

A decorative graphic on the left side of the slide, consisting of several overlapping blue rectangles of varying shades and heights, creating a stepped effect.

Installing Applications in FreeBSD

Before we start

❑ Permission issue

- **root**: the superuser
 - In Unix-like system, root is the conventional name of the user who has all rights or permissions (to all files and programs) in all modes (single- or multi-user)
- Like administrator in M\$ Windows

❑ Don't execute commands as root directly

- It's **DANGEROUS**

❑ But sometimes you still need to be root to do something

- Install software
- Manage system file
- Create/modify/delete users

Before we start

❑ Become root

- Console login with root
- By default, you cannot login as root via SSH

❑ Change current user

- Don't need to login with console
- Use command 'su -', and then type root's password
- To see which credit you are using, use 'whoami'

```
nctucs [~] -wangth- whoami
wangth
nctucs [~] -wangth- su -
Password:
nctucs [~] -wangth- whoami
root
```

Before we start

- ❑ As mentioned before, don't run as root directly

- ❑ Can we execute with root's credential only for some specific commands?
 - Like 'Run as administrator' in Windows
 - Is there similar commands in FreeBSD?

Before we start

- ❑ Run commands with other user's permission

- ❑ 'sudo' command
 - Only simplest explanation here for basic usage
 - 'sudo' syntax and other details will explain in later chapter
 - Here only tell you how to simply enable 'sudo'

- ❑ How to enable sudo?
 - 'sudo' is not a built-in command, need to be installed manually

Before we start – Enable ‘sudo’ (1)

❑ Install the package

- Check Internet connection
 - ping 168.95.1.1
- Become root (su -)
- Execute ‘pkg install sudo’
 - This will install ‘sudo’ from Internet
 - Type ‘Y’(means yes) when it asks for conformation

Before we start – Enable ‘sudo’ (2)

❑ Allowing your user to execute ‘sudo’

- Switch to root first
- Type ‘visudo’ to edit the sudoer file
 - Specific who can use ‘sudo’

```
##  
## User privilege specification  
##  
root ALL=(ALL) ALL  
wangth ALL=(ALL) ALL
```

- Save the file and exit, back to normal user
 - Use ‘logout’ command or press Ctrl+D

Before we start – Using ‘sudo’

- ❑ Now, you can prepend ‘sudo’ before commands to run them as root
 - But please **think carefully before you type**

- ❑ Execute commands with ‘sudo’
 - sudo whoami
 - You have **root’s credential**
 - sudo pkg install vim
 - Install software without become root directly
 - You need to re-type your password
 - Don’t need to re-type within 5 minutes

Install software

❑ Package

- Pre-built
 - Like most of installer (.msi) in Windows
- Other Unix-like system: rpm, yum, dpkg, apt, ...
- FreeBSD: pkg

❑ Source

- Compile the source files first and then install
- Tar ball, a pack of source code
- `tar -xzf certain-source.tar.gz`
- `cd certain-source`
- `./configure --help`
- `./configure [options ...]`
- `make`
- `make install` (root permission)

Install software : Overview

- ❑ Three technologies
 - Packages
 - Ports
 - Tar ball
- ❑ Packages
 - pre-built ports, contain **pre-compiled** copies of all the commands for the application, as well as any configuration files or documentation
- ❑ Ports
 - a collection of files designed to **automate** the process of **compiling** an application from source code and **additional patches**
 - a set of Makefile, patches, description files, ...
- ❑ Both packages and ports understand *dependencies*
- ❑ Tar ball
 - fetch it, configure the installation options, and compile it by yourself
 - **NO DEPENDENCY CHECKING.**

Overview

❑ Package benefits

- Packages do not require any additional compilation
 - Benefit for slow machines

❑ Ports benefits

- You can tweak the compilation options to generate code that is **specific** to a different processor – speed
- Some applications have compile time options relating to what they can and cannot do – customization

❑ Why tar ball?

