FreeBSD Porter’s Handbook
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Chapter 1. Introduction

The FreeBSD Ports Collection is the way almost everyone installs applications ("ports") on FreeBSD. Like everything else about FreeBSD, it is primarily a volunteer effort. It is important to keep this in mind when reading this document.

In FreeBSD, anyone may submit a new port, or volunteer to maintain an existing unmaintained port. No special commit privilege is needed.
Chapter 2. Making a New Port

Interested in making a new port, or upgrading existing ports? Great!

What follows are some guidelines for creating a new port for FreeBSD. To upgrade an existing port, read this, then read Upgrading a Port.

When this document is not sufficiently detailed, refer to /usr/ports/Mk/bsd.port.mk, which is included by all port Makefiles. Even those not hacking Makefiles daily can gain much knowledge from it. Additionally, specific questions can be sent to the FreeBSD ports mailing list.

Only a fraction of the variables (VAR) that can be overridden are mentioned in this document. Most (if not all) are documented at the start of /usr/ports/Mk/bsd.port.mk; the others probably ought to be. Note that this file uses a non-standard tab setting: Emacs and Vim will recognize the setting on loading the file. Both vi(1) and ex(1) can be set to use the correct value by typing :set tabstop=4 once the file has been loaded.

Looking for something easy to start with? Take a look at the list of requested ports and see if you can work on one (or more).
Chapter 3. Quick Porting

This section describes how to quickly create a new port. For applications where this quick method is not adequate, the full "Slow Porting" process is described in Slow Porting.

First, get the original tarball and put it into DISTDIR, which defaults to /usr/ports/distfiles.

These steps assume that the software compiled out-of-the-box. In other words, absolutely no changes were required for the application to work on a FreeBSD system. If anything had to be changed, refer to Slow Porting.

It is recommended to set the DEVELOPER make(1) variable in /etc/make.conf before getting into porting.

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

This setting enables the "developer mode" that displays deprecation warnings and activates some further quality checks on calling make.

3.1. Writing the Makefile

The minimal Makefile would look something like this:

```
PORTNAME= oneko
DISTVERSION= 1.1b
CATEGORIES= games
MAINTAINER= youremail@example.com
COMMENT= Cat chasing a mouse all over the screen
WWW= http://www.daidouji.com/oneko/
.include <bsd.port.mk>
```

Try to figure it out. A more detailed example is shown in the sample Makefile section.

3.2. Writing the Description Files

There are two description files that are required for any port, whether they actually package or not. They are pkg-descr and pkg-plist. Their pkg- prefix distinguishes them from other files.

3.2.1. pkg-descr

This is a longer description of the port. One to a few paragraphs concisely explaining what the port does is sufficient.
This is not a manual or an in-depth description on how to use or compile the port! Please be careful when copying from the README or manpage. Too often they are not a concise description of the port or are in an awkward format. For example, manpages have justified spacing, which looks particularly bad with monospaced fonts.

On the other hand, the content of pkg-descr must be longer than the COMMENT line from the Makefile. It must explain in more depth what the port is all about.

A well-written pkg-descr describes the port completely enough that users would not have to consult the documentation or visit the website to understand what the software does, how it can be useful, or what particularly nice features it has. Mentioning certain requirements like a graphical toolkit, heavy dependencies, runtime environment, or implementation languages help users decide whether this port will work for them.

The URL that used to be included as the last line of the pkg-descr file has been moved to the Makefile.

### 3.2.2. pkg-plist

This file lists all the files installed by the port. It is also called the “packing list” because the package is generated by packing the files listed here. The pathnames are relative to the installation prefix (usually /usr/local).

Here is a small example:

```bash
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
```

Refer to the pkg-create(8) manual page for details on the packing list.

It is recommended to keep all the filenames in this file sorted alphabetically. It will make verifying changes when upgrading the port much easier.

Creating a packing list manually can be a very tedious task. If the port installs a large numbers of files, creating the packing list automatically might save time.

There is only one case when pkg-plist can be omitted from a port. If the port installs just a handful of files, list them in PLIST_FILES, within the port's Makefile. For instance, we could get along without pkg-plist in the above oneko port by adding these lines to the Makefile:

```bash
PLIST_FILES=   bin/oneko \
               man/man1/oneko.1.gz \
```
Usage of `PLIST_FILES` should not be abused. When looking for the origin of a file, people usually try to grep through the pkg-plist files in the ports tree. Listing files in `PLIST_FILES` in the Makefile makes that search more difficult.

If a port needs to create an empty directory, or creates directories outside of `${PREFIX}` during installation, refer to Cleaning Up Empty Directories for more information.

As `PLIST_FILES` is a `make(1)` variable, any entry with spaces must be quoted. For example, if using keywords described in `pkg-create(8)` and Expanding Package List with Keywords, the entry must be quoted.

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

Later we will see how pkg-plist and `PLIST_FILES` can be used to fulfill more sophisticated tasks.

### 3.3. Creating the Checksum File

Just type `make makesum`. The ports framework will automatically generate distinfo. Do not try to generate the file manually.

### 3.4. Testing the Port

Make sure that the port rules do exactly what is desired, including packaging up the port. These are the important points to verify:

- pkg-plist does not contain anything not installed by the port.
- pkg-plist contains everything that is installed by the port.
- The port can be installed using the `install` target. This verifies that the install script works correctly.
- The port can be deinstalled properly using the `deinstall` target. This verifies that the deinstall script works correctly.
- The port only has access to network resources during the `fetch` target phase. This is important for package builders, such as `ports-mgmt/poudriere`.
- Make sure that `make package` can be run as a normal user (that is, not as `root`). If that fails, the software may need to be patched. See also `fakeroot` and `uidfix`.

*Procedure: Recommended Test Ordering*
1. `make stage`
2. `make stage-qa`
3. `make package`
4. `make install`
5. `make deinstall`
6. `make package` (as user)

Make certain no warnings are shown in any of the stages.

Thorough automated testing can be done with `ports-mgmt/poudriere` from the Ports Collection, see `Poudriere` for more information. It maintains `jails` where all of the steps shown above can be tested without affecting the state of the host system.

### 3.5. Checking the Port with `portlint`

Please use `portlint` to see if the port conforms to our guidelines. The `ports-mgmt/portlint` program is part of the ports collection. In particular, check that the `Makefile` is in the right shape and the `package` is named appropriately.

⚠️ Do not blindly follow the output of `portlint`. It is a static lint tool and sometimes gets things wrong.

### 3.6. Submitting the New Port

Before submitting the new port, read the **DOs and DON'Ts** section.

Once happy with the port, the only thing remaining is to put it in the main FreeBSD ports tree and make everybody else happy about it too.

⚠️ We do not need the work directory or the `pkgname.txz` package, so delete them now.

Next, create a `patch(1)` file. Assuming the port is called `oneko` and is in the `games` category.

**Example 1. Creating a `.diff` for a New Port**

Add all the files with `git add .`, then review the diff with `git diff`. For example:

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

Make sure that all required files are included, then commit the change to your local branch and generate a patch with `git format-patch`

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

Patch generated with `git format-patch` will include author identity and email addresses, making it easier for developers to apply (with `git am`) and give proper credit.

To make it easier for committers to apply the patch on their working copy of the ports tree, please generate the `.diff` from the base of your ports tree.

Submit `oneko.diff` with the bug submission form. Use product "Ports & Packages", component "Individual Port(s)", and follow the guidelines shown there. Add a short description of the program to the Description field of the PR (perhaps a short version of `COMMENT`), and remember to add `oneko.diff` as an attachment.

Giving a good description in the summary of the problem report makes the work of port committers and triagers a lot easier. The expected format for new ports is "[NEW PORT] category/portname short description of the port" for new ports. Using this scheme makes it easier and faster to begin the work of committing the new port.

After submitting the port, please be patient. The time needed to include a new port in FreeBSD can vary from a few days to a few months. A simple search form of the Problem Report database can be searched at https://bugs.freebsd.org/bugzilla/query.cgi.

To get a listing of open port PRs, select Open and Ports & Packages in the search form, then click [Search].

After looking at the new port, we will reply if necessary, and commit it to the tree. The submitter’s name will also be added to the list of Additional FreeBSD Contributors and other files.

It is also possible to submit ports using a `shar(1)` file. Using the previous example with the `oneko` port above.

**Example 2. Creating a .shar for a New Port**

go to the directory above where the port directory is located, and use `tar` to create the shar archive:

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

`oneko.shar` can then be submitted in the same way as `oneko.diff` above.
Chapter 4. Slow Porting

Okay, so it was not that simple, and the port required some modifications to get it to work. In this section, we will explain, step by step, how to modify it to get it to work with the ports paradigm.

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.

But do not worry, not many people understand exactly how `bsd.port.mk` is working... :-)

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. Getting the Original Sources

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. Patches with file names which do not start with patch- will not be applied automatically.

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
```

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`. Conditional patch file names usually start with `extra-` although this is not necessary. However, their file names must not start with `patch-`. If they do, they are applied
unconditionally by the framework which is undesired for conditional patches.

**Example 3. Applying a Patch for a Specific FreeBSD Version**

```makefile
.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>
```

**Example 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.

```makefile
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
```

**Example 5. Using EXTRA_PATCHES With a Directory**

Sometimes, 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:

```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. Configuring

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. Handling User Input

If the port requires user input to build, configure, or install, set \texttt{IS\_INTERACTIVE} in the Makefile. This will allow "overnight builds" to skip it. If the user sets the variable \texttt{BATCH} in their environment (and if the user sets the variable \texttt{INTERACTIVE}, then \textit{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, \texttt{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_SUF, 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 PKGNAMESPACEPREFIX 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.

Example 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.

Table 1. Examples of DISTVERSION and the Derived PORTVERSION

<table>
<thead>
<tr>
<th>DISTVERSION</th>
<th>PORTVERSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.7.1d</td>
<td>0.7.1.d</td>
</tr>
<tr>
<td>10Alpha3</td>
<td>10.a3</td>
</tr>
<tr>
<td>3Beta7-pre2</td>
<td>3.b7.p2</td>
</tr>
<tr>
<td>8:f_17</td>
<td>8f.17</td>
</tr>
</tbody>
</table>
Example 7. Using \texttt{DISTVERSION}

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

\begin{verbatim}
PORTNAME= nekoto
DISTVERSION= 1.2-4
\end{verbatim}

It will generate a \texttt{PORTVERSION} of 1.2.4.

Example 8. Using \texttt{DISTVERSION} \textit{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 \texttt{DISTVERSIONPREFIX}, \texttt{DISTVERSION}, and \texttt{DISTVERSIONSUFFIX}.

If the version is \texttt{v1.2-4}:

\begin{verbatim}
PORTNAME= nekoto
DISTVERSIONPREFIX= v
DISTVERSION= 1_2_4
\end{verbatim}

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

\begin{verbatim}
PORTNAME= nekoto
DISTVERSIONPREFIX= nekoto-
DISTVERSION= 1.2_4
\end{verbatim}

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

\begin{verbatim}
PORTNAME= nekoto
DISTVERSION= 1.2-4
DISTVERSIONSUFFIX= _RELEASE
\end{verbatim}

Or they do both, for example, \texttt{nekoto-1.2-4_RELEASE}:

\begin{verbatim}
PORTNAME= nekoto
DISTVERSIONPREFIX= nekoto-
DISTVERSION= 1.2-4
DISTVERSIONSUFFIX= _RELEASE
\end{verbatim}

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


All will generate a **PORTVERSION** of 1.2.4.

**Example 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**.

```plaintext
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
<
```

**Example 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**.

```plaintext
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.
- Changes to **MAINTAINER**.

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:

```bash
% 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 mailing list.

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.specif...
part (see below), use \texttt{PKGNAMEPREFIX} and \texttt{PKGNAMESUFFIX}, respectively. Do not make them part of \texttt{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 \texttt{language\_region-name-compiled.specifics-version.numbers}. 

The package name is defined as \texttt{\$\{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 \texttt{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 \texttt{ja} for Japanese, \texttt{ru} for Russian, \texttt{vi} for Vietnamese, \texttt{zh} for Chinese, \texttt{ko} for Korean and \texttt{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 \texttt{en\_US} for US English and \texttt{fr\_CH} for Swiss French.

The \texttt{language-} part is set in \texttt{PKGNAMEPREFIX}.

**name**

Make sure that the port’s name and version are clearly separated and placed into \texttt{PORTNAME} and \texttt{DISTVERSION}. The only reason for \texttt{PORTNAME} to contain a version part is if the upstream distribution is really named that way, as in the \texttt{textproc/libxml2} or \texttt{japanese/input2-freewnn} ports. Otherwise, \texttt{PORTNAME} cannot contain any version-specific information. It is quite normal for several ports to have the same \texttt{PORTNAME}, as the \texttt{www/apache*} ports do; in that case, different versions (and different index entries) are distinguished by \texttt{PKGNAMEPREFIX} and \texttt{PKGNAMESUFFIX} values.

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

**-compiled.specifics**

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

The \texttt{-compiled.specifics} part is set in \texttt{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 \texttt{pl} (meaning "patchlevel"), which can be used \texttt{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:

<table>
<thead>
<tr>
<th>Distribution Name</th>
<th>PKGNAMEPREFIX</th>
<th>PORTNAME</th>
<th>PKGNAMESUFFIX</th>
<th>DISTVERSION</th>
<th>PORTVERSION</th>
<th>Reason or comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>mule-2.2.2</td>
<td>(empty)</td>
<td>mule</td>
<td>(empty)</td>
<td>2.2.2</td>
<td></td>
<td>No changes required</td>
</tr>
<tr>
<td>mule-1.0.1</td>
<td>(empty)</td>
<td>mule</td>
<td>1</td>
<td>1.0.1</td>
<td></td>
<td>This is version 1 of mule, and version 2 already exists</td>
</tr>
<tr>
<td>EmiClock-1.0.2</td>
<td>(empty)</td>
<td>emiclock</td>
<td>(empty)</td>
<td>1.0.2</td>
<td></td>
<td>No uppercase names for single programs</td>
</tr>
<tr>
<td>rdist-1.3alpha</td>
<td>(empty)</td>
<td>rdist</td>
<td>(empty)</td>
<td>1.3alpha</td>
<td></td>
<td>Version will be 1.3.a</td>
</tr>
<tr>
<td>es-0.9-beta1</td>
<td>(empty)</td>
<td>es</td>
<td>(empty)</td>
<td>0.9-beta1</td>
<td></td>
<td>Version will be 0.9.b1</td>
</tr>
<tr>
<td>mailman-2.0rc3</td>
<td>(empty)</td>
<td>mailman</td>
<td>(empty)</td>
<td>2.0rc3</td>
<td></td>
<td>Version will be 2.0.r3</td>
</tr>
<tr>
<td>v3.3beta021.src</td>
<td>(empty)</td>
<td>tiff</td>
<td>(empty)</td>
<td>3.3</td>
<td></td>
<td>What the heck was that anyway?</td>
</tr>
<tr>
<td>Distribution Name</td>
<td>PKGNAMEPREFIX</td>
<td>PORTNAME</td>
<td>PKGNAMESUFFIX</td>
<td>DISTVERSION</td>
<td>PORTVERSION</td>
<td>Reason or comment</td>
</tr>
<tr>
<td>-------------------</td>
<td>----------------</td>
<td>----------</td>
<td>---------------</td>
<td>-------------</td>
<td>-------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>tvttwm</td>
<td>(empty)</td>
<td>tvttwm</td>
<td>(empty)</td>
<td>p11</td>
<td></td>
<td>No version in the filename, use what upstream says it is</td>
</tr>
<tr>
<td>piewm</td>
<td>(empty)</td>
<td>piewm</td>
<td>(empty)</td>
<td>1.0</td>
<td></td>
<td>No version in the filename, use what upstream says it is</td>
</tr>
<tr>
<td>xvgr-2.10pl1</td>
<td>(empty)</td>
<td>xvgr</td>
<td>(empty)</td>
<td>2.10.pl1</td>
<td></td>
<td>In that case, pl1 means patch level, so using DISTVERSION is not possible.</td>
</tr>
<tr>
<td>gawk-2.15.6</td>
<td>ja-</td>
<td>gawk</td>
<td>(empty)</td>
<td>2.15.6</td>
<td></td>
<td>Japanese language version</td>
</tr>
<tr>
<td>psutils-1.13</td>
<td>(empty)</td>
<td>psutils</td>
<td>-letter</td>
<td>1.13</td>
<td></td>
<td>Paper size hardcoded at package build time</td>
</tr>
<tr>
<td>pkfonts</td>
<td>(empty)</td>
<td>pkfonts</td>
<td>300</td>
<td>1.0</td>
<td></td>
<td>Package for 300dpi fonts</td>
</tr>
</tbody>
</table>

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 (`dyyyyy.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.

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>accessibility</td>
<td>Ports to help disabled users.</td>
<td></td>
</tr>
<tr>
<td>afterstep*</td>
<td>Ports to support the AfterStep window manager.</td>
<td></td>
</tr>
<tr>
<td>arabic</td>
<td>Arabic language support.</td>
<td></td>
</tr>
<tr>
<td>archivers</td>
<td>Archiving tools.</td>
<td></td>
</tr>
<tr>
<td>astro</td>
<td>Astronomical ports.</td>
<td></td>
</tr>
<tr>
<td>audio</td>
<td>Sound support.</td>
<td></td>
</tr>
<tr>
<td>benchmarks</td>
<td>Benchmarking utilities.</td>
<td></td>
</tr>
<tr>
<td>biology</td>
<td>Biology-related software.</td>
<td></td>
</tr>
<tr>
<td>cad</td>
<td>Computer aided design tools.</td>
<td></td>
</tr>
<tr>
<td>chinese</td>
<td>Chinese language support.</td>
<td></td>
</tr>
<tr>
<td>comms</td>
<td>Communication software.</td>
<td>Mostly software to talk to the serial port.</td>
</tr>
<tr>
<td>converters</td>
<td>Character code converters.</td>
<td></td>
</tr>
<tr>
<td>databases</td>
<td>Databases.</td>
<td></td>
</tr>
<tr>
<td>deskutils</td>
<td>Things that used to be on the desktop before computers were invented.</td>
<td></td>
</tr>
<tr>
<td>Category</td>
<td>Description</td>
<td>Notes</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>devel</td>
<td>Development utilities.</td>
<td>Do not put libraries here just because they are libraries. They should <em>not</em> be in this category unless they truly do not belong anywhere else.</td>
</tr>
<tr>
<td>dns</td>
<td>DNS-related software.</td>
<td></td>
</tr>
<tr>
<td>docs*</td>
<td>Meta-ports for FreeBSD documentation.</td>
<td></td>
</tr>
<tr>
<td>editors</td>
<td>General editors.</td>
<td>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.</td>
</tr>
<tr>
<td>education*</td>
<td>Education-related software.</td>
<td>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</td>
</tr>
<tr>
<td>elisp*</td>
<td>Emacs-lisp ports.</td>
<td></td>
</tr>
<tr>
<td>emulators</td>
<td>Emulators for other operating systems.</td>
<td>Terminal emulators do <em>not</em> belong here. X-based ones go to x11 and text-based ones to either comms or misc, depending on the exact functionality.</td>
</tr>
<tr>
<td>enlightenment*</td>
<td>Ports related to the Enlightenment window manager.</td>
<td></td>
</tr>
<tr>
<td>finance</td>
<td>Monetary, financial and related applications.</td>
<td></td>
</tr>
<tr>
<td>french</td>
<td>French language support.</td>
<td></td>
</tr>
<tr>
<td>ftp</td>
<td>FTP client and server utilities.</td>
<td>If the port speaks both FTP and HTTP, put it in ftp with a secondary category of www.</td>
</tr>
<tr>
<td>games</td>
<td>Games.</td>
<td></td>
</tr>
<tr>
<td>geography*</td>
<td>Geography-related software.</td>
<td></td>
</tr>
<tr>
<td>Category</td>
<td>Description</td>
<td>Notes</td>
</tr>
<tr>
<td>----------------</td>
<td>------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>german</td>
<td>German language support.</td>
<td></td>
</tr>
<tr>
<td>gnome*</td>
<td>Ports from the GNOME Project.</td>
<td></td>
</tr>
<tr>
<td>gnustep*</td>
<td>Software related to the GNUstep desktop environment.</td>
<td></td>
</tr>
<tr>
<td>graphics</td>
<td>Graphics utilities.</td>
<td></td>
</tr>
<tr>
<td>hamradio*</td>
<td>Software for amateur radio.</td>
<td></td>
</tr>
<tr>
<td>haskell*</td>
<td>Software related to the Haskell language.</td>
<td></td>
</tr>
<tr>
<td>hebrew</td>
<td>Hebrew language support.</td>
<td></td>
</tr>
<tr>
<td>hungarian</td>
<td>Hungarian language support.</td>
<td></td>
</tr>
<tr>
<td>irc</td>
<td>Internet Relay Chat utilities.</td>
<td></td>
</tr>
<tr>
<td>japanese</td>
<td>Japanese language support.</td>
<td></td>
</tr>
<tr>
<td>java</td>
<td>Software related to the Java™ language.</td>
<td>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.</td>
</tr>
<tr>
<td>kde*</td>
<td>Ports from the KDE Project (generic).</td>
<td></td>
</tr>
<tr>
<td>kde-applications*</td>
<td>Applications from the KDE Project.</td>
<td></td>
</tr>
<tr>
<td>kde-frameworks*</td>
<td>Add-on libraries from the KDE Project for programming with Qt.</td>
<td></td>
</tr>
<tr>
<td>kde-plasma*</td>
<td>Desktop from the KDE Project.</td>
<td></td>
</tr>
<tr>
<td>kld*</td>
<td>Kernel loadable modules.</td>
<td></td>
</tr>
<tr>
<td>korean</td>
<td>Korean language support.</td>
<td></td>
</tr>
<tr>
<td>lang</td>
<td>Programming languages.</td>
<td></td>
</tr>
<tr>
<td>linux*</td>
<td>Linux applications and support utilities.</td>
<td></td>
</tr>
<tr>
<td>lisp*</td>
<td>Software related to the Lisp language.</td>
<td></td>
</tr>
<tr>
<td>mail</td>
<td>Mail software.</td>
<td></td>
</tr>
<tr>
<td>mate*</td>
<td>Ports related to the MATE desktop environment, a fork of GNOME 2.</td>
<td></td>
</tr>
<tr>
<td>Category</td>
<td>Description</td>
<td>Notes</td>
</tr>
<tr>
<td>------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>math</td>
<td>Numerical computation software and other utilities for mathematics.</td>
<td></td>
</tr>
<tr>
<td>mbone*</td>
<td>MBone applications.</td>
<td></td>
</tr>
<tr>
<td>misc</td>
<td>Miscellaneous utilities</td>
<td>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.</td>
</tr>
<tr>
<td>multimedia</td>
<td>Multimedia software.</td>
<td></td>
</tr>
<tr>
<td>net</td>
<td>Miscellaneous networking software.</td>
<td></td>
</tr>
<tr>
<td>net-im</td>
<td>Instant messaging software.</td>
<td></td>
</tr>
<tr>
<td>net-mgmt</td>
<td>Networking management software.</td>
<td></td>
</tr>
<tr>
<td>net-p2p</td>
<td>Peer to peer network applications.</td>
<td></td>
</tr>
<tr>
<td>net-vpn*</td>
<td>Virtual Private Network applications.</td>
<td></td>
</tr>
<tr>
<td>news</td>
<td>USENET news software.</td>
<td></td>
</tr>
<tr>
<td>parallel*</td>
<td>Applications dealing with parallelism in computing.</td>
<td></td>
</tr>
<tr>
<td>pear*</td>
<td>Ports related to the Pear PHP framework.</td>
<td></td>
</tr>
<tr>
<td>perl5*</td>
<td>Ports that require Perl version 5 to run.</td>
<td></td>
</tr>
<tr>
<td>plan9*</td>
<td>Various programs from Plan9.</td>
<td></td>
</tr>
<tr>
<td>polish</td>
<td>Polish language support.</td>
<td></td>
</tr>
<tr>
<td>ports-mgmt</td>
<td>Ports for managing, installing and developing FreeBSD ports and packages.</td>
<td></td>
</tr>
<tr>
<td>portuguese</td>
<td>Portuguese language support.</td>
<td></td>
</tr>
<tr>
<td>print</td>
<td>Printing software.</td>
<td>Desktop publishing tools (previewers, etc.) belong here too.</td>
</tr>
<tr>
<td>python*</td>
<td>Software related to the Python language.</td>
<td></td>
</tr>
<tr>
<td>ruby*</td>
<td>Software related to the Ruby language.</td>
<td></td>
</tr>
<tr>
<td>Category</td>
<td>Description</td>
<td>Notes</td>
</tr>
<tr>
<td>--------------</td>
<td>------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>rubygems</td>
<td>Ports of RubyGems packages.</td>
<td></td>
</tr>
<tr>
<td>russian</td>
<td>Russian language support.</td>
<td></td>
</tr>
<tr>
<td>scheme</td>
<td>Software related to the Scheme language.</td>
<td></td>
</tr>
<tr>
<td>science</td>
<td>Scientific ports that do not fit into other categories such as astro, biology and math.</td>
<td></td>
</tr>
<tr>
<td>security</td>
<td>Security utilities.</td>
<td></td>
</tr>
<tr>
<td>shells</td>
<td>Command line shells.</td>
<td></td>
</tr>
<tr>
<td>spanish</td>
<td>Spanish language support.</td>
<td></td>
</tr>
<tr>
<td>sysutils</td>
<td>System utilities.</td>
<td></td>
</tr>
<tr>
<td>tcl</td>
<td>Ports that use Tcl to run.</td>
<td></td>
</tr>
<tr>
<td>textproc</td>
<td>Text processing utilities.</td>
<td>It does not include desktop publishing tools, which go to print.</td>
</tr>
<tr>
<td>tk</td>
<td>Ports that use Tk to run.</td>
<td></td>
</tr>
<tr>
<td>ukrainian</td>
<td>Ukrainian language support.</td>
<td></td>
</tr>
<tr>
<td>vietnamese</td>
<td>Vietnamese language support.</td>
<td></td>
</tr>
<tr>
<td>wayland</td>
<td>Ports to support the Wayland display server.</td>
<td></td>
</tr>
<tr>
<td>windowmaker</td>
<td>Ports to support the Window Maker window manager.</td>
<td></td>
</tr>
<tr>
<td>x11</td>
<td>The X Window System and friends.</td>
<td>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).</td>
</tr>
<tr>
<td>x11-clocks</td>
<td>X11 clocks.</td>
<td></td>
</tr>
<tr>
<td>x11-drivers</td>
<td>X11 drivers.</td>
<td></td>
</tr>
<tr>
<td>x11-fm</td>
<td>X11 file managers.</td>
<td></td>
</tr>
<tr>
<td>x11-fonts</td>
<td>X11 fonts and font utilities.</td>
<td></td>
</tr>
<tr>
<td>x11-servers</td>
<td>X11 servers.</td>
<td></td>
</tr>
<tr>
<td>x11-themes</td>
<td>X11 themes.</td>
<td></td>
</tr>
<tr>
<td>x11-toolkits</td>
<td>X11 toolkits.</td>
<td></td>
</tr>
</tbody>
</table>
### 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`, 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 mailing list 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 thoroughly 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 mailing list. 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
   - Makefile 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.

Example 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.
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:

```makefile
PORTNAME= bind
PORTVERSION= ${ISCVERSION:S/-P/P/:S/b/.b/:S/a/.a/:S/rc/.rc/}
CATEGORIES= dns net
MASTER_SITES= ISC/bind99/${ISCVERSION}
PKGNAMESUFFIX= 99
DISTNAME= ${PORTNAME}-${ISCVERSION}

MAINTAINER= mat@FreeBSD.org
COMMENT= BIND DNS suite with updated DNSSEC and DNS64
WWW= https://www.isc.org/bind/
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.

**Example 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:

```makefile
PORTNAME= kermit
PORTVERSION= 9.0.304
CATEGORIES= comms ftp net
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`.

**Example 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 |

Example 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:

<table>
<thead>
<tr>
<th>Macro</th>
<th>Shortcut</th>
</tr>
</thead>
<tbody>
<tr>
<td>PERL_CPAN</td>
<td>CPAN</td>
</tr>
<tr>
<td>GITHUB</td>
<td>GH</td>
</tr>
<tr>
<td>GITHUB_CLOUD</td>
<td>GHC</td>
</tr>
<tr>
<td>LIBREOFFICE_DEV</td>
<td>LODEV</td>
</tr>
<tr>
<td>NETLIB</td>
<td>NL</td>
</tr>
<tr>
<td>RUBYGEMS</td>
<td>RG</td>
</tr>
<tr>
<td>SOURCEFORGE</td>
<td>SF</td>
</tr>
</tbody>
</table>

### 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}
```

Table 4. Magic MASTER_SITES Macros

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

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>GH_ACCOUNT</td>
<td>Account name of the GitHub user hosting the project</td>
<td>${PORTNAME}</td>
</tr>
<tr>
<td>GH_PROJECT</td>
<td>Name of the project on GitHub</td>
<td>${PORTNAME}</td>
</tr>
<tr>
<td>GH_TAGNAME</td>
<td>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.</td>
<td>${DISTVERSIONPREFIX}${DISTVERSION}${DISTVERSIONSUFFIX}</td>
</tr>
<tr>
<td>GH_SUBDIR</td>
<td>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.</td>
<td>(none)</td>
</tr>
</tbody>
</table>

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

**Example 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/](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.
Example 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):

```bash
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.

Example 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:

```bash
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.

Example 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 gYYYYMDD, where g is for Git, and YYYYMDD represents the date the commit referenced in GH_TAGNAME.

```bash
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.

Example 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:

```bash
% 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}
```
Example 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 `${WRKDIR}` in their respective subdirectories. The default file is still extracted in `${WRKDIR}`, in this case, `${WRKDIR}/foo-1.0.2`. Each additional distribution file is extracted in `${WRKDIR_GROUP}`. Here, for the `icons` group, it is called `${WRKDIR.icons}` and it contains `${WRKDIR}/foo-icons-1.0`. The file with the `contrib` group is called `${WRKDIR_contrib}` and contains `${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} ${WRKDIR.icons} ${WRKDIR}/ext/icons
```

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

**Example 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:

```plaintext
[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:

```plaintext
% 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/LuaGlue'..
  
Cloning into '/home/mat/work/freebsd/ports/finance/moneymanagerex/moneymanagerex/3rd/cgitemplate'...
Cloning into '/home/mat/work/freebsd/ports/finance/moneymanagerex/moneymanagerex/3rd/mongoose'..
  
Cloning into '/home/mat/work/freebsd/ports/finance/moneymanagerex/moneymanagerex/lib/wxsqlite3'...
[...]
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
```
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.

Table 6. USE_GITLAB Description

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>GL_SITE</td>
<td>Site name hosting the GitLab project</td>
<td><a href="https://gitlab.com/">https://gitlab.com/</a></td>
</tr>
<tr>
<td>GL_ACCOUNT</td>
<td>Account name of the GitLab user hosting the project</td>
<td>${PORTNAME}</td>
</tr>
<tr>
<td>GL_PROJECT</td>
<td>Name of the project on GitLab</td>
<td>${PORTNAME}</td>
</tr>
<tr>
<td>GL_COMMIT</td>
<td>The commit hash to download. Must be the full 160 bit, 40 character hex sha1 hash. This is a required variable for GitLab.</td>
<td>(none)</td>
</tr>
<tr>
<td>GL_SUBDIR</td>
<td>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.</td>
<td>(none)</td>
</tr>
</tbody>
</table>

Example 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= e90302e342bdf27bc8c9132ab9d0ea3d8723fd03
```
It will automatically have \texttt{MASTER\_SITES} set to \texttt{gitlab.com} and \texttt{WRKSRC} to \texttt{$\{WRKDIR\}/libsignon-glib-e90302e342bf27bc8c9132ab9d0ea3d8723df03-e90302e342bf27bc8c9132ab9d0ea3d8723df03}.

\textbf{Example 24. More Complete Use of \texttt{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 \url{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 \texttt{MASTER\_SITES} set to ”\url{https://gitlab.example.com}” and \texttt{WRKSRC} to \texttt{$\{WRKDIR\}/bar-9c1669ce60c3f4f5eb43df874d7314483fb3f8a6-9c1669ce60c3f4f5eb43df874d7314483fb3f8a6}.

\begin{itemize}
\item \texttt{20170906} is the date of the commit referenced in \texttt{GL\_COMMIT}, not the date the Makefile is edited, or the date the commit to the FreeBSD ports tree is made.
\item \texttt{GL\_SITE}’s protocol, port and webroot can all be modified in the same variable.
\end{itemize}

\subsection*{5.4.4.1. Fetching Multiple Files from GitLab}

The \texttt{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 \texttt{Multiple Distribution or Patches Files from Multiple Locations} and \texttt{Fetching Multiple Files from GitLab}.

Multiple values are added to \texttt{GL\_SITE}, \texttt{GL\_ACCOUNT}, \texttt{GL\_PROJECT} and \texttt{GL\_COMMIT}. Each different value is assigned a group. \texttt{USE\_GITLAB Description}.

\texttt{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 \texttt{$\{WRKSRC\_group\}$} helper variable is created, containing the directory into which the file has been extracted. The \texttt{$\{WRKSRC\_group\}$} variables can be used to move directories around during \texttt{post\_extract}, or add to \texttt{CONFIGURE\_ARGS}, or whatever is needed so that the software builds correctly.

\texttt{The :\texttt{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:

```bash
USE_GITLAB= nodefault
```

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

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

**Example 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:

```bash
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= c189207a55da45305c884fe2b50e086fcd4724b
         ae7368cab1ca7ca754b38d49da064df87968ffe4:icons
         9e4dd76ad9b38f33f3db417a4c01935958d5acdac2a: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 `c189207a55da45305c884fe2b50e086fcd4724b`. 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 `9e4dd76ad9b38f33f3db417a4c01935958d5acdac2a`. The distribution files are named `foo-foo-c189207a55da45305c884fe2b50e086fcd4724b_GL0.tar.gz`, `bar-foo-icons-ae7368cab1ca7ca754b38d49da064df87968ffe4_GL0.tar.gz`, and `bar-foo-contrib-9e4dd76ad9b38f33f3db417a4c01935958d5acdac2a_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, `${WRKDIR}/foo-c189207a55da45305c884fe2b50e086fcad4724b-c189207a55da45305c884fe2b50e086fcad4724b. Each additional distribution file is extracted in `${WRKDIR}/${WRKDIR}/foo-icons-ae7368cab1ca7ca754b38d49da064df87968ffe4-ae7368cab1ca7ca754b38d49da064df87968ffe4. The file with the contrib group is called `${WRKDIR}/foo-contrib-9e4dd76ad9b38f33f4db417a4c01935958d5acd2a-9e4dd76ad9b38f33f4db417a4c01935958d5acd2a.

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} ${WRKDIR}/ext/icons
```

**Example 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:9e4dd76ad9b38f33f4db417a4c01935958d5acd2a:contrib

CONFIGURE_ARGS= --with-contrib=${WRKDIR}/foo-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**.

**Example 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**.

**Example 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
```

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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.

Example 29. Detailed Use of `MASTER_SITES:n` in `MASTER_SITE_SUBDIR`

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

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

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

```bash
MASTER_SITES= http://site1/%SUBDIR%/ http://site2/:DEFAULT \
                http://site3:/group3 http://site4:/group4 \n                http://site5:/group5 http://site6:/group6 \n                http://site7/:DEFAULT,group6 \n                http://site8/%SUBDIR%:/group6,group7 \n                http://site9:/group8
DISTFILES=  file1 file2:DEFAULT file3:/group3 \n            file4:/group4,group5,group6 file5:grouping \n            file6:/group7
MASTER_SITE_SUBDIR= directory-trial:1 directory-n/:groupn \n                    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`
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).

Example 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.

Example 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. Project website

Each port should point to a website that provides more information about the software.
Whenever possible, this should be the official project website maintained by the developers of the software.

```
WWW= https://ffmpeg.org/
```

But it can also be a directory or resource in the source code repository:

```
WWW= https://sourceforge.net/projects/mpd/
```

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

If the same content can be accessed via HTTP and HTTPS, the URL starting with `https://` shall be used. If the URI is the root of the website or directory, it must be terminated with a slash.

This information used to be placed into the last line of the `pkg-descr` file. It has been moved into the Makefile for easier maintenance and processing. Having a `WWW:` line at the end of the `pkg-descr` file is deprecated.

### 5.8. 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.

#### 5.8.1. 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`.

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

Table 7. Predefined License List

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<tr>
<th>Short Name</th>
<th>Name</th>
<th>Group</th>
<th>Permissions</th>
</tr>
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<td>FSF OSI</td>
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<td>COPYFREE FSF GPL OSI</td>
<td>(default)</td>
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<td>(default)</td>
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<td>GPL COPYFREE</td>
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<td>PHP License version 2.02</td>
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<td>Zope Public License version 2.1</td>
<td>GPL OSI</td>
<td>(default)</td>
</tr>
</tbody>
</table>

### 5.8.2. 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/](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/](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 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.

**Example 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 |

**Example 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 mailing list.

| 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.
5.8.3. 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

5.8.4. LICENSE_NAME and LICENSE_NAME_NAME

Full name of the license.

Example 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
```

5.8.5. 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}.

Example 37. LICENSE_FILE

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

5.8.6. 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.
5.8.7. LICENSE_DISTFILES and LICENSE_DISTFILES_NAME

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

Example 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
```

5.8.8. LICENSE_COMB

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

Example 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
```
Example 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
```

5.9. 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://www.renpy.org/dl/release/
  ```
5.10. 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.

5.10.1. 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.

5.10.2. 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.*

### 5.10.3. `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`.

### 5.10.4. 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`.

### 5.10.5. 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.

### 5.10.6. 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 \texttt{DEPENDS\_TARGET}.

5.10.7. \textbf{USES}

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

\begin{verbatim}
USES= feature[:arguments]
\end{verbatim}

For the complete list of values, please see \textit{Using USES Macros}.

\begin{itemize}
\item \texttt{USES} cannot be assigned after inclusion of \texttt{bsd.port.pre.mk}.
\end{itemize}

5.10.8. \textbf{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 \texttt{Makefiles}. Each of them is styled as \texttt{USE\_*}. These variables may be used only in the port \texttt{Makefiles} and \texttt{ports/Mk/bsd.*.mk}. They are not meant for user-settable options - use \texttt{PORT\_OPTIONS} for that purpose.

\begin{itemize}
\item It is \textit{always} incorrect to set any \texttt{USE\_*} in \texttt{/etc/make.conf}. For instance, setting

\begin{verbatim}
USE\_GCC=X.Y
\end{verbatim}

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

\begin{table}[h]
\centering
\caption{USE\_*}
\end{table}
### 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.

### 5.10.9. Minimal Version of a Dependency

A minimal version of a dependency can be specified in any `*.DEPENS` 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.

5.10.10. 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/jpg:extract
```

will always descend to the `jpg` port and extract it.

5.10.11. 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.

5.10.12. 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.

Example 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.

Example 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.

## 5.11. 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 &amp; ${RESOLUTION} != 240 &amp; &amp;
  ${RESOLUTION} != 300 &amp; &amp; ${RESOLUTION} != 360 &amp; &amp;
  ${RESOLUTION} != 400 &amp; &amp; ${RESOLUTION} != 600
  .BEGIN:
    @$\{ECHO_MSG\} "Error: invalid value for RESOLUTION: \"$\{RESOLUTION\}\""
    @$\{ECHO_MSG\} "Possible values are: 118, 240, 300, 360, 400 and 600."
    @$\{FALSE\}
  .endif
```

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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 FILES_DIR and SCRIPT_DIR 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.

### 5.12. 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.

### 5.13. 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.

### 5.14. 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.
5.14.1. **OPTIONS**

5.14.1.1. 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.

5.14.1.2. 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
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.

