Exercise 1 – FreeBSD Installation

Announced Date: 2005/9/22

Due Date: 2005/10/6

Outline

- FreeBSD version
- Installing FreeBSD
- Update source and make world
- Rebuild kernel

FreeBSD branches

- Two parallel development branches:
  - *-CURRENT*
    - Latest working sources for FreeBSD
    - Latest release version: 5.2.1 in Feb. 2004.
    - ***Latest Release version: 6.0-BETA4 in Sep. 2005.***
  - *-STABLE*
    - Receive only well-tested bug fixes and other small incremental enhancement
    - Latest release version: 4.10 May. 2004.
    - **Latest Release version:**
      - ***4.11 Jan, 2005***
      - ***5.4 May, 2005***

FreeBSD version

- A.B.C – Type
  - A: major version Number
  - B: minor version Number
  - C: slight patch version number
  - Type: version type
    - **SNAP**
    - **ALPHA、BETA、GAMMA**
    - **RELEASE**
    - **RELENG**
    - **STABLE**
    - **CURRENT**

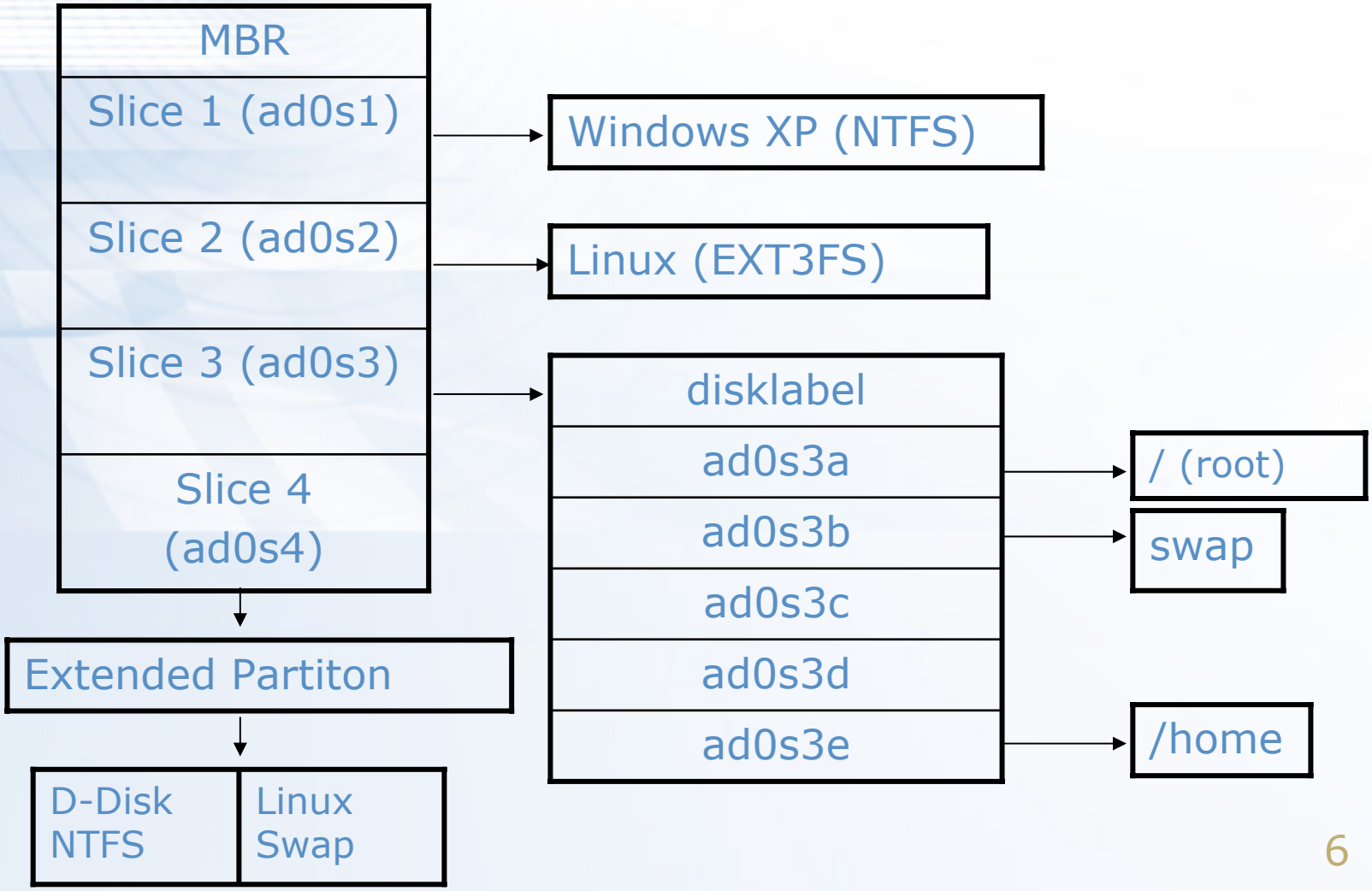
Snapshot → { Alpha / Beta / Gamma } → Release → Releng → Stable

FreeBSD view of Disk (1)

- What is the meaning of **ad0s1e**
  - Disk name
    - **IDE: ad**
    - **SCSI: da**
  - Slice is equal to the partition of common use
    - **Primary partition: s1 ~ s4**
    - **Extended partition: s5 ~ s8**
  - Label in each slice
    - **a: root partition**
    - **b: swap**
    - **c: entire disk**
    - **d: entire partition**
    - **efgh: /usr, /home, …**

FreeBSD view of Disk (2)

An Example



Installing FreeBSD

- Steps
  1. Knowing your hardware
  2. Obtaining installation file
  3. Booting from CD
  4. Kernel Configuration Menu
  5. sysinstall main menu
  6. Custom Installation Options
     1. **Partition**
     2. **Label**
     3. **Distribution**
     4. **Media**
     5. **Commit**
  7. Post Installation

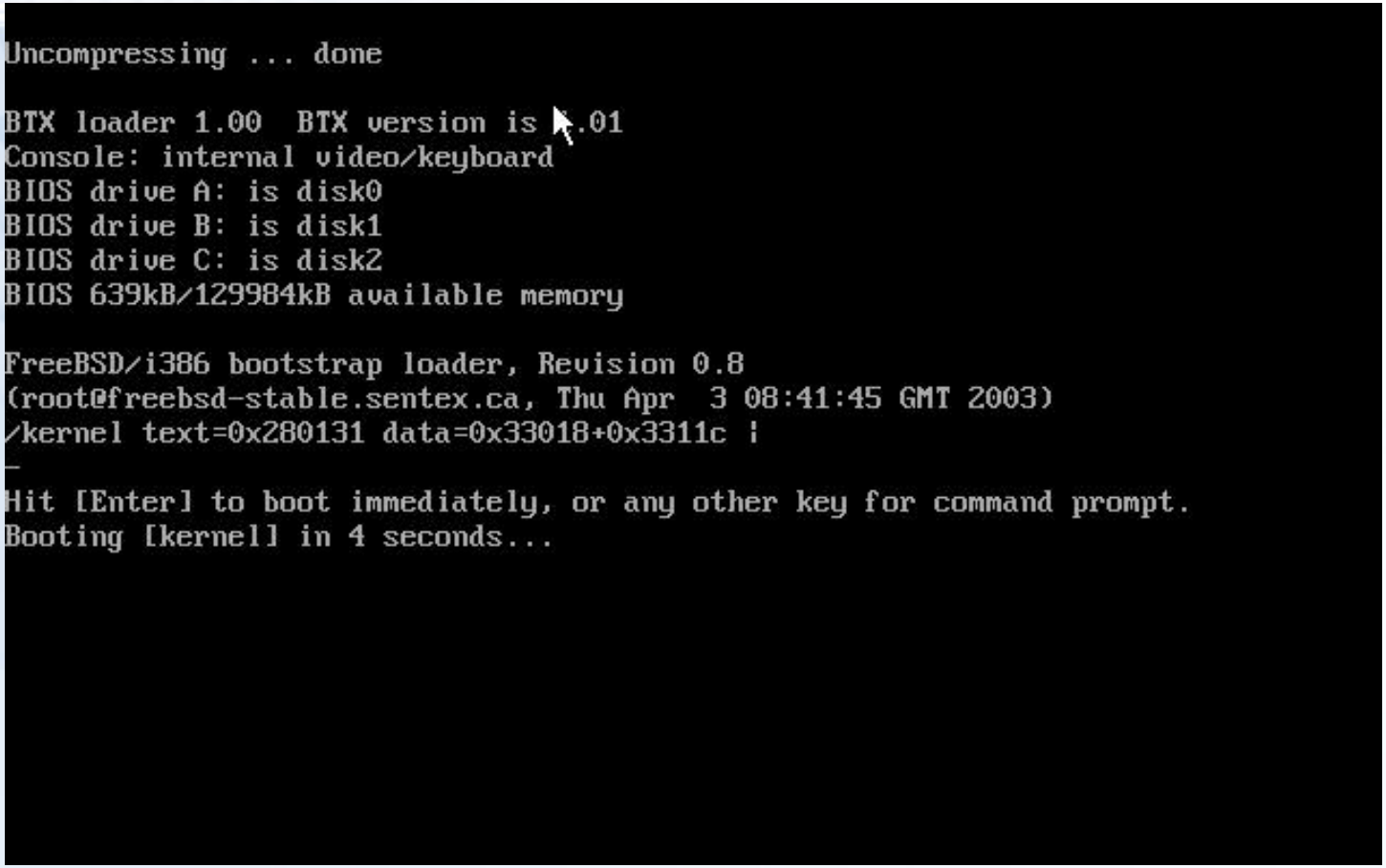
Installing FreeBSD – 1. knowing your hardware

