

## Homework #0

Due Time: 2017/2/24 (Fri.) 22:00

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### Submission

- Compress all your files into a file named **HW0\_[studentID]\_[version].zip** (e.g. HW0\_bxx902xxx\_v1.zip), which contains two folders named **[studentID]\_NA** and **[studentID]\_SA** respectively.
- **Folder [studentID]\_NA** should contain a pdf file of all your answers in *Network Administration Preliminary Part*.
- **Folder [studentID]\_SA** should contain a pdf file of all the linux commands you use and a .txt file of all the flags that you find in *System Administration Preliminary Part*.
- Submit your zip file to <https://www.dropbox.com/request/FffsJrCeaBMXmG11e0u2>

### Instructions and Announcements

- Discussions with others are encouraged. However, you should write down your solutions **in your own words**. In addition, for **each and every** problem you have to specify the references (the URL of the web page you consulted or the people you discussed with) on the first page of your solution to that problem.
- **NO LATE SUBMISSION IS ALLOWED.**

## Network Administration Preliminary

### True/False

In each of the following question, please specify if the statement is true or false and **briefly explain** why.

1. If you have a 100Mbps network connection, it means you can download a file with almost 100Mbps speed anytime from anywhere. Ignore header overhead.
2. One IP address corresponds to exactly one host and one owner. For example, when you see there are many PTT accounts which post articles using the same IP address, you can infer that those accounts belong to the same person. (Assume unicast.)
3. While DHCP isn't required to connect to the Internet, gateway is required.
4. In general, an end device judges whether itself is the recipient of a packet by the packet's destination mac address.
5. Hub is merely a nickname of switch and they are the same.
6. One can surf the Internet, such as browsing, without using DNS.
7. Compared to 802.11b/g/n wifi, there is less interference for 802.11ac wifi. Moreover, 802.11ac wifi is able to achieve better download speed. Therefore, it is pointless to maintain 802.11b/g/n wifi.
8. In general, a firewall includes one or several devices that filter packets according to some rules. Basically, filtering means to accept, drop or reject packets.
9. A DNS server, for example, NTU DNS server, stores every existing resource record in the world locally on its memory and/or disk.
10. DHCP clients are able to acquire a DNS server's address from a DHCP server.
11. When you send data over wifi with WPA2 authentication, the data is encrypted.
12. VPN is often used to access servers in a private network, encrypt traffic, and bypass firewalls. In addition, VPN can sometimes help achieve better download speed.
13. It is possible for a device with a private IP to directly (without NAT) connect to another device with a public IP. Assume both devices use the same router as their gateway.
14. A 42-byte IPv4 packet which contains a TCP segment is small. When some users send such packets very frequently, it's abnormal.

**Select All That Apply**

In each of the following question, please choose the most appropriate answer(s).

1. Assume you have a 100Mbps network connection from an ISP. When you do speedtest and get a result of 1Mbyte/s, which of the explanations are appropriate?
  - (a) Network is severely broken and you should contact an administrator immediately.
  - (b) Try again with different servers. If the result is still bad, you should contact an administrator.
  - (c) Location of the speedtest server influences the result. When the testing server is far from your location, the result can be like this.
  - (d) Background processes are also using the network. You should close them before a speedtest.
  - (e) Doing traceroute/mtr tests is helpful to diagnose the problem.
  
2. Which of the following are **NOT** common IPv4 private subnets?
  - (a) 8.8.8.8/24
  - (b) 10.0.0.0/8
  - (c) 140.112.0.0/16
  - (d) 172.16.0.0/12
  - (e) 192.168.0.0/16
  
3. IP address exhaustion is a serious issue nowadays and IPv4 address's price increases. Which of the following are workarounds for it?
  - (a) IPv6
  - (b) NTP
  - (c) VOIP
  - (d) CGNAT
  - (e) SSH

## System Administration Preliminary

### Let's catch the flag!!! :D

Needless to mention, everyone wants to take the NASA course. However, it will be nice to take a free trial before the start of the nightmare course. So I have placed all the flags there. Find them yourselves!

You need to collect flags during the following trip. That is, you have to find strings like `NASA{xxx}`. How much you complete will decide your priority to take the course. Please write down all the linux commands that you use in each step in a pdf file, and the flags (e.g. `NASA{I_am_a_sample.}`) that you find in a .txt file.

.txt file format:

1.1 `NASA{FLAG1}`

1.2 `NASA{FLAG2}`

1.3 `NASA{FLAG3}`

.

.

### 1.1 Ticket to Linux

Hurry, you're going to be late for the flight to Linux.

Hints:

- `ssh [your_csie_account]@nasa-hw0.csie.ntu.edu.tw (140.112.30.17)`
- google FireSSH or chrome `ssh` or `putty`
- You will see the first flag as soon as you log in.

Note

- For csie students, please log in with your CSIE workstation account.
- For non-csie students, please fill out the form (<https://goo.gl/lK3q9I>) to create your account.
- The service is provided without warranty of any kind. You should only use it to complete this homework and should not do anything malicious. We will not be responsible for any loss resulted from this service.

Some explanation:

If you do things correctly, you will see an interface that allows you to type something. The interface is called "shell", which is the basic but powerful interface for a real user to interact with a computer. You will know it more deeply sooner or later.

### 1.2 Where are you?

Wait, do I take the right airplane?

Hints:

- Check your "working directory".
- If you don't know how, you can check [this link](#).

Some explanation:

The working directory is the working directory. You will know it better sooner or later ker ker.

### 1.3 Carry-on baggage

Hmm...where is my passport?

Hints:

- See (list) what you have in your "working directory".
- [Useful link](#)

### 1.4 See me fly

Ah, the captain need your help to fire the engine.

Hints:

- You have to execute engine to fly.
- But you have make engine executable first. Actually, you have to make a file with appropriate permission to execute it.
- [Reference](#)

### Mayday Mayday Mayday

The careless captain happened to detach one of the wings (so you still have one). Hopefully, you have a toolbox to fix it.

### 1.5 Open the toolbox

Hint:

- Password is beside the toolbox.

### 1.6 Wing construction

Hints:

- You need to get into toolbox.
- You need to remove the obstacle.
- Then rename the crisis to chance.
- Now you can do some magic.

## 1.7 EtaGo

Now the captain is too nervous to fly the plane. Fortunately, we have next generation AI to tell you how to fly. You have to extract the essence from what it says, though...

- EtaGo is in user NASA's home directory.
- You may need "pipe" or "redirection".
- Ah...this challenge may be too challenging.

## 1.8 Landing

Oh...so what you need to do now is to push the throttle and then, STOP.

- Throttle is under the directory `/plane`
- Easy huh?

## 1.9 Immigration

Hints:

- In the Linux world, you need `man` to help you. `man` will tell you what is `man`.
- I think I did not forget the [article](#) "a".
- No, `man` is not antonyms of women.

## 1.10 Suspicious (BONUS)

Something specious happened...?

Hints:

- You don't have to waste time on this challenge.
- There are many things more interesting to do in your winter vacation.

Note

- If you are so bored that you want to try this challenge, **PLEASE DO IT ON YOUR OWN, AND DON'T SHARE ANY INFORMATION ABOUT IT WITH OTHERS.**
- Have fun.