

Install FreeBSD

lctseng (2019-2020, CC BY-SA)
? (1996-2018)

交大資工系資訊中心

Computer Center of Department of Computer Science, NCTU

Outline

- FreeBSD version
 - 12.1-RELEASE
- Installing FreeBSD
 - From CD-ROM
 - From USB

FreeBSD Version

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FreeBSD Branches/Tags

- Three parallel development branches:
 - RELEASE
 - Latest Release: 12.1 (November, 2019)
 - <http://www.freebsd.org/releases/>
 - Upcoming: 12.2 (October, 2020)
 - <https://www.freebsd.org/releases/12.2R/schedule.html>
 - STABLE
 - Tested new features and bug fixes
 - Merge From Current (MFC)
 - Still considered a development branch
 - CURRENT
 - Working space for FreeBSD developers
 - 13.0-CURRENT (January, 2021)
 - <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 11.3: 2020-09-30](#)
 - FreeBSD 12.1: 12.2-RELEASE + 3 months
 - [Ubuntu 14.04 LTS: 2022-04](#)
 - [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

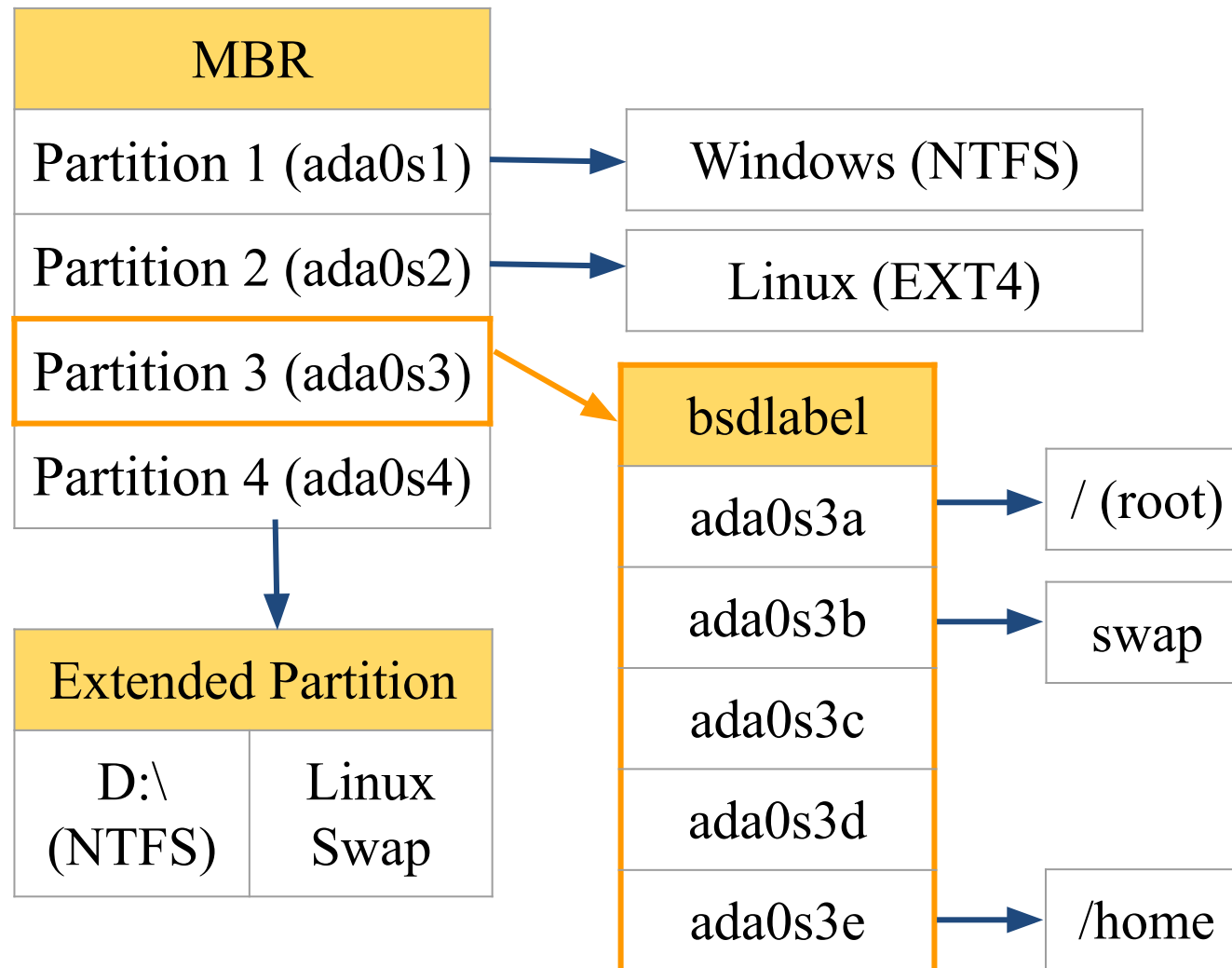
View of Disk (1)

