Homework #01
FreeBSD Installation

Announce: 20080930
Due: 20081007

FreeBSD Branches/Tags

- Three parallel development branches:
  - -RELEASE
    - Latest Release version:
      - **7.0 February 2008, 6.3 January 2008**
      - http://www.freebsd.org/releases/
  - -STABLE: Tested new features and bug fixes
    - ABI-compatibility
    - MFC: Merge From Current
  - -CURRENT: Working space for FreeBSD developers
    - Current version:
      - **8.0-CURRENT**
      - http://www.freebsd.org/releng/

FreeBSD version

- FreeBSD-A.B.C-Type
  - A: major version Number
  - B: minor version Number
  - C: slight patch version number
  - Type: version type
    - PRELEASE
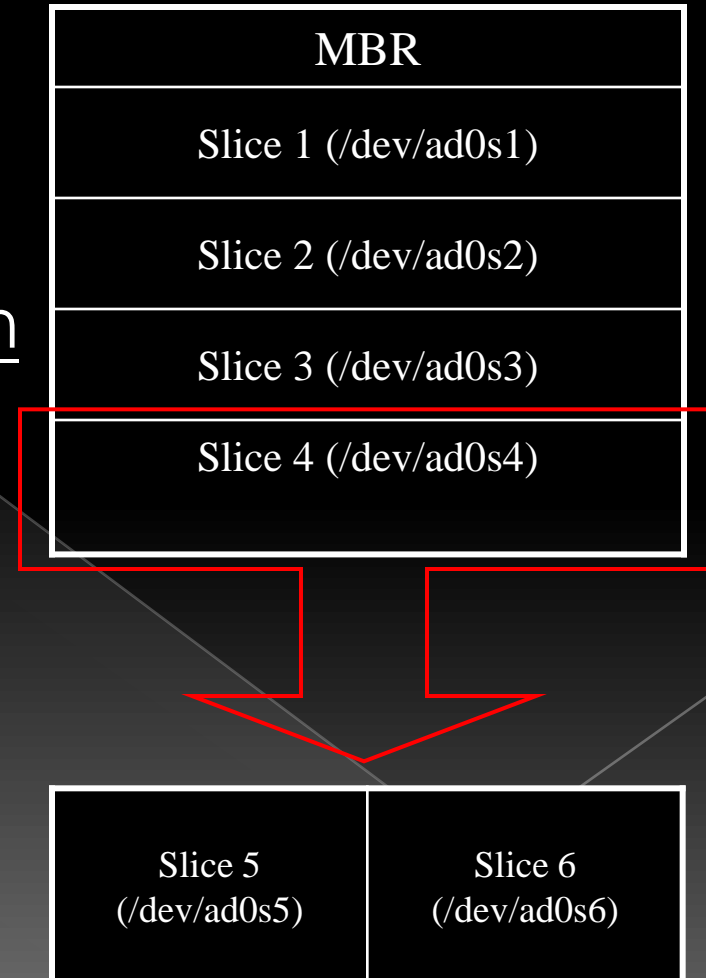   - BETA
    - RC
    - RELEASE
    - STABLE
    - CURRENT

Choosing the FreeBSD Version That Is Right For You:
http://www.freebsd.org/doc/en/articles/version-guide/index.html

FreeBSD view of Disk (1)
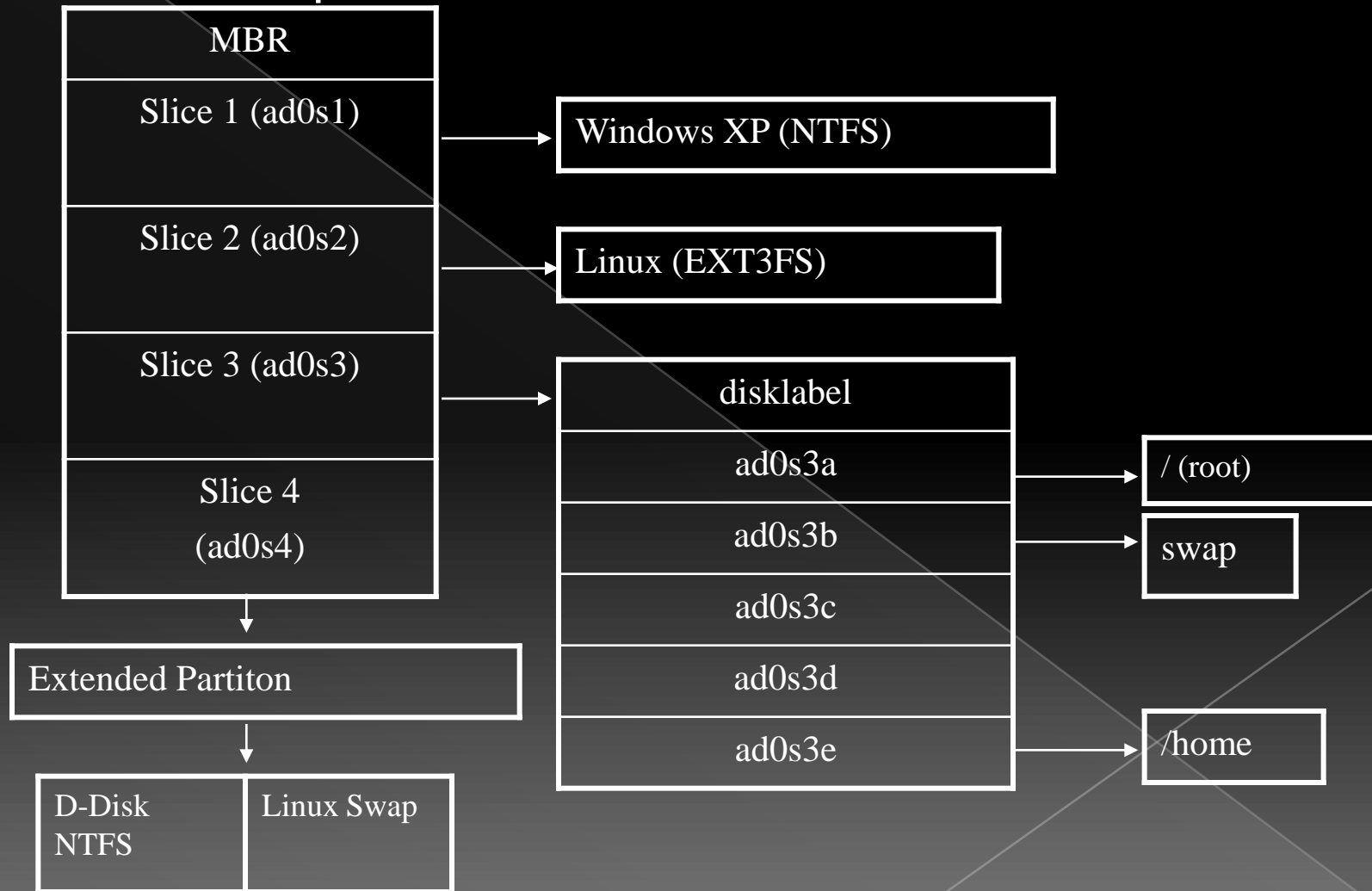
- The meaning of **ad0s1e**
  - › Disk name
    - IDE: ad
    - SCSI: da
  - › Slice is equal to the <u>partition</u> of common use
    - Primary partition: s1 ~ s4
    - Extended partition: s5 ~ *sn*
  - › Label in each slice
    - a: root partition
    - b: swap
    - c: entire disk
    - d: entire partition
    - efgh: /usr, /home, ...

MBR
Slice 1 (/dev/ad0s1)
Slice 2 (/dev/ad0s2)
Slice 3 (/dev/ad0s3)
Slice 4 (/dev/ad0s4)

Slice 5 (/dev/ad0s5)	Slice 6 (/dev/ad0s6)

FreeBSD view of Disk (2)

- An Example

MBR	
Slice 1 (ad0s1)	→ Windows XP (NTFS)
Slice 2 (ad0s2)	→ Linux (EXT3FS)
Slice 3 (ad0s3)	→ disklabel
Slice 4 (ad0s4)	

disklabel table:

disklabel	
ad0s3a	→ / (root)
ad0s3b	→ swap
ad0s3c	
ad0s3d	
ad0s3e	→ /home

Extended Partiton

D-Disk NTFS	Linux Swap

Installing FreeBSD

◉ Steps
1. Knowing your hardware
2. Obtaining installation file
3. Booting from CD
4. sysinstall main menu
5. Custom Installation Options
   1. Partition
   2. Label
   3. Distribution
   4. Media
   5. Commit
6. Post Installation configurations

Installing FreeBSD –
1. knowing your hardware

- CPU
  - 32bit or 64bit
  - Architecture: alpha, amd64, i386, ia64, pc98, powerpc, sparc64
- 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.cs.nctu.edu.tw/pub/ISO-IMAGES-i386/7.0/7.0-RELEASE-i386-bootonly.iso
  - ftp://freebsd.cs.nctu.edu.tw/pub/ISO-IMAGES-i386/7.0/7.0-RELEASE-i386-disc1.iso
  - Burn CD or USB!
- Unofficial snapshot
  - http://pub.allbsd.org/FreeBSD-snapshots/

Handbook!

