

Install FreeBSD

tsaimh (2022, CC BY-SA)

lctseng (2019-2021, CC BY-SA)

? (1996-2018)

國立陽明交通大學資工系資訊中心

Computer Center, Department of Computer Science, NYCU

Outline

- FreeBSD version
 - 13.1-RELEASE
- Installing FreeBSD
 - From CD-ROM (iso image)
 - From SD Card

FreeBSD Version

國立陽明交通大學資工系資訊中心

Computer Center, Department of Computer Science, NYCU

FreeBSD Branches/Tags

- Three parallel development branches:
 - RELEASE
 - Suitable for production use
 - Latest Release: 13.1 (May, 2022)
 - <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

國立陽明交通大學資工系資訊中心

Computer Center, Department of Computer Science, NYCU

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)

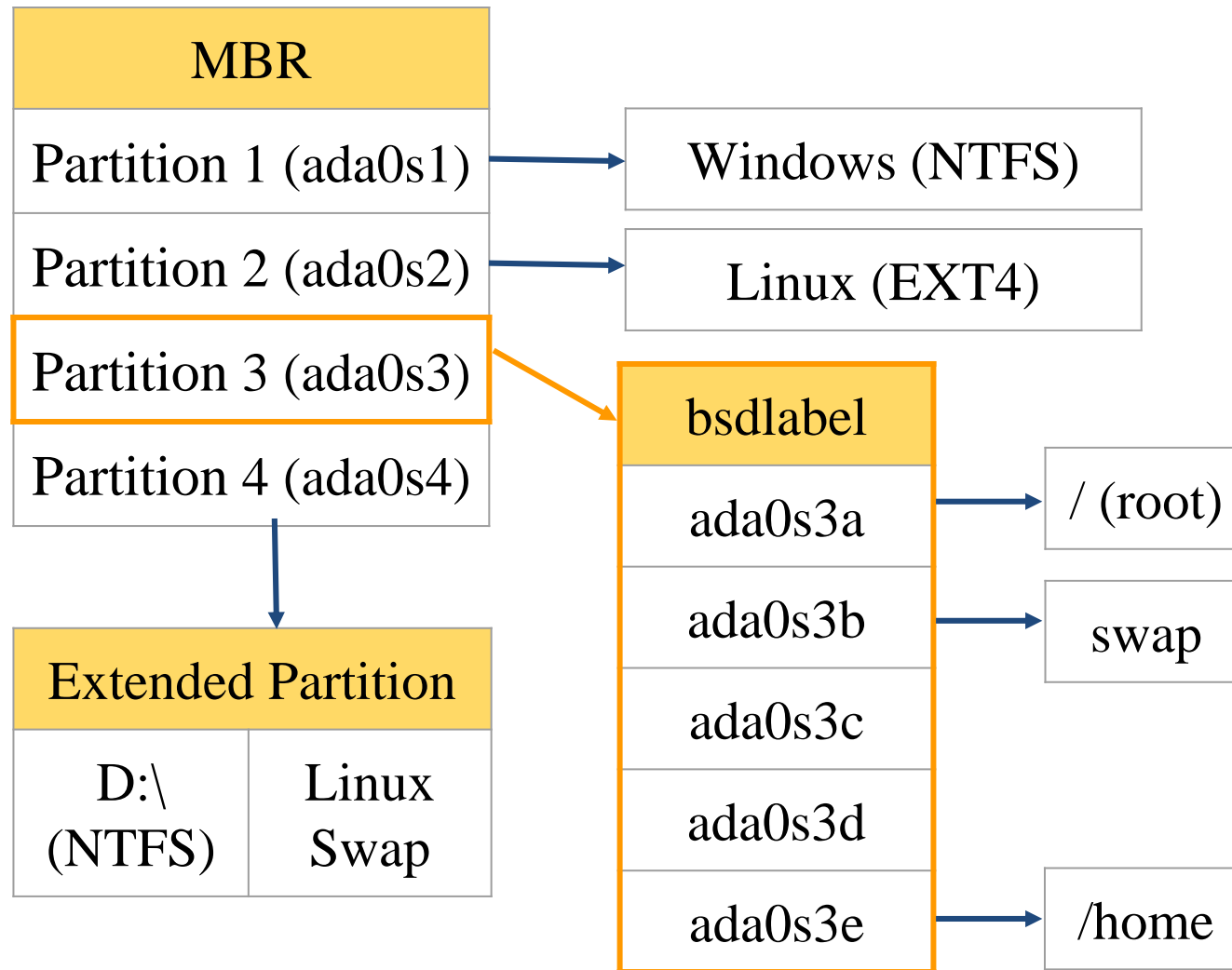
- Guided partitioning layout (GPT) between UFS and Root on ZFS

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

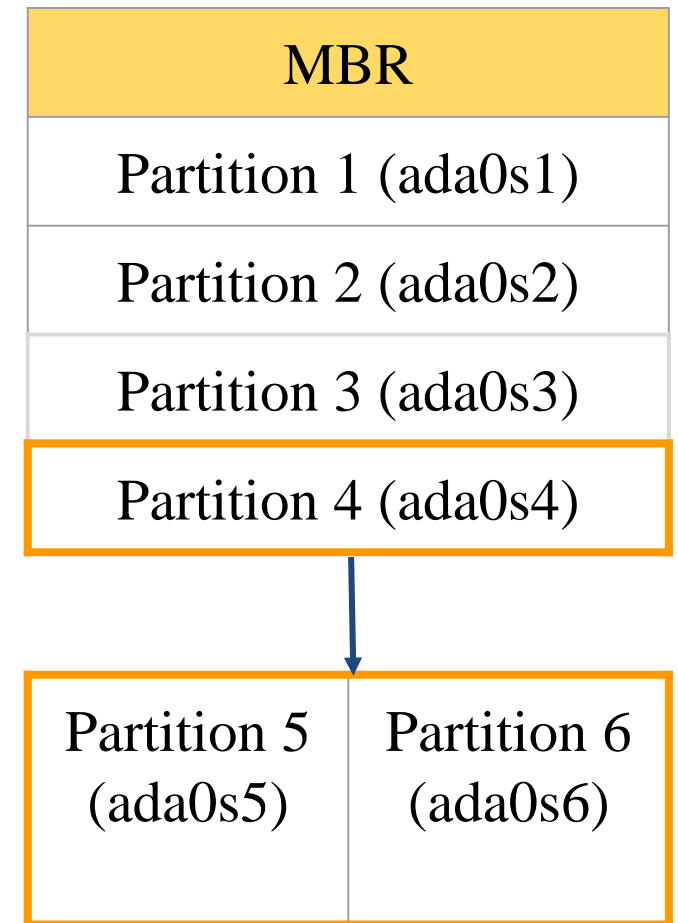
View of Disk (2)

ada0p1: GPT
ada0s1: MBR



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`, ...



