

# Computer System Administration

曾亮齊

國立陽明交通大學資工系資訊中心

Computer Center, Department of Computer Science, NYCU

# Online Course Announcement

- The live course will be available online
  - Using Microsoft Teams
  - Available at <https://nasa.cs.nctu.edu.tw/sa/2021/content.php>
- We will **record the meeting** during the class
  - For reference only
  - Will not release to public
- **DO NOT** record this meeting by yourself without approval from the lecturer!

# 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?

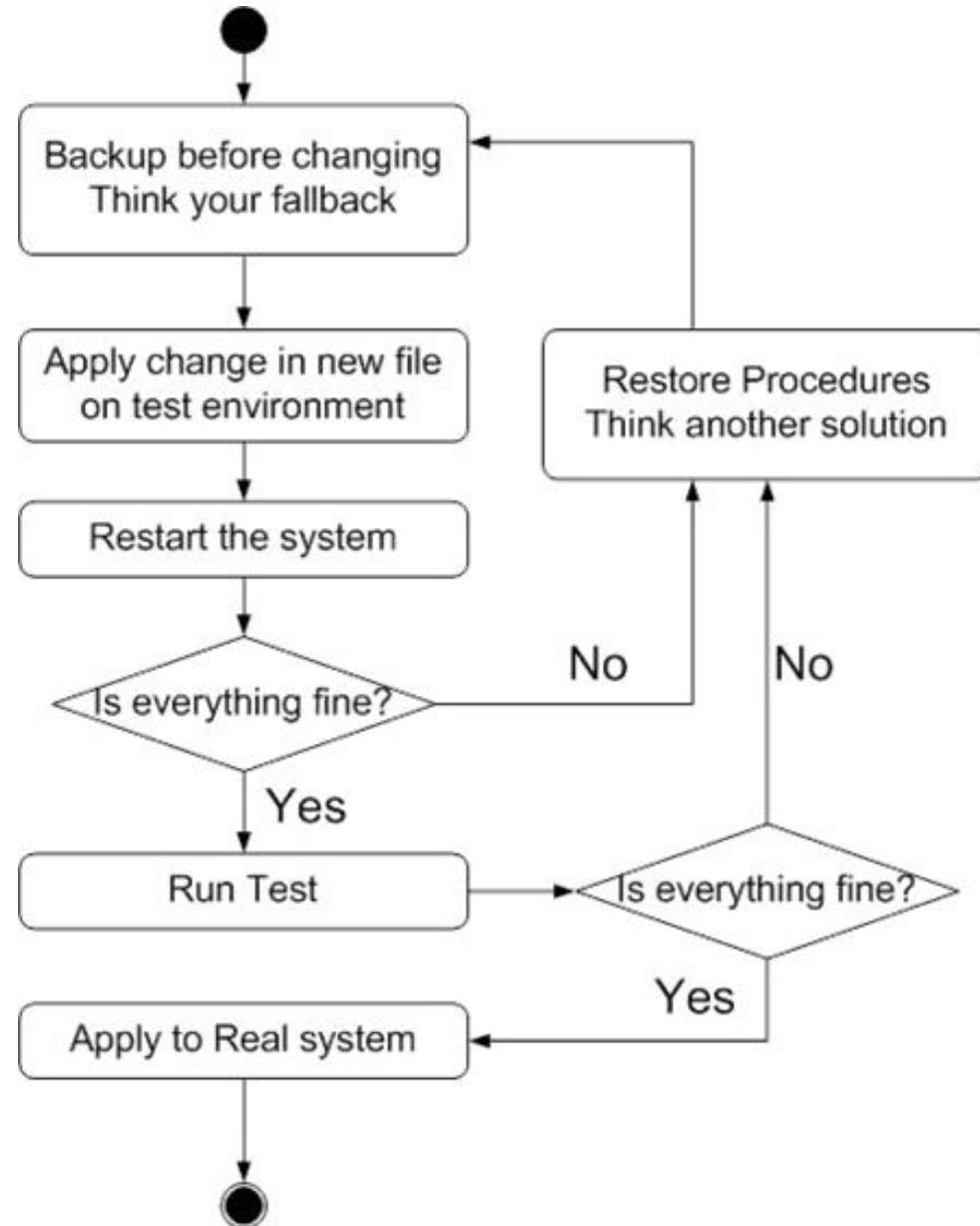
- The best words to describe the job
  - Thankless job.
    - <https://sysadminday.com/>
  - System administration is like keeping the trains on time; no one notices it except when they're late.
  - When we do right, no one remembers; when we do wrong, no one forgets.

# 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 (110A)
  - Manage one server
- Network Administration (110B)
  - Manage a network consist of multiple servers and devices

# About the Operating System

- Most of the course materials will take FreeBSD as examples
  - Homework is guaranteed to be doable under FreeBSD
- Linux?
  - Lots of distributions
  - You are still allowed to use them in homework
    - **On your own risk**

# Why FreeBSD

- Our goal is to learn "How it works"
  - FreeBSD is simple and easy to learn the internals
  - Unified environment is good for educational purpose
- 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](mailto:lctseng@cs.nctu.edu.tw)
  - 王則涵 [wangth@cs.nctu.edu.tw](mailto:wangth@cs.nctu.edu.tw)
  - 林瑞男 [jnlin@cs.nctu.edu.tw](mailto:jnlin@cs.nctu.edu.tw)
  - 許立文 [lwhsu@cs.nctu.edu.tw](mailto:lwhsu@cs.nctu.edu.tw)
- Time:
  - Thu. abc (18:30 ~ 21:20)
- Place:
  - ~~EC122~~ Online Course

# 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](mailto:ta@nasa.cs.nctu.edu.tw)
    - Also received by all lecturers
  - Office hour
    - Wed, 15:30 ~ 17:20, by appointment, @CSIT
  - Website:
    - <https://nasa.cs.nctu.edu.tw/sa/2021/>

# Syllabus

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



# Syllabus

- Registration (if you are not able to register on web)
  - Fill the registration form and email to [ta@nasa.cs.nctu.edu.tw](mailto:ta@nasa.cs.nctu.edu.tw)
- Dropping (after midterm)
  - Contact CS Department Office if you cannot find lecturers near the deadline
  - Or email to [ta@nasa.cs.nctu.edu.tw](mailto: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
  - 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 **roughly equals to 2~3 major courses**
- **You will learn a lot if you study hard**

# Basic knowledge in this course

國立陽明交通大學資工系資訊中心

Computer Center, Department of Computer Science, NYCU



# 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://it.cs.nycu.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://it.cs.nycu.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

國立陽明交通大學資工系資訊中心

Computer Center, Department of Computer Science, NYCU