



# Computer System Administration

---

# What System Administrator Should do? (1)

## □ Ordinary list

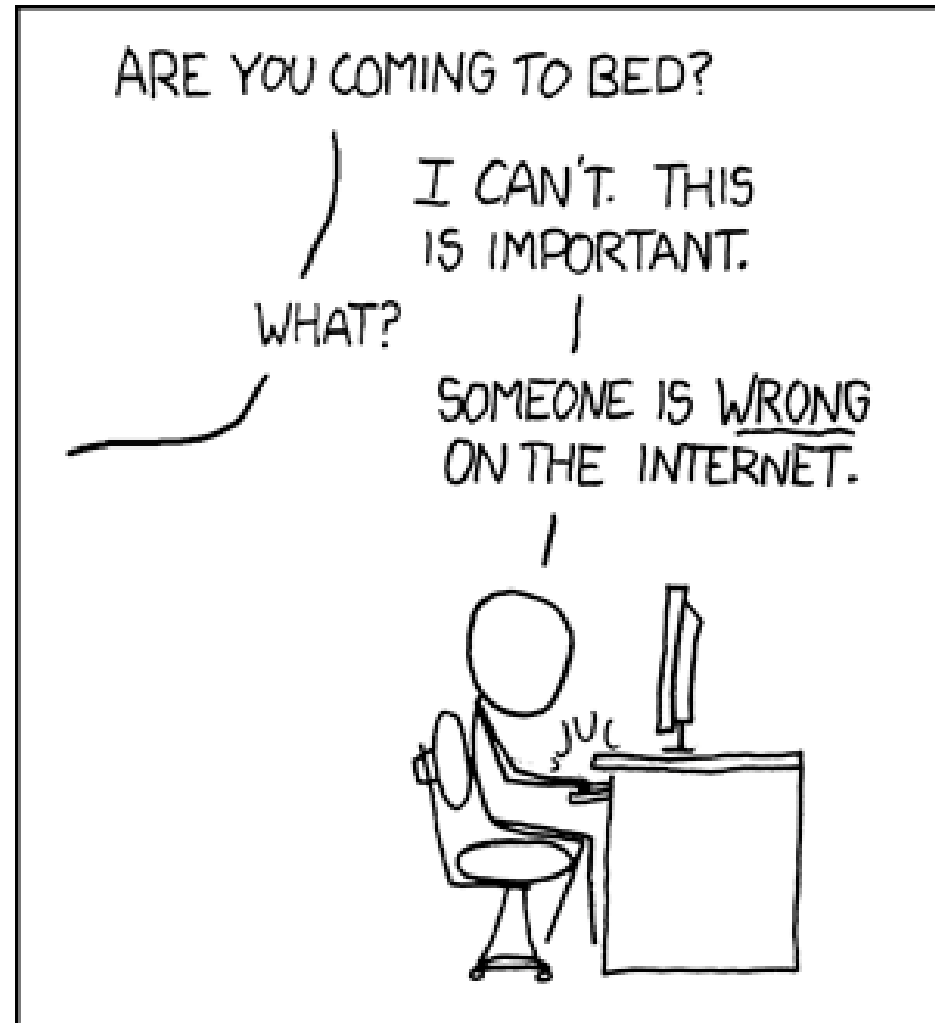
- Install new system, programs and OS updates
- Monitoring system and trying to Tune performance
- Adding and removing users
- Adding and removing hardware
- Backup and Restore
- Configuration management (Ansible, Chef, Puppet, SaltStack, ...)
- Continuous Integration / Continuous Delivery (Git, Jenkins / Travis CI, Sonarqube, ...)
- Log management (Fluentd / Logstash, Elasticsearch, Kibana )
- Security
- Virtualization (KVM, Xen, ...)
- ...