- Chapter 2 Installing FreeBSD
  - http://www.freebsd.org/doc/en/books/handbook/install.html
- Chinese resources
  - http://freebsddoc.twbbs.org
  - https://opensvn.csie.org/traccgi/freebsddoc

Booting

```
ata0 master: QEMU HARDDISK ATA-7 Hard-Disk (  64 GBytes)
ata1 master: QEMU DVD-ROM ATAPI-4 CD-Rom/DVD-Rom

Press F12 for boot menu.

Booting from CD-Rom...
509MB medium detected
CD Loader 1.2

Building the boot loader arguments
Looking up /BOOT/LOADER... Found
Relocating the loader and the BTX
Starting the BTX loader

BTX loader 1.00  BTX version is 1.01
Consoles: internal video/keyboard
BIOS CD is cd0
BIOS drive C: is disk0
BIOS 639kB/261056kB available memory

FreeBSD/i386 bootstrap loader, Revision 1.1
(root@logan.cse.buffalo.edu, Sun Feb 24 16:31:36 UTC 2008)
Loading /boot/defaults/loader.conf
/boot/kernel/kernel text=0x6fd45c -_
```

Booting…

- Just press Enter
- "loader prompt": some custom/special settings
  Ex: loading modules, loader tunables

```
        Welcome to FreeBSD!

1. Boot FreeBSD [default]
2. Boot FreeBSD with ACPI disabled
3. Boot FreeBSD in Safe Mode
4. Boot FreeBSD in single user mode
5. Boot FreeBSD with verbose logging
6. Escape to loader prompt
7. Reboot



Select option, [Enter] for default
or [Space] to pause timer  10
```

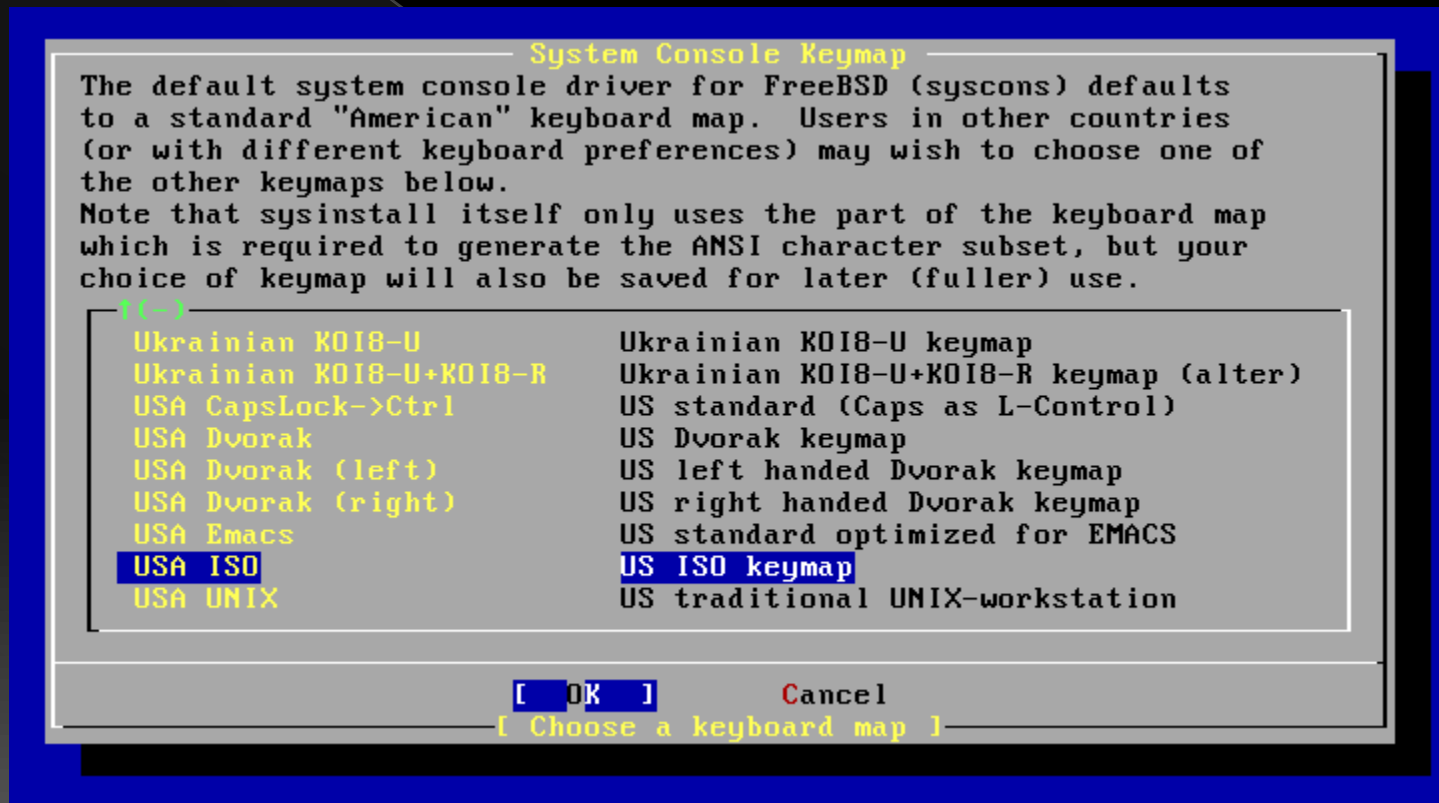# Country Selection

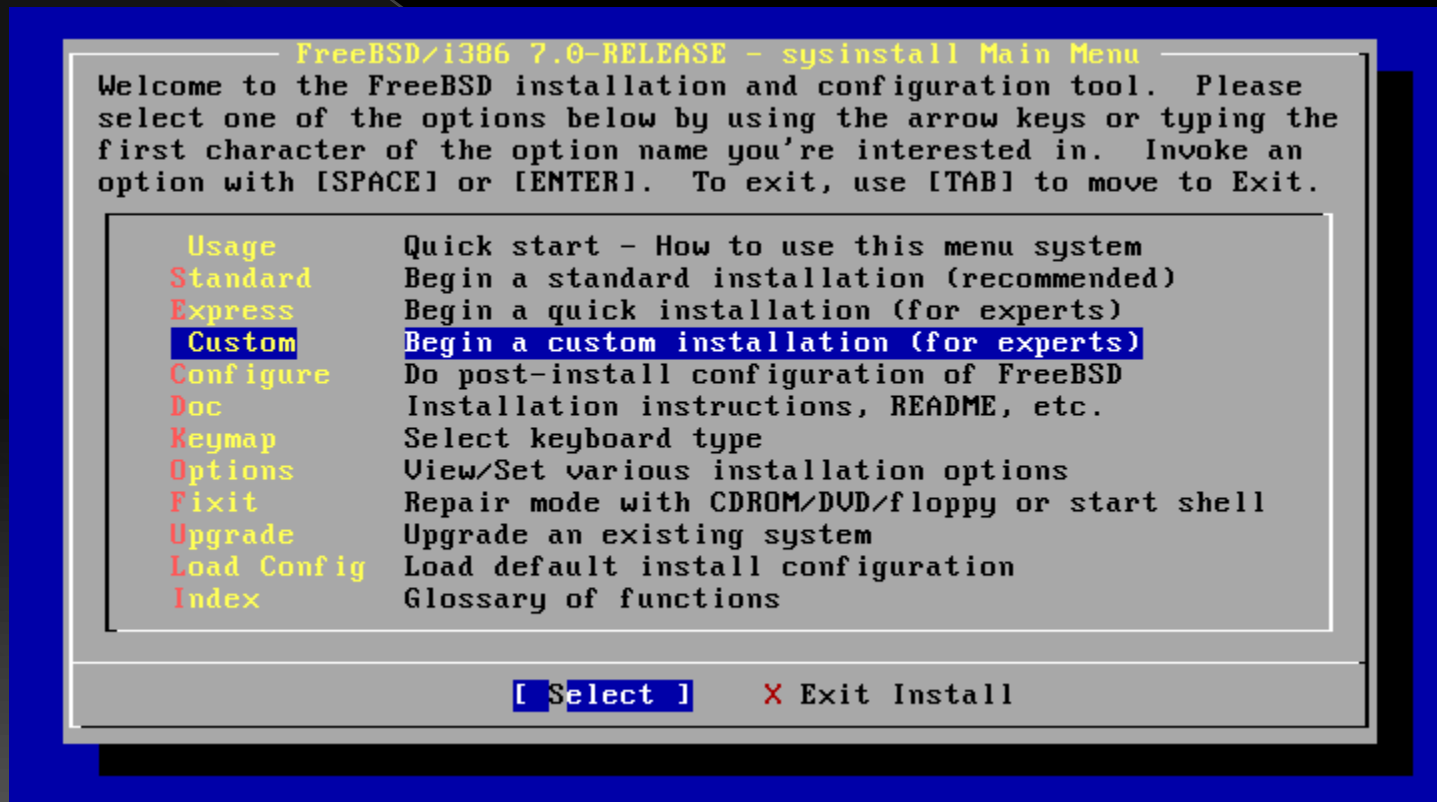Just use default or…

Country - Taiwan

This is loving Taiwan!

Keymap

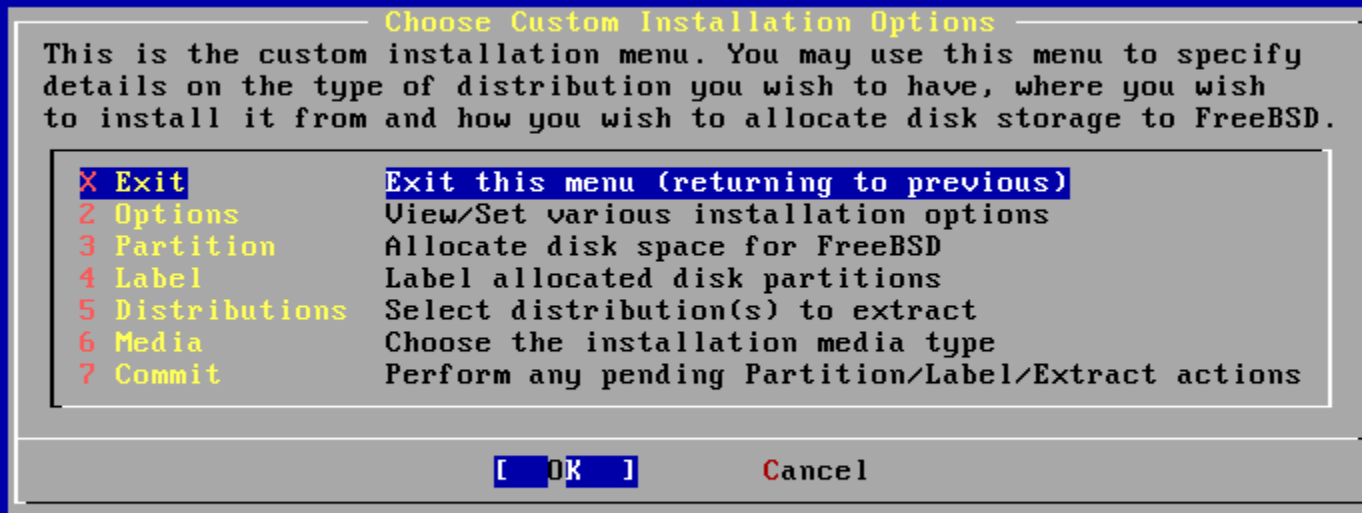Use USA ISO keymap because we don't have our keyboard layout…