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

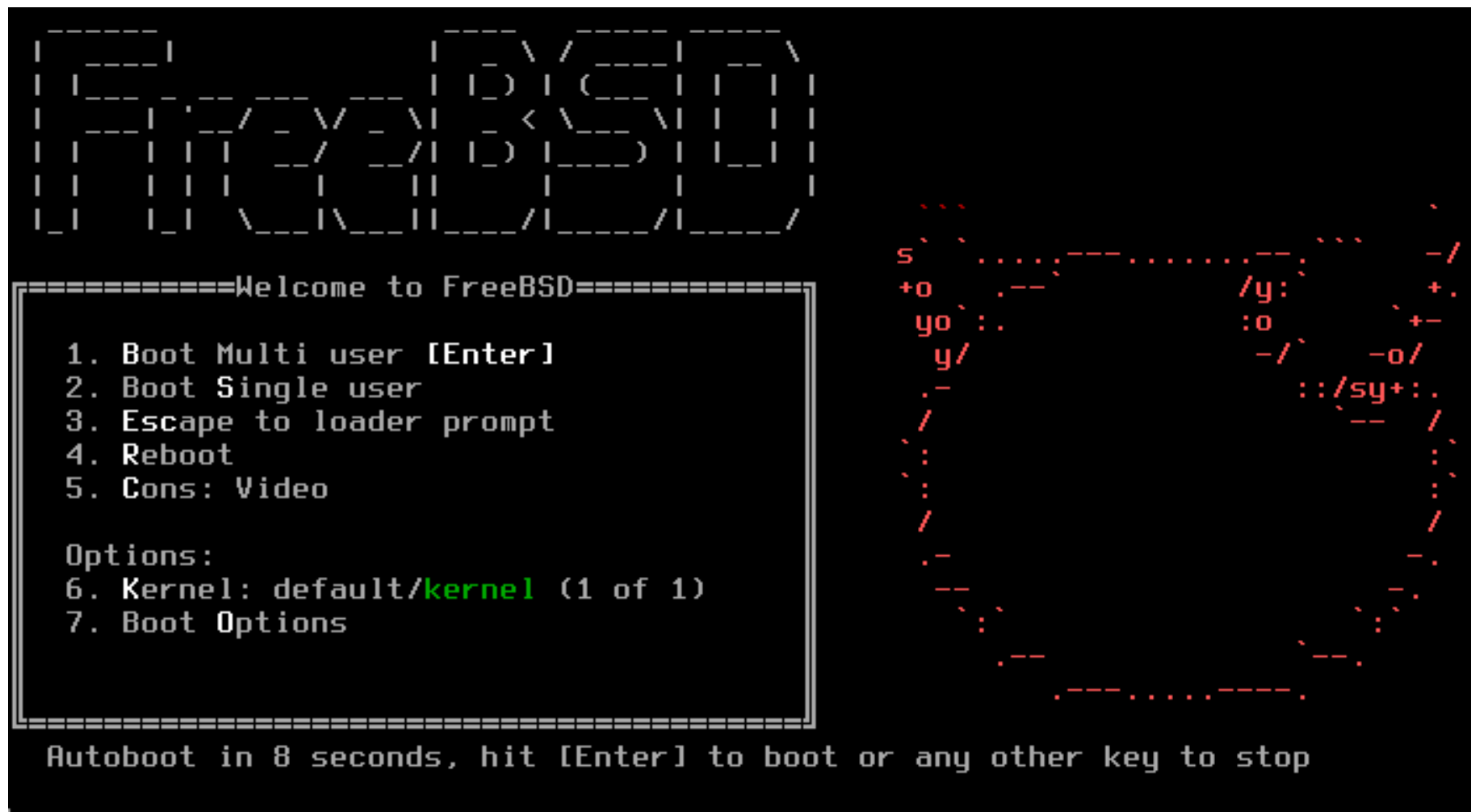
- Virtual Machine
 - VirtualBox 、 VMware 、 KVM
- Network Information
 - IP address
 - Subnet mask
 - Default router IP address
 - domain name of the local network
 - DNS server IP address(es)
- Prepare the Installation Media
 - <https://www.freebsd.org/where.html>
 - Installer image (iso, disc1 or dvd1)

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 13.1
 - Press Enter or Wait for autoboot



bsdinstall – (2)

- Install、Shell、Live CD
 - Choose “Install”

```
+-----Welcome-----+
| Welcome to FreeBSD! Would you |
| like to begin an installation  |
| or use the live CD?           |
+-----+
| <Install> <Shell> <Live CD> |
+-----+
```

