

Install FreeBSD

Reference: [NYCU CSCC SA Course](#)

國立成功大學資訊工程系

Department of Computer Science and Information Engineering, NCKU

Outline

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

FreeBSD Version

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FreeBSD Branches/Tags

- Three parallel development branches:
 - RELEASE
 - Suitable for production use
 - Latest Release: 13.1 (May, 2022) (13.2 is expected in March 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 (2023)
 - <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)

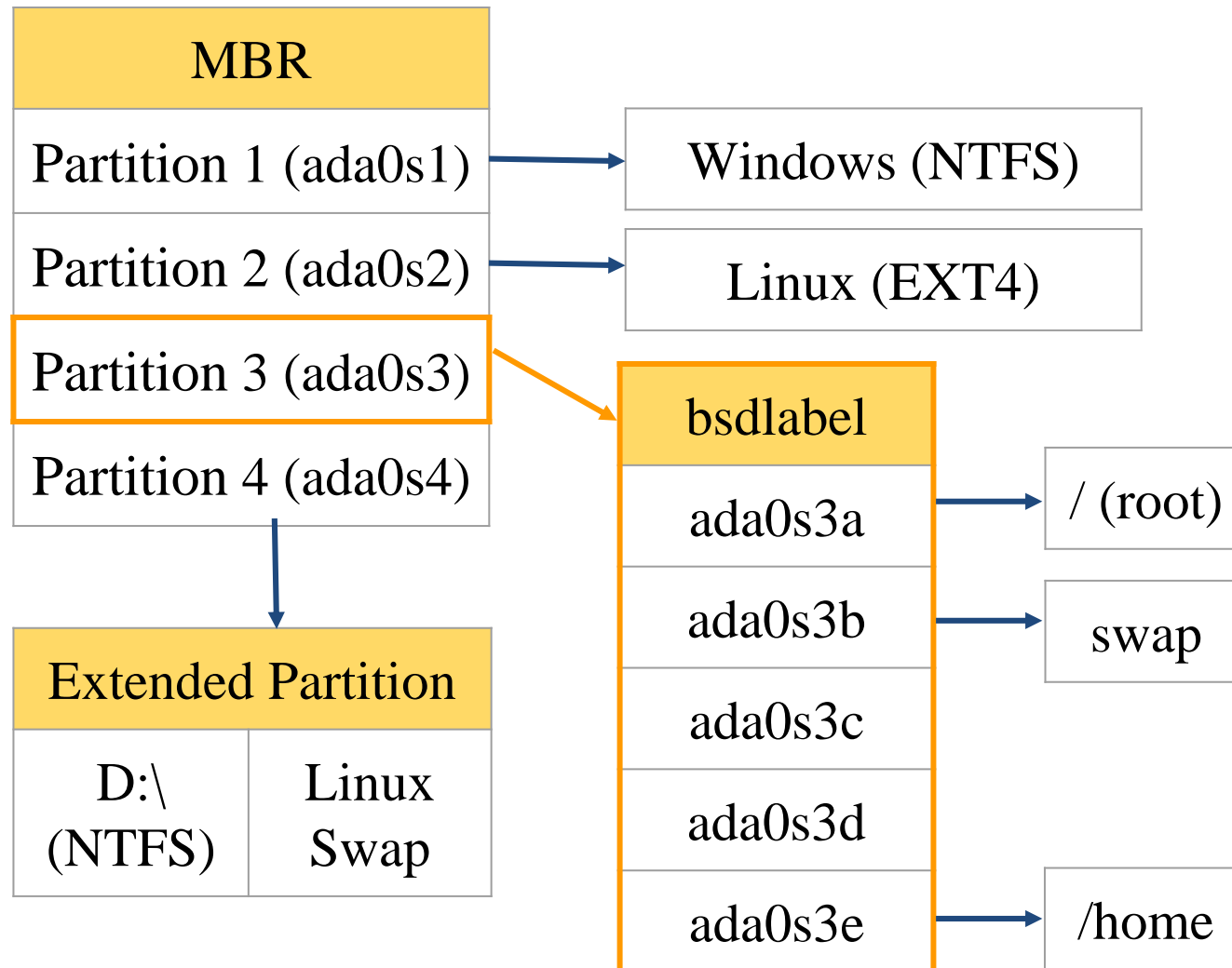
- Guided partitioning layout (GPT) between UFS and Root on ZFS

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

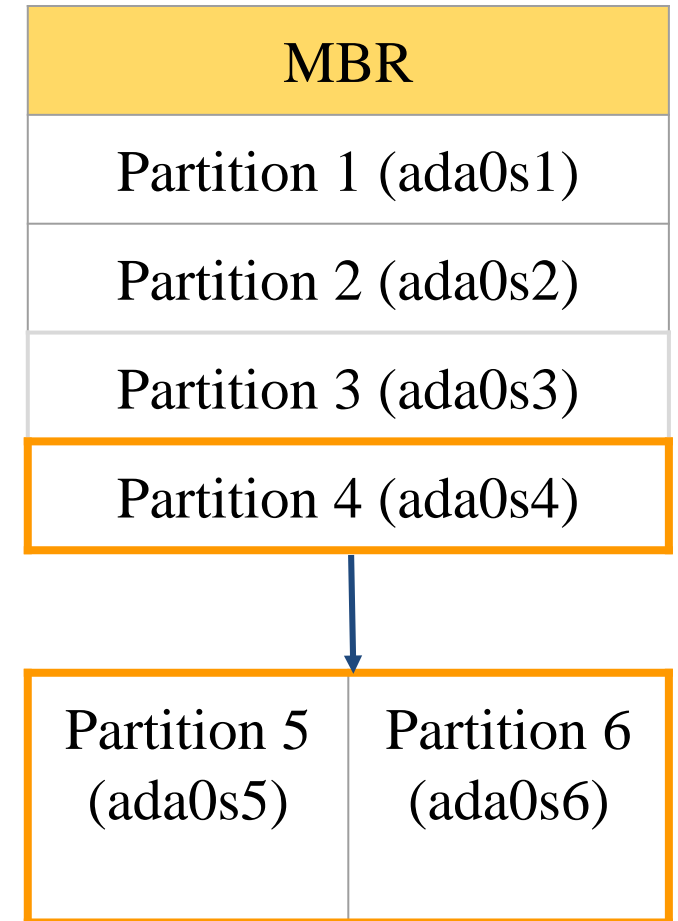
View of Disk (2)

