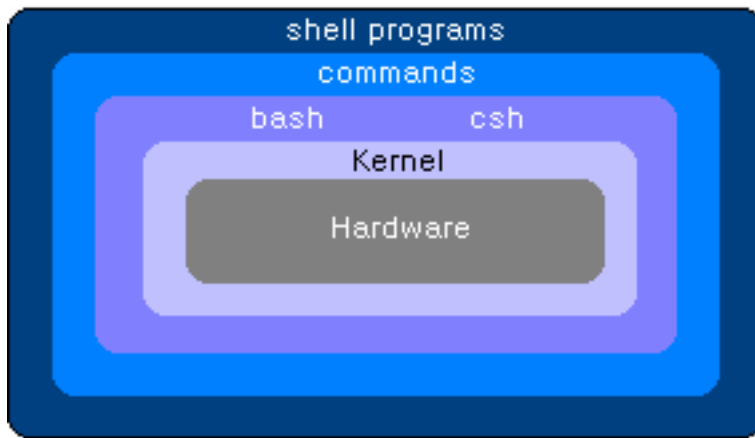


8 FreeBSD

8.1

FreeBSD
 . FreeBSD
 가



- :
- 가
 - 가 가
 - 가
 - 가
 - /dev 가
 - 가 가

8.2

가?

FreeBSD “ (monolithic)”
가

가 .

FreeBSD

(PCMCIA)

(modular)

KLD

가

가

FreeBSD

GENERIC

PC

가 :

-

-

GENERIC

RAM

- 가

GENERIC

가

8.3

/sys

```

/usr/src/sys
가
가
arch/conf . arch i386 alpha pc98 (
PC
)
FreeBSD
. FreeBSD 5.X sparc64
가

```

Note: /usr/src/sys 가 가
가 root /stand/sysinstall →

Configure → Distributions → src → sys

```

<<< X Exit      Exit this menu (returning to previous)
      All       Select all of the below
      Reset     Reset all of the below
[ ] base       top-level files in /usr/src
[ ] contrib    /usr/src/contrib (contributed software)
[ ] gnu        /usr/src/gnu (software from the GNU Project)
[ ] etc        /usr/src/etc (miscellaneous system files)
[ ] games      /usr/src/games (the obvious!)
[ ] include    /usr/src/include (header files)
[ ] lib        /usr/src/lib (system libraries)
[ ] libexec    /usr/src/libexec (system programs)
[ ] release    /usr/src/release (release-generation tools)
[ ] bin        /usr/src/bin (system binaries)
[ ] sbin       /usr/src/sbin (system binaries)
[ ] scrypto    /usr/src/crypto (contrib encryption sources)
[ ] share      /usr/src/share (documents and shared files)
[ ] skrb4      /usr/src/kerberosIV (sources for KerberosIV)
[ ] skrb5      /usr/src/kerberos5 (sources for Kerberos5)
[ ] ssecure    /usr/src/secure (BSD encryption sources)
[X] sys        /usr/src/sys (FreeBSD kernel)
[ ] tools     /usr/src/tools (miscellaneous tools)
[ ] ubin      /usr/src/usr.bin (user binaries)
[ ] usbin     /usr/src/usr.sbin (aux system binaries)

```

sysinstall

FreeBSD CDROM

```

# mount /cdrom
# mkdir -p /usr/src/sys
# ln -s /usr/src/sys /sys
# cat /cdrom/src/ssys.[a-d]* | tar -xzvf -

```

arch/conf

GENERIC

```

# cd /usr/src/sys/i386/conf

```

cp GENERIC MYKERNEL

FreeBSD

MYKERNEL

TIP: /usr/src
/usr/src

가
. 5

GENERIC

i386

cd /usr/src/sys/i386/conf
mkdir /root/kernels
cp GENERIC /root/kernels/MYKERNEL
ln -s /root/kernels/MYKERNEL

Note: root

MYKERNEL

가

vi
FreeBSD 가
ee
GENERIC

SunOS BSD
DOS

GENERIC

Note: FreeBSD
/usr/src/UPDATING

FreeBSD

/usr/src/UPDATING

FreeBSD

가

FreeBSD

가

가

- 1
- FreeBSD 4.0 make world FreeBSD 4.0
1
- (IPFWALL
가) 가
- make world 2

[:]

1.

config(8)

```
# /usr/sbin/config MYKERNEL
```

```
# cd ../ compile/MYKERNEL
```