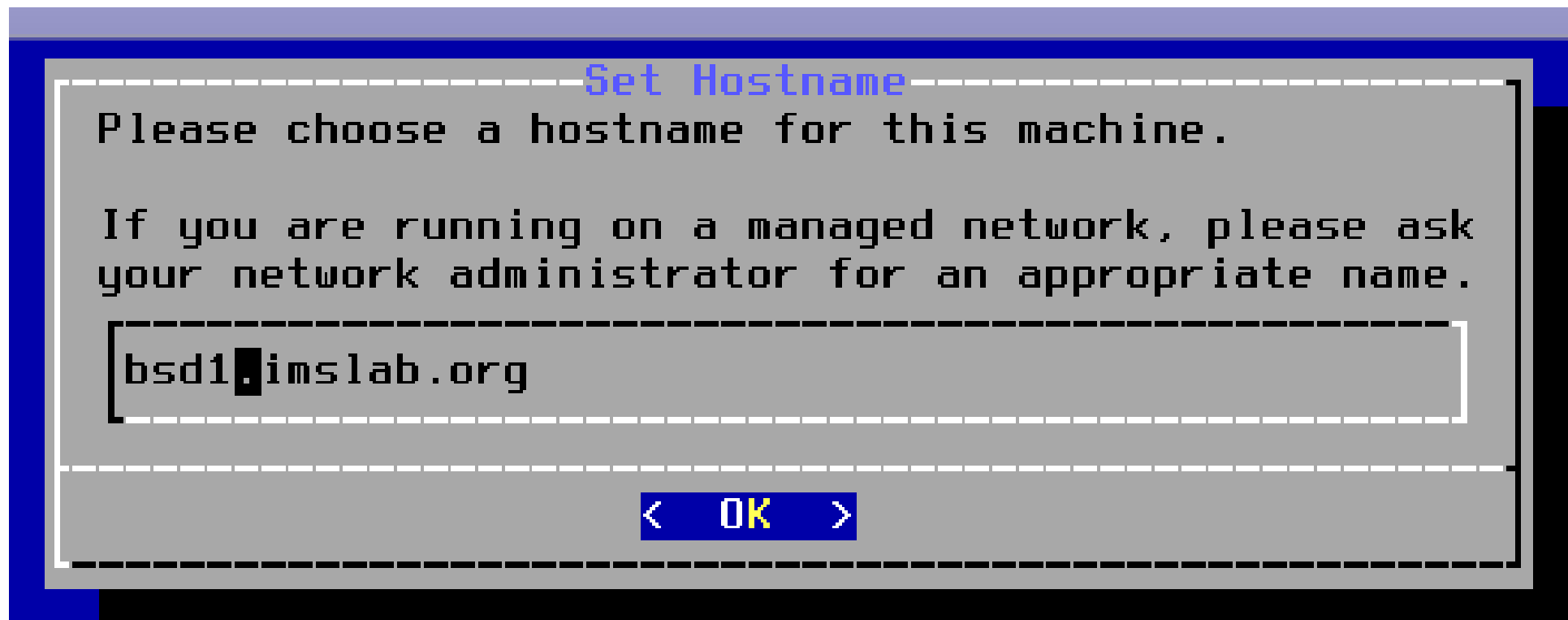
bsdinstall – (3)

- Select keymap
 - Select “Continue with default keymap”

```
FreeBSD Installer
-----
Keymap Selection
-----
The system console driver for FreeBSD defaults to standard "US"
keyboard map. Other keymaps can be chosen below.
-----
|>>> Continue with default keymap
|<->- Test default keymap
| ( ) Armenian phonetic layout
| ( ) Belarusian Codepage 1131
| ( ) Belarusian Codepage 1251
| ( ) Belarusian ISO-8859-5
| ( ) Belgian ISO-8859-1
| ( ) Belgian ISO-8859-1 (accent keys)
| ( ) Brazilian 275 Codepage 850
| ( ) Brazilian 275 ISO-8859-1
| ( ) Brazilian 275 ISO-8859-1 (accent keys)
| ( ) Bulgarian BDS
+-----v(+)-----11%-----
-----
|<Select>          <Cancel>
-----[Press arrows, TAB or ENTER]-----
```

bsdinstall – (4)

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



bsdinstall – (5)

- Select components to install
 - use default settings

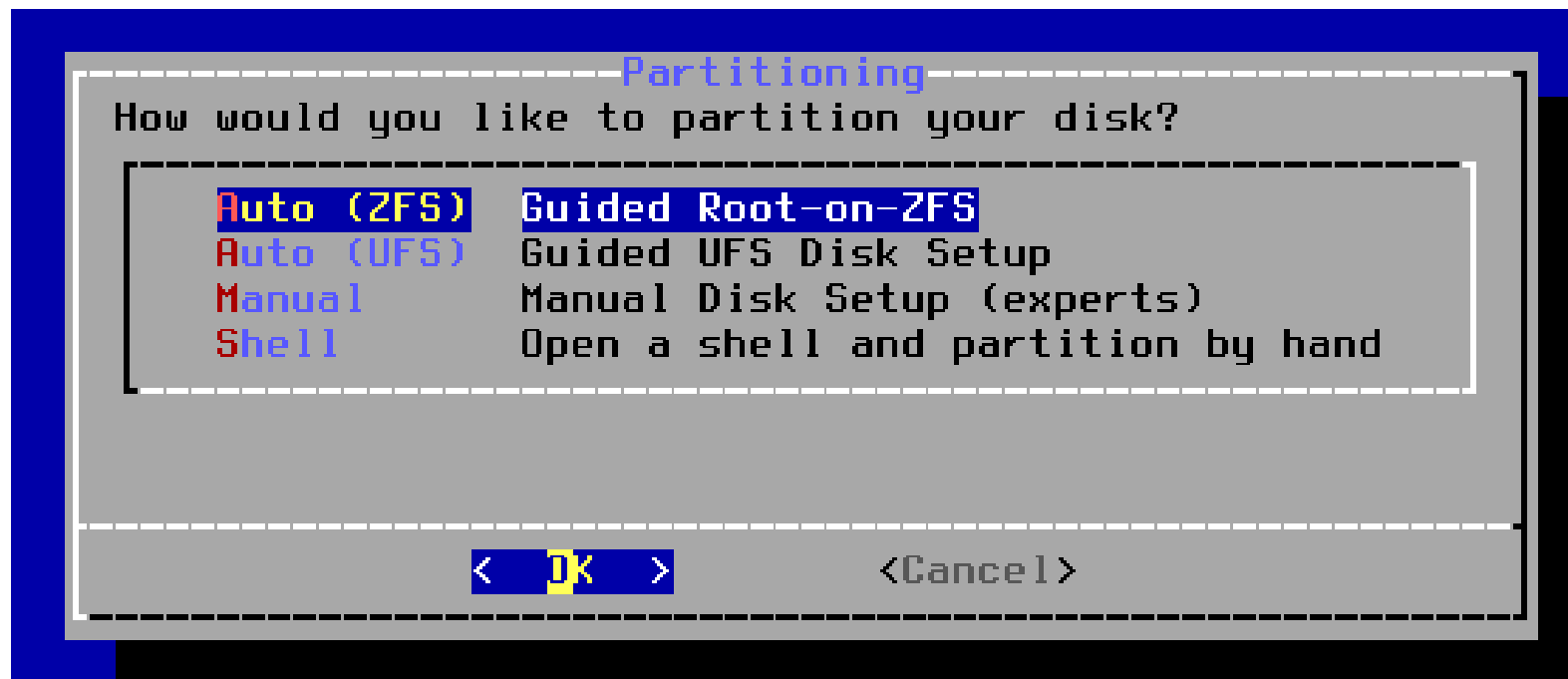
```
-----Distribution Select-----
Choose optional system components to
install:

[ ] base-dbg      Base system (Debugging)
[*] kernel-dbg   Kernel (Debugging)
[ ] ports        Ports tree
[ ] src          System source tree
[ ] tests        Test suite

< DK >
```