**Example 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>

Example 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

Example 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= psql=yes
# Will add --enable-postgres / --disable-postgres
PGSQL_CONFIGURE_ENABLE= postgres

ICU_LIB_DEPENDS= libicuuc.so:devel/icu
5.14.1.3. 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`.

5.14.2. 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`.

*Example 47. Wrong Handling of an Option*

```bash
.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.

*Example 48. Correct Handling of an Option*

```bash
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.

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

as an alternative to

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

### 5.14.3. 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.

5.14.3.1. 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+= @comment " NO_OPT1=""
 SUB_LIST+=  @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.

5.14.3.2. 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 \texttt{USE\_KEY}. If \textit{value} has spaces in it, replace them with commas and they will be changed back to spaces during processing. \texttt{OPT\_USE\_OFF} works the same way, but when \texttt{OPT} is \textit{not} selected. For example:

```sh
OPTIONS\_DEFINE= OPT1
OPT1\_USES= xorg
OPT1\_USE= mysql=yes xorg=x11,xextproto,xext,xrandr
OPT1\_USE\_OFF= openssl=yes
```

is equivalent to:

```sh
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
```

### 5.14.3.3. \texttt{CONFIGURE\_ARGS} Helpers

#### 5.14.3.3.1. \texttt{OPT\_CONFIGURE\_ENABLE}

When option \texttt{OPT} is selected, for each entry in \texttt{OPT\_CONFIGURE\_ENABLE} then \texttt{--enable-entry} is appended to \texttt{CONFIGURE\_ARGS}. When option \texttt{OPT} is \textit{not} selected, \texttt{--disable-entry} is appended to \texttt{CONFIGURE\_ARGS}. An optional argument can be specified with an \texttt{=} symbol. This argument is only appended to the \texttt{--enable-entry} configure option. For example:

```sh
OPTIONS\_DEFINE= OPT1 OPT2
OPT1\_CONFIGURE\_ENABLE= test1 test2
OPT2\_CONFIGURE\_ENABLE= test2=exhaustive
```

is equivalent to:

```sh
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
```
5.14.3.3.2. 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
```

5.14.3.3.3. 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:
Most of the time, the helpers in `OPT_CONFIGURE_ENABLE` and `OPT_CONFIGURE_WITH` provide a shorter and more comprehensive functionality.

### 5.14.3.4. CMAKE_ARGS Helpers

#### 5.14.3.4.1. 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:

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

is equivalent to:

```plaintext
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.

#### 5.14.3.4.2. 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

5.14.3.5. MESON_ARGS Helpers

5.14.3.5.1. 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

5.14.3.5.2. 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 \texttt{-D\_entry\_=true} when the option is \textit{not} selected. For example:

\begin{verbatim}
OPTIONS_DEFINE= OPT1
OPT1_MESON_TRUE=    test debug
OPT1_MESON_FALSE=   optimize
\end{verbatim}

is equivalent to:

\begin{verbatim}
OPTIONS_DEFINE= OPT1
.include <bsd.port.options.mk>
.if ${PORT_OPTIONS:MOPT1}
MESON_ARGS+=    -Dtest=true -Ddebug=true \n    -Doptimize=false
.else
MESON_ARGS+=    -Dtest=false -Ddebug=false \n    -Doptimize=true
.endif
\end{verbatim}

\textbf{5.14.3.5.3. \texttt{OPT\_MESON\_YES} and \texttt{OPT\_MESON\_NO}}

When option \textit{OPT} is selected, for each \textit{entry} in \texttt{OPT\_MESON\_YES} then \texttt{-D\_entry\_=yes} is appended to \texttt{MESON\_ARGS}. When option \textit{OPT} is \textit{not} selected, \texttt{-D\_entry\_=no} is appended to \texttt{MESON\_ARGS}. \texttt{OPT\_MESON\_NO} is the opposite, \texttt{-D\_entry\_=no} is appended to \texttt{MESON\_ARGS} when the option is selected, and \texttt{-D\_entry\_=yes} when the option is \textit{not} selected. For example:

\begin{verbatim}
OPTIONS_DEFINE= OPT1
OPT1_MESON_YES= test debug
OPT1_MESON_NO= optimize
\end{verbatim}

is equivalent to:

\begin{verbatim}
OPTIONS_DEFINE= OPT1
.include <bsd.port.options.mk>
.if ${PORT_OPTIONS:MOPT1}
MESON_ARGS+=    -Dtest=yes -Ddebug=yes \n    -Doptimize=no
.else
MESON_ARGS+=    -Dtest=no -Ddebug=no \n    -Doptimize=yes
.endif
\end{verbatim}
5.14.3.5.4. **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_=enabled is appended to MESON_ARGS when the option is selected, and -D_entry_=disabled when the option is not selected. For example:

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

is equivalent to:

```bash
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
```

5.14.3.6. **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:

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

is equivalent to:

```bash
OPTIONS_DEFINE= OPT1
.include <bsd.port.options.mk>
.if ${PORT_OPTIONS:MOPT1}
  QMAKE_ARGS+= -DTEST:BOOL=true
.else
  QMAKE_ARGS+= -DPRODUCTION:BOOL=true
.endif
```
5.14.3.7. **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
```

**Example 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
```

5.14.3.8. **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.

**Example 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
```

---

5.14.3.9. **$OPT_VARS$ 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
```
5.14.3.10. 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
```

5.14.3.11. 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
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
OPT1USES= gmake
OPT1CFLAGS_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.
5.14.3.12. 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:

```bash
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:

```bash
OPTIONS_DEFINE= OPT1
```
5.15. 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.

### 5.15.1. 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}
```

### 5.15.2. 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
```
5.15.3. **NO_WRKSUBDIR**

If the port does not extract into 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.

### 5.16. 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.

Each space-separated item in the `CONFLICTS*` variable values is matched against packages except the one being built, using shell globbing rules. This allows listing all flavors of a port in a conflict list instead of having to take pains to exclude the flavor being built from that list. For example, if `git-lite` is installed, `CONFLICTS_INSTALL=git git-lite` would allow to perform:

```
% make -C devel/git FLAVOR=lite all deinstall install
```

But the following command would report a conflict, since the package base name installed is `git-lite`, while `git` would be built, but cannot be installed in addition to `git-lite`:
Without that feature, the Makefile would need one `_flavor__CONFLICTS_INSTALL` for each flavor, listing every other flavor.

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`.

**Example 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.

**Example 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.
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
```

### 5.17. 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`.

#### 5.17.1. 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.
```

### 5.17.2. 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:

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

When multiple files need to be stripped:

```bash
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`.

### 5.17.3. 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.

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

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

```bash
post-install:
    ${MKDIR} ${STAGEDIR}${PREFIX}/share/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.

### 5.17.4. 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/share/PORTNAME.
- **DATADIR_REL** gets expanded to share/PORTNAME.
- **DOCSDIR** gets expanded to PREFIX/share/doc/PORTNAME.
- **DOCSDIR_REL** gets expanded to share/doc/PORTNAME.
- **EXAMPLESDIR** gets expanded to PREFIX/share/examples/PORTNAME.
• EXAMPLES_DIR_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 EXAMPLES_DIR 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 EXAMPLES_DIR 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.

### 5.17.5. 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.
5.18. 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.

**Example 53. Using BINARY_ALIAS to Make gsed Available as sed**

```bash
BUILD_DEPENDS= gsed:textproc/gsed
...  
BINARY_ALIAS= sed=gsed
```

**Example 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:

```bash
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.

Example 55. Create Relative Symbolic Links Automatically

```
$(RLN) uses install(1)'s relative symbolic feature which frees the porter of computing the
```
relative path.

% 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 mailing list.

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 \textbf{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 \texttt{make -VLEGAL}.

6.4.8. Examples

The preferred way to state "the distfiles for this port must be fetched manually" is as follows:

\begin{verbatim}
  .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
\end{verbatim}

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 \texttt{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 \texttt{-jX} flag to \texttt{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 \texttt{MAKE_JOBS_UNSAFE=yes} variable. It is used when a port is known to be broken with \texttt{-jX} due to race conditions causing intermittent build failures.

When setting \texttt{MAKE_JOBS_UNSAFE}, it is very important to explain either with a comment in the Makefile, or at least in the commit message, \texttt{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. \texttt{make}, \texttt{gmake}, and \texttt{imake}

Several differing \texttt{make} implementations exist. Ported software often requires a particular implementation, like GNU `\texttt{make}` , known in FreeBSD as \texttt{gmake}.

If the port uses GNU make, add \texttt{gmake} to \texttt{USES}.

\texttt{MAKE_CMD} can be used to reference the specific command configured by the \texttt{USES} setting in the port's Makefile. Only use \texttt{MAKE_CMD} within the application Makefiles in \texttt{WRKSRV} to call the \texttt{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.

Table 9. Variables for Ports That Use configure

<table>
<thead>
<tr>
<th>Variable</th>
<th>Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>GNU_CONFIGURE</td>
<td>The port uses configure script to prepare build.</td>
</tr>
<tr>
<td>HAS_CONFIGURE</td>
<td>Same as GNU_CONFIGURE, except default configure target is not added to CONFIGURE_ARGS.</td>
</tr>
<tr>
<td>CONFIGURE_ARGS</td>
<td>Additional arguments passed to configure script.</td>
</tr>
<tr>
<td>CONFIGURE_ENV</td>
<td>Additional environment variables to be set for configure script run.</td>
</tr>
<tr>
<td>CONFIGURE_TARGET</td>
<td>Override default configure target. Default value is ${MACHINE_ARCH}-portbld-freebsd${OSREL}.</td>
</tr>
</tbody>
</table>

6.5.4. Using cmake

For ports that use CMake, define USES= cmake.

Table 10. Variables for Ports That Use cmake

<table>
<thead>
<tr>
<th>Variable</th>
<th>Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMAKE_ARGS</td>
<td>Port specific CMake flags to be passed to the cmake binary.</td>
</tr>
<tr>
<td>CMAKE_ON</td>
<td>For each entry in CMAKE_ON, an enabled boolean value is added to CMAKE_ARGS. See CMAKE_ON and CMAKE_OFF.</td>
</tr>
<tr>
<td>CMAKE_OFF</td>
<td>For each entry in CMAKE_OFF, a disabled boolean value is added to CMAKE_ARGS. See CMAKE_ON and CMAKE_OFF.</td>
</tr>
<tr>
<td>CMAKE_BUILD_TYPE</td>
<td>Type of build (CMake predefined build profiles). Default is Release, or Debug if WITH_DEBUG is set.</td>
</tr>
<tr>
<td>CMAKE_SOURCE_PATH</td>
<td>Path to the source directory. Default is ${WRKSRC}.</td>
</tr>
</tbody>
</table>
### Variable Means

<table>
<thead>
<tr>
<th>Variable</th>
<th>Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONFIGURE_ENV</td>
<td>Additional environment variables to be set for the cmake binary.</td>
</tr>
</tbody>
</table>

**Table 11. Variables the Users Can Define for cmake Builds**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMAKE_NOCOLOR</td>
<td>Disables color build output. Default not set, unless BATCH or PACKAGE_BUILDING are set.</td>
</tr>
</tbody>
</table>

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.

**Example 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
```

**Example 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**.

Table 12. Variables the Users Can Define for cargo Builds

<table>
<thead>
<tr>
<th>Variable</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CARGO_CRATES</strong></td>
<td></td>
<td>List of crates the port depends on. Each entry needs to have a format like <code>cratename-semver</code> for example, <code>libc-0.2.40</code>. Port maintainers can generate this list from Cargo.lock using <code>make cargo-crates</code>. Manually bumping crate versions is possible but be mindful of transitive dependencies.</td>
</tr>
<tr>
<td><strong>CARGO_FEATURES</strong></td>
<td></td>
<td>List of application features to build (space separated list). To deactivate all default features add the special token <code>--no-default-features</code> to <strong>CARGO_FEATURES</strong>. Manually passing it to <strong>CARGO_BUILD_ARGS</strong>, <strong>CARGO_INSTALL_ARGS</strong>, and <strong>CARGO_TEST_ARGS</strong> is not needed.</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Variable</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARGO_CARGOTOML</td>
<td><code>${WRKSR}/Cargo.toml</code></td>
<td>The path to the Cargo.toml to use.</td>
</tr>
<tr>
<td>CARGO_CARGOLOCK</td>
<td><code>${WRKSR}/Cargo.lock</code></td>
<td>The path to the Cargo.lock to use for make cargo-crates. It is possible to specify more than one lock file when necessary.</td>
</tr>
<tr>
<td>CARGO_ENV</td>
<td></td>
<td>A list of environment variables to pass to Cargo similar to MAKE_ENV.</td>
</tr>
<tr>
<td>RUSTFLAGS</td>
<td></td>
<td>Flags to pass to the Rust compiler.</td>
</tr>
<tr>
<td>CARGO_CONFIGURE</td>
<td>yes</td>
<td>Use the default do-configure.</td>
</tr>
<tr>
<td>CARGO_UPDATE_ARGS</td>
<td></td>
<td>Extra arguments to pass to Cargo during the configure phase. Valid arguments can be looked up with cargo update --help.</td>
</tr>
<tr>
<td>CARGO_BUILDDEP</td>
<td>yes</td>
<td>Add a build dependency on lang/rust.</td>
</tr>
<tr>
<td>CARGO_CARGO_BIN</td>
<td><code>${LOCALBASE}/bin/cargo</code></td>
<td>Location of the cargo binary.</td>
</tr>
<tr>
<td>CARGO_BUILD</td>
<td>yes</td>
<td>Use the default do-build.</td>
</tr>
<tr>
<td>CARGO_BUILD_ARGS</td>
<td></td>
<td>Extra arguments to pass to Cargo during the build phase. Valid arguments can be looked up with cargo build --help.</td>
</tr>
<tr>
<td>CARGO_INSTALL</td>
<td>yes</td>
<td>Use the default do-install.</td>
</tr>
<tr>
<td>CARGO_INSTALL_ARGS</td>
<td></td>
<td>Extra arguments to pass to Cargo during the install phase. Valid arguments can be looked up with cargo install --help.</td>
</tr>
<tr>
<td>CARGO_INSTALL_PATH</td>
<td>.</td>
<td>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.</td>
</tr>
<tr>
<td>CARGO_TEST</td>
<td>yes</td>
<td>Use the default do-test.</td>
</tr>
<tr>
<td>Variable</td>
<td>Default</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------</td>
<td>--------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>CARGO_TEST_ARGS</td>
<td></td>
<td>Extra arguments to pass to Cargo during the test phase. Valid arguments can be looked up with <code>cargo test --help</code>.</td>
</tr>
<tr>
<td>CARGO_TARGET_DIR</td>
<td>{WRKDIR}/target</td>
<td>Location of the cargo output directory.</td>
</tr>
<tr>
<td>CARGO_DIST_SUBDIR</td>
<td>rust/crates</td>
<td>Directory relative to DISTDIR where the crate distribution files will be stored.</td>
</tr>
<tr>
<td>CARGO_VENDOR_DIR</td>
<td>{WRKSRC}/cargo-crates</td>
<td>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.</td>
</tr>
<tr>
<td>CARGO_USE_GITHUB</td>
<td>no</td>
<td>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.</td>
</tr>
<tr>
<td>CARGO_USE_GITLAB</td>
<td>no</td>
<td>Same as CARGO_USE_GITHUB but for GitLab instances and GL_TUPLE.</td>
</tr>
</tbody>
</table>

**Example 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:

```plaintext
PORTNAME=   tokei
DISTVERSIONPREFIX=  v
DISTVERSION=    7.0.2
CATEGORIES= devel

MAINTAINER= tobik@FreeBSD.org
COMMENT=    Display statistics about your code
WWW=        https://github.com/XAMPPRocky/tokei/

USES=       cargo
USE_GITHUB= yes
GH_ACCOUNT= Aaronepower
```
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
WWW= https://github.com/XAMPPRocky/tokei/

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 \
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/arrayvec-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.

**Example 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
```
Example 60. Encoding Application Features As Port Options

An example `[features]` section in Cargo.toml could look like this:

```toml
[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
```

Example 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
byteorder-1.0.1     MIT/Apache-2.0
 [...]
```

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`. 
### Table 13. Variables for Ports That Use **meson**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MESON_ARGS</strong></td>
<td>Port specific Meson flags to be passed to the meson binary.</td>
</tr>
<tr>
<td><strong>MESON_BUILD_DIR</strong></td>
<td>Path to the build directory relative to WRKSRC. Default is _build.</td>
</tr>
</tbody>
</table>

**Example 62. **USES=**meson** Example**

This snippet demonstrates the use of Meson for a port.

```plaintext
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.

**Example 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:

```plaintext
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
WWW= https://github.com/rakyll/hey/
LICENSE= APACHE20
LICENSE_FILE= ${WRKSRC}/LICENSE
USES= go:modules
GO_MODULE= github.com/rakyll/hey
PLIST_FILES= bin/hey
```

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
WWW=        https://github.com/x-motemen/ghq/

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=   \

```
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
WWW=        https://github.com/x-motemen/ghq/

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:45d19160413a: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-
```
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.

Example 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.

Example 65. Creating a Port for a Hackage-hosted Haskell Application

When preparing a Haskell Cabal port, `devel/hs-cabal-install` and `ports-mgmt/hs-cabal2tuple` programs are required, so make sure they are installed beforehand. First we need to define common ports variables that allow 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
WWW= https://www.shellcheck.net/

USES= cabal
.include <bsd.port.mk>
```
This minimal Makefile fetches the distribution file with the `cabal-extract` helper target:

```makefile
% 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 that we have ShellCheck.cabal package description file under `${WRKSRC}`, we can use `cabal-configure` to generate the build plan:

```makefile
% make cabal-configure
 [...] Resolving dependencies...
Build profile: -w ghc-8.10.7 -O1
In order, the following would be built (use -v for more details):
- Diff-0.4.1 (lib) (requires download & build)
- OneTuple-0.3.1 (lib) (requires download & build)
 [...]```

Once done, a list of required dependencies can generated:

```makefile
% 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 .cabal files only. Note additional version numbers after the `_` symbol. Put newly generated `USE_CABAL` list instead of an old one.

Finally, `distinfo` needs to be regenerated to contain all the distribution files:

```makefile
% 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          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.

Some Haskell ports install various data files under `share/${PORTNAME}`. For such cases special handling is required on the port side. The port should define the `CABAL_WRAPPER_SCRIPTS` knob listing each executable that is going to use data files. Moreover, in rare cases the program being ported uses data files of other Haskell packages, in which case the `FOO_DATADIR_VARS` comes to the rescue.

**Example 66. Handling Data Files in a Haskell Port**

devel/hs-profiteur is a Haskell application that generates a single-page HTML with some content.

```
PORTNAME= profiteur

USES= cabal

USE_CABAL= OneTuple-0.3.1_2
        QuickCheck-2.14.2
        [...]

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

It installs HTML templates under `share/profiteur`, so we need to add `CABAL_WRAPPER_SCRIPTS` knob:

```
USE_CABAL= OneTuple-0.3.1_2
        QuickCheck-2.14.2
        [...]

CABAL_WRAPPER_SCRIPTS= ${CABAL_EXECUTABLES}

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

The program also tries to access the `jquery.js` file, which is a part of `js-jquery-3.3.1` Haskell package. For that file to be found, we need to make the wrapper script to look for `js-jquery` data files in `share/profiteur` too. We use `profiteur_DATADIR_VARS` for this:
Now the port will install the actual binary into `libexec/cabal/profiteur` and the script into `bin/profiteur`.

There is no easy way to find out a proper value for the `FOO_DATADIR_VARS` knob apart from running the program and checking that everything works. Luckily, the need to use `FOO_DATADIR_VARS` is very rare.

Another corner case when porting complex Haskell programs is the presence of VCS dependencies in the `cabal.project` file.

Example 67. Porting Haskell Applications with VCS Dependencies

`net-p2p/cardano-node` is an extremely complex piece of software. In its `cabal.project` there are a lot of blocks like this:

```
[...]
source-repository-package
    type: git
    location: https://github.com/input-output-hk/cardano-crypto
    tag: f73079303f663e028288f9f4a9e08bcca39a923e
[...]
```

Dependencies of type `source-repository-package` are automatically pulled in by `cabal` during the build process. Unfortunately, this makes use of the network after the `fetch` stage. This is disallowed by the ports framework. These sources need to be listed in the port's Makefile. The `make-use-cabal` helper target can make it easy for packages hosted on GitHub. Running this target after the usual `cabal-extract` and `cabal-configure` will produce not only the `USE_CABAL` knob, but also `GH_TUPLE`:

```
% make make-use-cabal
USE_CABAL=    Diff-0.4.1 \ 
             Glob-0.10.2_3 \ 
             HUnit-1.6.2.0 \ 
             [...]

GH_TUPLE=     input-output-hk:cardano-base:0f3a867493059e650cda69e20a5cbf1ace289a57:cardano_base/dist-newstyle/src/cardano-b_-c8db9876882556ed \ 
             input-output-hk:cardano-crypto:f73079303f663e028288f9f4a9e08bcca39a923e:cardano_crypto/dist-
```
It might be useful to separate the `GH_TUPLE` items coming from `make-use-cabal` from the other ones to make it easy to update the port:

```bash
GH_TUPLE=  input-output-hk:cardano-base:0f3a867493059e650cda69e20a5cbf1ace289a57:cardano_base/dist-
newstyle/src/cardano-b_-c8db9876882556ed \
   input-output-hk:cardano-crypto:f73079383f663e028288f9f4a9e08bcca39a923e:cardano_crypto/dist-
newstyle/src/cardano-c_-253fd88117badd8f \
   [...] 
GH_TUPLE+=  bitcoin-core:secp256k1:ac83be33d0956f9af6b7f61a60ab524ef7d6a473a:secp
```

Haskell ports with VCS dependencies also require the following hack for the time being:

```bash
BINNARY_ALIAS=  git=true
```

### 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.

```bash
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:

```bash
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:

```bash
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:

```bash
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:

```bash
%%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.

<table>
<thead>
<tr>
<th>Table 14. Read-Only Variables for Ports That Use Perl</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Read only variables</strong></td>
</tr>
<tr>
<td>PERL</td>
</tr>
<tr>
<td>PERL_VERSION</td>
</tr>
<tr>
<td>PERL_LEVEL</td>
</tr>
<tr>
<td>PERL_ARCH</td>
</tr>
<tr>
<td>PERL_PORT</td>
</tr>
<tr>
<td>SITE_PERL</td>
</tr>
</tbody>
</table>

Ports of Perl modules which do not have an official website must link to cpan.org in the WWW line of Makefile. The preferred URL form is https://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.

### Example 68. Perl Dependency Example

```bash
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,

```bash
lib/perl5/5.14/man/man1/event.1.gz
lib/perl5/5.14/man/man3/AnyEvent::I3.3.gz
```

can be replaced with

```bash
%%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.

### Example 69. A Port Which Only Requires Perl to Build

As the default `USE_PERL5` value is build and run, set it to:

```bash
USES= perl5
USE_PERL5= build
```

### Example 70. 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:

```bash
USES= perl5
USE_PERL5= patch build run
```

### Example 71. A Perl Module Which Needs `ExtUtils::MakeMaker` to Build

Most Perl modules come with a Makefile.PL configure script. In this case, set:
Example 72. 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=  configure
```

If it instead requires `Module::Build::Tiny`, set

```
USES=       perl5
USE_PERL5=  modbuild
```

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`.

Example 73. `USE_XORG` Example

```
USES=       gl xorg
USE_GL=     glu
USE_XORG=   xrender xft xkbfile xt xaw
```

Table 15. Variables for Ports That Use X

<table>
<thead>
<tr>
<th>USES=</th>
<th>The port uses <code>imake</code>.</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>imake</code></td>
<td></td>
</tr>
<tr>
<td><code>XMKMF</code></td>
<td>Set to the path of <code>xmkmf</code> if not in the <code>PATH</code>. Defaults to <code>xmkmf -a</code>.</td>
</tr>
</tbody>
</table>
Example 74. Using X11-Related Variables

```bash
# 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`. Similarly, `x11-toolkits/open-motif-devel` can be chosen by setting `WANT_OPEN_MOTIF_DEVEL` in `make.conf`.

The `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.

```bash
USES= display
```

### 6.9.5. Desktop Entries

Desktop entries ([a Freedesktop standard](https://freedesktop.org/wiki/Software/gtk3desktopentries)) 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.

```bash
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
WWW= http://regexxer.sourceforge.net/

USES= gettext gmake localbase:ldflags pathfix pkgconfig tar:xz
GNU_CONFIGURE= yes
USE_GNOME= gnomeprefix intlhack gtksourceviewmm3
GLIB_SCHEMAS= org.regexxer.gschematic.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 gschematic.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.

Table 16. GNOME Components
<table>
<thead>
<tr>
<th>Component</th>
<th>Associated program</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atk</td>
<td>accessibility/atk</td>
<td>Accessibility toolkit (ATK)</td>
</tr>
<tr>
<td>atkmm</td>
<td>accessibility/atkmm</td>
<td>C++ bindings for atk</td>
</tr>
<tr>
<td>cairo</td>
<td>graphics/cairo</td>
<td>Vector graphics library with cross-device output support</td>
</tr>
<tr>
<td>cairomm</td>
<td>graphics/cairomm</td>
<td>C++ bindings for cairo</td>
</tr>
<tr>
<td>dconf</td>
<td>devel/dconf</td>
<td>Configuration database system (both, build, run)</td>
</tr>
<tr>
<td>evolutiondataserver3</td>
<td>databases/evolution-data-server</td>
<td>Data backends for the Evolution integrated mail/PIM suite</td>
</tr>
<tr>
<td>gdkpixbuf2</td>
<td>graphics/gdk-pixbuf2</td>
<td>Graphics library for GTK+</td>
</tr>
<tr>
<td>glib20</td>
<td>devel/glib20</td>
<td>GNOME core library glib20</td>
</tr>
<tr>
<td>glibmm</td>
<td>devel/glibmm</td>
<td>C++ bindings for glib20</td>
</tr>
<tr>
<td>gnomecontrolcenter3</td>
<td>sysutils/gnome-control-center</td>
<td>GNOME 3 Control Center</td>
</tr>
<tr>
<td>gnomedesktop3</td>
<td>x11/gnome-desktop</td>
<td>GNOME 3 desktop UI library</td>
</tr>
<tr>
<td>gsound</td>
<td>audio/gsound</td>
<td>GObject library for playing system sounds (both, build, run)</td>
</tr>
<tr>
<td>gtk-update-icon-cache</td>
<td>graphics/gtk-update-icon-cache</td>
<td>Gtk-update-icon-cache utility from the Gtk+ toolkit</td>
</tr>
<tr>
<td>gtk20</td>
<td>x11-toolkits/gtk20</td>
<td>Gtk+ 2 toolkit</td>
</tr>
<tr>
<td>gtk30</td>
<td>x11-toolkits/gtk30</td>
<td>Gtk+ 3 toolkit</td>
</tr>
<tr>
<td>gtkmm20</td>
<td>x11-toolkits/gtkmm20</td>
<td>C++ bindings 2.0 for the gtk20 toolkit</td>
</tr>
<tr>
<td>gtkmm24</td>
<td>x11-toolkits/gtkmm24</td>
<td>C++ bindings 2.4 for the gtk20 toolkit</td>
</tr>
<tr>
<td>gtkmm30</td>
<td>x11-toolkits/gtkmm30</td>
<td>C++ bindings 3.0 for the gtk30 toolkit</td>
</tr>
<tr>
<td>gtksourceview2</td>
<td>x11-toolkits/gtksourceview2</td>
<td>Widget that adds syntax highlighting to GtkTextView</td>
</tr>
<tr>
<td>gtksourceview3</td>
<td>x11-toolkits/gtksourceview3</td>
<td>Text widget that adds syntax highlighting to the GtkTextView widget</td>
</tr>
<tr>
<td>gtksourceviewmm3</td>
<td>x11-toolkits/gtksourceviewmm3</td>
<td>C++ bindings for the gtksourceview3 library</td>
</tr>
<tr>
<td>gvfs</td>
<td>devel/gvfs</td>
<td>GNOME virtual file system</td>
</tr>
<tr>
<td>intlttool</td>
<td>textproc/intlttool</td>
<td>Tool for internationalization (also see intlhack)</td>
</tr>
<tr>
<td>Component</td>
<td>Associated program</td>
<td>Description</td>
</tr>
<tr>
<td>----------------</td>
<td>-------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>introspection</td>
<td>devel/gobject-introspection</td>
<td>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)</td>
</tr>
<tr>
<td>libgda5</td>
<td>databases/libgda5</td>
<td>Provides uniform access to different kinds of data sources</td>
</tr>
<tr>
<td>libgda5-ui</td>
<td>databases/libgda5-ui</td>
<td>UI library from the libgda5 library</td>
</tr>
<tr>
<td>libgdamm5</td>
<td>databases/libgdamm5</td>
<td>c++ bindings for the libgda5 library</td>
</tr>
<tr>
<td>libgsf</td>
<td>devel/libgsf</td>
<td>Extensible I/O abstraction for dealing with structured file formats</td>
</tr>
<tr>
<td>librsvg2</td>
<td>graphics/librsvg2</td>
<td>Library for parsing and rendering SVG vector-graphic files</td>
</tr>
<tr>
<td>libsigc++20</td>
<td>devel/libsigc++20</td>
<td>Callback Framework for C++</td>
</tr>
<tr>
<td>libxml++26</td>
<td>textproc/libxml++26</td>
<td>c++ bindings for the libxml2 library</td>
</tr>
<tr>
<td>libxml2</td>
<td>textproc/libxml2</td>
<td>XML parser library (both, build, run)</td>
</tr>
<tr>
<td>libxslt</td>
<td>textproc/libxslt</td>
<td>XSLT C library (both, build, run)</td>
</tr>
<tr>
<td>metacity</td>
<td>x11-wm/metacity</td>
<td>Window manager from GNOME</td>
</tr>
<tr>
<td>nautilus3</td>
<td>x11-fm/nautilus</td>
<td>GNOME file manager</td>
</tr>
<tr>
<td>pango</td>
<td>x11-toolkits/pango</td>
<td>Open-source framework for the layout and rendering of i18n text</td>
</tr>
<tr>
<td>pangomm</td>
<td>x11-toolkits/pangomm</td>
<td>c++ bindings for the pango library</td>
</tr>
<tr>
<td>py3gobject3</td>
<td>devel/py3-gobject3</td>
<td>Python 3, GObject 3.0 bindings</td>
</tr>
<tr>
<td>pygobject3</td>
<td>devel/py-gobject3</td>
<td>Python 2, GObject 3.0 bindings</td>
</tr>
<tr>
<td>vte3</td>
<td>x11-toolkits/vte3</td>
<td>Terminal widget with improved accessibility and I18N support</td>
</tr>
</tbody>
</table>

Table 17. GNOME Macro Components
<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>gnomeprefix</td>
<td>Supply <code>configure</code> with some default locations.</td>
</tr>
<tr>
<td>intlhack</td>
<td>Same as intltool, but patches to make sure share/locale/ is used. Please only use when <code>intltool</code> alone is not enough.</td>
</tr>
<tr>
<td>referencehack</td>
<td>This macro is there to help splitting of the API or reference documentation into its own port.</td>
</tr>
</tbody>
</table>

Table 18. GNOME Legacy Components

<table>
<thead>
<tr>
<th>Component</th>
<th>Associated program</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>atspi</td>
<td>accessibility/at-spi</td>
<td>Assistive Technology Service Provider Interface</td>
</tr>
<tr>
<td>esound</td>
<td>audio/esound</td>
<td>Enlightenment sound package</td>
</tr>
<tr>
<td>gal2</td>
<td>x11-toolkits/gal2</td>
<td>Collection of widgets taken from GNOME 2 gnumeric</td>
</tr>
<tr>
<td>gconf2</td>
<td>devel/gconf2</td>
<td>Configuration database system for GNOME 2</td>
</tr>
<tr>
<td>gconfmm26</td>
<td>devel/gconfmm26</td>
<td>c++ bindings for gconf2</td>
</tr>
<tr>
<td>gdkpixbuf</td>
<td>graphics/gdk-pixbuf</td>
<td>Graphics library for GTK+</td>
</tr>
<tr>
<td>glib12</td>
<td>devel/glib12</td>
<td>glib 1.2 core library</td>
</tr>
<tr>
<td>gnomedocutils</td>
<td>textproc/gnome-doc-utils</td>
<td>GNOME doc utils</td>
</tr>
<tr>
<td>gnomemimedata</td>
<td>misc/gnome-mime-data</td>
<td>MIME and Application database for GNOME 2</td>
</tr>
<tr>
<td>gnomesharp20</td>
<td>x11-toolkits/gnome-sharp20</td>
<td>GNOME 2 interfaces for the .NET runtime</td>
</tr>
<tr>
<td>gnomespeech</td>
<td>accessibility/gnome-speech</td>
<td>GNOME 2 text-to-speech API</td>
</tr>
<tr>
<td>gnomevfs2</td>
<td>devel/gnome-vfs</td>
<td>GNOME 2 Virtual File System</td>
</tr>
<tr>
<td>gtk12</td>
<td>x11-toolkits/gtk12</td>
<td>Gtk+ 1.2 toolkit</td>
</tr>
<tr>
<td>gtkhtml3</td>
<td>www/gtkhtml3</td>
<td>Lightweight HTML rendering/printing/editing engine</td>
</tr>
<tr>
<td>gtkhtml4</td>
<td>www/gtkhtml4</td>
<td>Lightweight HTML rendering/printing/editing engine</td>
</tr>
<tr>
<td>gtksharp20</td>
<td>x11-toolkits/gtk-sharp20</td>
<td>GTK+ and GNOME 2 interfaces for the .NET runtime</td>
</tr>
<tr>
<td>gtksourceview</td>
<td>x11-toolkits/gtksourceview</td>
<td>Widget that adds syntax highlighting to GtkTextView</td>
</tr>
<tr>
<td>Component</td>
<td>Associated program</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------</td>
<td>--------------------------</td>
<td>----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>libartgpl2</td>
<td>graphics/libart_lgpl</td>
<td>Library for high-performance 2D graphics</td>
</tr>
<tr>
<td>libbonobo</td>
<td>devel/libbonobo</td>
<td>Component and compound document system for GNOME 2</td>
</tr>
<tr>
<td>libbonoboui</td>
<td>x11-toolkits/libbonoboui</td>
<td>GUI frontend to the libbonobo component of GNOME 2</td>
</tr>
<tr>
<td>libgda4</td>
<td>databases/libgda4</td>
<td>Provides uniform access to different kinds of data sources</td>
</tr>
<tr>
<td>libglade2</td>
<td>devel/libglade2</td>
<td>GNOME 2 glade library</td>
</tr>
<tr>
<td>libgnome</td>
<td>x11/libgnome</td>
<td>Libraries for GNOME 2, a GNU desktop environment</td>
</tr>
<tr>
<td>libgnomecanvas</td>
<td>graphics/libgnomecanvas</td>
<td>Graphics library for GNOME 2</td>
</tr>
<tr>
<td>libgnomekbd</td>
<td>x11/libgnomekbd</td>
<td>GNOME 2 keyboard shared library</td>
</tr>
<tr>
<td>libgnomeprint</td>
<td>print/libgnomeprint</td>
<td>Gnome 2 print support library</td>
</tr>
<tr>
<td>libgnomeprintui</td>
<td>x11-toolkits/libgnomeprintui</td>
<td>Libraries for the GNOME 2 GUI, a GNU desktop environment</td>
</tr>
<tr>
<td>libgnomeui</td>
<td>x11-toolkits/libgnomeui</td>
<td>Libraries for the GNOME 2 GUI, a GNU desktop environment</td>
</tr>
<tr>
<td>libgtkhtml</td>
<td>www/libgtkhtml</td>
<td>Lightweight HTML rendering/printing/editing engine</td>
</tr>
<tr>
<td>libgtksourceviewmm</td>
<td>x11-toolkits/libgtksourceviewmm</td>
<td>c++ binding of GtkSourceView</td>
</tr>
<tr>
<td>libidl</td>
<td>devel/libIDL</td>
<td>Library for creating trees of CORBA IDL file</td>
</tr>
<tr>
<td>libsigc++12</td>
<td>devel/libsigc++12</td>
<td>Callback Framework for C++</td>
</tr>
<tr>
<td>libwnck</td>
<td>x11-toolkits/libwnck</td>
<td>Library used for writing pagers and tasklists</td>
</tr>
<tr>
<td>libwnck3</td>
<td>x11-toolkits/libwnck3</td>
<td>Library used for writing pagers and tasklists</td>
</tr>
<tr>
<td>orbit2</td>
<td>devel/ORBit2</td>
<td>High-performance CORBA ORB with support for the C language</td>
</tr>
<tr>
<td>pygnome2</td>
<td>x11-toolkits/py-gnome2</td>
<td>Python bindings for GNOME 2</td>
</tr>
<tr>
<td>pygobject</td>
<td>devel/py-gobject</td>
<td>Python 2, GObject 2.0 bindings</td>
</tr>
<tr>
<td>pygtk2</td>
<td>x11-toolkits/py-gtk2</td>
<td>Set of Python bindings for GTK+</td>
</tr>
<tr>
<td>pygtksourceview</td>
<td>x11-toolkits/py-gtksourceview</td>
<td>Python bindings for GtkSourceView 2</td>
</tr>
<tr>
<td>Component</td>
<td>Associated program</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
<td>--------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>vte</td>
<td>x11-toolkits/vte</td>
<td>Terminal widget with improved accessibility and I18N support</td>
</tr>
</tbody>
</table>

Table 19. Deprecated Components: Do Not Use

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>pangox-compat</td>
<td>pangox-compat has been deprecated and split off from the pango package.</td>
</tr>
</tbody>
</table>

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 and Qt 6 with USES+=qt:5 and USES+=qt:6 respectively. 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:

Table 20. Variables Provided to Ports That Use Qt

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>QMAKE</td>
<td>Full path to qmake binary.</td>
</tr>
<tr>
<td>LRELEASE</td>
<td>Full path to lrelease utility.</td>
</tr>
<tr>
<td>MOC</td>
<td>Full path to moc.</td>
</tr>
<tr>
<td>RCC</td>
<td>Full path to rcc.</td>
</tr>
<tr>
<td>UIC</td>
<td>Full path to uic.</td>
</tr>
<tr>
<td>QT_INCDIR</td>
<td>Qt include directory.</td>
</tr>
<tr>
<td>QT_LIBDIR</td>
<td>Qt libraries path.</td>
</tr>
<tr>
<td>QT_PLUGINDIR</td>
<td>Qt plugins path.</td>
</tr>
</tbody>
</table>

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, which is generated from _USE_QT_COMMON and _USE_QT[56]_ONLY in /usr/ports/Mk/Uses/qt.mk):

