Computer System Administration

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計算機系統管理這門課值得修嗎?

計算機系統管理是一門相當重要的課程，特別是對於想要從事計算機相關職業的人來說。以下是我個人的幾點觀點，供您參考：

1. 系統管理是相當實用的技能：系統管理是指對計算機系統進行維護、管理和監控的過程。在現今的資訊化社會中，幾乎所有的企業和組織都需要有人來負責系統管理。因此，學習系統管理是相當實用的技能，可以增加你在職場上的競爭力。
2. 系統管理是相當廣泛的領域：系統管理涉及許多不同的領域，包括硬體、軟體、網路、安全等等。因此，學習系統管理可以幫助你了解這些不同領域的相互作用和關聯，從而更好地瞭解計算機系統的運作原理。
3. 系統管理可以幫助你解決問題：當計算機系統出現問題時，系統管理人員需要能夠快速且有效地解決問題。學習系統管理可以幫助你瞭解常見的系統問題，以及如何解決這些問題。

總體而言，我認為計算機系統管理是一門非常值得學習的課程。如果你有興趣從事計算機相關職業，或者想更深入地瞭解計算機系統的運作原理，那麼學習系統管理會是一個不錯的選擇。

計算機系統管理是一門值得修的課嗎？

查看其他草稿

計算機系統管理是一門重要的計算機課程，涵蓋了計算機系統的管理和維護。該課程對於任何想要在計算機系統領域工作的人來說都是必修課。

計算機系統管理課程的內容通常包括以下方面：

- 計算機系統的組成和工作原理
- 操作系統的管理
- 網路的管理
- 安全的管理
- 備份和災難恢復
- 性能調優

計算機系統管理課程可以幫助學生了解計算機系統的管理和維護，為學生在計算機系統領域的職業生涯打下基礎。該課程還可以幫助學生提高計算機技能和解決問題能力。

總的來說，計算機系統管理是一門值得修的課程。該課程可以幫助學生了解計算機系統的管理和維護，提高計算機技能和解決問題能力。

以下是一些計算機系統管理課程的具體好處：

Why this course?

- NYCU CS has the only one “complete” departmental information technology center (called NYCU CSIT; a.k.a. computer center) in Taiwan.
- To cultivate professionals capable of operating CSIT, we offered two elective courses since 1996 (NCKU 2012-2022, NTU 2014-, NTHU 2019-) :
  - Computer System Administration (Fall semester) introduces basic Unix system administration skills, primarily in a one-server scenario.
  - Computer Network Administration (Spring semester) introduces advanced skills to operate the entire information technology center with multiple servers and network equipment.