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”

```

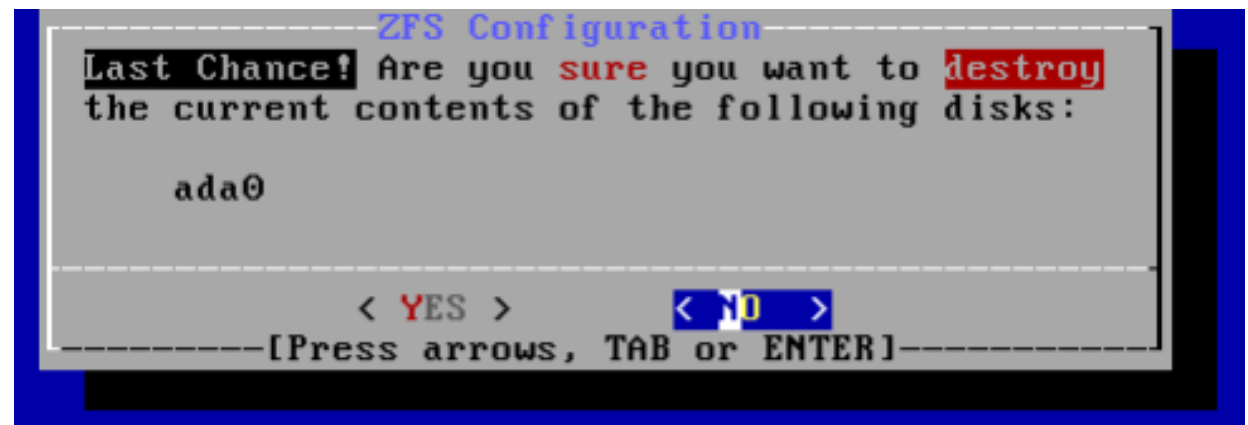
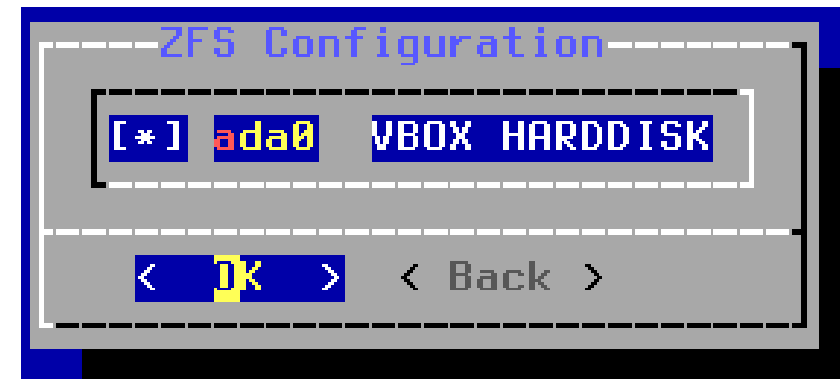
                                ZFS Configuration
Configure Options:
>>> Install                      Proceed with Installation
T Pool Type/Disks:                stripe: 0 disks
- Rescan Devices                  *
- Disk Info                       *
N Pool Name                       zroot
4 Force 4K Sectors?              YES
E Encrypt 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**



bsdinstall – (9)

- Fetching → Checksum Verification → Extraction

```
FreeBSD Installer
-----

Archive Extraction
Extracting distribution files...

base.txz... - [ 96% ]
kernel.txz [ Pending ]
lib32.txz [ Pending ]

Overall Progress:
[ 32% ]