Table 21. Available Qt Library Components
<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3d</td>
<td>Qt3D module</td>
</tr>
<tr>
<td>5compat</td>
<td>Qt 5 compatibility module for Qt 6</td>
</tr>
<tr>
<td>assistant</td>
<td>Qt 5 documentation browser</td>
</tr>
<tr>
<td>base</td>
<td>Qt 6 base module</td>
</tr>
<tr>
<td>canvas3d</td>
<td>Qt canvas3d module</td>
</tr>
<tr>
<td>charts</td>
<td>Qt 5 charts module</td>
</tr>
<tr>
<td>concurrent</td>
<td>Qt multi-threading module</td>
</tr>
<tr>
<td>connectivity</td>
<td>Qt connectivity (Bluetooth/NFC) module</td>
</tr>
<tr>
<td>core</td>
<td>Qt core non-graphical module</td>
</tr>
<tr>
<td>datavis3d</td>
<td>Qt 5 3D data visualization module</td>
</tr>
<tr>
<td>dbus</td>
<td>Qt D-Bus inter-process communication module</td>
</tr>
<tr>
<td>declarative</td>
<td>Qt declarative framework for dynamic user interfaces</td>
</tr>
<tr>
<td>designer</td>
<td>Qt 5 graphical user interface designer</td>
</tr>
<tr>
<td>diag</td>
<td>Tool for reporting diagnostic information about Qt and its environment</td>
</tr>
<tr>
<td>doc</td>
<td>Qt 5 documentation</td>
</tr>
<tr>
<td>examples</td>
<td>Qt 5 examples sourcecode</td>
</tr>
<tr>
<td>gamepad</td>
<td>Qt 5 Gamepad Module</td>
</tr>
<tr>
<td>graphicaleffects</td>
<td>Qt Quick graphical effects</td>
</tr>
<tr>
<td>gui</td>
<td>Qt graphical user interface module</td>
</tr>
<tr>
<td>help</td>
<td>Qt online help integration module</td>
</tr>
<tr>
<td>l10n</td>
<td>Qt localized messages</td>
</tr>
<tr>
<td>languageserver</td>
<td>Qt 6 Language Server Protocol implementation</td>
</tr>
<tr>
<td>linguist</td>
<td>Qt 5 translation tool</td>
</tr>
<tr>
<td>location</td>
<td>Qt location module</td>
</tr>
<tr>
<td>lottie</td>
<td>Qt 6 QML API for rendering graphics and animations</td>
</tr>
<tr>
<td>multimedia</td>
<td>Qt audio, video, radio and camera support module</td>
</tr>
<tr>
<td>network</td>
<td>Qt network module</td>
</tr>
<tr>
<td>networkauth</td>
<td>Qt network auth module</td>
</tr>
<tr>
<td>opengl</td>
<td>Qt 5-compatible OpenGL support module</td>
</tr>
<tr>
<td>paths</td>
<td>Command line client to QStandardPaths</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------</td>
<td>------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>phonon4</td>
<td>KDE multimedia framework</td>
</tr>
<tr>
<td>pixeltool</td>
<td>Qt 5 screen magnifier</td>
</tr>
<tr>
<td>plugininfo</td>
<td>Qt 5 plugin metadata dumper</td>
</tr>
<tr>
<td>positioning</td>
<td>Qt 6 positioning API from sources such as satellite, wifi or text files.</td>
</tr>
<tr>
<td>printsupport</td>
<td>Qt print support module</td>
</tr>
<tr>
<td>qdbus</td>
<td>Qt command-line interface to D-Bus</td>
</tr>
<tr>
<td>qdbusviewer</td>
<td>Qt 5 graphical interface to D-Bus</td>
</tr>
<tr>
<td>qdoc</td>
<td>Qt documentation generator</td>
</tr>
<tr>
<td>qdoc-data</td>
<td>QDoc configuration files</td>
</tr>
<tr>
<td>qev</td>
<td>Qt QWizard events introspection tool</td>
</tr>
<tr>
<td>qmake</td>
<td>Qt Makefile generator</td>
</tr>
<tr>
<td>quickcontrols</td>
<td>Set of controls for building complete interfaces in Qt Quick</td>
</tr>
<tr>
<td>quickcontrols2</td>
<td>Set of controls for building complete interfaces in Qt Quick</td>
</tr>
<tr>
<td>remoteobjects</td>
<td>Qt 5 SXCML module</td>
</tr>
<tr>
<td>script</td>
<td>Qt 4-compatible scripting module</td>
</tr>
<tr>
<td>scripttools</td>
<td>Qt Script additional components</td>
</tr>
<tr>
<td>scxml</td>
<td>Qt 5 SXCML module</td>
</tr>
<tr>
<td>sensors</td>
<td>Qt sensors module</td>
</tr>
<tr>
<td>serialbus</td>
<td>Qt functions to access industrial bus systems</td>
</tr>
<tr>
<td>serialport</td>
<td>Qt functions to access serial ports</td>
</tr>
<tr>
<td>shadertools</td>
<td>Qt 6 tools for the cross-platform Qt shader pipeline</td>
</tr>
<tr>
<td>speech</td>
<td>Accessibility features for Qt5</td>
</tr>
<tr>
<td>sql</td>
<td>Qt SQL database integration module</td>
</tr>
<tr>
<td>sql-ibase</td>
<td>Qt InterBase/Firebird database plugin</td>
</tr>
<tr>
<td>sql-mysql</td>
<td>Qt MySQL database plugin</td>
</tr>
<tr>
<td>sql-odbc</td>
<td>Qt Open Database Connectivity plugin</td>
</tr>
<tr>
<td>sql-pgsql</td>
<td>Qt PostgreSQL database plugin</td>
</tr>
<tr>
<td>sql-sqlite2</td>
<td>Qt SQLite 2 database plugin</td>
</tr>
<tr>
<td>sql-sqlite3</td>
<td>Qt SQLite 3 database plugin</td>
</tr>
<tr>
<td>sql-tds</td>
<td>Qt TDS Database Connectivity database plugin</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>svg</td>
<td>Qt SVG support module</td>
</tr>
<tr>
<td>testlib</td>
<td>Qt unit testing module</td>
</tr>
<tr>
<td>tools</td>
<td>Qt 6 assorted tools</td>
</tr>
<tr>
<td>translations</td>
<td>Qt 6 translation module</td>
</tr>
<tr>
<td>uiplugin</td>
<td>Custom Qt widget plugin interface for Qt Designer</td>
</tr>
<tr>
<td>uitools</td>
<td>Qt Designer UI forms support module</td>
</tr>
<tr>
<td>virtualkeyboard</td>
<td>Qt 5 Virtual Keyboard Module</td>
</tr>
<tr>
<td>wayland</td>
<td>Qt 5 wrapper for Wayland</td>
</tr>
<tr>
<td>webchannel</td>
<td>Qt 5 library for integration of C++/QML with HTML/js clients</td>
</tr>
<tr>
<td>webengine</td>
<td>Qt 5 library to render web content</td>
</tr>
<tr>
<td>webkit</td>
<td>QtWebKit with a more modern WebKit code base</td>
</tr>
<tr>
<td>websockets</td>
<td>Qt implementation of WebSocket protocol</td>
</tr>
<tr>
<td>websockets-qml</td>
<td>Qt implementation of WebSocket protocol (QML bindings)</td>
</tr>
<tr>
<td>webview</td>
<td>Qt component for displaying web content</td>
</tr>
<tr>
<td>widgets</td>
<td>Qt C++ widgets module</td>
</tr>
<tr>
<td>x11extras</td>
<td>Qt platform-specific features for X11-based systems</td>
</tr>
<tr>
<td>xml</td>
<td>Qt SAX and DOM implementations</td>
</tr>
<tr>
<td>xmlpatterns</td>
<td>Qt support for XPath, XQuery, XSLT and XML Schema</td>
</tr>
</tbody>
</table>

To determine the libraries an application depends on, run `ldd` on the main executable after a successful compilation.

**Table 22. Available Qt Tool Components**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>buildtools</td>
<td>build tools (<code>moc, rcc</code>), needed for almost every Qt application.</td>
</tr>
<tr>
<td>linguisttools</td>
<td>localization tools: <code>lrelease, lupdate</code></td>
</tr>
<tr>
<td>qmake</td>
<td>Makefile generator/build utility</td>
</tr>
</tbody>
</table>

**Table 23. Available Qt Plugin Components**
Example 75. 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.

Table 24. Possible Arguments for USES= qmake

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>no_configure</td>
<td>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.</td>
</tr>
<tr>
<td>no_env</td>
<td>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.</td>
</tr>
<tr>
<td>norecursive</td>
<td>Do not pass the -recursive argument to qmake.</td>
</tr>
<tr>
<td>outsource</td>
<td>Perform an out-of-source build.</td>
</tr>
</tbody>
</table>

Table 25. Variables for Ports That Use qmake

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>QMAKE_ARGS</td>
<td>Port specific qmake flags to be passed to the qmake binary.</td>
</tr>
<tr>
<td>Variable</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>QMAKE_ENV</td>
<td>Environment variables to be set for the qmake binary. The default is ${CONFIGURE_ENV}.</td>
</tr>
<tr>
<td>QMAKE_SOURCE_PATH</td>
<td>Path to qmake project files (.pro). The default is ${WRKSRC} if an out-of-source build is requested, empty otherwise.</td>
</tr>
</tbody>
</table>

When using `USES= qmake`, these settings are deployed:

```bash
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`.

**Example 76. USES= qmake Example**

This snippet demonstrates the use of qmake for a Qt 5 port:

```bash
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:

  ```bash
  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):

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>activities</td>
<td>KF5 runtime and library to organize work in separate activities</td>
</tr>
<tr>
<td>activities-stats</td>
<td>KF5 statistics for activities</td>
</tr>
<tr>
<td>activitymanagerd</td>
<td>System service to manage user's activities, track the usage patterns</td>
</tr>
<tr>
<td>akonadi</td>
<td>Storage server for KDE-Pim</td>
</tr>
<tr>
<td>akonadicalendar</td>
<td>Akonadi Calendar Integration</td>
</tr>
<tr>
<td>akonadiconsole</td>
<td>Akonadi management and debugging console</td>
</tr>
<tr>
<td>akonadicontacts</td>
<td>Libraries and daemons to implement Contact Management in Akonadi</td>
</tr>
<tr>
<td>akonadiimportwizard</td>
<td>Import data from other mail clients to KMail</td>
</tr>
<tr>
<td>akonadimime</td>
<td>Libraries and daemons to implement basic email handling</td>
</tr>
<tr>
<td>akonadinotes</td>
<td>KDE library for accessing mail storages in MBox format</td>
</tr>
<tr>
<td>akonadisearch</td>
<td>Libraries and daemons to implement searching in Akonadi</td>
</tr>
<tr>
<td>akregator</td>
<td>A Feed Reader by KDE</td>
</tr>
<tr>
<td>alarmcalendar</td>
<td>KDE API for KAlarm alarms</td>
</tr>
<tr>
<td>apidox</td>
<td>KF5 API Documentation Tools</td>
</tr>
<tr>
<td>archive</td>
<td>KF5 library that provides classes for handling archive formats</td>
</tr>
<tr>
<td>attica</td>
<td>Open Collaboration Services API library KDE5 version</td>
</tr>
<tr>
<td>attica5</td>
<td>Open Collaboration Services API library KDE5 version</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------------------------------------------------------</td>
</tr>
<tr>
<td>auth</td>
<td>KF5 abstraction to system policy and authentication features</td>
</tr>
<tr>
<td>baloo</td>
<td>KF5 Framework for searching and managing user metadata</td>
</tr>
<tr>
<td>baloo-widgets</td>
<td>BalooWidgets library</td>
</tr>
<tr>
<td>baloo5</td>
<td>KF5 Framework for searching and managing user metadata</td>
</tr>
<tr>
<td>blog</td>
<td>KDE API for blogging access</td>
</tr>
<tr>
<td>bookmarks</td>
<td>KF5 library for bookmarks and the XBEL format</td>
</tr>
<tr>
<td>breeze</td>
<td>Plasma5 artwork, styles and assets for the Breeze visual style</td>
</tr>
<tr>
<td>breeze-gtk</td>
<td>Plasma5 Breeze visual style for Gtk</td>
</tr>
<tr>
<td>breeze-icons</td>
<td>Breeze icon theme for KDE</td>
</tr>
<tr>
<td>calendarcore</td>
<td>KDE calendar access library</td>
</tr>
<tr>
<td>calendarsupport</td>
<td>Calendar support libraries for KDEPim</td>
</tr>
<tr>
<td>calendarutils</td>
<td>KDE utility and user interface functions for accessing calendar</td>
</tr>
<tr>
<td>codecs</td>
<td>KF5 library for string manipulation</td>
</tr>
<tr>
<td>completion</td>
<td>KF5 text completion helpers and widgets</td>
</tr>
<tr>
<td>config</td>
<td>KF5 widgets for configuration dialogs</td>
</tr>
<tr>
<td>configwidgets</td>
<td>KF5 widgets for configuration dialogs</td>
</tr>
<tr>
<td>contacts</td>
<td>KDE api to manage contact information</td>
</tr>
<tr>
<td>coreaddons</td>
<td>KF5 addons to QtCore</td>
</tr>
<tr>
<td>crash</td>
<td>KF5 library to handle crash analysis and bug report from apps</td>
</tr>
<tr>
<td>dbusaddons</td>
<td>KF5 addons to QtDBus</td>
</tr>
<tr>
<td>decoration</td>
<td>Plasma5 library to create window decorations</td>
</tr>
<tr>
<td>discover</td>
<td>Plasma5 package management tools</td>
</tr>
<tr>
<td>dnsstd</td>
<td>KF5 abstraction to system DNSSD features</td>
</tr>
<tr>
<td>doctools</td>
<td>KF5 documentation generation from docbook</td>
</tr>
<tr>
<td>drkonqi</td>
<td>Plasma5 crash handler</td>
</tr>
<tr>
<td>ecm</td>
<td>Extra modules and scripts for CMake</td>
</tr>
<tr>
<td>emoticons</td>
<td>KF5 library to convert emoticons</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>eventviews</td>
<td>Event view libraries for KDEPim</td>
</tr>
<tr>
<td>filemetadata</td>
<td>KF5 library for extracting file metadata</td>
</tr>
<tr>
<td>frameworkintegration</td>
<td>KF5 workspace and cross-framework integration plugins</td>
</tr>
<tr>
<td>gapi</td>
<td>KDE based library to access google services</td>
</tr>
<tr>
<td>globalaccel</td>
<td>KF5 library to add support for global workspace shortcuts</td>
</tr>
<tr>
<td>grantlee-editor</td>
<td>Editor for Grantlee themes</td>
</tr>
<tr>
<td>grantleetheme</td>
<td>KDE PIM grantleetheme</td>
</tr>
<tr>
<td>gravatar</td>
<td>Library for gravavatar support</td>
</tr>
<tr>
<td>guiaddons</td>
<td>KF5 addons to QtGui</td>
</tr>
<tr>
<td>holidays</td>
<td>KDE library for calendar holidays</td>
</tr>
<tr>
<td>hotkeys</td>
<td>Plasma5 library for hotkeys</td>
</tr>
<tr>
<td>i18n</td>
<td>KF5 advanced internationalization framework</td>
</tr>
<tr>
<td>iconthemes</td>
<td>KF5 library for handling icons in applications</td>
</tr>
<tr>
<td>identitymanagement</td>
<td>KDE pim identities</td>
</tr>
<tr>
<td>idletime</td>
<td>KF5 library for monitoring user activity</td>
</tr>
<tr>
<td>imap</td>
<td>KDE API for IMAP support</td>
</tr>
<tr>
<td>incidenceeditor</td>
<td>Incidence editor libraries for KDEPim</td>
</tr>
<tr>
<td>infocenter</td>
<td>Plasma5 utility providing system information</td>
</tr>
<tr>
<td>init</td>
<td>KF5 process launcher to speed up launching KDE applications</td>
</tr>
<tr>
<td>itemmodels</td>
<td>KF5 models for Qt Model/View system</td>
</tr>
<tr>
<td>itemviews</td>
<td>KF5 widget addons for Qt Model/View</td>
</tr>
<tr>
<td>jobwidgets</td>
<td>KF5 widgets for tracking KJob instance</td>
</tr>
<tr>
<td>js</td>
<td>KF5 library providing an ECMAScript interpreter</td>
</tr>
<tr>
<td>jsembed</td>
<td>KF5 library for binding JavaScript objects to QObjects</td>
</tr>
<tr>
<td>kaddressbook</td>
<td>KDE contact manager</td>
</tr>
<tr>
<td>kalarm</td>
<td>Personal alarm scheduler</td>
</tr>
<tr>
<td>kalarm</td>
<td>Personal alarm scheduler</td>
</tr>
<tr>
<td>kate</td>
<td>Basic editor framework for the KDE system</td>
</tr>
<tr>
<td>kcmutils</td>
<td>KF5 utilities for working with KCModules</td>
</tr>
<tr>
<td>kde-cli-tools</td>
<td>Plasma5 non-interactive system tools</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------</td>
<td>------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>kde-gtk-config</td>
<td>Plasma5 GTK2 and GTK3 configurator</td>
</tr>
<tr>
<td>kdeclarative</td>
<td>KF5 library providing integration of QML and KDE Frameworks</td>
</tr>
<tr>
<td>kded</td>
<td>KF5 extensible daemon for providing system level services</td>
</tr>
<tr>
<td>kdelibs4support</td>
<td>KF5 porting aid from KDELibs4</td>
</tr>
<tr>
<td>kdepm-addons</td>
<td>KDE PIM addons</td>
</tr>
<tr>
<td>kdepm-apps-libs</td>
<td>KDE PIM mail related libraries</td>
</tr>
<tr>
<td>kdepm-runtime5</td>
<td>KDE PIM tools and services</td>
</tr>
<tr>
<td>kdeplasma-addons</td>
<td>Plasma5 addons to improve the Plasma experience</td>
</tr>
<tr>
<td>kdesu</td>
<td>KF5 integration with su for elevated privileges</td>
</tr>
<tr>
<td>kdewebkit</td>
<td>KF5 library providing integration of QtWebKit</td>
</tr>
<tr>
<td>kgamma5</td>
<td>Plasma5 monitor's gamma settings</td>
</tr>
<tr>
<td>khtml</td>
<td>KF5 KTHML rendering engine</td>
</tr>
<tr>
<td>kimageformats</td>
<td>KF5 library providing support for additional image formats</td>
</tr>
<tr>
<td>kio</td>
<td>KF5 resource and network access abstraction</td>
</tr>
<tr>
<td>kirigami2</td>
<td>QtQuick based components set</td>
</tr>
<tr>
<td>kitinerary</td>
<td>Data Model and Extraction System for Travel Reservation information</td>
</tr>
<tr>
<td>kmail</td>
<td>KDE mail client</td>
</tr>
<tr>
<td>kmail</td>
<td>KDE mail client</td>
</tr>
<tr>
<td>kmail-account-wizard</td>
<td>KDE mail account wizard</td>
</tr>
<tr>
<td>kmenuedit</td>
<td>Plasma5 menu editor</td>
</tr>
<tr>
<td>knotes</td>
<td>Popup notes</td>
</tr>
<tr>
<td>kontakt</td>
<td>KDE Personal Information Manager</td>
</tr>
<tr>
<td>kontakt</td>
<td>KDE Personal Information Manager</td>
</tr>
<tr>
<td>contactinterface</td>
<td>KDE glue for embedding KParts into Kontakt</td>
</tr>
<tr>
<td>korganizer</td>
<td>Calendar and scheduling Program</td>
</tr>
<tr>
<td>kpimdav</td>
<td>A DAV protocol implementation with KJobs</td>
</tr>
<tr>
<td>kpkpass</td>
<td>Library to deal with Apple Wallet pass files</td>
</tr>
<tr>
<td>kross</td>
<td>KF5 multi-language application scripting</td>
</tr>
<tr>
<td>kscreen</td>
<td>Plasma5 screen management library</td>
</tr>
<tr>
<td>kscreenlocker</td>
<td>Plasma5 secure lock screen architecture</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>ksmtp</td>
<td>Job-based library to send email through an SMTP server</td>
</tr>
<tr>
<td>ksshaskpass</td>
<td>Plasma5 ssh-add frontend</td>
</tr>
<tr>
<td>ksysguard</td>
<td>Plasma5 utility to track and control the running processes</td>
</tr>
<tr>
<td>kwallet-pam</td>
<td>Plasma5 KWallet PAM Integration</td>
</tr>
<tr>
<td>kwayland-integration</td>
<td>Integration plugins for a Wayland-based desktop</td>
</tr>
<tr>
<td>kwin</td>
<td>Plasma5 window manager</td>
</tr>
<tr>
<td>kwrited</td>
<td>Plasma5 daemon listening for wall and write messages</td>
</tr>
<tr>
<td>ldap</td>
<td>LDAP access API for KDE</td>
</tr>
<tr>
<td>libkcddb</td>
<td>KDE CDDB library</td>
</tr>
<tr>
<td>libkcompactdisc</td>
<td>KDE library for interfacing with audio CDs</td>
</tr>
<tr>
<td>libkdcraw</td>
<td>LibRaw interface for KDE</td>
</tr>
<tr>
<td>libkdegames</td>
<td>Libraries used by KDE games</td>
</tr>
<tr>
<td>libkdepim</td>
<td>KDE PIM Libraries</td>
</tr>
<tr>
<td>libkeduvocdocument</td>
<td>Library for reading and writing vocabulary files</td>
</tr>
<tr>
<td>libkexiv2</td>
<td>Exiv2 library interface for KDE</td>
</tr>
<tr>
<td>libkipi</td>
<td>KDE Image Plugin Interface</td>
</tr>
<tr>
<td>libkleo</td>
<td>Certificate manager for KDE</td>
</tr>
<tr>
<td>libksane</td>
<td>SANE library interface for KDE</td>
</tr>
<tr>
<td>libkscreen</td>
<td>Plasma5 screen management library</td>
</tr>
<tr>
<td>libksieve</td>
<td>Sieve libraries for KDEPim</td>
</tr>
<tr>
<td>libksysguard</td>
<td>Plasma5 library to track and control running processes</td>
</tr>
<tr>
<td>mailcommon</td>
<td>Common libraries for KDEPim</td>
</tr>
<tr>
<td>mailimporter</td>
<td>Import mbox files to KMail</td>
</tr>
<tr>
<td>mailtransport</td>
<td>KDE library to managing mail transport</td>
</tr>
<tr>
<td>marble</td>
<td>Virtual globe and world atlas for KDE</td>
</tr>
<tr>
<td>mbox</td>
<td>KDE library for accessing mail storages in MBox format</td>
</tr>
<tr>
<td>mbox-importer</td>
<td>Import mbox files to KMail</td>
</tr>
<tr>
<td>mediaplayer</td>
<td>KF5 plugin interface for media player features</td>
</tr>
<tr>
<td>messagelib</td>
<td>Library for handling messages</td>
</tr>
<tr>
<td>milou</td>
<td>Plasma5 Plasmoid for search</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------</td>
<td>-----------------------------------------------------------</td>
</tr>
<tr>
<td>mime</td>
<td>Library for handling MIME data</td>
</tr>
<tr>
<td>newstuff</td>
<td>KF5 library for downloading application assets from the network</td>
</tr>
<tr>
<td>notifications</td>
<td>KF5 abstraction for system notifications</td>
</tr>
<tr>
<td>notifyconfig</td>
<td>KF5 configuration system for KNotify</td>
</tr>
<tr>
<td>okular</td>
<td>KDE universal document viewer</td>
</tr>
<tr>
<td>oxygen</td>
<td>Plasma5 Oxygen style</td>
</tr>
<tr>
<td>oxygen-icons5</td>
<td>The Oxygen icon theme for KDE</td>
</tr>
<tr>
<td>package</td>
<td>KF5 library to load and install packages</td>
</tr>
<tr>
<td>parts</td>
<td>KF5 document centric plugin system</td>
</tr>
<tr>
<td>people</td>
<td>KF5 library providing access to contacts</td>
</tr>
<tr>
<td>pim-data-exporter</td>
<td>Import and export KDE PIM settings</td>
</tr>
<tr>
<td>pimcommon</td>
<td>Common libraries for KDE PIM</td>
</tr>
<tr>
<td>pimtextedit</td>
<td>KDE library for PIM-specific text editing utilities</td>
</tr>
<tr>
<td>plasma-browser-integration</td>
<td>Plasma5 components to integrate browsers into the desktop</td>
</tr>
<tr>
<td>plasma-desktop</td>
<td>Plasma5 plasma desktop</td>
</tr>
<tr>
<td>plasma-framework</td>
<td>KF5 plugin based UI runtime used to write user interfaces</td>
</tr>
<tr>
<td>plasma-integration</td>
<td>Qt Platform Theme integration plugins for the Plasma workspaces</td>
</tr>
<tr>
<td>plasma-pa</td>
<td>Plasma5 Plasma pulse audio mixer</td>
</tr>
<tr>
<td>plasma-sdk</td>
<td>Plasma5 applications useful for Plasma development</td>
</tr>
<tr>
<td>plasma-workspace</td>
<td>Plasma5 Plasma workspace</td>
</tr>
<tr>
<td>plasma-workspace-wallpapers</td>
<td>Plasma5 wallpapers</td>
</tr>
<tr>
<td>plotting</td>
<td>KF5 lightweight plotting framework</td>
</tr>
<tr>
<td>polkit-kde-agent-1</td>
<td>Plasma5 daemon providing a polkit authentication UI</td>
</tr>
<tr>
<td>powerdevil</td>
<td>Plasma5 tool to manage the power consumption settings</td>
</tr>
<tr>
<td>prison</td>
<td>API to produce barcodes</td>
</tr>
<tr>
<td>pty</td>
<td>KF5 pty abstraction</td>
</tr>
<tr>
<td>purpose</td>
<td>Offers available actions for a specific purpose</td>
</tr>
<tr>
<td>qqc2-desktop-style</td>
<td>Qt QuickControl2 style for KDE</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------</td>
<td>-------------------------------------------------------</td>
</tr>
<tr>
<td>runner</td>
<td>KF5 parallelized query system</td>
</tr>
<tr>
<td>service</td>
<td>KF5 advanced plugin and service introspection</td>
</tr>
<tr>
<td>solid</td>
<td>KF5 hardware integration and detection</td>
</tr>
<tr>
<td>sonnet</td>
<td>KF5 plugin-based spell checking library</td>
</tr>
<tr>
<td>syndication</td>
<td>KDE RSS feed handling library</td>
</tr>
<tr>
<td>syntaxhighlighting</td>
<td>KF5 syntax highlighting engine for structured text and code</td>
</tr>
<tr>
<td>systemsettings</td>
<td>Plasma5 system settings</td>
</tr>
<tr>
<td>texteditor</td>
<td>KF5 advanced embeddable text editor</td>
</tr>
<tr>
<td>textwidgets</td>
<td>KF5 advanced text editing widgets</td>
</tr>
<tr>
<td>threadweaver</td>
<td>KF5 addons to QtDBus</td>
</tr>
<tr>
<td>tnef</td>
<td>KDE API for the handling of TNEF data</td>
</tr>
<tr>
<td>unitconversion</td>
<td>KF5 library for unit conversion</td>
</tr>
<tr>
<td>user-manager</td>
<td>Plasma5 user manager</td>
</tr>
<tr>
<td>wallet</td>
<td>KF5 secure and unified container for user passwords</td>
</tr>
<tr>
<td>wayland</td>
<td>KF5 Client and Server library wrapper for the Wayland libraries</td>
</tr>
<tr>
<td>widgetsaddons</td>
<td>KF5 addons to QtWidgets</td>
</tr>
<tr>
<td>windowsystem</td>
<td>KF5 library for access to the windowing system</td>
</tr>
<tr>
<td>xmlgui</td>
<td>KF5 user configurable main windows</td>
</tr>
<tr>
<td>xmlrpcclient</td>
<td>KF5 interaction with XMLRPC services</td>
</tr>
</tbody>
</table>

**Example 77. 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.

Table 27. Available LXQt Components

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>buildtools</td>
<td>Helpers for additional CMake modules</td>
</tr>
<tr>
<td>libfmqt</td>
<td>Libfm Qt bindings</td>
</tr>
<tr>
<td>lxqt</td>
<td>LXQt core library</td>
</tr>
<tr>
<td>qtxdg</td>
<td>Qt implementation of freedesktop.org XDG</td>
</tr>
</tbody>
</table>

Example 78. `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/openjdk18`, with `java/openjdk17`, `java/openjdk16`, `java/openjdk15`, `java/openjdk14`, `java/openjdk13`, `java/openjdk12`, `java/openjdk11`, `java/openjdk8`, and `java/openjdk7` also available.

Table 28. Variables Which May be Set by Ports That Use Java

<table>
<thead>
<tr>
<th>Variable</th>
<th>Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>USE_JAVA</td>
<td>Define for the remaining variables to have any effect.</td>
</tr>
<tr>
<td>JAVA_VERSION</td>
<td>List of space-separated suitable Java versions for the port. An optional &quot;+&quot; allows specifying a range of versions (allowed values: 7[<em>] 8[+] 11[</em>] 12[+] 13[+] 14[+] 15[+] 16[+] 17[+] 18[*]).</td>
</tr>
<tr>
<td>Variable</td>
<td>Means</td>
</tr>
<tr>
<td>-----------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>JAVA_OS</td>
<td>List of space-separated suitable JDK port operating systems for the port (allowed values: native linux).</td>
</tr>
<tr>
<td>JAVA_VENDOR</td>
<td>List of space-separated suitable JDK port vendors for the port (allowed values: openjdk oracle).</td>
</tr>
<tr>
<td>JAVA_BUILD</td>
<td>When set, add the selected JDK port to the build dependencies.</td>
</tr>
<tr>
<td>JAVA_RUN</td>
<td>When set, add the selected JDK port to the run dependencies.</td>
</tr>
<tr>
<td>JAVA_EXTRACT</td>
<td>When set, add the selected JDK port to the extract dependencies.</td>
</tr>
</tbody>
</table>

Below is the list of all settings a port will receive after setting `USE_JAVA`:

**Table 29. Variables Provided to Ports That Use Java**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>JAVA_PORT</td>
<td>The name of the JDK port (for example, java/openjdk6).</td>
</tr>
<tr>
<td>JAVA_PORT_VERSION</td>
<td>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/}.</td>
</tr>
<tr>
<td>JAVA_PORT_OS</td>
<td>The operating system used by the JDK port (for example, 'native').</td>
</tr>
<tr>
<td>JAVA_PORT_VENDOR</td>
<td>The vendor of the JDK port (for example, 'openjdk').</td>
</tr>
<tr>
<td>JAVA_PORT_OS_DESCRIPTION</td>
<td>Description of the operating system used by the JDK port (for example, 'Native').</td>
</tr>
<tr>
<td>JAVA_PORT_VENDOR_DESCRIPTION</td>
<td>Description of the vendor of the JDK port (for example, 'OpenJDK BSD Porting Team').</td>
</tr>
<tr>
<td>JAVA_HOME</td>
<td>Path to the installation directory of the JDK (for example, '/usr/local/openjdk6').</td>
</tr>
<tr>
<td>JAVAC</td>
<td>Path to the Java compiler to use (for example, '/usr/local/openjdk6/bin/javac').</td>
</tr>
<tr>
<td>JAR</td>
<td>Path to the jar tool to use (for example, '/usr/local/openjdk6/bin/jar' or '/usr/local/bin/fastjar').</td>
</tr>
<tr>
<td>APPELTVIEWER</td>
<td>Path to the appletviewer utility (for example, '/usr/local/openjdk6/bin/appletviewer').</td>
</tr>
<tr>
<td>Variable</td>
<td>Value</td>
</tr>
<tr>
<td>---------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>JAVA</strong></td>
<td>Path to the java executable. Use this for executing Java programs (for example, '/usr/local/openjdk6/bin/java').</td>
</tr>
<tr>
<td><strong>JAVADOC</strong></td>
<td>Path to the javadoc utility program.</td>
</tr>
<tr>
<td><strong>JAVAH</strong></td>
<td>Path to the javah program.</td>
</tr>
<tr>
<td><strong>JAVAP</strong></td>
<td>Path to the javap program.</td>
</tr>
<tr>
<td><strong>JAVA_KEY TOOL</strong></td>
<td>Path to the keytool utility program.</td>
</tr>
<tr>
<td><strong>JAVA_N2A</strong></td>
<td>Path to the native2ascii tool.</td>
</tr>
<tr>
<td><strong>JAVA_POLICY TOOL</strong></td>
<td>Path to the policytool program.</td>
</tr>
<tr>
<td><strong>JAVA_SERIALVER</strong></td>
<td>Path to the serialver utility program.</td>
</tr>
<tr>
<td><strong>RMIC</strong></td>
<td>Path to the RMI stub/skeleton generator, rmic.</td>
</tr>
<tr>
<td><strong>RMIREGISTRY</strong></td>
<td>Path to the RMI registry program, rmiregistry.</td>
</tr>
<tr>
<td><strong>RMI</strong></td>
<td>Path to the RMI daemon program rmid.</td>
</tr>
<tr>
<td><strong>JAVA_CLASSES</strong></td>
<td>Path to the archive that contains the JDK class files, ${JAVA_HOME}/jre/lib/rt.jar.</td>
</tr>
</tbody>
</table>

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:

**Table 30. Constants Defined for Ports That Use Java**

<table>
<thead>
<tr>
<th>Constant</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>JAVASHAREDIR</strong></td>
<td>The base directory for everything related to Java. Default: ${PREFIX}/share/java.</td>
</tr>
<tr>
<td><strong>JAVAJARDIR</strong></td>
<td>The directory where JAR files is installed. Default: ${JAVASHAREDIR}/classes.</td>
</tr>
<tr>
<td><strong>JAVA_LIBDIR</strong></td>
<td>The directory where JAR files installed by other ports are located. Default: ${LOCALBASE}/share/java/classes.</td>
</tr>
</tbody>
</table>

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):

```plaintext
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.

```plaintext
TOMCATDIR=  ${LOCALBASE}/apache-tomcat-7.0
WEBAPPPDIR=  myapplication
post-extract:
  @${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} * ${WEBAPPPDIR}/${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

**Table 31. Variables for Ports That Use Apache**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>USE_APACHE</td>
<td>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/.</td>
</tr>
<tr>
<td>APXS</td>
<td>Full path to the apxs binary. Can be overridden in the port.</td>
</tr>
<tr>
<td>HTTPD</td>
<td>Full path to the httpd binary. Can be overridden in the port.</td>
</tr>
<tr>
<td>APACHE_VERSION</td>
<td>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.</td>
</tr>
<tr>
<td>APACHEMODDIR</td>
<td>Directory for Apache modules. This variable is automatically expanded in pkg-plist.</td>
</tr>
<tr>
<td>APACHEINCLUDEDIR</td>
<td>Directory for Apache headers. This variable is automatically expanded in pkg-plist.</td>
</tr>
<tr>
<td>APACHEETCDIR</td>
<td>Directory for Apache configuration files. This variable is automatically expanded in pkg-plist.</td>
</tr>
</tbody>
</table>

**Table 32. Useful Variables for Porting Apache Modules**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODULENAME</td>
<td>Name of the module. Default value is PORTNAME. Example: mod_hello</td>
</tr>
</tbody>
</table>


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.

Example 79. 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
```
PEAR modules will automatically be flavoredized 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.

**Example 80. Example Makefile for Horde Module**

```makefile
PORTNAME= Horde_Core
DISTVERSION= 2.14.0
CATEGORIES= devel www pear

MAINTAINER= horde@FreeBSD.org
COMMENT= Horde Core Framework libraries
WWW= https://pear.horde.org/

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
```
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

PKGNAMEPREFIX = ${PYTHON_PKGNAMEPREFIX}

<table>
<thead>
<tr>
<th><strong>Table 33. Most Useful Variables for Ports That Use Python</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>USES=python</strong></td>
</tr>
<tr>
<td><strong>USE_PYTHON=distutils</strong></td>
</tr>
<tr>
<td><strong>USE_PYTHON=autoplist</strong></td>
</tr>
<tr>
<td><strong>USE_PYTHON=concurrent</strong></td>
</tr>
</tbody>
</table>
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.

Table 34. Python Module Dependency Helpers

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PYNUMERIC</td>
<td>Dependency line for numeric extension.</td>
</tr>
<tr>
<td>PYNUMPY</td>
<td>Dependency line for the new numeric extension, numpy. (PYNUMERIC is deprecated by upstream vendor).</td>
</tr>
<tr>
<td>PYXML</td>
<td>Dependency line for XML extension (not needed for Python 2.0 and higher as it is also in base distribution).</td>
</tr>
<tr>
<td>PY_ENUM34</td>
<td>Conditional dependency on devel/py-enum34 depending on the Python version.</td>
</tr>
<tr>
<td>PY_ENUM_COMPAT</td>
<td>Conditional dependency on devel/py-enum-compat depending on the Python version.</td>
</tr>
<tr>
<td>PY_PATHLIB</td>
<td>Conditional dependency on devel/py-pathlib depending on the Python version.</td>
</tr>
<tr>
<td>PY_IPADDRESS</td>
<td>Conditional dependency on net/py-ipaddress depending on the Python version.</td>
</tr>
<tr>
<td>PY_FUTURES</td>
<td>Conditional dependency on devel/py-futures depending on the Python version.</td>
</tr>
</tbody>
</table>

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.

Example 81. Makefile for a Simple Python Module

```bash
PORTNAME= sample
DISTVERSION= 1.2.3
CATEGORIES= devel

MAINTAINER= john@doe.tld
COMMENT= Python sample module
WWW= https://pypi.org/project/sample/

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:

```bash
(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.

<table>
<thead>
<tr>
<th>TCL_VER</th>
<th>chosen major.minor version of Tcl</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCLSH</td>
<td>full path of the Tcl interpreter</td>
</tr>
</tbody>
</table>

Table 35. The Most Useful Read-Only Variables for Ports That Use Tcl/Tk
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

**Table 36. Useful Variables for Ports That Use Ruby**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>USE_RUBY</td>
<td>Adds build and run dependencies on Ruby.</td>
</tr>
<tr>
<td>USE_RUBY_EXTCONF</td>
<td>The port uses extconf.rb to configure.</td>
</tr>
<tr>
<td>USE_RUBY_SETUP</td>
<td>The port uses setup.rb to configure.</td>
</tr>
<tr>
<td>RUBY_SETUP</td>
<td>Override the name of the setup script from setup.rb. Another common value is install.rb.</td>
</tr>
</tbody>
</table>

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.

**Table 37. Selected Read-Only Variables for Ports That Use Ruby**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Example value</th>
</tr>
</thead>
<tbody>
<tr>
<td>RUBY_PKGNAMEPREFIX</td>
<td>Used as a PKGNAMEPREFIX to distinguish packages for different Ruby versions.</td>
<td>ruby19-</td>
</tr>
<tr>
<td>RUBY_VERSION</td>
<td>Full version of Ruby in the form of x.y.z[p].</td>
<td>1.9.3.484</td>
</tr>
<tr>
<td>RUBY_SITELIBDIR</td>
<td>Architecture independent libraries installation path.</td>
<td>/usr/local/lib/ruby/site_ruby/1.9</td>
</tr>
<tr>
<td>RUBY_SITEARCHLIBDIR</td>
<td>Architecture dependent libraries installation path.</td>
<td>/usr/local/lib/ruby/site_ruby/1.9/amd64-freebsd10</td>
</tr>
<tr>
<td>RUBY_MODDOCDIR</td>
<td>Module documentation installation path.</td>
<td>/usr/local/share/doc/ruby19/patsy</td>
</tr>
<tr>
<td>RUBY_MODEXAMPLESDIR</td>
<td>Module examples installation path.</td>
<td>/usr/local/share/examples/ruby19/patsy</td>
</tr>
</tbody>
</table>

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):

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Default value</th>
</tr>
</thead>
<tbody>
<tr>
<td>USE_WX</td>
<td>List of versions the port can use</td>
<td>All available versions</td>
</tr>
<tr>
<td>USE_WX_NOT</td>
<td>List of versions the port cannot use</td>
<td>None</td>
</tr>
</tbody>
</table>

The available wxWidgets versions and the corresponding ports in the tree are:

<table>
<thead>
<tr>
<th>Version</th>
<th>Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.8</td>
<td>x11-toolkits/wxgtk28</td>
</tr>
<tr>
<td>3.0</td>
<td>x11-toolkits/wxgtk30</td>
</tr>
</tbody>
</table>

The variables in **Variables to Select wxWidgets Versions** can be set to one or more of these combinations separated by spaces:

<table>
<thead>
<tr>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single version</td>
<td>2.8</td>
</tr>
<tr>
<td>Description</td>
<td>Example</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Ascending range</td>
<td>2.8+</td>
</tr>
<tr>
<td>Descending range</td>
<td>3.0-</td>
</tr>
<tr>
<td>Full range (must be ascending)</td>
<td>2.8-3.0</td>
</tr>
</tbody>
</table>

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.