Sysinstall Main Menu

Being experts!


```
┌──────── FreeBSD/i386 7.0-RELEASE - sysinstall Main Menu ────────┐
│ Welcome to the FreeBSD installation and configuration tool.  Please │
│ select one of the options below by using the arrow keys or typing the │
│ first character of the option name you're interested in.  Invoke an │
│ option with [SPACE] or [ENTER].  To exit, use [TAB] to move to Exit. │
│ ┌──────────────────────────────────────────────────────────┐ │
│ │     Usage        Quick start - How to use this menu system    │ │
│ │     Standard     Begin a standard installation (recommended)  │ │
│ │     Express      Begin a quick installation (for experts)     │ │
│ │     Custom       Begin a custom installation (for experts)    │ │
│ │     Configure    Do post-install configuration of FreeBSD     │ │
│ │     Doc          Installation instructions, README, etc.      │ │
│ │     Keymap       Select keyboard type                         │ │
│ │     Options      View/Set various installation options        │ │
│ │     Fixit        Repair mode with CDROM/DVD/floppy or start shell │ │
│ │     Upgrade      Upgrade an existing system                   │ │
│ │     Load Config  Load default install configuration           │ │
│ │     Index        Glossary of functions                        │ │
│ └──────────────────────────────────────────────────────────┘ │
│                                                                  │
│              [ Select ]      X Exit Install                       │
└──────────────────────────────────────────────────────────────┘
```

Custom Installation

- Installation variables
- Partition your disk
- Label your disk
- What to install
- How to install
- Do it!

```
┌──────────── Choose Custom Installation Options ────────────┐
│ This is the custom installation menu. You may use this menu to specify │
│ details on the type of distribution you wish to have, where you wish │
│ to install it from and how you wish to allocate disk storage to FreeBSD. │
│                                                                        │
│  ┌────────────────────────────────────────────────────────────────┐ │
│  │ X Exit          Exit this menu (returning to previous)           │ │
│  │ 2 Options       View/Set various installation options            │ │
│  │ 3 Partition     Allocate disk space for FreeBSD                   │ │
│  │ 4 Label         Label allocated disk partitions                  │ │
│  │ 5 Distributions Select distribution(s) to extract                │ │
│  │ 6 Media         Choose the installation media type               │ │
│  │ 7 Commit        Perform any pending Partition/Label/Extract actions │ │
│  └────────────────────────────────────────────────────────────────┘ │
│                                                                        │
│              [  OK  ]          Cancel                                   │
└────────────────────────────────────────────────────────────────────────┘
```

Options

• Sometimes you can change "Release Name"

```
Options Editor

Name            Value             Name              Value
----            -----             ----              -----

NFS Secure      NO                Install Root      /
NFS Slow        NO                Browser package   links
NFS TCP         NO                Browser Exec      /usr/local/bin/links
NFS version 3   YES               Media Type        <not yet set>
Debugging       NO                Media Timeout     300
No Warnings     NO                Package Temp      /var/tmp
Yes to All      NO                Newfs Args        -b 16384 -f 2048
DHCP            NO                Fixit Console     standard
IPv6            NO                Re-scan Devices   <*>
Skip PCCARD     NO                Use Defaults      [RESET!]
FTP username    ftp
Editor          /usr/bin/ee
Tape Blocksize  20
Extract Detail  high
Release Name    7.0-RELEASE

Use SPACE to select/toggle an option, arrow keys to move,
? or F1 for more help.  When you're done, type Q to Quit.

NFS server talks only on a secure port
```

Partition

- C = Create
- D = Delete
- W = Write
- Q = Finish

```
Disk name:         ad0                           FDISK Partition Editor
DISK Geometry:   8354 cyls/255 heads/63 sectors = 134207010 sectors (65530MB)

Offset        Size(ST)        End        Name  PType      Desc  Subtype    Flags

       0   134217728   134217727          -     12      unused        0




The following commands are supported (in upper or lower case):

A = Use Entire Disk    G = set Drive Geometry   C = Create Slice   F = `DD' mode
D = Delete Slice       Z = Toggle Size Units    S = Set Bootable   | = Wizard m.
T = Change Type        U = Undo All Changes     Q = Finish


Use F1 or ? to get more help, arrow keys to select.
```
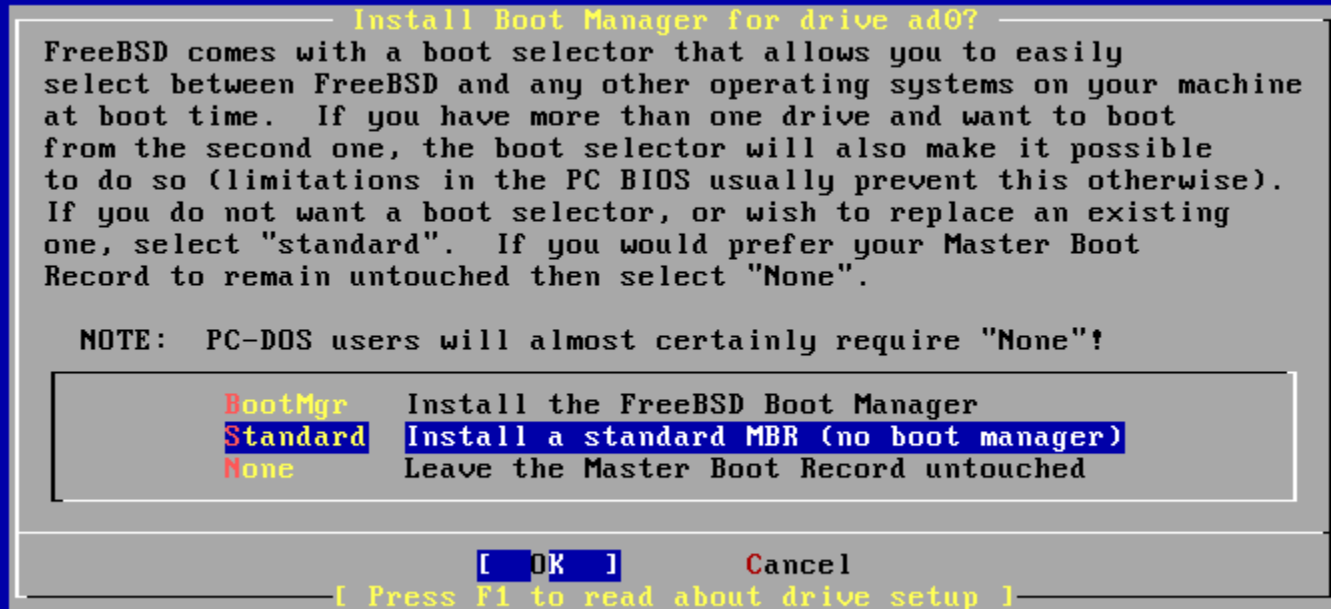
Partition

Size of the partition
Default value: entire free space

```
Disk name:        ad0                          FDISK Partition Editor
DISK Geometry:  8354 cyls/255 heads/63 sectors = 134207010 sectors (65530MB)

Offset        Size(ST)         End        Name  PType        Desc  Subtype      Flags

      0    134217728   134217727           -      12       unused          0

                        ┌──────── Value Required ────────┐
                        │ Please specify the size for new FreeBSD slice in blocks │
                        │ or append a trailing `M' for megabytes (e.g. 20M).       │
                        │                                                          │
                        │  134217728█                                             │
The follow              │                                                          │
                        │            [  OK  ]         Cancel                       │
                        └──────────────────────────────────────────────────────────┘
A = Use Entire Disk    G = set Drive Geometry   C = Create Slice   F = `DD' mode
D = Delete Slice       Z = Toggle Size Units    S = Set Bootable   i = Wizard m.
T = Change Type        U = Undo All Changes      Q = Finish


Use F1 or ? to get more help, arrow keys to select.
```
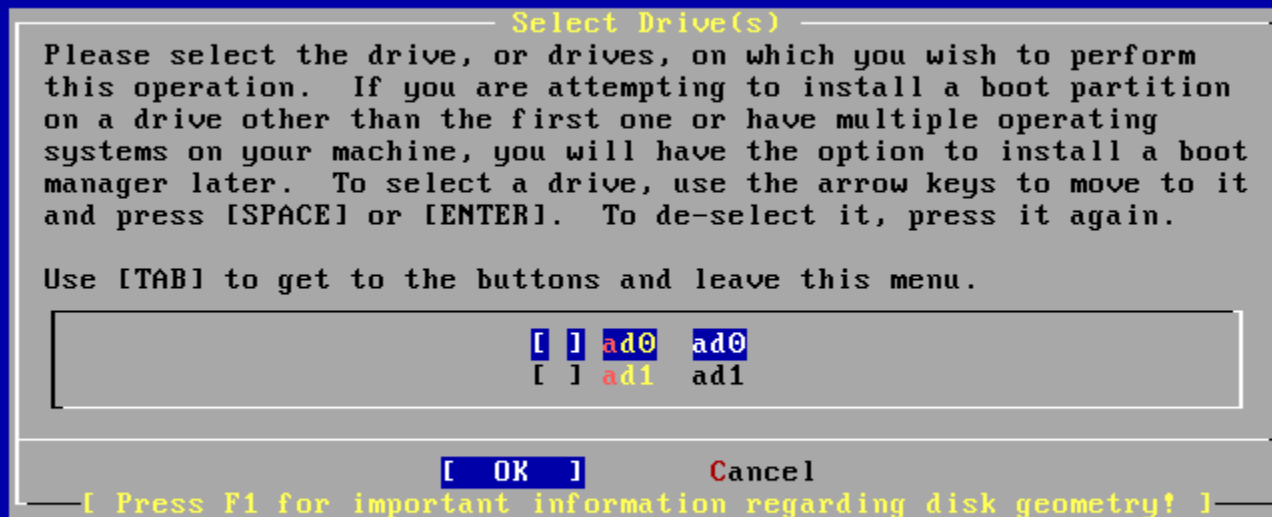
Partition

