

Homework 1

Install FreeBSD / Ubuntu & WireGuard

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Requirements – General

- Basic (15%)
 - Install FreeBSD 13.2-RELEASE
 - Alternatively, Install Ubuntu 22.04
- Root on ZFS (15%)
 - Zpool name : zroot (rpool on Ubuntu)
- Add a user and a group
 - User should also be in the "wheel" group ("sudo" on Ubuntu)
 - Use this user to do this homework instead of root (using sudo)
- Add a user called "judge" for Online Judge
 - User should also be in the "wheel" ("sudo" on ubuntu) group
 - Please use "sh" as default shell (10%)
 - This user needs to **run sudo without password** (15%)

Requirements – General (Cont.)

- Set your machine to current time zone and adjust current time (10%)
 - CST
- Enable sshd (20%)
 - Install this public key to your `/home/judge/.ssh/` for Online Judge.

```
$ fetch https://nasa.cs.nctu.edu.tw/sa/2023/nasakey.pub  
$ cat nasakey.pub >> /home/judge/.ssh/authorized_keys
```

- You can use Fingerprint to check "nasakey.pub"

```
$ ssh-keygen -l -f nasakey.pub  
256 SHA256:0L00tdbs1Q5q4J8wa4Hidej2gkq9gqtLQeJwm98VYZk sa-2023 (ED25519)
```

Requirements – Wireguard

- Install WireGuard ([Installation Guide](#)) on your system
 - You can install WireGuard with pkg or port, and apt for Ubuntu
- Login into [NASA Online Judge](#).
- Use WireGuard Key Reloader on the Online Judge to get the key and configuration.

Requirements – Wireguard (Cont.)

- Example of downloaded WireGuard config

```
[Interface]
Address = 10.113.$ID.11/32
PrivateKey = [WG_PRIVATE_KEY]

[Peer]
PublicKey = [WG_SERVER_PUBLIC_KEY]
AllowedIPs = 10.113.0.0/16, 172.16.0.0/16
Endpoint = 140.113.168.131:51011
PersistentKeepalive = 25
```

wg0.conf

Requirements – Wireguard (Cont.)

- Configure the connection
 - Configuration directory: `/usr/local/etc/wireguard/`
 - Copy the downloaded configuration files to your system
 - Or configure manually:
 - Address: `10.113.$ID.11/32` (`10.113.$ID.21/32` for Ubuntu)
 - Private Key
 - Server Endpoint: `140.113.168.131:51xxx`
 - Public Key
 - AllowedIPs: `10.113.0.0/16, 172.16.0.0/16`
- Use `wg-quick` to start/stop the connection
 - For detailed usage, please read the `wg-quick(8)` and `wg(8)` man page

Requirements – Wireguard (Cont.)

- You can use "ping -c 3 10.113.\$ID.254" to test whether you have connected to WireGuard Server
- Online judge server can ping your server (15%)

```
$ ping -c 3 10.113.11.254
PING 10.113.11.254 (10.113.11.254): 56 data bytes
64 bytes from 10.113.11.254: icmp_seq=0 ttl=64 time=2.225 ms
64 bytes from 10.113.11.254: icmp_seq=1 ttl=64 time=5.325 ms
64 bytes from 10.113.11.254: icmp_seq=2 ttl=64 time=3.501 ms

--- 10.113.11.254 ping statistics ---
3 packets transmitted, 3 packets received, 0.0% packet loss
round-trip min/avg/max/stddev = 2.225/3.684/5.325/1.272 ms
```

Requirements – OS

- Online judge system is designed for FreeBSD 13.2-RELEASE and Ubuntu 22.04 only
- Doing your homework with other OS may not pass online judgement

Score

- 100% for one system
- Additional 20% for second system

Requirements – Other

- TAs reserve the right of final explanations
- **Start from 9/21 19:00**
- **Deadline 10/5 23:59**



Attention

- Your work will be tested by Online Judge system.
 - You can submit multiple judge requests. However, OJ will cool down for several minutes after each judge.
 - **We will take the last submitted score instead of the highest score.**
 - Late submissions will not be accepted.
- **BACKUP your server before judge EVERY TIME**
 - **We may do something bad when judging.**
- Make sure everything is fine after reboot.



Suggestions

- Virtual machine is good for doing homeworks
 - Easy to install and backup
- Try to make your VM hardware configuration better
 - Disk controller
 - IDE → SATA, NVMe, ...
 - NIC: paravirtualized net, ...