# What System Administrator Should do? (2)

## ❑ Non-technique list

- Helping users
- Maintaining documentation
- Moving furniture
- Burning your liver
- Good communication and memorization



# What System Administrator Should do? (3)

---

## ❑ The best words to describe the job

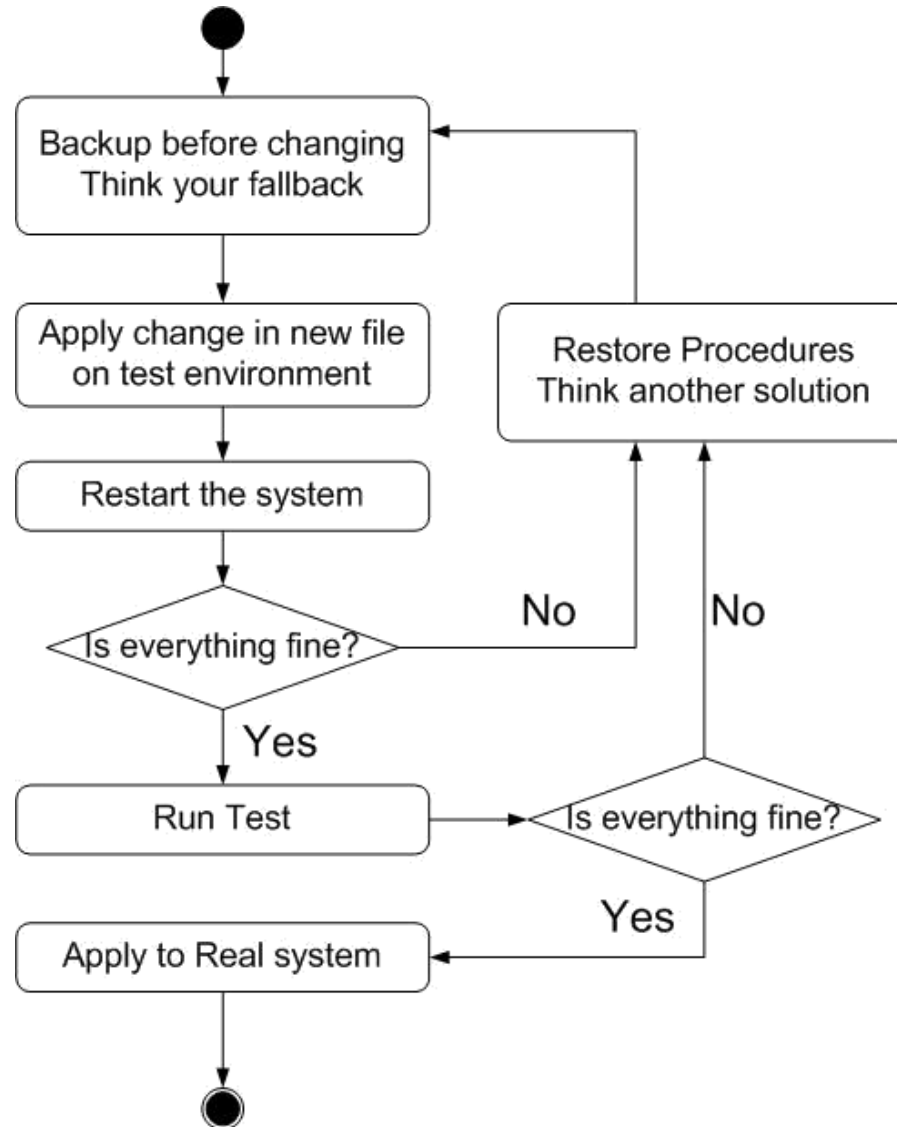
- Thankless job.
  - <http://www.sysadminday.com/>
- System administration is like keeping the trains on time; no one notices except when they're late.
- 氣象局：「我們對的時候，沒人記得；我們錯的時候，沒人忘記。」

## ❑ Philosophy of system administration

- Know how things really work.
- Plan it before you do it.
- Make it reversible.
- Make changes incrementally.
- Test before you unleash it.

