583	January 24, 2001	5.0-CURRENT after change allowing libc and libc_r to be linked together, deprecating -pthread option.
500017	72650	February 18, 2001	5.0-CURRENT after switch from struct ucred to struct xucred to stabilize kernel-exported API for mountd et al.
500018	72975	February 24, 2001	5.0-CURRENT after addition of CPUTYPE make variable for controlling CPU-specific optimizations.
500019	77937	June 9, 2001	5.0-CURRENT after moving machine/ioctl_fd.h to sys/fdcio.h
500020	78304	June 15, 2001	5.0-CURRENT after locale names renaming.
500021	78632	June 22, 2001	5.0-CURRENT after Bzip2 import. Also signifies removal of S/Key.
500022	83435	July 12, 2001	5.0-CURRENT after SSE support.
500023	83435	September 14, 2001	5.0-CURRENT after KSE Milestone 2.
500024	84324	October 1, 2001	5.0-CURRENT after d_thread_t, and moving UUCP to ports.
500025	84481	October 4, 2001	5.0-CURRENT after ABI change for descriptor and creds passing on 64 bit platforms.
500026	84710	October 9, 2001	5.0-CURRENT after moving to XFree86 4 by default for package builds, and after the new libc strnstr() function was added.
500027	84743	October 10, 2001	5.0-CURRENT after the new libc strcasestr() function was added.

Value	Revision	Date	Release
500028	87879	December 14, 2001	5.0-CURRENT after the userland components of smbfs were imported.
(not changed)			5.0-CURRENT after the new C99 specific-width integer types were added.
500029	89938	January 29, 2002	5.0-CURRENT after a change was made in the return value of sendfile(2).
500030	90711	February 15, 2002	5.0-CURRENT after the introduction of the type fflags_t, which is the appropriate size for file flags.
500031	91203	February 24, 2002	5.0-CURRENT after the usb structure element rename.
500032	92453	March 16, 2002	5.0-CURRENT after the introduction of Perl 5.6.1.
500033	93722	April 3, 2002	5.0-CURRENT after the sendmail_enable rc.conf(5) variable was made to take the value NONE.
500034	95831	April 30, 2002	5.0-CURRENT after mtx_init() grew a third argument.
500035	96498	May 13, 2002	5.0-CURRENT with Gcc 3.1.
500036	96781	May 17, 2002	5.0-CURRENT without Perl in /usr/src
500037	97516	May 29, 2002	5.0-CURRENT after the addition of dlfunc(3)
500038	100591	July 24, 2002	5.0-CURRENT after the types of some struct sockbuf members were changed and the structure was reordered.
500039	102757	September 1, 2002	5.0-CURRENT after GCC 3.2.1 import. Also after headers stopped using BSD_FOO_T and started using _FOO_T_DECLARED. This value can also be used as a conservative estimate of the start of bzip2(1) package support.

Value	Revision	Date	Release
500040	103675	September 20, 2002	5.0-CURRENT after various changes to disk functions were made in the name of removing dependency on disklabel structure internals.
500041	104250	October 1, 2002	5.0-CURRENT after the addition of getopt_long(3) to libc.
500042	105178	October 15, 2002	5.0-CURRENT after Binutils 2.13 upgrade, which included new FreeBSD emulation, vec, and output format.
500043	106289	November 1, 2002	5.0-CURRENT after adding weak pthread_XXX stubs to libc, obsoleting libXThrStub.so. 5.0-RELEASE.
500100	109405	January 17, 2003	5.0-CURRENT after branching for RELENG_5_0
500101	111120	February 19, 2003	<sys/dkstat.h> is empty. Do not include it.
500102	111482	February 25, 2003	5.0-CURRENT after the d_mmap_t interface change.
500103	111540	February 26, 2003	5.0-CURRENT after taskqueue_swi changed to run without Giant, and taskqueue_swi_giant added to run with Giant.
500104	111600	February 27, 2003	cdevsw_add() and cdevsw_remove() no longer exists. Appearance of MAJOR_AUTO allocation facility.
500105	111864	March 4, 2003	5.0-CURRENT after new cdevsw initialization method.
500106	112007	March 8, 2003	devstat_add_entry() has been replaced by devstat_new_entry()
500107	112288	March 15, 2003	Devstat interface change; see sys/sys/param.h 1.149
500108	112300	March 15, 2003	Token-Ring interface changes.