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

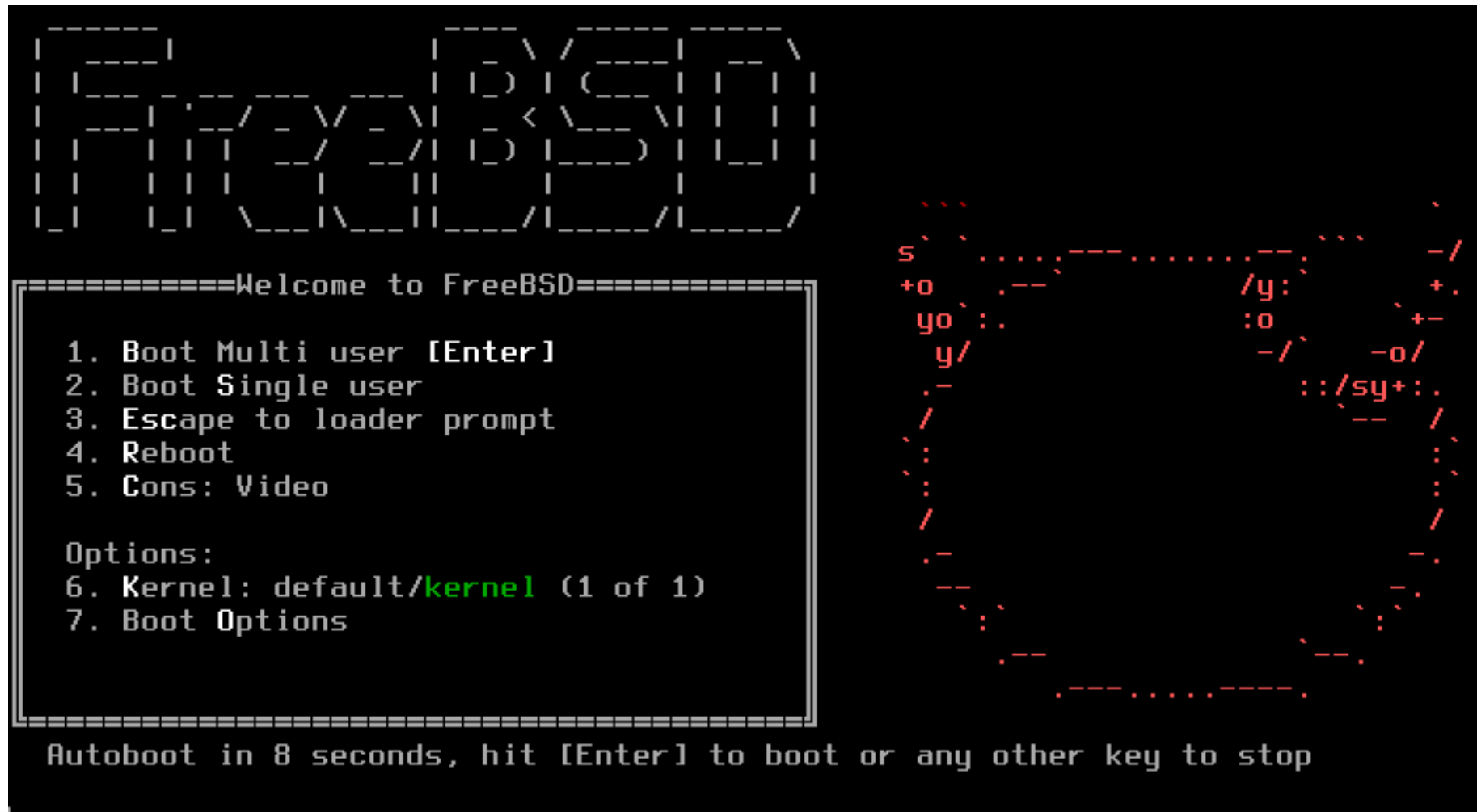
- Virtual Machine
 - VirtualBox 、 VMware 、 KVM
- Network Information
 - IP address
 - Subnet mask
 - Default router IP address
 - domain name of the local network
 - DNS server IP address(es)
- Prepare the Installation Media
 - <https://www.freebsd.org/where.html>
 - Installer image (iso, disc1 or dvd1)

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

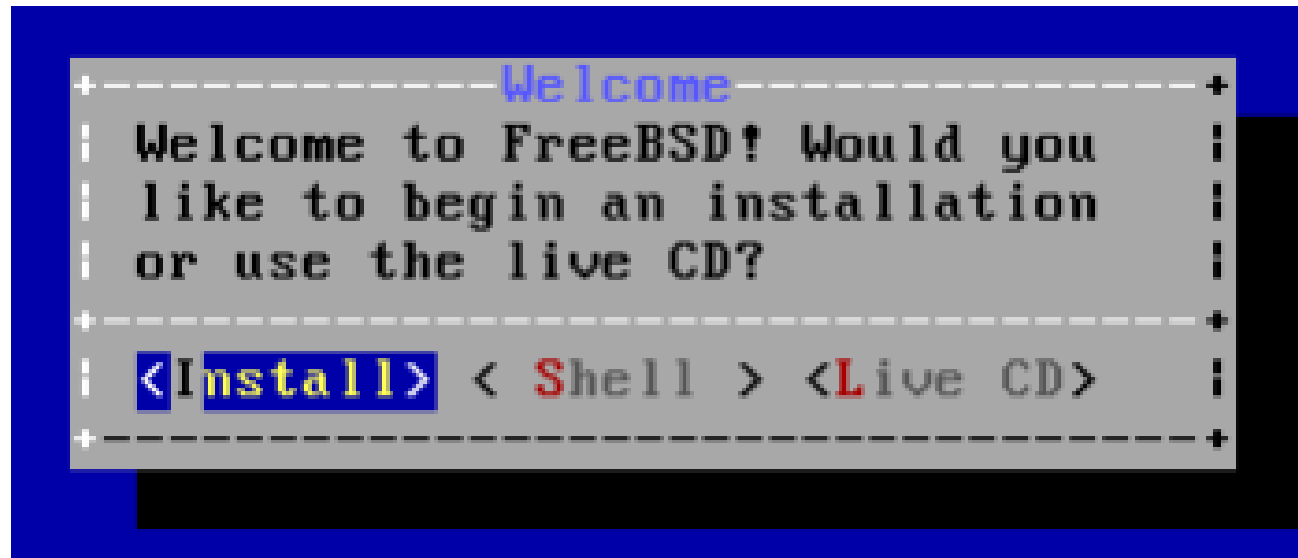
bsdinstall – (1)

- Boot screen of FreeBSD 13.1
 - Press Enter or Wait for autoboot



bsdinstall – (2)

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

A screenshot of the FreeBSD bsdinstall menu. The menu is displayed in a terminal window with a blue border. The text is as follows:

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

The word "Welcome" is in blue. The options "<Install>", "< Shell >", and "<Live CD>" are in red. The "<Install>" option is highlighted with a blue background.

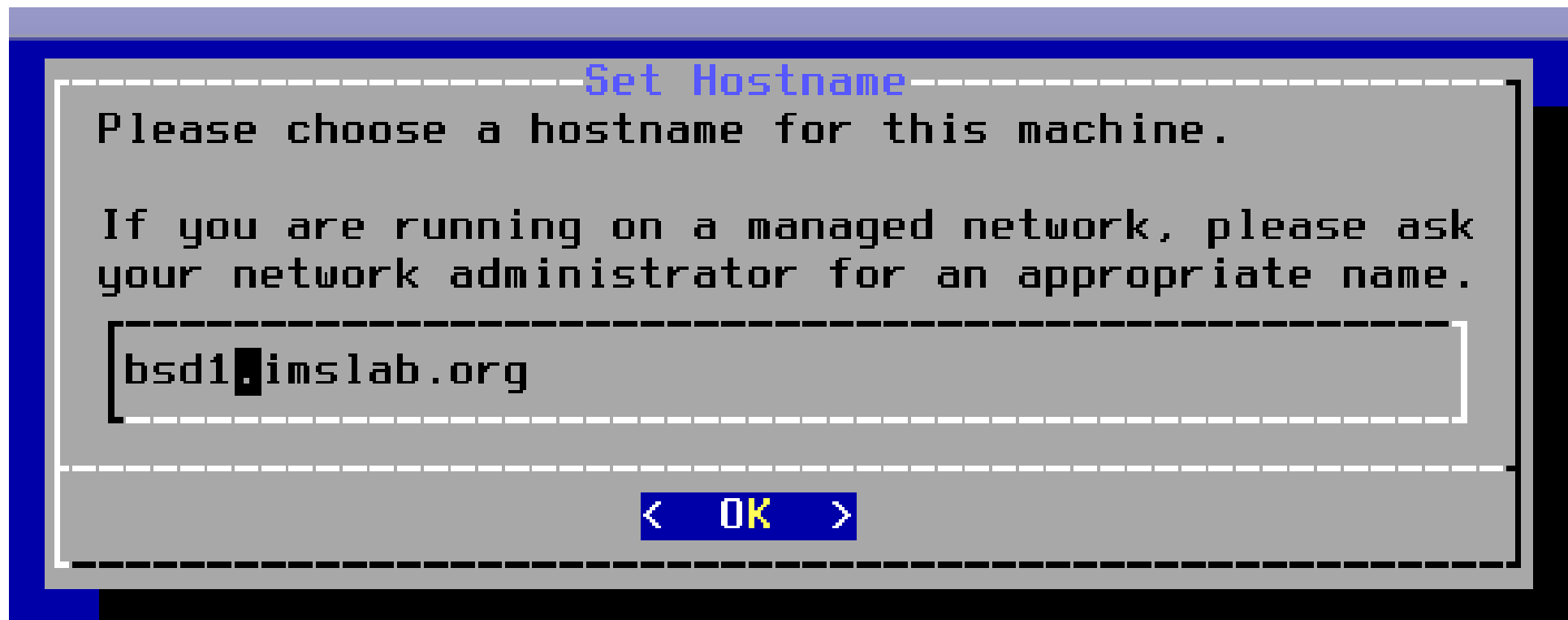
bsdinstall – (3)