Appendix: How to use Online Judge

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Online Judge

- <https://nasaoj.cs.nycu.edu.tw>



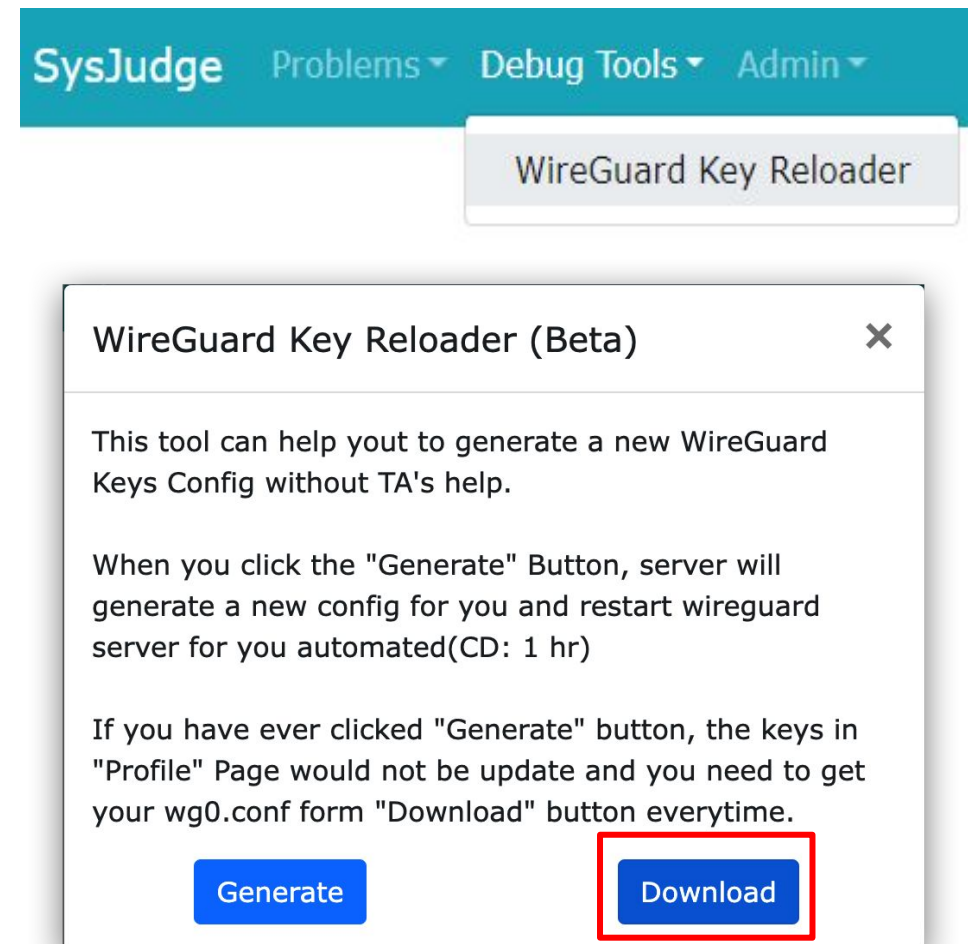
Login

- You can login with NYCU portal account or CS account
 - You would login to the same account no matter which method you choose.



WireGuard – Get key and configuration

- Install WireGuard
- Configure VPN connection
 - Download configuration file
 - Apply it to connect VPN server



The screenshot shows a web interface with a teal header containing navigation links: "SysJudge", "Problems", "Debug Tools", and "Admin". A dropdown menu is open, showing "WireGuard Key Reloader". Below this, a modal window titled "WireGuard Key Reloader (Beta)" is displayed. The modal contains the following text:

WireGuard Key Reloader (Beta) [Close]

This tool can help you to generate a new WireGuard Keys Config without TA's help.