165 - FreeBSD's magic number

```
Disk name:          ad0                              FDISK Partition Editor
DISK Geometry:      8354 cyls/255 heads/63 sectors = 134207010 sectors (65530MB)

Offset          Size(ST)            End         Name  PType        Desc  Subtype      Flags
```

```
                  ┌───────────────────── Value Required ─────────────────────┐
                  │ Enter type of partition to create:                         │
                  │                                                            │
                  │ Pressing Enter will choose the default, a native FreeBSD   │
                  │ slice (type 165).  Other popular values are 6 for a        │
                  │ DOS FAT partition, 131 for a Linux ext2fs partition, or    │
                  │ 130 for a Linux swap partition.                            │
                  │                                                            │
                  │ Note:  If you choose a non-FreeBSD partition type, it will not │
                  │ be formatted or otherwise prepared, it will simply reserve space │
The fo│ for you to use another tool, such as DOS format, to later format │
                  │ and actually use the partition.                            │
A = Us│                                                            │   mode
D = De│ ┌──────────────────────────────────────────────────────┐ │   rd m.
T = Ch│ │165█                                                    │ │
                  │ └──────────────────────────────────────────────────────┘ │
                  │              [  OK  ]            Cancel                     │
                  └────────────────────────────────────────────────────────────┘
Use F1 or ? to get more help, arrow keys to select.
```

Partition

Partition hard disk as only one partition

Partition

S = Set bootable

```
Disk name:        ad0                        FDISK Partition Editor
DISK Geometry:   8354 cyls/255 heads/63 sectors = 134207010 sectors (65530MB)

Offset         Size(ST)        End      Name  PType      Desc  Subtype      Flags

        0            63         62        -     12     unused        0
       63     134206947  134207009     ad0s1      8    freebsd      165        A
134207010         10718  134217727        -     12     unused        0




The following commands are supported (in upper or lower case):

A = Use Entire Disk    G = set Drive Geometry   C = Create Slice    F = 'DD' mode
D = Delete Slice       Z = Toggle Size Units    S = Set Bootable    ! = Wizard m.
T = Change Type        U = Undo All Changes     Q = Finish


Use F1 or ? to get more help, arrow keys to select.
```

Partition - Boot Manager

- BootMgr - install a simple boot manager to disk MBR
- Standard - write to disk MBR
- None - leave it unchanged

Partition - More than 1 HDs

Be aware which disk is your right target!

Label

- C = Create
- D = Delete
- Q = Finish


```
            FreeBSD Disklabel Editor
Disk: ad0       Partition name: ad0s1   Free: 134206947 blocks (65530MB)

Part        Mount           Size Newfs  Part      Mount           Size Newfs
----        -----           ---- -----  ----      -----           ---- -----




The following commands are valid here (upper or lower case):
C = Create          D = Delete   M = Mount pt.
N = Newfs Opts      Q = Finish   S = Toggle SoftUpdates   Z = Custom Newfs
T = Toggle Newfs    U = Undo     A = Auto Defaults         R = Delete+Merge

Use F1 or ? to get more help, arrow keys to select.
```

Label

Allocation space for swap:
typically is 2x~2.5x of your memory size.
But this is not the absolute rule!

```
              FreeBSD Disklabel Editor
Disk: ad0      Partition name: ad0s1   Free: 134206947 blocks (65530MB)

Part        Mount           Size Newfs  Part        Mount           Size Newfs
____        _____           ____ _____  ____        _____           ____ _____

                            Value Required
       Please specify the partition size in blocks or append a trailing G for
       gigabytes, M for megabytes, or C for cylinders.
       134206947 blocks (65530MB) are free.

       1G█

                         [  OK  ]        Cancel

The following commands are valid here (upper or lower case):
C = Create       D = Delete     M = Mount pt.
N = Newfs Opts   Q = Finish     S = Toggle SoftUpdates    Z = Custom Newfs
T = Toggle Newfs U = Undo       A = Auto Defaults          R = Delete+Merge

Use F1 or ? to get more help, arrow keys to select.
```

Label

Setting which label is used for swap
Swap spaces can be distributed on different disks
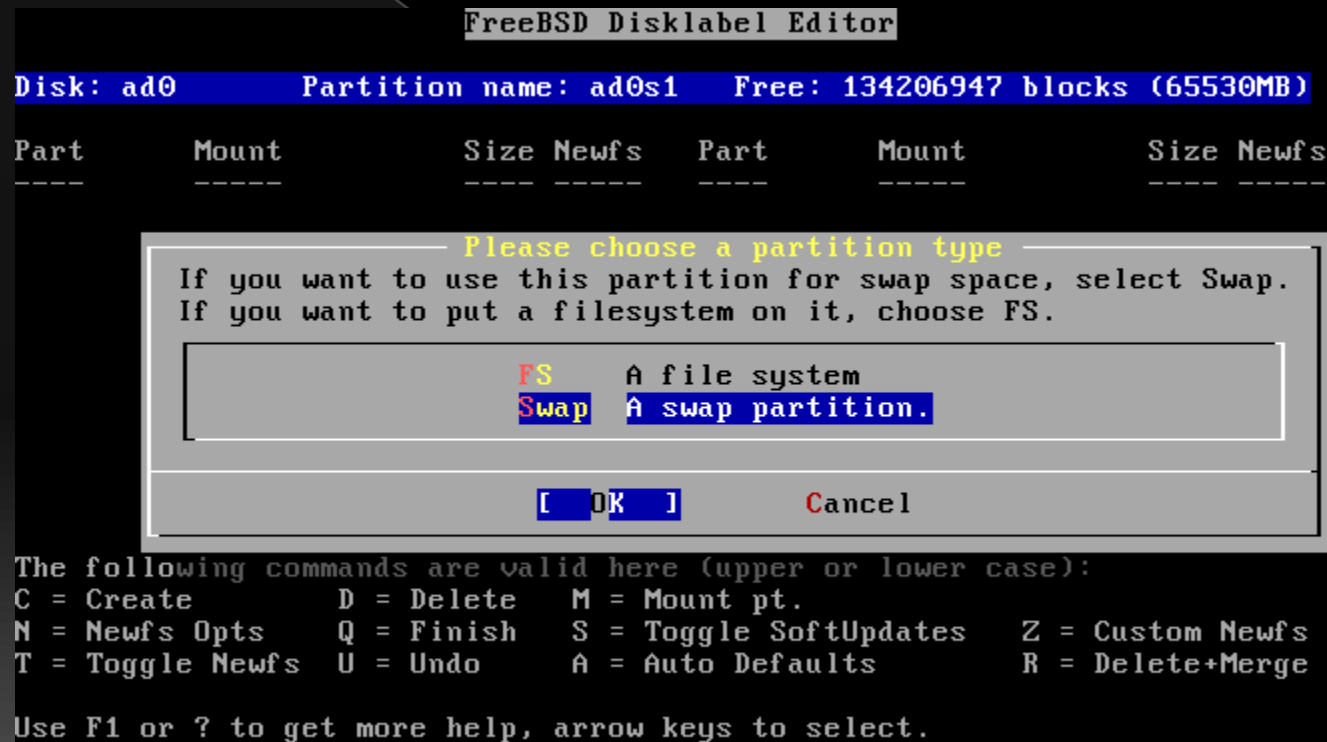
Label

Default is all that remained…

Label

File system type, for data storage
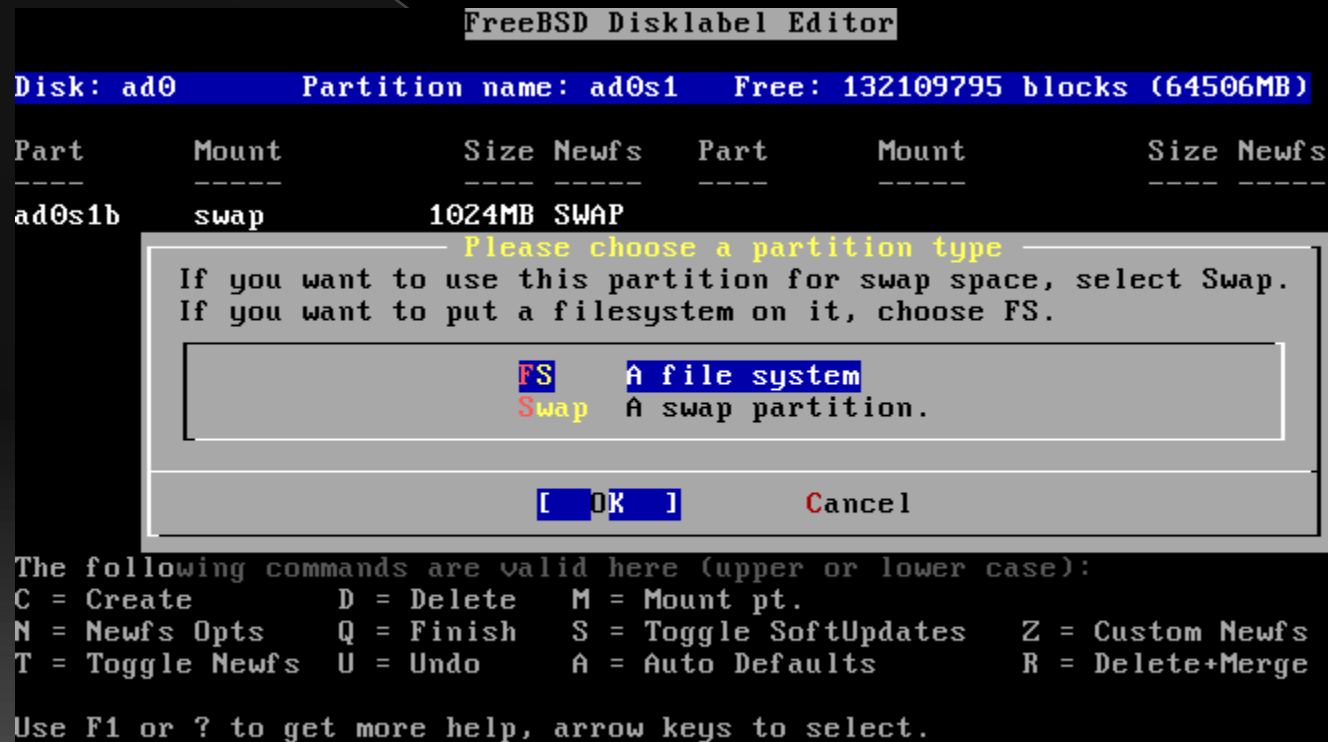
Label

