Gentoo. Why might you?


*"**Gentoo** is as tedious as a twice-told tale,
Vexing the dull ear of a drowsy man."*

- William Shakespeare – *King John* – 1598

Gentoo Penguin
## *The fastest penguin in the south* (36 km/h)

- **Penguin** – etymology unclear
  - Welsh: pen ("head") and gwyn ("white").
  - Latin: pinguis ("fat").
- **Gentoo** – etymology
  - Anglo Indian "Gentoo" (Hindu, not Muslim)
  - from Portuguese "gentio" (gentile – non Jewish)
- **Gentoo Penguin** – probably
  - from Falkland Island English
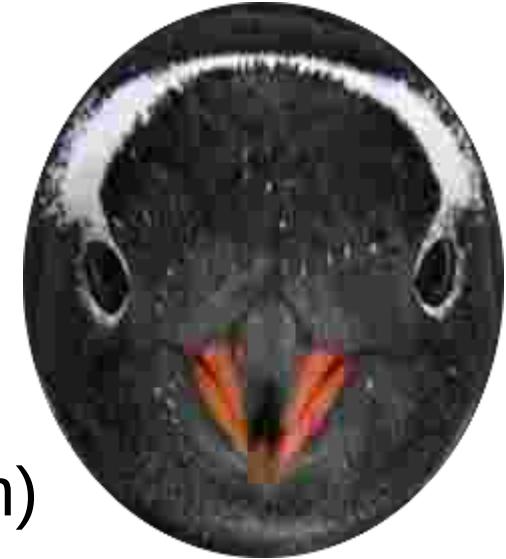
Gentoo Linux

- *Not* about being the fastest Linux.
  - Flexible.
  - With flexibility comes complexity.
  - But. Gentoo *is* faster…
- How to install Gentoo?
  - NOT GOING TO TELL YOU!

Colonoscopy

Large bowel (colon)
Colonoscope
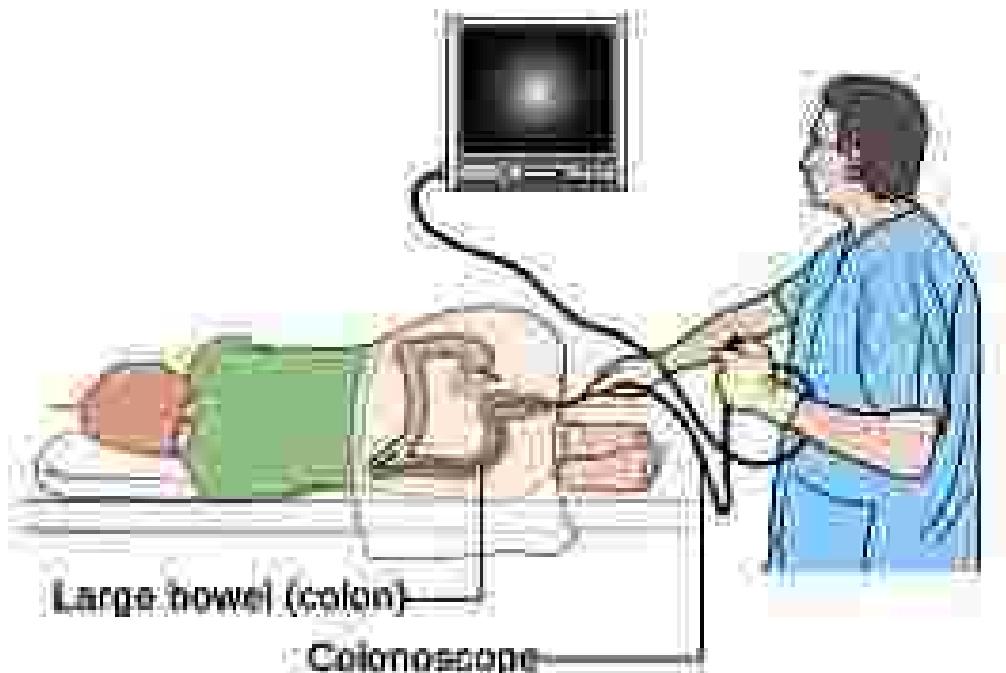
- How to install an colonoscope.