NYCU CSIT - one of the main origins of Taiwan's Internet startups

- Wretch (無名小站)
- PIXNET (痞客邦)
- funP (雲沛創新集團)
- Appier (沛星互動科技)
- …

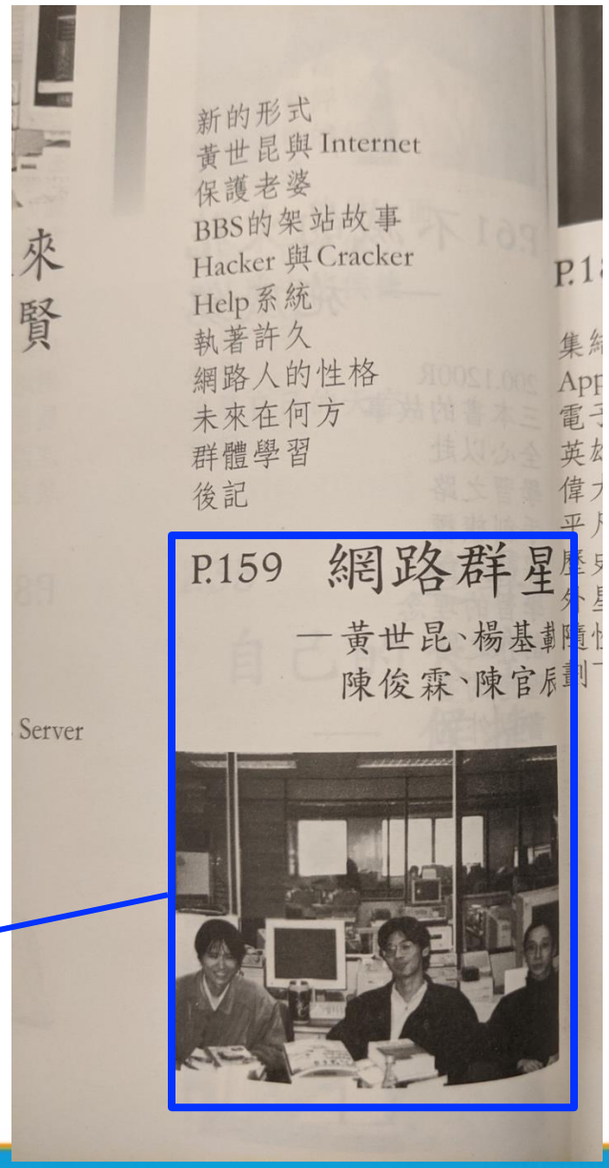
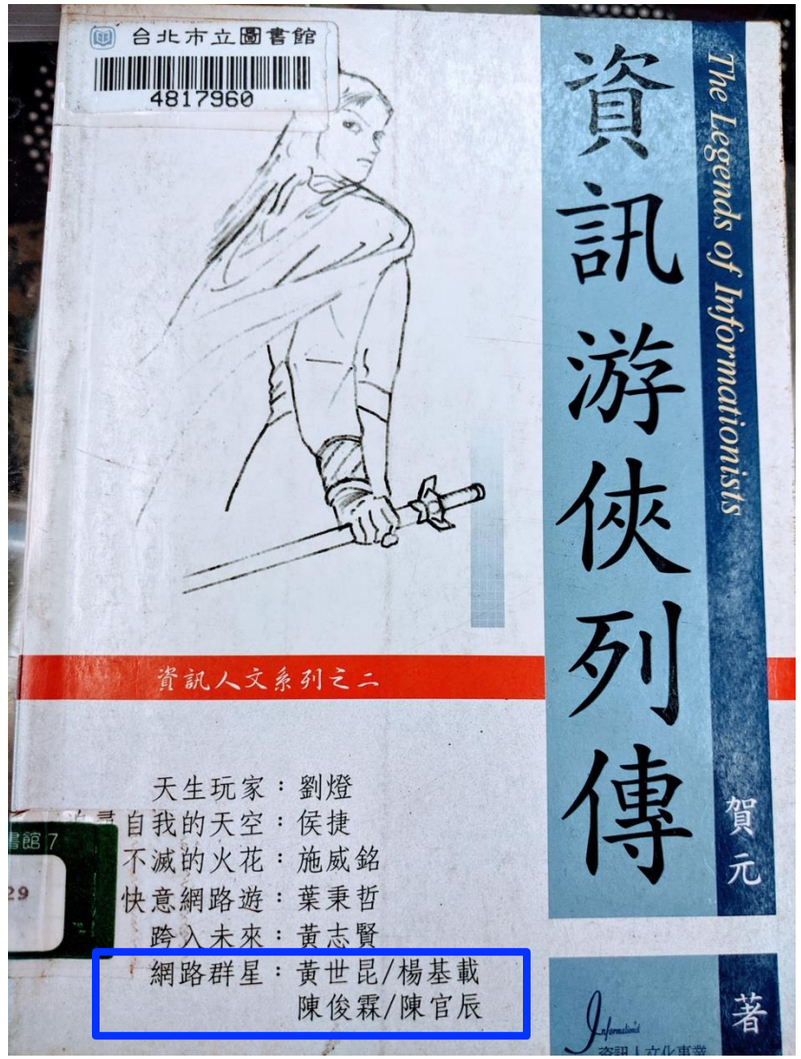
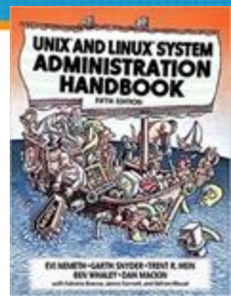