Setting mount point
For learning '/' is enough.
(Not so good for practical using,
unless all other things are on other machines)

```
                    FreeBSD Disklabel Editor
Disk: ad0          Partition name: ad0s1   Free: 132109795 blocks (64506MB)

Part          Mount          Size Newfs    Part       Mount          Size Newfs
----          -----          ---- -----    ----       -----          ---- -----
ad0s1b        swap         1024MB SWAP

                  ------------- Value Required -------------
                  |  Please specify a mount point for the partition  |
                  |                                                   |
                  |  |/█                                            | |
                  |                                                   |
                  |        [  OK  ]          Cancel                   |
                  -----------------------------------------------------

The following commands are valid here (upper or lower case):
C = Create         D = Delete     M = Mount pt.
N = Newfs Opts     Q = Finish     S = Toggle SoftUpdates    Z = Custom Newfs
T = Toggle Newfs   U = Undo       A = Auto Defaults          R = Delete+Merge

Use F1 or ? to get more help, arrow keys to select.
```

Label

Then we have two labels for meet minimal requirement

Label

S = Toggle SoftUpdates (something like journaling)
http://en.wikipedia.org/wiki/Soft_updates
http://www.mckusick.com/softdep/

```
               FreeBSD Disklabel Editor

Disk: ad0        Partition name: ad0s1    Free: 0 blocks (0MB)

Part        Mount          Size Newfs   Part      Mount          Size Newfs
----        -----          ---- -----   ----      -----          ---- -----
ad0s1b      swap          1024MB SWAP
ad0s1a      /            64506MB UFS2+S Y




The following commands are valid here (upper or lower case):
C = Create          D = Delete    M = Mount pt.
N = Newfs Opts      Q = Finish    S = Toggle SoftUpdates    Z = Custom Newfs
T = Toggle Newfs    U = Undo      A = Auto Defaults          R = Delete+Merge

Use F1 or ? to get more help, arrow keys to select.
```

Distributions


```
                       Choose Distributions
 As a convenience, we provide several "canned" distribution sets.
 These select what we consider to be the most reasonable defaults for the
 type of system in question.  If you would prefer to pick and choose the
 list of distributions yourself, simply select "Custom".  You can also
 pick a canned distribution set and then fine-tune it with the Custom item.

 Choose an item by pressing [SPACE] or [ENTER].  When finished, choose the
 Exit item or move to the OK button with [TAB].

   ↑(-)
   [ ]  4 Developer          Full sources, binaries and doc but no games
   [ ]  5 X-Developer        Same as above + X Window System
   [ ]  6 Kern-Developer     Full binaries and doc, kernel sources only
   [ ]  7 X-Kern-Developer   Same as above + X Window System
   [ ]  8 User               Average user - binaries and doc only
   [ ]  9 X-User             Same as above + X Window System
   [ ]  A Minimal            The smallest configuration possible
 > >  B Custom              Specify your own distribution set


                         [  OK  ]        Cancel
                 [ Press F1 for more information on these options. ]
```

Distributions

Minimum: base and kernel
Also be good: src and ports
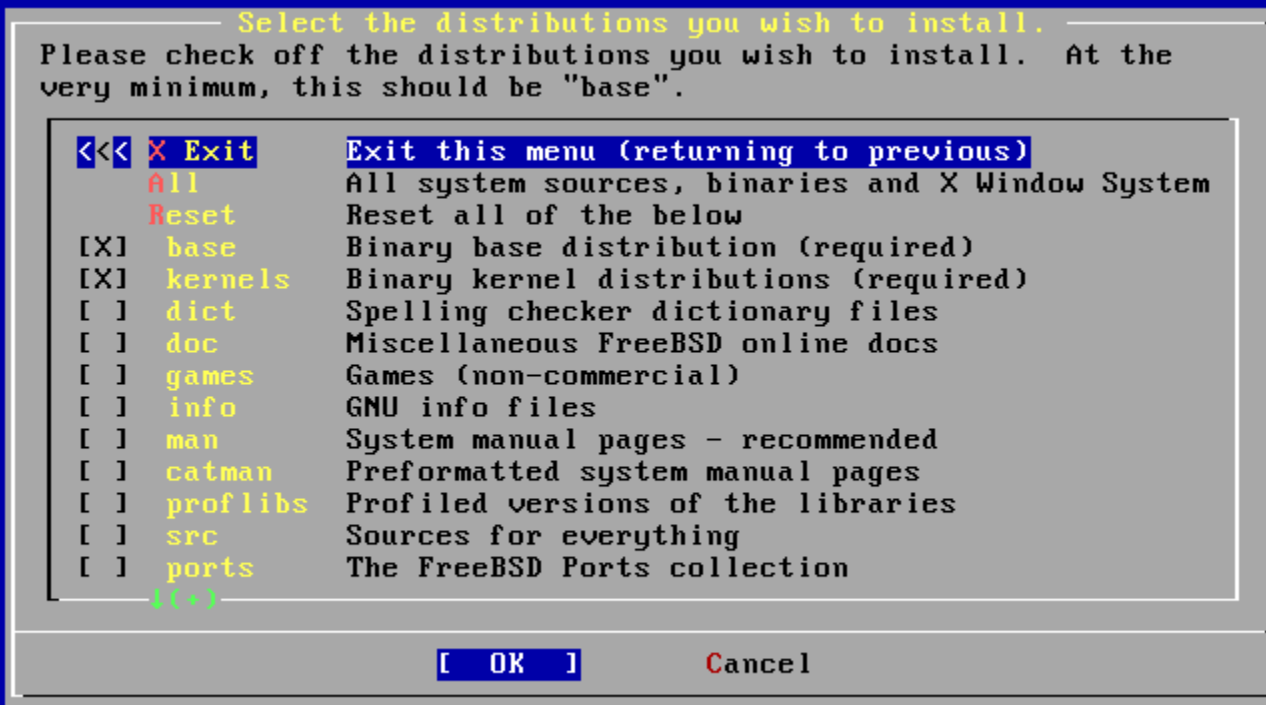
Distributions - kernel
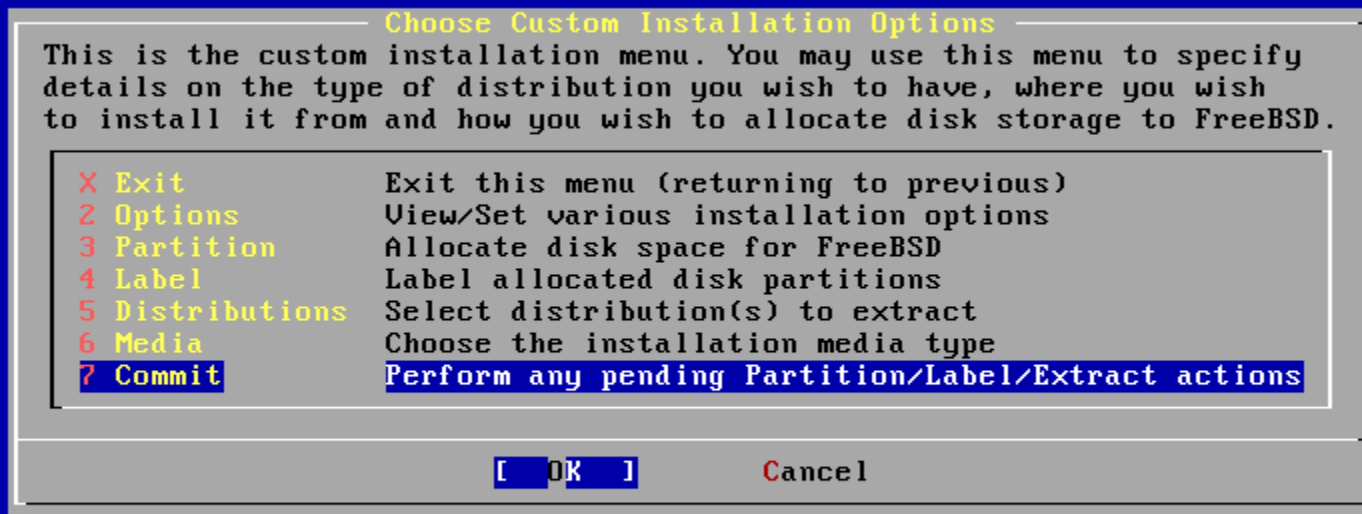
- SMP