- Some software cannot be found in ports collection
- Some latest version of software may have new configurations that do not exist in port

Package System (1)

- ❑ pkg
 - New generation of FreeBSD package system
- ❑ Install new software
 - Fetch packages from Internet
 - **pkg install** *<names of packages...>*
 - `pkg install vim screen tmux`
 - Run with root's permission (sudo)
 - Automatically update the database
 - By default invoking either of **pkg install** or **pkg upgrade** will cause repository catalogues to be updated automatically
 - Perform dependency check
 - Will install software that required by new software

Package System (2)

❑ Upgrade currently installed software

- `pkg upgrade <names of packages...>`
 - `pkg upgrade vim`
- `pkg upgrade`
 - Upgrade all installed software
- This will also update the database

❑ Update packages database only

- `pkg update`

❑ Delete a package

- `pkg delete <names of packages>`
 - `pkg delete php53`

Package System (3)

❑ Show information about installed packages

- **pkg info**
 - Show all installed packages
 - Use 'grep' to find specific packages
 - `pkg info | grep vim`
- **pkg info <name of package>**
 - Show detailed information
 - `pkg info php56`

❑ Show version of installed packages

- **pkg version**
 - `pkg version -v`

```
nctucs [~] -wangth- pkg version -v
bash-4.3.46_1          < needs updating (remote has 4.4.12_2)
bind99-9.9.9P8_1     < needs updating (remote has 9.9.10P3)
ca_root_nss-3.32     = up-to-date with remote
```

How to use ports

- ❑ Obtain the ports collection
 - List of ports available to be installed into system
- ❑ We should...
 - Find the application
 - Change to the directory for the port
- ❑ Ports will
 - Fetch the tar ball
 - Ask for configuration friendly
 - Compile the source code
 - Install your application
- ❑ Deinstall process

Obtaining the Ports Collection (1/2)

❑ portsnap(8)

- Fetch and update your port tree
- fetch, extract, update, cron
- **sudo portsnap fetch extract update**
- /etc/portsnap.conf
 - sudo vim /etc/portsnap.conf
 - SERVERNAME=portsnap.tw.FreeBSD.org
- https://www.freebsd.org/doc/en_US.ISO8859-1/books/handbook/ports-using.html

Obtaining the Ports Collection (2/2)

❑ svn(1) / svnlite

- Install Root SSL certificates to allow Subversion to verify the identity of HTTPS repository servers
 - `pkg install ca_root_nss`
- Checkout from a given repository
 - `svn checkout https://svn.FreeBSD.org/repository/branch lwcdir`
 - `sudo svn checkout https://svn.FreeBSD.org/ports/head /usr/ports`
- Update the local working copy
 - `svn update lwcdir`
 - `sudo svn update /usr/ports`
- <https://www.freebsd.org/doc/handbook/svn.html>

Obtaining the Ports Collection

□ Port directory

- /usr/ports/<category>/<name>

```
zfs [/usr/ports] -wngth- ls
CHANGES      arabic      emulators   misc        shells
CONTRIBUTING.md archivers   finance     multimedia  sysutils
COPYRIGHT     astro      french      net         textproc
GIDs          audio      ftp         net-im      ukrainian
INDEX-9       base       games       net-mgmt    vietnamese
Keywords      benchmarks german      net-p2p     www
LEGAL         biology    graphics    news        x11
MOVED         cad        hebrew      packages    x11-clocks
Makefile      chinese    hungarian   palm        x11-drivers
Mk            comms     irc         polish      x11-fm
README        converters japanese   ports-mgmt  x11-fonts
Templates     databases java        portuguese  x11-servers
Tools         deskutils korean      print       x11-themes
UIDs          devel     lang        russian     x11-toolkits
UPDATING     dns       mail        science     x11-wm
accessibility editors    math        security
```

```
zfs [/usr/ports/editors/vim] -wngth- ls
Makefile  distinfo  files  pkg-descr  pkg-plist
```

Ports system (1)

