# Lab 2: Basic Unix Commands

You can do this lab on a PC in the lab or on your own laptop. If you use macOS on your own laptop, you can use the Terminal app (in /Applications) on your Mac instead of Linux VM. Please use the command line in Terminal only, so please DO NOT use GUI except using Text Editor. Please follow step-by-step, and do not skip any of them. You will finally need to submit your work on *MyCourse* when you are done. We accept it at your lap time only.

## Part 1: Obtaining Unix

- Windows: You have 2 options
  - Install WSL to start your own Ubuntu. Please follow the steps in the article: https://docs.microsoft.com/en-us/windows/wsl/setup/environment (end at File Storage)
  - Install VirtualBox and then Ubuntu on a virtual machine. Please follow the step in the article: https://mycourses.ict.mahidol.ac.th/mod/resource/view.php?id=11355
- macOS: As we discussed in the class, macOS is rooted in Unix.
- Linux: `/dev/null`

## Part 2: Commands

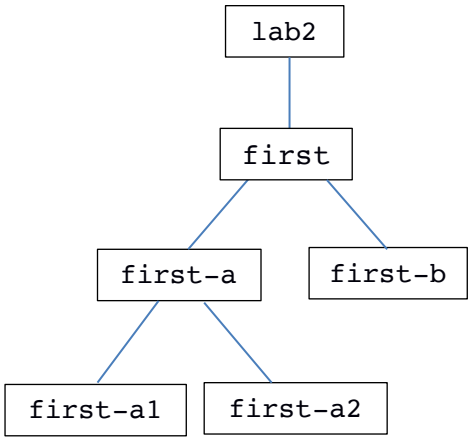
1. Read the slide by Aj. Ittipon Rassameeroj: https://mycourses.ict.mahidol.ac.th/mod/resource/view.php?id=11356
2. Please give a moment of silence for 1 minute to appreciate Linux and thank Linus Torvalds and all of the Linux contributors.
3. Open “Terminal” for macOS and Ubuntu (either native or virtual machine) or run a command “wsl” for Windows.
4. Please run the command below and press Enter, then enter the password, which is the same password in step 1. (FYI: you won’t see the password while typing. Just keep typing regularly)
   ```
   $ sudo script output.txt
   ```
   You might not need “sudo”, but I’ll you find that out by yourself.
   (Optional) From the previous step, if you are curious what `sudo` and `script` commands are, you may use `man` command to learn.
   ```
   $ man sudo
   $ man script
   ```
   Note: for `man` command, just use arrow up and arrow down keys to scroll up and down the page. If you want to quit the manual, press q.

5. In your home directory, create directory `lab2`
   ```
   $ mkdir lab2
   ```

6. In `lab2` directory, create a directory named `first`, and in `first` directory, created `first-a` and `first-b` directories.
```
$ cd lab2/first
$ mkdir first-a
$ mkdir first-b
```

7. Use `ls` to check if those directories are created.
```
$ ls
```

8. In `first-a` directory, create directory `first-a1` and `first-a2`. After that, you will have directory structure like this:



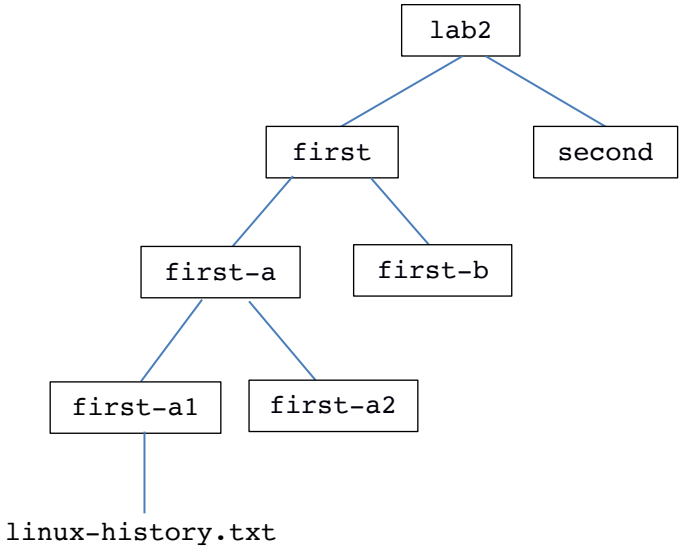

```
$ cd first-a
$ mkdir first-a1 first-a2
```