Value	Revision	Date	Release
500109	112571	March 25, 2003	Addition of vm_paddr_t.
500110	112741	March 28, 2003	5.0-CURRENT after realpath(3) has been made thread-safe
500111	113273	April 9, 2003	5.0-CURRENT after usbhid(3) has been synced with NetBSD
500112	113597	April 17, 2003	5.0-CURRENT after new NSS implementation and addition of POSIX.1 getpw*_r, getgr*_r functions
500113	114492	May 2, 2003	5.0-CURRENT after removal of the old rc system.
501000	115816	June 4, 2003	5.1-RELEASE.
501100	115710	June 2, 2003	5.1-CURRENT after branching for RELENG_5_1.
501101	117025	June 29, 2003	5.1-CURRENT after correcting the semantics of sigtimedwait(2) and sigwaitinfo(2).
501102	117191	July 3, 2003	5.1-CURRENT after adding the lockfunc and lockfuncarg fields to bus_dma_tag_create(9).
501103	118241	July 31, 2003	5.1-CURRENT after GCC 3.3.1-pre 20030711 snapshot integration.
501104	118511	August 5, 2003	5.1-CURRENT 3ware API changes to twe.
501105	119021	August 17, 2003	5.1-CURRENT dynamically-linked /bin and /sbin support and movement of libraries to /lib.
501106	119881	September 8, 2003	5.1-CURRENT after adding kernel support for Coda 6.x.
501107	120180	September 17, 2003	5.1-CURRENT after 16550 UART constants moved from <dev/sio/sioreg.h> to <dev/ic/ns16550.h>. Also when libmap functionality was unconditionally supported by rtld.

Value	Revision	Date	Release
501108	120386	September 23, 2003	5.1-CURRENT after PFIL_HOOKS API update
501109	120503	September 27, 2003	5.1-CURRENT after adding kiconv(3)
501110	120556	September 28, 2003	5.1-CURRENT after changing default operations for open and close in cdevsw
501111	121125	October 16, 2003	5.1-CURRENT after changed layout of cdevsw
501112	121129	October 16, 2003	5.1-CURRENT after adding kobj multiple inheritance
501113	121816	October 31, 2003	5.1-CURRENT after the if_xname change in struct ifnet
501114	122779	November 16, 2003	5.1-CURRENT after changing /bin and /sbin to be dynamically linked
502000	123198	December 7, 2003	5.2-RELEASE
502010	126150	February 23, 2004	5.2.1-RELEASE
502100	123196	December 7, 2003	5.2-CURRENT after branching for RELENG_5_2
502101	123677	December 19, 2003	5.2-CURRENT after cxa_atexit/cxa_finalize functions were added to libc.
502102	125236	January 30, 2004	5.2-CURRENT after change of default thread library from libc_r to libpthread.
502103	126083	February 21, 2004	5.2-CURRENT after device driver API megapatch.
502104	126208	February 25, 2004	5.2-CURRENT after getopt_long_only() addition.
502105	126644	March 5, 2004	5.2-CURRENT after NULL is made into ((void *)0) for C, creating more warnings.
502106	126757	March 8, 2004	5.2-CURRENT after pf is linked to the build and install.
502107	126819	March 10, 2004	5.2-CURRENT after time_t is changed to a 64-bit value on sparc64.

Value	Revision	Date	Release
502108	126891	March 12, 2004	5.2-CURRENT after Intel C/C++ compiler support in some headers and execve(2) changes to be more strictly conforming to POSIX.
502109	127312	March 22, 2004	5.2-CURRENT after the introduction of the bus_alloc_resource_any API
502110	127475	March 27, 2004	5.2-CURRENT after the addition of UTF-8 locales
502111	128144	April 11, 2004	5.2-CURRENT after the removal of the getvfsent(3) API
502112	128182	April 13, 2004	5.2-CURRENT after the addition of the .warning directive for make.
502113	130057	June 4, 2004	5.2-CURRENT after ttyioctl() was made mandatory for serial drivers.
502114	130418	June 13, 2004	5.2-CURRENT after import of the ALTQ framework.
502115	130481	June 14, 2004	5.2-CURRENT after changing sema_timedwait(9) to return 0 on success and a non-zero error code on failure.
502116	130585	June 16, 2004	5.2-CURRENT after changing kernel dev_t to be pointer to struct cdev *.
502117	130640	June 17, 2004	5.2-CURRENT after changing kernel udev_t to dev_t.
502118	130656	June 17, 2004	5.2-CURRENT after adding support for CLOCK_VIRTUAL and CLOCK_PROF to clock_gettime(2) and clock_getres(2).
502119	130934	June 22, 2004	5.2-CURRENT after changing network interface cloning overhaul.
502120	131429	July 2, 2004	5.2-CURRENT after the update of the package tools to revision 20040629.