FreeBSD 5.0

```
# cd ../../compile/MYKERNEL
```

```
# make depend
```

```
# make
```

```
# make install
```

가

```
# dmesg |grep MYKERNEL
```

```
Copyright (c) 1992-2004 The FreeBSD Project.  
Copyright (c) 1979, 1980, 1983, 1986, 1988, 1989, 1991, 1992, 1993, 1994  
The Regents of the University of California. All rights reserved.  
FreeBSD 4.10-RELEASE #1: Tue Sep 7 12:14:39 KST 2004  
root@www.trustedbsd.co.kr:/usr/src/sys/compile/MYKERNEL  
Timecounter "i8254" frequency 1193182 Hz  
Timecounter "TSC" frequency 933354324 Hz  
CPU: Intel Pentium III (933.35-MHz 686-class CPU)
```

2.

```
/usr/src
```

```
# cd /usr/src
```

```
# make buildkernel KERNCONF=MYKERNEL
```

```
# make installkernel KERNCONF=MYKERNEL
```

1

가

Note: FreeBSD 4.2

KERNCONF = KERNEL =

. 4.2-STABLE 2 2

KERNCONF =

buildworld - installwold

(CVSup, CTM anoncvs)
config → make → depend → make → make install .

Note: () 가 FreeBSD4.X
/dev 가 .

root /kernel /kernel.old .
가

Note: FreeBSD 5.0 /boot/kernel
/boot/kernel.old loader(8)
/boot 가 가
/boot/modules

8.4

가 . # 가
(Networking) GENERIC
GENERIC
GENERIC LINT
LINT .

Note: FreeBSD 5.X LINT .
NOTE
/usr/src/sys/conf/NOTES .

가 GENERIC
/usr/src/sys/i386/conf/GENERIC . 가
/usr/src/sys/i386/conf/LINT

```
#
# GENERIC - - Generic kernel configuration file for FreeBSD/i386
#
# For more information on this file, please read the handbook section on
# Kernel Configuration Files:
#
# http://www.FreeBSD.org/doc/en_US.ISO8859-1/books/handbook/kernelconfig-
# config.html
#
# The handbook is also available locally in /usr/share/doc/handbook
# if you've installed the doc distribution, otherwise always see the
# FreeBSD World Wide Web server (http://www.FreeBSD.org/) for the
# latest information.
#
# An exhaustive list of options and more detailed explanations of the
# device lines is also present in the ../../conf/NOTES and NOTES files.
# If you are in doubt as to the purpose or necessity of a line, check first
# in NOTES.
#
# $FreeBSD: src/sys/i386/conf/GENERIC,v 1.380 2003/03/29 13:36:41 mdodd Exp $
```

machine i386

. i386, pc98, sparc64, alpha, ia64, amd64

powerpc가

```

cpu      I486_CPU
cpu      I586_CPU
cpu      I686_CPU

가      CPU      . CPU
( :      I586_CPU I686_CPU )
가      CPU      . CPU

/var/run/dmesg.boot

The Regents of the University of California. All rights reserved.
FreeBSD 4.10-RELEASE #1: Tue Sep  7 12:14:39 KST 2004
root@www.trustedbsd.co.kr:/usr/src/sys/compile/MYKERNEL
Timecounter "i8254" frequency 1193182 Hz
Timecounter "TSC" frequency 933354324 Hz
CPU: Intel Pentium III (933.35-MHz 686-class CPU)
Origin = "GenuineIntel" Id = 0x68a Stepping = 10
Features=0x383f9ff<FPU,VME,DE,PSE,TSC,MSR,PAE,MCE,CX8,SEP,MTRR,PGE,MCA,
real memory = 335478784 (327616K bytes)
avail memory = 322916352 (315348K bytes)

I386_CPU  FreeBSD      STABLE
CURRENT      .      386  CPU  FreeBSD

:

FreeBSD      8.3

/usr/obj

386

CD-ROM      I386_CPU      FreeBSD

386

ident      GENERIC

```

. : MYKERNEL. Ident

maxusers *n*

maxusers

FreeBSD 4.5 가 0 (maxuser
32 384 .)