Table 41. Variables to Select Preferred wxWidgets Versions

<table>
<thead>
<tr>
<th>Name</th>
<th>Designed for</th>
</tr>
</thead>
<tbody>
<tr>
<td>WANT_WX_VER</td>
<td>the port</td>
</tr>
<tr>
<td>WITH_WX_VER</td>
<td>the user</td>
</tr>
</tbody>
</table>

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:

Table 42. Available wxWidgets Components

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Version restriction</th>
</tr>
</thead>
<tbody>
<tr>
<td>wx</td>
<td>main library</td>
<td>none</td>
</tr>
<tr>
<td>contrib</td>
<td>contributed libraries</td>
<td>none</td>
</tr>
<tr>
<td>python</td>
<td>wxPython (Python bindings)</td>
<td>2.8-3.0</td>
</tr>
</tbody>
</table>

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:

Table 43. Available wxWidgets Dependency Types

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>build</td>
<td>Component is required for building, equivalent to BUILD_DEPENDS</td>
</tr>
<tr>
<td>run</td>
<td>Component is required for running, equivalent to RUN_DEPENDS</td>
</tr>
<tr>
<td>lib</td>
<td>Component is required for building and running, equivalent to LIB_DEPENDS</td>
</tr>
</tbody>
</table>

The default values for the components are detailed in this table:

Table 44. Default wxWidgets Dependency Types

<table>
<thead>
<tr>
<th>Component</th>
<th>Dependency type</th>
</tr>
</thead>
<tbody>
<tr>
<td>wx</td>
<td>lib</td>
</tr>
<tr>
<td>Component</td>
<td>Dependency type</td>
</tr>
<tr>
<td>-----------</td>
<td>----------------</td>
</tr>
<tr>
<td>contrib</td>
<td>lib</td>
</tr>
<tr>
<td>python</td>
<td>run</td>
</tr>
<tr>
<td>mozilla</td>
<td>lib</td>
</tr>
<tr>
<td>svg</td>
<td>lib</td>
</tr>
</tbody>
</table>

Example 82. 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.

Example 83. 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
```
6.21.5. Defined Variables

These variables are available in the port (after defining one from Variables to Select wxWidgets Versions).

Table 45. Variables Defined for Ports That Use wxWidgets

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WX_CONFIG</td>
<td>The path to the wxWidgets<code>wx-config</code> script (with different name)</td>
</tr>
<tr>
<td>WXRC_CMD</td>
<td>The path to the wxWidgets<code>wxrc</code> program (with different name)</td>
</tr>
<tr>
<td>WX_VERSION</td>
<td>The wxWidgets version that is going to be used (for example, 2.6)</td>
</tr>
</tbody>
</table>

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.

Example 84. 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.

<table>
<thead>
<tr>
<th>Possible value</th>
<th>Resulting argument</th>
</tr>
</thead>
<tbody>
<tr>
<td>absolute</td>
<td>--with-wx-config=${WX_CONFIG}</td>
</tr>
<tr>
<td>relative</td>
<td>--with-wx=${LOCALBASE}  --with-wx-config=${WX_CONFIG:T}</td>
</tr>
</tbody>
</table>

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.
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_DOCDIR, 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_DOCDIR 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 \texttt{LUA_DOCSDIR} and \texttt{LUA_EXAMPLESDIR}.

As with module ports, a flavored port should avoid installing files that would conflict between versions. Typically this is done by adding \texttt{LUA_VER_STR} as a suffix to program names (e.g. using \texttt{uniquefiles}), and otherwise using either \texttt{LUA_VER} or \texttt{LUA_VER_STR} as part of any other files or subdirectories used outside of \texttt{LUA_MODLIBDIR} and \texttt{LUA_MODSHAREDIR}.

### 6.22.5. Defined Variables

These variables are available in the port.

\textit{Table 47. Variables Defined for Ports That Use Lua}

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>\texttt{LUA_VER}</td>
<td>The Lua version that is going to be used (for example, 5.4)</td>
</tr>
<tr>
<td>\texttt{LUA_VER_STR}</td>
<td>The Lua version without the dots (for example, 54)</td>
</tr>
<tr>
<td>\texttt{LUA_FLAVOR}</td>
<td>The flavor name corresponding to the selected Lua version, to be used for specifying dependencies</td>
</tr>
<tr>
<td>\texttt{LUA_BASE}</td>
<td>The prefix that should be used to locate Lua (and components) that are already installed</td>
</tr>
<tr>
<td>\texttt{LUA_PREFIX}</td>
<td>The prefix where Lua (and components) are to be installed by this port</td>
</tr>
<tr>
<td>\texttt{LUA_INCDIR}</td>
<td>The directory where Lua header files are installed</td>
</tr>
<tr>
<td>\texttt{LUA_LIBDIR}</td>
<td>The directory where Lua libraries are installed</td>
</tr>
<tr>
<td>\texttt{LUA_REFMODLIBDIR}</td>
<td>The directory where Lua module libraries (.so) that are already installed are to be found</td>
</tr>
<tr>
<td>\texttt{LUA_REFMODSHAREDIR}</td>
<td>The directory where Lua modules (.lua) that are already installed are to be found</td>
</tr>
<tr>
<td>\texttt{LUA_MODLIBDIR}</td>
<td>The directory where Lua module libraries (.so) are to be installed by this port</td>
</tr>
<tr>
<td>\texttt{LUA_MODSHAREDIR}</td>
<td>The directory where Lua modules (.lua) are to be installed by this port</td>
</tr>
<tr>
<td>\texttt{LUA_PKGNAMEPREFIX}</td>
<td>The package name prefix used by Lua modules</td>
</tr>
<tr>
<td>\texttt{LUAC_CMD}</td>
<td>The name of the Lua compiler (e.g. \texttt{luac54})</td>
</tr>
<tr>
<td>\texttt{LUA_CMD}</td>
<td>The name of the Lua interpreter (e.g. \texttt{lua54})</td>
</tr>
</tbody>
</table>

These additional variables are available for ports that specified the \texttt{module} parameter:

\textit{Table 48. Variables Defined for Lua Module Ports}
<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LUA_DOCSDIR</td>
<td>the directory to which the module’s documentation should be installed.</td>
</tr>
<tr>
<td>LUA_EXAMPLESDIR</td>
<td>the directory to which the module’s example files should be installed.</td>
</tr>
</tbody>
</table>

### 6.22.6. Examples

#### Example 85. 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.

```bash
PORTNAME= sample
DISTVERSION= 1.2.3
CATEGORIES= whatever

MAINTAINER= john@doe.tld
COMMENT= Sample
WWW= https://github.com/lua_sample/sample/

RUN_DEPENDS= ${LUA_REFMODLIBDIR}/lpeg.so:devel/lua-lpeg@${LUA_FLAVOR}

USES= lua

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

#### Example 86. Makefile for a simple Lua module

```bash
PORTNAME= sample
DISTVERSION= 1.2.3
CATEGORIES= whatever
PKGNAMEPREFIX= ${LUA_PKGNAMEPREFIX}

MAINTAINER= john@doe.tld
COMMENT= Sample
WWW= https://github.com/lua_sample/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:

<table>
<thead>
<tr>
<th>Variable name</th>
<th>Purpose</th>
<th>Port iconv (when using WCHAR_T or //TRANSLIT extensions)</th>
<th>Base iconv</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICONV_CMD</td>
<td>Directory where the iconv binary resides</td>
<td>${LOCALBASE}/bin/iconv</td>
<td>/usr/bin/iconv</td>
</tr>
<tr>
<td>ICONV_LIB</td>
<td>ld argument to link to libiconv (if needed)</td>
<td>-liconv</td>
<td>(empty)</td>
</tr>
<tr>
<td>ICONV_PREFIX</td>
<td>Directory where the iconv implementation resides (useful for configure scripts)</td>
<td>${LOCALBASE}</td>
<td>/usr</td>
</tr>
<tr>
<td>ICONV_CONFIGURE_ARG</td>
<td>Preconstructed configure argument for configure scripts</td>
<td>--with-libiconv-prefix=${LOCALBASE}</td>
<td>(empty)</td>
</tr>
<tr>
<td>ICONV_CONFIGURE_BASE</td>
<td>Preconstructed configure argument for configure scripts</td>
<td>--with-libiconv=${LOCALBASE}</td>
<td>(empty)</td>
</tr>
</tbody>
</table>

These two examples automatically populate the variables with the correct value for systems using `converters/libiconv` or the native `iconv` respectively:

**Example 87. Simple `iconv` Usage**

```
USES=       iconv
LDFLAGS+=   -L${LOCALBASE}/lib ${ICONV_LIB}
```

**Example 88. `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:

**Example 89. 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:

**Example 90. 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
Example 91. USES=xfce Example

| USES=       | xfce               |
| USE_XFCE=   | libmenu            |

Example 92. 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-
6.25. Using Databases

Use one of the `USES` macros from Database USES Macros to add a dependency on a database.

**Table 49. Database USES Macros**

<table>
<thead>
<tr>
<th>Database</th>
<th>USES Macro</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berkeley DB</td>
<td>bdb</td>
</tr>
<tr>
<td>MariaDB, MySQL, Percona</td>
<td>mysql</td>
</tr>
<tr>
<td>PostgreSQL</td>
<td>pgsql</td>
</tr>
<tr>
<td>SQLite</td>
<td>sqlite</td>
</tr>
</tbody>
</table>

**Example 93. Using Berkeley DB 6**

```
USES=   bdb:6
```

See `bdb` for more information.

**Example 94. Using MySQL**

```
USES=   mysql
```

See `mysql` for more information.

**Example 95. Using PostgreSQL**

```
USES=   pgsql:9.6+
WANT_PGSQL= server
```

See `pgsql` for more information.

**Example 96. 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 doorman daemon. Add the following to the Makefile:

```bash
USE_RC_SUBR=   doorman
```

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 doorman daemon:

```bash
#!/bin/sh

# PROVIDE: doorman
# REQUIRE: LOGIN
# KEYWORD: shutdown
#
# Add these lines to /etc/rc.conf.local or /etc/rc.conf
# to enable this service:
#
# doorman_enable (bool): Set to NO by default.
#                      Set it to YES to enable doorman.
# doorman_config (path): Set to %%PREFIX%%/etc/doorman/doorman.cf
#                      by default.

. /etc/rc.subr

name=doorman
rcvar=doorman_enable
load_rc_config $name

: ${doorman_enable:="NO"}
```
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.

**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. 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.

3. 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.

4. Does the script start a persistent service? If so, it must have KEYWORD: shutdown.

5. 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.

6. 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, will probably not work properly. See service(8) for more information.

7. Have all occurrences of /usr/local been replaced with %%PREFIX%%?

8. Do the default variable assignments come after load_rc_config?

9. 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.

10. Are things that are set in variables actually used in the script?

11. 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.

12. _name__flags must never be included in command_args (and vice versa, although that error is less common).

13. Does the script execute any code unconditionally? This is frowned on. Usually these things must be dealt with through a start_precmd.

14. All boolean tests must use the checkyesno function. No hand-rolled tests for [Yy][Ee][Ss], etc.

15. 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.

16. 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.

```make
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:

```make
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`.

Table 50. Shell completion file paths

<table>
<thead>
<tr>
<th>Shell</th>
<th>Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>bash</td>
<td>${PREFIX}/etc/bash_completion.d</td>
</tr>
<tr>
<td>fish</td>
<td>${PREFIX}/share/fish/vendor_completions.d</td>
</tr>
<tr>
<td>zsh</td>
<td>${PREFIX}/share/zsh/site-functions</td>
</tr>
</tbody>
</table>

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 _.

Example 97. 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_PKGNAME_SUFFIX= lite
[...]
if ${FLAVOR:U} != lite
[enable non lite features]
endif
```

Example 98. 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}
```
Example 99. 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_WRKSRCD=  ${WRKSRCD}/loaders/python
INSTALL_WRKSRCD= ${WRKSRCD}/loaders/python
.else # py3*
USE_GNOME+= py3gobject3
CONFIGURE_ARGS+=  --disable-python2 --enable-python3 \ 
    ac_cv_path_PYTHON3_CONFIG=${LOCALBASE}/bin/python${PYTHON_VER}-config
BUILD_WRKSRCD=  ${WRKSRCD}/loaders/python3
INSTALL_WRKSRCD= ${WRKSRCD}/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 `${WRKSRCD}`, 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\_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

*Example 100. Flavor Specific PKNAME*

As all packages must have a different package name, flavors must change theirs, using \_flavor\_PKGNAMESUFFIX and \_flavor\_PKGNAMESUFFIX 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.

*Example 101. Simple USES=php Extension*

This will generate package for all the supported versions:
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_PKGNAME_SUFFIX` to their package names.

#### Example 102. Flavorizing a PHP Application

Adding Flavors support to a PHP application is straightforward:

```
PKGNAMESUFFIX= ${PHP_PKGNAME_SUFFIX}
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.

#### Example 103. 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**.

**Example 104.** 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.
Example 105. For a Port Not Using `distutils`

If the default Python 3 version is 3.6, the following will set `PY_FLAVOR` to `py36`:

```run
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`. 

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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`:

```makefile
.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.

```bash
[...]
@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`:

```bash
post-install:
    ${MKDIR} ${STAGEDIR}${PREFIX}/some/directory
```

Add the directory to `pkg-plist` like any other. For example:

```bash
@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.

Example 106. 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:

```plaintext
PORTNAME=   Machine-Build
DISTVERSION=    1
CATEGORIES=  devel perl5
MASTER_SITES=   CPAN
PKGNAMEPREFIX=  p5-
MAINTAINER= perl@FreeBSD.org
COMMENT= Building machine
WWW=        https://search.cpan.org/dist/Machine-Build
USES=       perl5
USE_PERL5=  configure
PLIST_SUB=  PERL_ARCH=mach
```

The files installed by the port are:
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:
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. @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.

8.6.4. @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.

8.6.5. @kld directory

Runs kldxref on the directory on installation and deinstallation. Additionally, on deinstallation, it will remove the directory if empty.

8.6.6. @rmtry file

Will remove the file on deinstallation, and not give an error if the file is not there.

8.6.7. @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.
8.6.8. **@shared-mime-info directory**

Runs `update-mime-database` on the directory on installation and deinstallation.

8.6.9. **@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`.

8.6.10. **@terminfo**

Do not use by itself. If the port installs *.terminfo files, add 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`.

8.6.11. 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.

8.6.11.1. **@ [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
```

8.6.11.2. **@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.

8.6.11.3. @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.

8.6.11.4. @owner user
Set default ownership for all subsequent files to user. Use without an argument to set back to default ownership (root).

8.6.11.5. @group group
Set default group ownership for all subsequent files to group. Use without an arg to set back to default group ownership (wheel).

8.6.11.6. @comment string
This line is ignored when packing.

8.6.11.7. @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.
8.6.11.8. `@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.

8.6.11.9. `@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.

8.6.11.10. `@dirrmtry` directory (Deprecated)

Declare directory name to be removed, as for `@dirrm`, but does not issue a warning if the directory cannot be removed.

8.6.12. 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

8.6.12.1. 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 }
```

8.6.12.2. 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.

### 8.6.12.3. 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:

```plaintext
@foo some.content other.content
```

%1 and %2 will contain:

```plaintext
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:

```plaintext
actions: [file(1)]
```
8.6.12.4. **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.

8.6.12.5. **Custom Keyword Examples**

**Example 107. 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.

```plaintext
actions: [dirrmtry]
post-deinstall: <<EOD
    echo "Directory %D/%@ removed."
EOD
```

**Example 108. 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.

```plaintext
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 strictly 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 “]”.

**Example 109. UCL Short Strings**

The message is delimited by double quotes "", this is used for simple single line strings:

```
[
  { type: install
    message: "Simple message"
  }
]
```

**Example 110. 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
  }
]
```
Example 111. Display a Message on Install/Deinstall

When a message only needs to be displayed on installation or uninstallation, set the type:

```json
[
  {
    type: remove
    message: "package being removed."
  }
  { type: install, message: "package being installed."}
]
```

Example 112. Display a Message on Upgrade

When a port is upgraded, the message displayed can be even more tailored to the port's needs.

```json
[
  {
    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, pkg-pre-install, and pkg-post-install

If the port needs to execute commands when the binary package is installed with pkg add or pkg install, use pkg-install. It is 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 environment variable is set to the package installation directory.

If using pkg-pre-install or pkg-post-install instead, the script is run only once (before or after installing the package), with the single argument ${PKGNAME}. Using pkg-pre-install.lua or pkg-post-install.lua will run a lua script instead of a shell script. Lua scripts run by pkg provide some extensions and a few restrictions, both explained in pkg-lua-script(5).

Using pkg-pre-install (or pkg-pre-install.lua) and pkg-post-install (or pkg-post-install.lua) is preferred to using pkg-install.

These scripts are automatically added to the packing list.

These scripts are here to simplify package configuration after installation. They 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, pkg-pre-deinstall, and pkg-post-deinstall

These scripts execute when a package is removed.

The pkg-deinstall script is 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 environment variable is set to the package installation directory.

If using pkg-pre-deinstall or pkg-post-deinstall instead, the script is run only once (before or after deinstalling the package), with the single argument ${PKGNAME}. Using pkg-pre-deinstall.lua or pkg-post-deinstall.lua will run a lua script instead of a shell script. Lua scripts run by pkg provide some extensions and a few restrictions, both explained in pkg-lua-script(5).

Using pkg-pre-deinstall (or pkg-pre-deinstall.lua) and pkg-post-deinstall (or pkg-post-deinstall.lua) is preferred to using pkg-deinstall.

These scripts are automatically added to the packing list.

These scripts are here to simplify cleanup after package deinstallation. They 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}.)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Default value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DESCR</td>
<td>${PKGDIR}/pkg-descr</td>
</tr>
<tr>
<td>PLIST</td>
<td>${PKGDIR}/pkg-plist</td>
</tr>
<tr>
<td>PKGINSTALL</td>
<td>${PKGDIR}/pkg-install</td>
</tr>
<tr>
<td>PKGPREINSTALL</td>
<td>${PKGDIR}/pkg-pre-install</td>
</tr>
<tr>
<td>PKGPOSTINSTALL</td>
<td>${PKGDIR}/pkg-post-install</td>
</tr>
<tr>
<td>PKGDEINSTALL</td>
<td>${PKGDIR}/pkg-deinstall</td>
</tr>
<tr>
<td>PKGPREDEINSTALL</td>
<td>${PKGDIR}/pkg-pre-deinstall</td>
</tr>
<tr>
<td>PKGPOSTDEINSTALL</td>
<td>${PKGDIR}/pkg-post-deinstall</td>
</tr>
<tr>
<td>PKGMESSAGE</td>
<td>${PKGDIR}/pkg-message</td>
</tr>
</tbody>
</table>

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 mailing list.

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:
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. 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 131Ramd64 -v 13.1-RELEASE -a amd64
```

Fetch a 13.1-RELEASE for amd64 from the FTP server given by FREEBSD_HOST in poudriere.conf, create the zfs file system tank/poudriere/jails/131Ramd64, mount it on /poudriere/jails/131Ramd64 and extract the 13.1-RELEASE tarballs into this file system.

```
# poudriere jail -c -j 12i386 -v stable/12 -a i386 -m git+https
```

Create tank/poudriere/jails/12i386, mount it on /poudriere/jails/12i386, then check out the tip of the Subversion branch of FreeBSD-12-STABLE from SVN_HOST in poudriere.conf into /poudriere/jails/12i386/usr/src, then complete a buildworld and install it into /poudriere/jails/12i386.

If a specific Subversion revision is needed, append it to the version string. For example:

```
# poudriere jail -c -j 12i386 -v stable/12@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/13 jail is needed, the host will have to run stable/13 too. Running 13.1-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 `12.3-STABLE`. Poudriere jail if the `COMPAT_FREEBSD12` kernel option was compiled in (on by default in `14.0-CURRENT GENERIC` 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
131Ramd64            13.1-RELEASE         amd64   ftp
12i386               12.3-STABLE          i386    git+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 `Git`:

```
# poudriere jail -c -j 14amd64 -v main -a amd64 -m git+https
```
These commands create `tank/poudriere/ports/default`, mount it on `/poudriere/ports/default`, and populate it using Git. Afterward it is included in the list of known ports trees:

```
# poudriere ports -c -m git+https -B main
```

```
<table>
<thead>
<tr>
<th>PORTSTREE</th>
<th>METHOD</th>
<th>TIMESTAMP</th>
<th>PATH</th>
</tr>
</thead>
<tbody>
<tr>
<td>default</td>
<td>git+https</td>
<td>2020-07-20 04:23:56</td>
<td>/poudriere/ports/default</td>
</tr>
</tbody>
</table>
```

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.

The best way to deal with local modifications for a ports contributor is to use Git. 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:

```
<table>
<thead>
<tr>
<th>PORTSTREE</th>
<th>METHOD</th>
<th>TIMESTAMP</th>
<th>PATH</th>
</tr>
</thead>
</table>
```
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:

```bash
# 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 13.1-RELEASE jail:

```bash
# poudriere testport -j 131Ramd64 -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/131Ri386-development/build-time/logs.

The directory name 131Ri386-development is derived from the arguments to -j and -p, respectively. For convenience, a symbolic link /poudriere/data/logs/bulk/131Ri386-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:
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 131Ramd64 -p development -I -o www/firefox

[...]
====>> Installing local Pkg repository to /usr/local/etc/pkg/repos
====>> Leaving jail 131Ramd64-development-n running, mounted at /poudriere/data/.m/131Ramd64-development/ref for interactive run testing
====>> To enter jail: jexec 131Ramd64-development-n env -i TERM=$TERM /usr/bin/login -fp root
====>> To stop jail: poudriere jail -k -j 131Ramd64 -p development
# jexec 131Ramd64-development-n env -i TERM=$TERM /usr/bin/login -fp root
# [do some stuff in the jail]
# exit
# poudriere jail -k -j 131Ramd64 -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:
This will look for the existence of these directories in this order:

- /usr/local/etc/poudriere.d/131Ramd64-development-devset-options
- /usr/local/etc/poudriere.d/131Ramd64-devset-options
- /usr/local/etc/poudriere.d/131Ramd64-development-options
- /usr/local/etc/poudriere.d/devset-options
- /usr/local/etc/poudriere.d/development-options
- /usr/local/etc/poudriere.d/131Ramd64-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 131Ramd64 -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/131Ramd64-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/131Ramd64-development-devset-make.conf.

Example 113. 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.

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.


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 description 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.

Also, update the checksum reference in distinfo with make makesum.

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 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. This is the preferred way as it would include author identity, and it is also easier when you are making a series of changes that are not meant to be squashed together.

Alternatively, 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.

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:
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*[^1], 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:

```bash
% 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.

Committer can update the VuXML database themselves, assisting the Security Officer Team and delivering crucial information to the community more quickly. Those who are not committer 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="f4bc8d4-da62-11d8-90ea-0004ac98a7b9">
  <topic>Several vulnerabilities found in Foo</topic>
  <affects>
    <package>
      <name>foo</name>
      <name>foo-devel</name>
    </package>
  </affects>
</vuln>
```
<name>ja-foo</name>  
<range><ge>1.6</ge><lt>1.9</lt></range>  
<range><ge>2.*</ge><lt>2.4_1</lt></range>  
<range><eq>3.0b1</eq></range>  
</package>  
<package>  
<name>openfoo</name>  
<range><lt>1.10_7</lt></range>  
<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>  
<quote cite="http://j.r.hacker.com/advisories/1">  
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.</quote>  
</body>  
</description>  
<references>  
<freebsdsa>SA-10:75.foo</freebsdsa>  
<freebsdpr>ports/987654</freebsdpr>  
<cvename>CAN-2010-0201</cvename>  
<cvename>CAN-2010-0466</cvename>  
<bid>96298</bid>  
<certsa>CA-2010-99</certsa>  
<certvu>740169</certvu>  
<uscertsa>SA10-99A</uscertsa>  
<uscertta>SA10-99A</uscertta>  
<mlist msgid="201075606@hacker.com">http://marc.theaimsgroup.com/?l=bugtraq&amp;m=203886607825605</mlist>  
<url>http://j.r.hacker.com/advisories/1</url>  
</references>  
<dates>  
<discovery>2010-05-25</discovery>  
<entry>2010-07-13</entry>  
<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 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 PORTEOPOCH and PORTREVISION if applicable. Please remember that according to the collation rules, a version with a non-zero PORTEOPOCH is greater than any version without PORTEOPOCH, 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 <p> and </p> 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).
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: https://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).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCH</td>
<td>The architecture as returned by <code>uname -m</code> (for example, <code>i386</code>)</td>
</tr>
<tr>
<td>OPSYS</td>
<td>The operating system type, as returned by <code>uname -s</code> (for example, <code>FreeBSD</code>)</td>
</tr>
<tr>
<td>OSREL</td>
<td>The release version of the operating system (for example, <code>2.1.5</code> or <code>2.2.7</code>)</td>
</tr>
<tr>
<td>OSVERSION</td>
<td>The numeric version of the operating system; the same as <code>__FreeBSD_version</code>.</td>
</tr>
<tr>
<td>LOCALBASE</td>
<td>The base of the &quot;local&quot; tree (for example, <code>/usr/local</code>)</td>
</tr>
<tr>
<td>PREFIX</td>
<td>Where the port installs itself (see more on <code>PREFIX</code>).</td>
</tr>
</tbody>
</table>

- 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`:

```makefile
# 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 \texttt{exec} statement, for instance:

\begin{verbatim}
#!/bin/sh
exec %%LOCALBASE%%/bin/java -jar %%DATADIR%%/foo.jar "$@
\end{verbatim}

The \texttt{exec} statement replaces the shell process with the specified program. If \texttt{exec} is omitted, the shell process remains in memory while the program is executing, and needlessly consumes system resources.

\section*{13.7. Do Things Rationally}

The \texttt{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 \texttt{.if} construct instead of a shell \texttt{if} construct, not redefining \texttt{do-extract} if redefining \texttt{EXTRACT*} is enough, and using \texttt{GNU_CONFIGURE} instead of \texttt{CONFIGURE_ARGS += --prefix=${PREFIX}}.

If a lot of new code is needed to do something, there may already be an implementation of it in \texttt{bsd.port.mk}. While hard to read, there are a great many seemingly-hard problems for which \texttt{bsd.port.mk} already provides a shorthand solution.

\section*{13.8. Respect Both \texttt{CC} and \texttt{CXX}}

The port must respect both \texttt{CC} and \texttt{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 \texttt{NO_PACKAGE=ignores either cc or cxx} to the \texttt{Makefile}.

Here is an example of a \texttt{Makefile} respecting both \texttt{CC} and \texttt{CXX}. Note the ?=:

\begin{verbatim}
CC?= gcc
CXX?= g++
\end{verbatim}

Here is an example which respects neither \texttt{CC} nor \texttt{CXX}:

\begin{verbatim}
CC= gcc
CXX= g++
\end{verbatim}

Both \texttt{CC} and \texttt{CXX} can be defined on FreeBSD systems in \texttt{/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):
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, and FreshPorts.

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 reputedly 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/drupal7` but `www/drupal8` 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.
```


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 \texttt{TARGET/TARGET\_ARCH}. The ports read-only makevar \texttt{ARCH} is set based on the value of \texttt{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 \texttt{NO\_ARCH=yes}.

\texttt{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 \texttt{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 \texttt{IGNORE: ONLY\_FOR\_ARCHS} and \texttt{NOT\_FOR\_ARCHS}. Examples:

  ```
  ONLY\_FOR\_ARCHS= i386 amd64
  NOT\_FOR\_ARCHS= ia64 sparc64
  ```

  A custom \texttt{IGNORE} message can be set using \texttt{ONLY\_FOR\_ARCHS\_REASON} and \texttt{NOT\_FOR\_ARCHS\_REASON}. Per architecture entries are possible with \texttt{ONLY\_FOR\_ARCHS\_REASON_ARCH} and \texttt{NOT\_FOR\_ARCHS\_REASON_ARCH}.

- If a port fetches i386 binaries and installs them, set \texttt{IA32\_BINARY\_PORT}. If this variable is set, \texttt{/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, \texttt{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 \texttt{-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.

**Example 114. 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:

```make
.error "option is not supported"
```

```make
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, `setproctitle(argv[0])` in `main()` and then `getproctitle(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 `ENOBUFFS` 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.

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.

```
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]
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
WWW= http://xdvi.sourceforge.net/

[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
- WWW

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
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.

Example 115. 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.

```bash
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 mailing list. 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.
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 (`,`).

**Example 116. Using Multiple Values**

```
USES=   bison perl
```

**Example 117. Adding an Argument**

```
USES=   tar:xz
```

**Example 118. Adding Multiple Arguments**

```
USES=   drupal:7,theme
```

**Example 119. 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.
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`, `nodefault`

Sets default values and targets used to build Haskell software using Cabal. A build dependency on the Haskell compiler port (`lang/ghc`) is added. If there is some other version of GHC already listed in the `BUILD_DEPENDS` variable (for example, `lang/ghc8.10`), it would be used instead. If the `hpack` argument is given, a build dependency on `devel/hs-hpack` is added and `hpack` is invoked at configuration step to generate `.cabal` file. If the `nodefault` argument is given, the framework will not try to pull the main distribution file from the Hackage. This argument is implicitly added if `USE_GITHUB` or `USE_GITLAB` is present.

The framework provides the following variables:

**CABAL_REVISION**

Haskell packages hosted on Hackage may have revisions. Set this knob to an integer number to pull in revised package description.

**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 too, which are specified after the `_` symbol. Automatic generation of the 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. This variable is usually used to enable or disable flags that are declared in the `.cabal` file. Pass `foo` to enable the `foo` flag and `-foo` to disable it.
CABAL_EXECUTABLES
List of executable files installed by the port. Default value: \${PORTNAME}. Consult the .cabal file of the project being ported to get a list of possible values for this variable. Each value corresponds to an executable stanza in the .cabal file. Items from this list are automatically added to pkg-plist.

SKIP_CABAL_PLIST
If defined, do not add items from \${CABAL_EXECUTABLES} to pkg-plist.

opt_USE_CABAL
Adds items to \${USE_CABAL} depending on opt option.

opt_CABAL_EXECUTABLES
Adds items to \${CABAL_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. Note that this behavior is slightly different from the plain CABAL_FLAGS as it does not accept values starting with -.

CABAL_WRAPPER_SCRIPTS
A subset of \${CABAL_EXECUTABLES} containing Haskell programs to be wrapped into a shell script that sets *_datadir environment variables before running the program. This also causes the actual Haskell binary to be installed under libexec/cabal/ directory. This knob is needed for Haskell programs that install their data files under share/ directory.

FOO_DATADIR_VARS
List of extra Haskell packages, whose data files should be accessible by the executable named FOO. The executable should be a part of \${CABAL_WRAPPER_SCRIPTS}. Haskell packages listed there should not have a version suffix.

CABAL_PROJECT
Some Haskell projects may already have a cabal.project file, which is also generated by the ports framework. If that is the case, use this variable to specify what to do with the original cabal.project. Setting this variable to remove will cause the original file to be removed. Setting this variable to append will:

1. Move the original file to cabal.project.$(PORTNAME) during the extract stage.
2. Concatenate the original cabal.project.$(PORTNAME) and the generated cabal.project into a single file after the patch stage. Using append makes it possible to perform patching on the original file before it gets merged.

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-configure for testing and re-built.

For more information see [Using cmake](#).

17.12. **compiler**

Possible arguments: (none), `env` (default, implicit), `C++17-lang`, `C++14-lang`, `C++11-lang`, `gcc-C++11-lib`, `C++11-lib`, `C++0x`, `c11`, `nestedfct`, `features`

Determines which compiler to use based on any given wishes. Use `C++17-lang` if the port needs a C++17-capable compiler, `C++14-lang` if the port needs a C++14-capable compiler, `C++11-lang` if the port needs a C++11-capable compiler, `gcc-C++11-lib` if the port needs the g++ compiler with a C++11 library, or `C++11-lib` if the port needs a C++11-ready standard library. If the port needs a compiler understanding C++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.
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 7 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. **elfctl**
Possible arguments: (none)
Change an ELF binary's feature control note by setting ELF_FEATURES.

Example 120. Uses=elfctl

```plaintext
USES=        elfctl
ELF_FEATURES= featurelist:path/to/file1 \ 
             featurelist:path/to/file1 \ 
             featurelist:path/to/file2
```

The format of `featurelist` is described in `elfctl(1)`. The file paths are relative to `${BUILD_WRKSRC}`.

### 17.22. erlang

Possible arguments: (none), `enc`, `rebar`, `rebar3`

Adds a build and run time dependency on `lang/erlang`. Depending on the argument, it adds additional build dependencies. `enc` adds a dependency on `devel/erlang-native-compiler`, `rebar` adds a dependency on `devel/rebar` and `rebar3` adds a dependency on `devel/rebar3`.

In addition, the following variables are available to the port:

- `ERL_APP_NAME`: Erlang app name as installed in Erlang's lib dir (minus version)
- `ERL_APP_ROOT`: Root directory for this Erlang app
- `REBAR_CMD`: Path to the "rebar" command
- `REBAR3_CMD`: Path to the "rebar3" command
- `REBAR_PROFILE`: Rebar profile
- `REBAR_TARGETS`: Rebar target list (usually compile, maybe escriptize)
- `ERL_BUILD_NAME`: Build name for rebar3
- `ERL_BUILD_DEPS`: List of BUILD_DEPENDS in category/portname format
- `ERL_RUN_DEPS`: List of RUN_DEPENDS in category/portname format
- `ERL_DOCS`: List of documentation files and directories

### 17.23. 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`.

### 17.24. 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.

### 17.25. firebird

Possible arguments: (none), 25

Add a dependency to the client library of the Firebird database.

### 17.26. fonts

Possible arguments: (none), `fc`, `fontsdir` (default), `none`

Adds a runtime dependency on tools needed to register fonts. Depending on the argument, add a `@fc  ${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 `LIST_SUB` and `SUB_LIST`.

### 17.27. fortran

Possible arguments: `gcc` (default)

Uses the GNU Fortran compiler.

### 17.28. 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.

### 17.29. gem

Possible arguments: (none), `noautoplist`

Handle building with RubyGems. If `noautoplist` is used, the packing list is not generated automatically.

### 17.30. gettext

Possible arguments: (none)

Deprecated. Will include both `gettext-runtime` and `gettext-tools`.

### 17.31. 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.

### 17.32. 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.

### 17.33. 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.

### 17.34. 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`
Add a library dependency on libOpenGL.so from graphics/libglvnd

17.35. 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.

17.36. 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
• gksourceview
• gksourceview2
• gksourceview3
• gksourceviewmm3
• gvfs
• intlhack
• intlttool
• introspection
• libartlgpl2
• libbonobo
• libbonoboui
• libgda5
• libgda5-ui
• libgdammm5
• libglade2
• libgnome
• libgnomencanvas
• 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.

17.37. go

⚠️ Ports should not be created for Go libs, see Go Libraries for more information.

Possible arguments: (none), N.NN, N.NN-devel, modules, no_targets, run
Sets default values and targets used to build Go software. A build dependency on the Go compiler port is added, port maintainers can set version required. 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 extract and build targets. run will also add a run dependency on the Go compiler 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.

See Building Go Applications for usage examples.

**17.38. gperf**

Possible arguments: (none)

Add a buildtime dependency on devel/gperf if gperf is not present in the base system.

**17.39. 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.

17.40. **groff**

Possible arguments: `build`, `run`, `both`

Registers a dependency on `textproc/groff` if not present in the base system.

17.41. **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`
- `GSSAPIFLDFLAGS`
- `GSSAPILIBDIR`
- `GSSAPILIBS`
- `GSSAPI_CONFIGURE_ARGS`

The `flags` option can be given alongside `base`, `heimdal`, or `mit` to automatically add `GSSAPICPPFLAGS`, `GSSAPIFLDFLAGS`, 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`.

**Example 121. Typical Use**

```bash
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}
${GSSAPICPPFLAGS}
GSSAPI_HEIMDAL_USES= gssapi:heimdal
GSSAPI_HEIMDAL_CONFIGURE_ON= --with-gssapi=${GSSAPIBASEDIR}
```
# gstreamer

Possible arguments: (none)

Provides an easy way to depend on GStreamer components. The components should be listed in `USE_GSTREAMER`. The available components are:

- a52dec
- aalib
- amrnb
- amrwbdec
- aom
- assrender
- bad
- bs2b
- cairo
- cdio
- cdparanoia
- chromaprint
- curl
- dash
- dtls
- dts
- dv
- dvd
- dvdread
- editing-services
- faac
- faad
- flac
- flite
• gdkpixbuf
• gl
• gme
• gnonlin
• good
• gsm
• gtk4
• gtk
• hal
• hls
• jack
• jpeg
• kate
• kms
• ladspa
• lame
• libav
• libcaca
• libde265
• libmms
• libvisual
• lv2
• mm
• modplug
• mpeg2dec
• mpeg2enc
• mpg123
• mplex
• musepack
• neon
• ogg
• opencv
• openexr
•openh264
• openjpeg
- openmpt
- opus
- pango
- png
- pulse
- qt
- resindvd
- rsvg
- rtmp
- shout2
- sidplay
- smoothstreaming
- sndfile
- sndio
- soundtouch
- soup
- spandsp
- speex
- srt
- taglib
- theora
- ttml
- twolame
- ugly
- v4l2
- vorbis
- vpx
- vulkan
- wavpack
- webp
- webvtt
dsp
- x264
- x265
- x
- ximagesrc
17.43. **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.

17.44. **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`.

17.45. **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.

17.46. **kde**
Possible arguments: 5
Add dependency on KDE components. See Using KDE for more information.

17.47. **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.

17.48. lha
Possible arguments: (none)

Set EXTRACT_SUFX to .lzh

17.49. libarchive
Possible arguments: (none)

Registers a dependency on archivers/libarchive. Any ports depending on libarchive must include USES=libarchive.

17.50. libedit
Possible arguments: (none)

Registers a dependency on devel/libedit. Any ports depending on libedit must include USES=libedit.

17.51. 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.

17.52. linux
Possible arguments: c6, c7

Ports Linux compatibility framework. Specify c6 to depend on CentOS 6 packages. Specify c7 to depend on CentOS 7 packages. The available packages are:

- allegro
- 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
- openslap
- openmotif
- openssl
- pango
- pixman
- png
- pulseaudio-libs
- qt
- qt-x11
- qwebkit
- scimlibs
- sdl12
- sdlimage
- sdlmixer
- sqlite3
- tcl85
- tcp_wrappers-libs
- tiff
- tk85
- ucl
- xorglibs
17.53. **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*.

17.54. **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 *51-54*.

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.

17.55. **luajit**

Possible arguments: (none), *X*

Adds a dependency on luajit runtime. A specific version *X* can be used. Possible versions are *luajit, luajit-devel, luajit-openresty*.

After including bsd.port.options.mk or bsd.port.pre.mk the port can inspect these variables:

*LUAJIT_VER*
   The selected luajit version

*LUAJIT_INCDIR*
   The path to luajit’s header files

*LUAJIT_LUVER*
   Which luajit spec version is selected (2.0 for luajit, else 2.1)

For more information see Using Lua.

17.56. **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.

### 17.57. magick

Possible arguments: (none), `x`, `build`, `nox11`, `run`, `test`

Add a library dependency on ImageMagick. A specific version `X` can be used. Possible versions are 6 and 7 (default). `nox11` indicates that the `-nox11` version of the port is required. `build`, `run` and `test` add build-, run-time and test dependencies on ImageMagick.

### 17.58. makeinfo

Possible arguments: (none)

Add a build-time dependency on `makeinfo` if it is not present in the base system.

### 17.59. makeself

Possible arguments: (none)

Indicates that the distribution files are makeself archives and sets the appropriate dependencies.

### 17.60. 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
- intlttool
- libmatekbd
- libmateweather
- marco
• menus
• notificationdaemon
• panel
• pluma
• polkit
• session
• settingsdaemon

The default dependency is build- and run-time, it can be changed with \texttt{:build} or \texttt{:run}. For example:

\begin{verbatim}
USES= mate
USE_MATE= menus:build intlhack
\end{verbatim}

17.61. \textbf{meson}

Possible arguments: (none)

Provide support for Meson based projects. For more information see \texttt{Using meson}.

17.62. \textbf{metaport}

Possible arguments: (none)

Sets the following variables to make it easier to create a metaport: \texttt{MASTER_SITES}, \texttt{DISTFILES}, \texttt{EXTRACT_ONLY}, \texttt{NO_BUILD}, \texttt{NO_INSTALL}, \texttt{NO_MTREE}, \texttt{NO_ARCH}.

17.63. \textbf{minizip}

Possible arguments: (none), \texttt{ng}

Adds a library dependency on \texttt{archivers/minizip} or \texttt{archivers/minizip-ng} respectively.

17.64. \textbf{mysql}

Possible arguments: (none), \texttt{version}, \texttt{client} (default), \texttt{server}, \texttt{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 \texttt{m} and \texttt{p} suffixes are for the MariaDB and Percona variants of MySQL. \texttt{server} and \texttt{embedded} add a build- and run-time dependency on the MySQL server. When using \texttt{server} or \texttt{embedded}, add \texttt{client} to also add a dependency on libmysqlclient.so. A port can set \texttt{IGNORE_WITH_MYSQL} if some versions are not supported.

The framework sets \texttt{MYSQL_VER} to the detected MySQL version.
17.65. 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.

17.66. motif

Possible arguments: (none)

Uses x11-toolkits/open-motif as a library dependency. End users can set WANT_LESSTIF in make.conf to use x11-toolkits/lesstif as dependency instead of x11-toolkits/open-motif. Similarly setting WANT_OPEN_MOTIF_DEVEL in make.conf will add a dependency on x11-toolkits/open-motif-devel.

17.67. ncurses

Possible arguments: (none), base, port

Uses ncurses, and causes some useful variables to be set.

17.68. ninja

Possible arguments: (none)

Uses ninja to build the port.

17.69. nodejs

Possible arguments: (none), build, run, current, lts, 10, 14, 16, 17.

Uses nodejs. Adds a dependency on www/node*. If a supported version is specified then run and/or build must be specified too.

17.70. objc

Possible arguments: (none)

Add objective C dependencies (compiler, runtime library) if the base system does not support it.
17.71. **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*.

17.72. **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`.

17.73. **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.

17.74. **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.

17.75. **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

17.76. **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/php81`.

**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: pcrid 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:

<table>
<thead>
<tr>
<th>USES=</th>
<th>php:ext</th>
</tr>
</thead>
<tbody>
<tr>
<td>USE_PHP=</td>
<td>wddx</td>
</tr>
<tr>
<td>PHP_MOD_PRIO=</td>
<td>40</td>
</tr>
</tbody>
</table>

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`.

### 17.77. `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.

### 17.78. `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.

### 17.79. `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
• xmlopatterns

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
```

**17.80. pytest**

Possible arguments: (none), 4
Introduces a new dependency on `devel/pytest`. It defines a `do-test` target which will run the tests properly. Use the argument to depend on a specific `devel/pytest` version. For ports using `devel/pytest` consider using this instead of a specific `do-test` target. The framework exposes the following variables to the port:

**PYTEST_ARGS**

Additional arguments to pytest (defaults to empty).

