Install FreeBSD

國立陽明交通大學資工系資訊中心

Information Technology Center, Department of Computer Science, NYCU

Outline

- FreeBSD version
  - 13.2-RELEASE
- Installing FreeBSD
  - From DVD/CD-ROM (iso image)

FreeBSD Version

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FreeBSD Branches/Tags

- Three parallel development branches:
  - RELEASE
    - Suitable for production use
    - Latest Release: 13.2 (April, 2023)
      - http://www.freebsd.org/releases/
  - STABLE
    - Tested new features and bug fixes
    - ABI/KBI is "stable"
    - Still considered a development branch
  - CURRENT
    - Working space for FreeBSD developers
      - 14.0-CURRENT (2022)
      - http://www.freebsd.org/releng/

FreeBSD Versions

- FreeBSD–A.B.C–Type
  - A: major version Number
  - B: minor version Number
  - C: slight patch version number
  - Type: version type
    - PRERELEASE, BETA, RC
    - RELEASE
    - STABLE
    - CURRENT
- freebsd-version(1)
- -pN
  - patch level, increased after SA/EN announced

End-of-Life (EoL)

- The last supporting date of given OS version
  - Typically, no guaranteed security update/patch for an OS passed its EoL
- All OS have EoL
  - [FreeBSD 13.0: 13.1-RELEASE + 3 months](#)
  - [Ubuntu 14.04 LTS: 2024-04](#)
  - [CentOS Linux 8: 2021-12-31](#)
  - [Windows 7: 2020-01-14](#)
- If your OS is approaching its EoL, please consider updating it
  - Plan as early as possible
  - Good habit: prepare and evaluate upgrading when new version is out

Support Model

- Use FreeBSD as an example
  https://www.freebsd.org/security/#model
  > Under the current support model, each `major version`'s stable branch is explicitly supported for `5 years`, while each individual `point release` is only supported for `three months after the next point release`.

- Common support types
  - Normal (feature and security updates)
  - Security only (maintenance mode)
  - LTS (Long term support, good for services infrastructure)
  - Extended (longer than normal), paid (commercial) support, ...

FreeBSD Installation

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Installation Handbook

● Complete installation guide and be found at
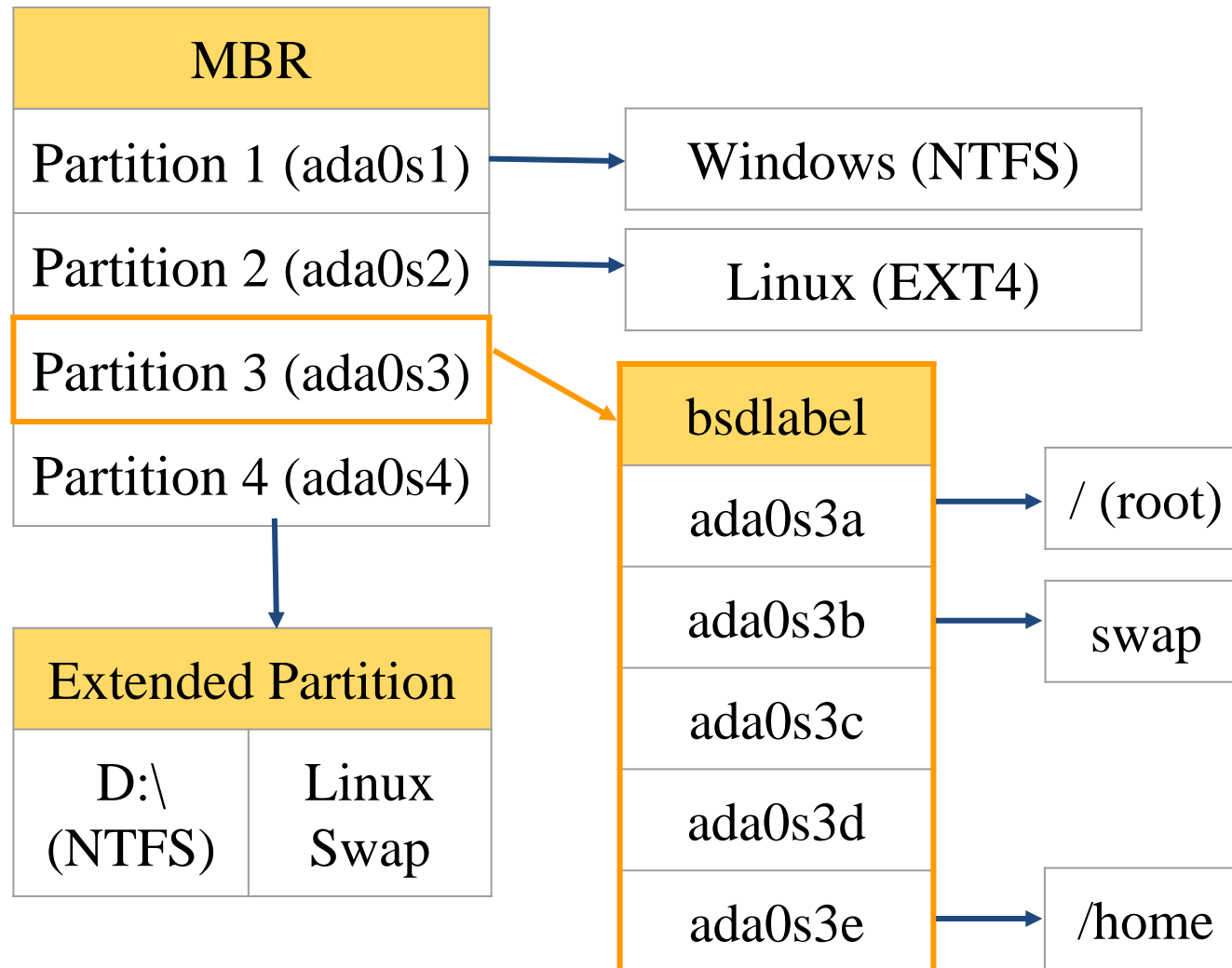 ○ https://www.freebsd.org/doc/handbook/bsdinstall.html
  ○ https://www.freebsd.org/doc/zh_TW/books/handbook/bsdinstall.html