- 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]-----+
+-----+-----+
```

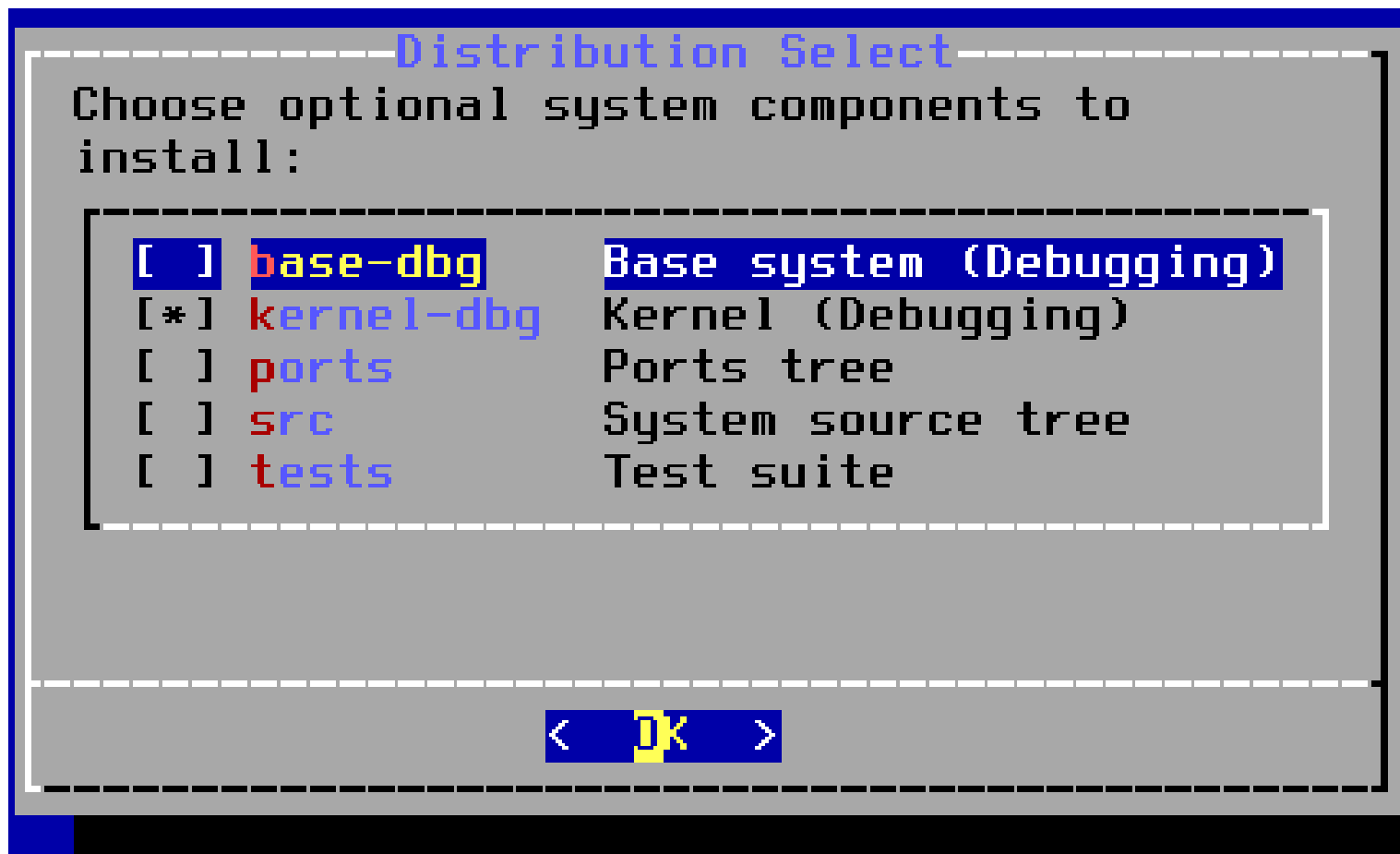
bsdinstall – (4)

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



bsdinstall – (5)

- Select components to install
 - use default settings



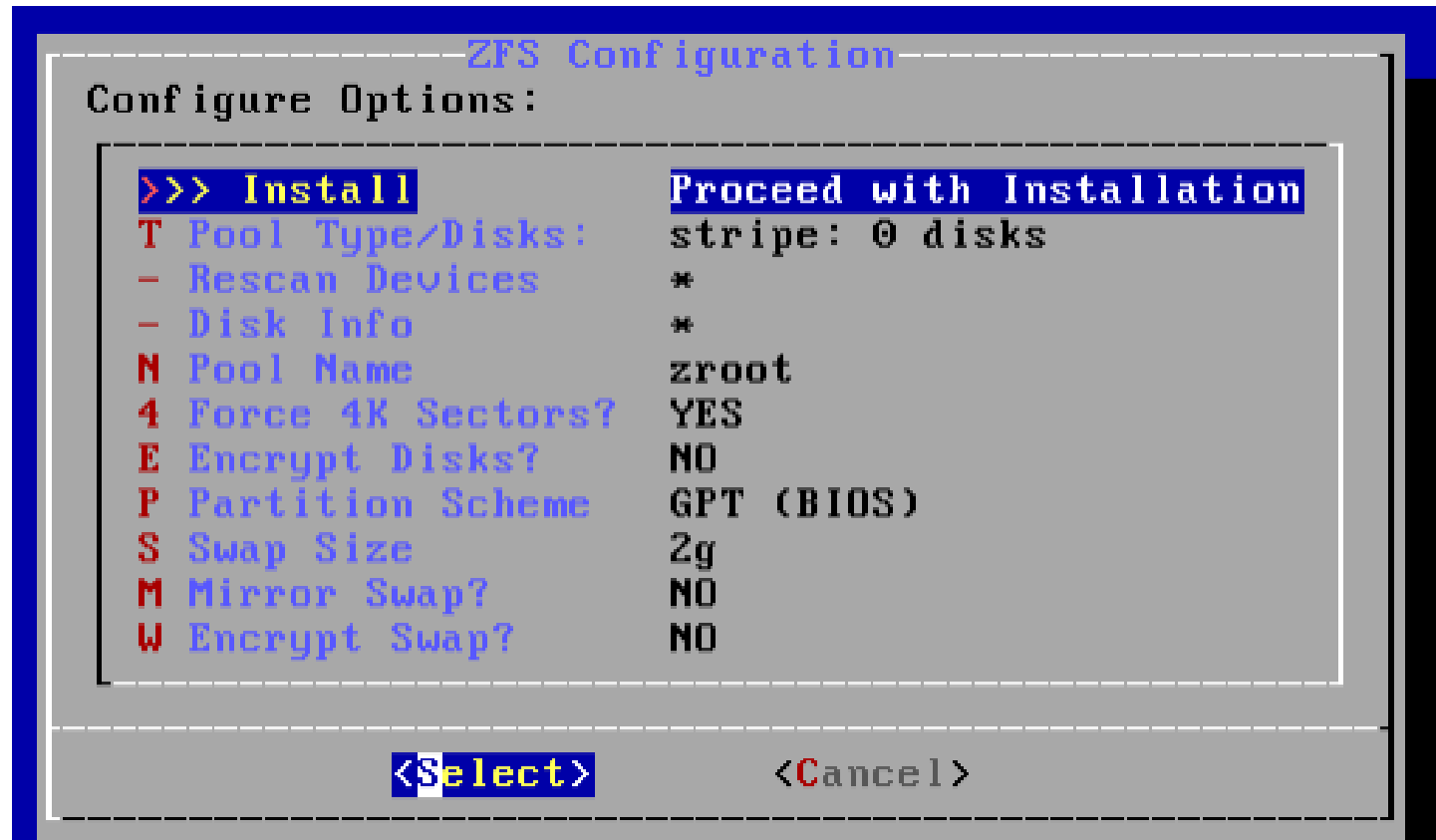
bsdinstall – (6)

- Partitioning methods
 - Shell – [gpart\(8\)](#) 、 [fdisk\(8\)](#) 、 [bsdlabel\(8\)](#)
 - Use Auto (ZFS)



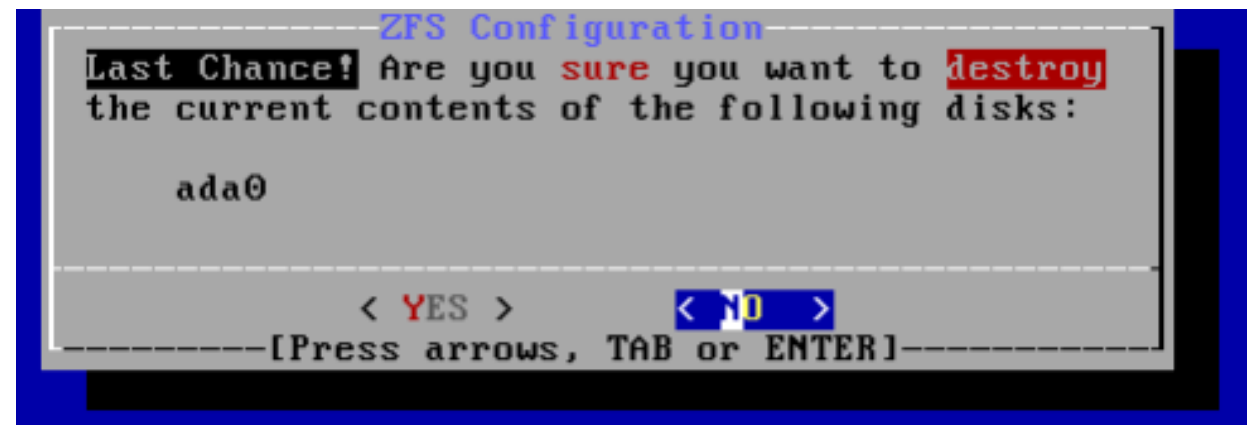
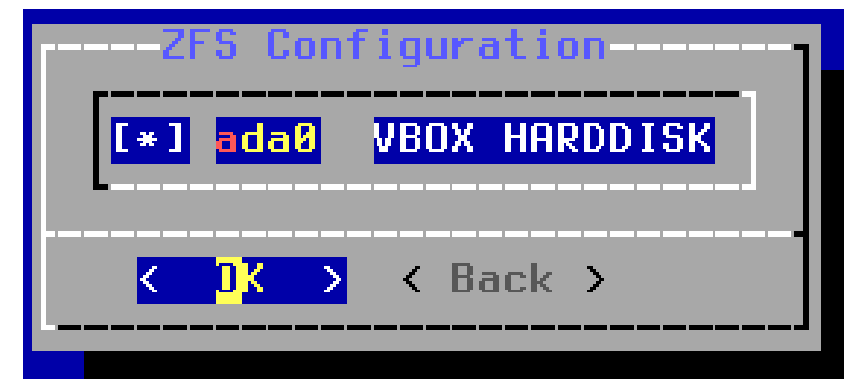
bsdinstall – (7) Auto (ZFS)

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



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

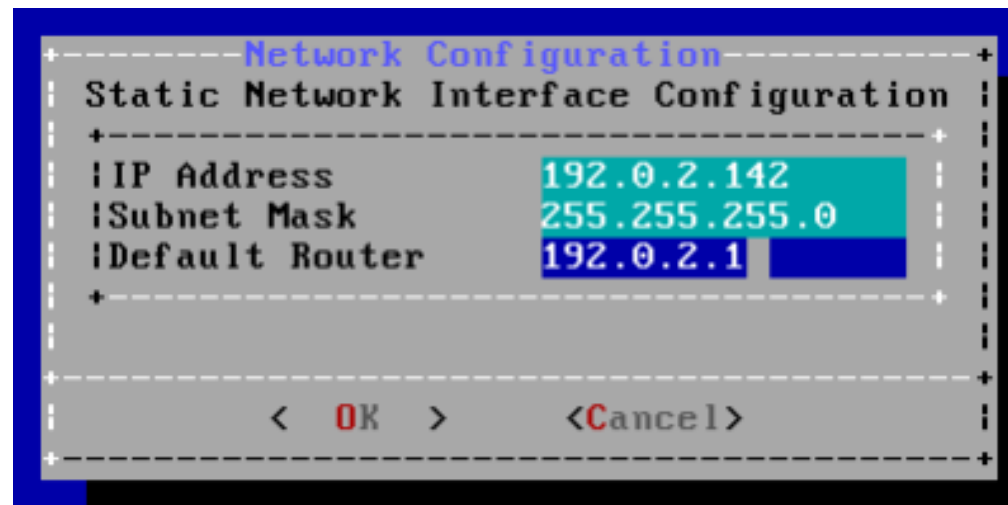
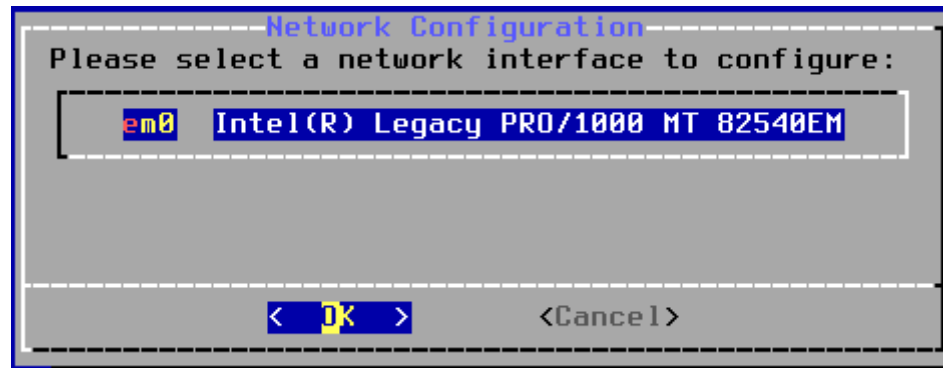
- Setting the root Password