Media - CD/DVD

Media - FTP

- Passive Mode:
  Server opens the port and let client to connect to.
  (recommended)
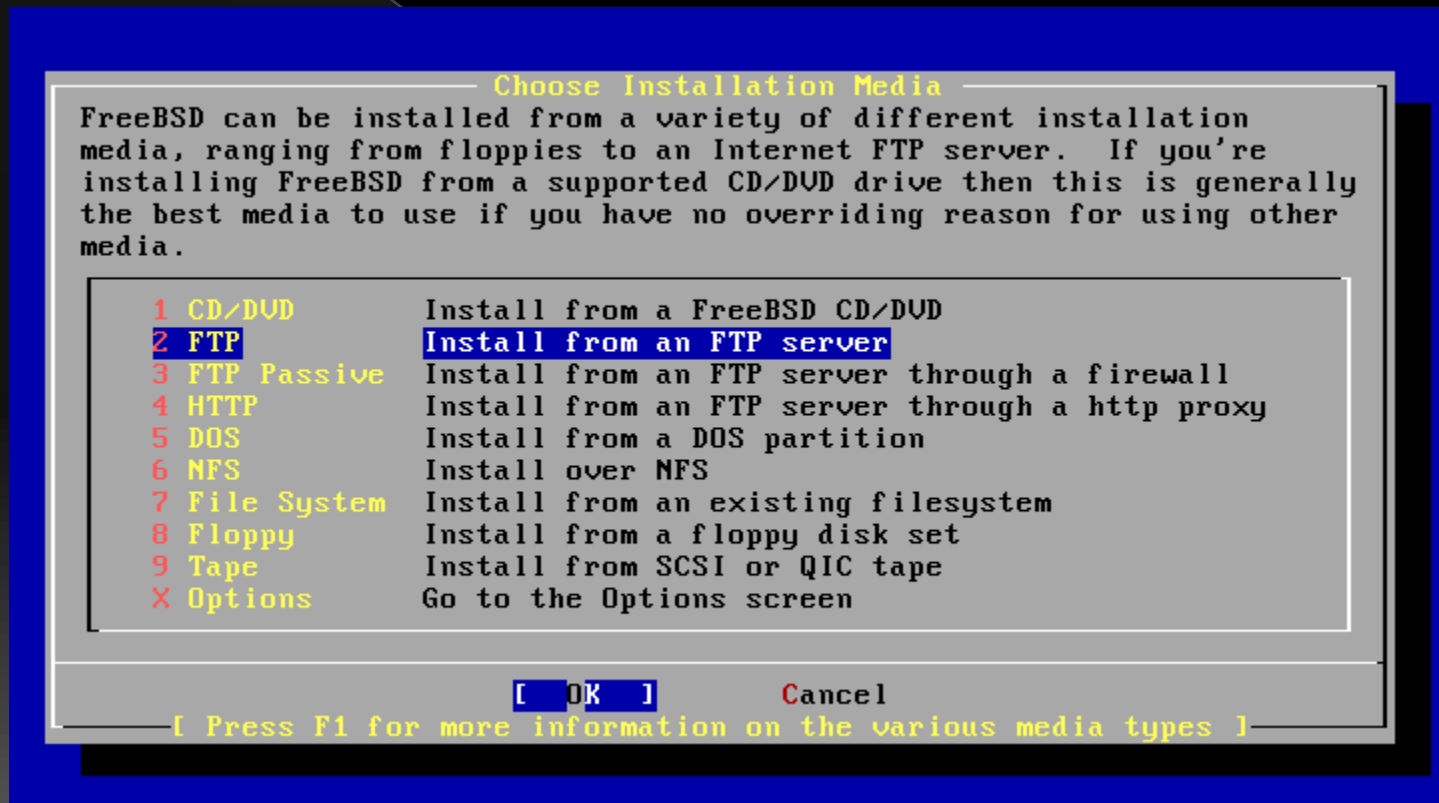
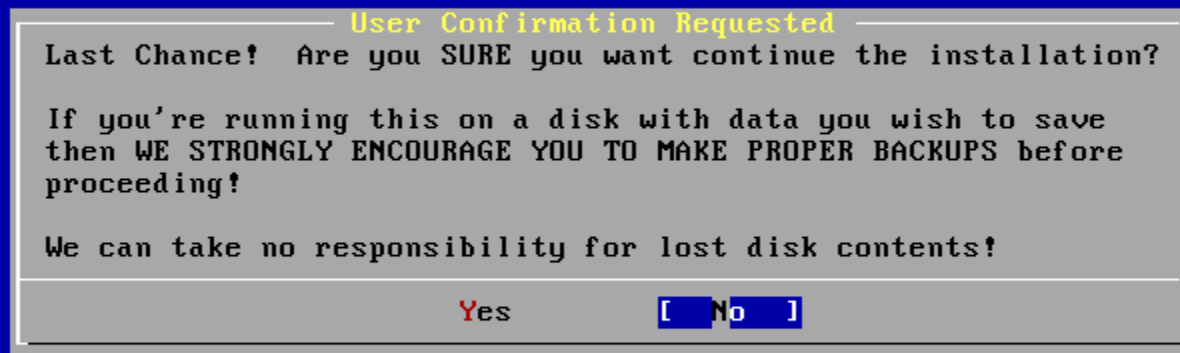# Commit

Just do it!

Last Chance!

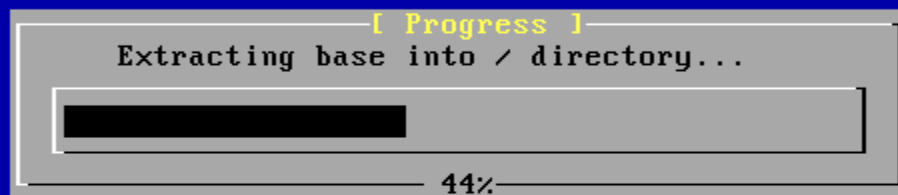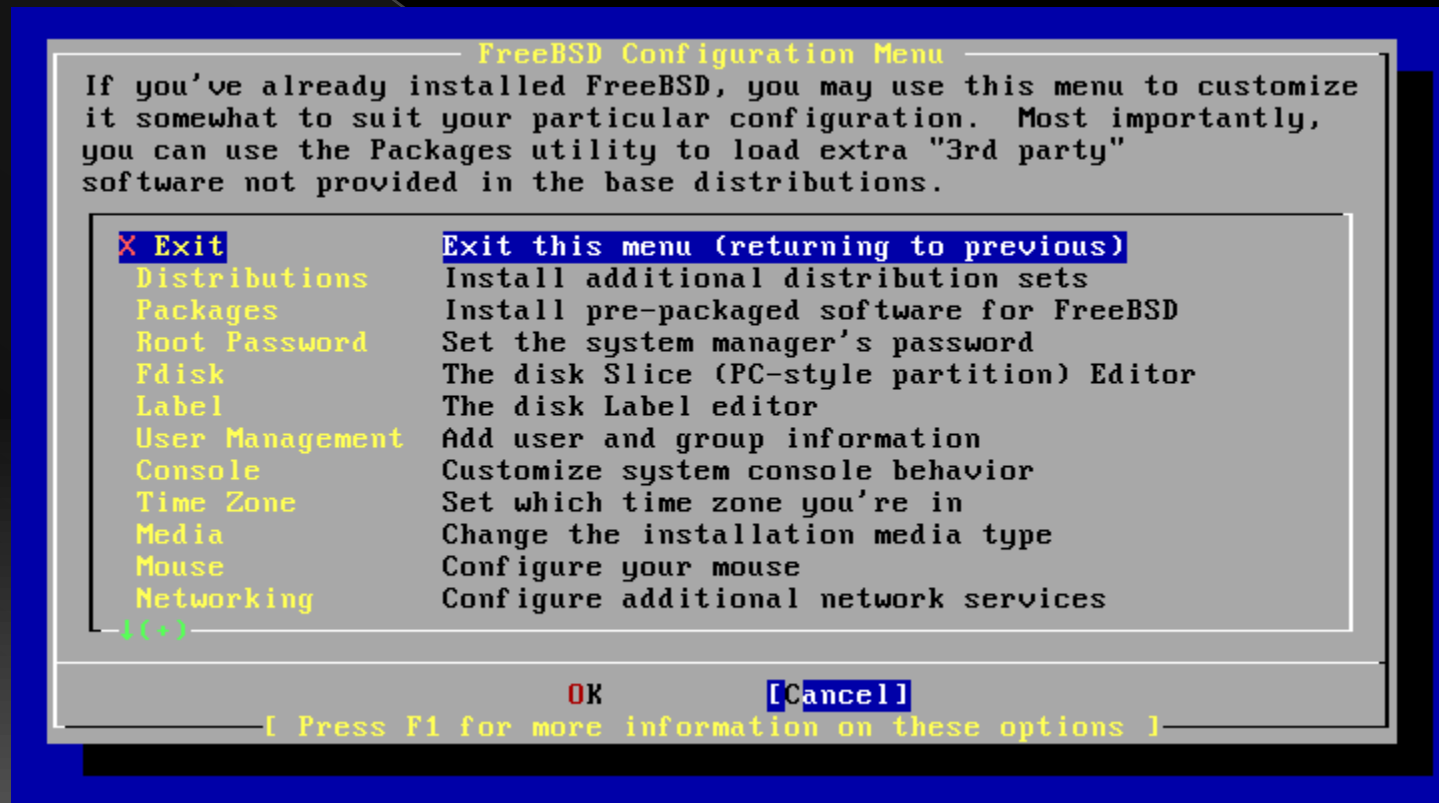We can take no responsibility for lost disk contents!
Don't forget backup!