24664 files read @ 2,242.0 files/sec. [1/2 busy/wait]
```

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

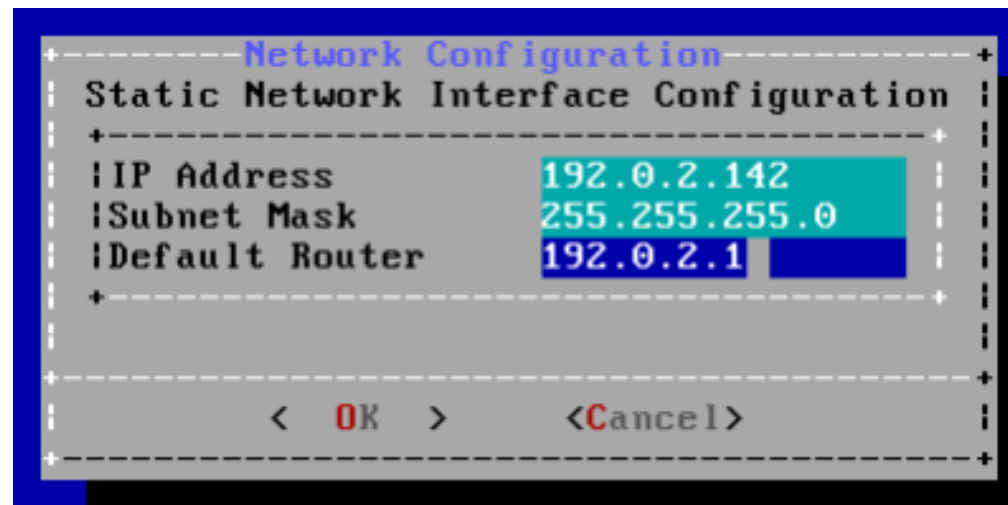
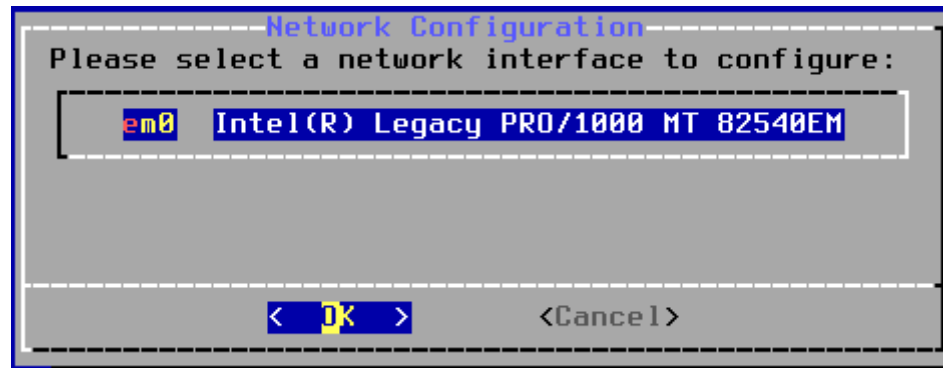
Post-installation

- 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



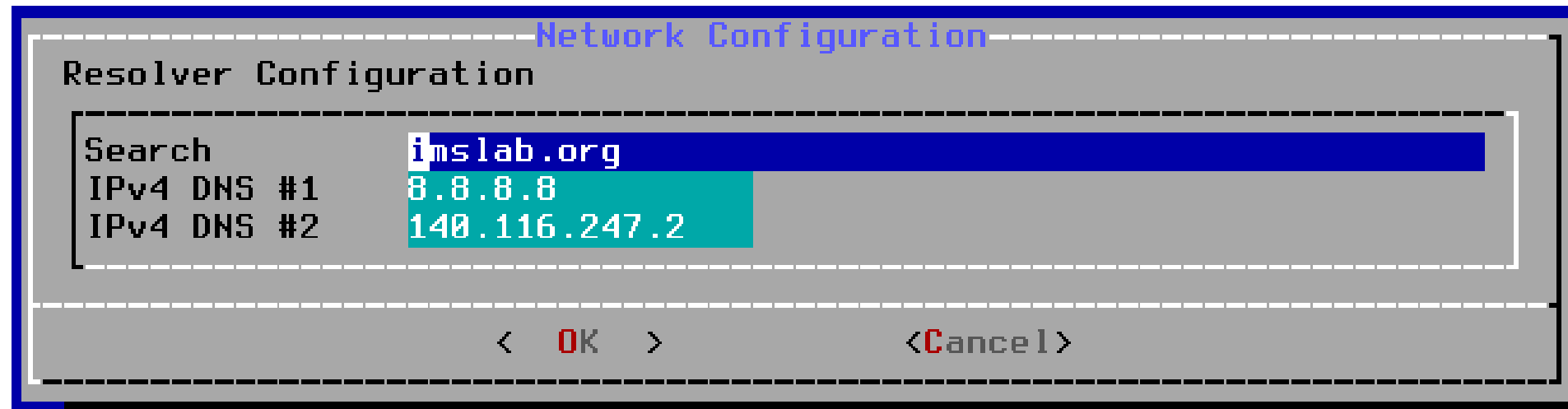
Post-installation

- 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.**