```
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:█
```

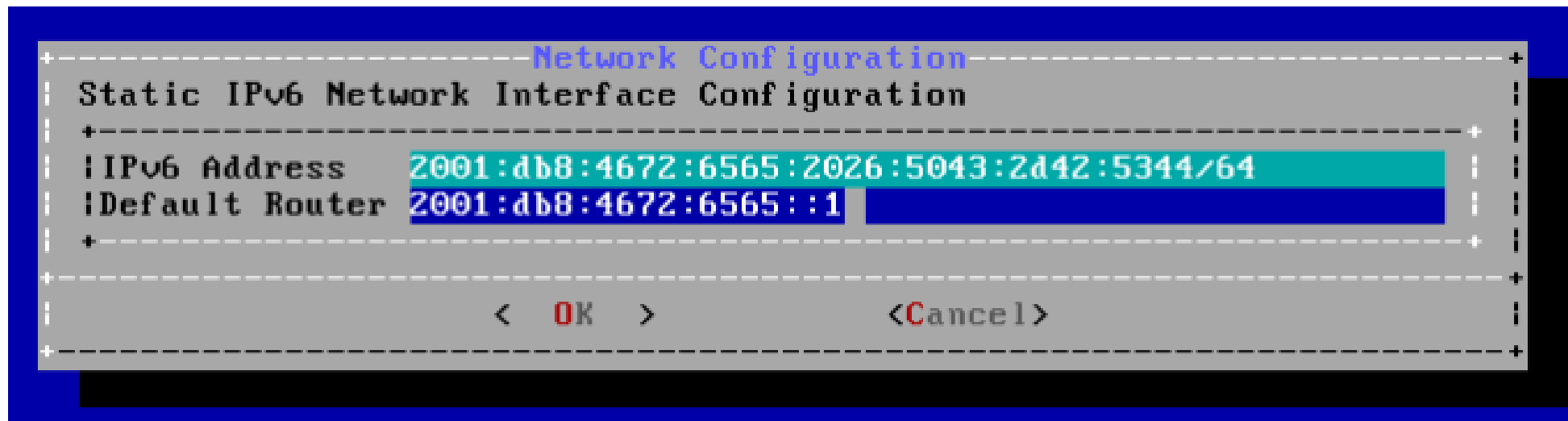
Post-installation

- Select a network interfaces
- Configuring IPv4 Networking with DHCP



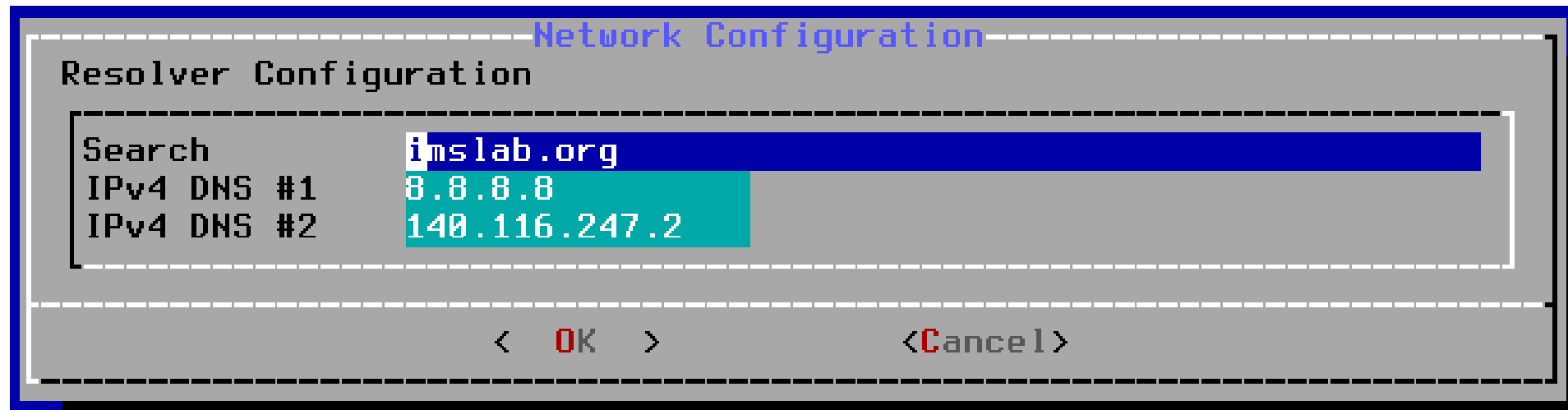
Post-installation

- 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.**



Post-installation

- Configuring DNS



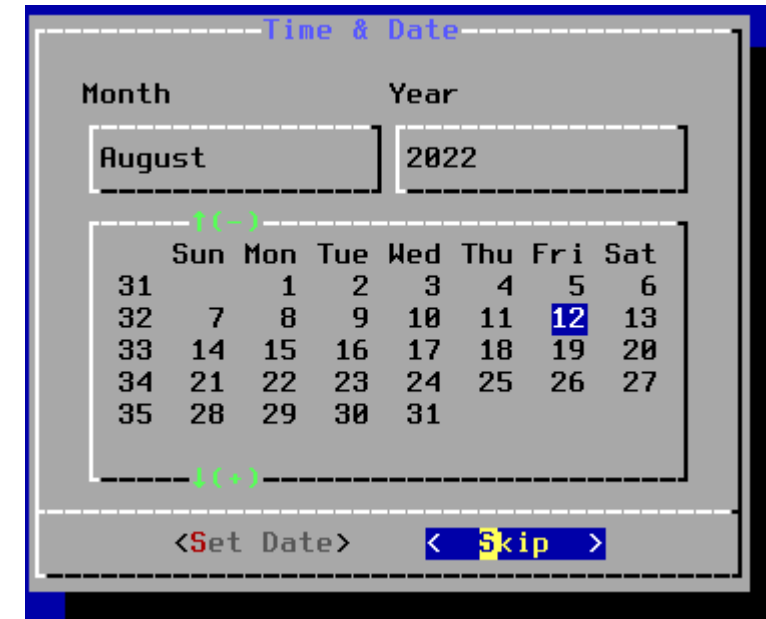
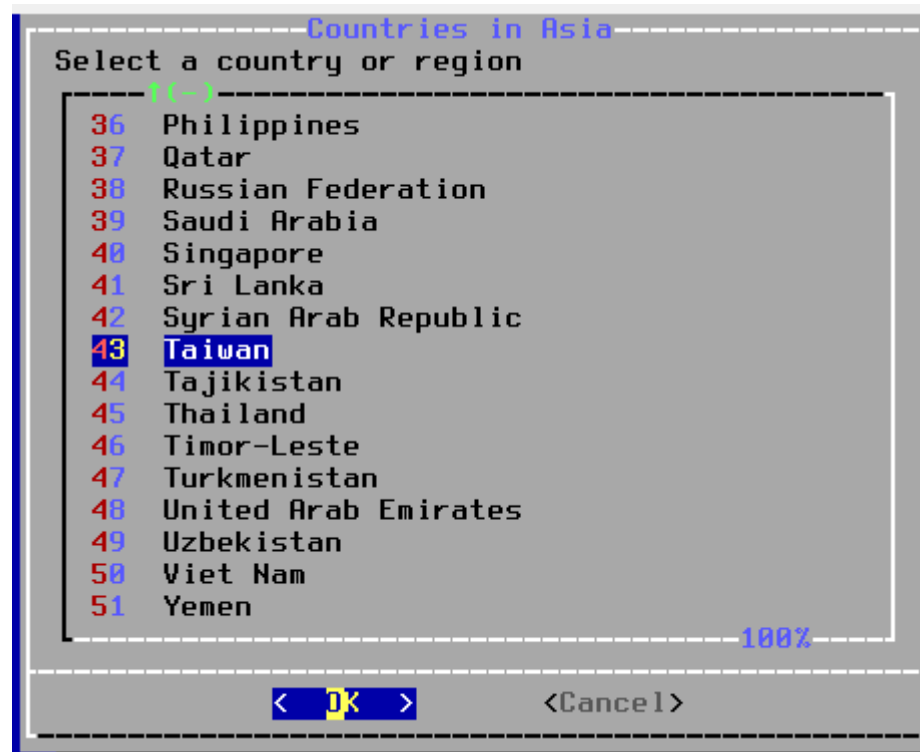
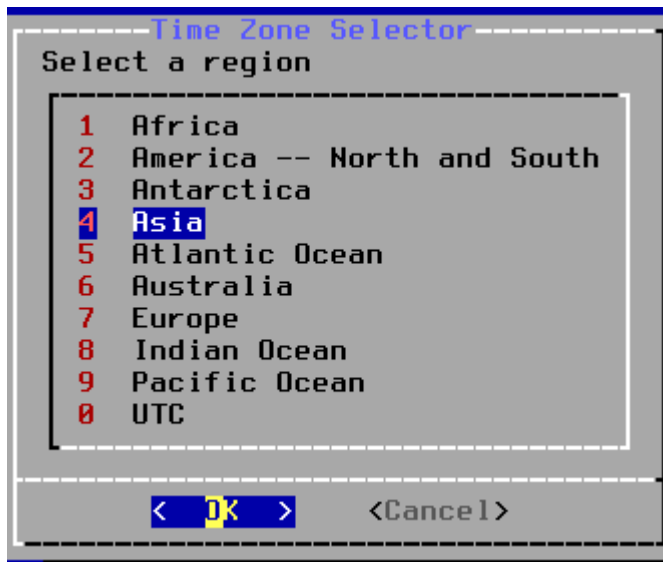
The image shows a terminal window titled "Network Configuration" with a sub-section "Resolver Configuration". Inside, there are three input fields: "Search" with the value "imslab.org", "IPv4 DNS #1" with the value "8.8.8.8", and "IPv4 DNS #2" with the value "140.116.247.2". At the bottom of the window are two buttons: "< OK >" and "<Cancel>".

Resolver Configuration	
Search	imslab.org
IPv4 DNS #1	8.8.8.8
IPv4 DNS #2	140.116.247.2

< OK > <Cancel>

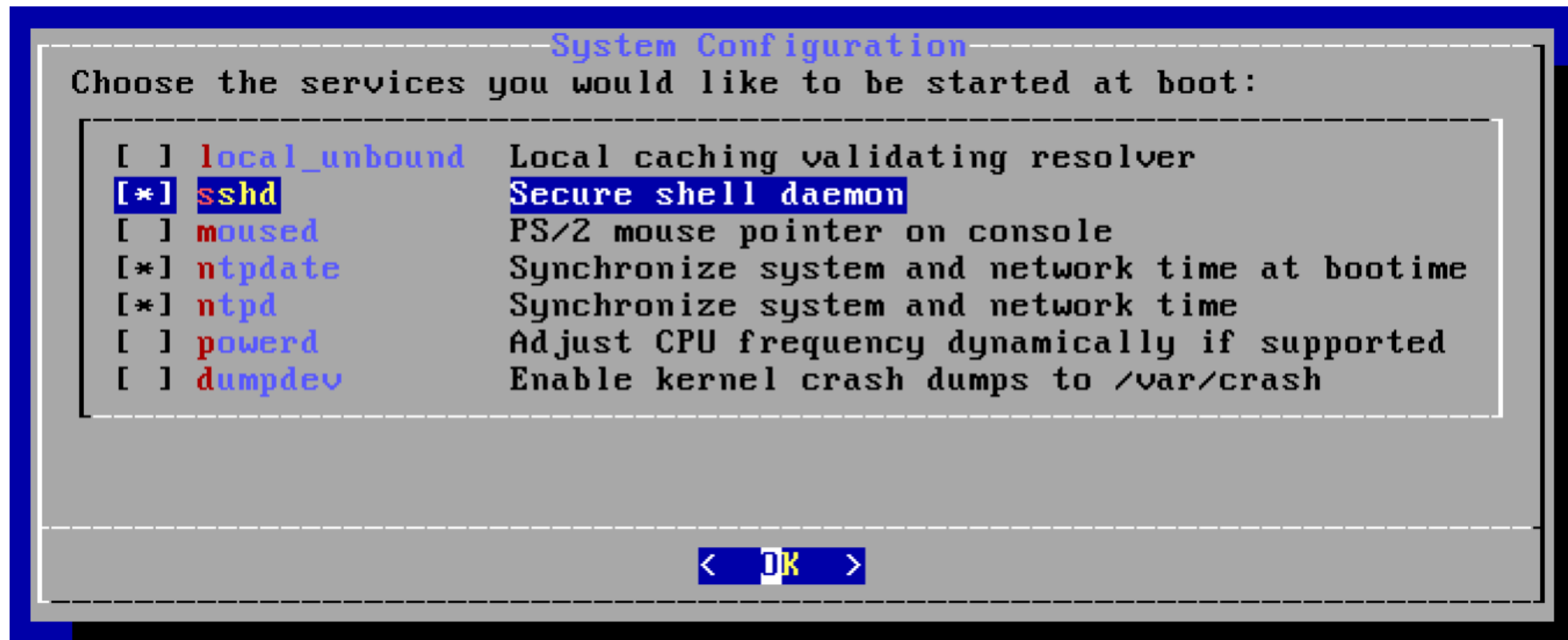
Post-installation

- Setting the Time Zone
 - Asia → Taiwan



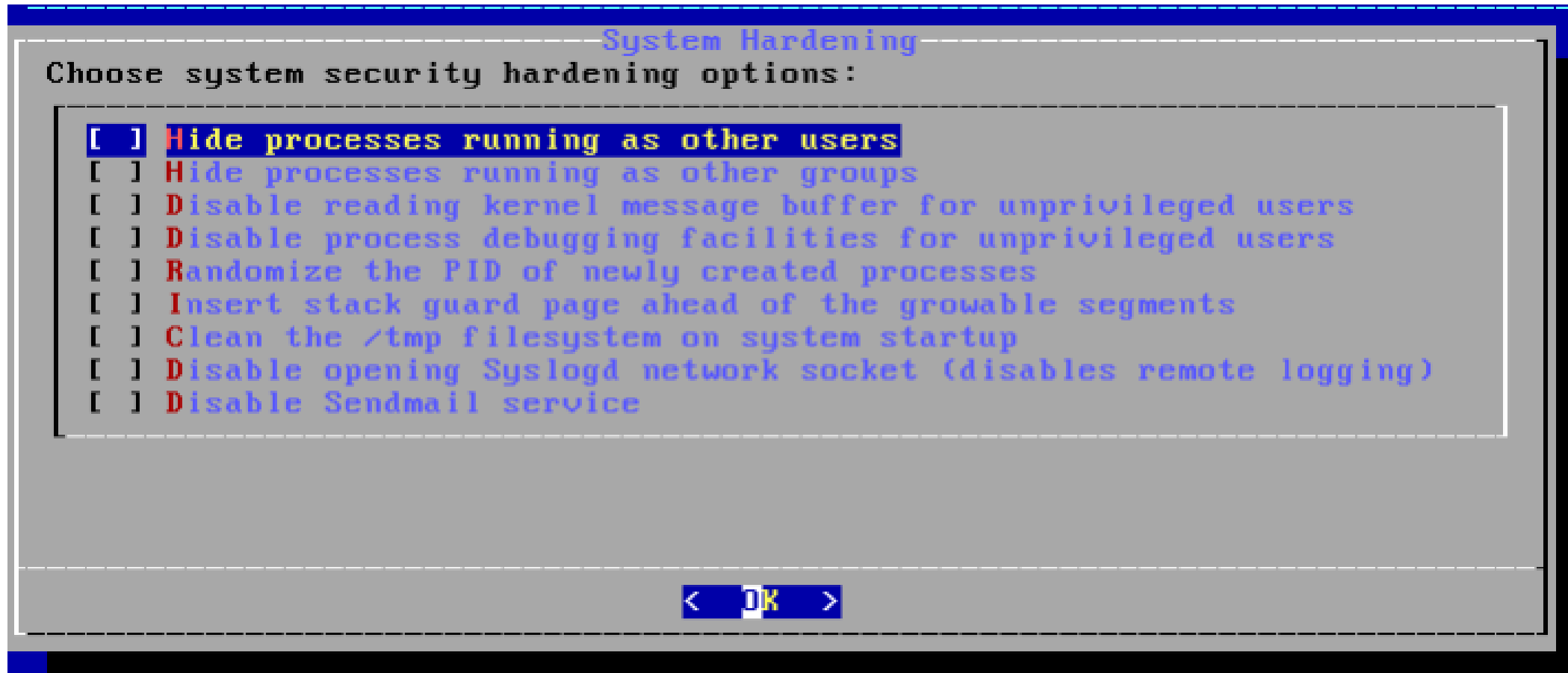
Post-installation

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



Post-installation

- Selecting system security hardening options
 - Use default settings



Post-installation