Installing…

Configuration

- Root Password
- User Management
- Time Zone
- Networking


```
                    FreeBSD Configuration Menu
If you've already installed FreeBSD, you may use this menu to customize
it somewhat to suit your particular configuration.  Most importantly,
you can use the Packages utility to load extra "3rd party"
software not provided in the base distributions.

X Exit              Exit this menu (returning to previous)
  Distributions     Install additional distribution sets
  Packages          Install pre-packaged software for FreeBSD
  Root Password     Set the system manager's password
  Fdisk             The disk Slice (PC-style partition) Editor
  Label             The disk Label editor
  User Management   Add user and group information
  Console           Customize system console behavior
  Time Zone         Set which time zone you're in
  Media             Change the installation media type
  Mouse             Configure your mouse
  Networking        Configure additional network services
  ↓(+)

                OK              [Cancel]
         [ Press F1 for more information on these options ]
```

Root Password

Or your computer will be cracked barely by hitting one [Enter]
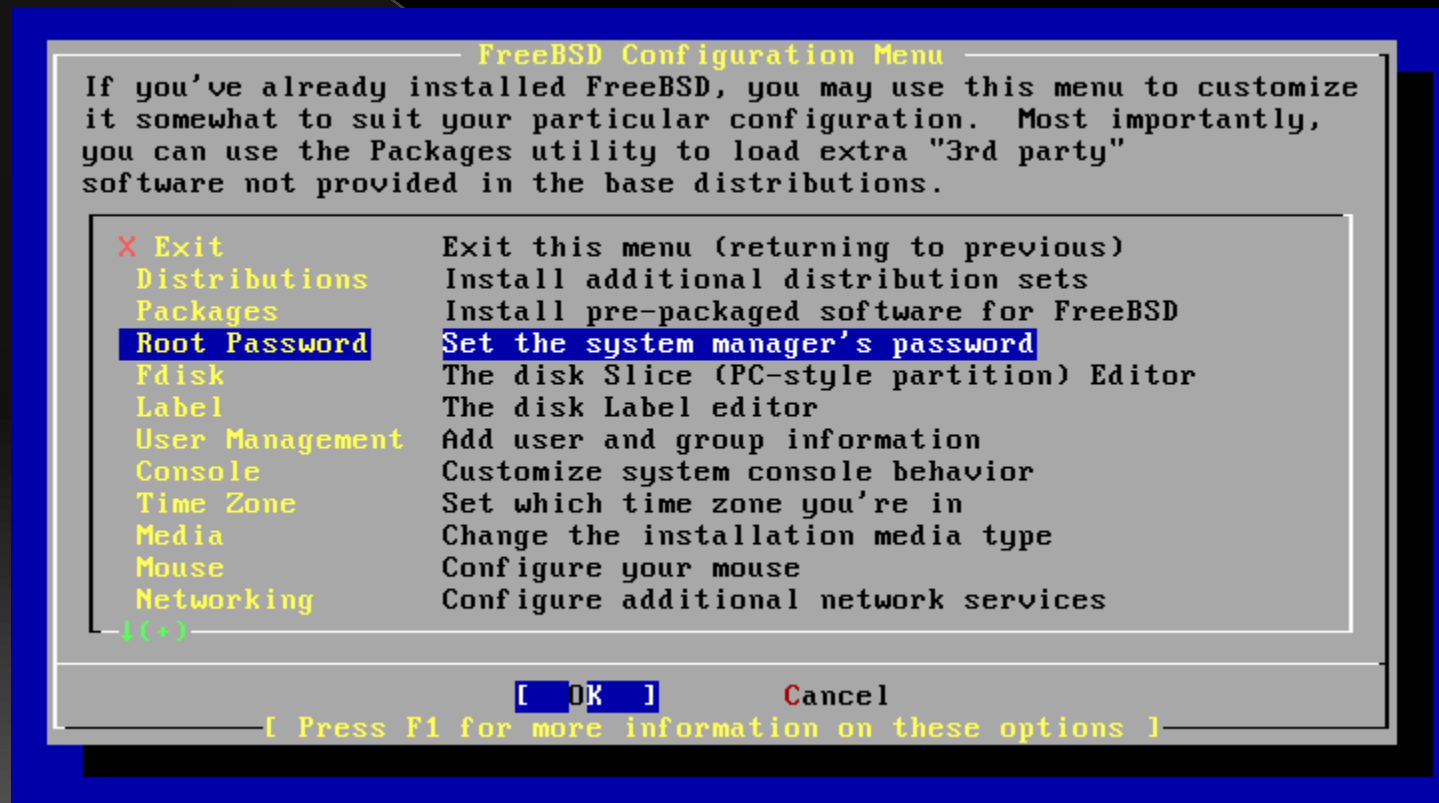
User Management

Create a user different than root for remote login

User Management

For administration user, "staff" is a good group.
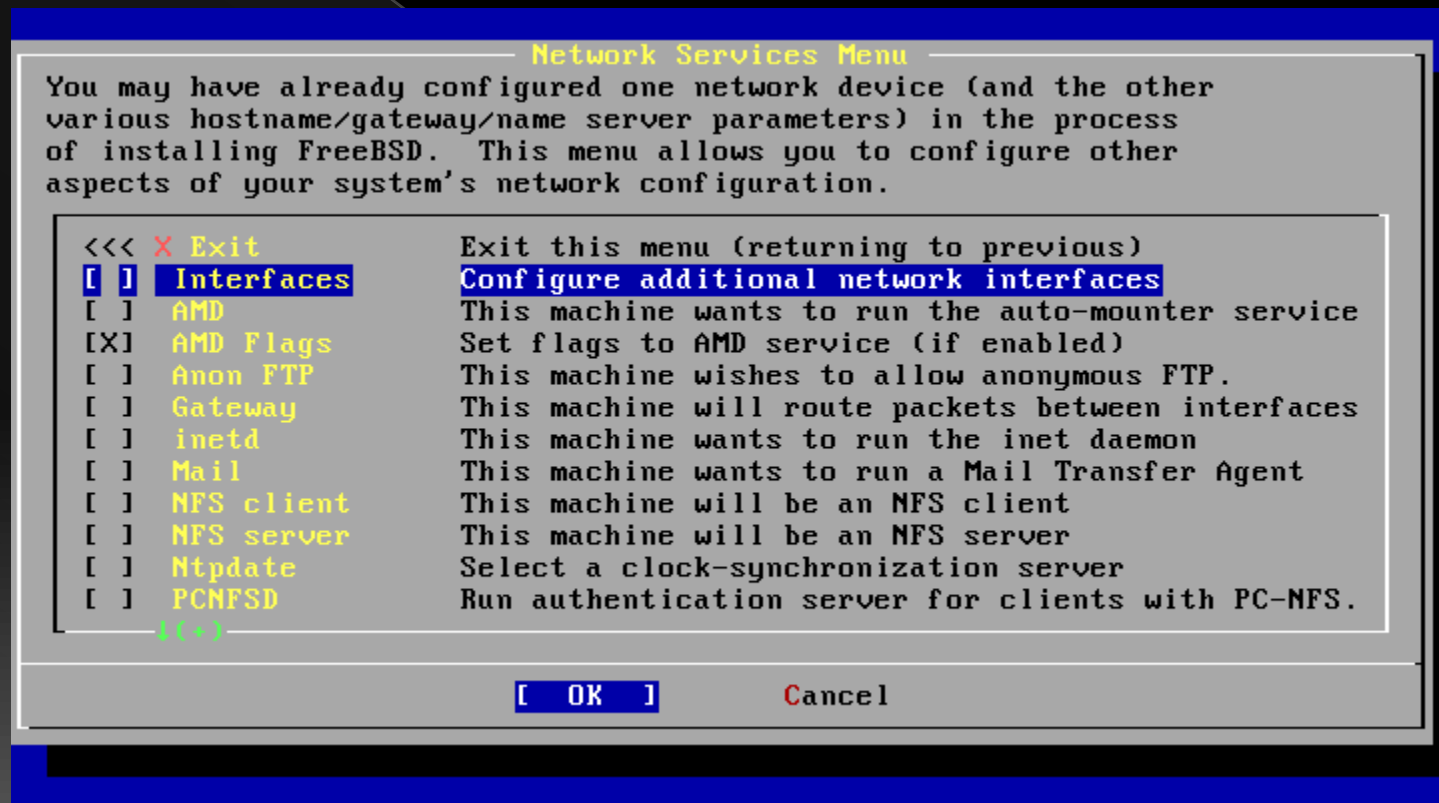If you want to become root, be sure you are in "wheel" group.

Time Zone

- Asia -> Taiwan
- Is BIOS time UTC? No.
- CST? Yes.

Network Services

- Interface
- sshd

Network Services - Interface

- DHCP?
- IPv6?