- CPU
  - 32bit or 64bit, Xeon, Intel、AMD or other brand
- RAM
  - Size
- HD
  - Size, amount, SCSI or IDE
- VGA
  - Brand, ram size
- Sound
  - Brand
- Network Interface Card
  - Brand
  - IP、Netmask、default gateway、Hostname、DNS
- Other Special device

Installing FreeBSD – 2. Obtaining installation file

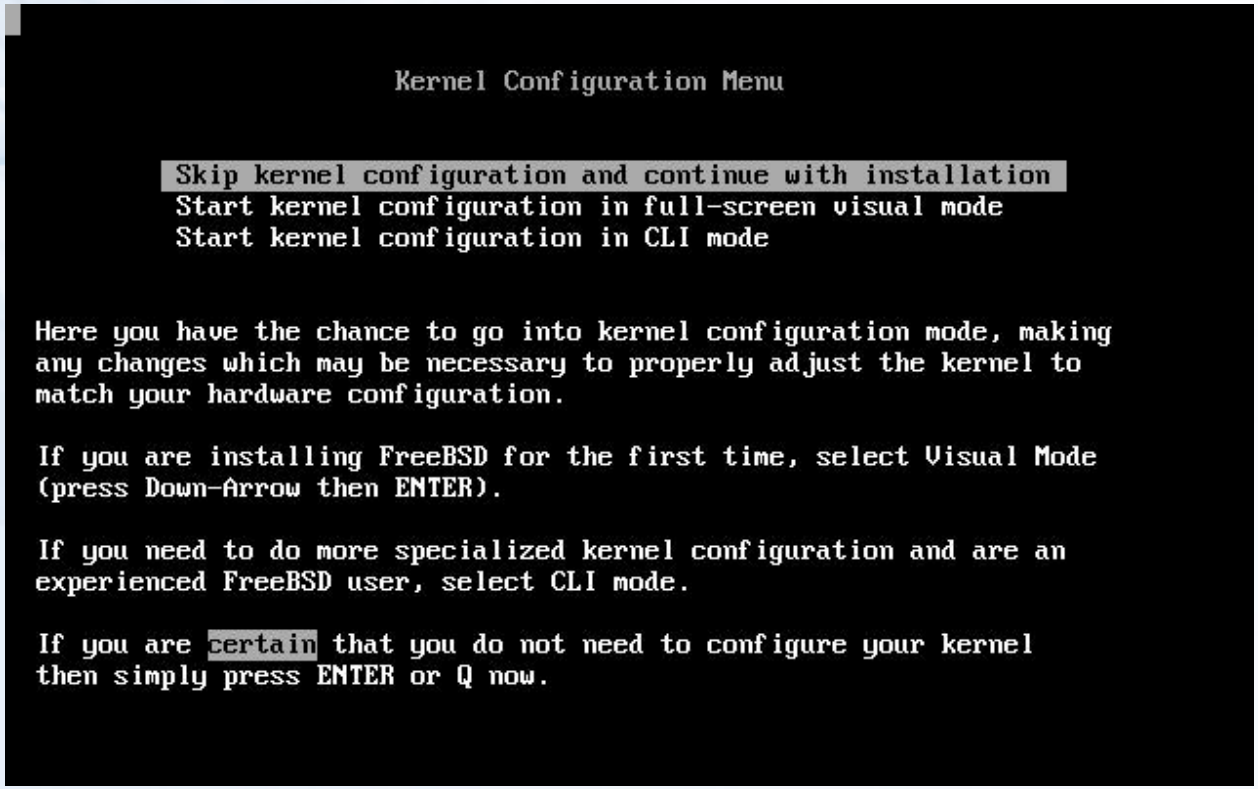
- FreeBSD installation CD
  - ftp://freebsd.csie.nctu.edu.tw/pub/ISO-IMAGES-i386/5.4/5.4-RELEASE-i386-bootonly.iso
  - ftp://freebsd.csie.nctu.edu.tw/pub/ISO-IMAGES-i386/5.4/5.4-RELEASE-i386-disc1.iso
  - Burn!
- Boot Floppy Image
  - ftp://freebsd.csie.nctu.edu.tw/pub/releases/i386/5.4-RELEASE/floppies/boot.flp
  - ftp://ftp.freebsd.org/pub/FreeBSD/tools/fdimage.exe
  - C:\fdimage.exe boot.flp a:\

Installing FreeBSD – 3. Booting from CD



Installing FreeBSD – 4. Kernel Configuration Menu

- Install first and configure kernel later
  - Choose "Skip kernel configuration and continue with installation"
  - Then it will probe the devices in your system

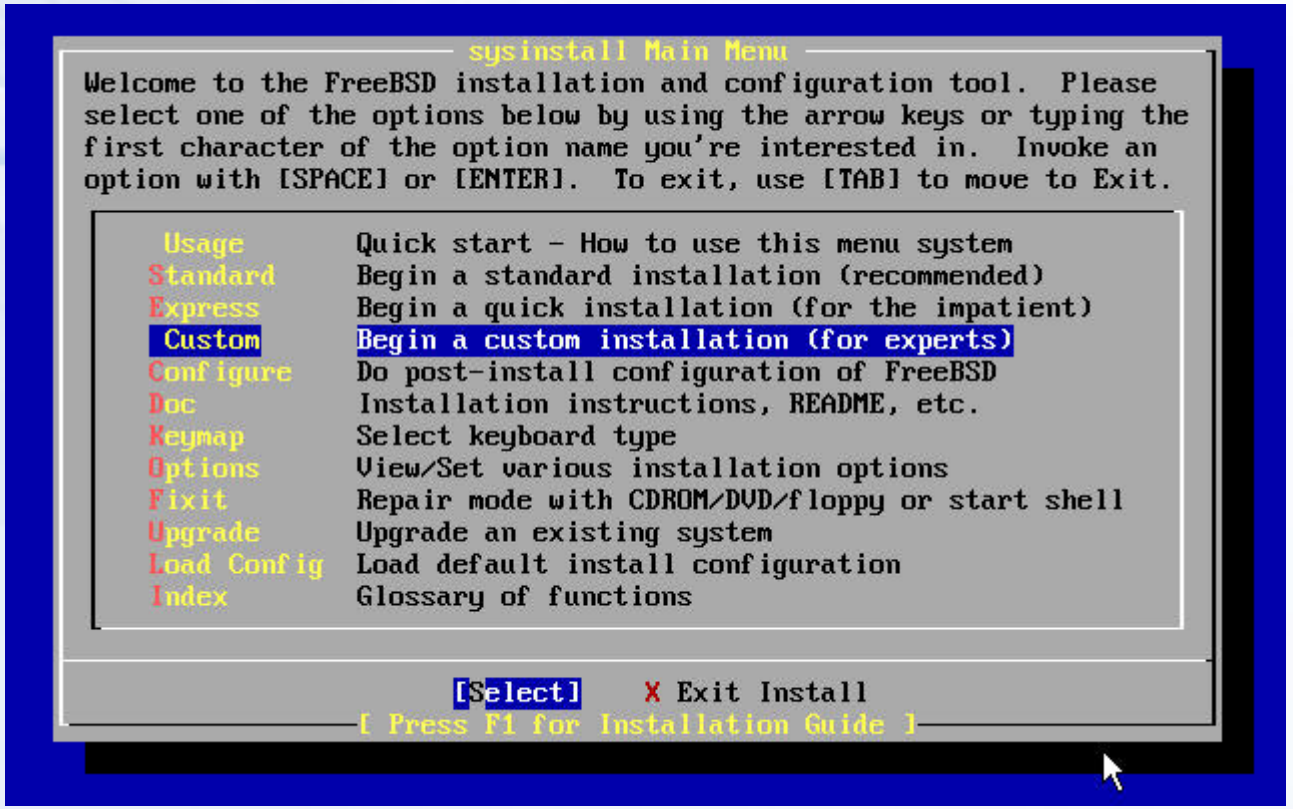


Installing FreeBSD – 5. sysinstall Main Menu

- You can press “Scroll Lock” key to see probe results.