**PYTEST_IGNORED_TESTS**

Lists of `pytest -k` patterns of tests to ignore (defaults to empty). For tests which are not expected to pass, such as ones requiring a database access.

**PYTEST_BROKEN_TESTS**

Lists of `pytest -k` patterns of tests to ignore (defaults to empty). For broken tests which require fixing.

In addition the following variables may be set by the user:

**PYTEST_ENABLE_IGNORED_TESTS**

Enable tests which are otherwise ignored by `PYTEST_IGNORED_TESTS`.

**PYTEST_ENABLE_BROKEN_TESTS**

Enable tests which are otherwise ignored by `PYTEST_BROKEN_TESTS`.

**PYTEST_ENABLE_ALL_TESTS**

Enable tests which are otherwise ignored by `PYTEST_IGNORED_TESTS` and `PYTEST_BROKEN_TESTS`.

### 17.81. python


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.

### 17.82. 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.
17.83. **qmake**

Possible arguments: (none), norecursive, outsource, no_env, no_configure

Uses QMake for configuring. For more information see Using qmake.

17.84. **qt**

Possible arguments: 5, 6, no_env

Add dependency on Qt components. no_env is passed directly to USES= qmake. See Using Qt for more information.

17.85. **qt-dist**

Possible arguments: (none) or 5 and (none) or 6 and (none) or one of 3d, 5compat, base, charts, connectivity, datavis3d, declarative, doc languageserver, gamepad, graphicaleffects, imageformats, location, lottie, multimedia, networkauth, positioning, quick3d, quickcontrols2, quickcontrols, quicktimeline, remoteobjects, script, scxml, 'sensors, serialbus, serialport, shadertools, speech, svg, tools, translations, virtualkeyboard, wayland, webchannel, webengine, webglplugin, websockets, webview, x11extras, xmlpatterns.

Provides support for building Qt 5 and Qt 6 components. It takes care of setting up the appropriate configuration environment for the port to build.

**Example 122. 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
```

**Example 123. Building Qt 6 Components**

The port is Qt 6's websockets component, which is part of the websockets distribution file.

```
PORTNAME= websockets
PORTVERSION= '${QT6_VERSION}'
USES= qt-dist:6
```

If **PORTNAME** does not match the component name, it can be passed as an argument to **qt-dist**.
Example 124. 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
```

17.86. **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`.

17.87. **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.

17.88. **scons**

Possible arguments: (none)

Provide support for the use of `devel/scons`. See Using `scons` for more information.

17.89. **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.

17.90. 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`.

**Example 125. Adding Another Interpreter to USES=shebangfix**

To add another interpreter, set `SHEBANG_LANG`. For example:

```bash
SHEBANG_LANG= lua
```

**Example 126. Specifying all the Paths When Adding an Interpreter to USES=shebangfix**

If it was not already defined, and there were no default values for `_interp_OLD_CMD` and `_interp_CMD` the Ksh entry could be defined as:

```bash
SHEBANG_LANG= ksh
ksh_OLD_CMD= "/usr/bin/env ksh" /bin/ksh /usr/bin/ksh
ksh_CMD= ${LOCALBASE}/bin/ksh
```

**Example 127. 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:

```bash
python_OLD_CMD= /opt/bin/python2.7
```

**Example 128. USES=shebangfix with SHEBANG_REGEX**

To fix all the files in `${WRKSRC}/scripts` ending in `.pl`, `.sh`, or `.cgi` do:

```bash
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.
Example 129. **USES=shebangfix with SHEBANG_GLOB**

To fix all the files in `${WRKSRC}` ending in `.pl` or `.sh`, do:

```plaintext
USES=  shebangfix
SHEBANG_GLOB=  *.sh *.pl
```

Example 130. **USES=shebangfix with SHEBANG_FILES**

To fix the files `script/foobar.pl` and `script/*.sh` in `${WRKSRC}`, do:

```plaintext
USES=  shebangfix
SHEBANG_FILES=  scripts/foobar.pl scripts/*.sh
```

### 17.91. 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.

### 17.92. 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.

  ![Tip] 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

17.93. **tar**

Possible arguments: (none), z, bz2, bzip2, lzma, tbz, tbz2, tgz, txz, xz, zst, zstd

Set EXTRACT_SUFX to .tar, .tar.Z, .tar.bz2, .tar.bz2, .tar.lzma, .tbz, .tbz2, .tgz, .txz, .tar.xz, .tar.zst or .tar.zstd respectively.

17.94. **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

17.95. **terminfo**

Possible arguments: (none)

Adds @terminfo to the plist. Use when the port installs *.terminfo files in ${PREFIX}/share/misc.

17.96. **tk**

Same as arguments for tcl

Small wrapper when using both Tcl and Tk. The same variables are returned as when using Tcl.
17.97. **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.

17.98. **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.

17.99. **vala**

Possible arguments: `build, lib, no_depend`

Adds build or library dependencies on `lang/vala`. The `no_depend` argument is reserved for `lang/vala` itself.

17.100. **varnish**

Possible arguments: `4` (default), `6, 7`

Handle dependencies on Varnish Cache. Adds a dependency on `www/varnish*`.

17.101. **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`.

### 17.102. 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`.

### 17.103. 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:

**Table 51. Available X.Org Components**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>dmx</td>
<td>DMX extension library</td>
</tr>
<tr>
<td>fontenc</td>
<td>The fontenc Library</td>
</tr>
<tr>
<td>fontutil</td>
<td>Create an index of X font files in a directory</td>
</tr>
<tr>
<td>ice</td>
<td>Inter Client Exchange library for X11</td>
</tr>
<tr>
<td>libfs</td>
<td>The FS library</td>
</tr>
<tr>
<td>pciaccess</td>
<td>Generic PCI access library</td>
</tr>
<tr>
<td>pixman</td>
<td>Low-level pixel manipulation library</td>
</tr>
<tr>
<td>sm</td>
<td>Session Management library for X11</td>
</tr>
<tr>
<td>x11</td>
<td>X11 library</td>
</tr>
<tr>
<td>xau</td>
<td>Authentication Protocol library for X11</td>
</tr>
<tr>
<td>xaw</td>
<td>X Athena Widgets library</td>
</tr>
<tr>
<td>xaw6</td>
<td>X Athena Widgets library</td>
</tr>
<tr>
<td>xaw7</td>
<td>X Athena Widgets library</td>
</tr>
<tr>
<td>xbitmaps</td>
<td>X.Org bitmaps data</td>
</tr>
<tr>
<td>xcb</td>
<td>The X protocol C-language Binding (XCB) library</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>------------------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>xcomposite</td>
<td>X Composite extension library</td>
</tr>
<tr>
<td>xcbcursor</td>
<td>X client-side cursor loading library</td>
</tr>
<tr>
<td>xdamage</td>
<td>X Damage extension library</td>
</tr>
<tr>
<td>xdmcp</td>
<td>X Display Manager Control Protocol library</td>
</tr>
<tr>
<td>xext</td>
<td>X11 Extension library</td>
</tr>
<tr>
<td>xfrees</td>
<td>X Fixes extension library</td>
</tr>
<tr>
<td>xfont</td>
<td>X font library</td>
</tr>
<tr>
<td>xfont2</td>
<td>X font library</td>
</tr>
<tr>
<td>xft</td>
<td>Client-sided font API for X applications</td>
</tr>
<tr>
<td>xi</td>
<td>X Input extension library</td>
</tr>
<tr>
<td>xinerama</td>
<td>X11 Xinerama library</td>
</tr>
<tr>
<td>xkbfie</td>
<td>XKB file library</td>
</tr>
<tr>
<td>xmu</td>
<td>X Miscellaneous Utilities libraries</td>
</tr>
<tr>
<td>xmwu</td>
<td>X Miscellaneous Utilities libraries</td>
</tr>
<tr>
<td>xorg-macros</td>
<td>X.Org development aclocal macros</td>
</tr>
<tr>
<td>xorg-server</td>
<td>X.Org X server and related programs</td>
</tr>
<tr>
<td>xorgproto</td>
<td>xorg protocol headers</td>
</tr>
<tr>
<td>xpm</td>
<td>X Pixmap library</td>
</tr>
<tr>
<td>xpresent</td>
<td>X Present Extension library</td>
</tr>
<tr>
<td>xrandr</td>
<td>X Resize and Rotate extension library</td>
</tr>
<tr>
<td>xrender</td>
<td>X Render extension library</td>
</tr>
<tr>
<td>xres</td>
<td>X Resource usage library</td>
</tr>
<tr>
<td>xscrnnsaver</td>
<td>The XScrnSaver library</td>
</tr>
<tr>
<td>xshmefence</td>
<td>Shared memory 'SyncFence' synchronization primitive</td>
</tr>
<tr>
<td>xt</td>
<td>X Toolkit library</td>
</tr>
<tr>
<td>xtrans</td>
<td>Abstract network code for X</td>
</tr>
<tr>
<td>xtst</td>
<td>X Test extension</td>
</tr>
<tr>
<td>xv</td>
<td>X Video Extension library</td>
</tr>
<tr>
<td>xvmc</td>
<td>X Video Extension Motion Compensation library</td>
</tr>
<tr>
<td>xxf86dga</td>
<td>X DGA Extension</td>
</tr>
<tr>
<td>xxf86vm</td>
<td>X Vidmode Extension</td>
</tr>
</tbody>
</table>
17.104. **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.

17.105. **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

*Table 52. FreeBSD 14 `__FreeBSD_version` Values*

<table>
<thead>
<tr>
<th>Value</th>
<th>Revision</th>
<th>Date</th>
<th>Release</th>
</tr>
</thead>
<tbody>
<tr>
<td>1400000</td>
<td>a53ce3fc4938</td>
<td>January 22, 2021</td>
<td>14.0-CURRENT.</td>
</tr>
<tr>
<td>1400001</td>
<td>739ecbcf1c4f</td>
<td>January 23, 2021</td>
<td>14.0-CURRENT after adding symlink support to lockless lookup.</td>
</tr>
<tr>
<td>1400002</td>
<td>2cf84258922f</td>
<td>January 26, 2021</td>
<td>14.0-CURRENT after fixing a clang assertion when building the <code>devel/onetbb</code> port.</td>
</tr>
<tr>
<td>1400003</td>
<td>d386f3a3c32f</td>
<td>January 28, 2021</td>
<td>14.0-CURRENT after adding various LinuxKPI bits conflicting with drm-kmod.</td>
</tr>
<tr>
<td>1400004</td>
<td>68f6800ce05c</td>
<td>February 8, 2021</td>
<td>14.0-CURRENT after kernel interfaces for dispatching cryptographic operations were changed.</td>
</tr>
<tr>
<td>1400005</td>
<td>45eabf5754ac</td>
<td>February 17, 2021</td>
<td>14.0-CURRENT after changing the API of <code>ptrace(2) PT_GETDBREGS /PT_SETDBREGS</code> on arm64.</td>
</tr>
<tr>
<td>1400006</td>
<td>c96151d33509</td>
<td>March 17, 2021</td>
<td>14.0-CURRENT after adding <code>sndstat(4)</code> enumeration ioctls.</td>
</tr>
<tr>
<td>1400007</td>
<td>d36d68161517</td>
<td>April 6, 2021</td>
<td>14.0-CURRENT after fixing wrong <code>dlpi_tls_data</code>.</td>
</tr>
<tr>
<td>1400008</td>
<td>e152bbecb221</td>
<td>April 11, 2021</td>
<td>14.0-CURRENT after changing the internal KAPI between the krpc and NFS modules.</td>
</tr>
<tr>
<td>Value</td>
<td>Revision</td>
<td>Date</td>
<td>Release</td>
</tr>
<tr>
<td>--------</td>
<td>---------------</td>
<td>-----------------</td>
<td>---------------------------------------------------</td>
</tr>
<tr>
<td>1400009</td>
<td>9ca874cf740e</td>
<td>April 20, 2021</td>
<td>14.0-CURRENT after adding TCP LRO support for VLAN and VxLAN.</td>
</tr>
<tr>
<td>1400010</td>
<td>a3a02acde100</td>
<td>April 21, 2021</td>
<td>14.0-CURRENT after changing the sndstat(4) ioctl's nlist schema and definitions.</td>
</tr>
<tr>
<td>1400015</td>
<td>d72cd275187c</td>
<td>May 25, 2021</td>
<td>14.0-CURRENT after adding more LinuxKPI changes needing adjustments to drm-kmod.</td>
</tr>
<tr>
<td>1400016</td>
<td>21e3c1fbe246</td>
<td>May 25, 2021</td>
<td>14.0-CURRENT after removing support for KTLS software backends.</td>
</tr>
<tr>
<td>1400017</td>
<td>beb817edfe22</td>
<td>May 25, 2021</td>
<td>14.0-CURRENT after adding crypto_cursor_segment().</td>
</tr>
<tr>
<td>1400018</td>
<td>a4b07a2701f5</td>
<td>May 30, 2021</td>
<td>14.0-CURRENT after allowing the VFS_QUOTACTL(9) implementation to indicate busy state changes.</td>
</tr>
<tr>
<td>1400019</td>
<td>37d64dcdfa51</td>
<td>June 7, 2021</td>
<td>14.0-CURRENT after including pr_err_once() in the LinuxKPI printk.h.</td>
</tr>
<tr>
<td>1400020</td>
<td>8a1a42b2a7a4</td>
<td>June 9, 2021</td>
<td>14.0-CURRENT after adding macros for might_lock_nested() and lockdep_(re/un/)pin_lock() to the LinuxKPI.</td>
</tr>
<tr>
<td>1400021</td>
<td>b47f461c8e67</td>
<td>June 10, 2021</td>
<td>14.0-CURRENT after adding a list_for_each_entry_lockless() macro to the LinuxKPI.</td>
</tr>
<tr>
<td>Value</td>
<td>Revision</td>
<td>Date</td>
<td>Release</td>
</tr>
<tr>
<td>---------</td>
<td>--------------</td>
<td>--------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1400022</td>
<td>40cc9a3a6b81</td>
<td>June 11, 2021</td>
<td>14.0-CURRENT after commit e1a907a25cfa changed the internal KAPI between the krpc and nfsserver modules.</td>
</tr>
<tr>
<td>1400023</td>
<td>d409305fa383</td>
<td>June 13, 2021</td>
<td>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.</td>
</tr>
<tr>
<td>1400024</td>
<td>41dfd8bd6466</td>
<td>June 18, 2021</td>
<td>14.0-CURRENT after various additions to LinuxKPI.</td>
</tr>
<tr>
<td>1400025</td>
<td>5fa1eb1cd927</td>
<td>July 5, 2021</td>
<td>14.0-CURRENT after various additions to LinuxKPI.</td>
</tr>
<tr>
<td>1400026</td>
<td>fad3f322efb5</td>
<td>July 16, 2021</td>
<td>14.0-CURRENT after changing the internal KAPI between the nfscommon and nfsd modules.</td>
</tr>
<tr>
<td>1400027</td>
<td>cc55ee8009a5</td>
<td>July 28, 2021</td>
<td>14.0-CURRENT after adding out-of-line LSE atomics helpers to libcompiler_rt.a on aarch64.</td>
</tr>
<tr>
<td>1400028</td>
<td>792b602a337d</td>
<td>July 31, 2021</td>
<td>14.0-CURRENT after making FPU sections thread-safe in the LinuxKPI.</td>
</tr>
<tr>
<td>1400029</td>
<td>245ec7651e42</td>
<td>August 5, 2021</td>
<td>14.0-CURRENT after adding fspacetft(2), vn_deallocate(9) and VOP_DEALLOCATE(9).</td>
</tr>
<tr>
<td>1400030</td>
<td>95941b963606</td>
<td>August 12, 2021</td>
<td>14.0-CURRENT after VOP_DEALLOCATE(9) parameter changes and addition of fspacetft(2) support to POSIX shared memory.</td>
</tr>
<tr>
<td>Value</td>
<td>Revision</td>
<td>Date</td>
<td>Release</td>
</tr>
<tr>
<td>-----------</td>
<td>----------------</td>
<td>-----------------</td>
<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1400031</td>
<td>1a4c5061fc5b</td>
<td>August 24, 2021</td>
<td>14.0-CURRENT after changing <code>fspacectl(2)</code>, <code>vn_deallocate(9)</code> and <code>VOP_DEALLOCATE(9)</code> to update rmsr.r_offset to a meaningful value.</td>
</tr>
<tr>
<td>1400032</td>
<td>76321d2d432e</td>
<td>August 25, 2021</td>
<td>14.0-CURRENT after changing <code>fspacectl(2)</code>, <code>vn_deallocate(9)</code> and <code>VOP_DEALLOCATE(9)</code> to make calculating the number of bytes zeroed easier.</td>
</tr>
<tr>
<td>1400033</td>
<td>c751d067c166</td>
<td>September 7, 2021</td>
<td>14.0-CURRENT after moving the socket buffer locks into the containing socket and renaming sb(un)lock to <code>SOCK_IO_RECV_LOCK</code>, <code>SOCK_IO_RECV_UNLOCK</code>, <code>SOCK_IO_SEND_LOCK</code>, and <code>SOCK_IO_SEND_UNLOCK</code>.</td>
</tr>
<tr>
<td>1400034</td>
<td>c751d067c166</td>
<td>September 29, 2021</td>
<td>14.0-CURRENT after LinuxKPI changes.</td>
</tr>
<tr>
<td>1400035</td>
<td>16f1ee11e657</td>
<td>October 4, 2021</td>
<td>14.0-CURRENT after splitting <code>libtinfo</code> from <code>libncurses</code>.</td>
</tr>
<tr>
<td>1400036</td>
<td>ac847dbf7368</td>
<td>October 6, 2021</td>
<td>14.0-CURRENT after extending the AES-CCM and Chacha20-Poly1305 ciphers in OCF to support multiple nonce lengths.</td>
</tr>
<tr>
<td>1400037</td>
<td>2b68eb8e1dbb</td>
<td>October 11, 2021</td>
<td>14.0-CURRENT after removal of thread argument from <code>VOP_STAT(9)</code> and <code>fo_stat</code>.</td>
</tr>
<tr>
<td>Value</td>
<td>Revision</td>
<td>Date</td>
<td>Release</td>
</tr>
<tr>
<td>--------</td>
<td>------------</td>
<td>-----------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1400038</td>
<td>0d6516b45346</td>
<td>October 17, 2021</td>
<td>14.0-CURRENT after LinuxKPI gained support of lazy BAR allocation.</td>
</tr>
<tr>
<td>1400039</td>
<td>bd49c454ca62</td>
<td>October 19, 2021</td>
<td>14.0-CURRENT after page allocator changes.</td>
</tr>
<tr>
<td>1400040</td>
<td>f38bef2ce417</td>
<td>October 30, 2021</td>
<td>14.0-CURRENT after libdialog shared library version number bump.</td>
</tr>
<tr>
<td>1400041</td>
<td>0c276dee030b</td>
<td>November 6, 2021</td>
<td>14.0-CURRENT after changing the arguments for VOP_ALLOCATE(9).</td>
</tr>
<tr>
<td>1400042</td>
<td>20aa359773be</td>
<td>November 13, 2021</td>
<td>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.</td>
</tr>
<tr>
<td>1400043</td>
<td>7e1d3eef410</td>
<td>November 25, 2021</td>
<td>14.0-CURRENT after removing the unused thread argument from NDINIT(9)*.</td>
</tr>
<tr>
<td>1400044</td>
<td>ec434c85b46d</td>
<td>December 9, 2021</td>
<td>14.0-CURRENT after changing in-kernel software crypto ciphers transforms to support AEAD ciphers and changing the Blake-2S/B auth transforms to support Init before Setkey like other auth transforms.</td>
</tr>
<tr>
<td>1400045</td>
<td>b214fcceacad</td>
<td>December 15, 2021</td>
<td>14.0-CURRENT after changing VOP_READDIR(9)'s cookies argument to a **uint64_t.</td>
</tr>
<tr>
<td>Value</td>
<td>Revision</td>
<td>Date</td>
<td>Release</td>
</tr>
<tr>
<td>---------</td>
<td>------------------</td>
<td>-----------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1400046</td>
<td>e2650af157bc</td>
<td>December 30, 2021</td>
<td>14.0-CURRENT after making the CPU_SET macros compatible with glibc.</td>
</tr>
<tr>
<td>1400047</td>
<td>ed6417cd8d0b</td>
<td>January 17, 2022</td>
<td>14.0-CURRENT after multiple LinuxKPI changes required by drm-kmod.</td>
</tr>
<tr>
<td>1400048</td>
<td>dd2f7a4b45eb</td>
<td>January 18, 2022</td>
<td>14.0-CURRENT after adding &lt;crypto/chacha20_poly1305.h&gt;.</td>
</tr>
<tr>
<td>1400049</td>
<td>2c4b65cc3d22</td>
<td>January 24, 2022</td>
<td>14.0-CURRENT after adding &lt;crypto/curve25519.h&gt;.</td>
</tr>
<tr>
<td>1400050</td>
<td>213e91399b79</td>
<td>January 25, 2022</td>
<td>14.0-CURRENT after iflib adds the feature that a driver can set its own TX queue selection function as if_ttxq_select in struct if_txxrx.</td>
</tr>
<tr>
<td>1400051</td>
<td>59d465e200bb</td>
<td>January 25, 2022</td>
<td>14.0-CURRENT after adding i2c support for LinuxKPI.</td>
</tr>
<tr>
<td>1400052</td>
<td>05f0b24bf34</td>
<td>February 14, 2022</td>
<td>14.0-CURRENT after adding GUID_INIT and pm_qos.h support for LinuxKPI.</td>
</tr>
<tr>
<td>1400053</td>
<td>ba87e9bf7420</td>
<td>February 17, 2022</td>
<td>14.0-CURRENT after adding mmap_lock.h to LinuxKPI.</td>
</tr>
<tr>
<td>1400054</td>
<td>50bb3a33d879</td>
<td>March 28, 2022</td>
<td>14.0-CURRENT after changing irq_work_queue to return a bool in LinuxKPI to match 5.10 API.</td>
</tr>
<tr>
<td>Value</td>
<td>Revision</td>
<td>Date</td>
<td>Release</td>
</tr>
<tr>
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<td>-------------------</td>
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</tr>
<tr>
<td>1400055</td>
<td>d69af4758be9</td>
<td>March 29, 2022</td>
<td>14.0-CURRENT after adding for_each_sgtable_dma_sg and for_each_sgtable_dma_page to LinuxKPI</td>
</tr>
<tr>
<td>1400056</td>
<td>ab8ac4c28574</td>
<td>March 31, 2022</td>
<td>14.0-CURRENT after zlib upgrade to 1.2.12</td>
</tr>
<tr>
<td>1400057</td>
<td>e68b35e40881</td>
<td>April 22, 2022</td>
<td>14.0-CURRENT after changing udp_tun_func_t() prototype.</td>
</tr>
<tr>
<td>1400058</td>
<td>2e32d4e41d20</td>
<td>May 7, 2022</td>
<td>14.0-CURRENT after newbus changes to remove devclass arguments.</td>
</tr>
<tr>
<td>1400059</td>
<td>3a9a9c0ca44e</td>
<td>May 14, 2022</td>
<td>14.0-CURRENT after upgrading llvm, clang, compiler-rt, libc++, libunwind, lld, lldb and openmp to llvmorg-14.0.3-0-g1f9140064dfb, a.k.a. 14.0.3 release.</td>
</tr>
<tr>
<td>1400060</td>
<td>85d7875d4291</td>
<td>June 6, 2022</td>
<td>14.0-CURRENT after LinuxKPI dmi_matches() fixes.</td>
</tr>
<tr>
<td>1400061</td>
<td>c4c5981c14d5</td>
<td>June 8, 2022</td>
<td>14.0-CURRENT after mbuf(9) structure changes.</td>
</tr>
<tr>
<td>1400062</td>
<td>8c309d48aafb</td>
<td>June 18, 2022</td>
<td>14.0-CURRENT after struct kinfo_file changes.</td>
</tr>
<tr>
<td>1400063</td>
<td>8cff8e6e13a6</td>
<td>June 29, 2022</td>
<td>14.0-CURRENT after multiple LinuxKPI changes required by drm-kmod.</td>
</tr>
<tr>
<td>1400064</td>
<td>ddd9004e7a5d</td>
<td>July 18, 2022</td>
<td>14.0-CURRENT after the removal of OBJT_DEFAULT.</td>
</tr>
<tr>
<td>Value</td>
<td>Revision</td>
<td>Date</td>
<td>Release</td>
</tr>
<tr>
<td>---------</td>
<td>------------</td>
<td>-------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1400065</td>
<td>b273f93657cf</td>
<td>August 8, 2022</td>
<td>14.0-CURRENT after multiple LinuxKPI changes required by drm-kmod.</td>
</tr>
<tr>
<td>1400066</td>
<td>ff7812ee7d44</td>
<td>August 18, 2022</td>
<td>14.0-CURRENT after multiple LinuxKPI changes required by drm-kmod.</td>
</tr>
<tr>
<td>1400069</td>
<td>f95c0bc89ea4</td>
<td>September 22, 2022</td>
<td>14.0-CURRENT after multiple LinuxKPI changes.</td>
</tr>
<tr>
<td>1400070</td>
<td>6bddde307e21</td>
<td>September 22, 2022</td>
<td>14.0-CURRENT after KPI changes to pmap_unmapdev() and kmem_*().</td>
</tr>
<tr>
<td>1400071</td>
<td>d3f96f661050</td>
<td>September 26, 2022</td>
<td>14.0-CURRENT after KPI changes that sysctl OIDs lists converted to RB trees.</td>
</tr>
<tr>
<td>1400072</td>
<td>8a96874eeeee</td>
<td>September 22, 2022</td>
<td>14.0-CURRENT after qsort_r prototype modified to match POSIX.</td>
</tr>
</tbody>
</table>

### 18.2. FreeBSD 13 Versions

Table 53. FreeBSD 13 __FreeBSD_version Values

<table>
<thead>
<tr>
<th>Value</th>
<th>Revision</th>
<th>Date</th>
<th>Release</th>
</tr>
</thead>
<tbody>
<tr>
<td>1300000</td>
<td>339436</td>
<td>October 19, 2018</td>
<td>13.0-CURRENT.</td>
</tr>
<tr>
<td>1300001</td>
<td>339730</td>
<td>October 25, 2018</td>
<td>13.0-CURRENT after bumping OpenSSL shared library version numbers.</td>
</tr>
<tr>
<td>1300002</td>
<td>339765</td>
<td>October 25, 2018</td>
<td>13.0-CURRENT after restoration of sys/joystick.h.</td>
</tr>
<tr>
<td>1300003</td>
<td>340055</td>
<td>November 2, 2018</td>
<td>13.0-CURRENT after vop_symlink API change (a_target is now const.)</td>
</tr>
<tr>
<td>Value</td>
<td>Revision</td>
<td>Date</td>
<td>Release</td>
</tr>
<tr>
<td>----------</td>
<td>----------</td>
<td>-----------------</td>
<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1300004</td>
<td>340841</td>
<td>November 23, 2018</td>
<td>13.0-CURRENT after enabling crtbegn and crtend code.</td>
</tr>
<tr>
<td>1300005</td>
<td>341836</td>
<td>December 11, 2018</td>
<td>13.0-CURRENT after enabling UFS inode checksums.</td>
</tr>
<tr>
<td>1300006</td>
<td>342398</td>
<td>December 24, 2018</td>
<td>13.0-CURRENT after fixing sys/random.h include to be usable from C++.</td>
</tr>
<tr>
<td>1300007</td>
<td>342629</td>
<td>December 30, 2018</td>
<td>13.0-CURRENT after changing the size of struct linux_cdev on 32-bit platforms.</td>
</tr>
<tr>
<td>1300008</td>
<td>342772</td>
<td>January 4, 2019</td>
<td>13.0-CURRENT after adding kern.smp.threads_per_core and kern.smp.cores sysctls.</td>
</tr>
<tr>
<td>1300009</td>
<td>343213</td>
<td>January 20, 2019</td>
<td>13.0-CURRENT after struct ieee80211vap structure change to resolve ioctl/detach race for ieee80211com structure.</td>
</tr>
<tr>
<td>1300010</td>
<td>343485</td>
<td>January 27, 2019</td>
<td>13.0-CURRENT after increasing SPECNAMELEN from 63 to MAXNAMELEN (255).</td>
</tr>
<tr>
<td>1300011</td>
<td>344041</td>
<td>February 12, 2019</td>
<td>13.0-CURRENT after renameat(2) has been corrected to work with kernels built with the CAPABILITIES option.</td>
</tr>
<tr>
<td>1300012</td>
<td>344062</td>
<td>February 12, 2019</td>
<td>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.</td>
</tr>
<tr>
<td>Value</td>
<td>Revision</td>
<td>Date</td>
<td>Release</td>
</tr>
<tr>
<td>---------</td>
<td>----------</td>
<td>------------------</td>
<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1300013</td>
<td>344300</td>
<td>February 19, 2019</td>
<td>13.0-CURRENT after the removal of drm and drm2.</td>
</tr>
<tr>
<td>1300014</td>
<td>344779</td>
<td>March 4, 2019</td>
<td>13.0-CURRENT after upgrading clang, llvm, lld, lldb, compiler-rt and libc++ to 8.0.0 rc3.</td>
</tr>
<tr>
<td>1300015</td>
<td>345196</td>
<td>March 15, 2019</td>
<td>13.0-CURRENT after deanonymizing thread and proc state enums, so userland applications can use them without redefining the value names.</td>
</tr>
<tr>
<td>1300016</td>
<td>345236</td>
<td>March 16, 2019</td>
<td>13.0-CURRENT after enabling LLVM OpenMP 8.0.0 rc5 on amd64 by default.</td>
</tr>
<tr>
<td>1300017</td>
<td>345305</td>
<td>March 19, 2019</td>
<td>13.0-CURRENT after exposing the Rx mbuf buffer size to drivers in iflib.</td>
</tr>
<tr>
<td>1300018</td>
<td>346012</td>
<td>March 16, 2019</td>
<td>13.0-CURRENT after introduction of funlinkat syscall in 345982.</td>
</tr>
<tr>
<td>1300019</td>
<td>346282</td>
<td>April 16, 2019</td>
<td>13.0-CURRENT after addition of is_random_seeded(9) to random(4).</td>
</tr>
<tr>
<td>1300020</td>
<td>346358</td>
<td>April 18, 2019</td>
<td>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.</td>
</tr>
<tr>
<td>Value</td>
<td>Revision</td>
<td>Date</td>
<td>Release</td>
</tr>
<tr>
<td>----------</td>
<td>----------</td>
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<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1300021</td>
<td>346645</td>
<td>April 24, 2019</td>
<td>13.0-CURRENT after LinuxKPI uses <code>bus_dma(9)</code> to be compatible with an IOMMU.</td>
</tr>
<tr>
<td>1300022</td>
<td>347089</td>
<td>May 4, 2019</td>
<td>13.0-CURRENT after fixing regression issue after 346645 in the LinuxKPI.</td>
</tr>
<tr>
<td>1300023</td>
<td>347192</td>
<td>May 6, 2019</td>
<td>13.0-CURRENT after list-ifying kernel dump device configuration.</td>
</tr>
<tr>
<td>1300024</td>
<td>347325</td>
<td>May 8, 2019</td>
<td>13.0-CURRENT after bumping the Mellanox driver version numbers (<code>mlx4en(4); mlx5en(4)</code>).</td>
</tr>
<tr>
<td>1300025</td>
<td>347532</td>
<td>May 13, 2019</td>
<td>13.0-CURRENT after renaming <code>vm.max_wired</code> to <code>vm.max_user_wired</code> and changing its type.</td>
</tr>
<tr>
<td>1300026</td>
<td>347596</td>
<td>May 14, 2019</td>
<td>13.0-CURRENT after adding context member to <code>ww_mutex</code> in LinuxKPI.</td>
</tr>
<tr>
<td>1300027</td>
<td>347601</td>
<td>May 14, 2019</td>
<td>13.0-CURRENT after adding prepare to <code>pm_ops</code> in LinuxKPI.</td>
</tr>
<tr>
<td>1300028</td>
<td>347925</td>
<td>May 17, 2019</td>
<td>13.0-CURRENT after removal of bm, cs, de, ed, ep, ex, fe, pcn, sf, sn, tl, tx, txp, vx, wb, and xe drivers.</td>
</tr>
<tr>
<td>Value</td>
<td>Revision</td>
<td>Date</td>
<td>Release</td>
</tr>
<tr>
<td>--------</td>
<td>----------</td>
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</tr>
<tr>
<td>1300029</td>
<td>347984</td>
<td>May 20, 2019</td>
<td>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.</td>
</tr>
<tr>
<td>1300030</td>
<td>348350</td>
<td>May 29, 2019</td>
<td>13.0-CURRENT after adding relocation support to libdwarf on powerpc64 to fix handling of DWARF information on unlinked objects. Original commit in 348347.</td>
</tr>
<tr>
<td>1300031</td>
<td>348808</td>
<td>June 8, 2019</td>
<td>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.</td>
</tr>
<tr>
<td>1300032</td>
<td>349151</td>
<td>June 17, 2019</td>
<td>13.0-CURRENT after separating kernel crc32() implementation to its own header (gsb_crc32.h) and renaming the source to gsb_crc32.c.</td>
</tr>
<tr>
<td>Value</td>
<td>Revision</td>
<td>Date</td>
<td>Release</td>
</tr>
<tr>
<td>------------</td>
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<td>-----------------</td>
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</tr>
<tr>
<td>1300033</td>
<td>349277</td>
<td>June 21, 2019</td>
<td>13.0-CURRENT after additions to LinuxKPI's rcu list.</td>
</tr>
<tr>
<td>1300034</td>
<td>349352</td>
<td>June 24, 2019</td>
<td>13.0-CURRENT after NAND and NANDFS removal.</td>
</tr>
<tr>
<td>1300035</td>
<td>349846</td>
<td>July 8, 2019</td>
<td>13.0-CURRENT after merging the vm_page hold and wire mechanisms.</td>
</tr>
<tr>
<td>1300036</td>
<td>349972</td>
<td>July 13, 2019</td>
<td>13.0-CURRENT after adding arm_drain_writebuf() and arm_sync_icache() for compatibility with NetBSD and OpenBSD.</td>
</tr>
<tr>
<td>1300037</td>
<td>350307</td>
<td>July 24, 2019</td>
<td>13.0-CURRENT after removal of libcap_random(3).</td>
</tr>
<tr>
<td>1300038</td>
<td>350437</td>
<td>July 30, 2019</td>
<td>13.0-CURRENT after removal of gzip’ed a.out support.</td>
</tr>
<tr>
<td>1300039</td>
<td>350665</td>
<td>August 7, 2019</td>
<td>13.0-CURRENT after merge of fusefs from projects/fuse2.</td>
</tr>
<tr>
<td>1300040</td>
<td>351140</td>
<td>August 16, 2019</td>
<td>13.0-CURRENT after deletion of sys/dir.h which has been deprecated since 1997.</td>
</tr>
<tr>
<td>(not changed)</td>
<td>351423</td>
<td>August 23, 2019</td>
<td>13.0-CURRENT after changing most arguments to ping6(8).</td>
</tr>
<tr>
<td>1300041</td>
<td>351480</td>
<td>August 25, 2019</td>
<td>13.0-CURRENT after removal of zlib 1.0.4 after the completion of kernel zlib unification.</td>
</tr>
<tr>
<td>1300042</td>
<td>351522</td>
<td>August 27, 2019</td>
<td>13.0-CURRENT after addition of kernel-side support for in-kernel TLS.</td>
</tr>
<tr>
<td>1300043</td>
<td>351698</td>
<td>September 2, 2019</td>
<td>13.0-CURRENT after removal of gets(3).</td>
</tr>
<tr>
<td>Value</td>
<td>Revision</td>
<td>Date</td>
<td>Release</td>
</tr>
<tr>
<td>---------</td>
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</tr>
<tr>
<td>1300044</td>
<td>351701</td>
<td>September 2, 2019</td>
<td>13.0-CURRENT after adding sysfs create/remove functions that handles multiple files in one call to the LinuxKPI.</td>
</tr>
<tr>
<td>1300045</td>
<td>351729</td>
<td>September 3, 2019</td>
<td>13.0-CURRENT after adding <code>sysctlbyname(3)</code> system call.</td>
</tr>
<tr>
<td>1300046</td>
<td>351937</td>
<td>September 6, 2019</td>
<td>13.0-CURRENT after LinuxKPI sysfs improvements.</td>
</tr>
<tr>
<td>1300048</td>
<td>352700</td>
<td>September 25, 2019</td>
<td>13.0-CURRENT after adding a <code>shm_open2</code> syscall to support the upcoming <code>memfd_create(2)</code> syscall.</td>
</tr>
<tr>
<td>1300049</td>
<td>353274</td>
<td>October 7, 2019</td>
<td>13.0-CURRENT after factoring out the VNET shutdown check into an own vnet structure field.</td>
</tr>
<tr>
<td>1300050</td>
<td>353358</td>
<td>October 9, 2019</td>
<td>13.0-CURRENT after updating llvm, clang, compiler-rt, libc++, libunwind, lld, lldb and openmp to 9.0.0 final release r372316.</td>
</tr>
<tr>
<td>1300051</td>
<td>353685</td>
<td>October 17, 2019</td>
<td>13.0-CURRENT after splitting out a more generic <code>debugnet(4)</code> from <code>netdump(4)</code>.</td>
</tr>
<tr>
<td>Value</td>
<td>Revision</td>
<td>Date</td>
<td>Release</td>
</tr>
<tr>
<td>------------</td>
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<td>-------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1300052</td>
<td>353698</td>
<td>October 17, 2019</td>
<td>13.0-CURRENT after promoting the page busy field to a first class lock that no longer requires the object lock for consistency.</td>
</tr>
<tr>
<td>1300053</td>
<td>353700</td>
<td>October 17, 2019</td>
<td>13.0-CURRENT after implementing NetGDB.</td>
</tr>
<tr>
<td>1300054</td>
<td>353868</td>
<td>October 21, 2019</td>
<td>13.0-CURRENT after removing obsoleted KPIs that were used to access interface address lists.</td>
</tr>
<tr>
<td>1300055</td>
<td>354335</td>
<td>November 4, 2019</td>
<td>13.0-CURRENT after enabling device class group attributes in the LinuxKPI.</td>
</tr>
<tr>
<td>1300056</td>
<td>354460</td>
<td>November 7, 2019</td>
<td>13.0-CURRENT after fixing a potential OOB read security issue in libc++.</td>
</tr>
<tr>
<td>1300057</td>
<td>354694</td>
<td>November 13, 2019</td>
<td>13.0-CURRENT after adding support for AT_EXECPATH to elf_aux_info(3).</td>
</tr>
<tr>
<td>1300058</td>
<td>354820</td>
<td>November 18, 2019</td>
<td>13.0-CURRENT after widening the vm_page aflags field to 16 bits.</td>
</tr>
<tr>
<td>1300059</td>
<td>354835</td>
<td>November 18, 2019</td>
<td>13.0-CURRENT after converting the in-tree sysent targets to use the new makesyscalls.lua.</td>
</tr>
<tr>
<td>1300060</td>
<td>354922</td>
<td>November 20, 2019</td>
<td>13.0-CURRENT after adding /etc/os-release as a symbolic link to /var/run/os-release.</td>
</tr>
<tr>
<td>1300061</td>
<td>354977</td>
<td>November 21, 2019</td>
<td>13.0-CURRENT after adding functions to bitstring(3) to find contiguous sequences of set or unset bits.</td>
</tr>
<tr>
<td>Value</td>
<td>Revision</td>
<td>Date</td>
<td>Release</td>
</tr>
<tr>
<td>--------</td>
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<td>-----------------------</td>
<td>--------------------------------------------------------------</td>
</tr>
<tr>
<td>1300062</td>
<td>355309</td>
<td>December 2, 2019</td>
<td>13.0-CURRENT after adding TCP_STATS support.</td>
</tr>
<tr>
<td>1300063</td>
<td>355537</td>
<td>December 8, 2019</td>
<td>13.0-CURRENT after removal of VI_DOOMED (use VN_IS_DOOMED instead).</td>
</tr>
<tr>
<td>1300064</td>
<td>355658</td>
<td>December 9, 2019</td>
<td>13.0-CURRENT after correcting the C++ version check for declaring timespec_get(3).</td>
</tr>
<tr>
<td>1300065</td>
<td>355643</td>
<td>December 12, 2019</td>
<td>13.0-CURRENT after adding sigsetop extensions commonly found in musl libc and glibc.</td>
</tr>
<tr>
<td>1300066</td>
<td>355679</td>
<td>December 12, 2019</td>
<td>13.0-CURRENT after changing the internal interface between the NFS modules as part of the introduction of NFS 4.2.</td>
</tr>
<tr>
<td>1300067</td>
<td>355732</td>
<td>December 13, 2019</td>
<td>13.0-CURRENT after removing the deprecated callout_handle_init, timeout, and untimeout functions.</td>
</tr>
<tr>
<td>1300068</td>
<td>355828</td>
<td>December 16, 2019</td>
<td>13.0-CURRENT after doubling the value of ARG_MAX, for 64 bit platforms.</td>
</tr>
<tr>
<td>1300069</td>
<td>356051</td>
<td>December 24, 2019</td>
<td>13.0-CURRENT after the addition of busdma templates.</td>
</tr>
<tr>
<td>1300070</td>
<td>356113</td>
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<td>13.0-CURRENT after eliminating the last MI difference in AT_* definitions (for powerpc).</td>
</tr>
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<td>356135</td>
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<td>13.0-CURRENT after making USB statistics be per-device instead of per bus.</td>
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<td>1300072</td>
<td>356185</td>
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<td>13.0-CURRENT after removal of \texttt{GEOM_SCHED} class and \texttt{gsched} tool.</td>
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<td>1300073</td>
<td>356263</td>
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<td>13.0-CURRENT after removing arm/arm as a valid target.</td>
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<td>356337</td>
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<td>13.0-CURRENT after removing flags argument from \texttt{VOP_UNLOCK}.</td>
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<td>1300075</td>
<td>356409</td>
<td>January 6, 2020</td>
<td>13.0-CURRENT after adding own counter for cancelled USB transfers.</td>
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<td>1300076</td>
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<td>13.0-CURRENT after pushing \texttt{vnop} implementation into the fileop layer in \texttt{posix_fallocate(2)}.</td>
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<td>357396</td>
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<td>13.0-CURRENT after removal of armv5 architecture code from the src tree.</td>
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<td>13.0-CURRENT after removal of sparc64 architecture code from the src tree.</td>
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<td>358020</td>
<td>February 17, 2020</td>
<td>13.0-CURRENT after changing \texttt{struct vnet} and the VNET magic cookie.</td>
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<td>1300079</td>
<td>358164</td>
<td>February 20, 2020</td>
<td>13.0-CURRENT after upgrading ncurses to 6.2.x</td>
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<td>358172</td>
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<td>1300081</td>
<td>358218</td>
<td>February 21, 2020</td>
<td>13.0-CURRENT after recent linuxkpi changes.</td>
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<td>358497</td>
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<td>13.0-CURRENT after removal of <code>bktr(4)</code></td>
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<td>1300083</td>
<td>358834</td>
<td>March 10, 2020</td>
<td>13.0-CURRENT after removal of <code>amd(8)</code>, r358821.</td>
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<td>1300084</td>
<td>358851</td>
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<td>13.0-CURRENT after switching powerpc and powerpcspe to the lld linker.</td>
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<td>13.0-CURRENT after refactoring the driver and consumer interfaces for in-kernel cryptography.</td>
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<td>1300088</td>
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<td>13.0-CURRENT after removing support for procsfs process debugging.</td>
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<tr>
<td>1300089</td>
<td>359727</td>
<td>April 8, 2020</td>
<td>13.0-CURRENT after cloning the RCU interface into a sleepable and a non-sleepable part in the LinuxKPI.</td>
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<tr>
<td>1300090</td>
<td>359747</td>
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<td>359839</td>
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<td>13.0-CURRENT after implementing a <code>close_range(2)</code> syscall.</td>
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<td>1300092</td>
<td>359920</td>
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<td>13.0-CURRENT after reworking unmapped mbufs in KTLS to carry <code>ext_pgs</code> in the <code>mbuf</code> itself.</td>
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<td>13.0-CURRENT after adding support for kernel TLS receive offload.</td>
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<td>1300094</td>
<td>360796</td>
<td>May 7, 2020</td>
<td>13.0-CURRENT after linuxkpi changes.</td>
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<td>13.0-CURRENT after adding HyperV socket support for FreeBSD guests.</td>
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<td>1300096</td>
<td>361410</td>
<td>May 23, 2020</td>
<td>13.0-CURRENT after updating llvm, clang, compiler-rt, libc++, libunwind, lld, lldb and openmp to 10.0.1 rc1 f79cd71e145.</td>
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<td>1300097</td>
<td>361724</td>
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<td>13.0-CURRENT after implementing <code>__isconstexpr()</code> function macro in the LinuxKPI.</td>
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<tr>
<td>1300098</td>
<td>362159</td>
<td>June 14, 2020</td>
<td>13.0-CURRENT after changing the <code>export_args ex_flags</code> field so that is 64bits.</td>
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<tr>
<td>1300099</td>
<td>362453</td>
<td>June 20, 2020</td>
<td>13.0-CURRENT after making liblzma use libmd implementation of SHA256.</td>
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<tr>
<td>1300100</td>
<td>362640</td>
<td>June 26, 2020</td>
<td>13.0-CURRENT after changing the internal API between the NFS kernel modules.</td>
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<tr>
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<td>1300101</td>
<td>363077</td>
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<td>13.0-CURRENT after implementing the <code>array_size()</code> function in the LinuxKPI.</td>
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<td>1300102</td>
<td>363562</td>
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<td>13.0-CURRENT after implementing lockless lookup in the VFS layer.</td>
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<tr>
<td>1300103</td>
<td>363757</td>
<td>August 1, 2020</td>
<td>13.0-CURRENT after making rights mandatory for NDINIT_ALL.</td>
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<td>1300104</td>
<td>363783</td>
<td>August 2, 2020</td>
<td>13.0-CURRENT after vnode layout changes.</td>
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<tr>
<td>1300105</td>
<td>363894</td>
<td>August 5, 2020</td>
<td>13.0-CURRENT after <code>vaccess()</code> change.</td>
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<tr>
<td>1300106</td>
<td>364092</td>
<td>August 11, 2020</td>
<td>13.0-CURRENT after adding an argument to <code>newnfs_connect()</code> that indicates use TLS for the connection.</td>
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<tr>
<td>1300107</td>
<td>364109</td>
<td>August 11, 2020</td>
<td>13.0-CURRENT after change to clone the task struct fields related to RCU.</td>
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<td>1300108</td>
<td>364233</td>
<td>August 14, 2020</td>
<td>13.0-CURRENT after adding a few <code>wait_bit</code> functions to the <code>linuxkpi</code>, which are needed for DRM from Linux v5.4.</td>
</tr>
<tr>
<td>1300109</td>
<td>364274</td>
<td>August 16, 2020</td>
<td>13.0-CURRENT after <code>vget()</code> argument removal and namei flags renumbering.</td>
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<td>364284</td>
<td>August 16, 2020</td>
<td>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-gff47911ddf.</td>
</tr>
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<td>1300110</td>
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<td>13.0-CURRENT after deleting the unused use_ext argument to nfscl_reqstart().</td>
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<td>13.0-CURRENT after adding atomic and bswap functions to libcompiler_rt.</td>
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<tr>
<td>1300114</td>
<td>365459</td>
<td>September 8, 2020</td>
<td>13.0-CURRENT after changing arm64 AT_HWCAP definitions for elf_aux_info(3).</td>
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<tr>
<td>1300115</td>
<td>365705</td>
<td>September 14, 2020</td>
<td>13.0-CURRENT after fixing crunchgen(1) application build with WARNS=6.</td>
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<tr>
<td>1300116</td>
<td>366062</td>
<td>September 22, 2020</td>
<td>13.0-CURRENT after the introduction of the powerpc64le ARCH.</td>
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<tr>
<td>1300117</td>
<td>366070</td>
<td>September 23, 2020</td>
<td>13.0-CURRENT after reimplementing purgevfs to iterate vnodes instead of the entire hash.</td>
</tr>
<tr>
<td>1300118</td>
<td>366374</td>
<td>October 2, 2020</td>
<td>13.0-CURRENT after adding backlight support and dmi_* functions to the linuxkpi.</td>
</tr>
<tr>
<td>1300119</td>
<td>366432</td>
<td>October 6, 2020</td>
<td>13.0-CURRENT after populating the acquire context field of a ww_mutex in the LinuxKPI.</td>
</tr>
<tr>
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<td>Revision</td>
<td>Date</td>
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<td>1300120</td>
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<td>13.0-CURRENT after the fix to arm64 write-only mappings.</td>
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<tr>
<td>1300121</td>
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<td>13.0-CURRENT after the addition of VOP_EAGAIN.</td>
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<td>1300124</td>
<td>367162</td>
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<td>13.0-CURRENT after adding cache_vop_mkdir and renaming cache_rename to cache_vop_rename.</td>
</tr>
<tr>
<td>1300125</td>
<td>367347</td>
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<td>13.0-CURRENT after using a rms lock for teardown handling in zfs.</td>
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<td>1300126</td>
<td>367384</td>
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<td>13.0-CURRENT after rationalizing per-cpu zones.</td>
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<td>1300127</td>
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<td>13.0-CURRENT after moving malloc_type_internal into malloc_type.</td>
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<td>November 9, 2020</td>
<td>13.0-CURRENT after LinuxKPI additions to implement ACPI bits required by drm-kmod in the base system.</td>
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<td>1300129</td>
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<td>13.0-CURRENT after retiring malloc_last_fail.</td>
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<td>1300130</td>
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<td>13.0-CURRENT after p_pd / pwddesc split from p_fd / filedesc.</td>
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<td>1300132</td>
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<td>December 15, 2020</td>
<td>13.0-CURRENT after improving handling of alternate settings in the USB stack.</td>
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<tr>
<td>1300133</td>
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<td>December 23, 2020</td>
<td>13.0-CURRENT after changing the internal API between the NFS and kernel RPC modules.</td>
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<td>1300134</td>
<td>a84b0e94cacf</td>
<td>January 7, 2021</td>
<td>13.0-CURRENT after factoring out the hardware-independent part of USB HID support to a new module.</td>
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<td>1300135</td>
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<td>13.0-CURRENT after adding <code>kernel_fpu_begin/kernel_fpu_end</code> to the LinuxKPI.</td>
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<td>1300136</td>
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<td>13.0-CURRENT after reimplementing LinuxKPI's <code>irq_work</code> queue on top of fast taskqueue.</td>
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<td>1300137</td>
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<td>13.0-CURRENT after fixing a clang assertion when building the <code>devel/onetbb</code> port.</td>
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<tr>
<td>1300138</td>
<td>dcee9964238b</td>
<td>February 1, 2021</td>
<td>13.0-ALPHA3 after adding lockless symlink lookup to vfs cache.</td>
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<td>1300139</td>
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<td>February 2, 2021</td>
<td>13.0-ALPHA3 after adding various LinuxKPI bits conflicting with drm-kmod.</td>
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<tr>
<td>1300500</td>
<td>3c6a89748a01</td>
<td>February 5, 2021</td>
<td>13.0-STABLE after releng/13.0 was branched.</td>
</tr>
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<td>April 23, 2021</td>
<td>13.0-STABLE after fixing rtld's dl_iterate_phdr().</td>
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<td>13.0-STABLE after fixing rtld's dl_iterate_phdr().</td>
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<td>1300502</td>
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<td>13.0-STABLE after implementing atomic_dec_and_lock_irqsave() in the LinuxKPI.</td>
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<td>1300503</td>
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<td>April 23, 2021</td>
<td>13.0-STABLE after changing the internal KAPI between the krpc and NFS.</td>
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<td>1300504</td>
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<td>April 30, 2021</td>
<td>13.0-STABLE after updating the LinuxKPI to accommodate the drm-kmod 5.5 update.</td>
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<tr>
<td>1300505</td>
<td>8f81f190a640</td>
<td>May 10, 2021</td>
<td>13.0-STABLE after changing the internal KAPI between the nscl.ko and nfscommon.ko modules.</td>
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<tr>
<td>1300506</td>
<td>e31579b8558d</td>
<td>June 2, 2021</td>
<td>13.0-STABLE after adding TCP LRO support for VLAN and VxLAN.</td>
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<td>1300507</td>
<td>c64d1bd7145b</td>
<td>June 2, 2021</td>
<td>13.0-STABLE after adding a new member to the EPOCH(9) tracker structure.</td>
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<tr>
<td>1300508</td>
<td>658f5eed38c3</td>
<td>June 11, 2021</td>
<td>13.0-STABLE after adding macros for might_lock_nested() and lockdep_(re/un/)pin_lock() to the LinuxKPI.</td>
</tr>
<tr>
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<td>1300509</td>
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<td>June 14, 2021</td>
<td>13.0-STABLE after adding a macro for <code>list_for_each_entry_lockless()</code> to the LinuxKPI.</td>
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<tr>
<td>1300510</td>
<td>eb3397588e1b</td>
<td>June 26, 2021</td>
<td>13.0-STABLE after changing the internal KAPI between the krpc and nfsd modules.</td>
</tr>
<tr>
<td>1300511</td>
<td>2622570aeb3d</td>
<td>July 7, 2021</td>
<td>13.0-STABLE after changing <code>softdep_prelink()</code> to only do sync if another thread changed the vnode metadata since previous prelink.</td>
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<tr>
<td>1300512</td>
<td>f72db34d2295</td>
<td>July 18, 2021</td>
<td>13.0-STABLE after various merges to LinuxKPI, OFED, net80211, and drivers.</td>
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<td>1300513</td>
<td>af732203b8f7</td>
<td>July 31, 2021</td>
<td>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.</td>
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<td>1300514</td>
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<td>August 3, 2021</td>
<td>Incompatible changes to the KBI of internal interfaces between NFS requires rebuilding modules.</td>
</tr>
<tr>
<td>1300515</td>
<td>0437d10e359e</td>
<td>September 22, 2021</td>
<td>13.0-STABLE returning to 13.0 KBI for linuxkpi.</td>
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<tr>
<td>1300518</td>
<td>a017868e2818</td>
<td>October 21, 2021</td>
<td>13.0-STABLE after adding <code>crypto_cursor_segment()</code></td>
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<td>1300519</td>
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<td>13.0-STABLE after extending the AES-CCM and Chacha20-Poly1305 ciphers in OCF to support multiple nonce lengths.</td>
</tr>
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<td>1300521</td>
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<td>13.0-STABLE after various merges to LinuxKPI and net80211.</td>
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<td>13.0-STABLE after changing the internal KAPI between the NFS modules.</td>
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<td>December 18, 2021</td>
<td>13.0-STABLE after adding two arguments to <code>VOP_ALLOCATE(9)</code>.</td>
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<td>1300524</td>
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<td>13.0-STABLE after making the CPU_SET macros compatible with glibc.</td>
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<td>1300525</td>
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<td>January 22, 2022</td>
<td>13.0-STABLE after multiple LinuxKPI changes required by drm-kmod.</td>
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<td>February 20, 2022</td>
<td>13.0-STABLE after multiple LinuxKPI changes overlapping but not conflicting with drm-kmod.</td>
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<td>1301000</td>
<td>ad329796db2</td>
<td>March 10, 2022</td>
<td>releng/13.1 branched.</td>
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<td>1301500</td>
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<td>March 10, 2022</td>
<td>13.1-STABLE after releng/13.1 branched.</td>
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<td>1301501</td>
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<td>March 27, 2022</td>
<td>13.1-STABLE after various merges to LinuxKPI and net80211.</td>
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<td>April 27, 2022</td>
<td>13.1-STABLE after various merges to LinuxKPI.</td>
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<td>May 19, 2022</td>
<td>13.1-_STABLE after adding alternate DRIVER_MODULE macros without a devclass argument.</td>
</tr>
<tr>
<td>1301504</td>
<td>a13b6fc61908</td>
<td>June 4, 2022</td>
<td>13.1-_STABLE after upgrading llvm, clang, compiler-rt, libc++, libunwind, lld, lldb and openmp to llvmorg-14.0.3-0-g1f9140064dfb, a.k.a. 14.0.3 release.</td>
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<td>13.1-_STABLE after various merges to LinuxKPI.</td>
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<td>1301506</td>
<td>8e6cfc632cf6</td>
<td>July 13, 2022</td>
<td>13.1-_STABLE after after adding <code>&lt;crypto/chacha20_poly 1305.h&gt;</code> and <code>&lt;crypto/curve25519.h&gt;</code>.</td>
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<td>1301507</td>
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<td>June 21, 2022</td>
<td>13.1-_STABLE after various merges to LinuxKPI.</td>
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1301510 | 6820a0512fa6 | December 8, 2022 | 13.1-_STABLE after LinuxKPI dmi_matches() fixes.                           |