FreeBSD 5.X *maxusers* 0 . FreeBSD 4.5
maxusers X
maxusers 4
maxusers 가 $20 + 16 * \text{maxusers}$
, *maxusers* 1 18 X
15 36
9
가 . *maxusers* 64
1044
가 가 (ftp.FreeBSD.org)
가

Note: *maxusers*

X 가 *pseudo-*
device pty 16 . FreeBSD 5.X pty(4) 가 “ - ”
device pty

```

# Floating point support - do not disable.
device      npx0      at nexus? port IO_NPX irq 13

npx0  FreeBSD      -

# Pseudo devices - the number indicates how many units to allocate.
device  loop      # Network loopback

TCP/IP      .      FTP  localhost (127.0.0.1)
. FreeBSD 4.X      pseudo-
device loop

#To statically compile in device wiring instead of /boot/device.hints
#hints      "GENERIC.hints"      #Default places to look for devices.

FreeBSD 5.X      device.hints(5)가
loader(8)가      /boot/device.hints . hints
hints      /boot      device.hints

#makeoptions  DEBUG=-g      #Build kernel with gdb(1) debug
symbols

FreeBSD
STRIPS      . CURRENT

FreeBSD
gcc(1)      -g
(config; make depend; )      config(8) -g

```

options MATH_EMULATE #Support for x87 emulation

- 가 (386 486SX) -
 . 486DX, 386, 486SX(387 487)
 (, 2) 가 .

Note: FreeBSD 가 가 -
 . - 가
 GNU
GPL_MATH_EMULATE .

CPU
 가 GENERIC
 FreeBSD 5.0 .

options INET #InterNETworking

가(: PC) .

options INET6 #IPv6 communications protocols

IPv6 (IP) .

options FFS #Berkeley Fast Filesystem
options FFS_ROOT #FFS usable as root device [keep this!]

Note: FreeBSD 5.0 FFS_ROOT

options UFS_ACL #Support for access control lists

FreeBSD 5.0

UFS2 14.12 . ACL

options UFS_DIRHASH #Improve performance on big directories

가

가

가

FreeBSD

options SOFTUPDATES #Enable FFS Soft Updates support

가

4.X

mount(8)

```

/dev/da0s1a on / (ufs, local)
/dev/da0s1f on /tmp (ufs, local, soft-updates)
/dev/da0s1g on /usr (ufs, local, soft-updates)
/dev/da0s1e on /var (ufs, local, soft-updates)
procfs on /proc (procfs, local)

```

soft-updates

tunefs(8)

newfs(8)

```

options      MFS      #Memory Filesystem
options      MD_ROOT  #MD is a potential root device

RAM          가
MFS          /tmp
            /tmp  MFS RAM
/etc/fstab   가  :

/dev/ad1s2b  /tmp mfs rw 0 0

mount /tmp

Note: FreeBSD 5.X   md(4)-backed UFS   MFS
            . MD-backed
mdconfig(8), mdmfs(8)   16.12
MFS

options      NFS      #Network Filesystem
options      NFS_ROOT  #NFS usable as root device, NFS required

TCP/IP

options      MSDOSFS   #MSDOS Filesystem

MS-DOS      DOS
            DOS
            mtools   (      )
DOS         (MSDOSFS)

options      CD9660    #ISO 9660 Filesystem
options      CD9660_ROOT #CD-ROM usable as root, CD9660 required

```

```

CDROM          ISO 9660          . CDROM          가
                CD                (                CD
                )                .                CD
                .                .                .

options        PROCFS            #Process filesystem

                .                가                ps(1)
                /proc
PROCFS         FreeBSD 5.X       PROCFS
                가                가 5.X-CURRENT   PROCFS
PSEUDOFSS
options        PSEUDOFSS        #Pseudo - filesystem framework

PSEUDOFSS     FreeBSD 4.X        . FreeBSD 4.X        FreeBSD 5.X

options        COMPAT_43        #Compatible with BSD 4.3 [KEEP THIS!]

4.3 BSD
options        COMPAT_FREEBSD4   #Compatible with FreeBSD4

FreeBSD 5.X i386  alpha
FreeBSD
                i386  alpha                ; ia64
Sparc64       5.X

options        SCSI_DELAY=15000 #Delay (in ms) before probing SCSI
    
```



```

        SCSI                                15                                . IDE
가
5
가
        FreeBSD 가 SCSI

options      UCONSOLE                      #Allow users to grab the console

X
        가
        write(1)  talk(1)
xterm      xterm -c

Note: FreeBSD 5.X      UCONSOLE

options      USERCONFIG                    #boot -c editor

options      VISUAL_USERCONFIG            #visual boot -c editor

Note: FreeBSD      5.0      USERCONFIG
device.hints(5)      device.hints(5)
12.5

options      KTRACE                        #ktrace(1) support

options      SYSVSHM                       #SYSV-style shared memory