View of Disk (1)

● Guided partitioning layout (GPT) between UFS and Root on ZFS

GPT (UFS)	
Partition 1 (/dev/ada0p1)	freebsd-boot
Partition 2 (/dev/ada0p2)	freebsd-ufs
Partition 3 (/dev/ada0p3)	freebsd-swap

GPT (ZFS on Root)	
Partition 1 (/dev/ada0p1)	freebsd-boot
Partition 2 (/dev/ada0p2)	freebsd-swap
Partition 3 (/dev/ada0p3)	freebsd-zfs

View of Disk (2)

MBR
Partition 1 (ada0s1)
Partition 2 (ada0s2)
Partition 3 (ada0s3)
Partition 4 (ada0s4)

Partition 1 (ada0s1) → Windows (NTFS)

Partition 2 (ada0s2) → Linux (EXT4)

Extended Partition	
D:\ (NTFS)	Linux Swap

bsdlabel
ada0s3a
ada0s3b
ada0s3c
ada0s3d
ada0s3e

ada0s3a → / (root)

ada0s3b → swap

ada0s3e → /home

FreeBSD View of Disk

- What is the meaning of ada0s1a
  - Disk name
    - ada : IDE, SATA
    - da: SCSI, usb stick
  - Partition (slice)
    - Primary partition: s1 ~ s4
    - Extended partition: s5 ~ sn
  - Label in each slice
    - a: root partition /
    - b: swap
    - c: entire slice
    - defgh: /usr, /home, …

MBR
Partition 1 (ada0s1)
Partition 2 (ada0s2)
Partition 3 (ada0s3)
Partition 4 (ada0s4)

Partition 5 (ada0s5)	Partition 6 (ada0s6)
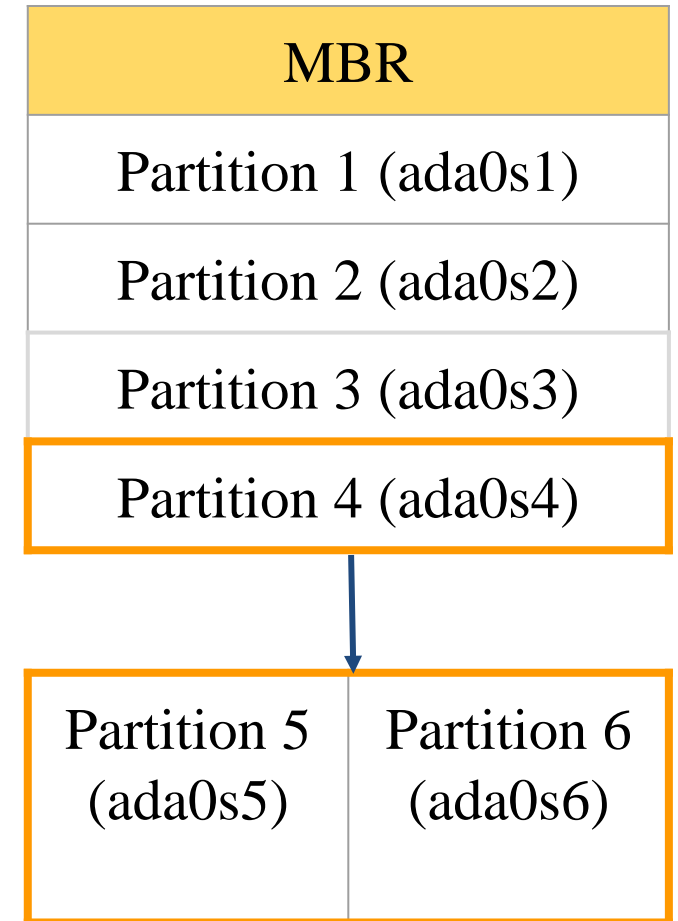
Know Your Hardware

- CPU
  - 32bit or 64bit
  - Intel、AMD
  - Architecture: amd64, i386 (powerpc, mips, riscv, …)
- RAM
  - Size, Speed
- HDD
  - Size, amount, SATA, SCSI, SAS, …
- Graphics
  - Brand, ram size
- Sound
  - Brand

Know Your Hardware

- Network Interface and settings
  - Brand
  - Media type (10/100, 1G, 2.5G, 10G, …)
  - Hostname, IP, Netmask, Default gateway, DNS
- Other Special devices
 - pciconf -lv

Pre-Installation Tasks

- Virtual Machine
  - VirtualBox、VMware、KVM
- Network Information
  - IP address
  - Subnet mask
  - Default router IP address
  - domain name of the local network
  - DNS server IP address(es)
- Prepare the Installation Media
  - https://www.freebsd.org/where.html
  - Installer image (iso, disc1 or dvd1)

bsdinstall

- [bsdinstall (8)](#)
- An easy to use, text-based installation program
  - Beginning with FreeBSD 9.0-RELEASE
- Official handbook
  - https://www.freebsd.org/doc/handbook/using-bsdinstall.html
  - https://www.freebsd.org/doc/zh_TW/books/handbook/using-bsdinstall.html

bsdinstall – (1)