Value	Revision	Date	Release
502121	131883	July 9, 2004	5.2-CURRENT after marking Bluetooth code as non-i386 specific.
502122	131971	July 11, 2004	5.2-CURRENT after the introduction of the KDB debugger framework, the conversion of DDB into a backend and the introduction of the GDB backend.
502123	132025	July 12, 2004	5.2-CURRENT after change to make VFS_ROOT take a struct thread argument as does vflush. Struct kinfo_proc now has a user data pointer. The switch of the default X implementation to xorg was also made at this time.
502124	132597	July 24, 2004	5.2-CURRENT after the change to separate the way ports rc.d and legacy scripts are started.
502125	132726	July 28, 2004	5.2-CURRENT after the backout of the previous change.
502126	132914	July 31, 2004	5.2-CURRENT after the removal of kmem_alloc_pageable( ) and the import of gcc 3.4.2.
502127	132991	August 2, 2004	5.2-CURRENT after changing the UMA kernel API to allow ctors/inits to fail.
502128	133306	August 8, 2004	5.2-CURRENT after the change of the vfs_mount signature as well as global replacement of PRISON_ROOT with SUSER_ALLOWJAIL for the suser(9) API.
503000	134189	August 23, 2004	5.3-BETA/RC before the pfil API change
503001	135580	September 22, 2004	5.3-RELEASE
503100	136595	October 16, 2004	5.3-STABLE after branching for RELENG_5_3

Value	Revision	Date	Release
503101	138459	December 3, 2004	5.3-STABLE after addition of glibc style strftime(3) padding options.
503102	141788	February 13, 2005	5.3-STABLE after OpenBSD’s nc(1) import MFC.
503103	142639	February 27, 2005	5.4-PRERELEASE after the MFC of the fixes in <src/include/stdbool.h> and <src/sys/i386/include/_types.h> for using the GCC-compatibility of the Intel C/C++ compiler.
503104	142835	February 28, 2005	5.4-PRERELEASE after the MFC of the change of ifi_epoch from wall clock time to uptime.
503105	143029	March 2, 2005	5.4-PRERELEASE after the MFC of the fix of EOVERFLOW check in vswprintf(3).
504000	144575	April 3, 2005	5.4-RELEASE.
504100	144581	April 3, 2005	5.4-STABLE after branching for RELENG_5_4
504101	146105	May 11, 2005	5.4-STABLE after increasing the default thread stacksizes
504102	504101	June 24, 2005	5.4-STABLE after the addition of sha256
504103	150892	October 3, 2005	5.4-STABLE after the MFC of if_bridge
504104	152370	November 13, 2005	5.4-STABLE after the MFC of bsdiff and portsnap
504105	154464	January 17, 2006	5.4-STABLE after MFC of ldconfig_local_dirs change.
505000	158481	May 12, 2006	5.5-RELEASE.
505100	158482	May 12, 2006	5.5-STABLE after branching for RELENG_5_5

18.11. FreeBSD 4 Versions

表 62. FreeBSD 4 __FreeBSD_version Values

Value	Revision	Date	Release
400000	43041	January 22, 1999	4.0-CURRENT after 3.4 branch

Value	Revision	Date	Release
400001	44177	February 20, 1999	4.0-CURRENT after change in dynamic linker handling
400002	44699	March 13, 1999	4.0-CURRENT after C++ constructor/destructor order change
400003	45059	March 27, 1999	4.0-CURRENT after functioning dladdr(3)
400004	45321	April 5, 1999	4.0-CURRENT after __deregister_frame_info dynamic linker bug fix (also 4.0-CURRENT after EGCS 1.1.2 integration)
400005	46113	April 27, 1999	4.0-CURRENT after suser(9) API change (also 4.0-CURRENT after newbus)
400006	47640	May 31, 1999	4.0-CURRENT after cdevsw registration change
400007	47992	June 17, 1999	4.0-CURRENT after the addition of so_cred for socket level credentials
400008	48048	June 20, 1999	4.0-CURRENT after the addition of a poll syscall wrapper to libc_r
400009	48936	July 20, 1999	4.0-CURRENT after the change of the kernel's dev_t type to struct specinfo pointer
400010	51649	September 25, 1999	4.0-CURRENT after fixing a hole in jail(2)
400011	51791	September 29, 1999	4.0-CURRENT after the sigset_t datatype change
400012	53164	November 15, 1999	4.0-CURRENT after the cutover to the GCC 2.95.2 compiler
400013	54123	December 4, 1999	4.0-CURRENT after adding pluggable linux-mode ioctl handlers
400014	56216	January 18, 2000	4.0-CURRENT after importing OpenSSL
400015	56700	January 27, 2000	4.0-CURRENT after the C++ ABI change in GCC 2.95.2 from -fvtable-thunks to -fno-vtable-thunks by default
400016	57529	February 27, 2000	4.0-CURRENT after importing OpenSSH
400017	58005	March 13, 2000	4.0-RELEASE