- Want a colonoscopy?

- Ask about the benefits of a colonoscopy before requesting one.

Benefits of Gentoo...

- **USE flags** – controlling features to be built into packages
- **Profiles** – predefined sets of USE flags.
- **genkernel** – roll your own kernel, adding or removing features.
- **ebuilds**, **overlays** and **layman** – building unofficial packages
- Home rolled binary packages – **buildpkg** and **usepkg**.

---- USE flags ----

- Configure features from packages.
    - Exclude unused functionality.
    - Include exotic functionality.
    - Remove or permit un-free software.
    - Select language version (python, ruby, perl)
- Overview
    - https://www.gentoo.org/support/use-flags/

Profiles

- Set of USE flags

- Default set from profile (desktop, developer, server, selinux etc)

- Change the profile and rebuild will transform your system, without re-installation.

- View available profiles ('eselect profile list')

Profiles ('eselect profiles list')

```
<snip>
  [12]  default/linux/amd64/17.0 (stable) *
  [13]  default/linux/amd64/17.0/selinux (stable)
  [14]  default/linux/amd64/17.0/hardened (stable)
  [15]  default/linux/amd64/17.0/hardened/selinux (stable)
  [16]  default/linux/amd64/17.0/desktop (stable)
  [17]  default/linux/amd64/17.0/desktop/gnome (stable)
  [18]  default/linux/amd64/17.0/desktop/gnome/systemd (stable)
  [19]  default/linux/amd64/17.0/desktop/plasma (stable)
  [20]  default/linux/amd64/17.0/desktop/plasma/systemd (stable)
  [21]  default/linux/amd64/17.0/developer (stable)
  [22]  default/linux/amd64/17.0/no-multilib (stable)
  [23]  default/linux/amd64/17.0/no-multilib/hardened (stable)
  [24]  default/linux/amd64/17.0/no-multilib/hardened/selinux (stable)
  [25]  default/linux/amd64/17.0/systemd (stable)
<snip>
  [54]  hardened/linux/uclibc/amd64 (exp)
```

Use *speex* codec to compress audio

- Script to download rss news podcasts (40Mb for 50 minute show)

- Compress with speex codec. Open source version of "gsm" codec.

- Compresses 40Mb => 2.4Mb

- Download at cabin (at 5c / Mb)

- ffmpeg doesn't support speex by default.

eix ffmpeg

Enable / disable USE flags

- Per package (*/etc/portage/package.use*)
  - Turn on: **media-video/ffmpeg speex**
  - Turn off: **net-analyzer/wireshark -qt4 qt5**
- Globally (/etc/portage/make.conf)
  - **USE= "-qt4 qt5"**
  - **USE= "-doc"**
  - **USE= "-X wayland"**

re 'emerge' ffmpeg

- **emerge -uDN @world**
  - u (--update) to most recent supported version
  - D (--deep) check entire dependency tree
  - N (--newuse) apply new USE flags
  - Update everything (only ffmpeg will be updated)
- USE flags allow Gentoo to:
  - exclude the cruft you don't need
  - include stuff you do need

Global or package USE flags?

- Easier to change a single global flag vs multiple package flags.