# What System Administrator Should do? (4)

## ❑ Flow of Change



# What you can learn in this course?

---

- The skill to be a candidate of system administrator
- Information about CS computer center
  
- System Admin / Network Admin ?
  - Play with computers
  
- What FreeBSD can do.

# Attitude

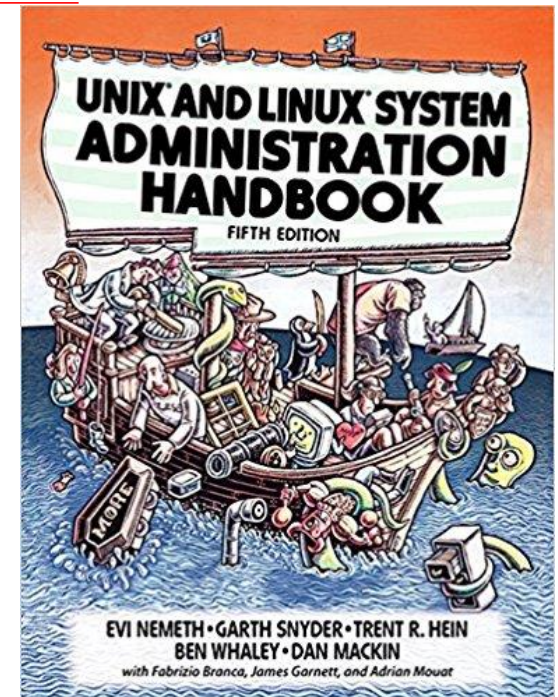
---

- Attend every class
- Do every exercise
  - As early as possible
  - **On your own**
- Read book and practice at least 6 hours every week
  - Use unix-like environment
  - Recommend: more than 1.5 hours/day averagely.
- Collect information on the internet
  - The newer, the better.



# Syllabus

- ❑ Website:
  - <http://www.cs.nctu.edu.tw/~wangth/course/sysadm/>
- ❑ Instructors:
  - 王則涵 [wangth@cs.nctu.edu.tw](mailto:wangth@cs.nctu.edu.tw)
- ❑ Time:
  - Thu. IJK (PM 6:30 ~ 9:20)
- ❑ Place:
  - EC122
- ❑ TAs:
  - We might get about 6 TAs.
  - Email to TAs: [ta@nasa.cs.nctu.edu.tw](mailto:ta@nasa.cs.nctu.edu.tw)
  - 3GH every week
- ❑ Textbook:
  - **Unix and Linux System Administration Handbook (5th Edition)**





# Syllabus – Content

---

- ❑ We will cover the following chapters in this semester (SysAdm):
  - Chapter 1 ~ 14
  - Chapter 16, 19, 20
  - Chapter 27, 31
- ❑ The following chapters is covered in the next semester (NetAdm):
  - Chapter 15 ~ 18, 21, 23 ~ 25, 30 ~ 32
  - NAT, DHCP, VPN, Proxy, ...
  - Python Programming

# Syllabus – Text book outline

## Part I. Basic Administration

- ❑ Chap 1 – Where to start.
- ❑ Chap 2 – Booting and Shutting Down
- ❑ Chap 3 – The Filesystem
- ❑ Chap 4 – Access control and rootly powers
- ❑ Chap 5 – Controlling processes
- ❑ Chap 6 – User Management
- ❑ Chap 7 – Storage
- ❑ Chap 8 – Periodic processes
- ❑ Chap 9 – Backups
- ❑ Chap 10 – Syslog and log files
- ❑ Chap 11 – Software installation and management
- ❑ Chap 12 – The Kernel
- ❑ Chap 13 – Scripting and the Shell
- ❑ Chap 14 – Configuration Management