❑ Find your application

- `cd /usr/ports`
- **make search name**=program name
- **make search key**=string

```
liuyh@NASA /usr/ports $ make search name=zh-mutt
Port: zh-mutt-devel-1.5.20_20090629
Path: /usr/ports/chinese/mutt
Info: The Mongrel of Mail User Agents with Chinese support
Maint: rafan@FreeBSD.org
B-deps: autoconf-2.62 autoconf-wrapper-20071109 automake-1.10.1 automake-wrapper-20071109
gettext-0.17_1 libiconv-1.13.1 m4-1.4.13,1 perl-5.8.9_3 zh-autoconvert-0.3.16
R-deps: gettext-0.17_1 libiconv-1.13.1 mime-support-3.46.1 zh-autoconvert-0.3.16
WWW: http://www.mutt.org/
```

Ports system (2)

❑ psearch(1)

- Simple but useful tool to find ports
- ports-mgmt/psearch
 - Install it before you use
- **psearch** *<name of port>*
 - psearch vim

```
nctucs [~] -wangth- psearch vim
audio/vitunes      Curses-based media player with vim-like keybinds
devel/clewn        Clewn provides Gdb support within Vim
devel/p5-Shell-EnvImporter Inherit different shell environments and restore previous
editors/cream      Gvim extension with many features
editors/neovim     Next generation Vim
editors/p5-Vimana  Vim script manager
editors/vim        Improved version of the vi editor
editors/vim-lite   Improved version of the vi editor (lite package)
...
```

Ports system (3)

- ❑ Type “make install clean” to install your application
 - make config (/var/db/ports/)
 - make fetch (/usr/ports/distfiles/)
 - make checksum
 - make extract
 - make patch
 - make configure
 - make build
 - “make” means all of the above
 - make install
 - make clean
 - make distclean
 - Clean files generated by configure process

Ports system (4)

❑ The ports system uses [fetch\(1\)](#) to download the files

- **MASTER_SITES** environment variable
- `/etc/make.conf`

```
MASTER_SITE_BACKUP?= \
    http://FreeBSD.cs.nctu.edu.tw/distfiles/${DIST_SUBDIR}/
MASTER_SITE_OVERRIDE?= ${MASTER_SITE_BACKUP}
```

❑ Options for ports

- `make config`
 - Won't build or install the port
 - Use this to re-configure ports (otherwise, it uses old one instead)
- hidden options (not shown in 'make config')
 - Edit the Makefiles under that port directory

Ports system (5)

- ❑ I have installed the application but
 - Command not found...
 - Logout, and then login.
 - If you use (t)csh
 - rehash

Deinstall Applications

❑ Two methods

- pkg delete
 - Find the package name via pkg info
 - Dependency check
 - Disable dependency check
 - -f : force
 - `pkg delete -f <names of packages>`
- make deinstall
 - Change to the ports directory
 - make deinstall
 - Delete it anyway
 - Similar to ‘pkg delete -f’

Upgrading Ports using Portmaster

❑ ports-mgmt/portmaster

- A utility for easily upgrading and installing ports

```
cd /usr/ports/ports-mgmt/portmaster  
make install clean
```

❑ Install or upgrade a port

- portmaster <category>/<name>
 - portmaster sysutils/lsof
- /usr/ports/UPDATING
 - **Read before attempting any port upgrades!!!**

❑ Useful options

- -B, -D, -a, -r, -y, -H, -w
- portmaster -dyBwH editors/vim

Package/Port Security Issue

- ❑ Show security issues about installed packages
 - No matter from port or from package
 - **pkg audit**
 - Upgrade these packages to avoid security problems

```
nctucs [~] -wangth- pkg audit  
lynx-2.8.8.2_3,1 is vulnerable:  
lynx -- multiple vulnerabilities  
CVE: CVE-2016-9179  
CVE: CVE-2014-3566  
WWW: https://vuxml.FreeBSD.org/freebsd/03532a19-d68e-11e6-9171-14dae9d210b8.html
```

Try to install from ports

- screen, tmux
- vim, emacs
- mutt
- wget, curl
- lftp
- lynx, w3m
- expect
- zh-telnet