- Officially "Use package flags not global flags"
  - Global flags can have unintended consequences.
  - Flags don't always mean the same thing.

e.g. gtk, gtk2, gtk3 USE flags

- In theory turn on gtk – use any version. OR, force gtk v2, gtk v3
- In practice
  - **gtk:** Build GTK GUI, defaults to GTK3 / Use gtk+ to determine mimetypes / Enable ArtworkDB support
  - **gtk2**: Build GTK2 GUI / Enable GTK2 instead of GTK3 even if GTK3 is available / Install GTK+2 theme
  - **gtk3**: Build GTK3 GUI / Enable GTK3 interface (default) / Support GTK 3.x, too / Install GTK+3 theme / Enable support for the experimental native GTK File Dialog
- **force-gtk3**: Use the cairo-gtk3 rendering engine
- **gtk2-only :** Allow dependency-resolution for a system without GTK+3
- What happens when GTK4 comes around, and nobody maintains each use of gtk3.

EXPAND_FLAGS vs USE flags

- /etc/portage/make.conf (EXPAND_FLAGS)

  - `PYTHON_TARGETS="python2_7 python3_6"`

  - `PYTHON_SINGLE_TARGET="python3_6"`

  - `ACCEPT_LICENSE="*"`

  - `LINGUAS="en en_GB"`

- /etc/portage/package.use (USE FLAGS)

  - `python_targets_python3_5`

  - `python_single_target_python3_5`

---- genkernel ----

- https://wiki.gentoo.org/wiki/Genkernel
  - Configuring the kernel sources.
  - Build kernel bzImage, initramfs and symlinks.
  - Configuring bootloader.

zcat /proc/config.gz

- The file is 7000 lines long.
- Requires IKCONFIG support in kernel (security risk)
- name/value pairs
  - Flags are Y (in kernel), N (don't build) or M (module)
  - **CONFIG_IKCONFIG=y** (built into kernel)
  - **CONFIG_IKCONFIG=m** (module, must run "modprobe configs")
  - **CONFIG_IKCONFIG_PROC=y** (through /proc/config.gz)

auto-genkernel.sh (my wrapper)

- Ensure
  - running as root
  - Mount /boot
  - /proc/config.gz exists (`# modprobe configs`)
- Backup current environment
  - /proc/config.gz
  - /boot/kernel-genkernel-x86_64-4.14.52-gentoo
  - /boot/System.map-genkernel-x86_64-4.14.52-gentoo
  - /boot/initramfs-genkernel-x86_64-4.14.52-gentoo
- Run genkernel on current config.gz
  - zcat /proc/config.gz > /usr/src/linux/.config.`uname -r`.zcat
  - genkernel --kernel-config=/usr/src/linux/.config.`uname -r`.zcat all –menuconfig
- Install kernel
  - grub-mkconfig -o > /boot/grub/grub.cfg