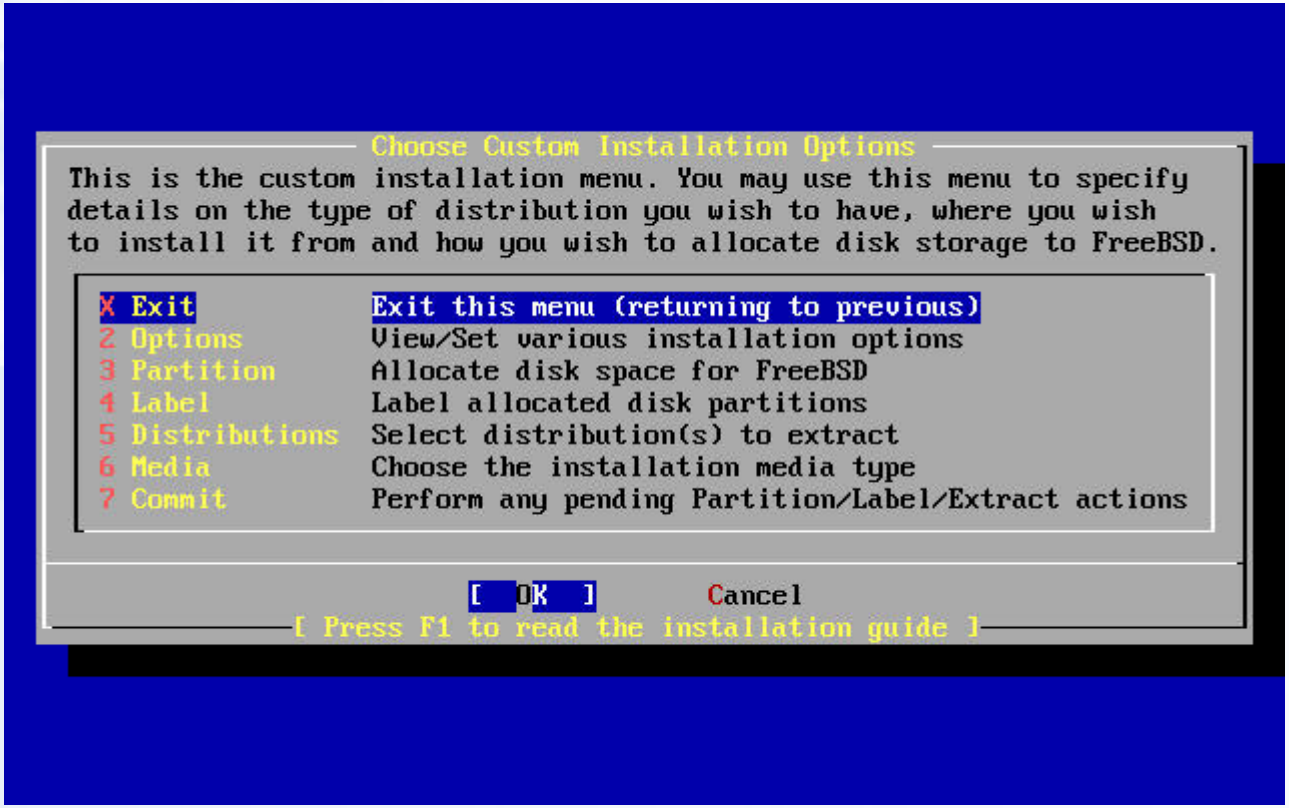
> sysinstall Main Menu

- Choose “Custom”



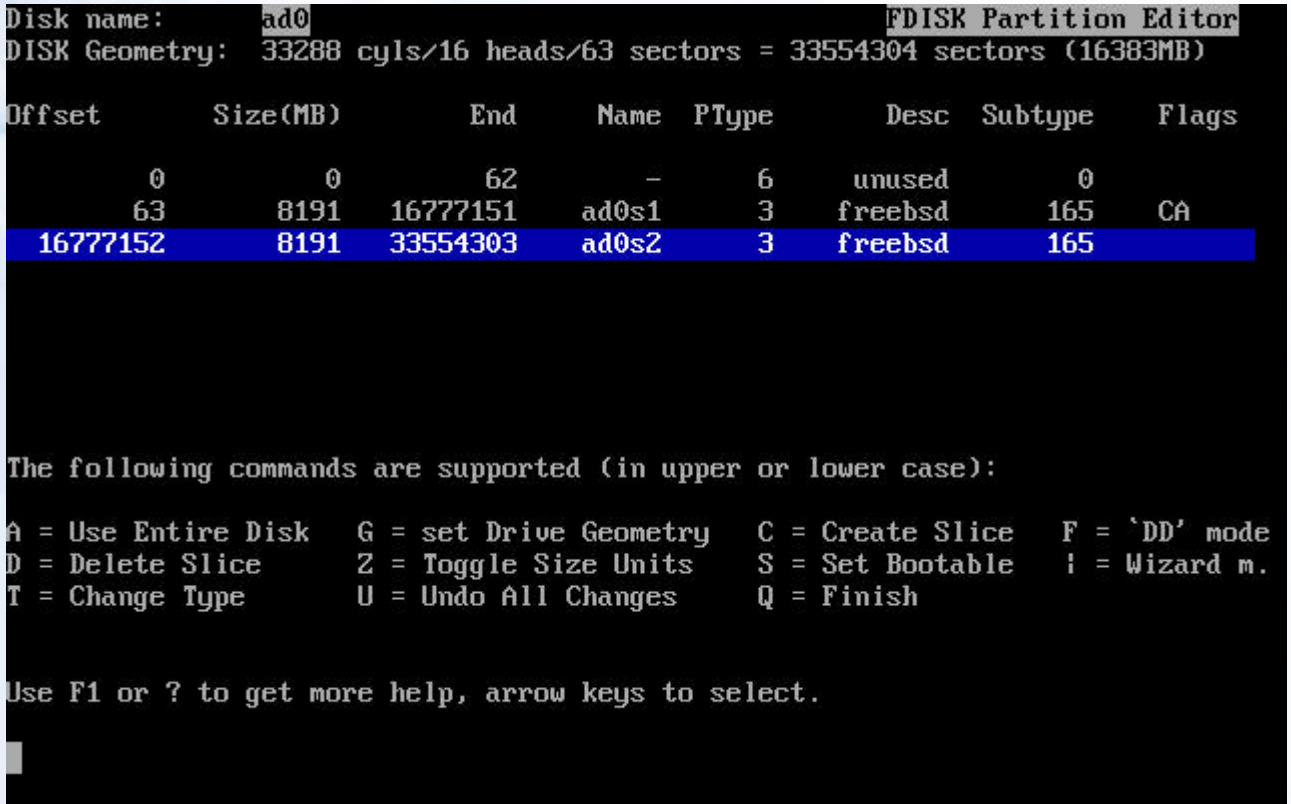
Installing FreeBSD – 6. Custom Installation Options

- 4 major steps
  - Partition and label your disk
  - Choose what to install and how to install
  - Commit



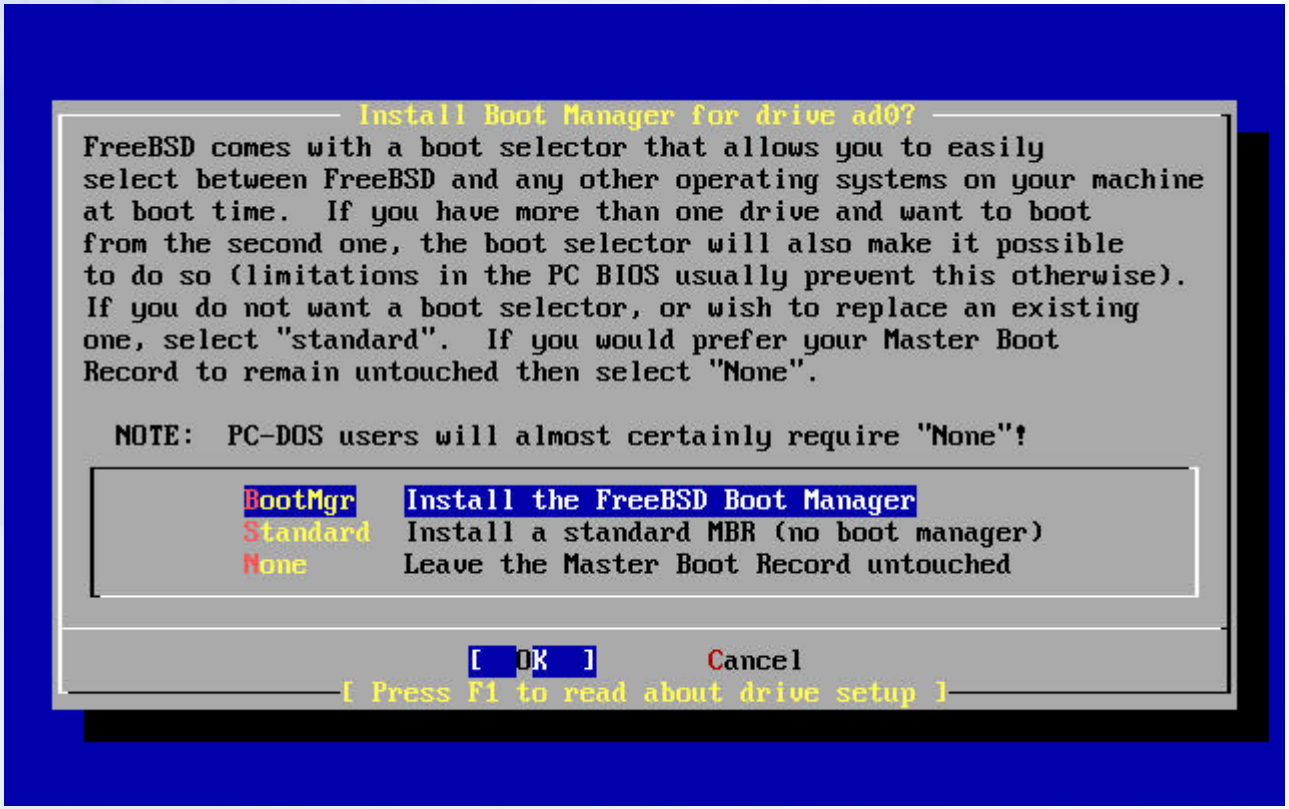
Installing FreeBSD – 6. Custom Installation – partition (1)