- Boot screen of FreeBSD 13.2
    - Press Enter or Wait for autoboot
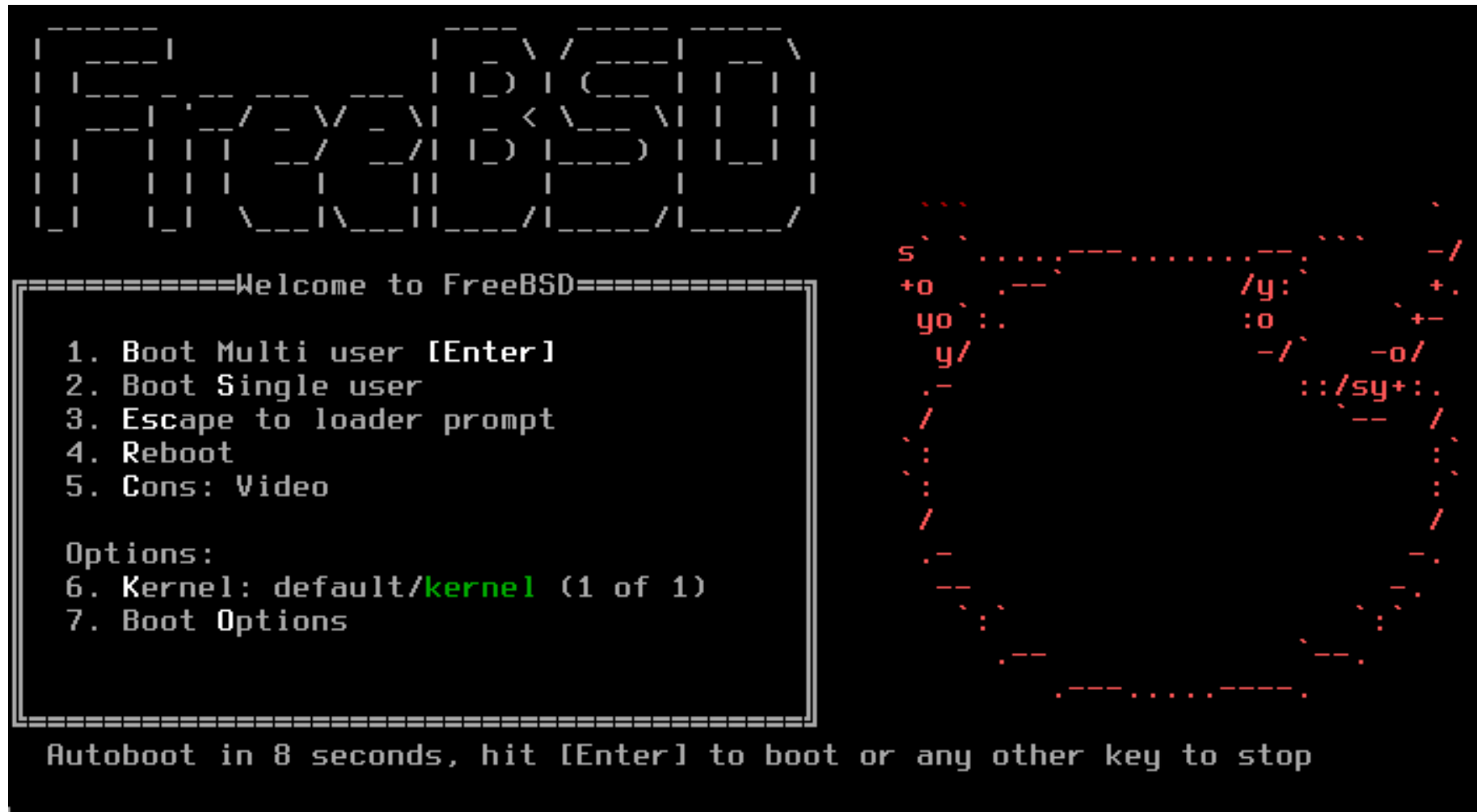
bsdinstall – (2)

- Install、Shell、Live CD
  - Choose "Install"

bsdinstall – (3)

- Select keymap
  - Select "Continue with default keymap"

bsdinstall – (4)

- Setting hostname
  - e.g., xxx.cs.nycu.edu.tw

bsdinstall – (5)