genkernel --menuconfig
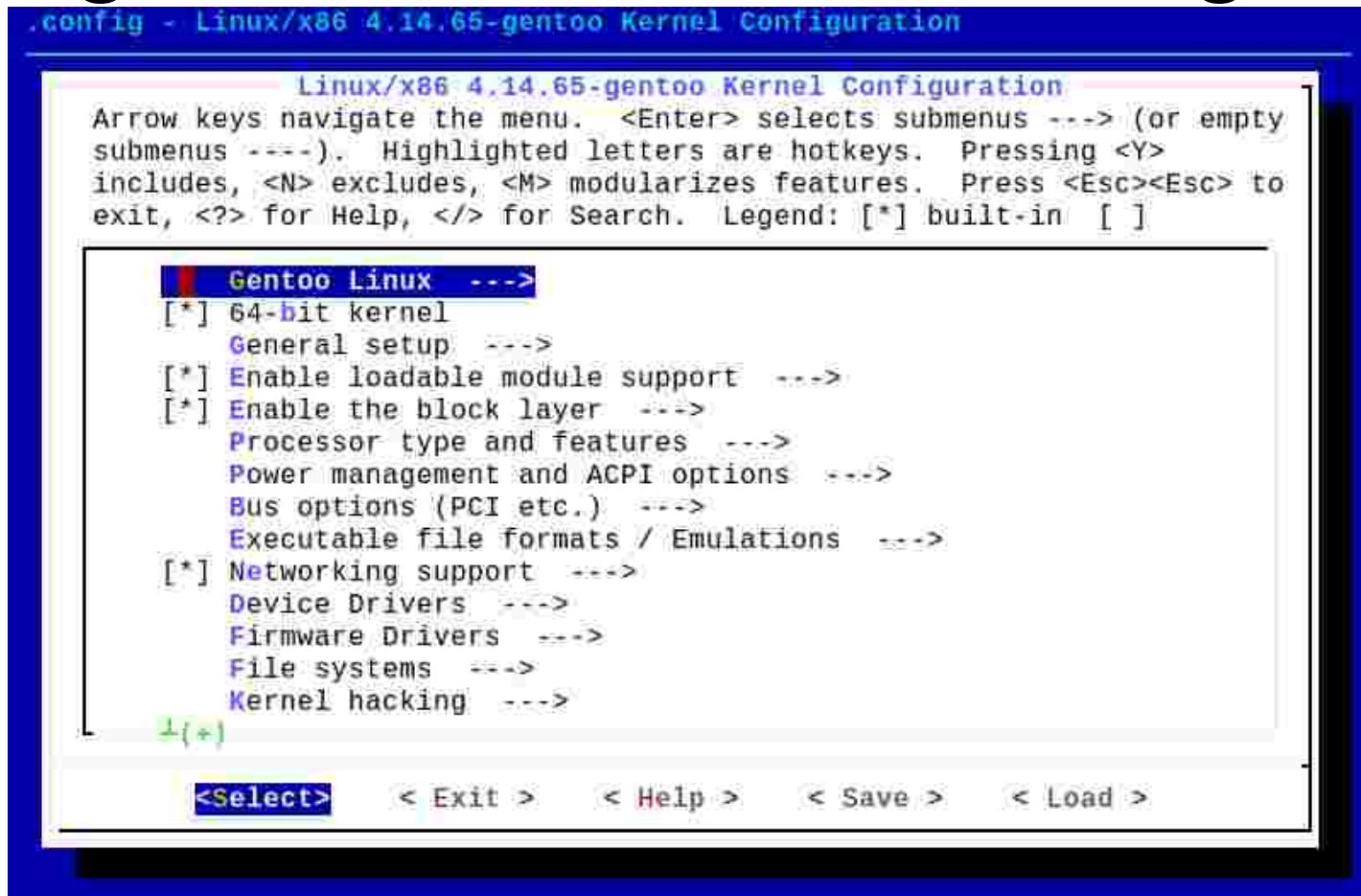
(find) / IKCONFIG

```
.config - Linux/x86 4.14.65-gentoo Kernel Configuration
> Search (IKCONFIG) ─────────────────────────────────────
───────────────────── Search Results ─────────────────────
 Symbol: IKCONFIG [=y]
 Type   : tristate
 Prompt: Kernel .config support
   Location:
 (1) -> General setup
   Defined at init/Kconfig:481
   Selects: BUILD_BIN2C [=y]


 Symbol: IKCONFIG_PROC [=y]
 Type   : boolean
 Prompt: Enable access to .config through /proc/config.gz
   Location:
     -> General setup
 (2)    -> Kernel .config support (IKCONFIG [=y])
   Defined at init/Kconfig:494
   Depends on: IKCONFIG [=y] && PROC_FS [=y]

                                                   (100%)
                    < Exit >
```