```
-----Network Configuration-----
| Static IPv6 Network Interface Configuration |
|-----|
| IPv6 Address 2001:db8:4672:6565:2026:5043:2d42:5344/64 |
| Default Router 2001:db8:4672:6565::1 |
|-----|
| < OK > <Cancel> |
|-----|
```

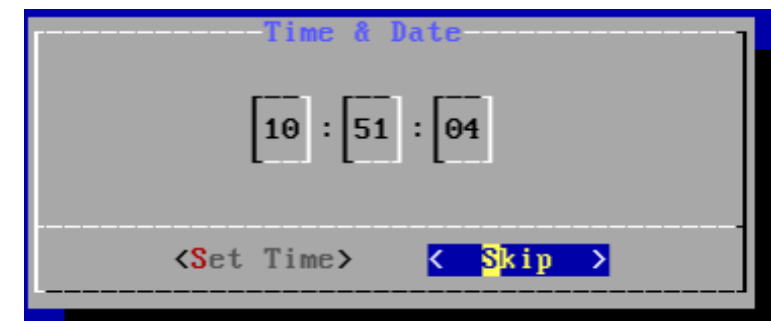
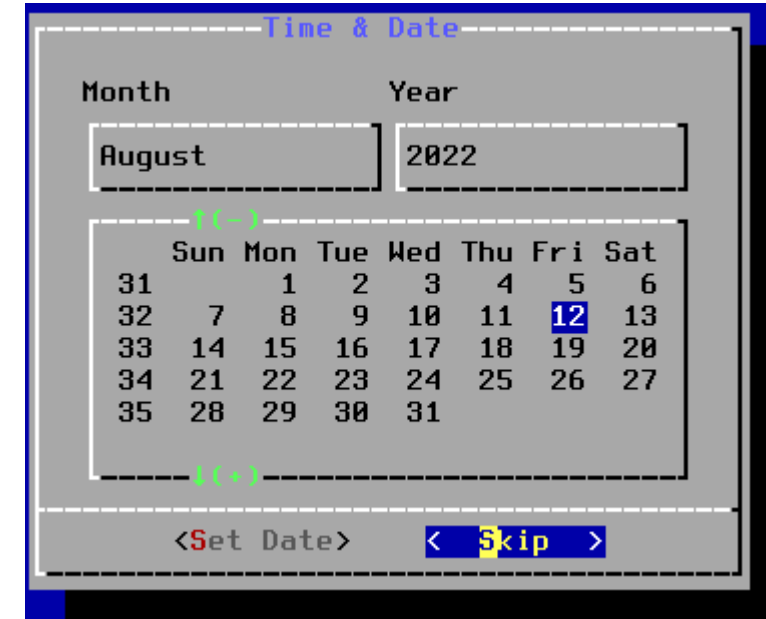
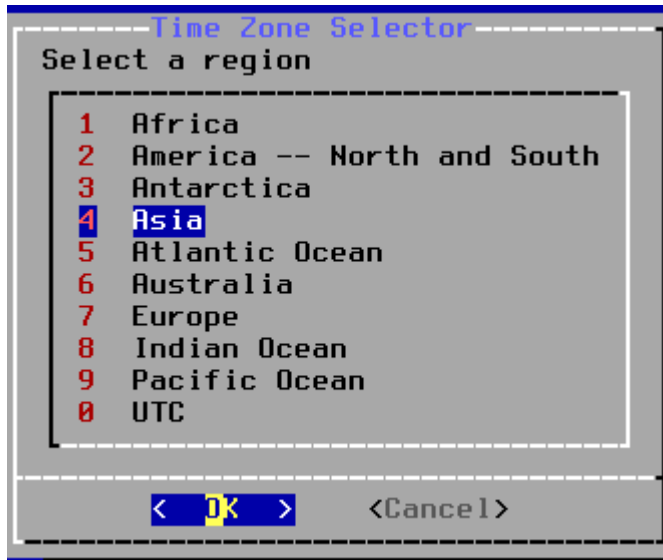

Post-installation

- Configuring DNS



Post-installation

- Setting the Time Zone
 - Asia → Taiwan



Post-installation

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

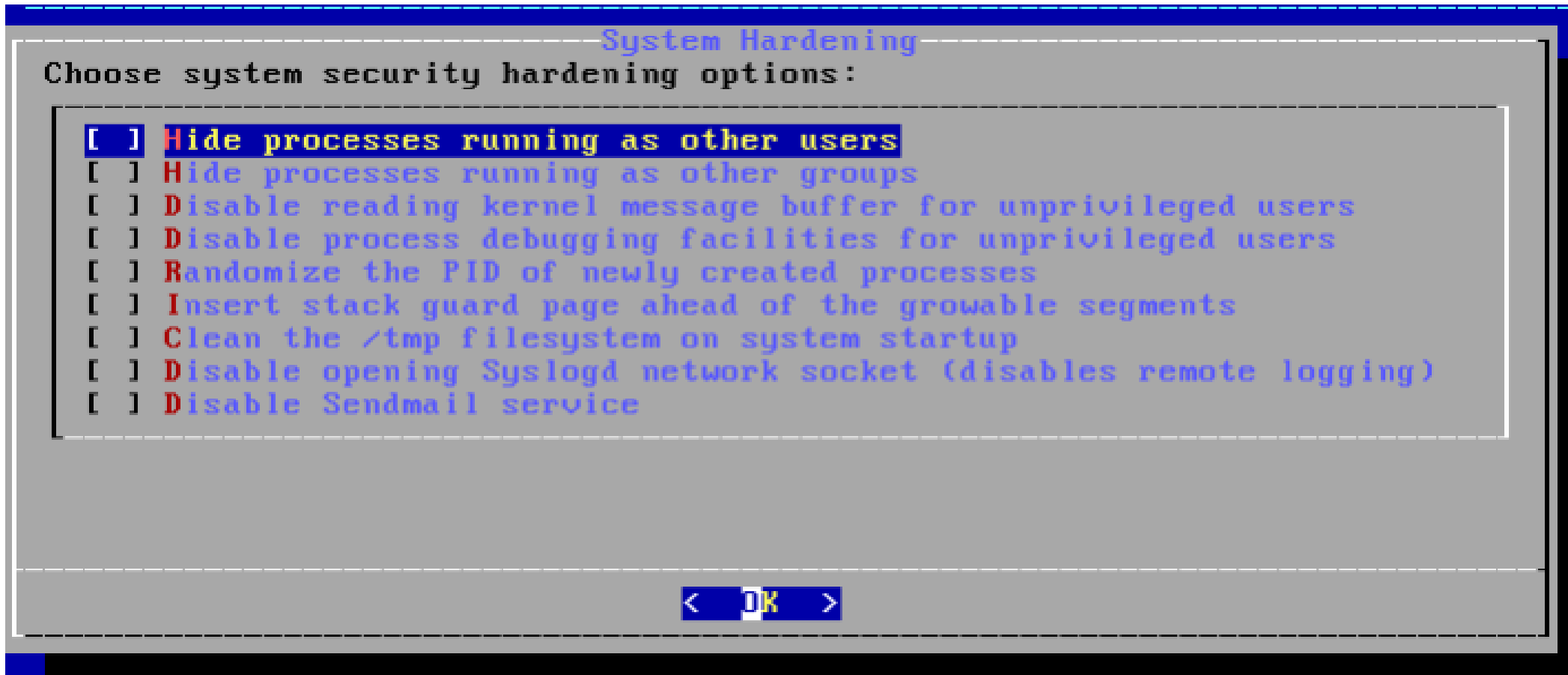
```
System Configuration
Choose the services you would like to be started at boot:

[ ] local_unbound  Local caching validating resolver
[*] sshd          Secure shell daemon
[ ] moused        PS/2 mouse pointer on console
[*] ntpdate       Synchronize system and network time at bootime
[*] ntpd          Synchronize system and network time
[ ] powerd        Adjust CPU frequency dynamically if supported
[ ] dumpdev       Enable kernel crash dumps to /var/crash