- Guided partitioning layout 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

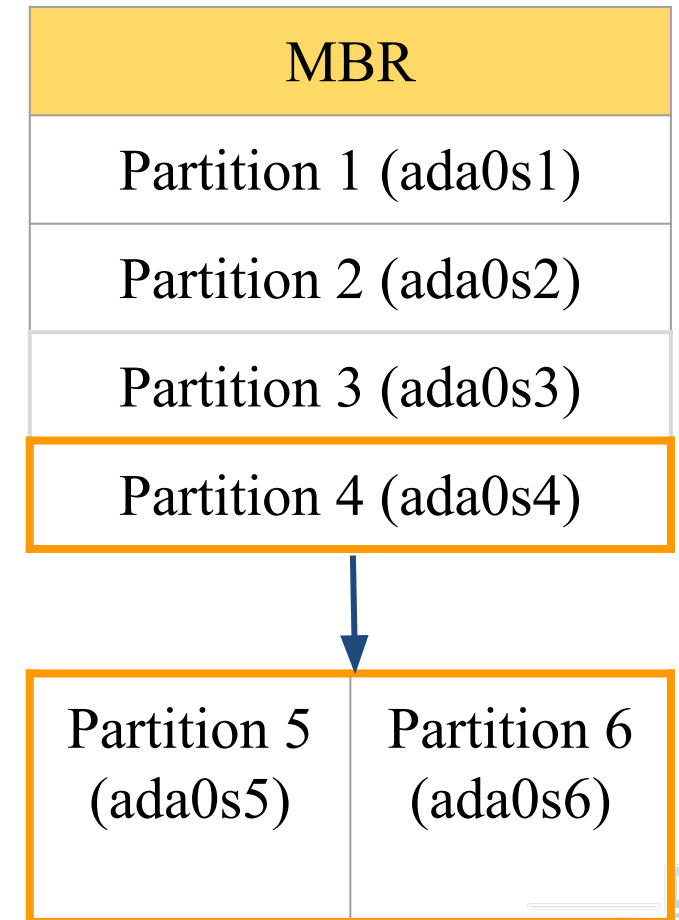
GPT (ZFS on Root)	
Partition 1 (/dev/ada0p1)	freebsd-boot
Partition 2 (/dev/ada0p2)	freebsd-swap
Partition 3 (/dev/ada0p3)	freebsd-zfs

View of Disk (2)



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 12.0



bsdinstall – (2)