## Part II. Networking

- ❑ Chap 15 – Physical Networking
- ❑ Chap 16 – TCP/IP
- ❑ Chap 17 – Routing
- ❑ Chap 18 – DNS: Domain Name System
- ❑ Chap 19 – NFS: Network File System
- ❑ Chap 20 – HTTP: Hypertext Transfer Protocol
- ❑ Chap 21 – SMTP: Simple Mail Transfer Protocol
- ❑ Chap 22 – Directory Services
- ❑ Chap 23 – Electronic Mail
- ❑ Chap 24 – Web Applications
- ❑ Chap 25 – Network Management and Debugging

# Syllabus – Text book outline (Cont.)

## Part III. Operations

- ❑ Chap 26 – Continuous Integration and Delivery
- ❑ Chap 27 – Security
- ❑ Chap 28 – Cloud Computing
- ❑ Chap 29 – Containers and Virtualization
- ❑ Chap 30 – Monitoring
- ❑ Chap 31 – Performance Analysis
- ❑ Chap 32 – Policy and Politics

# Syllabus – Grade Policy

---

- ❑ Mid
  - 15 ~ 20%
- ❑ Final
  - 15 ~ 20%
- ❑ Exercise (Homeworks)
  - 60 ~ 70%
  - No Delay Work
  - 4 exercises
  - 1 term project

# What you should prepare?

---

## Background knowledge

- UNIX commands
- Basic of TCP/IP Networking (not required)

## Environment

- One dedicated PC
  - Or dual OS in your PC.

## Yourself

- Your hard study

# Finally, Am I OK to take this course?

---

- Are you willing to devote yourself to exercise?
  - Yes! Please come
- Are you newbie in this area?
  - Yes!? It's ok, Please come
- Do you take more than 3 major courses?
  - Yes!??? It is quite dangerous, but I can not stop u



# Basic knowledge in this course

---

# Login

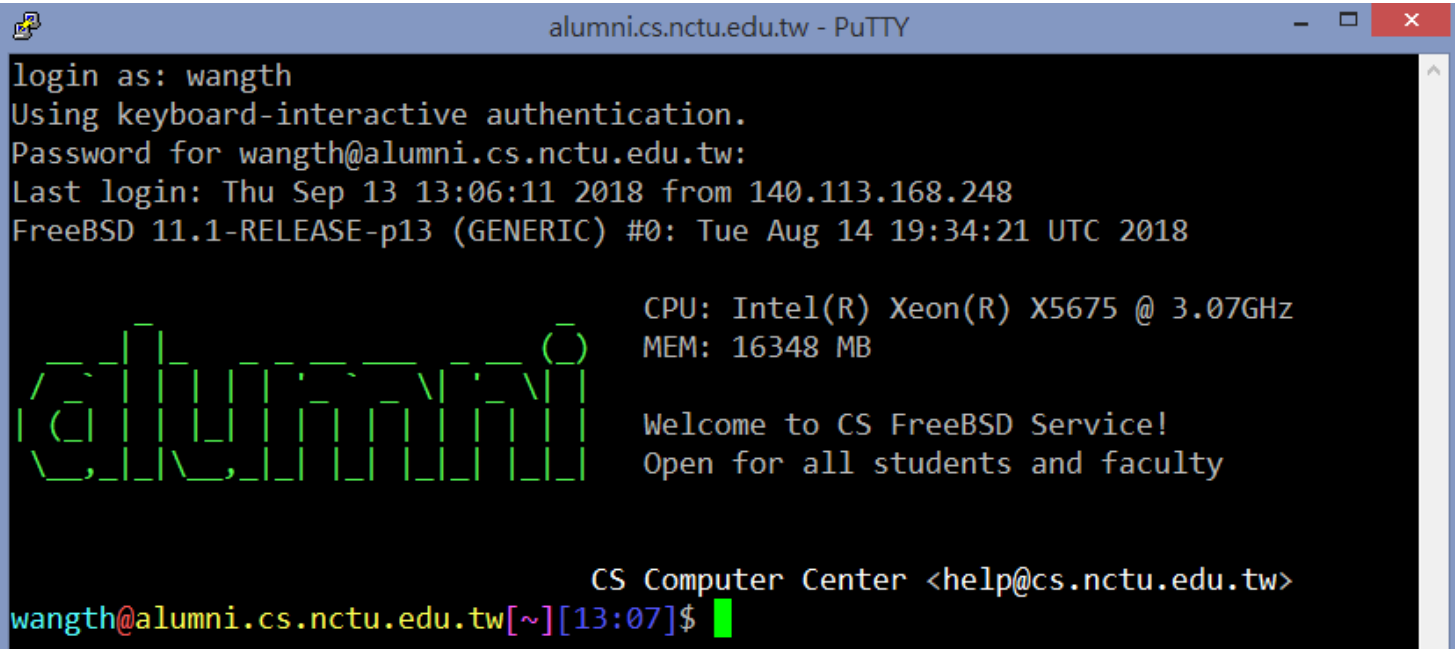
## ❑ SSH (Secure Shell)