Value	Revision	Date	Release
400018	58170	March 17, 2000	4.0-STABLE after 4.0-RELEASE
400019	60047	May 5, 2000	4.0-STABLE after the introduction of delayed checksums.
400020	61262	June 4, 2000	4.0-STABLE after merging libxpg4 code into libc.
400021	62820	July 8, 2000	4.0-STABLE after upgrading Binutils to 2.10.0, ELF branding changes, and tcsh in the base system.
410000	63095	July 14, 2000	4.1-RELEASE
410001	64012	July 29, 2000	4.1-STABLE after 4.1-RELEASE
410002	65962	September 16, 2000	4.1-STABLE after setproctitle(3) moved from libutil to libc.
411000	66336	September 25, 2000	4.1.1-RELEASE
411001			4.1.1-STABLE after 4.1.1-RELEASE
420000	68066	October 31, 2000	4.2-RELEASE
420001	70895	January 10, 2001	4.2-STABLE after combining libgcc.a and libgcc_r.a, and associated GCC linkage changes.
430000	73800	March 6, 2001	4.3-RELEASE
430001	76779	May 18, 2001	4.3-STABLE after wint_t introduction.
430002	80157	July 22, 2001	4.3-STABLE after PCI powerstate API merge.
440000	80923	August 1, 2001	4.4-RELEASE
440001	85341	October 23, 2001	4.4-STABLE after d_thread_t introduction.
440002	86038	November 4, 2001	4.4-STABLE after mount structure changes (affects filesystem klds).
440003	88130	December 18, 2001	4.4-STABLE after the userland components of smbfs were imported.
450000	88271	December 20, 2001	4.5-RELEASE
450001	91203	February 24, 2002	4.5-STABLE after the usb structure element rename.
450002	92151	March 12, 2002	4.5-STABLE after locale changes.

Value	Revision	Date	Release
450003			(Never created)
450004	94840	April 16, 2002	4.5-STABLE after the sendmail_enable rc.conf(5) variable was made to take the value NONE.
450005	95555	April 27, 2002	4.5-STABLE after moving to XFree86 4 by default for package builds.
450006	95846	May 1, 2002	4.5-STABLE after accept filtering was fixed so that is no longer susceptible to an easy DoS.
460000	97923	June 21, 2002	4.6-RELEASE
460001	98730	June 21, 2002	4.6-STABLE sendfile(2) fixed to comply with documentation, not to count any headers sent against the amount of data to be sent from the file.
460002	100366	July 19, 2002	4.6.2-RELEASE
460100	98857	June 26, 2002	4.6-STABLE
460101	98880	June 26, 2002	4.6-STABLE after MFC of sed -i.
460102	102759	September 1, 2002	4.6-STABLE after MFC of many new pkg_install features from the HEAD.
470000	104655	October 8, 2002	4.7-RELEASE
470100	104717	October 9, 2002	4.7-STABLE
470101	106732	November 10, 2002	Start generated std{in,out,err}p references rather than sF. This changes std{in,out,err} from a compile time expression to a runtime one.
470102	109753	January 23, 2003	4.7-STABLE after MFC of mbuf changes to replace m_aux mbufs by m_tag’ s
470103	110887	February 14, 2003	4.7-STABLE gets OpenSSL 0.9.7
480000	112852	March 30, 2003	4.8-RELEASE
480100	113107	April 5, 2003	4.8-STABLE
480101	115232	May 22, 2003	4.8-STABLE after realpath(3) has been made thread-safe

Value	Revision	Date	Release
480102	118737	August 10, 2003	4.8-STABLE 3ware API changes to twe.
490000	121592	October 27, 2003	4.9-RELEASE
490100	121593	October 27, 2003	4.9-STABLE
490101	124264	January 8, 2004	4.9-STABLE after e_sid was added to struct kinfo_eproc.
490102	125417	February 4, 2004	4.9-STABLE after MFC of libmap functionality for rtld.
491000	129700	May 25, 2004	4.10-RELEASE
491100	129918	June 1, 2004	4.10-STABLE
491101	133506	August 11, 2004	4.10-STABLE after MFC of revision 20040629 of the package tools
491102	137786	November 16, 2004	4.10-STABLE after VM fix dealing with unwiring of fictitious pages
492000	138960	December 17, 2004	4.11-RELEASE
492100	138959	December 17, 2004	4.11-STABLE
492101	157843	April 18, 2006	4.11-STABLE after adding libdata/ldconfig directories to mtree files.