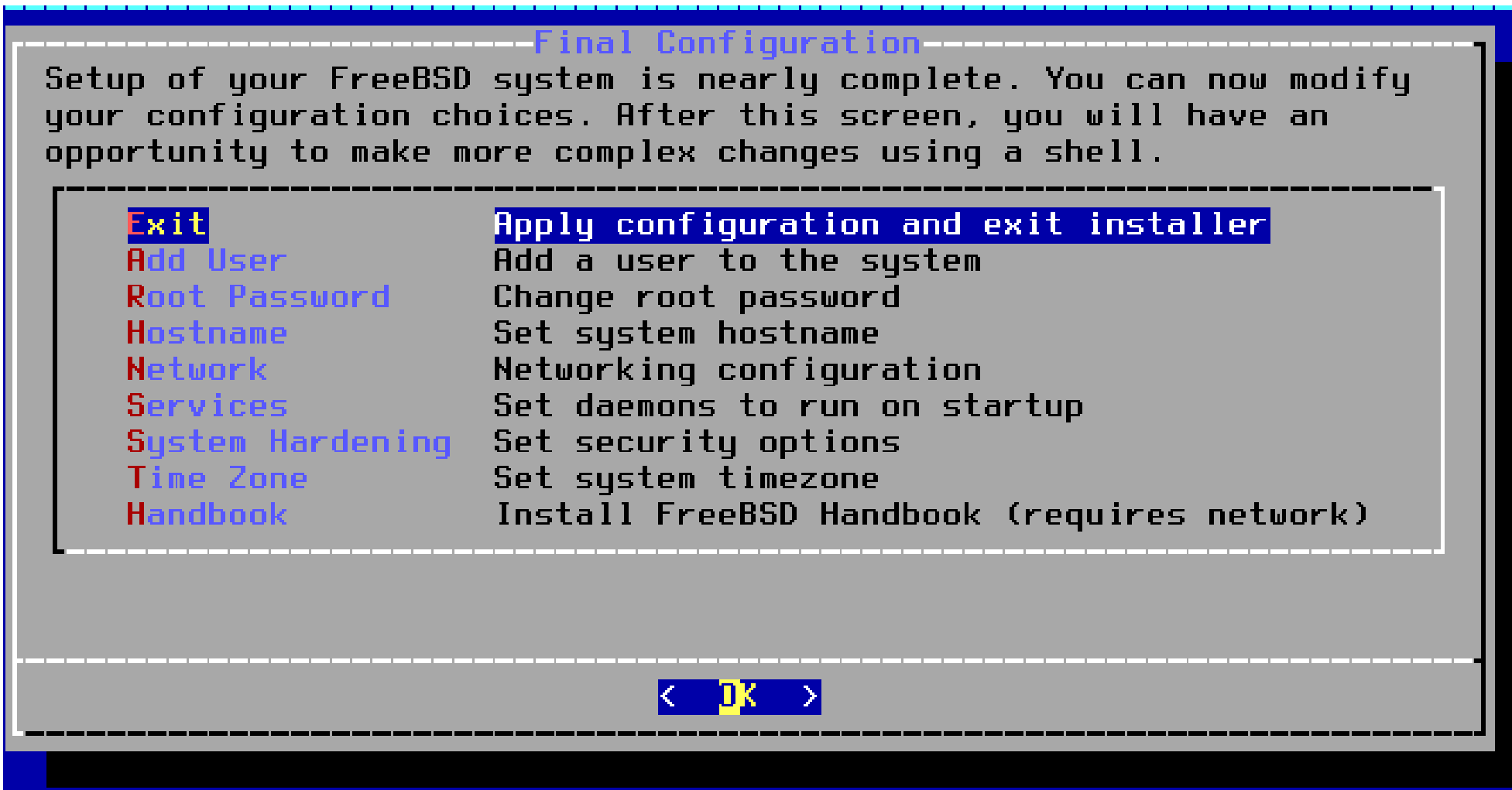
- Add Users
 - Username - **tsaimh**
 - Full name - **Meng-Hsun Tsai**
 - Uid - User ID. Typically **left blank for default**.
 - Login group - The user's group. - "**staff**" is good for you
 - Invite user into other groups? - **wheel**
 - Login class - Typically **left blank for default**.
 - Shell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

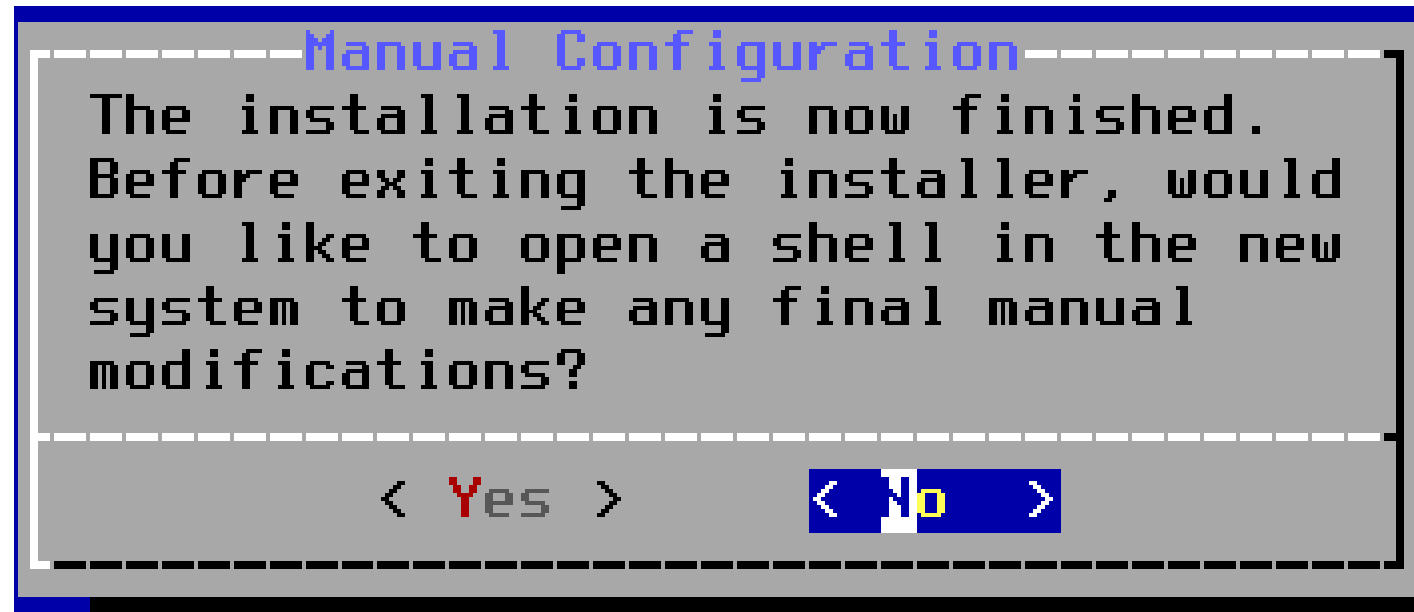
Post-installation

- 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)

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bsdinstall – Manual (UFS)

- Guided partitioning result