- Install, Shell, Live CD

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

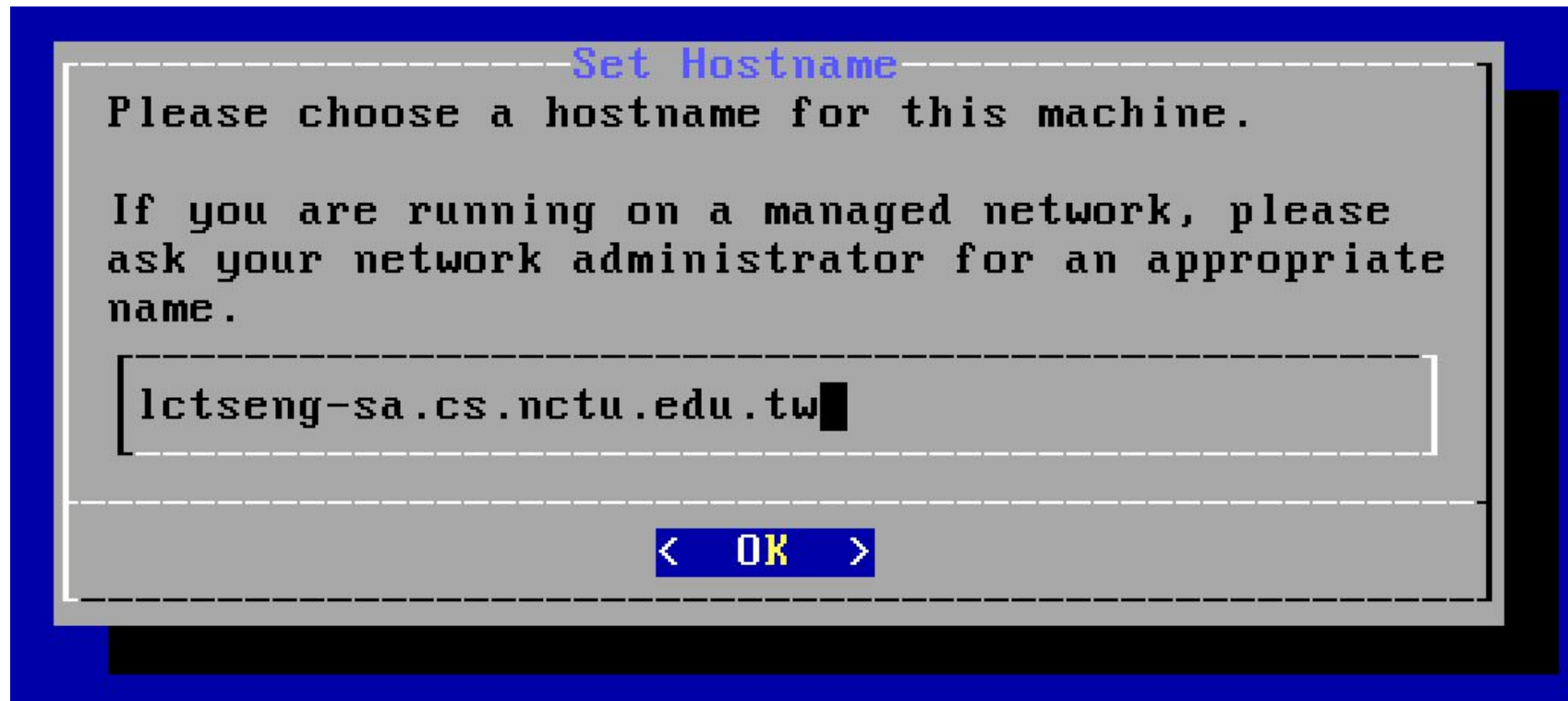
bsdinstall – (3)

- Select 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-sa.cs.nctu.edu.tw



bsdinstall – (5)

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

[ ] base-dbg      Base system (Debugging)
[ ] doc          Additional Documentation
[ ] kernel-dbg   Kernel (Debugging)
[ ] lib32-dbg    32-bit compatibility libraries (Debugging)
[*] lib32        32-bit compatibility libraries
[ ] 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
 - Enter a pool name, disable forcing 4k sectors, enable or disable encryption
 - Switch between GPT (recommended) and MBR partition table types, and select the amount of swap space