< OK >
```

Post-installation

- Selecting system security hardening options
 - Use default settings



Post-installation

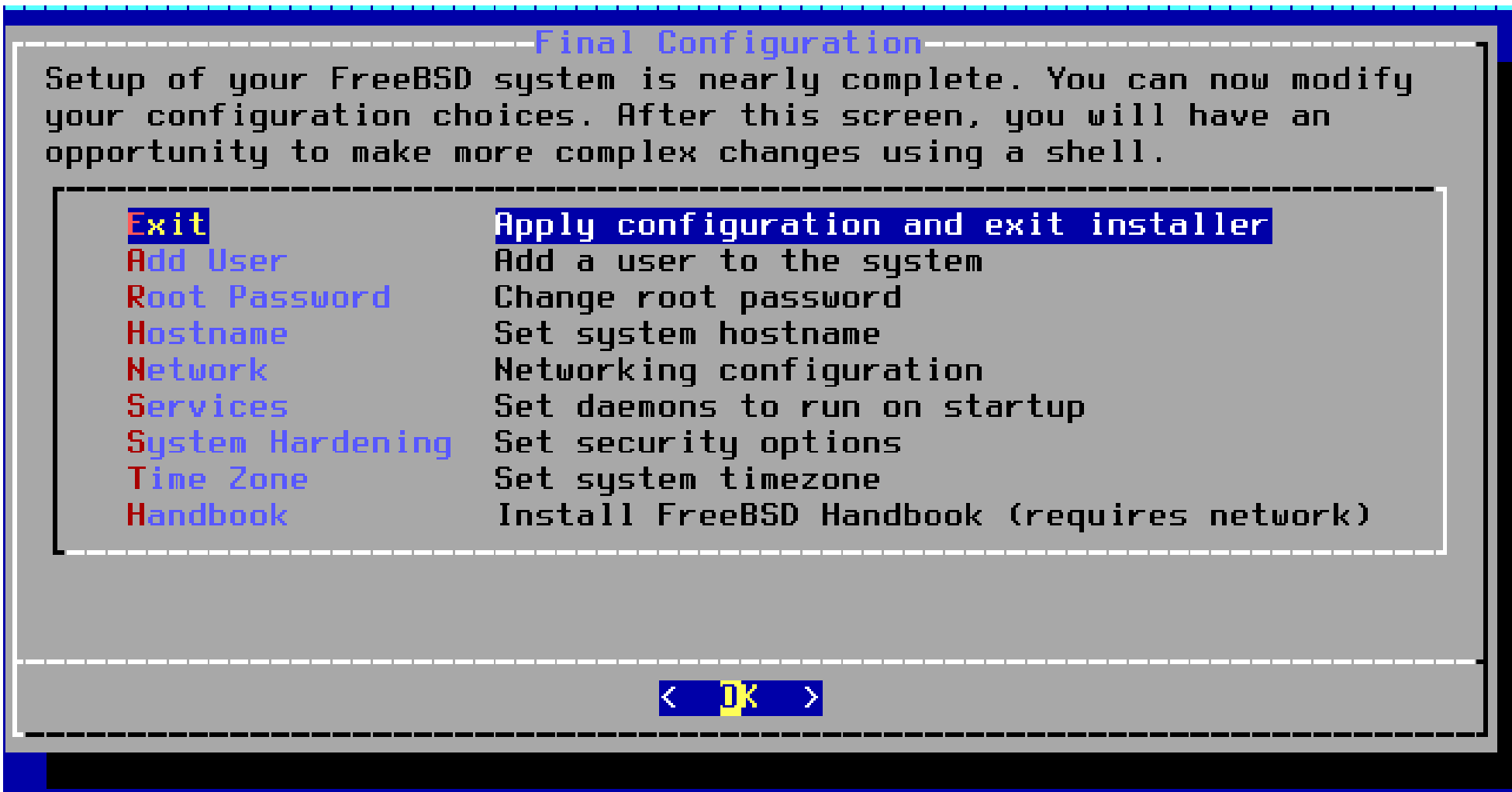
- Add Users
 - Username - **tsaimh**
 - Full name - **Meng-Hsun Tsai**
 - Uid - User ID. Typically **left blank for default**.
 - Login group - The user's group. - "**staff**" is good for you
 - Invite user into other groups? - **wheel**
 - Login class - Typically **left blank for default**.
 - Shell - The interactive shell for this user. CSCC 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".

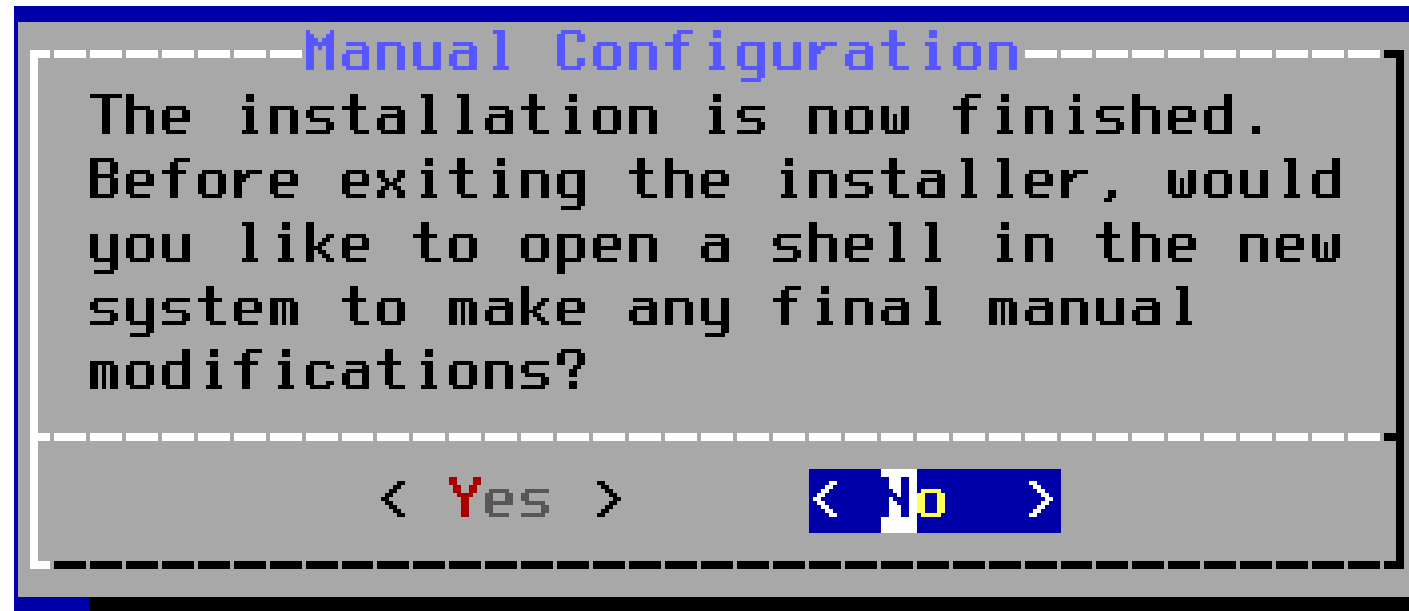
Post-installation

- Final Configuration



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 "13.1-RELEASE"

FreeBSD Handbook

- Chapter 2. Installing FreeBSD (FreeBSD 9.0 Release and Later)
 - <http://www.tw.freebsd.org/doc/en/books/handbook/bsdinstall.html>
- Chinese resources
 - https://www.tw.freebsd.org/doc/zh_TW/books/handbook/bsdinstall.html

Appendix

bsdinstall – Manual (UFS)

國立陽明交通大學資工系資訊中心

Computer Center, Department of Computer Science, NYCU

bsdinstall – Manual (UFS)

- Guided partitioning result

```
+----- Partition Editor -----+
| Please review the disk setup. When complete, press |
| the Finish button.                               |
+-----+
| ada0             12 GB       GPT                   |
|   ada0p1         64 kB       freebsd-boot           |
|   ada0p2         11 GB       freebsd-ufs             |
|   ada0p3         627 MB      freebsd-swap           |
|                                           none      |
|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:| |
|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:| |
|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:|:| |
+-----+
| <Create> <Delete> <Modify> <Revert> <Auto> <Finish> |
+-----+
```

bsdinstall – Manual (UFS)

- Guided partitioning
 - Select disk

- How to partition the disk
 - Entire Disk
 - Partition – use free space

