

Computer System Administration

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交大資工系資訊中心

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What System Administrator Should do?

- Ordinary list
 - Installing new system, programs and OS updates
 - Monitoring system and tuning performance
 - Adding and removing users
 - Adding and removing hardware
 - Backup and restore
 - Configuration management (Ansible, Chef, Puppet, SaltStack, ...)
 - Infrastructure management (Terraform, ...)

What System Administrator Should do?

- Ordinary list
 - Continuous Integration & Delivery (Jenkins, Travis CI, ...)
 - Log management (Fluentd, Papertrail, ...)
 - Security monitoring and reaction
 - Virtualization (VMWare, Xen, Bhyve, ...)
 - Containerization (Docker, ...)
 - Capacity planning
 - ...

What System Administrator Should do?

- Non-technique list
 - Helping users
 - Maintaining documentation
 - Moving furniture
 - Good communication and memorization
 - Leverage external memory
 - ~~Burning your liver~~

What System Administrator Should do?

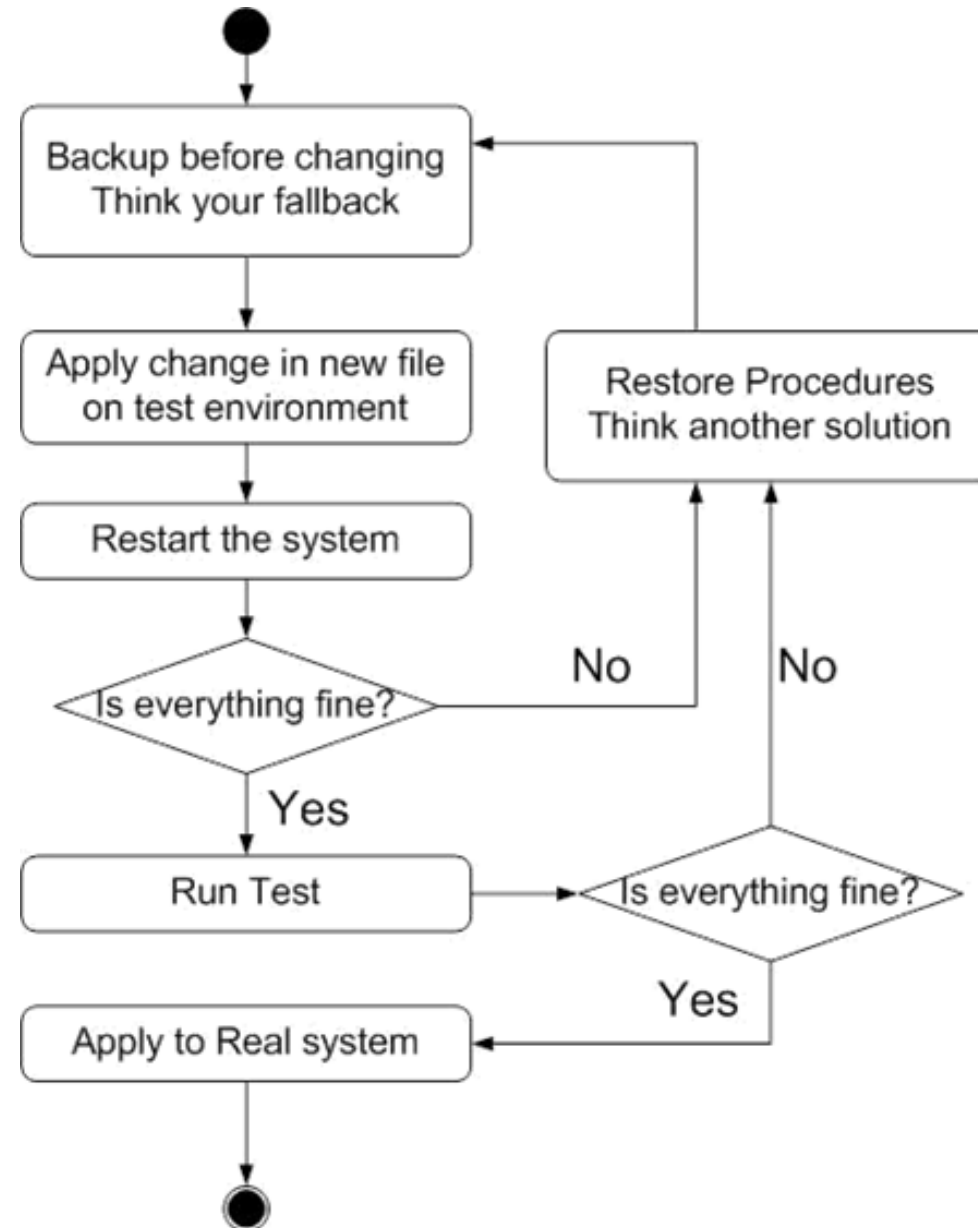
- The best words to describe the job
 - Thankless job.
 - <https://sysadminday.com/>
 - System administration is like keeping the trains on time; no one notices it except when they're late.
 - When we do right, no one remembers; when we do wrong, no one forgets.