Photo taken at NYCU CSIT



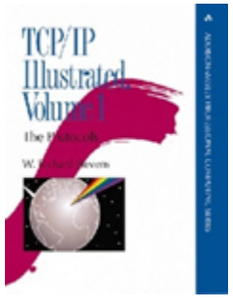
NASA = SA + NA

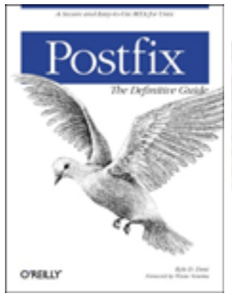


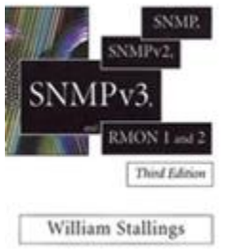
NASA Course Website

Computer System and Network Administration, NYCU CSCC

HOMEPAGE ▾ COURSES ▾ PROGRAMS







Graduate Courses

System Administration Practice (**SAP**, 2015~2017)
Network Administration Practice (**NAP**, 2015~2018)

Undergraduate Courses

Computer System Administration (**SA**, 1996~)
Computer Network Administration (**NA**, 2009~)
(Computer) Network Management (**NM**, 1997~2008)

Useful Articles

提問的智慧 (**zh-tw**)
How To Ask Questions The Smart Way (**en**)

NYCU CSCC (Computer Center, Department of Computer Science, National Yang Ming Chiao Tung University)

Three-year trial for graduates

NYCU CSIT is powered by Open Source

- Thanks to all the open-source contributors.
- This course is supported by MoE ITSA project.
- Let me know if you have open source contribution (bonus).

What System Administrator Should do?

- Ordinary list
  - Installing new system, and updates of OS and software
  - 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.

Two videos celebrating SysAdmin Day

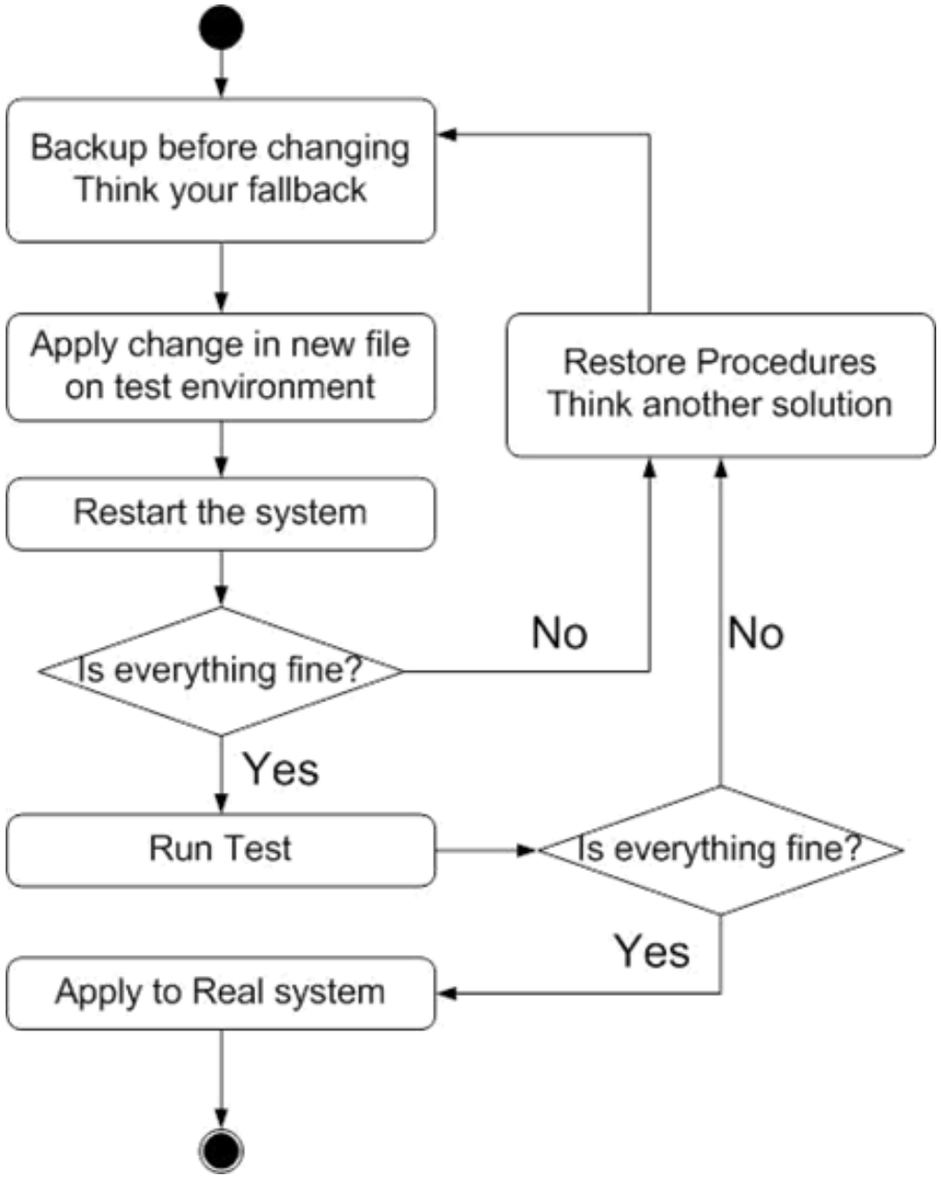
- Sysadrella (2019)
- This AI can do ANYTHING (2022)