```template:
13XXXXX

XXX
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<th>Release</th>
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<td>12.0-CURRENT.</td>
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<td>1200001</td>
<td>302628</td>
<td>July 12, 2016</td>
<td>12.0-CURRENT after removing collation from `[a-z]-type ranges.</td>
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<td>1200002</td>
<td>304395</td>
<td>August 18, 2016</td>
<td>12.0-CURRENT after removing unused and obsolete openbsd_poll system call.</td>
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| 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.
| 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.
| 1200021 | 313858 | February 16, 2017 | 12.0-CURRENT after removing MCA and EISA support.
February 21, 2017 | 12.0-CURRENT after making the LinuxKPI task struct persistent across system calls.


March 2, 2017 | 12.0-CURRENT after upgrading our copies of clang, llvm, lld, lldb, compiler-rt and libc++ to 4.0.0.

March 7, 2017 | 12.0-CURRENT after removal of pcap-int.h

March 16, 2017 | 12.0-CURRENT after addition of the <dev/mmc/mmc_ioctl.h> header.

March 16, 2017 | 12.0-CURRENT after hiding struct inpcb and struct tcpcb from userland.


April 10, 2017 | 12.0-CURRENT after renaming smp_no_rendevous_barrier() to smp_no_rendezvous_barrier() in 316648.

April 19, 2017 | 12.0-CURRENT after the removal of struct vmmeter from struct pcpu from 317061.

April 24, 2017 | 12.0-CURRENT after removing NATM support including en(4), fatm(4), hatm(4), and patm(4).

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).


June 17, 2017 | 12.0-CURRENT after the type of the struct event member data was increased to 64bit, and ext structure members added.

June 19, 2017 | 12.0-CURRENT after the NFS client and server were changed so that they actually use the 64bit ino_t.

June 24, 2017 | 12.0-CURRENT after the MAP_GUARD mmap(2) flag was added.

June 26, 2017 | 12.0-CURRENT after changing time_t to 64 bits on powerpc (32-bit version).

July 1, 2017 | 12.0-CURRENT after the cleanup and inlining of bus_dmamap* functions (320528).


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).
<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
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<tr>
<td>August 21, 2017</td>
<td>12.0-CURRENT after WRFSBASE instruction become operational on amd64.</td>
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<tr>
<td>August 25, 2017</td>
<td>12.0-CURRENT after PLPMTUD counters were changed to use <code>counter(9)</code>.</td>
</tr>
<tr>
<td>August 28, 2017</td>
<td>12.0-CURRENT after dropping x86 CACHE_LINE_SIZE down to 64 bytes.</td>
</tr>
<tr>
<td>September 8, 2017</td>
<td>12.0-CURRENT after implementing <code>poll_wait()</code> in the LinuxKPI.</td>
</tr>
<tr>
<td>September 18, 2017</td>
<td>12.0-CURRENT after adding shared memory support to LinuxKPI. (323703).</td>
</tr>
<tr>
<td>September 22, 2017</td>
<td>12.0-CURRENT after adding support for 32-bit compatibility IOCTLs to LinuxKPI.</td>
</tr>
<tr>
<td>September 26, 2017</td>
<td>12.0-CURRENT after removing <code>M_HASHTYPE_RSS_UDP_IPV4_EX</code>. (324052).</td>
</tr>
<tr>
<td>October 2, 2017</td>
<td>12.0-CURRENT after hiding <code>struct socket</code> and <code>struct unpcb</code> from userland.</td>
</tr>
<tr>
<td>October 4, 2017</td>
<td>12.0-CURRENT after adding the <code>value.u16</code> field to <code>struct diocgattr_arg</code>.</td>
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<tr>
<td>October 5, 2017</td>
<td>12.0-CURRENT after adding the <code>armv7 MACHINE_ARCH</code>. (324340).</td>
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<tr>
<td>October 9, 2017</td>
<td>12.0-CURRENT after removing <code>libstand.a</code> as a public interface. (324454).</td>
</tr>
<tr>
<td>October 26, 2017</td>
<td>12.0-CURRENT after fixing <code>ptrace()</code> to always clear the correct thread event when resuming.</td>
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<tr>
<td>November 7, 2017</td>
<td>12.0-CURRENT after changing <code>struct mbuf</code> layout to add optional hardware timestamps for receive packets.</td>
</tr>
<tr>
<td>November 15, 2017</td>
<td>12.0-CURRENT after changing the layout of <code>struct vmtotal</code> to allow for reporting large memory counters.</td>
</tr>
<tr>
<td>January 9, 2018</td>
<td>12.0-CURRENT after adding <code>cpucontrol -e</code> support.</td>
</tr>
<tr>
<td>January 14, 2018</td>
<td>12.0-CURRENT after upgrading clang, llvm, lld, lldb, compiler-rt and libc++ to 6.0.0 (branches/release_60 r321788).</td>
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<tr>
<td>February 8, 2018</td>
<td>12.0-CURRENT after applying a clang 6.0.0 fix to make the wine ports build correctly.</td>
</tr>
<tr>
<td>Date</td>
<td>Revision</td>
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<tr>
<td>------------</td>
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<tr>
<td>July 19, 2018</td>
<td>1200075</td>
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July 30, 2018 | 12.0-CURRENT after KPI changes to timespecadd.

August 10, 2018 | 12.0-CURRENT after timespec_get(3) was added to the system.

August 15, 2018 | 12.0-CURRENT after exec.created hook for jails.

August 19, 2018 | 12.0-CURRENT after converting arc4random to using the Chacha20 algorithm and deprecating arc4random_stir and arc4random_addrandom.

August 22, 2018 | 12.0-CURRENT after removing the drm drivers.

August 21, 2018 | 12.0-CURRENT after KPI changes to NVMe.

August 24, 2018 | 12.0-CURRENT after reverting the removal of the drm drivers.

August 26, 2018 | 12.0-CURRENT after removing arc4random_stir and arc4random_addrandom.

September 5, 2018 | 12.0-CURRENT after updating objcopy(1) to properly handle little-endian MIPS64 object files.

October 19, 2018 | 12.0-STABLE after updating OpenSSL to version 1.1.1.

October 25, 2018 | 12.0-STABLE after updating OpenSSL shared library version numbers.

November 16, 2018 | 12-STABLE after releng/12.0 was branched.

January 6, 2019 | 12-STABLE after merge of fixing linux_destroy_dev() behaviour when there are still files open from the destroying cdev.

January 17, 2019 | 12-STABLE after enabling sys/random.h #include from C++.

February 15, 2019 | 12-STABLE after merge of fixing renameat(2) for CAPABILITIES kernels.

March 15, 2019 | 12-STABLE after merging CCM for the benefit of the ZoF port.

March 20, 2019 | 12-STABLE after merging support for selectively disabling ZFS without disabling loader.

April 12, 2019 | 12-STABLE after merging llvm, clang, compiler-rt, libc++, libunwind, lld, lldb and openmp 8.0.0 final release r356365.

April 17, 2019 | 12-STABLE after MFC of iflib changes in 345303, 345658, and partially of 345305.

April 27, 2019 | 12-STABLE after ether_gen_addr availability.

May 16, 2019 | 12-STABLE after bumping the Mellanox driver version numbers mlx4en(4); mlx5en(4).

May 21, 2019 | 12-STABLE after bumping the Mellanox driver version numbers mlx4en(4); mlx5en(4).

May 21, 2019 | 12-STABLE after change to struct in linuxkpi from 348035.
May 24, 2019 | 12-STABLE after MFC of 347843: adding group_leader member to struct task_struct to the LinuxKPI.

May 24, 2019 | 12-STABLE after adding context member to ww_mutex in LinuxKPI.

July 5, 2019 | 12-STABLE after MFC of epoch(9) changes: 349763, 340404, 340415, 340417, 340419, 340420.

July 17, 2019 | 12-STABLE after additions to LinuxKPI's rcu list.

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() syscall wrappers).

August 20, 2019 | 12-STABLE after MFC of various changes to iflib 351276.

September 9, 2019 | 12-STABLE after adding sysfs create/remove functions that handles multiple files in one call to the LinuxKPI.

September 10, 2019 | 12-STABLE after additional updates to LinuxKPI's sysfs.

September 15, 2019 | 12-STABLE after MFC of the new fusefs driver.

September 20, 2019 | releeng/12.1 branched from stable/12@r352480.

September 20, 2019 | 12-STABLE after branching releeng/12.1.

November 10, 2019 | 12-STABLE after fixing a potential OOB read security issue in libc++.

November 11, 2019 | 12-STABLE after enabling device class group attributes in the LinuxKPI.

November 21, 2019 | 12-STABLE after adding support for AT_EXECPATH to elf_aux_info(3).

November 10, 2019 | 12-STABLE after correcting the C++ version check for declaring timespec_get(3).

December 19, 2019 | 12-STABLE after adding sigsetop extensions commonly found in musl libc and glibc.

December 21, 2019 | 12-STABLE after doubling the value of ARG_MAX, for 64 bit platforms.

January 2, 2020 | 12-STABLE after adding functions to bitstring(3) to find contiguous sequences of set or unset bits.

January 6, 2020 | 12-STABLE after making USB statistics be per-device instead of per bus.
January 7, 2020 | 12-STABLE after updating llvm, clang, compiler-rt, libc++, libunwind, lld, lldb and openmp to 9.0.0 final release r372316.

January 13, 2020 | 12-STABLE after adding own counter for cancelled USB transfers.

January 31, 2020 | 12-STABLE after adding /etc/os-release as a symbolic link to /var/run/os-release.

February 6, 2020 | 12-STABLE after recent LinuxKPI changes.

April 15, 2020 | 12-STABLE after cloning the RCU interface into a sleepable and a non-sleepable part in the LinuxKPI.

May 1, 2020 | 12-STABLE after implementing full bus_dma(9) support in the LinuxKPI and pulling in all dependencies.

May 1, 2020 | 12-STABLE after updating llvm, clang, compiler-rt, libc++, libunwind, lld, lldb and openmp to 10.0.0 release.

May 4, 2020 | 12-STABLE after moving id_mapped to end of bus_dma_impl structure to preserve KPI.

May 21, 2020 | 12-STABLE after renaming vm.max_wired to vm.max_user_wired and changing its type.

June 18, 2020 | 12-STABLE after implementing __is_constexpr() function macro in the LinuxKPI.

July 4, 2020 | 12-STABLE after making liblzma use libmd implementation of SHA256.

July 24, 2020 | 12-STABLE after updating llvm, clang, compiler-rt, libc++, libunwind, lld, lldb and openmp to 10.0.1 release.

August 3, 2020 | 12-STABLE after implementing the array_size() function in the LinuxKPI.

August 4, 2020 | 12-STABLE after adding sysctlblname system call.

August 19, 2020 | 12-STABLE after change to clone the task struct fields related to RCU.

September 5, 2020 | 12-STABLE after splitting XDR off into a separate kernel module, to minimize ZFS dependencies.

September 8, 2020 | 12-STABLE after adding atomic and bswap functions to libcompiler_rt.

September 10, 2020 | 12-STABLE after updating net80211 and kernel privilege checking API changes.
<table>
<thead>
<tr>
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<th>Description</th>
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<td>365618</td>
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<td>12-STABLE after branching releng/12.2.</td>
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<tr>
<td>September 12, 2020</td>
<td>365661</td>
<td>12-STABLE after followup commits to libcompiler_rt.</td>
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<td>September 16, 2020</td>
<td>365816</td>
<td>12-STABLE after fixing crunchgen(1) application build with WARNs=6.</td>
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<td>September 20, 2020</td>
<td>366878</td>
<td>12-STABLE after populating the acquire context field of a ww_mutex in the LinuxKPI.</td>
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<tr>
<td>November 9, 2020</td>
<td>367511</td>
<td>12-STABLE after the addition of ptsname_r(3).</td>
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<tr>
<td>December 28, 2020</td>
<td>f3d75bed5475</td>
<td>12-STABLE after improving handling of alternate settings in the USB stack.</td>
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<td>April 30, 2021</td>
<td>d36cc12ddf37</td>
<td>12-STABLE after changing the internal KAPI between the krpc and NFS.</td>
</tr>
<tr>
<td>May 10, 2021</td>
<td>1e279fe9deae</td>
<td>12-STABLE after changing the internal KAPI between the nscl.ko and nfscommon.ko modules.</td>
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<td>June 26, 2021</td>
<td>489236b04748</td>
<td>12-STABLE after changing the internal KAPI between the krpc and nfsd modules.</td>
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<td>12-STABLE after branching releng/12.3.</td>
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<td>December 22, 2021</td>
<td>b148c7b87148</td>
<td>12-STABLE after adding atomic and bswap functions to libcompiler_rt.</td>
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<td>December 22, 2021</td>
<td>47724135cb3</td>
<td>12-STABLE after updating llvm, clang, compiler-rt, libc++, libunwind, lld, lldb and openmp to 10.0.1.</td>
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<td>December 25, 2021</td>
<td>e405b2dc913c</td>
<td>12-STABLE after updating llvm, clang, compiler-rt, libc++, libunwind, lld, lldb and openmp to 12.0.0.</td>
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<td>December 25, 2021</td>
<td>1a398266112e</td>
<td>12-STABLE after adding out-of-line LSE atomics helpers to libcompiler_rt.a on aarch64.</td>
</tr>
<tr>
<td>December 25, 2021</td>
<td>0b7be89b329e</td>
<td>12-STABLE after updating llvm, clang, compiler-rt, libc++, libunwind, lld, lldb and openmp to 13.0.0.</td>
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<td>February 12, 2022</td>
<td>f591279d9c93</td>
<td>12-STABLE after restoring availability tradeoff of random(4).</td>
</tr>
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<td>April 9, 2022</td>
<td>180d95e04e93</td>
<td>12-STABLE after zlib unification.</td>
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<td>fce871fe3520</td>
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<td>6a9031c5e2ba</td>
<td>12-STABLE after branching releng/12.4.</td>
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October 30, 2021

12-STABLE after XXXXXX. ///

== FreeBSD 11 Versions

.FreeBSD 11 __FreeBSD_version Values [cols="1,1,1", frame="none", options="header"]

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<th>Revision</th>
<th>Date</th>
<th>Release</th>
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<td>11.0-CURRENT.</td>
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<td>1100001</td>
<td>256776</td>
<td>October 19, 2013</td>
<td>11.0-CURRENT after addition of support for “first boot” rc.d scripts, so ports can make use of this.</td>
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<td>1100002</td>
<td>257696</td>
<td>November 5, 2013</td>
<td>11.0-CURRENT after dropping support for historic ioctl$s.</td>
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<td>1100003</td>
<td>258284</td>
<td>November 17, 2013</td>
<td>11.0-CURRENT after icnv changes.</td>
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<td>1100004</td>
<td>259424</td>
<td>December 15, 2013</td>
<td>11.0-CURRENT after the behavior change of gss_pseudo_random introduced in 259286.</td>
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<td>1100005</td>
<td>260010</td>
<td>December 28, 2013</td>
<td>11.0-CURRENT after 259951 - Do not coalesce entries in vm_map_stack(9).</td>
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<tr>
<td>1100006</td>
<td>261246</td>
<td>January 28, 2014</td>
<td>11.0-CURRENT after upgrades of libelf and libdwarf.</td>
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<td>1100007</td>
<td>261283</td>
<td>January 30, 2014</td>
<td>11.0-CURRENT after upgrade of libc++ to 3.4 release.</td>
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<tr>
<td>1100008</td>
<td>261881</td>
<td>February 14, 2014</td>
<td>11.0-CURRENT after libc++ 3.4 ABI compatibility fix.</td>
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<td>11.0-CURRENT after upgrade of llvm/clang to 3.4 release.</td>
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<td>11.0-CURRENT after upgrade of ncurses to 5.9 release (rev 262629).</td>
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<tr>
<td>1100011</td>
<td>263102</td>
<td>March 13, 2014</td>
<td>11.0-CURRENT after ABI change in struct if_data.</td>
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<td>1100012</td>
<td>263140</td>
<td>March 14, 2014</td>
<td>11.0-CURRENT after removal of Novell IPX protocol support.</td>
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<td>263152</td>
<td>March 14, 2014</td>
<td>11.0-CURRENT after removal of AppleTalk protocol support.</td>
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<tr>
<td>1100014</td>
<td>263235</td>
<td>March 16, 2014</td>
<td>11.0-CURRENT after renaming &lt;sys/capability.h&gt; to &lt;sys/capsicum.h&gt; 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.</td>
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<td>March 22, 2014</td>
<td>11.0-CURRENT after cnt rename to vm_cnt.</td>
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<tr>
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<td>Changes</td>
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<tr>
<td>March 23, 2014</td>
<td>11.0-CURRENT after addition of armv6hf TARGET_ARCH.</td>
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<tr>
<td>April 4, 2014</td>
<td>11.0-CURRENT after GCC support for __block definition.</td>
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<tr>
<td>April 6, 2014</td>
<td>11.0-CURRENT after support for UDP-Lite protocol (RFC 3828).</td>
<td></td>
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<tr>
<td>April 8, 2014</td>
<td>11.0-CURRENT after FreeBSD-SA-14:06.openssl (rev 264265).</td>
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<tr>
<td>May 1, 2014</td>
<td>11.0-CURRENT after removing lindev in favor of having /dev/full by default (rev 265212).</td>
<td></td>
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<tr>
<td>May 6, 2014</td>
<td>11.0-CURRENT after src.opts.mk changes, decoupling make.conf(5) from buildworld (rev 265419).</td>
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<tr>
<td>May 30, 2014</td>
<td>11.0-CURRENT after changes to strcasecmp(3), moving strcasecmp_l(3) and strncasecmp_l(3) from &lt;string.h&gt; to &lt;strings.h&gt; for POSIX 2008 compliance (rev 266865).</td>
<td></td>
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<tr>
<td>June 13, 2014</td>
<td>11.0-CURRENT after the CUSE library and kernel module have been attached to the build by default.</td>
<td></td>
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<tr>
<td>June 27, 2014</td>
<td>11.0-CURRENT after sysctl(3) API change.</td>
<td></td>
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<tr>
<td>June 30, 2014</td>
<td>11.0-CURRENT after regex(3) library update to add &quot;&gt;&quot; and &quot;&lt;&quot; delimiters.</td>
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<tr>
<td>July 1, 2014</td>
<td>11.0-CURRENT after the internal interface between the NFS modules, including the krpc, was changed by (rev 268115).</td>
<td></td>
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<tr>
<td>July 21, 2014</td>
<td>11.0-CURRENT after hdestroy(3) compliance fix changed ABI.</td>
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<tr>
<td>September 1, 2014</td>
<td>11.0-CURRENT after SOCK_RAW sockets were changed to not modify packets at all.</td>
<td></td>
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<tr>
<td>September 11, 2014</td>
<td>11.0-CURRENT after API changes to ifa_ifwithbroadaddr, ifa_ifwithdstaddr, ifa_ifwithnet, and ifa_ifwithroute.</td>
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<tr>
<td>September 9, 2014</td>
<td>11.0-CURRENT after changing access, eaccess, and faccessat to validate the mode argument.</td>
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<tr>
<td>September 17, 2014</td>
<td>11.0-CURRENT after i915 HW context support.</td>
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<tr>
<td>September 17, 2014</td>
<td>Version bump to have ABI note distinguish binaries ready for strict mmap(2) flags checking (rev 271724).</td>
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</table>
| 1100037 | 272674 | October 6, 2014 | 11.0-CURRENT after addition of \texttt{explicit_bzero(3)} (rev 272673).
| 1100038 | 272951 | October 11, 2014 | 11.0-CURRENT after cleanup of TCP wrapper(3).
| 1100039 | 273250 | October 18, 2014 | 11.0-CURRENT after removal of \texttt{MAP_RENAME} and \texttt{MAP_NORESERVE}.
| 1100040 | 273432 | October 21, 2014 | 11.0-CURRENT after FreeBSD-SA-14:23 (rev 273146).
| 1100041 | 273875 | October 30, 2014 | 11.0-CURRENT after API changes to \texttt{syscall_register}, \texttt{syscall32_register}, \texttt{syscall_register_helper} and \texttt{syscall32_register_helper} (rev 273707).
| 1100042 | 274046 | November 3, 2014 | 11.0-CURRENT after a change to \texttt{struct tcpcb}.
| 1100043 | 274085 | November 4, 2014 | 11.0-CURRENT after enabling \texttt{vt(4)} by default.
| 1100044 | 274116 | November 4, 2014 | 11.0-CURRENT after adding new libraries/utilities (dpv and figpar) for data throughput visualization.
| 1100046 | 274470 | November 13, 2014 | 11.0-CURRENT after \texttt{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 \texttt{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.
| 1100053 | 276781 | January 7, 2015 | 11.0-CURRENT after \texttt{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 \texttt{futimens} and \texttt{utimensat} system calls.