```
+-----Partition Editor-----+
| Please review the disk setup. When complete, press |
| the Finish button.                                |
+-----+
| ada@          12 GB      GPT                        |
|   ada@p1      64 kB      freebsd-boot                |
|   ada@p2      11 GB      freebsd-ufs                  |
|   ada@p3      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



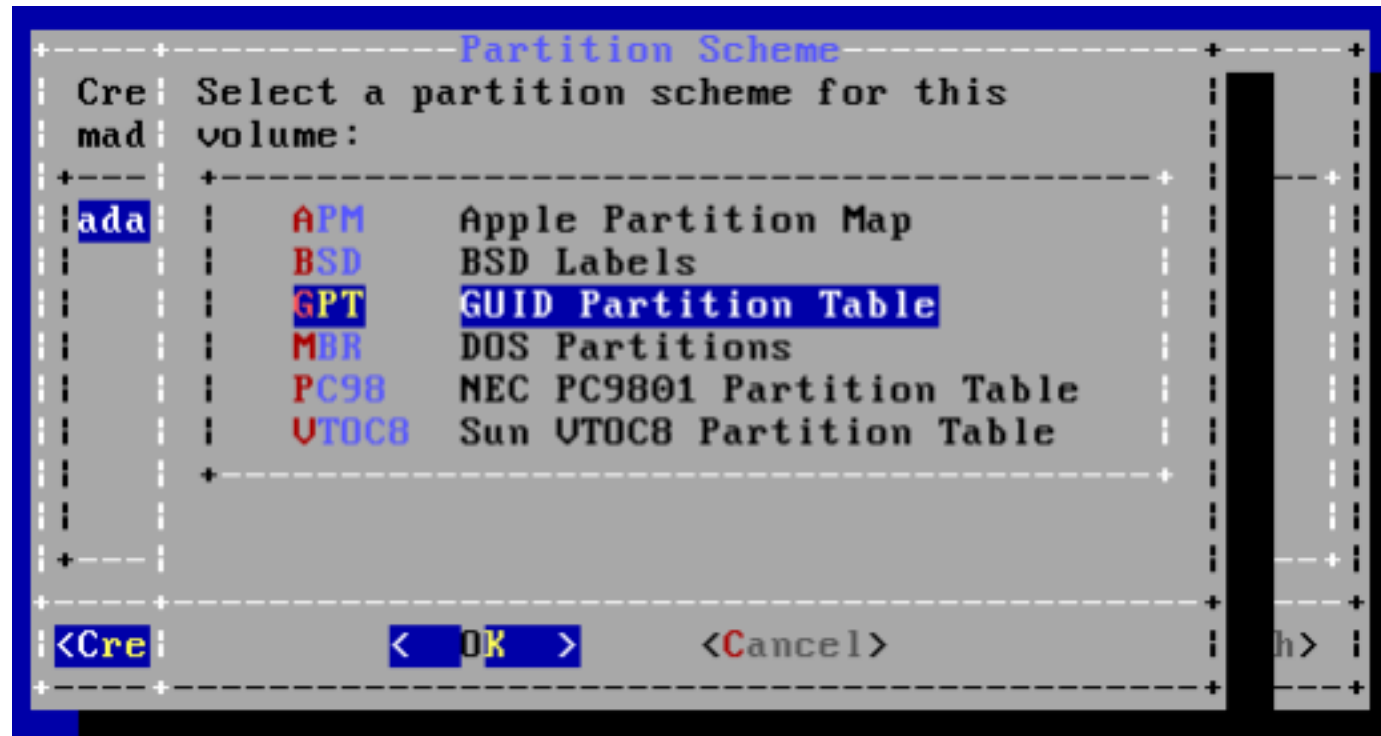
bsdinstall – Manual (UFS)