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 an arbitrary webpage on Internet
- System Administration (in Fall semester)
  - Manage one server
- Network Administration (in Spring semester)
  - Manage a network consisting 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 14.1 Release
  - If time permits, TAs will also test the homework on Ubuntu Linux 24.04 LTS.
- Why not Linux?
  - Lots of distributions (slackware, RedHat, Debian, Ubuntu, Ezgo, Linpus, …)
  - 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)

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

- Instructor:
  - 蔡孟勳 (Meng-Hsun Tsai)

    tsaimh@cs.nycu.edu.tw

    Office: EC125C, Tel: ext. 56668
  - Office Hour: By appointment
- Class Time/Classroom:
  - Thu. abc (18:30 ~ 21:20)
  - 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 answer/configuration there directly!
    - You will be banned

Syllabus

- Lecture/Exam in Chinese
  - Not recommend for those who do not speak Chinese
- TAs:
  - We have eight TAs.
  - Email to TAs: ta@nasa.cs.nycu.edu.tw
    - Also received by the instructor
  - Office hour
    - by appointment, @CSIT
  - Website:
    - https://nasa.cs.nycu.edu.tw/sa/2024/

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 – 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

- Midterm
  - 15%
- Final
  - 15%
- Homeworks
  - 70%
  - No Delay Submission
  - 4 homeworks

What you should prepare?

- Background knowledge
  - Basic knowledge of UNIX commands
  - Basic Programming skills
  - Basics 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 your 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**

Some comments on the Internet

- **2010**

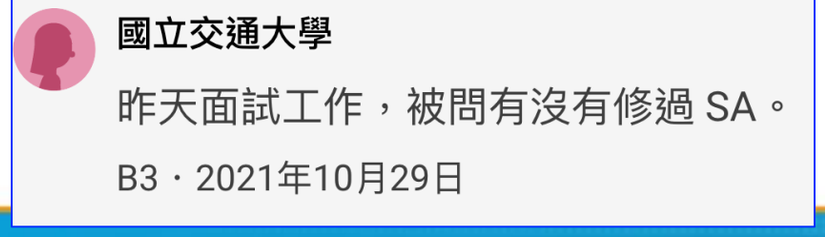
  雖然這門課的作業確實有點重，但也因為這些作業，使得 SA 比任何一門課都更能測試與磨練解決問題以及學習的能力。有心想修的同學可以透過課程網頁開始自行預習和做作業，相信一定會有不少收獲。

- **2018**

  這門課是一堂注重實務的課，只要肯認真寫作業、認真看 manual，一定可以給你滿滿的收穫。

- **2021**

  雖然早有耳聞SA 和NA是交大兩大硬課，可作業拿到手上還是被嚇到了，hw1就花了不少功夫在寫，hw2更是到了現在還有bug沒修好。整個壓力山大，加上必修課和專題，還有個最致命的GPE（對沒錯我超爛 大三還沒考過QQ）。最近期中考周整個人快要死掉，連室友都被我的氣色嚇到那種。