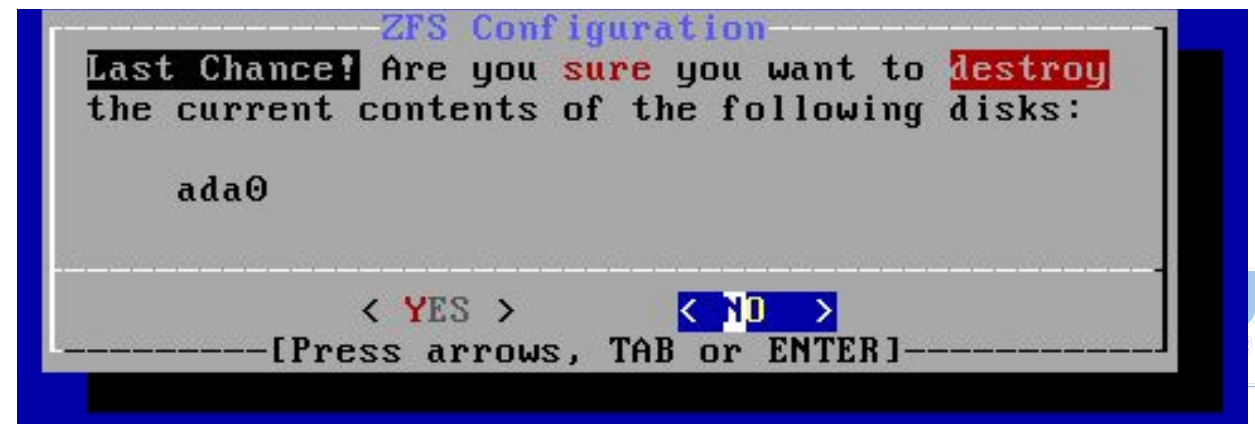
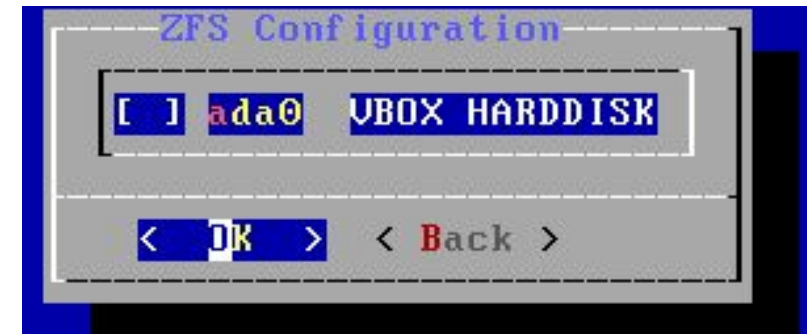
```

                                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
 - 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

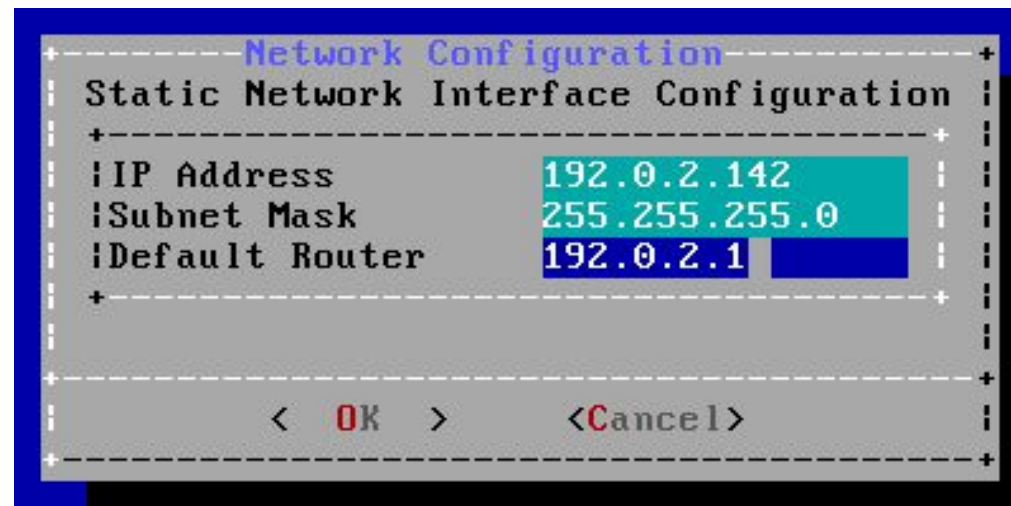
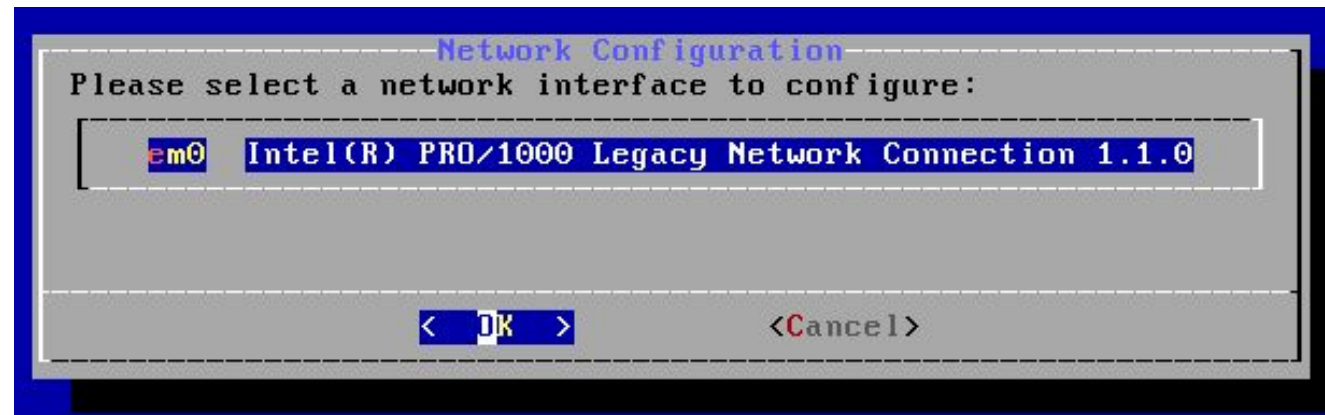
Post-installation

- Setting the root Password