```
----- Partitioning -----  
Select the disk on which to install FreeBSD.  
+-----+  
|  ada0  12 GB ATA Hard Disk <UBOX HARDDISK> |  
|  ada1  10 GB ATA Hard Disk <UBOX HARDDISK> |  
+-----+  
  
| < OK > | < Cancel > |
```

```
----- Partition -----  
Would you like to use this entire disk  
(ada0) for FreeBSD or partition it to  
share it with other operating systems?  
Using the entire disk will erase any  
data currently stored there.  
+-----+  
| < Entire Disk > | < Partition > |
```

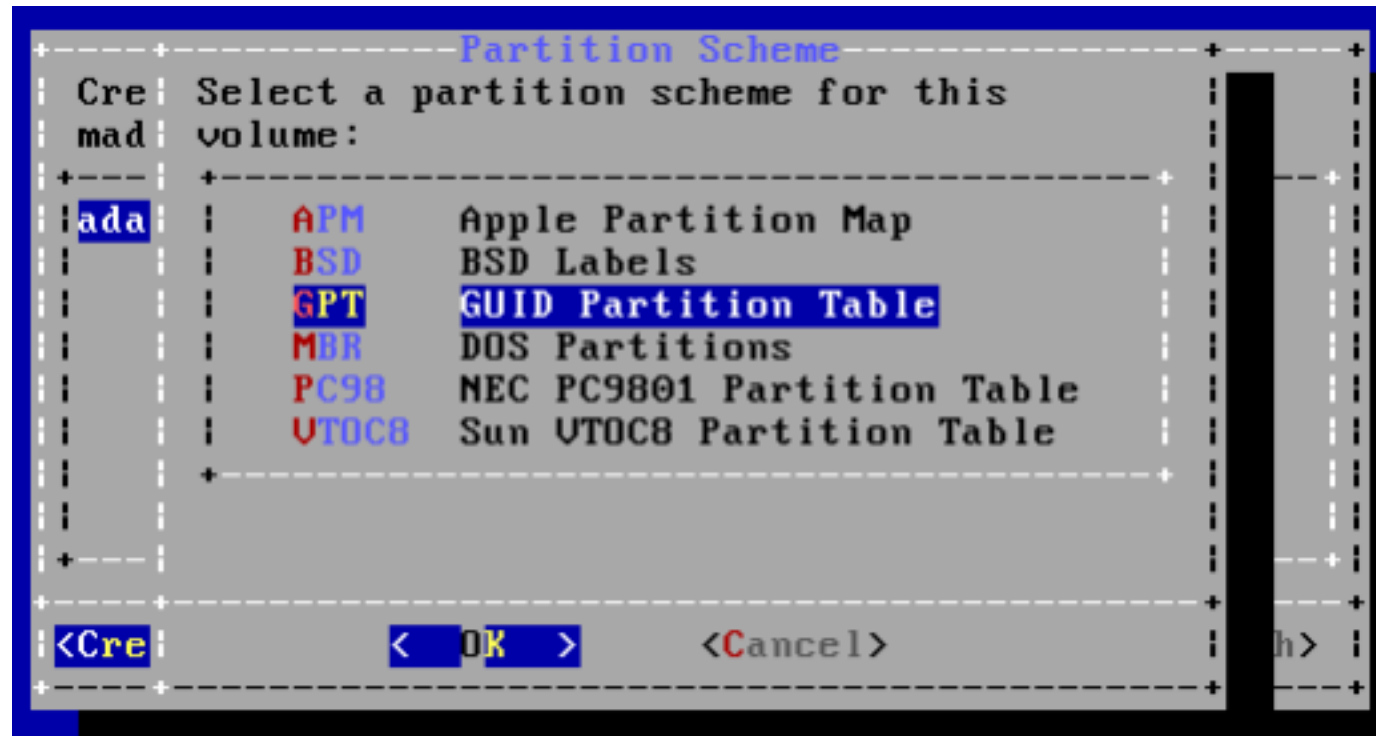
bsdinstall – Manual (UFS)

- Manual Partitioning

```
+-----Partition Editor-----+
| Create partitions for FreeBSD. No changes will be |
| made until you select Finish.                   |
+-----+-----+
| ada0                12 GB                    |
|                                                    |
|                                                    |
|                                                    |
|                                                    |
+-----+-----+
| <Create> <Delete> <Modify> <Revert> <Auto> <Finish> |
+-----+-----+
```

bsdinstall – Manual (UFS)

- Choose a partitioning scheme
 - Master Boot Record (MBR)
 - 4 Primary Partition, 1 Extended Partition, multiple Logical Partition
 - GUID Partition Table (GPT)
 - 128 Partitions per disk
 - **DON'T use BSD**
 - Some disk tools cannot identify this label



bsdinstall – Manual (UFS)

- Add partitions
 - freebsd-boot
 - FreeBSD boot code. This partition must be first on the disk.

```
----- Partition Editor -----
| Create partitions for FreeBSD. No changes will be |
| made un----- Add Partition -----|
|-----|-----|-----|-----|
| ada0 | |Type:   | freebsd-ufs |
|       | |Size:   | 12GB       |
|       | |Mountpoint: |           |
|       | |Label:  |           |
|       | +-----+-----+-----+-----+
|       | |-----|-----|-----|-----|
|       | | OK  | <Options> | <Cancel > |
|       | +-----+-----+-----+-----+
|-----|-----|-----|-----|
| <Create> | <Delete> | <Modify> | <Revert> | <Auto > | <Finish> |
|-----|-----|-----|-----|
```

bsdinstall – Manual (UFS)

- Final confirmation

```
+-----Partition Editor-----+
| Please review the disk setup. When complete, press |
| the Finish button.                                |
+-----+
+-----Confirmation-----+
| Your changes will now be written to disk. If you  |
| have chosen to overwrite existing data, it will  |
| be PERMANENTLY ERASED. Are you sure you want to  |
| commit your changes?                             |
+-----+
| < Commit > <Revert & Exit> < Back >              |
+-----+
+-----+
| <Create> <Delete> <Modify> <Revert> < Auto > <Finish> |
+-----+
```

bsdinstall – Manual (UFS)

- Reference (handbook)
 - <https://www.freebsd.org/doc/handbook/bsdinstall-partitioning.html>
 - https://www.freebsd.org/doc/zh_TW/books/handbook/bsdinstall-partitioning.html