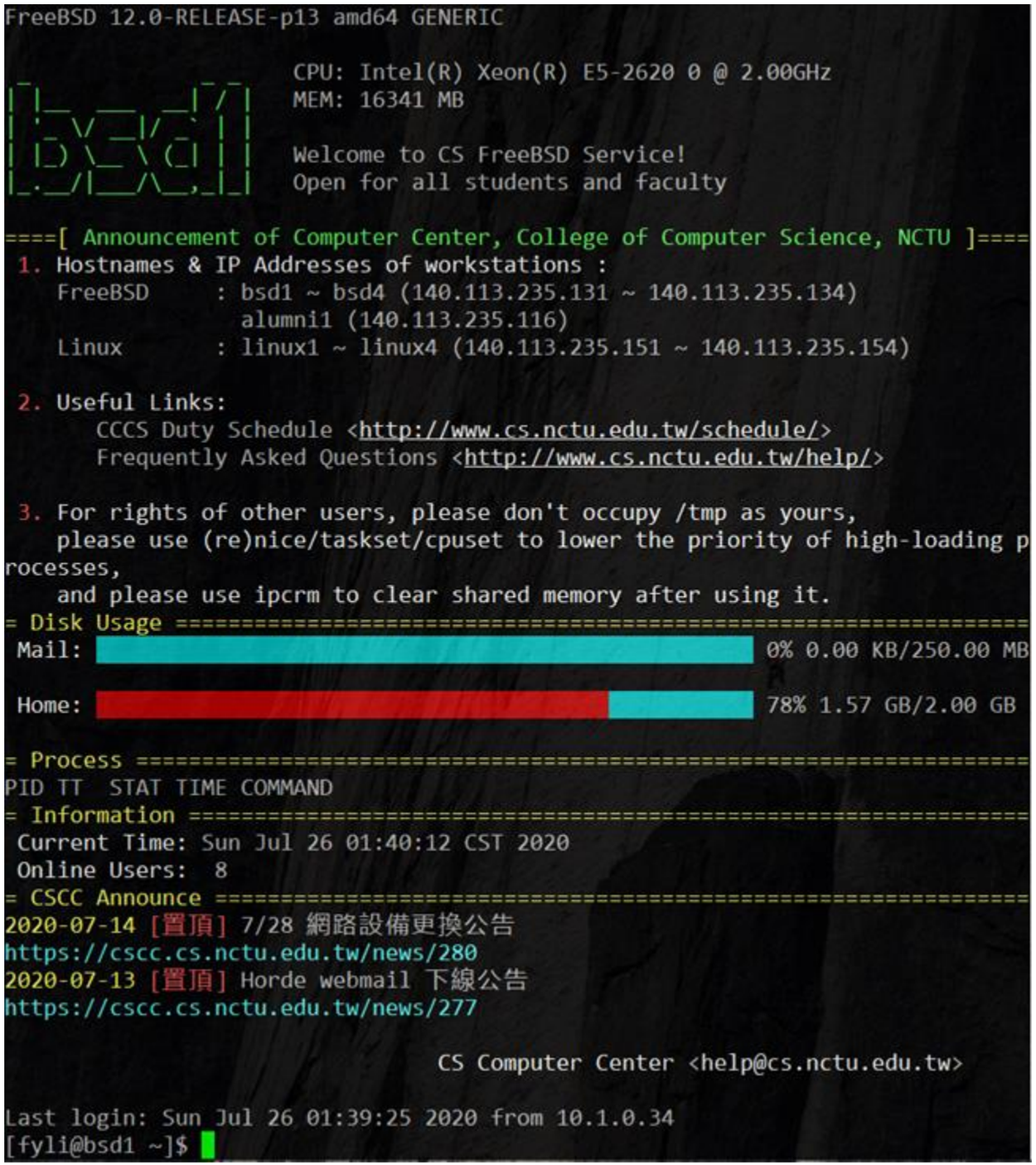
Basic knowledge in this course

Play with Unix-Like system

- Our department has FreeBSD/Linux workstations for all students
  - bsd{1,2,3,4}.cs.nycu.edu.tw
  - linux{1,2,3,4}.cs.nycu.edu.tw
  - alumni.cs.nycu.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



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 in man pages

- 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