February 5, 2015 | 11.0-CURRENT after addition of support for probing the SCSI VPD Extended Inquiry page (0x86).

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).

February 16, 2015 | 11.0-CURRENT after forwarding FBIO_BLANK to framebuffer clients.

February 18, 2015 | 11.0-CURRENT after CDAI_FLAG_NONE addition.

February 23, 2015 | 11.0-CURRENT after mtio(4) and sa(4) API and ioctl(2) additions.

March 7, 2015 | 11.0-CURRENT after adding mutex support to the pps_ioctl() API in the kernel.

March 7, 2015 | 11.0-CURRENT after adding PPS support to USB serial drivers.

March 15, 2015 | 11.0-CURRENT after upgrading clang, llvm and lldb to 3.6.0.

March 20, 2015 | 11.0-CURRENT after removal of SSLv2 support from OpenSSL.

March 25, 2015 | 11.0-CURRENT after removal of SSLv2 support from fetch(1) and fetch(3).

April 6, 2015 | 11.0-CURRENT after change to net.inet6.ip6.mif6table sysctl.

April 15, 2015 | 11.0-CURRENT after removal of const qualifier from iconv(3).

April 16, 2015 | 11.0-CURRENT after moving ALTQ from contrib to net/altq.

April 29, 2015 | 11.0-CURRENT after API/ABI change to smb(4) (rev 281985).

May 1, 2015 | 11.0-CURRENT after adding reallocarray(3) in libc (rev 282314).

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.

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.

May 27, 2015 | 11.0-CURRENT after dounmount() requiring a reference on the passed struct mount (rev 283602).

June 4, 2015 | 11.0-CURRENT after disabled generation of legacy formatted password databases entries by default.

June 10, 2015 | 11.0-CURRENT after API changes to lim_cur, lim_max, and lim_rlimit (rev 284215).
<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>August 12, 2015</td>
<td>11.0-CURRENT after <strong>crunchgen</strong>(1) changes from 284356 to 285986.</td>
</tr>
<tr>
<td>August 18, 2015</td>
<td>11.0-CURRENT after import of jemalloc 4.0.0 (rev 286866).</td>
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<tr>
<td>October 5, 2015</td>
<td>11.0-CURRENT after upgrading clang, llvm, lldb, compiler-rt and libc++ to 3.7.0.</td>
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<td>October 16, 2015</td>
<td>11.0-CURRENT after undating ZFS to support resumable send/receive (rev 289362).</td>
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<tr>
<td>October 19, 2015</td>
<td>11.0-CURRENT after Linux KPI updates.</td>
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<td>October 22, 2015</td>
<td>11.0-CURRENT after renaming linuxapi.ko to linuxkpi.ko.</td>
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<tr>
<td>October 29, 2015</td>
<td>11.0-CURRENT after moving the LinuxKPI module into the default kernel build.</td>
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<tr>
<td>October 30, 2015</td>
<td>11.0-CURRENT after import of OpenSSL 1.0.2d.</td>
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<tr>
<td>November 2, 2015</td>
<td>11.0-CURRENT after making <strong>figpar</strong>(3) macros more unique.</td>
</tr>
<tr>
<td>November 7, 2015</td>
<td>11.0-CURRENT after changing <strong>sysctl_add_oid</strong>(9)'s ABI.</td>
</tr>
<tr>
<td>November 7, 2015</td>
<td>11.0-CURRENT after string collation and locales rework.</td>
</tr>
<tr>
<td>November 7, 2015</td>
<td>11.0-CURRENT after API change to <strong>sysctl_add_oid</strong>(9) (rev 290475).</td>
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<tr>
<td>November 10, 2015</td>
<td>11.0-CURRENT after API change to callout_stop macro; (rev 290664).</td>
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<tr>
<td>November 30, 2015</td>
<td>11.0-CURRENT after changing the interface between the nfsd.ko and nfscommon.ko modules in 291527.</td>
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<tr>
<td>January 15, 2016</td>
<td>11.0-CURRENT after LinuxKPI PCI changes (rev 294086).</td>
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<tr>
<td>January 19, 2016</td>
<td>11.0-CURRENT after LRO optimizations.</td>
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<tr>
<td>January 21, 2016</td>
<td>11.0-CURRENT after LinuxKPI idr_* additions.</td>
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<tr>
<td>January 26, 2016</td>
<td>11.0-CURRENT after API change to <strong>dpv</strong>(3).</td>
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<tr>
<td>February 16, 2016</td>
<td>11.0-CURRENT after API change to rman (rev 294883).</td>
</tr>
<tr>
<td>February 18, 2016</td>
<td>11.0-CURRENT after allowing drivers to set the TCP ACK/data segment aggregation limit.</td>
</tr>
</tbody>
</table>
February 26, 2016 | 11.0-CURRENT after **bus_alloc_resource_any(9)** API addition.

March 5, 2016 | 11.0-CURRENT after upgrading our copies of clang, llvm, lldb and compiler-rt to 3.8.0 release.

March 12, 2016 | 11.0-CURRENT after libelf cross-endian fix in rev **296685**.

March 18, 2016 | 11.0-CURRENT after using **uintmax_t** for rman ranges.

March 21, 2016 | 11.0-CURRENT after tracking filemon usage via a proc.p_filemon pointer rather than its own lists.

April 6, 2016 | 11.0-CURRENT after fixing **sed** functions **i** and **a** from discarding leading white space.

April 22, 2016 | 11.0-CURRENT after fixes for using IPv6 addresses with RDMA.

May 4, 2016 | 11.0-CURRENT after improving performance and functionality of the **bitstring(3)** api.

May 12, 2016 | 11.0-CURRENT after fixing handling of **IOCTLs** in the LinuxKPI.

May 16, 2016 | 11.0-CURRENT after implementing more Linux device related functions in the LinuxKPI.

May 19, 2016 | 11.0-CURRENT after adding support for managing Shingled Magnetic Recording (SMR) drives.

May 20, 2016 | 11.0-CURRENT after removing brk and sbrk from arm64.

May 23, 2016 | 11.0-CURRENT after adding **bit_count** to the **bitstring(3)** API.

May 26, 2016 | 11.0-CURRENT after disabling alignment faults on armv6.

May 26, 2016 | 11.0-CURRENT after fixing **crunchgen(1)** usage with **MAKEOBJDIRPREFIX**.

May 30, 2016 | 11.0-CURRENT after adding an mbuf flag for **M_HASHTYPE_**.

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**).

June 6, 2016 | 11.0-CURRENT after libpam was synced with stock **301602**, bumping library version.

June 21, 2016 | 11.0-CURRENT after breaking binary compatibility of struct disk **302069**.

June 23, 2016 | 11.0-CURRENT after switching geom_disk to using a pool mutex.

June 23, 2016 | 11.0-CURRENT after adding spares to struct ifnet.

August 12, 2015 | 11-STABLE after **relen/11.0** branched from 11-STABLE (rev **335**).
| 1100500 | 303975 | 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 \texttt{LC\_\_MASK} fix. |
| 1100503 | 305733 | September 12, 2016 | 11.0-STABLE after resolving a deadlock between \texttt{device\_detach()} and \texttt{usbd\_do\_request\_flags()} |
| 1100504 | 307330 | October 14, 2016 | 11.0-STABLE after ZFS merges. |
| 1100505 | 307590 | October 19, 2016 | 11.0-STABLE after \texttt{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 \texttt{ki\_moret\_name} member to \texttt{struct kinfo\_proc} and \texttt{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 \texttt{crunchgen(1)} META\_MODE fix (rev 311185). |
| 1100510 | 315312 | March 15, 2017 | 11.0-STABLE after MFC of \texttt{fget\_cap}, \texttt{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 \texttt{<dev/mmc/mmc\_ioctl.h>} header. |
| 1100514 | 319279 | May 31, 2017 | 11.0-STABLE after multiple MFCs of \texttt{libpcap}, \texttt{WITHOUT\_INET6}, and a few other minor changes. |
| 1101000 | 320486 | June 30, 2017 | \texttt{releng/11.1} branched from stable/11. |
| 1101001 | 320763 | June 30, 2017 | 11.1-RC1 After merging the \texttt{MAP\_GUARD} \texttt{mmap(2)} flag addition. |
| 1101500 | 320487 | June 30, 2017 | 11-STABLE after \texttt{releng/11.1} branched. |
| 1101501 | 320666 | July 5, 2017 | 11-STABLE after merging the \texttt{MAP\_GUARD} \texttt{mmap(2)} flag addition. |
| 1101502 | 321688 | July 29, 2017 | 11-STABLE after merging the NFS client forced dismount support \texttt{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), casinh(3), casinl(3), catanl(3), catanh(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. |
| 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. |
| 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

<table>
<thead>
<tr>
<th>1102504</th>
<th>340309</th>
<th>November 9, 2018</th>
<th>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.</th>
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<tbody>
<tr>
<td>1102505</td>
<td>342804</td>
<td>January 6, 2019</td>
<td>11-STABLE after merge of fixing linux_destroy_dev() behaviour when there are still files open from the destroying cdev.</td>
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<td>1102506</td>
<td>344220</td>
<td>February 17, 2019</td>
<td>11-STABLE after merging multiple commits to lualoader.</td>
</tr>
<tr>
<td>1102507</td>
<td>346296</td>
<td>April 16, 2019</td>
<td>11-STABLE after merging llvm, clang, compiler-rt, libc++, libunwind, lld, lldb and openmp 8.0.0 final release r356365.</td>
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<tr>
<td>1102508</td>
<td>346784</td>
<td>April 27, 2019</td>
<td>11-STABLE after ether_gen_addr availability.</td>
</tr>
<tr>
<td>1102509</td>
<td>347212</td>
<td>May 6, 2019</td>
<td>11-STABLE after MFC of 345303, 345658, and partially of 345305.</td>
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<tr>
<td>1102510</td>
<td>347883</td>
<td>May 16, 2019</td>
<td>11-STABLE after bumping the Mellanox driver version numbers (mlx4en(4); mlx5en(4)).</td>
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<tr>
<td>1103000</td>
<td>349026</td>
<td>June 14, 2019</td>
<td>releng/11.3 branched from stable/11.</td>
</tr>
<tr>
<td>1103500</td>
<td>349027</td>
<td>June 14, 2019</td>
<td>11-STABLE after releng/11.3 branched.</td>
</tr>
<tr>
<td>1103501</td>
<td>354598</td>
<td>November 10, 2019</td>
<td>11-STABLE after fixing a potential OOB read security issue in libc++.</td>
</tr>
<tr>
<td>1103502</td>
<td>354614</td>
<td>November 11, 2019</td>
<td>11-STABLE after adding sysfs create/remove functions that handles multiple files in one call to the LinuxKPI.</td>
</tr>
<tr>
<td>1103503</td>
<td>354615</td>
<td>November 11, 2019</td>
<td>11-STABLE after LinuxKPI sysfs improvements.</td>
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<tr>
<td>1103504</td>
<td>354616</td>
<td>November 11, 2019</td>
<td>11-STABLE after enabling device class group attributes in the LinuxKPI.</td>
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<tr>
<td>1103505</td>
<td>355899</td>
<td>December 19, 2019</td>
<td>11-STABLE after adding sigsetop extensions commonly found in musl libc and glibc.</td>
</tr>
<tr>
<td>1103506</td>
<td>356395</td>
<td>January 6, 2020</td>
<td>11-STABLE after making USB statistics be per-device instead of per bus.</td>
</tr>
<tr>
<td>1103507</td>
<td>356680</td>
<td>January 13, 2020</td>
<td>11-STABLE after adding own counter for cancelled USB transfers.</td>
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<tr>
<td>1103508</td>
<td>357613</td>
<td>February 6, 2020</td>
<td>11-STABLE after recent LinuxKPI changes.</td>
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<td>1103509</td>
<td>359958</td>
<td>April 15, 2020</td>
<td>11-STABLE after moving id_mapped to end of bus_dma_impl structure to preserve KPI.</td>
</tr>
<tr>
<td>1103510</td>
<td>360658</td>
<td>May 5, 2020</td>
<td>11-STABLE after updating llvm, clang, compiler-rt, libc++, libunwind, lld, lldb and openmp to 9.0.0 final release r372316.</td>
</tr>
</tbody>
</table>
May 7, 2020 | 11-STABLE after updating llvm, clang, compiler-rt, libc++, libunwind, lld, lldb and openmp to 10.0.0 release.

May 8, 2020 | releng/11.4 branched from stable/11.

May 8, 2020 | 11.4-BETA1 after updating llvm, clang, compiler-rt, libc++, libunwind, lld, lldb and openmp to 10.0.0 release.

May 8, 2020 | 11-STABLE after updating llvm, clang, compiler-rt, libc++, libunwind, lld, lldb and openmp to 10.0.0 release.

May 8, 2020 | 11-STABLE after releng/11.4 branched.

June 18, 2020 | 11-STABLE after implementing __is_constexpr() function macro in the LinuxKPI.

July 4, 2020 | 11-STABLE after making liblzma use libmd implementation of SHA256.

July 24, 2020 | 11-STABLE after updating llvm, clang, compiler-rt, libc++, libunwind, lld, lldb and openmp to 10.0.1 release.

August 3, 2020 | 11-STABLE after implementing the array_size() function in the LinuxKPI.

August 19, 2020 | 11-STABLE after change to clone the task struct fields related to RCU.

September 8, 2020 | 11-STABLE after adding atomic and bswap functions to libcompiler_rt.

September 12, 2020 | 11-STABLE after followup commits to libcompiler_rt.

October 20, 2020 | 11-STABLE after populating the acquire context field of a ww_mutex in the LinuxKPI.

October 20, 2020 | 11-STABLE after additions to LinuxKPI’s RCU list.

November 9, 2020 | 11-STABLE after the addition of ptsname_r.

== FreeBSD 10 Versions

+ FreeBSD 10 __FreeBSD_version Values [cols="1,1,1,1", frame="none", options="header"]

<table>
<thead>
<tr>
<th>Value</th>
<th>Revision</th>
<th>Date</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1000000</td>
<td>225757</td>
<td>September 26, 2011</td>
<td>10.0-CURRENT.</td>
</tr>
<tr>
<td>1000001</td>
<td>227070</td>
<td>November 4, 2011</td>
<td>10-CURRENT after addition of the posix_fadvise(2) system call.</td>
</tr>
<tr>
<td>1000002</td>
<td>228444</td>
<td>December 12, 2011</td>
<td>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).</td>
</tr>
</tbody>
</table>
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).

January 1, 2012 | 10-CURRENT after the removal of skpc() and the addition of memchr(9) (rev 229200).

January 16, 2012 | 10-CURRENT after the removal of support for SIOCSIFADDR, SIOCSIFNETMASK, SIOCSIFBRDADDR, SIOCSIFDSTADDR ioctls.

January 26, 2012 | 10-CURRENT after introduction of read capacity data asynchronous notification in the cam(4) layer.

February 5, 2012 | 10-CURRENT after introduction of new tcp(4) socket options: TCP_KEEPINIT, TCP_KEEPIDLE, TCP_KEEPINTVL, and TCP_KEEPCNT.

February 11, 2012 | 10-CURRENT after introduction of the new extensible sysctl(3) interface NET_RT_IFLISTL to query address lists.

February 25, 2012 | 10-CURRENT import of libarchive 3.0.3 (rev 232153).

March 31, 2012 | 10-CURRENT after xlocale cleanup.

April 16, 2012 | 10-CURRENT import of LLVM/Clang 3.1 trunk 154661 (rev 234353).

May 2, 2012 | 10-CURRENT jemalloc import.

May 22, 2012 | 10-CURRENT after byacc import.

June 8, 2012 | 10-CURRENT after BSD sort becoming the default sort (rev 237629).

July 12, 2012 | 10-CURRENT after import of OpenSSL 1.0.1c.

July 13, 2012 | 10-CURRENT after the fix for LLVM/Clang 3.1 regression.

August 8, 2012 | 10-CURRENT after KBI change in ucom(4).

August 8, 2012 | 10-CURRENT after adding streams feature to the USB stack.

September 8, 2012 | 10-CURRENT after major rewrite of pf(4).

October 6, 2012 | 10-CURRENT after pf(9) KBI/KPI changed to supply packets in net byte order to AF_INET filter hooks.

October 16, 2012 | 10-CURRENT after the network interface cloning KPI changed and struct if_clone becoming opaque.

October 22, 2012 | 10-CURRENT after removal of support for non-MPSAFE filesystems and addition of support for FUSEFS (rev 241519).
October 22, 2012 | 10-CURRENT after the entire IPv4 stack switched to network byte order for IP packet header storage.

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.

November 5, 2012 | 10-CURRENT after clang was made the default compiler on i386 and amd64.

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.

January 11, 2013 | 10-CURRENT after install gained the -N flag. May also be used to indicate the presence of nmtree.


February 13, 2013 | 10-CURRENT after USB moved to the driver structure requiring a rebuild of all USB modules.

March 4, 2013 | 10-CURRENT after the introduction of tickless callout facility which also changed the layout of struct callout (rev 247777).

March 12, 2013 | 10-CURRENT after KPI breakage introduced in the VM subsystem to support read/write locking (rev 248084).

April 26, 2013 | 10-CURRENT after the dst parameter of the ifnet if_output method was changed to take const qualifier (rev 249925).

May 1, 2013 | 10-CURRENT after the introduction of the accept4(2) (rev 250154) and pipe2(2) (rev 250159) system calls.

May 21, 2013 | 10-CURRENT after flex 2.5.37 import.


June 8, 2013 | 10-CURRENT after the introduction of the aio_mlock(2) system call (rev 251526).

July 9, 2013 | 10-CURRENT after the addition of a new function to the kernel GSSAPI module's function call interface.

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).
July 16, 2013 | 10-CURRENT after making ARM EABI the default ABI on arm, armel, armv6, and armv6eb architectures.

July 22, 2013 | 10-CURRENT after CAM and mps(4) driver scanning changes.

July 24, 2013 | 10-CURRENT after addition of libusb pkgconf files.

August 5, 2013 | 10-CURRENT after change from time_second to time_uptime in PF_INET6.

August 9, 2013 | 10-CURRENT after VM subsystem change to unify soft and hard busy mechanisms.

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.

August 15, 2013 | 10-CURRENT after libc.so conversion to an ld(1) script (rev 251668).

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.

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).

August 21, 2013 | 10-CURRENT after stat(2) update to allow storing some Windows/DOS and CIFS file attributes as stat(2) flags.

August 22, 2013 | 10-CURRENT after modification of structure xsctp_inpcb.

August 24, 2013 | 10-CURRENT after physio(9) support for devices that do not function properly with split I/O, such as sa(4).

August 24, 2013 | 10-CURRENT after modifications of structure mbuf (rev 254780, 254799, 254804, 254807254842).


September 3, 2013 | 10-CURRENT after import of NetBSD libexecinfo is connected to the build.

September 6, 2013 | 10-CURRENT after API and ABI changes to the Capsicum framework.

September 6, 2013 | 10-CURRENT after gcc and libstdc++ are no longer built by default.

September 6, 2013 | 10-CURRENT after addition of MMAP_32BIT mmap(2) flag (rev 255426).

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.
| 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.
| 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.
| 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.
| 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).


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.


1001510 | 279329 | February 26, 2015 | 10-STABLE after MFC of rev 278964.

1001511 | 280246 | March 19, 2015 | 10-STABLE after sys/capability.h is renamed to sys/capsicum.h (rev 280224).

1001512 | 280438 | March 24, 2015 | 10-STABLE after addition of new mtio(4), sa(4) ioctls.

1001513 | 281955 | April 24, 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.


1001519 | 284720 | June 23, 2015 | 10-STABLE after reverting bumping MAXCPU on amd64.

1002000 | 285380 | July 24, 2015 | releng/10.2 branched from 10-STABLE.

1002500 | 285830 | July 24, 2015 | 10-STABLE after releng/10.2 branched from 10-STABLE.

1002501 | 289005 | October 8, 2015 | 10-STABLE after merge of ZFS changes that affected the internal interface of zfeature_info structure (rev 288572).
<table>
<thead>
<tr>
<th>Date</th>
<th>Revision</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>November 24, 2015</td>
<td>291243</td>
<td>10-STABLE after merge of dump device changes that affected the arguments of <code>g_dev_setdumpdev()</code> (rev 291215).</td>
</tr>
<tr>
<td>December 14, 2015</td>
<td>292224</td>
<td>10-STABLE after merge of changes to the internal interface between the nfsd.ko and nfscmmon.ko modules, requiring them to be upgraded together (rev 292223).</td>
</tr>
<tr>
<td>December 22, 2015</td>
<td>292589</td>
<td>10-STABLE after merge of xz 5.2.2 merge (multithread support) (rev 292588).</td>
</tr>
<tr>
<td>December 30, 2015</td>
<td>292908</td>
<td>10-STABLE after merge of changes to <code>pci(4)</code> (rev 292907).</td>
</tr>
<tr>
<td>January 9, 2016</td>
<td>293476</td>
<td>10-STABLE after merge of <code>utimensat(2)</code> (rev 293473).</td>
</tr>
<tr>
<td>January 9, 2016</td>
<td>293610</td>
<td>10-STABLE after merge of changes to <code>linux(4)</code> (rev 293477 through 293609).</td>
</tr>
<tr>
<td>January 9, 2016</td>
<td>293619</td>
<td>10-STABLE after merge of changes to <code>figpar(3)</code> types/macros (rev 290275).</td>
</tr>
<tr>
<td>February 1, 2016</td>
<td>295107</td>
<td>10-STABLE after merge of API change to <code>dpv(3)</code>.</td>
</tr>
<tr>
<td>March 4, 2016</td>
<td>296373</td>
<td><code>relen/10.3</code> branched from 10-STABLE.</td>
</tr>
<tr>
<td>March 4, 2016</td>
<td>296374</td>
<td>10-STABLE after <code>relen/10.3</code> branched from 10-STABLE.</td>
</tr>
<tr>
<td>June 19, 2016</td>
<td>298299</td>
<td>10-STABLE after adding kdbcontrol's <code>-P</code> option (rev 298297).</td>
</tr>
<tr>
<td>June 19, 2016</td>
<td>299966</td>
<td>10-STABLE after <code>libcrypto.so</code> was made position independent.</td>
</tr>
<tr>
<td>June 19, 2016</td>
<td>300235</td>
<td>10-STABLE after allowing MK_ overrides (rev 300233).</td>
</tr>
<tr>
<td>June 21, 2016</td>
<td>302066</td>
<td>10-STABLE after MFC of filemon changes from 11-CURRENT.</td>
</tr>
<tr>
<td>June 27, 2016</td>
<td>302228</td>
<td>10-STABLE after converting sed to use REG_STARTEND, fixing a Mesa issue.</td>
</tr>
<tr>
<td>August 22, 2016</td>
<td>304611</td>
<td>10-STABLE after adding C++11 thread_local support.</td>
</tr>
<tr>
<td>August 26, 2016</td>
<td>304864</td>
<td>10-STABLE after <code>LC_*_MASK</code> fix.</td>
</tr>
<tr>
<td>September 12, 2016</td>
<td>305734</td>
<td>10-STABLE after resolving a deadlock between <code>device_detach()</code> and <code>usbd_do_request_flags(9)</code>.</td>
</tr>
<tr>
<td>October 14, 2016</td>
<td>307331</td>
<td>10-STABLE after ZFS merges.</td>
</tr>
<tr>
<td>October 28, 2016</td>
<td>308047</td>
<td>10-STABLE after installing header files required development with <code>libzfs_core</code>.</td>
</tr>
<tr>
<td>December 15, 2016</td>
<td>310128</td>
<td>10-STABLE after exporting whole thread name in <code>kinfo_proc</code> (rev 309676).</td>
</tr>
<tr>
<td>March 22, 2017</td>
<td>315730</td>
<td>10-STABLE after <code>libmd</code> changes (rev 314143).</td>
</tr>
</tbody>
</table>
April 4, 2017 | 10-STABLE after making CAM SIM lock optional (revs 315673, 315674).

May 11, 2017 | 10-STABLE after merging the addition of the <dev/mmc/mmc_ioctl.h> header.

July 19, 2017 | 10-STABLE after adding C14 sized deallocation functions to libc.

July 30, 2017 | 10-STABLE after merging the MAP_GUARD mmap(2) flag addition.

September 15, 2017 | releng/10.4 branched from 10-STABLE.

September 15, 2017 | releng/10.4 branched from 10-STABLE.

January 24, 2018 | 10-STABLE after merging 325028, fixing ptrace() to always clear the correct thread event when resuming.

January 6, 2020 | 10-STABLE after making USB statistics be per-device instead of per bus.

January 13, 2020 | 10-STABLE after adding own counter for cancelled USB transfers.

== FreeBSD 9 Versions

.FreeBSD 9 __FreeBSD_version Values [cols="1,1,1,1", frame="none", options="header"]

<table>
<thead>
<tr>
<th>Value</th>
<th>Revision</th>
<th>Date</th>
<th>Release</th>
</tr>
</thead>
<tbody>
<tr>
<td>900000</td>
<td>196432</td>
<td>August 22, 2009</td>
<td>9.0-CURRENT.</td>
</tr>
</tbody>
</table>

| 900001 | 197019  | September 8, 2009 | 9.0-CURRENT after importing x86emu, a software emulator for real mode x86 CPU from OpenBSD. |

| 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. |


| 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. |
January 20, 2010 | 9.0-CURRENT after the import of BSDL bc/dc and the deprecation of GNU bc/dc.

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.

March 22, 2010 | 9.0-CURRENT after the import of zlib 1.2.4.

April 24, 2010 | 9.0-CURRENT after adding soft-updates journalling.

May 10, 2010 | 9.0-CURRENT after adding liblzma, xz, xzdec, and lzmainfo.

May 24, 2010 | 9.0-CURRENT after bringing in USB fixes for linux(4).


July 22, 2010 | 9.0-CURRENT after the import of BSD grep.

July 28, 2010 | 9.0-CURRENT after adding mti_zone to struct malloc_type_internal.

August 23, 2010 | 9.0-CURRENT after changing back default grep to GNU grep and adding WITH_BSD_GREP knob.

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.

August 28, 2010 | 9.0-CURRENT after addition of the MAP_PREFAULT_READ flag to mmap(2).

September 9, 2010 | 9.0-CURRENT after adding drain functionality to sbufs, which also changed the layout of struct sbuf.

September 13, 2010 | 9.0-CURRENT after DTrace has grown support for userland tracing.

October 2, 2010 | 9.0-CURRENT after addition of the BSDL man utilities and retirement of GNU/GPL man utilities.

October 11, 2010 | 9.0-CURRENT after updating xz to git 20101010 snapshot.

November 11, 2010 | 9.0-CURRENT after libgcc.a was replaced by libcompiler_rt.a.

November 12, 2010 | 9.0-CURRENT after the introduction of the modularised congestion control.

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.

December 5, 2010 | 9.0-CURRENT after the addition of log2 to libm.
December 21, 2010 | 9.0-CURRENT after the addition of the Hhook (Helper Hook),
Khelp (Kernel Helpers) and Object Specific Data (OSD) KPIs.

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.

January 12, 2011 | 9.0-CURRENT after the update of libdialog to version 20100428.

February 7, 2011 | 9.0-CURRENT after the addition of pthread_getthreadid_np(3).

February 8, 2011 | 9.0-CURRENT after the removal of the uio_yield prototype and
symbol.

February 18, 2011 | 9.0-CURRENT after the update of binutils to version 2.17.50.

March 8, 2011 | 9.0-CURRENT after the struct sysvec (sv_schedtail) changes.

March 29, 2011 | 9.0-CURRENT after the update of base gcc and libstdc++ to the
last GPLv2 licensed revision.

April 18, 2011 | 9.0-CURRENT after the removal of libobjc and Objective-C
support from the base system.

May 13, 2011 | 9.0-CURRENT after importing the libprocstat(3) library and
fuser(1) utility to the base system.

May 22, 2011 | 9.0-CURRENT after adding a lock flag argument to VFS_FHTOVP(9).

June 28, 2011 | 9.0-CURRENT after importing pf from OpenBSD 4.5.

July 19, 2011 | Increase default MAXCPU for FreeBSD to 64 on amd64 and ia64
and to 128 for XLP (mips).

August 13, 2011 | 9.0-CURRENT after the implementation of Capsicum
capabilities; fget(9) gains a rights argument.

August 28, 2011 | Bump shared libraries' version numbers for libraries whose
ABI has changed in preparation for 9.0.

September 2, 2011 | Add automatic detection of USB mass storage devices which
do not support the no synchronize cache SCSI command.

September 10, 2011 | Re-factor auto-quirk. 9.0-RELEASE.

January 2, 2012 | 9-STABLE after merging of addition of the posix_fadvise(2)
system call.
<table>
<thead>
<tr>
<th>Date</th>
<th>Version</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 16, 2012</td>
<td>9.0-STABLE</td>
<td>after merging gperf 3.0.3</td>
</tr>
<tr>
<td>February 15, 2012</td>
<td>9.0-STABLE</td>
<td>after introduction of the new extensible sysctl(3) interface NET_RT_IFLISTL to query address lists.</td>
</tr>
<tr>
<td>March 3, 2012</td>
<td>9.0-STABLE</td>
<td>after changes related to mounting of filesystem inside a jail.</td>
</tr>
<tr>
<td>March 13, 2012</td>
<td>9.0-STABLE</td>
<td>after introduction of new tcp(4) socket options: TCP_KEEPINIT, TCP_KEEPIDLE, TCP_KEEPINTVL, and TCP_KEEPCNT.</td>
</tr>
<tr>
<td>August 5, 2012</td>
<td>9.1-RELEASE</td>
<td></td>
</tr>
<tr>
<td>November 11, 2012</td>
<td>9.1-STABLE</td>
<td>after LIST_PREV(3) added to queue.h (rev 242893) and KBI change in USB serial devices.</td>
</tr>
<tr>
<td>February 21, 2013</td>
<td>9.1-STABLE</td>
<td>after USB moved to the driver structure requiring a rebuild of all USB modules. Also indicates the presence of nmtree.</td>
</tr>
<tr>
<td>August 2, 2013</td>
<td>9.2-STABLE</td>
<td>after inclusion of the PIM_RESCAN CAM path inquiry flag.</td>
</tr>
<tr>
<td>August 26, 2013</td>
<td>9.2-STABLE</td>
<td>after inclusion of support for &quot;first boot&quot; rc(8) scripts.</td>
</tr>
<tr>
<td>August 27, 2013</td>
<td>9.2-STABLE</td>
<td>after inclusion of the SI_UNMAPPED cdev flag.</td>
</tr>
<tr>
<td>October 22, 2013</td>
<td>9.2-STABLE</td>
<td>after inclusion of support for &quot;first boot&quot; rc(8) scripts.</td>
</tr>
<tr>
<td>December 12, 2013</td>
<td>9.2-STABLE</td>
<td>after Heimdal encoding fix.</td>
</tr>
<tr>
<td>December 31, 2013</td>
<td>9.2-STABLE</td>
<td>after MAP_STACK fixes (rev 260082).</td>
</tr>
<tr>
<td>March 5, 2014</td>
<td>9.2-STABLE</td>
<td>after upgrade of libc++ to 3.4 release.</td>
</tr>
<tr>
<td>March 21, 2014</td>
<td>9.2-STABLE</td>
<td>after upgrade of llvm/clang to 3.4 release.</td>
</tr>
</tbody>
</table>
March 27, 2014 | 9-STABLE after merge of the vt(4) driver.

March 27, 2014 | 9-STABLE after FreeBSD-SA-14:06.openssl.

April 30, 2014 | 9-STABLE after FreeBSD-SA-14:08.tcp.

June 20, 2014 | 9-RC1 releng/9.3 branch.

June 20, 2014 | 9.3-STABLE releng/9.3 branch.


December 13, 2014 | 9-STABLE after merging an important fix to the LLVM vectorizer, which could lead to buffer overruns in some cases.


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.

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.

September 12, 2016 | 9-STABLE after resolving a deadlock between device_detach() and usbd_do_request_flags(9).

== FreeBSD 8 Versions

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<table>
<thead>
<tr>
<th>Value</th>
<th>Revision</th>
<th>Date</th>
<th>Release</th>
</tr>
</thead>
<tbody>
<tr>
<td>800000</td>
<td>172531</td>
<td>October 11, 2007</td>
<td>8.0-CURRENT. Separating wide and single byte ctype.</td>
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<tr>
<td>800001</td>
<td>172688</td>
<td>October 16, 2007</td>
<td>8.0-CURRENT after libpcap 0.9.8 and tcpdump 3.9.8 import.</td>
</tr>
<tr>
<td>800002</td>
<td>172841</td>
<td>October 21, 2007</td>
<td>8.0-CURRENT after renaming kthread_create(9) and friends to kproc_create(9) etc.</td>
</tr>
<tr>
<td>Date</td>
<td>Version</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>-----------------</td>
<td>---------</td>
<td>-----------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>October 24, 2007</td>
<td>8.0-CURRENT</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>November 12, 2007</td>
<td>8.0-CURRENT</td>
<td>agp(4) driver moved from src/sys/pci to src/sys/dev/agp.</td>
<td></td>
</tr>
<tr>
<td>December 4, 2007</td>
<td>8.0-CURRENT</td>
<td>changes to the jumbo frame allocator (rev 174247).</td>
<td></td>
</tr>
<tr>
<td>December 7, 2007</td>
<td>8.0-CURRENT</td>
<td>addition of callgraph capture functionality to hwpmc(4).</td>
<td></td>
</tr>
<tr>
<td>December 25, 2007</td>
<td>8.0-CURRENT</td>
<td>kdb_enter() gains a &quot;why&quot; argument.</td>
<td></td>
</tr>
<tr>
<td>January 9, 2008</td>
<td>8.0-CURRENT</td>
<td>introduction of lockmgr_disown(9).</td>
<td></td>
</tr>
<tr>
<td>January 10, 2008</td>
<td>8.0-CURRENT</td>
<td>vn_lock(9) prototype change.</td>
<td></td>
</tr>
<tr>
<td>January 13, 2008</td>
<td>8.0-CURRENT</td>
<td>VOP_LOCK(9) and VOP_UNLOCK(9) prototype changes.</td>
<td></td>
</tr>
<tr>
<td>January 19, 2008</td>
<td>8.0-CURRENT</td>
<td>introduction of lockmgr_recursed(9), BUF_RECURSED(9) and BUF_ISLOCKED(9) and the removal of BUF_REFCNT().</td>
<td></td>
</tr>
<tr>
<td>January 23, 2008</td>
<td>8.0-CURRENT</td>
<td>introduction of the &quot;ASCII&quot; encoding.</td>
<td></td>
</tr>
<tr>
<td>January 24, 2008</td>
<td>8.0-CURRENT</td>
<td>changing the prototype of lockmgr(9) and removal of lockcount() and LOCKMGR_ASSERT().</td>
<td></td>
</tr>
<tr>
<td>January 26, 2008</td>
<td>8.0-CURRENT</td>
<td>extending the types of the fts(3) structures.</td>
<td></td>
</tr>
<tr>
<td>February 1, 2008</td>
<td>8.0-CURRENT</td>
<td>adding an argument to MEXTADD(9).</td>
<td></td>
</tr>
<tr>
<td>February 6, 2008</td>
<td>8.0-CURRENT</td>
<td>the introduction of LK_NODUP and LK_NOWITNESS options in the lockmgr(9) space.</td>
<td></td>
</tr>
<tr>
<td>February 8, 2008</td>
<td>8.0-CURRENT</td>
<td>the addition of m Collapse.</td>
<td></td>
</tr>
<tr>
<td>February 9, 2008</td>
<td>8.0-CURRENT</td>
<td>the addition of current working directory, root directory, and jail directory support to the kern.proc. filedesc sysctl.</td>
<td></td>
</tr>
<tr>
<td>February 13, 2008</td>
<td>8.0-CURRENT</td>
<td>introduction of lockmgr_assert(9) and BUF_ASSERT functions.</td>
<td></td>
</tr>
<tr>
<td>February 15, 2008</td>
<td>8.0-CURRENT</td>
<td>introduction of lockmgr_args(9) and LK_INTERNAL flag removal.</td>
<td></td>
</tr>
<tr>
<td>(backed out)</td>
<td>8.0-CURRENT</td>
<td>changing the default system ar to BSD ar(1).</td>
<td></td>
</tr>
</tbody>
</table>
February 25, 2008 | 8.0-CURRENT after changing the prototypes of lockstatus(9) and VOP_ISLOCKED(9); more specifically retiring the struct thread argument.

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).

March 8, 2008 | 8.0-CURRENT after adding F_DUP2FD command to fcntl(2).

March 12, 2008 | 8.0-CURRENT after changing the priority parameter to cv_broadcastpri such that 0 means no priority.

March 24, 2008 | 8.0-CURRENT after adding F_DUP2FD command to fcntl(2).

March 26, 2008 | 8.0-CURRENT after adding l_sysid to struct flock.

March 28, 2008 | 8.0-CURRENT after reintegration of the BUF_LOCKWAITERS function and the addition of lockmgr_waiters(9).

April 1, 2008 | 8.0-CURRENT after the introduction of the rw_try_rlock(9) and rw_try_wlock(9) functions.

April 6, 2008 | 8.0-CURRENT after the introduction of the lockmgr_rw and lockmgr_args_rw functions.

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.

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.

April 10, 2008 | 8.0-CURRENT after introduction of the memrchr function.

April 16, 2008 | 8.0-CURRENT after introduction of the fdopendir function.

April 20, 2008 | 8.0-CURRENT after switchover of 802.11 wireless to multi-bss support (aka vaps).

May 9, 2008 | 8.0-CURRENT after addition of multi routing table support (aka setfib(1), setfib(2)).

May 26, 2008 | 8.0-CURRENT after removal of netatm and ISDN4BSD. Also, the addition of the Compact C Type (CTF) tools.

June 14, 2008 | 8.0-CURRENT after removal of sgtty.

June 26, 2008 | 8.0-CURRENT with kernel NFS lockd client.

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. |
| 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. |
December 15, 2008 | 8.0-CURRENT incorporates the new arp-v2 rewrite.

December 19, 2008 | 8.0-CURRENT after the addition of makefs.


January 28, 2009 | 8.0-CURRENT after removal of minor(), minor2unit(), unit2minor(), etc.

February 18, 2009 | 8.0-CURRENT after GENERIC config change to use the USB2 stack, but also the addition of fdevname(3).

February 23, 2009 | 8.0-CURRENT after the USB2 stack is moved to and replaces dev/usb.

February 26, 2009 | 8.0-CURRENT after the renaming of all functions in libmp(3).

February 27, 2009 | 8.0-CURRENT after changing USB devfs handling and layout.

February 28, 2009 | 8.0-CURRENT after adding getdelim(), getline(), stpcpy(), strnlen(), wcsnlen(), wcscasecmp(), and wcsncasecmp().