Option (1)
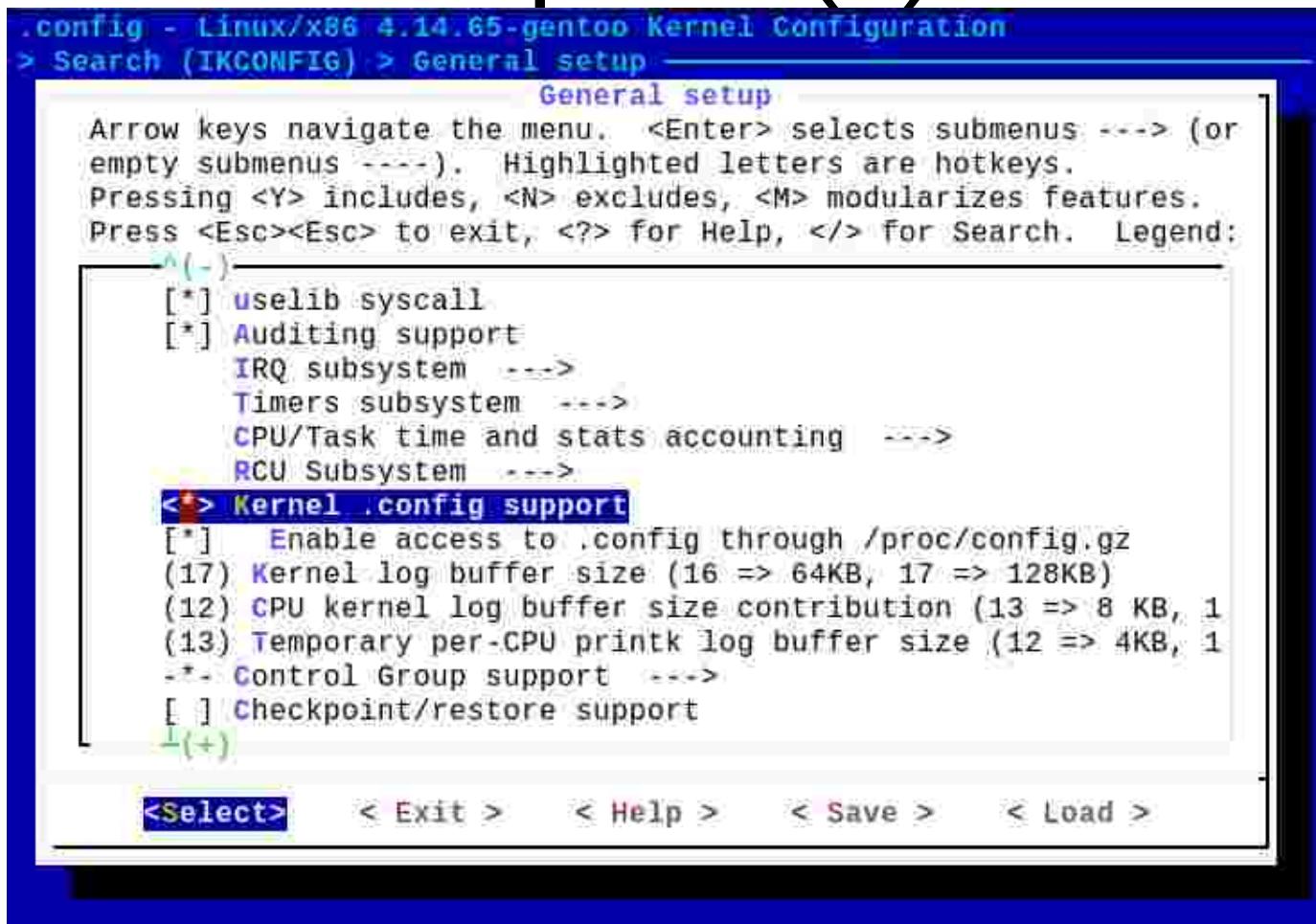
```
.config - Linux/x86 4.14.65-gentoo Kernel Configuration
> Search (IKCONFIG) > General setup
                           General setup
  Arrow keys navigate the menu.  <Enter> selects submenus --->(or
  empty submenus ----).  Highlighted letters are hotkeys.
  Pressing <Y> includes, <N> excludes, <M> modularizes features.
  Press <Esc><Esc> to exit, <?> for Help, </> for Search.  Legend:
    ^(-)
        [*] uselib syscall
        [*] Auditing support
            IRQ subsystem  --->
            Timers subsystem  --->
            CPU/Task time and stats accounting  --->
            RCU Subsystem  --->
        <*> Kernel .config support
        [*]    Enable access to .config through /proc/config.gz
        (17) Kernel log buffer size (16 => 64KB, 17 => 128KB)
        (12) CPU kernel log buffer size contribution (13 => 8 KB, 1
        (13) Temporary per-CPU printk log buffer size (12 => 4KB, 1
        -*- Control Group support  --->
        [ ] Checkpoint/restore support
    (+)

    <Select>    < Exit >    < Help >    < Save >    < Load >
```