```
FreeBSD Installer
=====
Please select a password for the system management account (root):
Changing local password for root
New Password:
Retype New Password:█
```

Post-installation

- Select a network interfaces
- Configuring IPv4 Networking



Post-installation

- Configuring IPv6 Networking
 - IPv6 Stateless Address Auto configuration (SLAAC)
 - <http://tools.ietf.org/html/rfc4862>

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

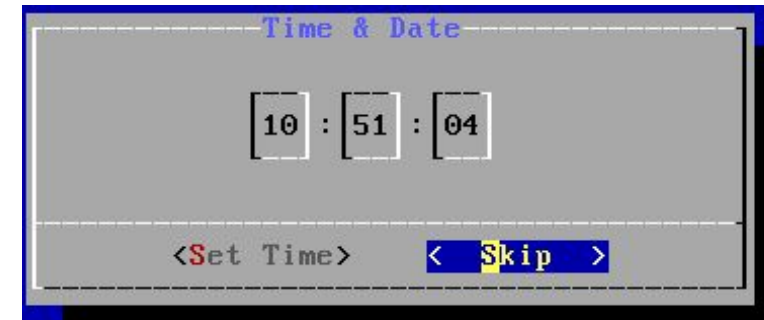
Post-installation

- Configuring DNS

```
----- Network Configuration -----  
Resolver Configuration  
+-----+  
!Search          example.com  
!IPv6 DNS #1     2001:db8:35::35  
!IPv6 DNS #2     2001:db8:53::53  
!IPv4 DNS #1     192.0.2.1  
!IPv4 DNS #2     203.0.113.8  
+-----+  
                < 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

```
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

```
System Hardening
Choose system security hardening options:

[ ] Hide processes running as other users
[ ] Hide processes running as other groups
[ ] Disable reading kernel message buffer for unprivileged users
[ ] Disable process debugging facilities for unprivileged users
[ ] Randomize the PID of newly created processes
[ ] Insert stack guard page ahead of the growable segments
[ ] Clean the /tmp filesystem on system startup
[ ] Disable opening Syslogd network socket (disables remote logging)
[ ] Disable Sendmail service