18.12. FreeBSD 3 Versions

表 63. FreeBSD 3 __FreeBSD_version Values

Value	Revision	Date	Release
300000	22917	February 19, 1996	3.0-CURRENT before mount(2) change
300001	36283	September 24, 1997	3.0-CURRENT after mount(2) change
300002	36592	June 2, 1998	3.0-CURRENT after semctl(2) change
300003	36735	June 7, 1998	3.0-CURRENT after ioctl arg changes
300004	38768	September 3, 1998	3.0-CURRENT after ELF conversion
300005	40438	October 16, 1998	3.0-RELEASE
300006	40445	October 16, 1998	3.0-CURRENT after 3.0-RELEASE
300007	43042	January 22, 1999	3.0-STABLE after 3/4 branch
310000	43807	February 9, 1999	3.1-RELEASE
310001	45060	March 27, 1999	3.1-STABLE after 3.1-RELEASE

Value	Revision	Date	Release
310002	45689	April 14, 1999	3.1-STABLE after C++ constructor/destructor order change
320000			3.2-RELEASE
320001	46742	May 8, 1999	3.2-STABLE
320002	50563	August 29, 1999	3.2-STABLE after binary-incompatible IPFW and socket changes
330000	50813	September 2, 1999	3.3-RELEASE
330001	51328	September 16, 1999	3.3-STABLE
330002	53671	November 24, 1999	3.3-STABLE after adding mkstemp(3) to libc
340000	54166	December 5, 1999	3.4-RELEASE
340001	54730	December 17, 1999	3.4-STABLE
350000	61876	June 20, 2000	3.5-RELEASE
350001	63043	July 12, 2000	3.5-STABLE

18.13. FreeBSD 2.2 Versions

表 64. FreeBSD 2.2 __FreeBSD_version Values

Value	Revision	Date	Release
220000	22918	February 19, 1997	2.2-RELEASE
(not changed)			2.2.1-RELEASE
(not changed)			2.2-STABLE after 2.2.1-RELEASE
221001	24941	April 15, 1997	2.2-STABLE after texinfo-3.9
221002	25325	April 30, 1997	2.2-STABLE after top
222000	25851	May 16, 1997	2.2.2-RELEASE
222001	25921	May 19, 1997	2.2-STABLE after 2.2.2-RELEASE
225000	30053	October 2, 1997	2.2.5-RELEASE
225001	31300	November 20, 1997	2.2-STABLE after 2.2.5-RELEASE
225002	32019	December 27, 1997	2.2-STABLE after ldconfig -R merge
226000	34445	March 24, 1998	2.2.6-RELEASE
227000	37803	July 21, 1998	2.2.7-RELEASE
227001	37809	July 21, 1998	2.2-STABLE after 2.2.7-RELEASE
227002	39489	September 19, 1998	2.2-STABLE after semctl(2) change
228000	41403	November 29, 1998	2.2.8-RELEASE

Value	Revision	Date	Release
228001	41418	November 29, 1998	2.2-STABLE after 2.2.8-RELEASE

Note that 2.2-STABLE sometimes identifies itself as "2.2.5-STABLE" after the 2.2.5-RELEASE. The pattern used to be year followed by the month, but we decided to change it to a more straightforward major/minor system starting from 2.2. This is because the parallel development on several branches made it infeasible to classify the releases merely by their real release dates. Do not worry about old -CURRENTs; they are listed here just for reference.

18.14. FreeBSD 2 Before 2.2-RELEASE Versions

表 65. FreeBSD 2 Before 2.2-RELEASE __FreeBSD_version Values

Value	Revision	Date	Release
119411			2.0-RELEASE
199501	7153	March 19, 1995	2.1-CURRENT
199503	7310	March 24, 1995	2.1-CURRENT
199504	7704	April 9, 1995	2.0.5-RELEASE
199508	10297	August 26, 1995	2.2-CURRENT before 2.1
199511	12189	November 10, 1995	2.1.0-RELEASE
199512	12196	November 10, 1995	2.2-CURRENT before 2.1.5
199607	17067	July 10, 1996	2.1.5-RELEASE
199608	17127	July 12, 1996	2.2-CURRENT before 2.1.6
199612	19358	November 15, 1996	2.1.6-RELEASE
199612			2.1.7-RELEASE