Computer Architecture 2021 Lab 0

Linux Environment Setup

In this course, we will finish three CA labs in relation to assembly, processor and memory system. We have provided a Linux environment for you to write, test and submit your code.

In this tutorial, we will prepare our accounts and learn basic commands and useful tools under Linux. GNU/Linux, along with other open-source applications, are designed to facilitate our world. There are lots of in-depth tutorials online, e.g.:

- Linux cheat sheet: https://www.linuxtrainingacademy.com/linux-commands-cheat-sheet/

Table of Contents

1. Generate SSH key pair

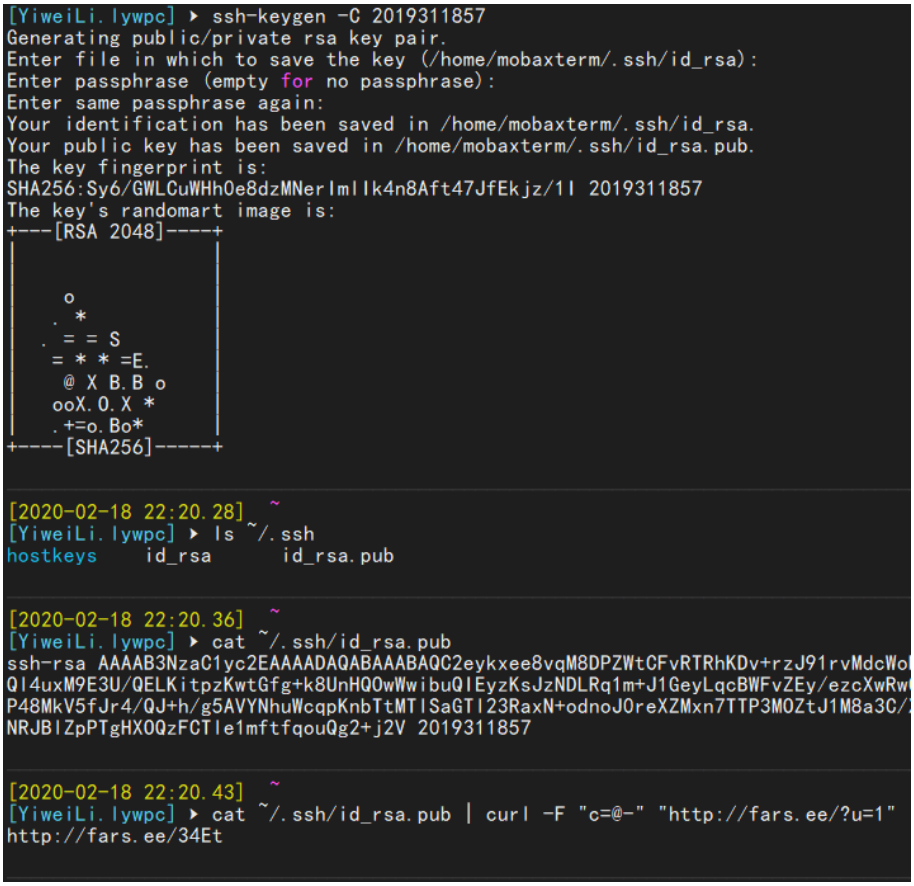
If you already have one public/private key pair and you really know what it means, skip this section.

In addition to access a server by plugging a monitor directly (which we mostly do to our own PC), there is another common method called SSH (Secure Shell), enabling us to safely access a remote server, even if the network is not encrypted. To login a Linux server via SSH, there are two typical methods: password and key pair. The latter is much more complicated, thus more reliable.

The following is for Windows users:

Although Windows 10 has a basic ssh.exe tool, a good third-party terminal emulator is suggested to improve your efficiency. Now we take MobaXterm for example.

- First download MobaXterm via link: https://mobaxterm.mobatek.net/download-home-edition.html
- Install and launch it, you will see a welcome page.
- Click “Start local terminal”. You will see a cmd-like CLI.
- Type “ssh-keygen -C [your student ID]” and leave a default for location and **empty** for passphrase. You can type “ls ~/.ssh/” to ensure a key pair is generated where **the private key is id_rsa, the public key is id_rsa.pub**



The following is for Linux/OS X users:

- Open a terminal, type “ssh-keygen -C [your student ID]” and leave a default location and **empty** for passphrase.