< OK >
```

Post-installation

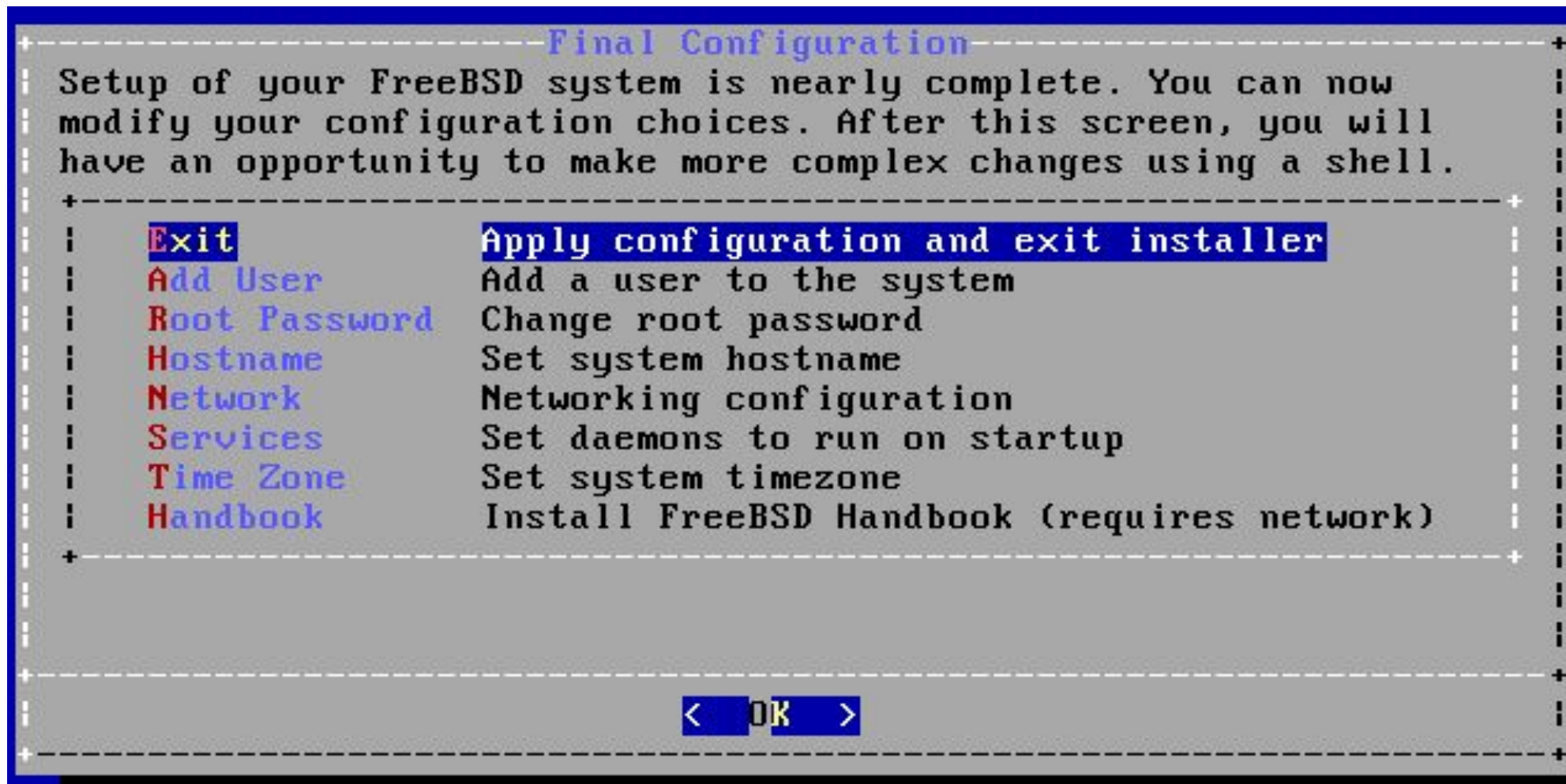
- Add Users
 - Username - lctseng
 - Full name - Liang-Chi Tseng
 - Uid - User ID. Typically left blank for default.
 - Login group - The user's group. - "staff" is good for you
 - Invite user into other groups? - **wheel**
 - Login class - Typically left blank for default.
 - Shell - The interactive shell for this user. CSCC use tcsh.