March 2, 2009 | 8.0-CURRENT after renaming the ushub devclass to uhub.

March 9, 2009 | 8.0-CURRENT after libusb20.so.1 was renamed to libusb.so.1.

March 9, 2009 | 8.0-CURRENT after merging IGMPv3 and Source-Specific Multicast (SSM) to the IPv4 stack.

March 14, 2009 | 8.0-CURRENT after gcc was patched to use C99 inline semantics in c99 and gnu99 mode.

March 15, 2009 | 8.0-CURRENT after the IFF_NEEDSGIANT flag has been removed; non-MPSAFE network device drivers are no longer supported.

March 18, 2009 | 8.0-CURRENT after the dynamic string token substitution has been implemented for rpath and needed paths.

March 24, 2009 | 8.0-CURRENT after tcpdump 4.0.0 and libpcap 1.0.0 import.

April 6, 2009 | 8.0-CURRENT after layout of structs vnet_net, vnet_inet and vnet_ipfw has been changed.

April 9, 2009 | 8.0-CURRENT after adding delay profiles in dummynet.

April 14, 2009 | 8.0-CURRENT after removing VOP_LEASE() and vop_vector.vop_lease.

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.
April 15, 2009 | 8.0-CURRENT after struct llentry pointers are added to struct route and struct route_in6.

April 15, 2009 | 8.0-CURRENT after layout of struct inpcb has been changed.

April 19, 2009 | 8.0-CURRENT after the layout of struct malloc_type has been changed.

April 21, 2009 | 8.0-CURRENT after the layout of struct ifnet has changed, and with if_ref() and if_rele() ifnet refcounting.

April 22, 2009 | 8.0-CURRENT after the implementation of a low-level Bluetooth HCI API.

April 29, 2009 | 8.0-CURRENT after IPv6 SSM and MLDv2 changes.

April 30, 2009 | 8.0-CURRENT after enabling support for VIMAGE kernel builds with one active image.

May 8, 2009 | 8.0-CURRENT after adding support for input lines of arbitrarily length in patch(1).

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.

May 20, 2009 | 8.0-CURRENT after net80211 monitor mode changes.

May 23, 2009 | 8.0-CURRENT after adding UDP control block support.

May 23, 2009 | 8.0-CURRENT after virtualizing interface cloning.

May 27, 2009 | 8.0-CURRENT after adding hierarchical jails and removing global securelevel.

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.

May 29, 2009 | 8.0-CURRENT after adding mnt_xflag to struct mount.

May 30, 2009 | 8.0-CURRENT after adding VOP_ACCESSX(9).

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.

June 1, 2009 | 8.0-CURRENT after updating to the new netisr implementation and after changing the way we store and access FIBs.

June 8, 2009 | 8.0-CURRENT after the introduction of vnet destructor hooks and infrastructure.
<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 11, 2009</td>
<td>8.0-CURRENT after the introduction of netgraph outbound to inbound path call detection and queuing, which also changed the layout of struct thread.</td>
</tr>
<tr>
<td>June 14, 2009</td>
<td>8.0-CURRENT after OpenSSL 0.9.8k import.</td>
</tr>
<tr>
<td>June 22, 2009</td>
<td>8.0-CURRENT after NGROUPS update and moving route virtualization into its own VImage module.</td>
</tr>
<tr>
<td>June 24, 2009</td>
<td>8.0-CURRENT after SYSVIPC ABI change.</td>
</tr>
<tr>
<td>June 29, 2009</td>
<td>8.0-CURRENT after the removal of the /dev/net/* per-interface character devices.</td>
</tr>
<tr>
<td>July 12, 2009</td>
<td>8.0-CURRENT after padding was added to struct sackhint, struct tcpcb, and struct tcpstat.</td>
</tr>
<tr>
<td>July 13, 2009</td>
<td>8.0-CURRENT after replacing struct tcpopt with struct toeopt in the TOE driver interface to the TCP syncache.</td>
</tr>
<tr>
<td>July 14, 2009</td>
<td>8.0-CURRENT after the addition of the linker-set based per-vnet allocator.</td>
</tr>
<tr>
<td>July 19, 2009</td>
<td>8.0-CURRENT after version bump for all shared libraries that do not have symbol versioning turned on.</td>
</tr>
<tr>
<td>July 24, 2009</td>
<td>8.0-CURRENT after introduction of OBJT_SG VM object type.</td>
</tr>
<tr>
<td>August 2, 2009</td>
<td>8.0-CURRENT after making the newbus subsystem Giant free by adding the newbus sxlock and 8.0-RELEASE.</td>
</tr>
<tr>
<td>November 21, 2009</td>
<td>8.0-STABLE after implementing EVFILT_USER kevent filter.</td>
</tr>
<tr>
<td>January 7, 2010</td>
<td>8.0-STABLE after __FreeBSD_version bump to make pkg_add -r use packages-8-stable.</td>
</tr>
<tr>
<td>January 24, 2010</td>
<td>8.0-STABLE after change of the scandir(3) and alphasort(3) prototypes to conform to SUSv4.</td>
</tr>
<tr>
<td>January 31, 2010</td>
<td>8.0-STABLE after addition of sigpause(2).</td>
</tr>
<tr>
<td>February 25, 2010</td>
<td>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.</td>
</tr>
<tr>
<td>March 1, 2010</td>
<td>8.0-STABLE after MFC of importing x86emu, a software emulator for real mode x86 CPU from OpenBSD.</td>
</tr>
<tr>
<td>May 18, 2010</td>
<td>8.0-STABLE after MFC of adding liblezma, xz, xzdec, and lzmainfo.</td>
</tr>
<tr>
<td>June 14, 2010</td>
<td>8.1-RELEASE</td>
</tr>
<tr>
<td>June 14, 2010</td>
<td>8.1-STABLE after 8.1-RELEASE.</td>
</tr>
</tbody>
</table>
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).

December 22, 2010 | 8.2-RELEASE

December 22, 2010 | 8.2-STABLE after 8.2-RELEASE.

February 28, 2011 | 8.2-STABLE after merging DTrace changes, including support for userland tracing.

March 6, 2011 | 8.2-STABLE after merging log2 and log2f into libm.

May 1, 2011 | 8.2-RELEASE after upgrade of the gcc to the last GPLv2 version from the FSF gcc-4_2-branch.

May 28, 2011 | 8.2-STABLE after introduction of the KPI and supporting infrastructure for modular congestion control.

May 28, 2011 | 8.2-STABLE after introduction of Hhook and Khelp KPIs.

May 28, 2011 | 8.2-STABLE after addition of OSD to struct tcpcb.

June 6, 2011 | 8.2-STABLE after ZFS v28 import.

June 8, 2011 | 8.2-STABLE after removal of the schedtail event handler and addition of the sv_schedtail method to struct sysvec.

July 14, 2011 | 8.2-STABLE after merging the SSSE3 support into binutils.

July 19, 2011 | 8.2-STABLE after addition of RFTSIGZMB flag for rfork(2).

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.

September 10, 2011 | 8.2-STABLE after merging of re-factoring of auto-quirk.

October 25, 2011 | 8.2-STABLE after merging of the MAP_PREFAULT_READ flag to mmap(2).

November 16, 2011 | 8.2-STABLE after merging of addition of posix_fallocate(2) syscall.

January 6, 2012 | 8.2-STABLE after merging of addition of posix_fadvise(2) system call.

January 16, 2012 | 8.2-STABLE after merging gperf 3.0.3

February 15, 2012 | 8.2-STABLE after introduction of the new extensible sysctl(3) interface NET_RT_IFLISTL to query address lists.

March 3, 2012 | 8.3-RELEASE.

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 | 271314 | 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).


| 804509 | 305736 | September 12, 2016 | 8-STABLE after resolving a deadlock between device_detach() and usbd_do_request_flags(9).

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<table>
<thead>
<tr>
<th>Value</th>
<th>Revision</th>
<th>Date</th>
<th>Release</th>
</tr>
</thead>
<tbody>
<tr>
<td>700000</td>
<td>147925</td>
<td>July 11, 2005</td>
<td>7.0-CURRENT.</td>
</tr>
<tr>
<td>700001</td>
<td>148341</td>
<td>July 23, 2005</td>
<td>7.0-CURRENT after bump of all shared library versions that had not been changed since RELENG_5.</td>
</tr>
<tr>
<td>700002</td>
<td>149039</td>
<td>August 13, 2005</td>
<td>7.0-CURRENT after credential argument is added to dev_clone event handler.</td>
</tr>
<tr>
<td>700003</td>
<td>149470</td>
<td>August 25, 2005</td>
<td>7.0-CURRENT after memmem(3) is added to libc.</td>
</tr>
<tr>
<td>700004</td>
<td>151888</td>
<td>October 30, 2005</td>
<td>7.0-CURRENT after solisten(9) kernel arguments are modified to accept a backlog parameter.</td>
</tr>
<tr>
<td>700005</td>
<td>152296</td>
<td>November 11, 2005</td>
<td>7.0-CURRENT after IFP2ENADDR() was changed to return a pointer to IF_LLADDR().</td>
</tr>
</tbody>
</table>
| 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).
| 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.
| 700022 | 162170 | September 9, 2006 | 7.0-CURRENT after dlsm 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 scfp calls to libc.
January 26, 2007 | 7.0-CURRENT after the GNU gzip(1) implementation was replaced with a BSD licensed version ported from NetBSD.

February 7, 2007 | 7.0-CURRENT after the removal of IPIP tunnel encapsulation (VIFF_TUNNEL) from the IPv4 multicast forwarding code.

February 23, 2007 | 7.0-CURRENT after the modification of bus_setup_intr() (newbus).

March 2, 2007 | 7.0-CURRENT after the inclusion of ipw(4) and iwi(4) firmware.

March 9, 2007 | 7.0-CURRENT after the inclusion of ncurses wide character support.

March 19, 2007 | 7.0-CURRENT after changes to how insmntque(), getnewvnode(), and vfs_hash_insert() work.

March 26, 2007 | 7.0-CURRENT after addition of a notify mechanism for CPU frequency changes.

April 6, 2007 | 7.0-CURRENT after import of the ZFS filesystem.

April 8, 2007 | 7.0-CURRENT after addition of CAM ‘SG’ peripheral device, which implements a subset of Linux SCSI SG passthrough device API.

April 30, 2007 | 7.0-CURRENT after changing getenv(3), putenv(3), setenv(3) and unsetenv(3) to be POSIX conformant.

May 1, 2007 | 7.0-CURRENT after the changes in 700038 were backed out.

May 10, 2007 | 7.0-CURRENT after the addition of fopen(3) to libutil.

May 13, 2007 | 7.0-CURRENT after enabling symbol versioning, and changing the default thread library to libthr.

May 19, 2007 | 7.0-CURRENT after the import of gcc 4.2.0.

May 21, 2007 | 7.0-CURRENT after bump of all shared library versions that had not been changed since RELENG_6.

June 7, 2007 | 7.0-CURRENT after changing the argument for vn_open()/VOP_OPEN() from file descriptor index to the struct file *.

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.

June 11, 2007 | 7.0-CURRENT after updated 802.11 wireless support.

June 11, 2007 | 7.0-CURRENT after adding TCP LRO interface capabilities.

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. This required the ABI of the PCIOCGETCONF IOCTL to be broken again.
| 700100 | 174864 | December 22, 2007 | 7.0-STABLE after 7.0-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
<table>
<thead>
<tr>
<th>701100</th>
<th>185302</th>
<th>November 25, 2008</th>
<th>7.1-STABLE after 7.1-RELEASE.</th>
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<tbody>
<tr>
<td>701101</td>
<td>187023</td>
<td>January 10, 2009</td>
<td>7.1-STABLE after <code>strndup(3)</code> merge.</td>
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<tr>
<td>701102</td>
<td>187370</td>
<td>January 17, 2009</td>
<td>7.1-STABLE after <code>cpuctl(4)</code> support added.</td>
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<tr>
<td>701103</td>
<td>188281</td>
<td>February 7, 2009</td>
<td>7.1-STABLE after the merge of multi-/no-IPv4/v6 jails.</td>
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<tr>
<td>701104</td>
<td>188625</td>
<td>February 14, 2009</td>
<td>7.1-STABLE after the store of the suspension owner in the <code>strct mount</code>, and introduction of <code>vfs_susp_clean</code> method into the <code>strct vfsops</code>.</td>
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<tr>
<td>701105</td>
<td>189740</td>
<td>March 12, 2009</td>
<td>7.1-STABLE after the incompatible change to the <code>kern.ipc.shmseg</code> sysctl to allow allocating larger SysV shared memory segments on 64bit architectures.</td>
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<tr>
<td>701106</td>
<td>189786</td>
<td>March 14, 2009</td>
<td>7.1-STABLE after the merge of a fix for POSIX semaphore wait operations.</td>
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<tr>
<td>702000</td>
<td>191099</td>
<td>April 15, 2009</td>
<td>7.2-RELEASE</td>
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<td>702100</td>
<td>191091</td>
<td>April 15, 2009</td>
<td>7.2-STABLE after 7.2-RELEASE.</td>
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<tr>
<td>702101</td>
<td>192149</td>
<td>May 15, 2009</td>
<td>7.2-STABLE after <code>ichsmb(4)</code> was changed to use left-adjusted slave addressing to match other SMBus controller drivers.</td>
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<tr>
<td>702102</td>
<td>193020</td>
<td>May 28, 2009</td>
<td>7.2-STABLE after MFC of the <code>fdopendir(3)</code> function.</td>
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<tr>
<td>702103</td>
<td>193638</td>
<td>June 6, 2009</td>
<td>7.2-STABLE after MFC of PmcTools.</td>
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<tr>
<td>702104</td>
<td>195694</td>
<td>July 14, 2009</td>
<td>7.2-STABLE after MFC of the <code>closefrom(2)</code> system call.</td>
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<tr>
<td>702105</td>
<td>196006</td>
<td>July 31, 2009</td>
<td>7.2-STABLE after MFC of the SYSVIPC ABI change.</td>
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<tr>
<td>702106</td>
<td>197198</td>
<td>September 14, 2009</td>
<td>7.2-STABLE after MFC of the x86 PAT enhancements and addition of <code>d_mmap_single()</code> and the scatter/gather list VM object type.</td>
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<tr>
<td>703000</td>
<td>203740</td>
<td>February 9, 2010</td>
<td>7.3-RELEASE</td>
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<td>703100</td>
<td>203742</td>
<td>February 9, 2010</td>
<td>7.3-STABLE after 7.3-RELEASE.</td>
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<td>704000</td>
<td>216647</td>
<td>December 22, 2010</td>
<td>7.4-RELEASE</td>
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<tr>
<td>704100</td>
<td>216658</td>
<td>December 22, 2010</td>
<td>7.4-STABLE after 7.4-RELEASE.</td>
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<tr>
<td>704101</td>
<td>221318</td>
<td>May 2, 2011</td>
<td>7.4-STABLE after the gcc MFC in rev 221317.</td>
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</table>

== FreeBSD 6 Versions

.FreeBSD 6 `__FreeBSD_version` Values [cols="1,1,1", frame="none", options="header"]

<table>
<thead>
<tr>
<th>Value</th>
<th>Revision</th>
<th>Date</th>
<th>Release</th>
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362
<table>
<thead>
<tr>
<th>Date</th>
<th>Version</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>August 18, 2004</td>
<td>6.0-CURRENT</td>
<td>after permanently enabling PFIL_HOOKS in the kernel.</td>
</tr>
<tr>
<td>August 27, 2004</td>
<td>6.0-CURRENT</td>
<td>after initial addition of ifi_epoch to struct if_data. Backed out after a few days. Do not use this value.</td>
</tr>
<tr>
<td>September 8, 2004</td>
<td>6.0-CURRENT</td>
<td>after the re-addition of the ifi_epoch member of struct if_data.</td>
</tr>
<tr>
<td>September 29, 2004</td>
<td>6.0-CURRENT</td>
<td>after addition of the struct inpcb argument to the pfil API.</td>
</tr>
<tr>
<td>October 5, 2004</td>
<td>6.0-CURRENT</td>
<td>after addition of the &quot;-d DESTDIR&quot; argument to newsyslog.</td>
</tr>
<tr>
<td>November 4, 2004</td>
<td>6.0-CURRENT</td>
<td>after addition of glibc style strftime(3) padding options.</td>
</tr>
<tr>
<td>December 12, 2004</td>
<td>6.0-CURRENT</td>
<td>after addition of 802.11 framework updates.</td>
</tr>
<tr>
<td>January 25, 2005</td>
<td>6.0-CURRENT</td>
<td>after changes to VOP_*VOBJECT() functions and introduction of MNTK_MPSAFE flag for Giantfree filesystems.</td>
</tr>
<tr>
<td>February 4, 2005</td>
<td>6.0-CURRENT</td>
<td>after addition of the cpufreq framework and drivers.</td>
</tr>
<tr>
<td>February 6, 2005</td>
<td>6.0-CURRENT</td>
<td>after importing OpenBSD's nc(1).</td>
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<tr>
<td>February 12, 2005</td>
<td>6.0-CURRENT</td>
<td>after removing semblance of SVID2 matherr() support.</td>
</tr>
<tr>
<td>February 15, 2005</td>
<td>6.0-CURRENT</td>
<td>after increase of default thread stacks' size.</td>
</tr>
<tr>
<td>February 19, 2005</td>
<td>6.0-CURRENT</td>
<td>after fixes in &lt;src/include/stdbool.h&gt; and &lt;src/sys/i386/include/_types.h&gt; for using the GCC-compatibility of the Intel C/C++ compiler.</td>
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<tr>
<td>February 21, 2005</td>
<td>6.0-CURRENT</td>
<td>after EOVERFLOW checks in vswprintf(3) fixed.</td>
</tr>
<tr>
<td>February 25, 2005</td>
<td>6.0-CURRENT</td>
<td>after changing the struct if_data member, ifi_epoch, from wall clock time to uptime.</td>
</tr>
<tr>
<td>February 26, 2005</td>
<td>6.0-CURRENT</td>
<td>after LC_CTYPE disk format changed.</td>
</tr>
<tr>
<td>February 27, 2005</td>
<td>6.0-CURRENT</td>
<td>after NLS catalogs disk format changed.</td>
</tr>
<tr>
<td>February 27, 2005</td>
<td>6.0-CURRENT</td>
<td>after LC_COLLATE disk format changed.</td>
</tr>
<tr>
<td>February 28, 2005</td>
<td>6.0-CURRENT</td>
<td>Installation of acpica includes into /usr/include.</td>
</tr>
<tr>
<td>March 9, 2005</td>
<td>6.0-CURRENT</td>
<td>Addition of MSG_NOSIGNAL flag to send(2) API.</td>
</tr>
</tbody>
</table>
March 17, 2005 | Addition of fields to cdevsw

March 21, 2005 | Removed gtar from base system.

April 13, 2005 | LOCAL_CREDS, LOCAL_CONNWAIT socket options added to unix(4).

April 19, 2005 | hwpmc(4) and related tools added to 6.0-CURRENT.

April 26, 2005 | struct icmphdr added to 6.0-CURRENT.

May 3, 2005 | pf updated to 3.7.

May 6, 2005 | Kernel libalias and ng_nat introduced.

May 13, 2005 | POSIX ttyname_r(3) made available through unistd.h and libc.

May 29, 2005 | 6.0-CURRENT after libpcap updated to v0.9.1 alpha 096.

June 5, 2005 | 6.0-CURRENT after importing NetBSD’s if_bridge(4).

June 10, 2005 | 6.0-CURRENT after struct ifnet was broken out of the driver softcs.

July 11, 2005 | 6.0-CURRENT after the import of libpcap v0.9.1.

July 25, 2005 | 6.0-STABLE after bump of all shared library versions that had not been changed since RELENG_5.

August 13, 2005 | 6.0-STABLE after credential argument is added to dev_clone event handler. 6.0-RELEASE.

November 1, 2005 | 6.0-STABLE after 6.0-RELEASE

December 21, 2005 | 6.0-STABLE after incorporating scripts from the local_startup directories into the base rcover(8).

December 30, 2005 | 6.0-STABLE after updating the ELF types and constants.

January 15, 2006 | 6.0-STABLE after MFC of pidfile(3) API.

January 17, 2006 | 6.0-STABLE after MFC of ldconfig_local_dirs change.

February 26, 2006 | 6.0-STABLE after NLS catalog support of csh(1).

May 6, 2006 | 6.1-RELEASE

May 6, 2006 | 6.1-STABLE after 6.1-RELEASE.

June 22, 2006 | 6.1-STABLE after the import of csup.

July 11, 2006 | 6.1-STABLE after the iwi(4) update.

July 17, 2006 | 6.1-STABLE after the resolver update to BIND9, and exposure of...
A 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 dl sym 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.

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
November 25, 2007 | 6.3-STABLE after 6.3-RELEASE. (not changed)

December 7, 2007 | 6.3-STABLE after fixing multibyte type support in bit macro.

April 24, 2008 | 6.3-STABLE after adding l_sysid to struct flock.

May 27, 2008 | 6.3-STABLE after MFC of the memchr(3) function.

June 15, 2008 | 6.3-STABLE after MFC of support for :u variable modifier in make(1).

October 4, 2008 | 6.4-RELEASE

October 4, 2008 | 6.4-STABLE after 6.4-RELEASE.

--- FreeBSD 5 Versions

<table>
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<tr>
<th>Value</th>
<th>Revision</th>
<th>Date</th>
<th>Release</th>
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<tr>
<td>500000</td>
<td>58009</td>
<td>March 13, 2000</td>
<td>5.0-CURRENT</td>
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<tr>
<td>500001</td>
<td>59348</td>
<td>April 18, 2000</td>
<td>5.0-CURRENT after adding addition ELF header fields, and changing our ELF binary branding method.</td>
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<td>500002</td>
<td>59906</td>
<td>May 2, 2000</td>
<td>5.0-CURRENT after kld metadata changes.</td>
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<td>500003</td>
<td>60688</td>
<td>May 26, 2000</td>
<td>5.0-CURRENT after buf/bio changes.</td>
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<td>500004</td>
<td>60936</td>
<td>May 26, 2000</td>
<td>5.0-CURRENT after binutils upgrade.</td>
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<td>500005</td>
<td>61221</td>
<td>June 3, 2000</td>
<td>5.0-CURRENT after merging libxpg4 code into libc and after TASKQ interface introduction.</td>
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<td>500006</td>
<td>61500</td>
<td>June 10, 2000</td>
<td>5.0-CURRENT after the addition of AGP interfaces.</td>
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<td>500007</td>
<td>62235</td>
<td>June 29, 2000</td>
<td>5.0-CURRENT after Perl upgrade to 5.6.0</td>
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<td>500008</td>
<td>62764</td>
<td>July 7, 2000</td>
<td>5.0-CURRENT after the update of KAME code to 2000/07 sources.</td>
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<tr>
<td>500009</td>
<td>63154</td>
<td>July 14, 2000</td>
<td>5.0-CURRENT after ether_ifattach() and ether_ifdetach() changes.</td>
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<td>500010</td>
<td>63265</td>
<td>July 16, 2000</td>
<td>5.0-CURRENT after changing mtree defaults back to original variant, adding -L to follow symlinks.</td>
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<td>500011</td>
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<td>July 18, 2000</td>
<td>5.0-CURRENT after kqueue API changed.</td>
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<td>500012</td>
<td>65353</td>
<td>September 2, 2000</td>
<td>5.0-CURRENT after setproctitle(3) moved from libutil to libc.</td>
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<td>5.0-CURRENT after the first SMPng commit.</td>
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<tr>
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<td>Description</td>
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<td>January 4, 2001</td>
<td>5.0-CURRENT after <code>&lt;sys/select.h&gt;</code> moved to <code>&lt;sys/selinfo.h&gt;</code></td>
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<td>January 10, 2001</td>
<td>5.0-CURRENT after combining <code>libgcc.a</code> and <code>libgcc_r.a</code>, and associated GCC linkage changes.</td>
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<tr>
<td>January 24, 2001</td>
<td>5.0-CURRENT after change allowing <code>libc</code> and <code>libc_r</code> to be linked together, deprecating <code>-pthread</code> option.</td>
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<td>February 18, 2001</td>
<td>5.0-CURRENT after switch from <code>struct ucred</code> to <code>struct xucred</code> to stabilize kernel-exported API for mountd et al.</td>
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<tr>
<td>February 24, 2001</td>
<td>5.0-CURRENT after addition of CPUTYPE make variable for controlling CPU-specific optimizations.</td>
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<tr>
<td>June 9, 2001</td>
<td>5.0-CURRENT after moving <code>machine/ioctl_fd.h</code> to <code>sys/fdcio.h</code></td>
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<td>June 15, 2001</td>
<td>5.0-CURRENT after locale names renaming.</td>
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<td>June 22, 2001</td>
<td>5.0-CURRENT after Bzip2 import. Also signifies removal of S/Key.</td>
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<td>July 12, 2001</td>
<td>5.0-CURRENT after SSE support.</td>
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<td>September 14, 2001</td>
<td>5.0-CURRENT after KSE Milestone 2.</td>
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<td>October 1, 2001</td>
<td>5.0-CURRENT after <code>d_thread_t</code>, and moving UUCP to ports.</td>
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<td>October 4, 2001</td>
<td>5.0-CURRENT after ABI change for descriptor and creds passing on 64 bit platforms.</td>
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<td>October 9, 2001</td>
<td>5.0-CURRENT after moving to XFree86 4 by default for package builds, and after the new <code>libc</code> <code>strnstr()</code> function was added.</td>
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<td>October 10, 2001</td>
<td>5.0-CURRENT after the new <code>libc</code> <code>strcasestr()</code> function was added.</td>
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<td>December 14, 2001</td>
<td>5.0-CURRENT after the userland components of <code>smbfs</code> were imported.</td>
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<td>(not changed)</td>
<td>5.0-CURRENT after the new C99 specific-width integer types were added.</td>
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<tr>
<td>January 29, 2002</td>
<td>5.0-CURRENT after a change was made in the return value of <code>sendfile(2)</code>.</td>
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<tr>
<td>February 15, 2002</td>
<td>5.0-CURRENT after the introduction of the type <code>fflags_t</code>, which is the appropriate size for file flags.</td>
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<td>February 24, 2002</td>
<td>5.0-CURRENT after the usb structure element rename.</td>
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<tr>
<td>March 16, 2002</td>
<td>5.0-CURRENT after the introduction of Perl 5.6.1.</td>
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<td>April 3, 2002</td>
<td>5.0-CURRENT after the <code>sendmail_enable rc.conf(5)</code> variable was made to take the value <code>NONE</code>.</td>
<td></td>
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<td>Version</td>
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<td>Notes</td>
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<td>----------------------------------------------------------------------</td>
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<tr>
<td>5.0-CURRENT</td>
<td>April 30, 2002</td>
<td>mtx_init() grew a third argument.</td>
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<td>May 13, 2002</td>
<td>5.0-CURRENT with Gcc 3.1.</td>
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<td>May 17, 2002</td>
<td>5.0-CURRENT without Perl in /usr/src</td>
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<td>May 29, 2002</td>
<td>5.0-CURRENT after the addition of dlfunc(3)</td>
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<td>July 24, 2002</td>
<td>5.0-CURRENT after the types of some struct sockbuf members were</td>
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<td>changed and the structure was reordered.</td>
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<tr>
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<td>September 1, 2002</td>
<td>5.0-CURRENT after GCC 3.2.1 import. Also after headers</td>
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<tr>
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<td>stopped using BSD_FOO_T and started using _FOO_TDECLARED. This value</td>
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<td>can also be used as a conservative estimate of the start of bzip2(1)</td>
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<td>September 20, 2002</td>
<td>5.0-CURRENT after various changes to disk functions were made</td>
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<tr>
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<td>in the name of removing dependency on disklabel structure internals.</td>
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<td>October 1, 2002</td>
<td>5.0-CURRENT after the addition of getopt_long(3) to libc.</td>
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<td>October 15, 2002</td>
<td>5.0-CURRENT after Binutils 2.13 upgrade, which included new FreeBSD</td>
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<tr>
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<td>emulation, vec, and output format.</td>
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<td>November 1, 2002</td>
<td>5.0-CURRENT after adding weak pthread XXX stubs to libc,</td>
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<td></td>
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<td>obsoleting libXThrStub.so. 5.0-RELEASE.</td>
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<tr>
<td></td>
<td>January 17, 2003</td>
<td>5.0-CURRENT after branching for RELENG_5_0</td>
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<td></td>
<td>February 19, 2003</td>
<td>&lt;sys/dkstat.h&gt; is empty. Do not include it.</td>
<td></td>
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<td>February 25, 2003</td>
<td>5.0-CURRENT after the d_mmap_t interface change.</td>
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<td>February 26, 2003</td>
<td>5.0-CURRENT after taskqueue_swi changed to run without Giant, and</td>
<td></td>
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<td>taskqueue_swi_giant added to run with Giant.</td>
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<tr>
<td></td>
<td>February 27, 2003</td>
<td>cdevsw_add() and cdevsw_remove() no longer exists. Appearance of</td>
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<tr>
<td></td>
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<td>MAJOR_AUTO allocation facility.</td>
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<tr>
<td></td>
<td>March 4, 2003</td>
<td>5.0-CURRENT after new cdevsw initialization method.</td>
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<tr>
<td></td>
<td>March 8, 2003</td>
<td>devstat_add_entry() has been replaced by devstat_new_entry()</td>
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<tr>
<td></td>
<td>March 15, 2003</td>
<td>Devstat interface change; see sys/sys/param.h 1.149</td>
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<td></td>
<td>March 15, 2003</td>
<td>Token-Ring interface changes.</td>
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<tr>
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<td>March 25, 2003</td>
<td>Addition of vm_paddr_t.</td>
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<td>March 28, 2003</td>
<td>5.0-CURRENT after realpath(3) has been made thread-safe</td>
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<td></td>
<td>April 9, 2003</td>
<td>5.0-CURRENT after usbhid(3) has been synced with NetBSD</td>
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<td></td>
<td>April 17, 2003</td>
<td>5.0-CURRENT after new NSS implementation and addition of</td>
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</table>
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. |
| 501110 | | | |
| 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...
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<tr>
<th>Date</th>
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<tr>
<td>February 21, 2004</td>
<td>520103</td>
<td>5.2-CURRENT after device driver API megapatch.</td>
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<td>520104</td>
<td>5.2-CURRENT after <code>getopt_long_only()</code> addition.</td>
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<td>520105</td>
<td>5.2-CURRENT after NULL is made into <code>((void *)0)</code> for C, creating more warnings.</td>
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<td>520106</td>
<td>5.2-CURRENT after <code>pf</code> is linked to the build and install.</td>
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<td>March 10, 2004</td>
<td>520107</td>
<td>5.2-CURRENT after <code>time_t</code> is changed to a 64-bit value on sparc64.</td>
</tr>
<tr>
<td>March 12, 2004</td>
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<td>5.2-CURRENT after Intel C/C++ compiler support in some headers and <code>execve(2)</code> changes to be more strictly conforming to POSIX.</td>
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<td>520109</td>
<td>5.2-CURRENT after the introduction of the <code>bus_alloc_resource_any</code> API</td>
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<td>March 27, 2004</td>
<td>520110</td>
<td>5.2-CURRENT after the addition of UTF-8 locales</td>
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<td>April 11, 2004</td>
<td>520111</td>
<td>5.2-CURRENT after the removal of the <code>getvfsent(3)</code> API</td>
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<td>5.2-CURRENT after the addition of the <code>.warning</code> directive for make.</td>
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<td>June 4, 2004</td>
<td>520113</td>
<td>5.2-CURRENT after <code>ttyioctl()</code> was made mandatory for serial drivers.</td>
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<td>June 13, 2004</td>
<td>520114</td>
<td>5.2-CURRENT after import of the ALTQ framework.</td>
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<tr>
<td>June 14, 2004</td>
<td>520115</td>
<td>5.2-CURRENT after changing <code>sema_timedwait(9)</code> to return 0 on success and a non-zero error code on failure.</td>
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<td>June 16, 2004</td>
<td>520116</td>
<td>5.2-CURRENT after changing kernel <code>dev_t</code> to be pointer to struct <code>cdev *</code>.</td>
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<td>5.2-CURRENT after changing kernel <code>udev_t</code> to <code>dev_t</code>.</td>
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<td>June 17, 2004</td>
<td>520118</td>
<td>5.2-CURRENT after adding support for <code>CLOCK_VIRTUAL</code> and <code>CLOCK_PROF</code> to <code>clock_gettime(2)</code> and <code>clock_getres(2)</code>.</td>
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<tr>
<td>June 22, 2004</td>
<td>520119</td>
<td>5.2-CURRENT after changing network interface cloning overhaul.</td>
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<tr>
<td>July 2, 2004</td>
<td>520120</td>
<td>5.2-CURRENT after the update of the package tools to revision 20040629.</td>
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<tr>
<td>July 9, 2004</td>
<td>520121</td>
<td>5.2-CURRENT after marking Bluetooth code as non-i386 specific.</td>
</tr>
<tr>
<td>July 11, 2004</td>
<td>520122</td>
<td>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.</td>
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</tbody>
</table>
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.

July 24, 2004 | 5.2-CURRENT after the change to separate the way ports rc.d and legacy scripts are started.

July 28, 2004 | 5.2-CURRENT after the backout of the previous change.

July 31, 2004 | 5.2-CURRENT after the removal of kmem_alloc_pageable() and the import of gcc 3.4.2.

August 2, 2004 | 5.2-CURRENT after changing the UMA kernel API to allow ctors/inits to fail.

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.

August 23, 2004 | 5.3-BETA/RC before the pfil API change

September 22, 2004 | 5.3-RELEASE

October 16, 2004 | 5.3-STABLE after branching for RELENG_5_3

December 3, 2004 | 5.3-STABLE after addition of glibc style strftime(3) padding options.

February 13, 2005 | 5.3-STABLE after OpenBSD's nc(1) import MFC.

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.

February 28, 2005 | 5.4-PRERELEASE after the MFC of the fix of EOVERFLOW check in vswprintf(3).

March 2, 2005 | 5.4-PRERELEASE after the MFC of the fix of EOVERFLOW check in vswprintf(3).

April 3, 2005 | 5.4-RELEASE.

April 3, 2005 | 5.4-STABLE after branching for RELENG_5_4

May 11, 2005 | 5.4-STABLE after increasing the default thread stack sizes

June 24, 2005 | 5.4-STABLE after the addition of sha256

October 3, 2005 | 5.4-STABLE after the MFC of if_bridge

November 13, 2005 | 5.4-STABLE after the MFC of bsdiff and portsnap

January 17, 2006 | 5.4-STABLE after MFC of ldconfig_local_dirs change.
== FreeBSD 4 Versions

FreeBSD 4 __FreeBSD_version Values [cols="1,1,1", frame="none", options="header"]

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<tr>
<td>400000</td>
<td>43041</td>
<td>January 22, 1999</td>
<td>4.0-CURRENT after 3.4 branch</td>
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<td>400001</td>
<td>44177</td>
<td>February 20, 1999</td>
<td>4.0-CURRENT after change in dynamic linker handling</td>
</tr>
<tr>
<td>400002</td>
<td>44699</td>
<td>March 13, 1999</td>
<td>4.0-CURRENT after C++ constructor/destructor order change</td>
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<td>400003</td>
<td>45059</td>
<td>March 27, 1999</td>
<td>4.0-CURRENT after functioning dladdr(3)</td>
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<td>400004</td>
<td>45321</td>
<td>April 5, 1999</td>
<td>4.0-CURRENT after __deregister_frame_info dynamic linker bug fix (also 4.0-CURRENT after EGCS 1.1.2 integration)</td>
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<td>400005</td>
<td>46113</td>
<td>April 27, 1999</td>
<td>4.0-CURRENT after suser(9) API change (also 4.0-CURRENT after newbus)</td>
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<td>400006</td>
<td>47640</td>
<td>May 31, 1999</td>
<td>4.0-CURRENT after cdevsw registration change</td>
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<td>400007</td>
<td>47992</td>
<td>June 17, 1999</td>
<td>4.0-CURRENT after the addition of so_cred for socket level credentials</td>
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<td>4.0-CURRENT after the addition of a poll syscall wrapper to libc_r</td>
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<td>400009</td>
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<td>4.0-CURRENT after the change of the kernel’s dev_t type to struct specinfo pointer</td>
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<td>400010</td>
<td>51649</td>
<td>September 25, 1999</td>
<td>4.0-CURRENT after fixing a hole in jail(2)</td>
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<td>400011</td>
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<td>4.0-CURRENT after the sigset_t datatype change</td>
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<td>400012</td>
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<td>4.0-CURRENT after the cutover to the GCC 2.95.2 compiler</td>
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<tr>
<td>400013</td>
<td>54123</td>
<td>December 4, 1999</td>
<td>4.0-CURRENT after adding pluggable linux-mode ioctl handlers</td>
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<tr>
<td>400014</td>
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<td>January 18, 2000</td>
<td>4.0-CURRENT after importing OpenSSL</td>
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<td>56700</td>
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<td>4.0-CURRENT after the C++ ABI change in GCC 2.95.2 from -fvtable-thunks to -fno-vtable-thunks by default</td>
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<td>58170</td>
<td>March 17, 2000</td>
<td>4.0-STABLE after 4.0-RELEASE</td>
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May 5, 2000 | 4.0-STABLE after the introduction of delayed checksums.

June 4, 2000 | 4.0-STABLE after merging libxpg4 code into libc.

July 8, 2000 | 4.0-STABLE after upgrading Binutils to 2.10.0, ELF branding changes, and tcsh in the base system.

July 14, 2000 | 4.1-RELEASE

July 29, 2000 | 4.1-STABLE after 4.1-RELEASE

September 16, 2000 | 4.1-STABLE after setproctitle(3) moved from libutil to libc.

September 25, 2000 | 4.1.1-RELEASE

September 25, 2000 | 4.1.1-STABLE after 4.1.1-RELEASE

October 31, 2000 | 4.2-RELEASE

January 10, 2001 | 4.2-STABLE after combining libgcc.a and libgcc_r.a, and associated GCC linkage changes.

March 6, 2001 | 4.3-RELEASE

May 18, 2001 | 4.3-STABLE after wint_t introduction.

July 22, 2001 | 4.3-STABLE after PCI powerstate API merge.

August 1, 2001 | 4.4-RELEASE

October 23, 2001 | 4.4-STABLE after d_thread_t introduction.

November 4, 2001 | 4.4-STABLE after mount structure changes (affects filesystem klds).

December 18, 2001 | 4.4-STABLE after the userland components of smbfs were imported.

December 20, 2001 | 4.5-RELEASE

February 24, 2002 | 4.5-STABLE after the usb structure element rename.

March 12, 2002 | 4.5-STABLE after locale changes.

(Never created)

April 16, 2002 | 4.5-STABLE after the sendmail_enable rc.conf(5) variable was made to take the value NONE.

April 27, 2002 | 4.5-STABLE after moving to XFree86 4 by default for package builds.

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 |

| 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 |

<p>| 491102 | 137786 | November 16, 2004 | 4.10-STABLE after VM fix dealing with unwiring of fictitious pages |</p>
<table>
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<tr>
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<th>Release</th>
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<td>3.0-CURRENT after mount(2) change</td>
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<td>300002</td>
<td>36592</td>
<td>June 2, 1998</td>
<td>3.0-CURRENT after semctl(2) change</td>
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<td>36735</td>
<td>June 7, 1998</td>
<td>3.0-CURRENT after ioctl arg changes</td>
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== FreeBSD 2.2 Versions

### FreeBSD 2.2 __FreeBSD_version Values [cols="1,1,1", frame="none", options="header"]

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<td>2.2-STABLE after 2.2.8-RELEASE</td>
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</table>

[NOTE] ==== 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. ====

== FreeBSD 2 Before 2.2-RELEASE Versions

### FreeBSD 2 Before 2.2-RELEASE __FreeBSD_version Values [cols="1,1,1", frame="none", options="header"]

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