```

```

System V          . 가          X
                  가          XSHM      . X

options          SYSVSEM          #SYSV-style semaphores

System V          .          가          .

options          SYSVMSG          #SYSV-style message queues

System V          .          가          .

Note: ipcs(1)          System V

options          P1003_1B          #Posix P1003_1B real-time extensions
options          _KPOSIX_PRIORITY_SCHEDULING

1993 POSIX      가          .          (
)

Note: FreeBSD 5.X
      _KPOSIX_PRIORITY_SCHEDULING          P1003_1B

options          ICMP_BANDLIM          #Rate limit bad replies

ICMP

Note: FreeBSD 5.X

```

```

ICMP_BANDLIM

# To make an SMP kernel, the next two are needed
#options SMP # Symmetric MultiProcessor Kernel
#options APIC_IO # Symmetric (APIC) I/O

가 SMP( CPU)

device isa
FreeBSD 가 PC ISA . IBM PS/2(
) 가 FreeBSD 가 . MCA
/usr/src/sys/i386/conf/LINT

device eisa
EISA 가 EISA

device pci
PCI 가 PCI PCI ISA

device agp
AGP 가 AGP 가
AGP GART

# Floppy drives

```

```

device      fdc0      at isa? port IO_FD1 irq 6 drq 2
device      fd0       at fdc0 drive 0
device      fd1       at fdc0 drive 1

        . fd0      A:      fd1  B:

.

device      ata

        ATA  ATAPI      .      PCI
ATA/ATAPI      device ata

device      atadisk      # ATA disk drives

        ATA      device ata 가

device      atapicd      # ATAPI CDROM drives

        ATAPI CDROM      device ata 가

device      atapifd      # ATAPI floppy drives

        ATAPI      device ata 가

device      atapist      # ATAPI tape drives

        ATAPI      device ata 가

options     ATA_STATIC_ID      #Static device numbering

```

```

(
)

# SCSI Controllers
device      ahb      # EISA AHA1742 family
device      ahc      # AHA2940 and onboard AIC7xxx devices
device      amd      # AMD 53C974 (Teckram DC-390(T))
device      dpt      # DPT Smartcache - See LINT for options!
device      isp      # Qlogic family
device      ncr      # NCR/Symbios Logic
device      sym      # NCR/Symbios Logic (newer chipsets)

device      adv0     at isa?
device      adw
device      bt0      at isa?
device      aha0     at isa?
device      aic0     at isa?

SCSI . . . . . IDE

# SCSI peripherals
device      scbus    # SCSI bus (required)
device      da       # Direct Access (disks)
device      sa       # Sequential Access (tape etc)
device      cd       # CD
device      pass     # Passthrough device (direct SCSI
access)

SCSI . . . . . IDE . . . . . SCSI

```

```

# RAID controllers
device      ida      # Compaq Smart RAID
device      amr      # AMI MegaRAID
device      mlx      # Mylex DAC960 family

RAID        . RAID

# atkbdc0 controls both the keyboard and the PS/2 mouse
device      atkbdc0  at isa? port IO_KBD

AT          PS/2          I/O
           (atkbd) PS/2          (psm)

device      atkbd0   at atkbdc? irq 1

atkbdc      atkbd    AT 84      AT
AT

device      psm0     at atkbdc? irq 12

가 PS/2

device      vga0     at isa?

# splash screen/screen saver
device      splash

(
가          ).          가          . FreeBSD 4.X

```

pseudo - device splash

```

# syscons is the default console driver, resembling an SCO console
device          sc0          at isa?

SCO             sc0
termcap
                VT220                vt0                가
                                                가          TERM
scoansi

# Enable this and PCVT_FREEBSD for pcvt vt220 compatible console driver
#device          vt0          at isa?
#options          XSERVER          # support for X server on a vt console
#options          FAT_CURSOR          # start with block cursor
# If you have a ThinkPAD, uncomment this along with the rest of the PCVT lines
#options          PCVT_SCANSET=2    # IBM keyboards are non-std

                VT100/102                VT220                . sc0
                가                .                TERM
vt100  vt220                가  sc0                termcap
terminfo
. -- vt100

# Power management support (see LINT for more options)
device          apm0          at nexus? disable flags 0x20 # Advanced Power
Management

# PCCARD (PCMCIA) support
device          card