- Select components to install
  - use default settings

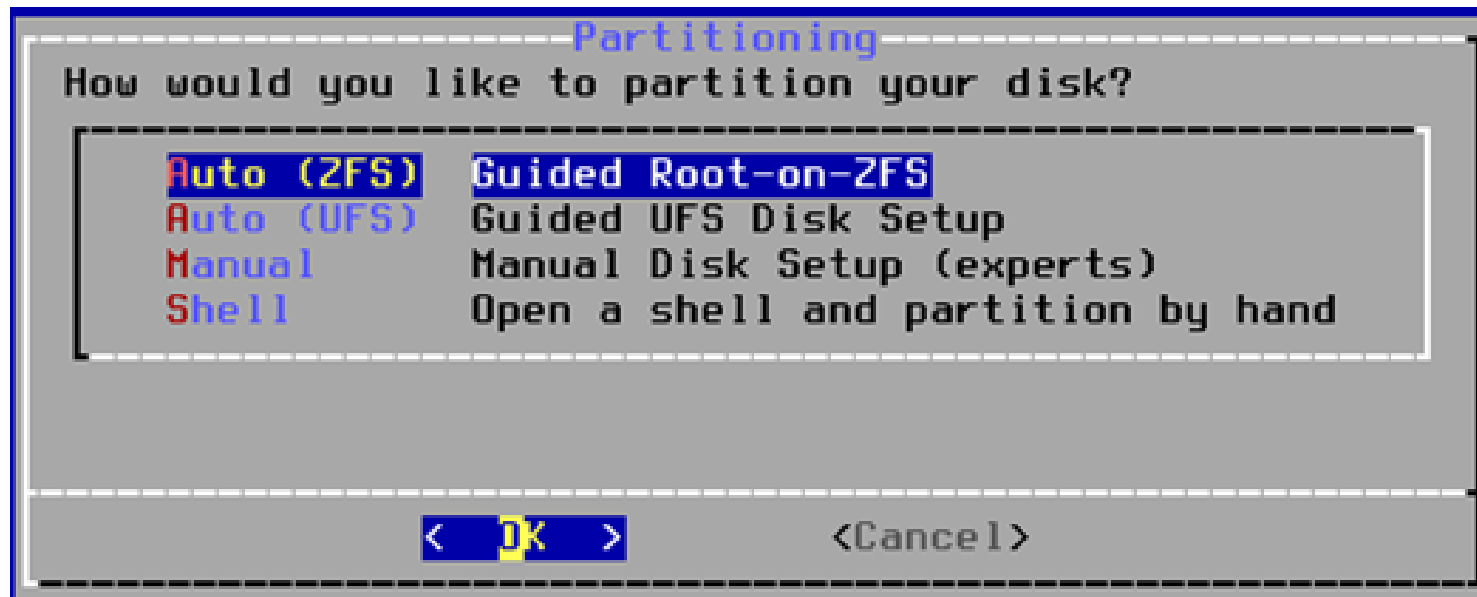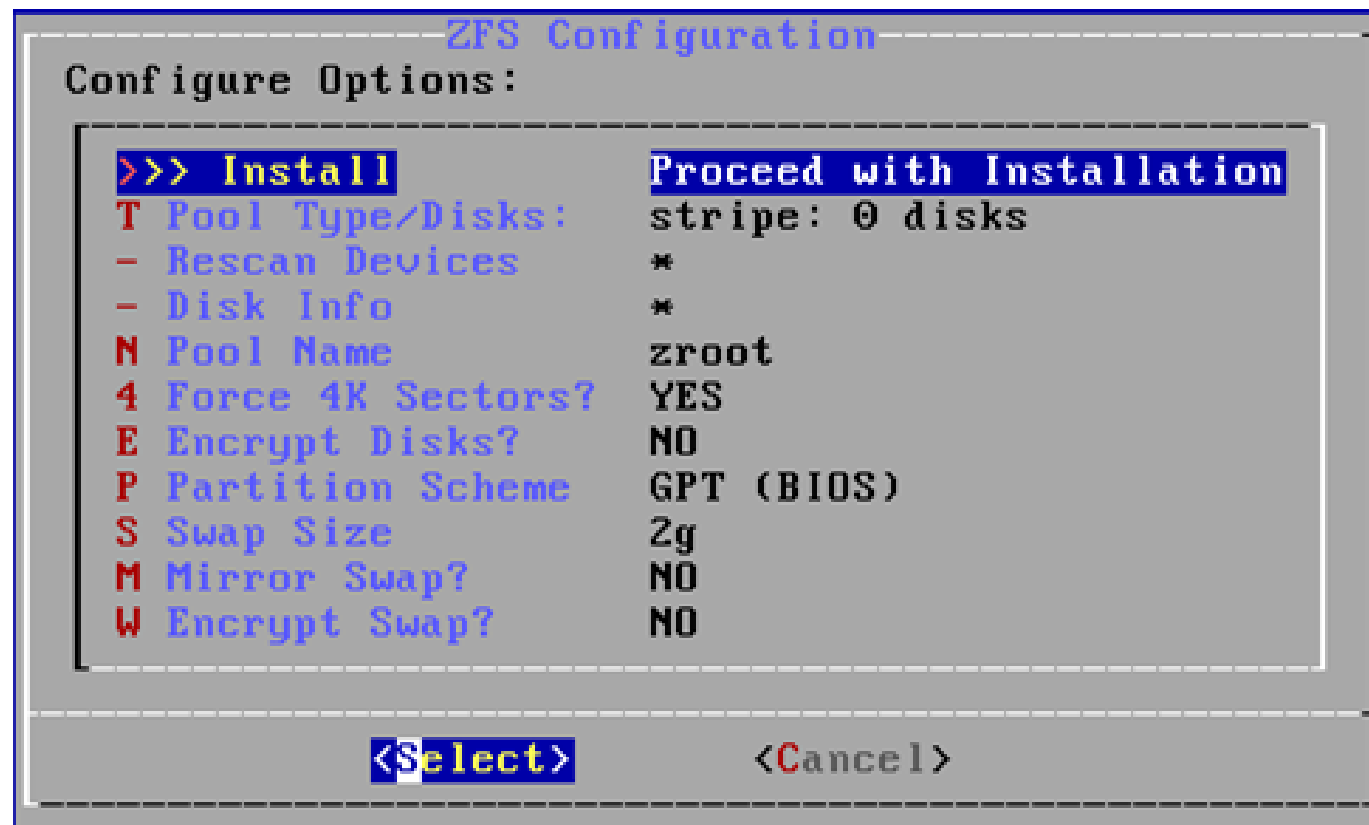# bsdinstall – (6)