- 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> |
+-----+-----+
```

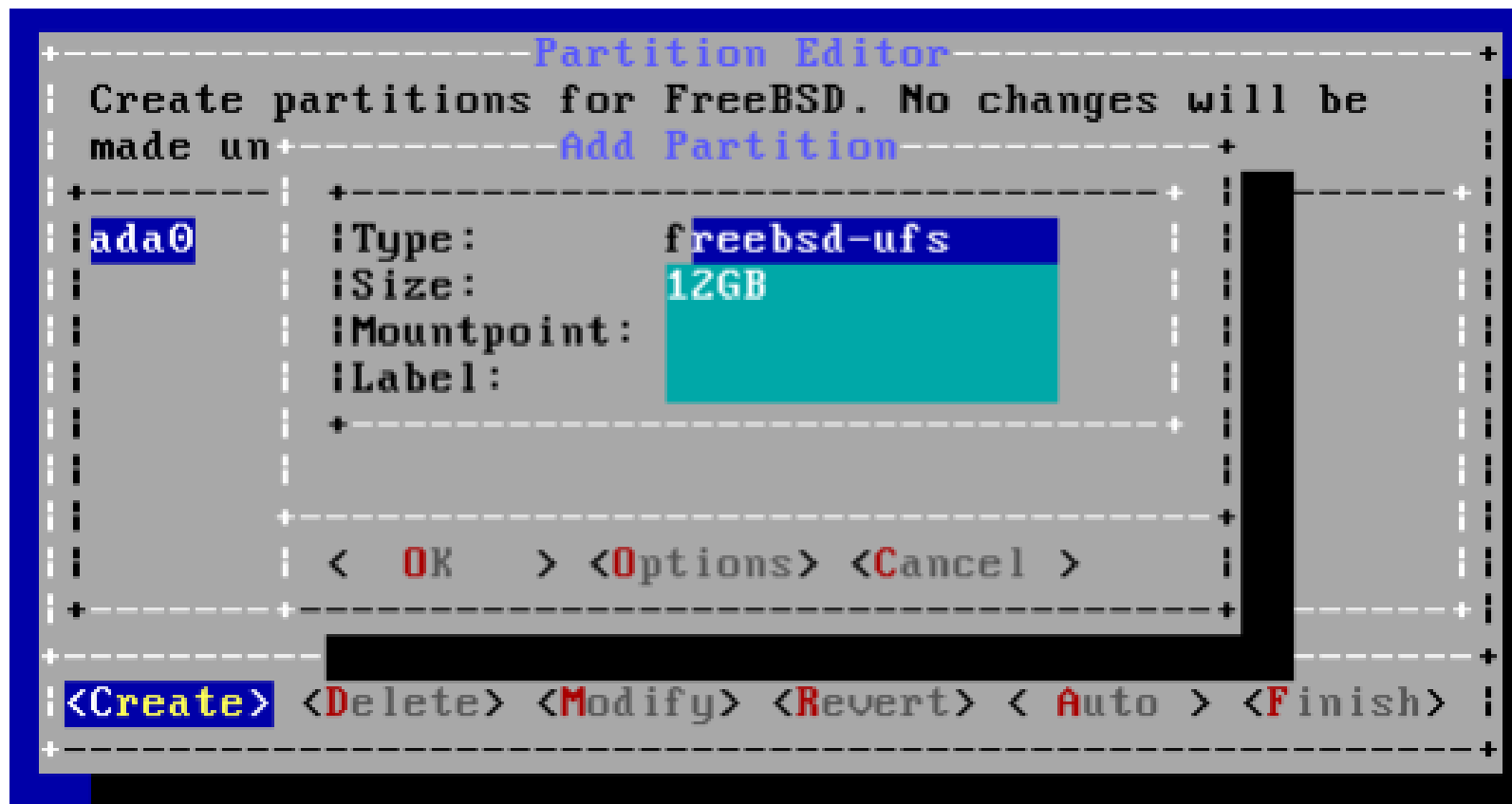
bsdinstall – Manual (UFS)

- 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.



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