- Create slice and choose boot manager
  - Press "C" to create a new slice or press "A" to use entire disk
  - Press "S" to toggle ad0s1 as bootable (we will put / on this slice)
  - Press "Q" to next step (Select Boot Manager)



Installing FreeBSD – 6. Custom Installation – partition (2)

- Select "BootMgr" for ad0
- After press OK, it will back to Custom Installation Options menu



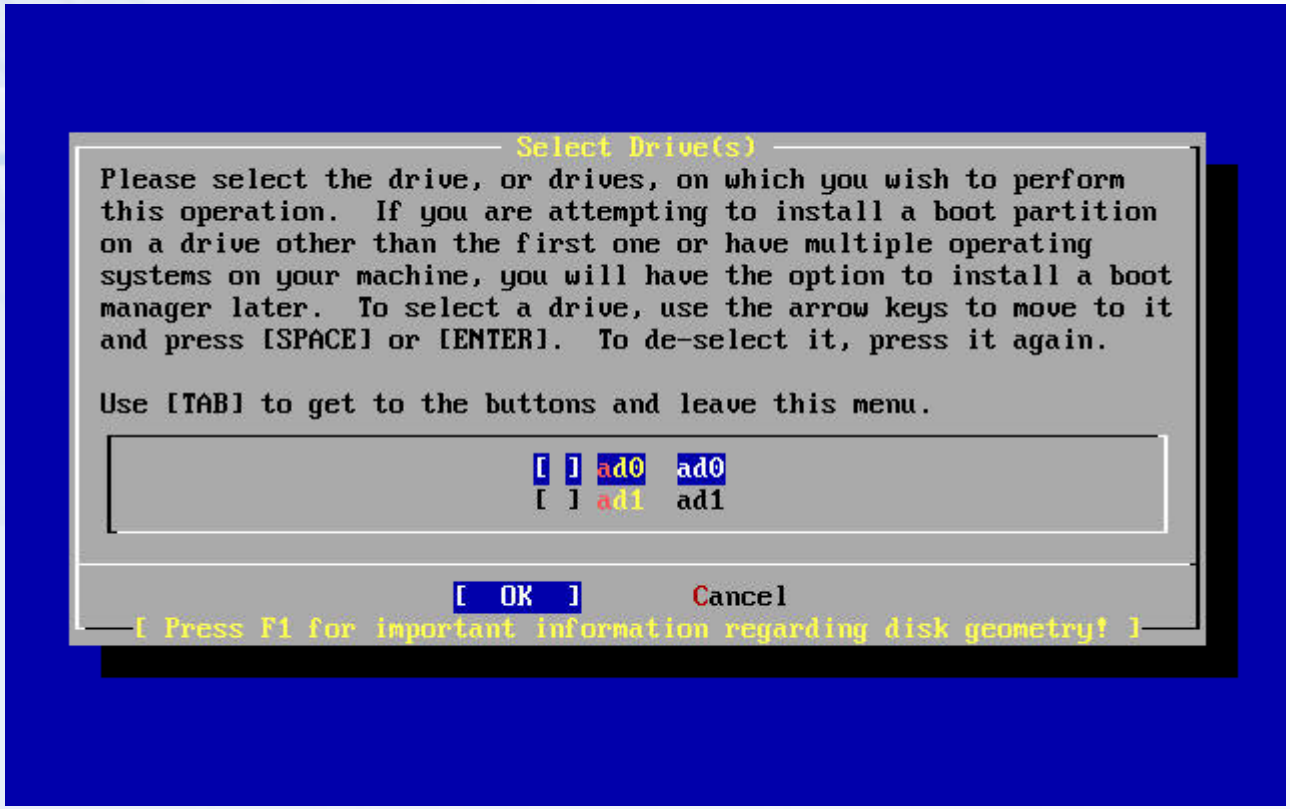
BootMgr
- multiple OS

Standard
- single OS

None
- Other BM

Installing FreeBSD – 6. Custom Installation – partition (3)

- If you have more than one disk…
  - You can choose whether to partition it.
  - Install “BootMgr” for first disk and “none” for rest ones

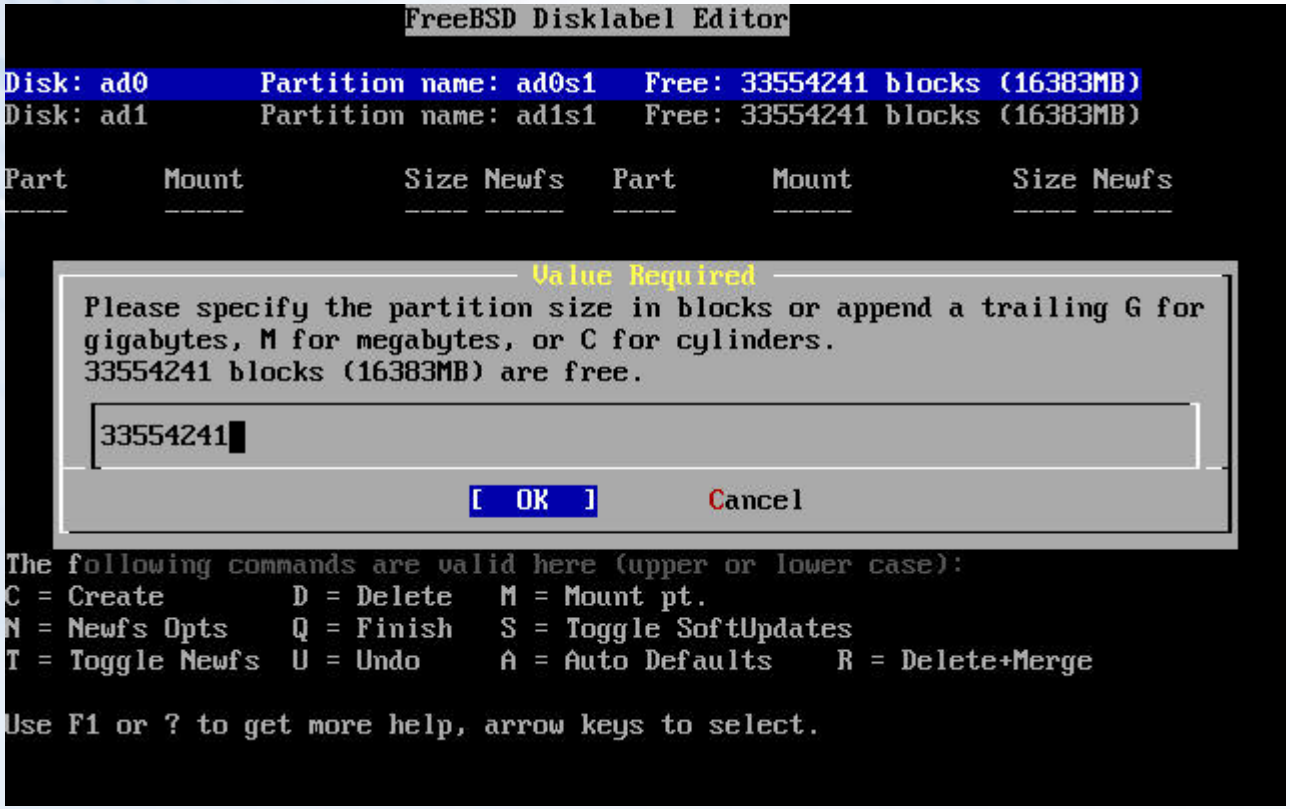


Installing FreeBSD – 6. Custom Installation – Label (1)

- Disklabel Editor
  - Move blue bar to select slice
  - Press "C" to create disk label
    - **/ , swap, /home**
      - > Specify size
      - > Choose type (either swap or FS)
      - > Specify mount point
  - Press "S" to toggle SoftUpdates (async written to disk)
  - Press "Q" to next step (back to custom installation options menu)