What System Administrator Must do?

- Philosophy of system administration
 - Know how things really work.
 - Plan it before you do it.
 - Make it revertible.
 - Make changes incrementally and backward-compatible.
 - Test thoroughly before unleash it.

What System Administrator Should do?

- Flow of Change



What System Administrator Should do?

- The skills to be a candidate of system administrator
 - We are not going to teach you cool & new things
 - But the how to master these skills
 - Find and read authoritative docs, not just copy & paste from a random webpage on Internet
- System Administration
 - Manage one server
- Network Administration
 - Manage a network consist of multiple servers and devices

Why FreeBSD

- Our goal is to learn "How it works"
 - FreeBSD is simple and easy to learn the internals
 - Unified environment is good for education purpose
- Linux?
 - Still good to try it (them?) out
 - Lots of distributions
- BSDs are still popular in some ways
 - Apple MacOS, iOS and many other products or services are based or heavily using BSDs
 - [https://en.wikipedia.org/wiki/Darwin_\(operating_system\)](https://en.wikipedia.org/wiki/Darwin_(operating_system))

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

- Instructors:
 - 曾亮齊 lctseng@cs.nctu.edu.tw
 - 王則涵 wangth@cs.nctu.edu.tw
 - 林瑞男 jnlin@cs.nctu.edu.tw
 - 許立文 lwhsu@cs.nctu.edu.tw
- Time:
 - Thu. IJK (PM 6:30 ~ 9:20)
- Place:
 - EC122

Syllabus

- Discussion Forum
 - <https://groups.google.com/forum/#!forum/nctunasa>
 - We suggest you to join - TAs might give homework hints there
 - Request join and tell us your student ID
 - Ask **course-related/technical questions** there
 - Everyone in the group can answer/vote
 - **But DON'T post direct answer/configuration there!**
 - You will be banned.

Syllabus

- Lecture/Exam in Chinese
 - Not recommend for those do not speak Chinese
- TAs:
 - We might have about 6 TAs.
 - Email to TAs: ta@nasa.cs.nctu.edu.tw
 - Also received by all lecturers
 - 3GH every week
 - Website:
 - <https://nasa.cs.nctu.edu.tw/sa/2020/>

Syllabus

- Email Policy (**IMPORTANT**)
 - Don't send course-related/technical questions to TAs
 - TAs won't answer you
 - Only ask TAs for personal/non-technical questions
 - Course registration/dropping
 - Grading
 - Office hour appointment
 - Demo appointment

Syllabus

- Registration (non-NCTU students)
 - Send registration form to CSCC front desk if you cannot find lecturers
- Dropping (after midterm)
 - Contact CS Department Office if you cannot find lecturers near the deadline
 - Email to ta@nasa.cs.nctu.edu.tw

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

Syllabus – Text book outline

- Part I. Basic Administration
 - 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

Syllabus – Text book outline

- Part II. Networking
 - Chap 19 – NFS: Network File System
 - Chap 20 – HTTP: Hypertext Transfer Protocol
- Operations
 - Chap 27 – Security
 - Chap 31 – Performance Analysis

Syllabus – Grade Policy

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

What you should prepare?