Network Services - sshd

Open a way for remote login

Done!

```
        FreeBSD/i386 7.0-RELEASE - sysinstall Main Menu
Welcome to the FreeBSD installation and configuration tool.  Please
select one of the options below by using the arrow keys or typing the
first character of the option name you're interested in.  Invoke an
option with [SPACE] or [ENTER].  To exit, use [TAB] to move to Exit.

    Usage          Quick start - How to use this menu system
    Standard       Begin a standard installation (recommended)
    Express        Begin a quick installation (for experts)
    Custom         Begin a custom installation (for experts)
    Configure      Do post-install configuration of FreeBSD
    Doc            Installation instructions, README, etc.
    Keymap         Select keyboard type
    Options        View/Set various installation options
    Fixit          Repair mode with CDROM/DVD/floppy or start shell
    Upgrade        Upgrade an existing system
    Load Config    Load default install configuration
    Index          Glossary of functions


              Select        [X Exit Install]
```
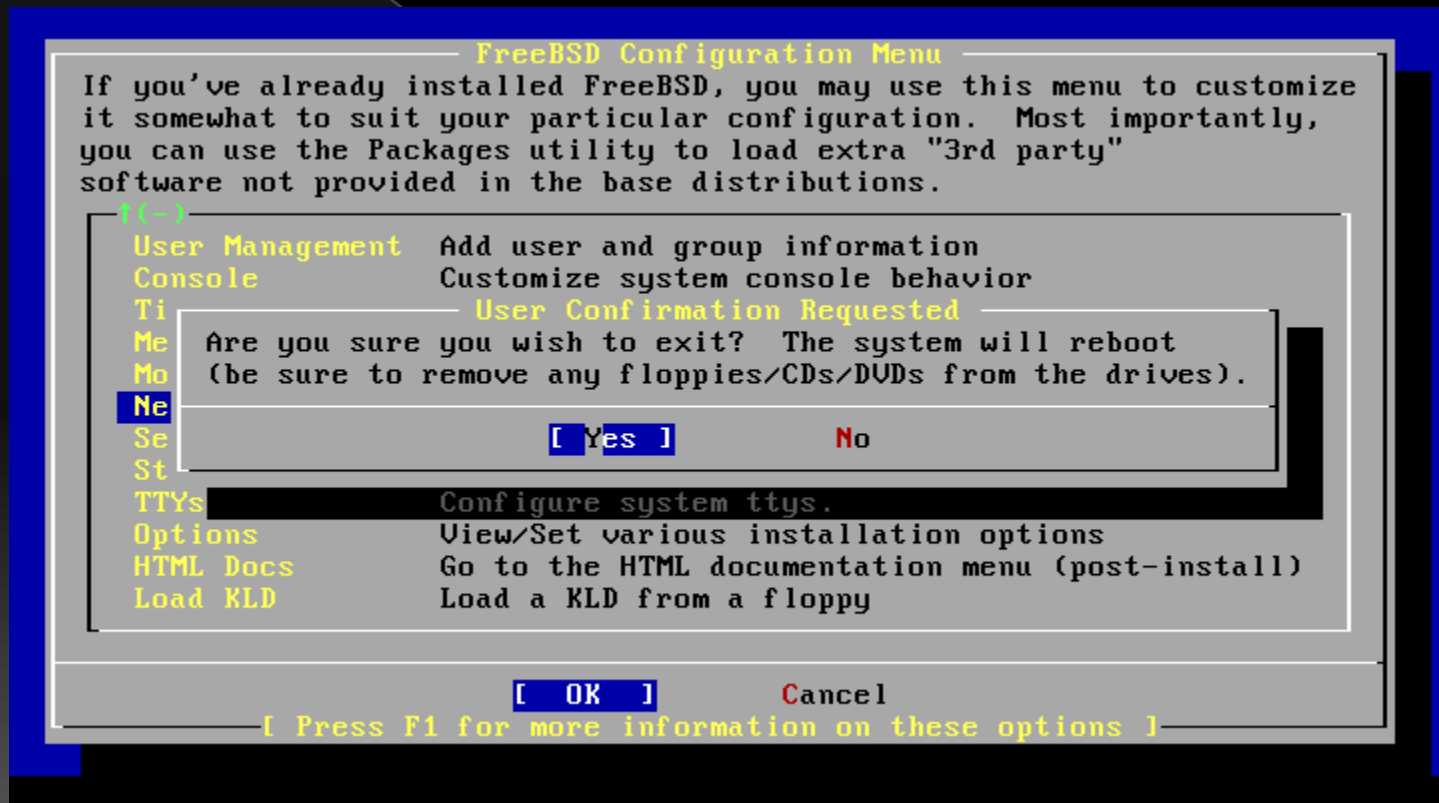
Last Step…

Be sure to remove booting media.
You would not want restart whole process again…

Finally, reboot and enjoy!

Other Installers
- Finstall
  - http://sourceforge.net/projects/finstall/
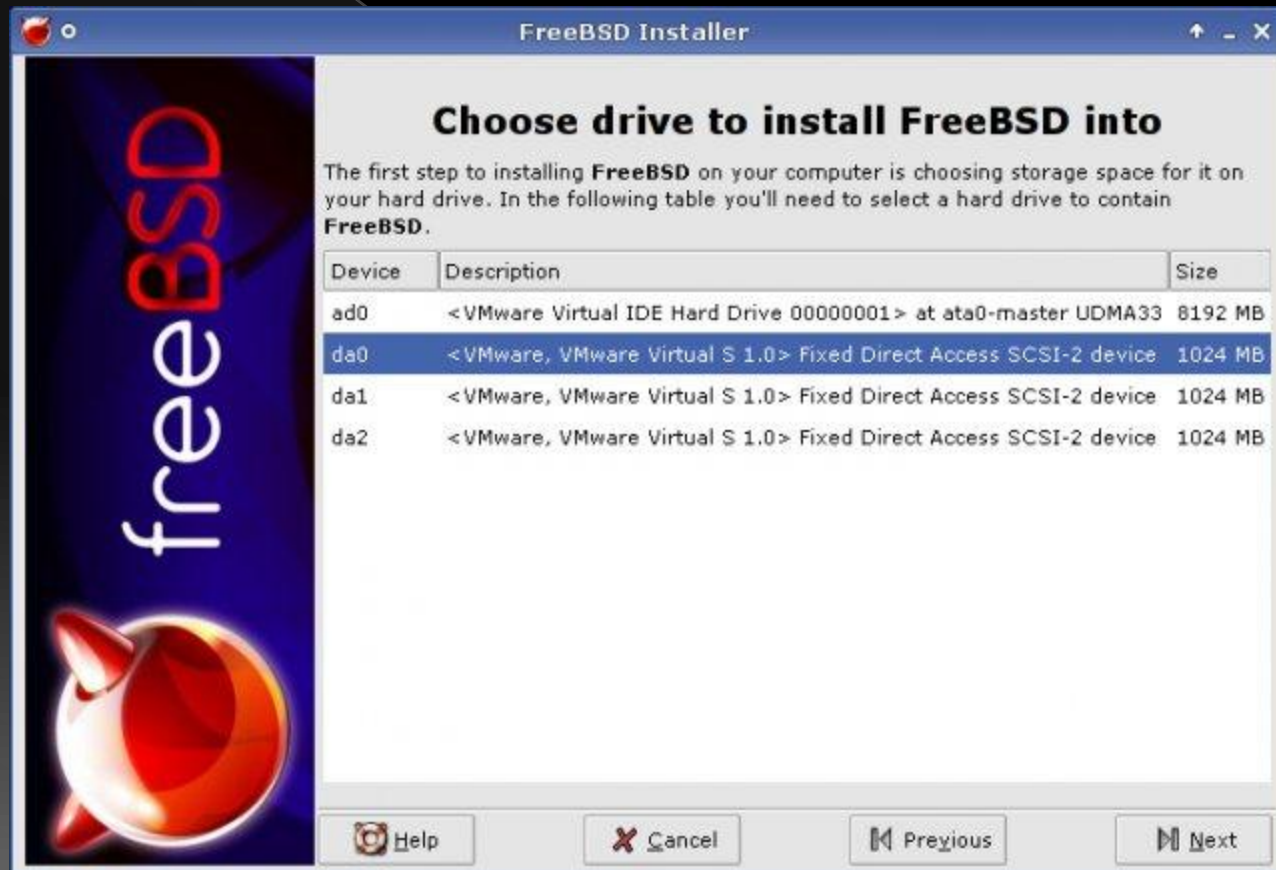
Exercise 1 – Keeping update - build world and kernel

CVS Tags

- Branch Tags
  - HEAD (.) (-CURRENT)
  - RELENG_7 (-STABLE)
  - RELENG_7_0 (-RELEASE)
    - RELENG_7_0_BP
- Release Tags
  - RELENG_7_0_0_RELEASE

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

CVSup Configuration File

- /usr/share/examples/cvsup/
  - › standard-supfile

*default host=cvsup.tw.FreeBSD.org

*default base=/var/db

*default prefix=/usr

*default release=cvs tag=RELENG_7_0

*default delete use-rel-suffix

- csup <supfile>

csup(1)

Make configuration file

/etc/make.conf:

SUP_UPDATE= yes

SUP=   /usr/bin/csup

SUPFLAGS=   -L 2

SUPFILE=   /usr/local/etc/src-supfile

PORTSSUPFILE=/usr/local/etc/ports-supfile

KERNCONF=   SABSD

CPUTYPE=   core2

/usr/share/examples/etc/make.conf

/usr/share/mk/bsd.cpu.mk

Make configuration file (advanced)

NO_CLEANDIR=yes

NO_CLEAN=yes

NO_KERNELCLEAN= yes

#NO_MODULES=   yes

#MODULES_WITH_WORLD=   true

NO_PORTSUPDATE= yes

Use these options carefully!

/usr/src/Makefile.inc1

Steps

- cd /usr/src
- make update
- mergemaster -p (Pre-buildworld mode)
- make buildworld
- make kernel (buildkernel, installkernel)

(reboot and boot in single user mode)

- make installworld
- mergemaster (or mergemaster -Ui)
- (make check-old, make delete-old)
- reboot

/usr/src/Makefile, mergemaster(8)

Kernel configuration file

- Kernel configure file
  - › cd /usr/src/sys/{i386,amd64}/conf/
- "LINT"
  - › make LINT
- Make your own kernel configuration file
  - › cp GENERIC "YOUR-KERNEL-NAME"
- Edit your configuration file
- Edit /etc/make.conf

Parallel

- make -j*N*
  - › N: how many parallel process
  - › Not useable in ports

make(1)

Reboot & Check

- Reboot and enjoy it
  - # reboot
- Check
  - # uname -a

Handbook!

- Chapter 8 Configuring the FreeBSD Kernel
    - http://www.freebsd.org/doc/en/books/handbook/kernelconfig.html
- 23.4 Rebuilding "world"
    - http://www.freebsd.org/doc/en/books/handbook/makeworld.html

If Something Goes Wrong

- Boot from old kernel
  - "6. Escape to loader prompt"
  - Boot /boot/kernel.old/kernel

  - cd /boot
  - cp -R kernel.old kernel.ok
  - rm -fr kernel
  - mv kernel.old krenel

Handbook!

- 8.7 If Something Goes Wrong
  - › http://www.freebsd.org/doc/en/books/handbook/kernelconfig-trouble.html

Exercise 2 – Make FreeBSD more useable
- Install 3rd party software

Install software

- Use the Source!
  - Tar ball
  - tar xzvf certain-source.tar.gz
  - ./configure
  - make; make install

Install software

- Package
  - Pre-built ports
  - pkg_add, pkg_delete, pkg_deinstall, pkg_info, pkg_version
- Ports
  - cd /usr/ports, make search, make install clean
  - ports/ports-mgmt/portupgrade
    - portinstall, portupgrade, portversion
    - **/usr/local/etc/pkgtools.conf**
  - Ports/ports-mgmt/portmaster

CVSup Configuration File

- /usr/share/examples/cvsup/
  - ports-supfile

*default host=cvsup.tw.FreeBSD.org

*default base=/var/db

*default prefix=/usr

*default release=cvs tag=.

*default delete use-rel-suffix

Try to use ports

- Try to install some software, such as:
  - vim
  - mutt
  - wget
  - w3m
  - Perl, Python Ruby