- Partitioning methods
  - Shell – gpart(8)、fdisk(8)、bsdlabel(8)
  - Use Auto (ZFS)

bsdinstall – (7) Auto (ZFS)

- Guided Root-on-ZFS
  - Keep the default settings, and choose "Install"

```
┌──────────────────────ZFS Configuration──────────────────────┐
│ Configure Options:                                           │
│ ┌──────────────────────────────────────────────────────────┐│
│ │>>> Install              Proceed with Installation         ││
│ │ T Pool Type/Disks:      stripe: 0 disks                   ││
│ │ - Rescan Devices        *                                 ││
│ │ - Disk Info             *                                 ││
│ │ N Pool Name             zroot                             ││
│ │ 4 Force 4K Sectors?     YES                               ││
│ │ E Encrypt Disks?        NO                                ││
│ │ P Partition Scheme      GPT (BIOS)                        ││
│ │ S Swap Size             2g                                ││
│ │ M Mirror Swap?          NO                                ││
│ │ W Encrypt Swap?         NO                                ││
│ └──────────────────────────────────────────────────────────┘│
│                                                              │
│           <Select>            <Cancel>                       │
└──────────────────────────────────────────────────────────────┘
```

bsdinstall – (8)

- Virtual Device type
  - Stripe (select this type, and add a disk)
  - Mirror
  - RAID10
  - RAID-Z 1, 2, 3
- Caution! Backup important data when using dual OS

```
------------------- ZFS Configuration -------------------
Select Virtual Device type:

    stripe    Stripe - No Redundancy
    mirror    Mirror - n-Way Mirroring
    raid10    RAID 1+0 - n x 2-Way Mirrors
    raidz1    RAID-Z1 - Single Redundant RAID
    raidz2    RAID-Z2 - Double Redundant RAID
    raidz3    RAID-Z3 - Triple Redundant RAID


             <  OK  >      <Cancel>
    --------[Press arrows, TAB or ENTER]--------
```

```
----------------- ZFS Configuration -----------------

    [*]  ada0    VBOX HARDDISK


             <  OK  >    < Back >
```

```
------------------ ZFS Configuration ------------------
Last Chance! Are you sure you want to destroy
the current contents of the following disks:

    ada0



           < YES >        < NO >
    --------[Press arrows, TAB or ENTER]--------
```

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bsdinstall – (9)

- Fetching → Checksum Verification → Extraction

bsdinstall – (10)

- Post-installation
  - root password
  - Network interfaces
    - Wired – Static IPv4 / DHCP / Static IPv6 / SLAAC
    - Wireless
    - DNS
  - Time Zone
  - Services
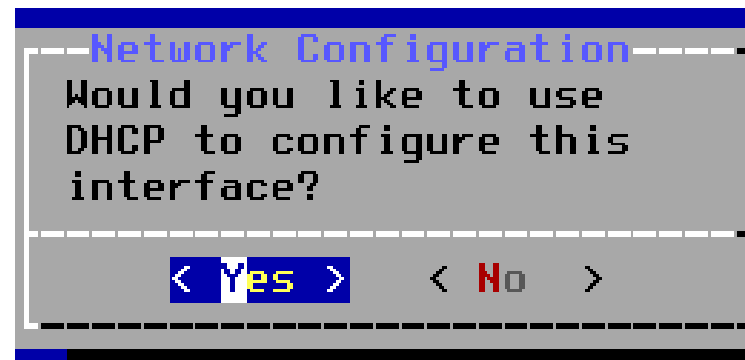 - System security hardening options
  - Add users

