Introduction to GNU/Linux

Zihao — UM-JI (Summer 2019)

Goals

- Introduce GNU/Linux
- Introduce basics about GNU/Linux
- Introduce basics involved during installation

Contents

1 Introduction

After days of gaming, Mr. Fox finally decided to resume his project. Fortunately, through some illegal tools, he had some scientific access to some formal source engine and found out that his problem could be easily solved by lines of code, with the help of some package installed. Mr. Fox got to the official webpage of the package and found out that as a user of GameOS, he had to download the source code from GitHub, a website owned by the company of GameOS, and compile the source code by himself. However, the compilation failed and Mr. Fox was informed to install another package...Now the project is due, and Mr. Fox is still installing all those packages "recursively"...

2 Free Software

According to Richard Stallman, *"Free software" means software that respects users' freedom and community. Roughly, it means* ***that the users have the freedom to run, copy, distribute, study, change and improve the software***.[1]

2.1 The Four Essential Freedoms

A program is free software if the program's users have four essential freedoms:

- The freedom to run the program as you wish, for any purpose (freedom 0).
- The freedom to study how the program works, and change it so it does your computing as you wish (freedom 1). Access to the source code is a precondition for this.
- The freedom to redistribute copies so you can help others (freedom 2).

- The freedom to distribute copies of your modified versions to others (freedom 3). By doing this you can give the whole community a chance to benefit from your changes. Access to the source code is a precondition for this.

3 The GNU/Linux operating system

3.1 Operating systems

The operating system manages hardware and provides interface for user programs.

- Different operating systems have different interfaces for drivers, so you need different drivers for different operating systems. `https://www.debian.org/releases/stable/amd64/ch02s03.html.en#idm347`
- Different operating systems have different interface for user programs, so you need different binaries for different operating systems.

Therefore, you should use different tool for different purpose, e.g.

- GameOS for gaming
- MacOS for working
- Linux for coding

3.2 Distributions

Tens if not hundreds of flavours of Linux are available, and you can even create your own! Each comes with a different set of pre-installed software, graphical user interfaces, tools, etc.. A very short list of common distribution is given below. Feel free to install more than one, for instance in several virtual machines, and play with them to know which one suites you best.

- Debian, Ubuntu, etc.
- Arch Linux, Manjaro Linux, etc.
- Check Distrowatch.com, go to the corresponding official webpage and check whether it is the Linux designed for you, and then...

4 Installation Guide

4.1 Documentation

In brief, go to the official website and read the official documentation[2], e.g. `https://www.debian.org/releases/stable/amd64/index.html.en`

If you think that we are kidding, please check `https://www.debian.org/releases/stable/amd64/pr01.html.en`.

If you are still wondering, you may compare with `https://github.com/ve280/tutorials` and decide which side is more serious, professional, and helpful.

In addition, reading a documentation does not mean that you should read them word by word and we don't mean that the quick guides are bad and you should throw them away. The thing is that you should be responsible to yourself own, or in other words, you should always know what you are exactly doing.

The following are anther quick guide which list some key points that you should know or keep in mind.

4.2 Back up Your Existing Data

You are responsible to your data. During the installation, it is very likely that you will need to repartition your disk because of the difference of file system between operating systems. The procedure will erase the current data on your disk. Users of virtual machines or Logical Volume Manager should be safe if things are done in the right way. However, having a backup is always a good idea. In addition, we strongly recommend you to keep your data secure.

4.3 Obtaining the Installation Image

Before installing, download the image from the official website and verify the checksum and/or signature. For more information on what they are you can refer to

- `https://wiki.manjaro.org/index.php?title=Check_a_Downloaded_ISO_Image_For_Errors`
- `https://wiki.manjaro.org/index.php?title=How-to_verify_GPG_key_of_official_.ISO_images`

4.4 Installation

As a general rule carefully read all the instructions appearing of the screen and follow them. **If you are unsure of what to do please ask us for help.**

Install a virtual machine or prepare a USB Memory Stick, win32diskimager may help for Windows users. If you need to reboot, this following link might be helpful `https://www.debian.org/releases/stable/amd64/ch03s06.html.en`

4.5 Partitioning

Again, make sure if your data is safe.

Logical Volume Manager: LVM is strongly recommended for the sake of resizing your partition without losing your data afterwards.

Partition Table: your partition layout will differ according to the partition table you are using, please check `https://wiki.archlinux.org/index.php/Installation_guide#Partition_the_disks` for more detailed information. For GPT users, please pay attention to EFI system partition, you should have that with corresponding file system, otherwise you may not be able to boot your operating system.

Recommended Partitions: We strongly recommend you have a independent partition just for your `home` directory, so that you can reinstall the system without losing any personal data if you break your Linux, which can be common for beginners...

For other directories, please check `https://www.debian.org/releases/stable/amd64/apcs02.html.en` and do as what you wish. Again LVM is very helpful so that you can create, delete, resize, do what ever you want **at any time!**

Swap partition: you may want a swap area, you may check https://wiki.archlinux.org/index.php/Swap for basic information, the size needed will differ depending on your RAM and whether or not you want hibernation. Historically a common Swap partition should be twice the amount of RAM.

4.6 Software

Software on Linux are managed as packages, most Linux distributions have their own package manager helping you to install, remove and most importantly, to solve the dependencies so that you do not need to install the packages "recursively". There are other package manager for specific software, e.g. python. In addition, Windows also have some package manager such as Chocolatey. For now, you may need a GUI to make your life easier, please search online on your own for more information.

5 End

Hope you now have beautiful Linux running on your computer. If you need further assistance with Linux installation or usage please contact us or ask your questions of FOCS' Piazza.

Enjoy!

References

[1] Stallman, Richard. "The Free Software Definition" *GNU*, 20 March. 2019. https://www.gnu.org/philosophy/free-sw.en.html. Accessed 22 May. 2019.

[2] Debian Installer team. "Debian GNU/Linux Installation Guide" *Debian*, 9 Jun. 2018. https://www.debian.org/releases/stable/amd64/index.html.en. Accessed 22 May. 2019.