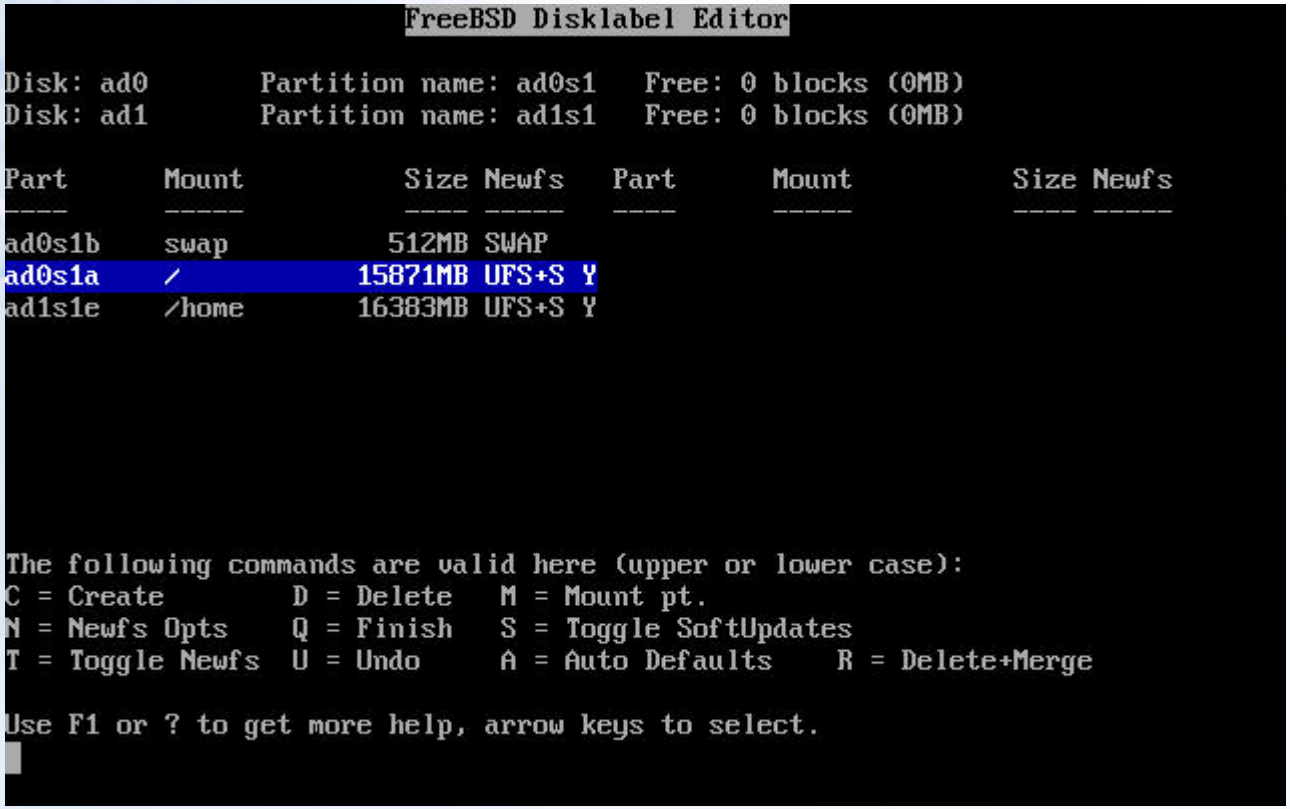
Installing FreeBSD – 6. Custom Installation – Label (2)

- Create label in ad0 and specify size



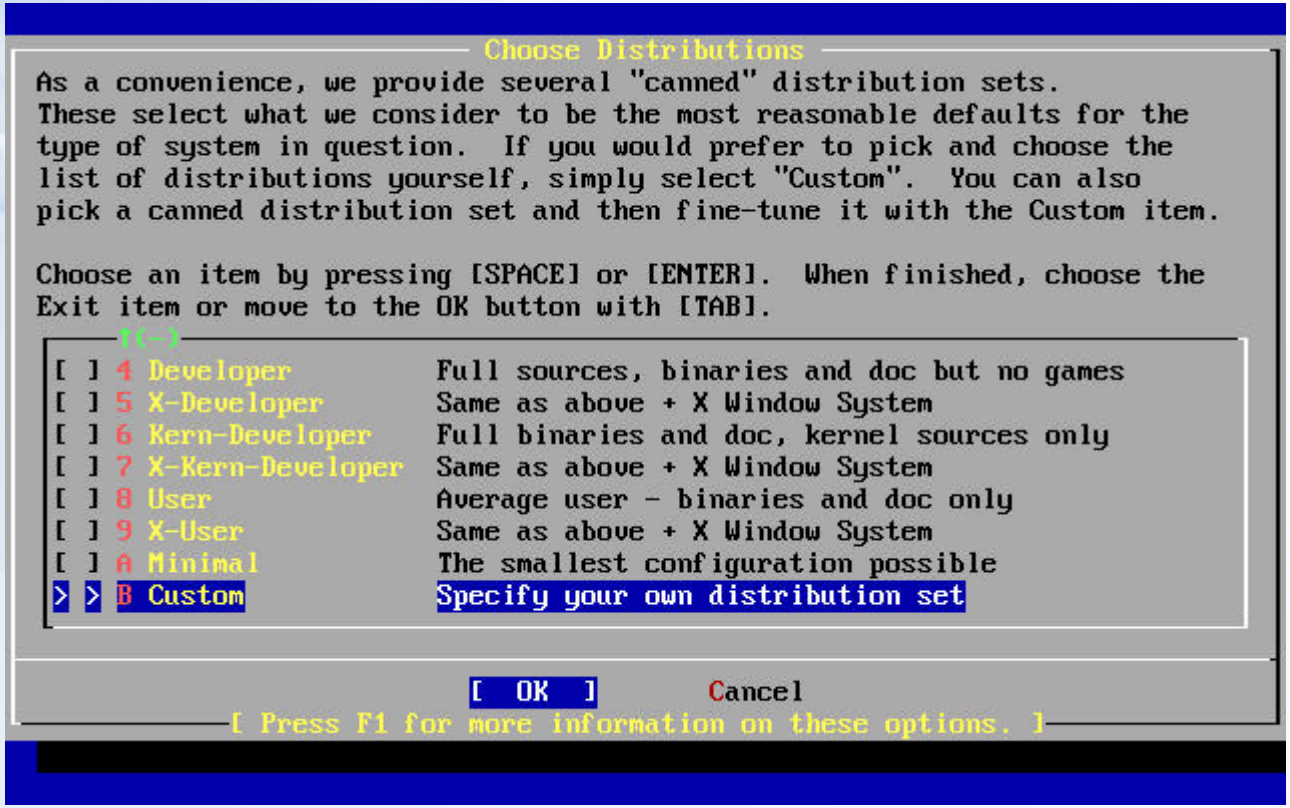
Installing FreeBSD – 6. Custom Installation – Label (3)

- Complete disklabel



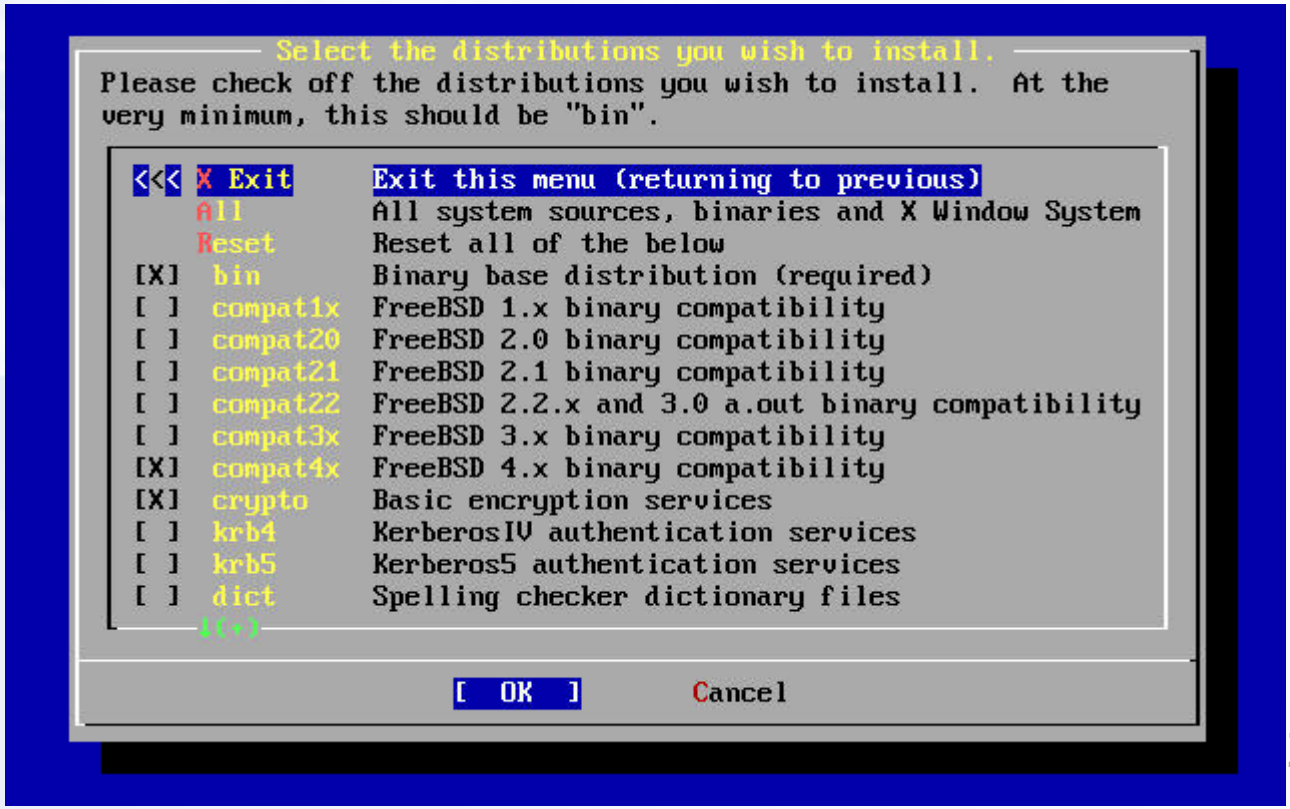
Installing FreeBSD – 6. Custom Installation – distri. (1)