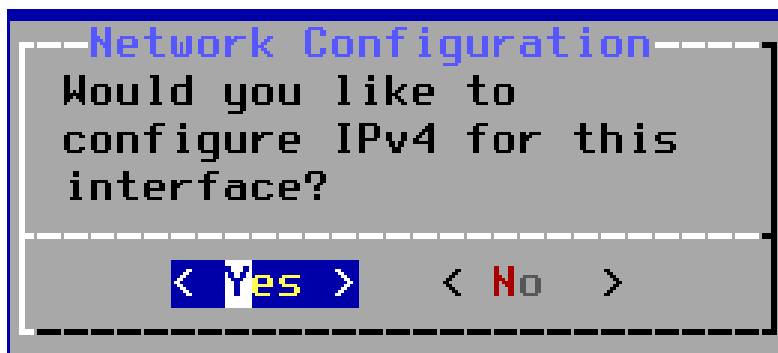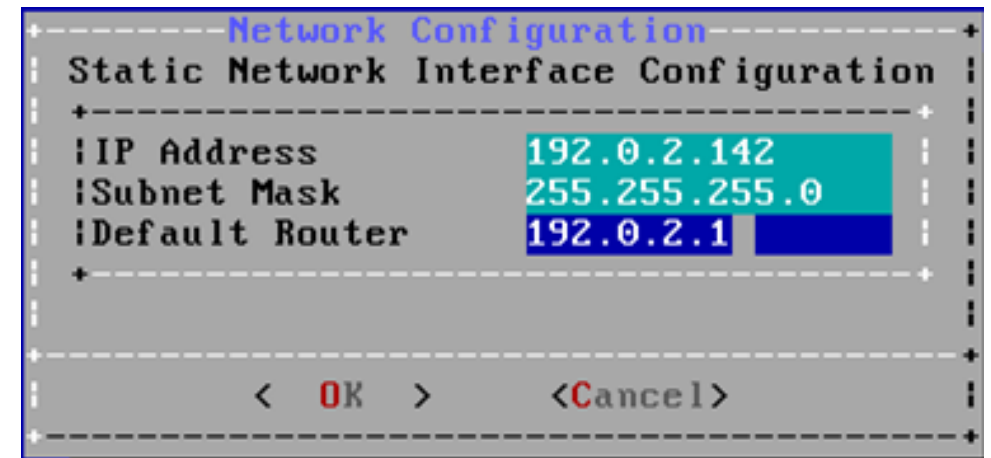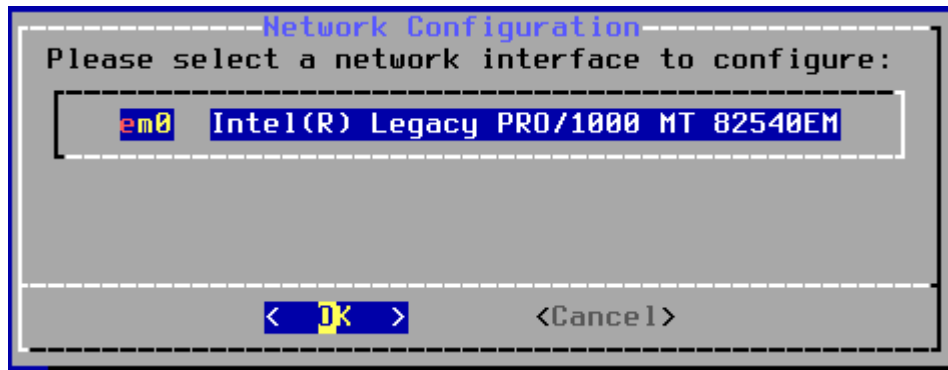# Post-installation

● Setting the root Password

```
FreeBSD Installer
========================

Please select a password for the system management account (root):
Typed characters will not be visible.
Changing local password for root
New Password:█
```
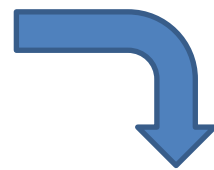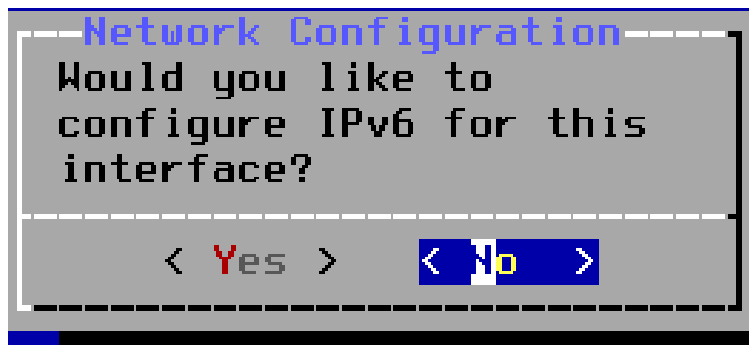
Post-installation

- Select a network interfaces
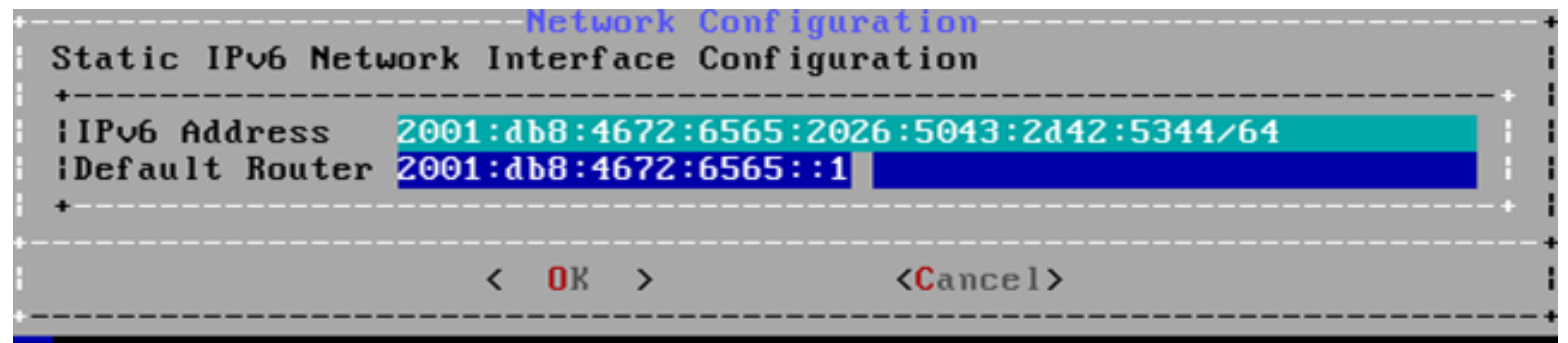- Configuring IPv4 Networking with DHCP

```
+---------Network Configuration---------+
| Please select a network interface to configure: |
|   +------------------------------------------+ |
|   | em0  Intel(R) Legacy PRO/1000 MT 82540EM | |
|   +------------------------------------------+ |
|                                                |
|        <  OK  >           <Cancel>             |
+------------------------------------------------+
```

```
+----------Network Configuration----------+
| Static Network Interface Configuration  |
| +-------------------------------------+  |
| |IP Address        192.0.2.142        |  |
| |Subnet Mask       255.255.255.0      |  |
| |Default Router    192.0.2.1          |  |
| +-------------------------------------+  |
|                                          |
|        <  OK  >        <Cancel>          |
+------------------------------------------+
```

```
+------Network Configuration------+
| Would you like to               |
| configure IPv4 for this         |
| interface?                      |
|                                 |
|    < Yes >       < No >         |
+---------------------------------+
```

```
+------Network Configuration------+
| Would you like to use           |
| DHCP to configure this          |
| interface?                      |
|                                 |
|    < Yes >       < No >         |
+---------------------------------+
```