- Background knowledge
 - Basic knowledge of UNIX commands
 - <https://csc.ccs.nctu.edu.tw/unix-basic-commands>
 - Basic Programming skills
 - Basic of TCP/IP Networking
- Environment
 - Virtual Machine (Virtualbox, VMware)
 - Bare-metal Machine is also fine
- 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?
 - Sometimes you may spend the whole weekend to just figure out what to do in the homework
 - Loading of this course **equals to 2-3 major courses**
- **You will learn a lot if you study hard**

Basic knowledge in this course

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Play with Unix-Like system

- Our department has FreeBSD/Linux workstations for all students
 - `bsd{1,2,3,4}.cs.nctu.edu.tw`
 - `linux{1,2,3,4}.cs.nctu.edu.tw`
 - `alumni.cs.nctu.edu.tw`
 - About CS workstation
 - <https://csc.cs.nctu.edu.tw/workstation-guide>
- Get familiar with CLI (command line interface)
 - Without GUI (graphics user interface)
 - Don't be afraid

Usage

- SSH (Secure Shell)
 - [Putty](#) (Windows)
 - Terminal (macOS)
 - GNOME Terminal

```
FreeBSD 12.0-RELEASE-p13 amd64 GENERIC

CPU: Intel(R) Xeon(R) E5-2620 0 @ 2.00GHz
MEM: 16341 MB

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

====[ Announcement of Computer Center, College of Computer Science, NCTU ]====
1. Hostnames & IP Addresses of workstations :
   FreeBSD   : bsd1 ~ bsd4 (140.113.235.131 ~ 140.113.235.134)
              alumni1 (140.113.235.116)
   Linux     : linux1 ~ linux4 (140.113.235.151 ~ 140.113.235.154)
2. Useful Links:
   CCCS Duty Schedule <http://www.cs.nctu.edu.tw/schedule/>
   Frequently Asked Questions <http://www.cs.nctu.edu.tw/help/>
3. For rights of other users, please don't occupy /tmp as yours,
   please use (re)nice/taskset/cpuset to lower the priority of high-loading p
   rocesses,
   and please use ipcrm to clear shared memory after using it.
= Disk Usage =====
Mail: ████████████████████████████████████████████████████████████████████████████████████████ 0% 0.00 KB/250.00 MB
Home: ████████████████████████████████████████████████████████████████████████████████████████████████████ 78% 1.57 GB/2.00 GB

= Process =====
PID TT  STAT TIME COMMAND
= Information =====
Current Time: Sun Jul 26 01:40:12 CST 2020
Online Users: 8
= CSCC Announce =====
2020-07-14 [置頂] 7/28 網路設備更換公告
https://csc.ccs.nctu.edu.tw/news/280
2020-07-13 [置頂] Horde webmail 下線公告
https://csc.ccs.nctu.edu.tw/news/277

CS Computer Center <help@cs.nctu.edu.tw>

Last login: Sun Jul 26 01:39:25 2020 from 10.1.0.34
[fyli@bsd1 ~]$
```


Commands

- Useful commands
 - `ls`
 - `passwd`
 - `mkdir`, `rmdir`
 - `cp`, `mv`, `rm`
 - `poweroff`, `shutdown -p now`
 - `reboot`, `shutdown -r now`
 - ...
- Most important command: `man`
- Basic command tutorials
 - <https://csc.ccs.nctu.edu.tw/unix-basic-commands>

Conventions

- Syntax of commands:
 - Anything between "[" and "]" is optional.
 - Anything followed by "..." can be repeated.
 - {a | b} – you should choose one of them.
 - bork [-x] { on | off } filename...

Yes/No	Commands
O	bork on /etc/hosts
O	bork -x off /etc/hosts /etc/passwd
X	bork -x /etc/hosts
X	bork -h /etc/hosts

Q & A

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