- Choose Distributions Menu
  - Choose “Custom”



Installing FreeBSD – 6. Custom Installation – distri. (2)

- Select
  - **bin** : binary
  - **compat4x** : 4.x binary compatibility
  - **crypto** : encryption service
  - **man**
  - **src (all)**
  - **ports**

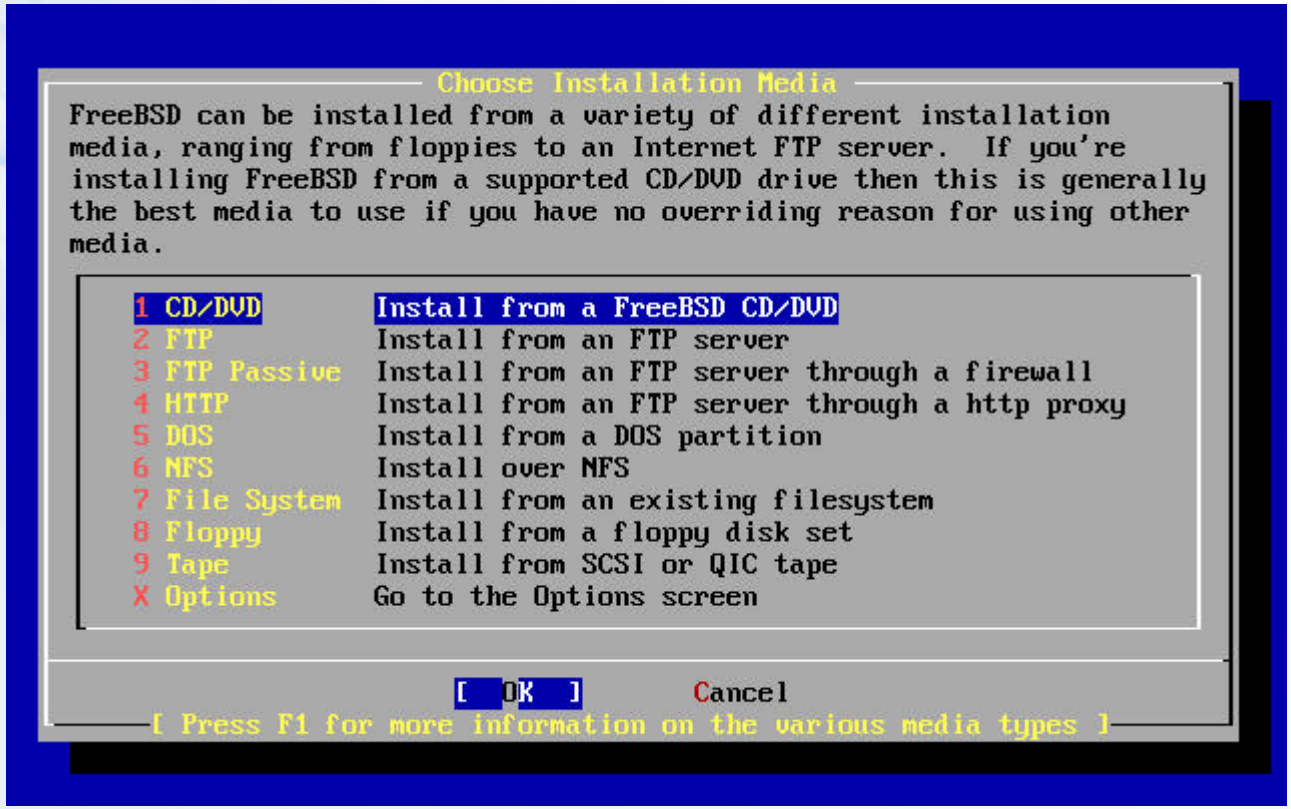


Installing FreeBSD – 6. Custom Installation – distri. (3)

- Press “OK” and it will return to “Choose Distributions menu”
- Press “OK” again to back to “Custom Installation Options menu”
- Select “Media”

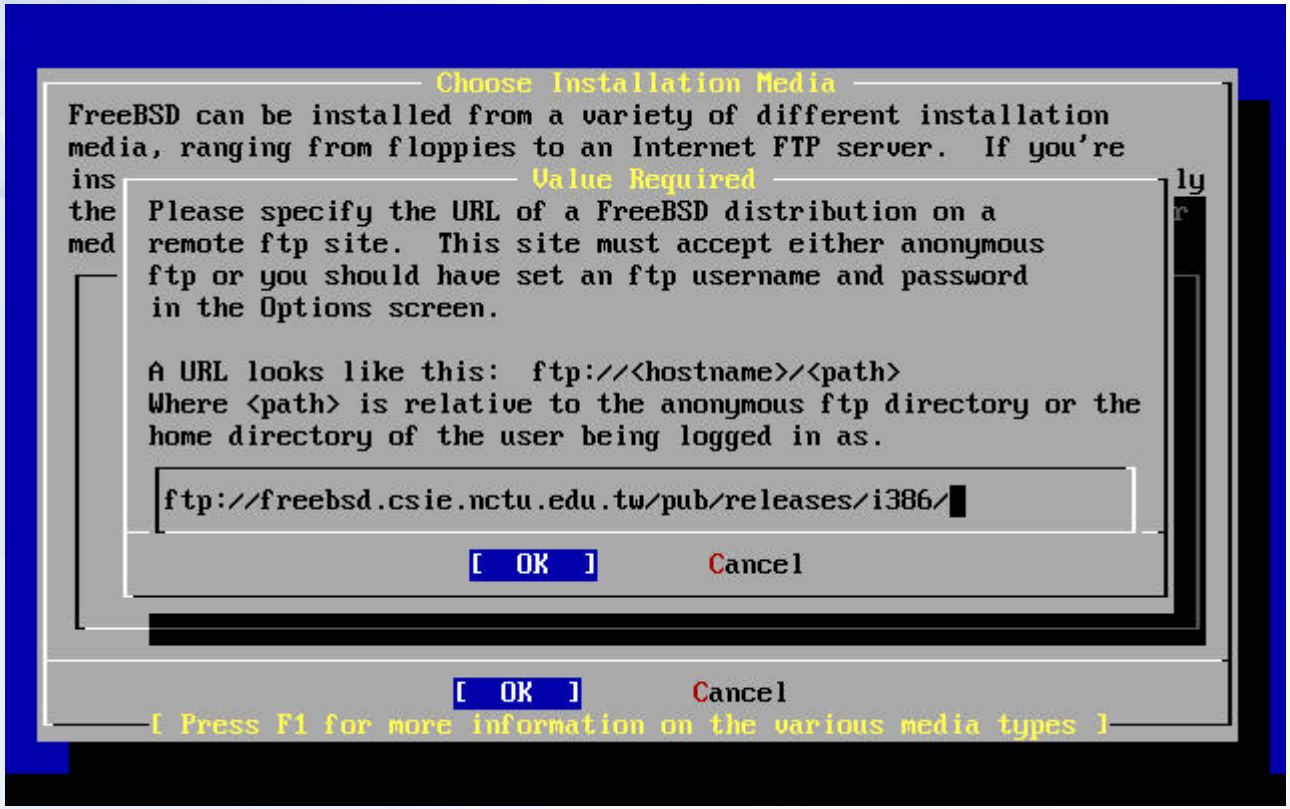
Installing FreeBSD – 6. Custom Installation – Media (1)

- Choose CD/DVD if you have 5.4 Stable CD
- Choose FTP if your NIC is detected
  - **Choose FTP Passive if you in private network**



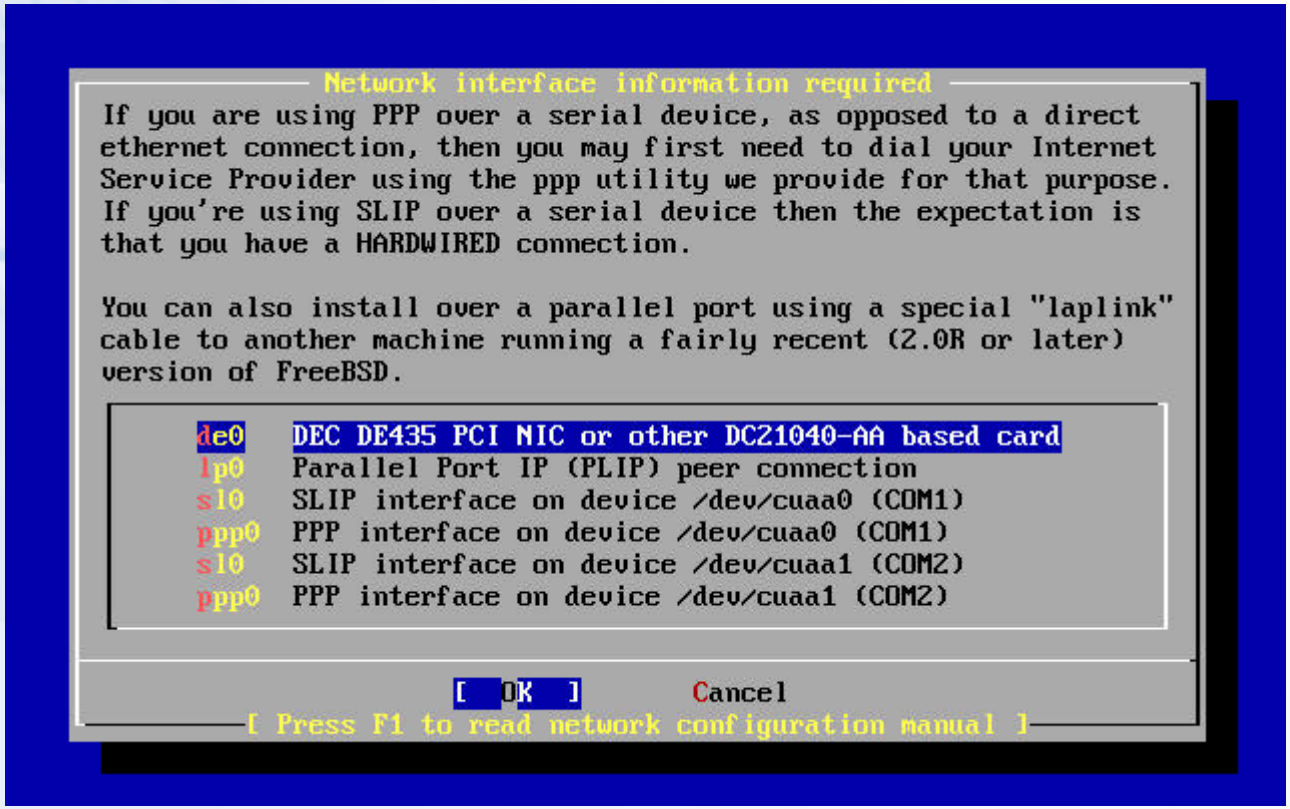
Installing FreeBSD – 6. Custom Installation – Media (2)

