Homework #7

Due Time: 2019/6/23 (Sun.) 22:00
Contact TAs: vegetable@csie.ntu.edu.tw

Submission

- Put all answers **in one single PDF file** named **[studentID].pdf**, in the same order as the problem sheet. Do not repeat problem descriptions, just organize them by problem number in a tidy manner.
- Submit on NTU COOL (https://cool.ntu.edu.tw).

Instructions and Announcements

- The full score is 115.
- 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.
- Problems below will be related to the materials taught in the class and may be far beyond that. Try to search for additional information on the Internet and give a reasonable answer.
- Some problems below may not have standard solutions. We will give you the points if your answer is followed by reasonable explanations.
- **NO LATE SUBMISSION OR PLAGIARISM IS ALLOWED.**

Network Administration (48%)

1. WPA2/WPA3

In lab, we've briefly talked about WPA3. Please give two functions implemented in WPA3 which are different from WPA2, and explain them. (5%)

2. SSID/BSSID

Please explain the meaning of SSID and BSSID. (5%) Is it possible that an access point has multiple SSID? (2%)How about BSSID?. (2%)

3. Channel

In lab, you're asked to observe the channel on an radio of an access point. What is a channel? (3%) How many channels are there in 2.4GHz? (2%) What's the difference between adjacent channel interference and co-channel interference? (3%)

4. WPA2 Enterprise/Personal

What's the difference between WPA2 Personal or WPA2 Enterprise?(4%) Is "csie" a WPA2-Enterprise network or WPA2-Personal? How do you know that? (4%) (You can provide a screenshot to prove that you've seen this information of "csie" somewhere, or if you just infer the result, explain your reason.)

5. PSK/EAP/PEAP

Briefly explain PSK, EAP and PEAP. (4%) Try to compare them (4%) and combine what you learned in problem 4. Is PSK more likely to be used in personal or enterprise network? (2%)

6. Wi-fi Certificate

What is a Wifi Certificate? (4%) What is an certification authority(CA)? (4%) In this problem, you could just explain server certificate, not client-side certificate.

7. Lab

Please remember to submit the result you measured in lab. The result should contain:

- 1-2 screenshot of where you see the result of arbitrary SSID
- SSID
- Signal Strength
- Transmission Rate
- Channel
- Location

Make sure that for each SSID, you measure the above information for three locations specified in lab slide. There should be 6(SSID) * 3(Locations) = 18 different set of answer. However, you just need to provide a screenshot for arbitrary set of answer. (Don't attach 18 screenshots!)

System Administration (67%)

1. I just messed up ...

- VM credential: username and password is `nasa` and `nasa2019`, respectively.
- VM image: https://tinyurl.com/nasa19-hw7-vm.

(a) There is a photo in the home directory that had been accidentally deleted in the VM. Recover it and tell me what you did. (10%)
Hint: use any disk recovery tool you can find; *testdisk* is one of them to try. Furthermore, for image format conversion the command `qemu-img` might be of use.

(b) There is a broken `systemd` service in the VM. Please fix it and tell me how you accomplish it. (5%)

(c) There is an executable in your home directory named "`web`" and it needs `./config.josn` to start. Try to write a `systemd` service file that automatically runs `web` every time at boot. (5%)

2. Web terminology (6%)

1. Please briefly explain *reverse proxy* and its difference with *forward proxy*. List one advantage of reverse proxy.
2. Please briefly explain MVC (Model-View-Controller) architecture in less than 3 sentences.

3. Try MySQL

Before you start

- Prepare an environment with `mariadb`.
- Create an database named "**sahw7**".
- Create an MySQL user for "**sahw7**" and give it privileges.
- Download SQL file: https://www.csie.ntu.edu.tw/~chenpowen/sahw7.sql and run the following command:

```
$ mysql -u <username> -p sahw7 < sahw7.sql
```

Let's SQL!

- In the following tasks, except for the last task, you only need to write down the SQL commands.
- No GUI interface for MySQL(mariadb) is allowed.

Here we have an databases with a "**fastfood restaurants**" table. There is already some data in it. Please follow the instructions to make it more useful.

a. Show restaurants (5%)

Get the **names**, **since**, **origin** of all records in the **restaurants** table.

b. Add nicknames (5%)

As you may notice, the nicknames of the restaurants are `NULL`. Add any nicknames you want for them.

c. Create another table (5%)

Next, we want to store some famous dishes for the restaurants. Please add a table called **dishes** with the following columns:

Column	Type	Attribute
id	int	Primary Key, auto_increment, not null
name	varchar	
price	int	
restaurant_id	int	

d. Add records (5%)

Now please add at least one dishes for each of the restaurants.

e. Show restaurants their dishes(5%)

Get the **restaurant names**, **nicknames**, **dish name**, and **price** of all records and **sort** them by **descending order** according to their **price**, and provide a screenshot of the output.

4. More LAMP~

- Create an *CentOS* VM with `httpd` (The Apache webserver) installed and set up a **bridged network** as we did in class.
- To complete each task, write down what you did step by step following our instructions, and provide explanation and the commands you use for each step.

a. Run a website (4%)

- Write a PHP code which simply shows "**Welcome!**" and configure `httpd` so that you can see it when accessing the PHP page in a browser.

b. GET parameters (4%)

Support `HTTP GET` method in your PHP code: show the `GET` parameter "**name**" after the "Welcome". For example, When user enters `http://xxx.xxx.xxx.xxx/xxx.php?name=MaMa` in the browser, the php code should print "`Welcome! MaMa`".

c. Directive (5%)

Configure `httpd` such that the PHP webpage in previous task is accessible to only the VM host while other source IPs are blocked.

- Do not use the **Allow, Deny** configuration in old Apache (under v2.2).
- You can hard-code VM host's IP in `httpd`'s configuration. For example, if VM host obtains the IP `192.168.1.3` from local DHCP server (because of the bridged network, the VM is also in this subnet), simply put `192.168.1.3` in your configuration.
- You only need to show your configuration changes.

d. Apache Virtual Host (3%)

Please briefly explain Apache Virtual Host in less than 3 sentences.