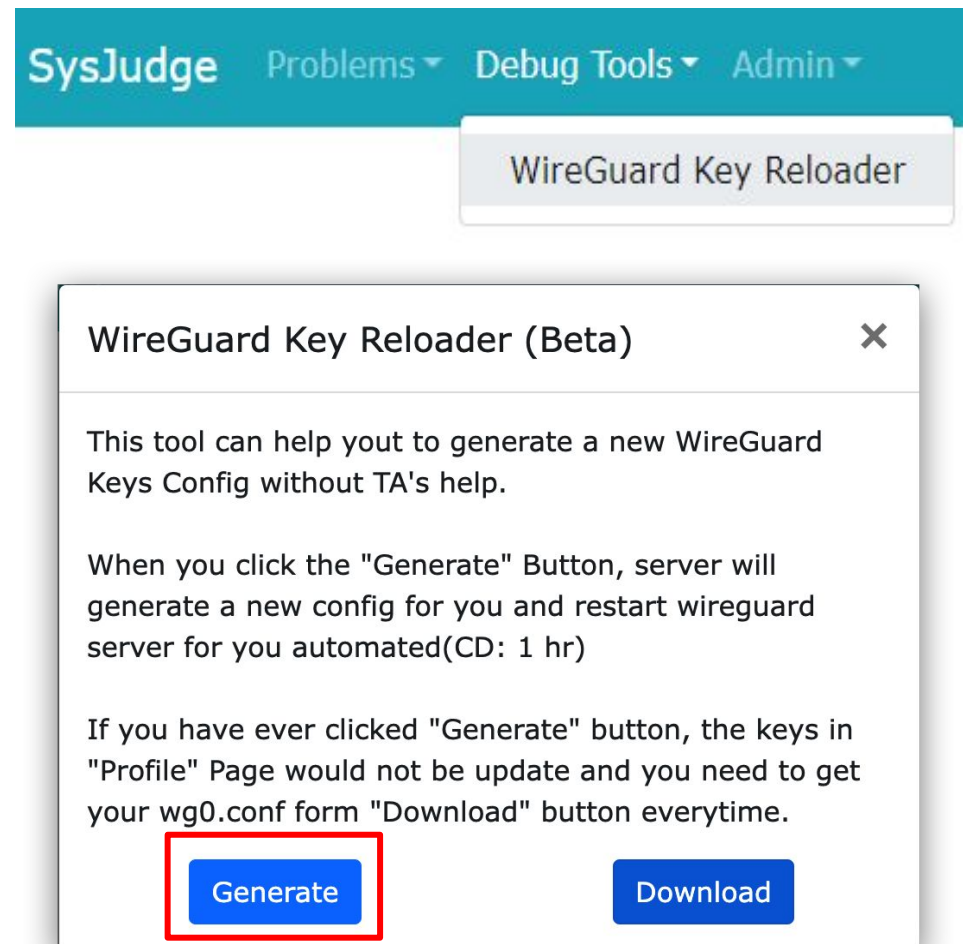
When you click the "Generate" Button, server will generate a new config for you and restart wireguard server for you automated(CD: 1 hr)

If you have ever clicked "Generate" button, the keys in "Profile" Page would not be update and you need to get your wg0.conf form "Download" button everytime.

At the bottom of the modal, there are two buttons: "Generate" and "Download". The "Download" button is highlighted with a red rectangular border.

WireGuard – Regenerate key

- If you cannot connect to Wireguard
 - Regenerate key and configuration file
 - Download and apply it



The screenshot shows the SysJudge web interface. At the top, there is a teal navigation bar with the following items: SysJudge, Problems (with a dropdown arrow), Debug Tools (with a dropdown arrow), and Admin (with a dropdown arrow). Below the navigation bar, a grey button labeled "WireGuard Key Reloader" is visible. Below that, a white modal window titled "WireGuard Key Reloader (Beta)" is open. The modal contains the following text: "This tool can help you to generate a new WireGuard Keys Config without TA's help." followed by "When you click the 'Generate' Button, server will generate a new config for you and restart wireguard server for you automated(CD: 1 hr)". Below this, it says "If you have ever clicked 'Generate' button, the keys in 'Profile' Page would not be update and you need to get your wg0.conf form 'Download' button everytime." At the bottom of the modal, there are two blue buttons: "Generate" and "Download". The "Generate" button is highlighted with a red rectangular border.

Help!

- Join NCTUNASA google group
 - If you have any question, you can post your problem in this group, TAs and Students will help you.
 - <https://groups.google.com/g/nctunasa>
- UNIX 常見指令教學
 - <https://it.cs.nycu.edu.tw/unix-basic-commands>
- How To Ask Questions The Smart Way
 - <https://github.com/ryanhanwu/How-To-Ask-Questions-The-Smart-Way>