- Install through FTP
  - Specify ftp server and path



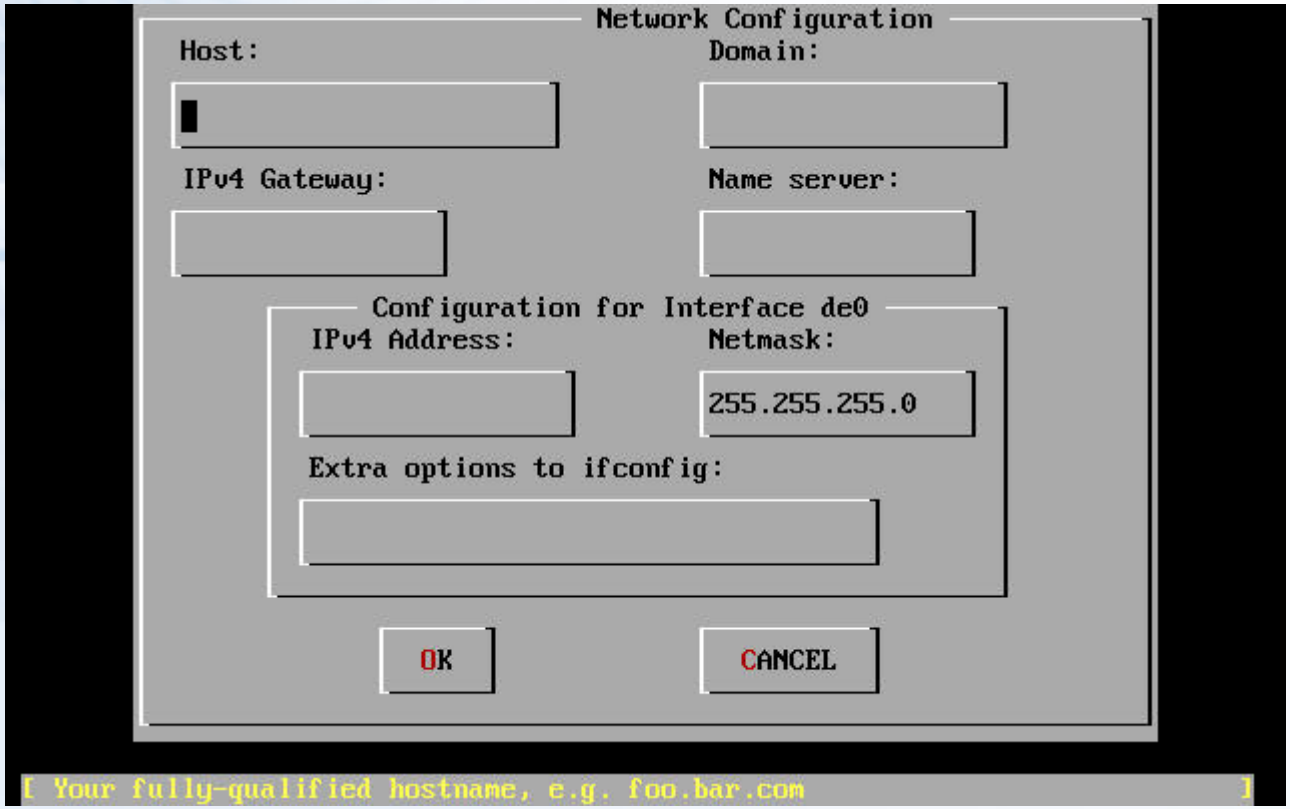
Installing FreeBSD – 6. Custom Installation – Media (3)

- Select NIC
- IPv6 and DHCP



Installing FreeBSD – 6. Custom Installation – Media (4)

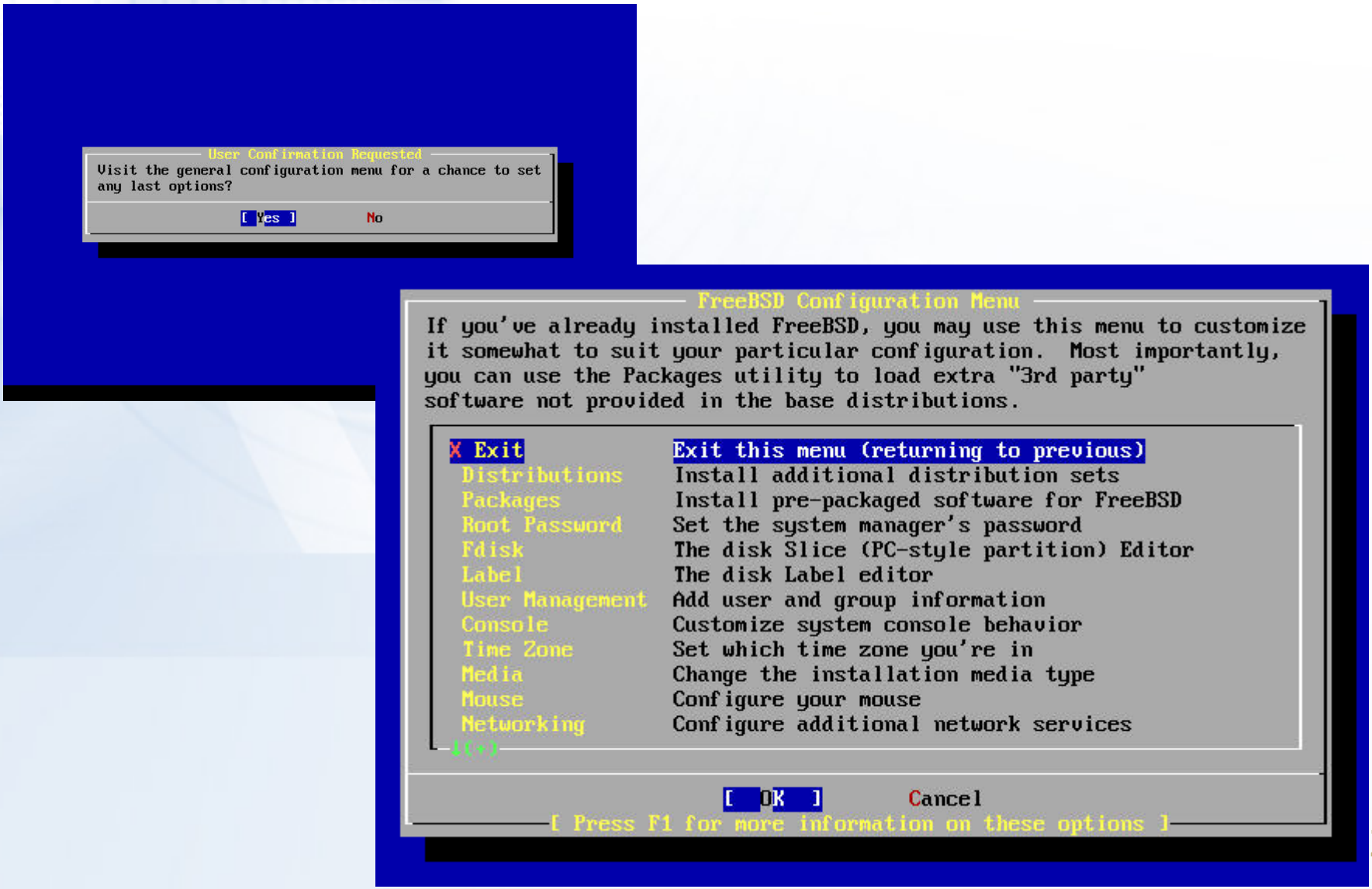
- Specify your IP information
- Press “OK” to next step



Installing FreeBSD – 6. Custom Installation – Commit

- Start to format disk、make file system and install software
- You can press “Alt + F2” to see the install detail