```

```

device      pcic0    at isa? irq 10 port 0x3e0 iomem 0xd0000
device      pcic1    at isa? irq 11 port 0x3e2 iomem 0xd4000 disable

PCMCIA

# Serial (COM) ports
device      sio0     at isa? port IO_COM1 flags 0x10 irq 4
device      sio1     at isa? port IO_COM2 irq 3
device      sio2     at isa? disable port IO_COM3 irq 5
device      sio3     at isa? disable port IO_COM4 irq 9

MS-DOS/          COM1    COM4          4

Note:          COM4          COM2 가          FreeBSD
                  IRQ 2 (
IRQ2=IRQ9)          가
                  sio(4)
0x*2e8          IO          (S3          )
가          16 IO
                  COM4

                  IRQ 가          (          가
                  )          COM3 COM4

# Parallel port
device      ppc0     at isa? irq 7

ISA

device      ppbus    # Parallel port bus (required)

```



```
device      lpt      # Printer
```

Note: 3 가 가

```
device      plip     # TCP/IP over parallel
```

```
device      ppi      # Parallel port interface device
```

I/O("geek port")+IEEE1284 I/O.

```
#device     vpo      # Requires scbus and da
```

```
lomega ZIP . scbus da . EPP 1.9
```

PCI Ethernet NICs.

```
device     de      # DEC/Intel DC21x4x ("Tulip")
```

```
device     fxp     # Intel EtherExpress PRO/100B (82557, 82558)
```

```
device     tx      # SMC 9432TX (83c170 "EPIC")
```

```
device     vx      # 3Com 3c590, 3c595 ("Vortex")
```

```
device     wx      # Intel Gigabit Ethernet Card ("Wiseman")
```

PCI

PCI Ethernet NICs that use the common MII bus controller code.

```

device          miibus      # MII bus support

MII
                PCI 10/100          .      MII-
                MII                  .      device
miibus          가              miibus API
                PHY                  PHY

device          dc              # DEC/Intel 21143 and various workalikes
device          rl              # RealTek 8129/8139
device          sf              # Adaptec AIC-6915 ("Starfire")
device          sis             # Silicon Integrated Systems SiS 900/SiS 7016
device          ste             # Sundance ST201 (D-Link DFE-550TX)
device          tl              # Texas Instruments ThunderLAN
device          vr              # VIA Rhine, Rhine II
device          wb              # Winbond W89C840F
device          xl              # 3Com 3c90x ("Boomerang", "Cyclone")

MII
                가              dmesg

isab1: <PCI to ISA bridge (vendor=1106 device=3057)> at device
xl0: <3Com 3c905C-TX Fast Etherlink XL> port 0x1400-0x147f mem
xl0: Ethernet address: 00:01:03:39:00:2d
miibus0: <MII bus> on xl0
ukphy0: <Generic IEEE 802.3u media interface> on miibus0
ukphy0: 10baseT, 10baseT-FDX, 100baseTX, 100baseTX-FDX, auto

# ISA Ethernet NICs.
device          ed0            at isa? port 0x280 irq 10 iomem 0xd8000
device          ex
device          ep

# WaveLAN/IEEE 802.11 wireless NICs. Note: the WaveLAN/IEEE really
# exists only as a PCMCIA device, so there is no ISA attachment needed
# and resources will always be dynamically assigned by the pccard code.
device          wi

```

```

# Aironet 4500/4800 802.11 wireless NICs. Note: the declaration below will
# work for PCMCIA and PCI cards, as well as ISA cards set to ISA PnP
# mode (the factory default). If you set the switches on your ISA
# card for a manually chosen I/O address and IRQ, you must specify
# those parameters here.
device          an

# The probe order of these is presently determined by i386/isa/isa_compat.c.
device          ie0    at isa? port 0x300 irq 10 iomem 0xd0000
device          fe0    at isa? port 0x300
device          le0    at isa? port 0x300 irq 5 iomem 0xd0000
device          lnc0   at isa? port 0x280 irq 10 drq 0
device          cs0    at isa? port 0x300
device          sn0    at isa? port 0x300 irq 10
# requires PCCARD (PCMCIA) support to be activated
#device         xe0    at isa?

ISA . 가
/usr/src/sys/i386/conf/LINT .

device ether # Ethernet support

가 ether
. FreeBSD 4.X pseudo-device ether

device sl 1 # Kernel SLIP

s/ SLIP .
PPP . sl SLIP
. FreeBSD 4.X pseudo-device sl

device ppp 1 # Kernel PPP

PPP tun