\<Help\>

Build and install

- Exit the ncurses dialogue, and build files.

- Reboot machine.

- Use new kernel – or restore old and figure out what you broke.

- Breaking your kernel: New flags, existing ones removed, or changed.

---- overlays ----

- Overlays are repositories, including unofficial repositories.

- https://gpo.zugaina.org/

https://gpo.zugaina.org/

Search Portage & Overlays:

bluegriffon

| Newest | News | Repository news | GLSAs | Browse | USE Flags | Overlays | More... |

Search Results

Search: *bluegriffon*

Page: 1

Results: 1 - 1 of 1

dev-util/bluegriffon
  The next-generation Web Editor based on the rendering engine of Firefox

Page: 1

Results: 1 - 1 of 1

https://gpo.zugaina.org/

Search Portage & Overlays:

Search a package

| Newest | News | Repository news | GLSAs | Browse | USE Flags | Overlays | More... |

dev-util/bluegriffon

The next-generation Web Editor based on the rendering engine of Firefox

http://www.bluegriffon.org/

bluegriffon-3.0.1   amd64 ~x86

View   Download   Browse   License: GPL-2

Overlay: **spikyatlinux** *(layman)*

layman

- The tool that allows you to add overlays to your installation.
- layman -a spikyatlinix (add an overlay)
- layman -L (list all overlays)
- layman -l (list installed overlays)

```
* cg            [Git   ](https://github.com/brothermechanic/cg.git)
* spikyatlinux  [Git   ](https://github.com/spikyatlinux/ebuilds_for_gentoo.git)
```

'equery has repository'

```
equery has repository spikyatlinux
 * Searching for repository spikyatlinux ...
[I-O] [  ] dev-util/bluegriffon-3.0.1:0
[I-O] [  ] sys-block/gparted-0.32.0:0
```

- **I** (installed)
- **P** (available from portage – NOT available)
- **O** (available from an overlay)
- 2 packages installed from spikyatlinux overlay
  - bluegriffon (Web Editor)
  - gparted (newer version than official 0.29.0)

ebuilds

- ls /usr/portage/media-video/ffmpeg/*.ebuild
  - ffmpeg-3.2.6.ebuild
  - ffmpeg-3.2.7.ebuild
  - ffmpeg-3.3.4.ebuild
  - ffmpeg-3.3.6.ebuild
  - ffmpeg-3.3.8.ebuild
  - **ffmpeg-3.4.4.ebuild**
  - ffmpeg-4.0.2.ebuild

ffmpeg.ebuild

- Too complex for this introduction
- 500 lines long

eix civetweb

- eix civetweb
  - www-servers/civetweb
  - Available versions: (~)1.10 {ssl}
  - Installed versions: 1.10(09:12:12 21/06/18)(ssl)
  - Homepage: https://github.com/civetweb/civetweb/
  - Description: Embedded C/C++ web server

civetweb files

- ls /usr/portage/www-servers/civetweb/
  - Manifest (checksums)
  - civetweb-1.10.ebuild
  - metadata.xml (source and maintainer email)