If "No" is pressed

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Post-installation

- Configuring IPv6 Networking
  - IPv6 Stateless Address Auto configuration (SLAAC)
  - http://tools.ietf.org/html/rfc4862
  - IPv6 is optional to you. We don't use IPv6 in this class.

If "Yes" is pressed

Post-installation

● Configuring DNS

```
┌──────────────────────Network Configuration──────────────────────┐
│ Resolver Configuration                                            │
│                                                                   │
│   Search          nasa.tw                                         │
│   IPv4 DNS #1     140.113.1.1                                     │
│   IPv4 DNS #2     8.8.8.8                                         │
│                                                                   │
│              <   OK   >              <Cancel>                      │
└───────────────────────────────────────────────────────────────────┘
```
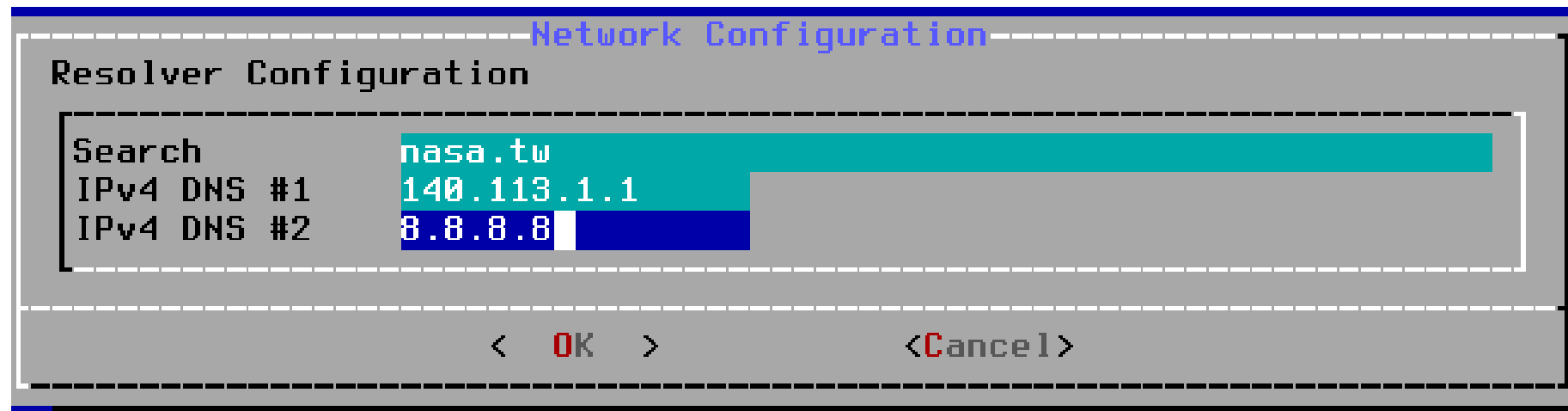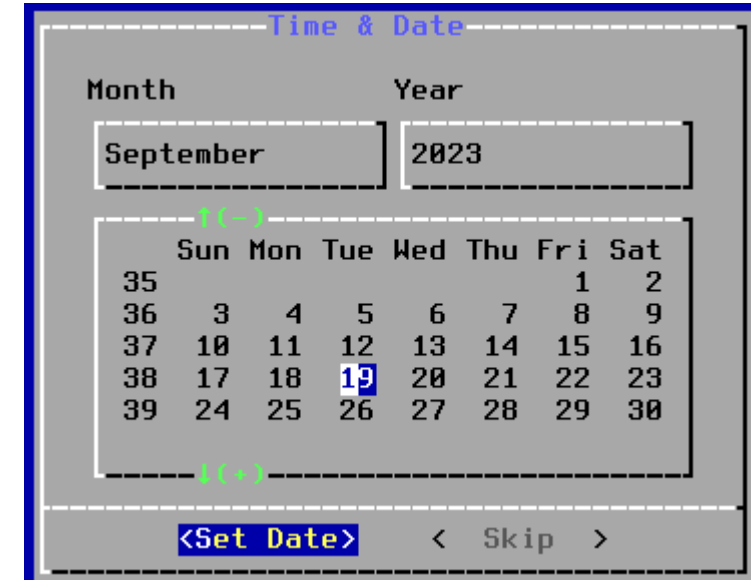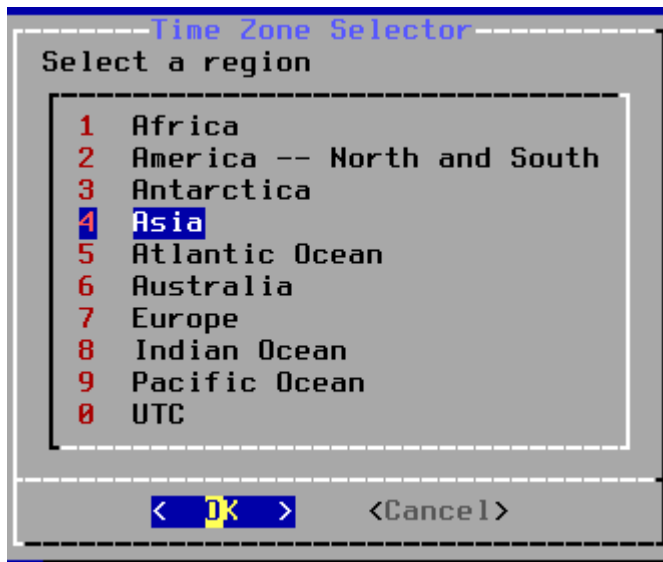
Post-installation