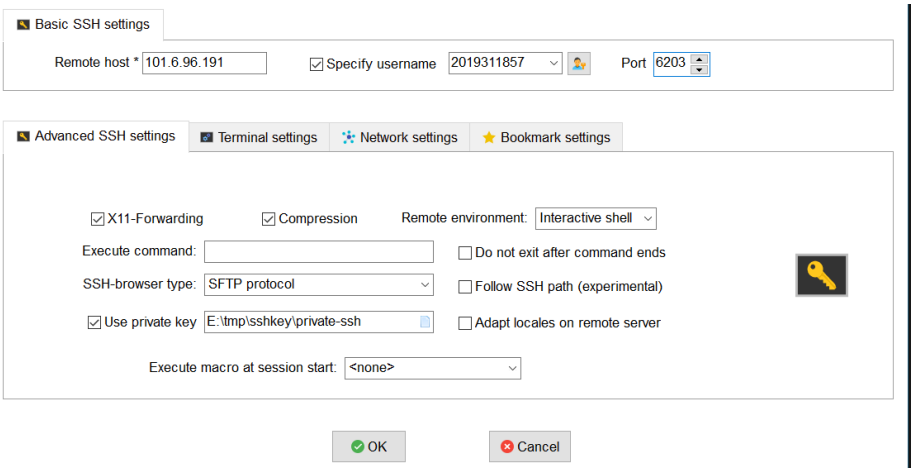
2. Upload public key and login with your account

- Type “cat ~/.ssh/id_rsa.pub”. Make sure the comment text (tail substring) is your student ID since our accounts are created automatically by scripts.
- Type “cat ~/.ssh/id_rsa.pub | curl -F "c=@-" "http://fars.ee/?u=1"” to upload your public key. **Never show your private key to others!**
- Fill in your ID slot in our public key list with the returned link (remember to fill your ID in sheet s21, not s20)
  https://shimo.im/sheets/alqnrv8rOEFvF2qo/MODOC/

After TA creates your account, have a look at your own workspace!

The following is for Windows users:

- In MobaXterm, choose “Sessions->New session”
- Click SSH. **Remote host: 101.6.96.191 Username: [your student ID] Port: [Machine ID]**
- Under “Advanced SSH settings”, choose “Use private key” and specify your private key location. (If you use default location in first step, this would be “C:\Users\<username>\Documents\MobaXterm\home\.ssh\id_rsa”)
- Click OK. You will see a Linux welcome message. All done!



The following is for Linux/OS X users:

- Open a terminal, and type: **“ssh [your student ID]@101.6.96.191 -p [Machine ID] -i [private key location] ”**.

You will see Linux welcome message. All done!

```
liyiwei@lywpc:~/tmp$ ssh 2019311857@101.6.96.191 -p 6200 -i "~/tmp/id_rsa"
Welcome to Ubuntu 18.04.3 LTS (GNU/Linux 5.0.0-23-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage


 * Canonical Livepatch is available for installation.
   - Reduce system reboots and improve kernel security. Activate at:
     https://ubuntu.com/livepatch

121 packages can be updated.
0 updates are security updates.

Your Hardware Enablement Stack (HWE) is supported until April 2023.
*** System restart required ***
Last login: Tue Feb 18 22:54:19 2020 from 120.227.82.5
2019311857@w0:~$
```

3. Play around in Linux

3.1 Some useful configurations

3.1.1 Keep your home directory invisible to others

- chmod 700 ~/.

3.2 Save connection config [linux-only]

We save stable ssh connection info on our PC. Next time we can login by simply type “ssh lab-server”

Append following lines to ~/.ssh/config (create one if it does not exist)

```
Host lab-server
  Hostname 101.6.96.191
  User 2019311857
  Port 6201
  IdentityFile /scorpio/home/liyiwei/.ssh/id_rsa
```

3.3 Git Tutorial

Git is a distributed version control system. We will manage our lab code with the help of git.

Github tutorial for reference:

- https://guides.github.com/activities/hello-world/
- https://product.hubspot.com/blog/git-and-github-tutorial-for-beginners

3.4 Transfer files between PC and server

For string operation, generally we use “CTRL+INS”/ “CTRL+SHIFT+C” to copy and “SHIFT+INS”/ “CTRL+SHIFT+V” to paste. Those shortcuts are correlated with terminal emulators.

For windows users, MobaXterm provides a tree structure file browser on remote server with a group of nice GUI commands: upload, download, …

For linux users, we generally use scp to sync remote files.:

- https://linux.die.net/man/1/scp

3.5 Choose a proper IDE

There is no best choice for everyone. VS Code is suggested for its graceful remote operation. After installation, search “remote ssh” in the extension market then config it properly.

VSCode + Remote ssh tutorial:

- https://code.visualstudio.com/docs/remote/ssh

There are far more hundred useful tips in linux waiting for you to explore.

HAVE FUN PLAYING LINUX