Installing FreeBSD – 7. Post Installation (1)



Installing FreeBSD – 7. Post Installation (2)

- Root Password
- Time Zone → Asia → Taiwan
- Mouse → enable
- Networking → sshd

Exercise 1 – FreeBSD build world and kernel

FreeBSD source

- Maintained in a CVS repository in California
- We can use CVSup keep our system up-to-date with any FreeBSD mirror sites
  - Install CVSup
  - Edit CVSup supfile
  - Update source using CVSup
  - Make world to build the updated source

CVSup – CVSup Installation

- Install via pkg_add
  - Package is pre-compiled application
  - % pkg_add ftp://freebsd.csie.nctu.edu.tw/pub/CVSup/cvsup-16.1e.tgz
  - **pkg_add** package-name
  - **pkg_delete** package-name
  - **pkg_info** package-name
  - All installed package is stored in /var/db/pkg
- The cvsup binary is in /usr/local/bin/cvsup
  - You can use “whereis” command to find something

CVSup – CVSup Configuration file (1)

- Example cvsup supfile
  - /usr/share/examples/cvsup/stable-supfile
  - /usr/share/examples/cvsup/ports-supfile
- Create your own supfile
  - Edit /usr/local/etc/cvsup-src
  - Edit /usr/local/etc/cvsup-ports

CVSup – CVSup Configuration file (2)

/usr/local/etc/cvsup-src

```
*default host=freebsd.csie.nctu.edu.tw
*default base=/usr
*default prefix=/usr
*default delete use-rel-suffix
*default release=cvs tag=RELENG_5
src-all
```

Where to get source
Where to put status file
Where to put source
Allow cvs to delete

CVSup – CVSup Configuration file (3)

- CVS tags
  - Branch Tags
    - **.** **(FreeBSD-CURRENT line)**
    - **RELENG_6** **(FreeBSD 6-STABLE line)**
    - **RELENG_5** **(FreeBSD 5-STABLE line)**
  - Release Tags
    - **RELENG_5_4_0_RELEASE**
    - **RELENG_5_3_0_RELEASE**
    - **RELENG_5_2_1_RELEASE**
    - **RELENG_4_11_0_RELEASE**
    - **RELEGN_4_10_0_RELEASE**

http://www.freebsd.org/doc/en_US.ISO8859-1/books/handbook/cvs-tags.html

CVSup – CVSup Configuration file (4)

/usr/local/etc/cvsup-ports

```
*default host=freebsd.csie.nctu.edu.tw
*default base=/usr
*default prefix=/usr
*default delete use-rel-suffix
*default release=cvs tag=.
ports-all
```

CVSup – CVSup Configuration file (5)

Or you can put them all together /usr/local/etc/cvsup-all

```
*default host=freebsd.csie.nctu.edu.tw
*default base=/usr
*default prefix=/usr
*default delete use-rel-suffix
*default release=cvs tag=RELENG_4
src-all
ports-all tag=.
```

CVSup – update source using CVSup

- Update both src and ports
  - % /usr/local/bin/cvsup -g -L 1 /usr/local/etc/cvsup-all > /var/log/cvsup.log

---

The "–g" tells cvsup not to use its GUI
The "–L 1" tells cvsup to print out the details of all the file updates it is doing. from 0 (silent) to 2

It will run about 10 minutes
P4 1.8G 1GB Ram 100MB NIC

Rebuilding world

- The canonical way to update system
  - make buildworld
  - make buildkernel
  - make installkernel
  - reboot and boot in single user mode
  - make installworld
  - mergemaster
  - reboot

Rebuilding world – Prepare make.conf

- Example make.conf
  - /etc/defaults/make.conf 4.x
  - /usr/share/examples/etc/make.conf 5.x
- Everything add in make.conf is used every time you run make
  - KERNCONF=TYBSD

Rebuilding world – make buildworld

- Build FreeBSD entire system
  - % cd /usr/src
  - % make –j3 buildworld >& /var/log/world.log &

Spawn multiple (n) processes to do make.
The compiling processes of make world is I/O bound.

It will run about 30 minutes
P4 1.8G 1GB Ram 100MB NIC

Rebuilding world – make buildkernel (1)

- Why rebuild kernel?
  - Fast boot time.
    - **Probe necessary device**
  - Lower memory usage
    - **Smaller kernel image**
  - Additional hardware support.

Rebuilding world – make buildkernel (2)

- Edit kernel config file
  - cd /usr/src/sys/i386/conf
    - **GENERIC may not have all for your system**
    - **LINT has every options**
  - cp GENERIC "YOUR-NAME"
    - **We often use hostname to be "YOUR-NAME"**
  - edit config file
    - **Depend on your system**
    - **Be attention to related options**
    - **Following the explanation of http://www.freebsd.org/doc/en_US.ISO8859-1/books/handbook/kernelconfig-config.html**

Rebuilding world – make buildkernel (3)

- Build kernel
  - % cd /usr/src
  - % make KERNCONF=TYBSD buildkernel

It will run about 5 minutes depend on your configuration
P4 1.8G 1GB Ram 100MB NIC

Rebuilding world – make installkernel

- Install kernel
  - % cd /usr/src
  - % make KERNCONF=TYBSD installkernel

Rebuilding world – reboot in single user mode

- Boot in single user mode
  - Hit any key other than “enter” when counting down
  - Type “boot –s”

  Or

  - % shutdown now
    - **For a running system, this will drop it to single user mode**

Rebuilding world – make installworld

- Install the built world
  - % make installworld

Rebuilding world – mergemaster

- mergemaster
  - Synchronize /usr/src/etc with /etc
  - Choose “i” for most case, such as
    - **/etc/defaults/rc.conf, …**
  - Press “enter” for certain file, such as
    - **master.passwd, hosts, csh.***

Reboot

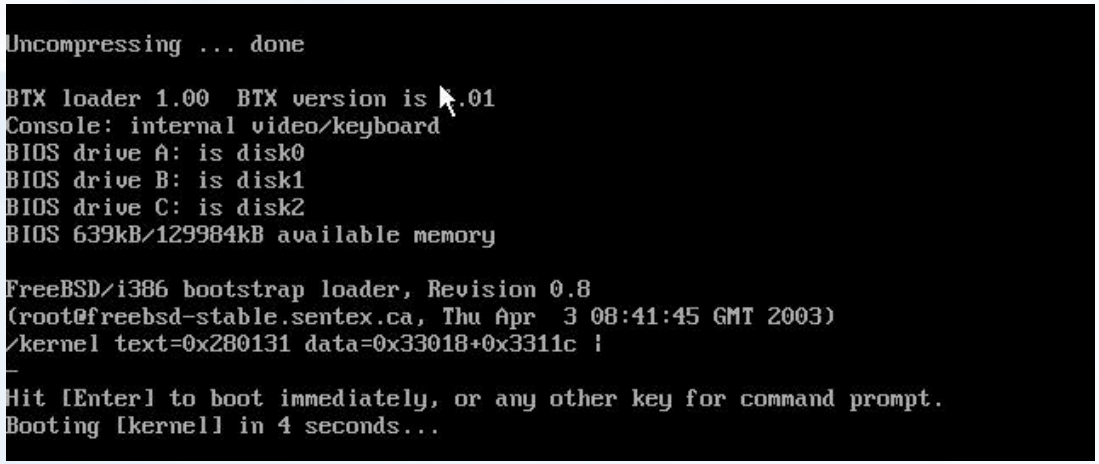
- Reboot and enjoy it
  - % reboot

If Something Goes Wrong … (1)

- Possible errors in building new kernel
  - Configuration file
    - **% cd /usr/src/sys/i386/conf/**
    - **% config TYBSD**
  - make fail
  - Install fail
  - Kernel does not boot
    - **Boot with old kernel, recompile kernel**
  - Kernel works, but ps does not work
    - **Build world**

If Something Goes Wrong … (2)

- Boot with old kernel
  - In 5.x
    - **Press "4"**
    - **Type "boot /boot/kernel.old/kernel**
  - In 4.x
    - **Hit any key other than "enter" when counting down**
    - **Type "unload"**
    - **Type "load /kernel.old"**
    - **Type "boot"**



If Something Goes Wrong … (3)

- Move working kernel to /boot/kernel
  - % mv /boot/kernel.old/kernel /boot/kernel
- For versions of FreeBSD prior to 5.x
  - Unlock kernel
    - **% chflags noschg /kernel**
    - **% cp kernel.old kernel**
    - **% sync;sync; reboot**
  - Lock kernel
    - **% chflags schg /kernel**
- Use ls –lo to check similar file

---

schg → set the immutable (永遠不變的) flag
ls –o → include file flags in long output

Install software

- Ports
  - cd /usr/ports, make search, make install clean
- Package
  - Pre-built ports
  - pkg_add, pkg_delete, pkg_info
- Source
  - Tar ball
  - tar xzvf certain-source.tar.gz
  - ./configure
  - make; make install

How to use ports

> Steps of install software using ports

(1) Figure out the path to the software

- % cd /usr/ports
- % make search key=mutt
- % cd /usr/ports/chinese/mutt

(2) Fetch and compile the source

- % make install

> Uninstall

- % make deinstall

How to use ports (1)

- Try to install some software, such as:
  - vim
  - mutt
  - wget