- Setting the Time Zone
  - Asia → Taiwan

Post-installation

- Selecting services to be enabled at boot
  - Enable sshd, ntpd, ntpdate
  - Disable dumpdev

Post-installation

- Selecting system security hardening options
  - Use default settings

```
                              System Hardening
Choose system security hardening options:

[ ] 0 hide_uids        Hide processes running as other users
[ ] 1 hide_gids        Hide processes running as other groups
[ ] 2 hide_jail        Hide processes running in jails
[ ] 3 read_msgbuf      Disable reading kernel message buffer for unprivil
[ ] 4 proc_debug       Disable process debugging facilities for unprivile
[ ] 5 random_pid       Randomize the PID of newly created processes
[ ] 6 clear_tmp        Clean the /tmp filesystem on system startup
[ ] 7 disable_syslogd  Disable opening Syslogd network socket (disables r
[ ] 8 disable_sendmail Disable Sendmail service
[ ] 9 secure_console   Enable console password prompt
[ ] 10 disable_ddtrace Disallow DTrace destructive-mode


                              <  OK  >
```

Post-installation

- Add Users
  - Username - tsaimh
  - Full name - Meng-Hsun Tsai
  - Uid - User ID. Typically left blank for default.
  - Login group - The user's group. - "staff" is good for you
  - Invite user into other groups? - wheel
  - Login class - Typically left blank for default.
  - Shell - The interactive shell for this user. CSIT use tcsh.
  - Home directory - The user's home directory. Use default.
  - Home directory permissions - The default is usually correct.
  - Use password-based authentication? - Typically "yes".

Post-installation

- Add Users (Cont.)
    - Use an empty password? - Typically "no".
    - Use a random password? - Typically "no".
    - Enter password - The actual password for this user.
    - Enter password again - The password must be typed again for verification.
    - Lock out the account after creation? - Typically "no".

Post-installation

● Final Configuration

```
                          ─────Final Configuration─────
Setup of your FreeBSD system is nearly complete. You can now modify
your configuration choices. After this screen, you will have an
opportunity to make more complex changes using a shell.
─────────────────────────────────────────────────────────────────
    Exit              Apply configuration and exit installer
    Add User          Add a user to the system
    Root Password     Change root password
    Hostname          Set system hostname
    Network           Networking configuration
    Services          Set daemons to run on startup
    System Hardening  Set security options
    Time Zone         Set system timezone
    Handbook          Install FreeBSD Handbook (requires network)


                        <   OK   >
```

Post-installation

- Make sure the configuration is correct before exiting
- Remove installation media
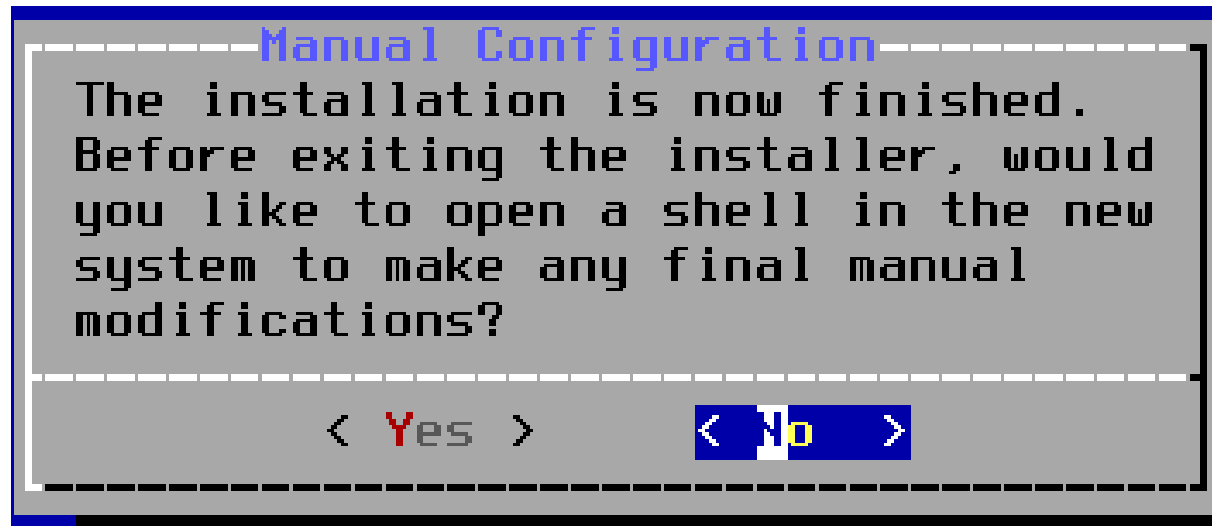
Post-installation

- Update your system to latest patch (login as `root`)
  - `$ freebsd-update fetch install`
- Check your patch version
  - `$ uname -r`
  - Should be "13.2-RELEASE"