```

```

                                PPP
ppp                                가 . FreeBSD
4.X    pseudo-device ppp

                                PPP
device tun    # Packet tunnel.
                                . tun
                                PPP . FreeBSD 4.X
pseudo-device tun

                                # Pseudo-ttys (telnet etc)
                                telnet
"pseudo-terminal"
rlogin , xterm Emacs . pty
                                16
ptys . xterm
                                256 가

device md    # Memory ``disks''
                                pseudo-device md
                                pseudo-devices. FreeBSD 4.X

device gif    # IPv6 and IPv4 tunneling
                                , IPv4 IPv6 , IPv4 IPv4
IPv6 IPv6 . FreeBSD 4.4 가 gif
                                FreeBSD pseudo-device
gif 4 가

device faith # IPv6-to-IPv4 relaying (translation)

```

```

pseudo-device      IPv4/IPv6
. FreeBSD 4.X      pseudo-device faith 1

# The `bpf' pseudo-device enables the Berkeley Packet Filter.
# Be aware of the administrative consequences of enabling this!
device bpf         # Berkeley packet filter

. pseudo-device
(promiscuous)      ( : )
.                  tcpdump(1)
. FreeBSD 4.X      pseudo-device bpf

Note: bpf(4)       IP 가 dhclient(8)가
. DHCP

# USB support
#device uhci       # UHCI PCI->USB interface
#device ohci       # OHCI PCI->USB interface
#device usb        # USB Bus (required)
#device ugen       # Generic
#device uhid       # ``Human Interface Devices''
#device ukbd       # Keyboard
#device ulpt       # Printer
#device umass      # Disks/Mass storage - Requires scbus and da
#device ums        # Mouse
# USB Ethernet, requires mii
#device aue        # ADMtek USB ethernet
#device cue        # CATC USB ethernet
#device kue        # Kawasaki LSI USB ethernet

USB (USB , , )
FreeBSD 가 가 /usr/src/sys/i386/conf/LINT

```

8.4.1 (PAE)

가 4 가
 Intel Pentium Pro CPU 36-bit
 가 .
 Intel Pentium Pro CPU (PAE) 64 가
 . FreeBSD 4.X FreeBSD 4.9-RELEASE 5.X
 FreeBSD 5.1-RELEASE PAE
 . Intel 4 가 가 . 4
 가 가 (pool) 가 .
 PAE 가 :

options PAE

Note: FreeBSD PAE Intel IA-32
 PAE FreeBSD

FreeBSD PAE 가 :

- 가 4 가 VM
- KLD PAE 가
- bus_dma(9) PAE 가
 . PAE
 PAE 가
 FreeBSD 5.X

- PAE
vnode
kern.maxvnodes sysctl

- 가 (KVA) 가 KVA
가 KVA 가
KVA_PAGES
tuning(7) . pae(4)
FreeBSD PAE 가

8.5

Note: FreeBSD 5.0

devfs(5)
/dev "node" 가
가
/dev/MAKEDEV 가
가 가
가 가
IDE CD-ROM 가

device acd0

/dev acd0 c 가 "raw"
r
/dev

sh MAKEDEV acd0

```
가   acd0c   racd0c   가   가   /dev
```

```
# sh MAKEDEV snd0
```

Note:

```
   /etc/fstab   가
   . ftab(5)
```

```
GENERIC   가
```

Note: SCSI /dev

```
   가   .   SLIP/PPP pseudo-devices
/dev   가   가
```

8.6 가

```
5   가   .   :
```

config :

```
   config(8)   가
   가   .   config(8)   가
vi
```

```
config: line 17: syntax error
```

```
vi   17G   가
   GENERIC
```


make :

make config(8)가

FreeBSD

(<http://lists.freebsd.org/mailman/listinfo/freebsd-questions>)

:

(make install make installkernel)
1 (init(8)) .

1

가

0

:

FreeBSD

가

FreeBSD

가 10

. Enter

unload

boot kernel.old

가

/var/log/messages

. dmesg(8)

Note:

가 GENERIC

가

kernel.old

```

.   가 가
kernel                               ps(1)
. make                               (                               )

# chflags noschg /kernel

securelevel(8)                       0
/etc/rc.conf kern_securelevel -1
securelevel(8)

# chflags schg /kernel

FreeBSD 5.X                            가
가

ps(1)                                  :

3.X      4.X                            가
ps(1)   vmstat(8)
libkvm

```