- PuTTY:

<https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html>

- Workstation:

<https://help.cs.nctu.edu.tw/help/index.php?title=分類:工作站>



```
alumni.cs.nctu.edu.tw - PuTTY
login as: wangth
Using keyboard-interactive authentication.
Password for wangth@alumni.cs.nctu.edu.tw:
Last login: Thu Sep 13 13:06:11 2018 from 140.113.168.248
FreeBSD 11.1-RELEASE-p13 (GENERIC) #0: Tue Aug 14 19:34:21 UTC 2018

CPU: Intel(R) Xeon(R) X5675 @ 3.07GHz
MEM: 16348 MB

Welcome to CS FreeBSD Service!
Open for all students and faculty

CS Computer Center <help@cs.nctu.edu.tw>
wangth@alumni.cs.nctu.edu.tw[~][13:07]$
```



# Commands

---

## ❑ Useful commands

- passwd, chsh, chfn, chpass
- ls
- ps, top
- mkdir/rmdir
- cp/mv/rm
- write
- Email reader: mutt, ...etc.
- News reader: tin
- Connecting: ssh/telnet
- Manual: man, info, ...etc.
- Editor: vim, joe, ee, ...etc.
- File Transmission: ftp, ncftp, lftp, scp, wget, curl, ...etc.
- Compilers: gcc, g++, javac, ...etc.
- Scripting: perl, php, ruby, python ...etc.
- login/exit/logout/screen/tmux

# Conventions

## ❑ Syntax of commands:

- Anything between “[” and “]” – is optional.
- Anything followed by “...” – can be repeated.
- {a | b} – you should choose one of them.
- Example:

➤ bork [-x] { on | off } filename ...

bork on /etc/hosts

○

bork -x off /etc/hosts /etc/passwd

○

bork -x /etc/hosts

X

bork -h /etc/hosts

X

## ❑ Globing characters

- “\*” matches zero or more characters.
- “?” match one character.
- “~” (twiddle) means home directory
- “~user” means home directory of user

# man pages (manual)

---

## □ man pages (manual)

- Contain descriptions of
  - Individual command.
    - % man cp
  - File format.
    - % man rc.local
  - Library routines.
    - % man strcpy

# man command

## ❑ Command

- % man [section] *title* (BSD)
  - % man printf (printf command)
  - % man 3 printf (C Standard printf func.)
  - % man -k exit (keyword search)

## ❑ Man pages organization

%man man

AT&T	BSD	Contents
1	1	User-Level <b>commands</b> and applications
2	2	<b>System calls</b> and kernel error code
3	3	<b>Library</b> calls
4	5	Standard file format
5	7	Miscellaneous files and documents
6	6	Games and demonstrations
7	4	Device Drivers and network protocols
1m	8	System administration commands
9	9	Obscure kernel specs and interfaces

# HOWTO - Shutdown

---

## ❑ FreeBSD Shutdown

- `shutdown -p now`
- `shutdown -r now (reboot)`

# Q&A

---

Break time.