 - Home directory - The user's home directory.
 - 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".

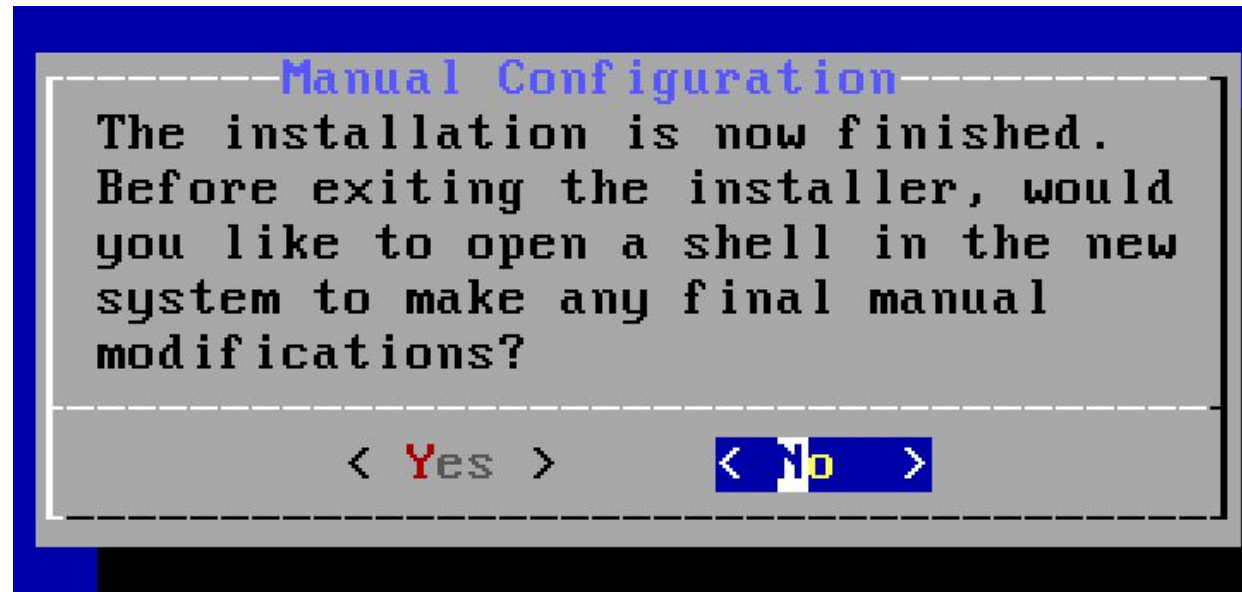
Post-installation

- Final Configuration



Post-installation

- Make change if needed
- Remove installation media



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.
+-----+
| 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)

- 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