civetweb-1.10.ebuild

```
EAPI=6

inherit cmake-utils

HOMEPAGE="https://github.com/civetweb/civetweb/"
DESCRIPTION="Embedded C/C++ web server"

SRC_URI="https://github.com/civetweb/${PN}/
archive/v${PV}.tar.gz -> ${P}.tar.gz"

LICENSE="MIT"

SLOT="0"

KEYWORDS="~amd64 ~x86"

IUSE="ssl"

RDEPEND="ssl? ( dev-libs/openssl:0= )"

DEPEND="${RDEPEND}"
```

```
src_prepare() {
  sed -e 's|DESTINATION lib$|DESTINATION $
{CMAKE_INSTALL_LIBDIR}|' \
            -i src/CMakeLists.txt ||
die
  cmake-utils_src_prepare
}

src_configure() {
  local mycmakeargs=(
    -DBUILD_TESTING=OFF
    -DBUILD_SHARED_LIBS=ON
    -DCIVETWEB_ENABLE_LUA=OFF
    -DCIVETWEB_ENABLE_DUKTAPE=OFF
    -DCIVETWEB_ENABLE_SSL="$(usex ssl)"
  )

  cmake-utils_src_configure
}
```

modifying ebuilds

Original version

```
KEYWORDS="~amd64 ~x86"
IUSE="ssl"

src_configure() {
 local mycmakeargs=(
   -DBUILD_TESTING=OFF
   -DBUILD_SHARED_LIBS=ON

   -DCIVETWEB_ENABLE_LUA=OFF
   -DCIVETWEB_ENABLE_DUKTAPE=OFF

   -DCIVETWEB_ENABLE_SSL="$(usex ssl)"
)
```

Modified for ARM + websockets

```
KEYWORDS="~amd64 ~x86 ~arm"
IUSE="ssl websockets lua debug"

src_configure() {
 local mycmakeargs=(
   -DBUILD_TESTING=OFF
   -DBUILD_SHARED_LIBS=ON
   -DWITH_DEBUG="$(usex debug)"
   -DCIVETWEB_ENABLE_LUA="$(usex lua)"
   -DCIVETWEB_ENABLE_DUKTAPE=OFF
   -DCIVETWEB_ENABLE_WEBSOCKETS="$(usex websockets)"
   -DCIVETWEB_ENABLE_SSL="$(usex ssl)"
)
```

My local civetweb.ebuild

```
$ eix civetweb
[I] www-servers/civetweb
  Available versions:  (~)1.10 (~)1.10[1] {debug lua ssl websockets}
  Installed versions:  1.10[1](09:12:12 06/21/18)(debug ssl websockets -lua)
  Homepage:            https://github.com/civetweb/civetweb/
  Description:         Embedded C/C++ web server

[1] "tug" /usr/local/portage-tug

$ equery has repository tug
 * Searching for repository tug ...
[I-O] [  ] games-adventure/pioneer-20150715:0
[I-O] [  ] www-servers/civetweb-1.10:0
```

buildpkg, usepkg and **usepkgonly**

- Inside /usr/portage/make.conf
  - PKGDIR="/mnt/binpkg/ARMv7" (nfs shared disk)
  - FEATURES= "buildpkg" (*only on build machine*)
  - EMERGE_DEFAULT_OPTS="--usepkg"
  - EMERGE_DEFAULT_OPTS="--usepkgonly"
- /mnt/binpkg/ARMv7/www-servers/civetweb-1.10.tbz2
- /mnt/binpkg/ARMv7/Packages (flat ascii)

Package contents:

- /mnt/binpkg/ARMv7/www-servers/civetweb-1.10.tbz2

```
./usr/
./usr/bin/
./usr/bin/civetweb
./usr/share/
./usr/share/doc/
./usr/share/doc/civetweb-1.10/
./usr/share/doc/civetweb-1.10/README.md.bz2
./usr/lib/
./usr/lib/libcivetweb.so
./usr/lib/libcivetweb.so.1.10.0
./usr/include/
./usr/include/civetweb.h
```

Want to install Gentoo?

"I gyve unto my wief my second best bed with the furniture**, and my Gentoo server**"

- William Shakespeare – *Last Will and Testament* – 1616