9. Use `pwd` command to check where you are now.
```
$ pwd
```

10. Create directory named `second` at `lab2` directory.
```
$ cd ../..
$ mkdir second
```

11. In `lab2/first/first-a/first-a1`, create an empty file named `linux-history.txt`
```
$ cd ~/lab2/first/first-a/first-a1
$ touch linux-history.txt
```

So far, you have files and directories like this:




12. Open Text Editor app (if you are using macOS, use TextEdit app in /Applications or NotePad for Windows).

13. Use Text Editor app to open `linux-history.txt` file that we have just created. Copy the below text and paste on the file, save it, and close Text Editor app.

> After AT&T had dropped out of the Multics project, the Unix operating system was conceived and implemented by Ken Thompson and Dennis Ritchie (both of AT&T Bell Laboratories) in 1969 and first released in 1970. Later they rewrote it in a new programming language, C, to make it portable. The availability and portability of Unix caused it to be widely adopted, copied and modified by academic institutions and businesses.
>
> In 1977, the Berkeley Software Distribution (BSD) was developed by the Computer Systems Research Group (CSRG) from UC Berkeley, based on the 6th edition of Unix from AT&T. Since BSD contained Unix code that AT&T owned, AT&T filed a lawsuit (USL v. BSDi) in the early 1990s against the University of California. This strongly limited the development and adoption of BSD.
>
> In 1983, Richard Stallman started the GNU project with the goal of creating a free UNIX-like operating system. As part of this work, he wrote the GNU General Public License (GPL). By the early 1990s, there was almost enough available software to create a full operating system. However, the GNU kernel, called Hurd, failed to attract enough development effort, leaving GNU incomplete.
>
> In 1985, Intel released the 80386, the first x86 microprocessor with a 32-bit instruction set and a memory management unit with paging.
>
> In 1986, Maurice J. Bach, of AT&T Bell Labs, published The Design of the UNIX Operating System. This definitive description principally covered the System V Release 2 kernel, with some new features from Release 3 and BSD.
>
> In 1987, MINIX, a Unix-like system intended for academic use, was released by Andrew S. Tanenbaum to exemplify the principles conveyed in his textbook, Operating Systems: Design and Implementation. While source code for the system was available, modification and redistribution were restricted. In addition, MINIX's 16-bit design was not well adapted to the 32-bit features of the increasingly cheap and popular Intel 386 architecture for personal computers. In the early nineties a commercial UNIX operating system for Intel 386 PCs was too expensive for private users.
>
> These factors and the lack of a widely adopted, free kernel provided the impetus for Torvalds' starting his project. He has stated that if either the GNU Hurd or 386BSD kernels had been available at the time, he likely would not have written his own.

14. Go back to the Terminal. See content of the file you have just added.
    ```
    $ more linux-history.txt
    ```

15. Copy `linux-history.txt` file in `first-a1` to directory `first-b`.
    ```
    $ cp linux-history.txt ../../first-b/
    ```

16. Open Text Editor app (or TextEdit on Mac) and open linux-history.txt file in `first-b` that we have just copied. Copy the below text and paste on the file to append the existing content, NOT replace it. Then, save and exit Text Editor.

> Linus Torvalds had wanted to call his invention Freax, a portmanteau of "free", "freak", and "x" (as an allusion to Unix). During the start of his work on the system, he stored the files under the name "Freax" for about half of a year. Torvalds had already considered the name "Linux", but initially dismissed it as too egotistical.
>
> In order to facilitate development, the files were uploaded to the FTP server of FUNET in September 1991. Ari Lemmke at Helsinki University of Technology (HUT), who was one of the volunteer administrators for the FTP server at the time, did not think that "Freax" was a good name. So, he named the project "Linux" on the server without consulting Torvalds. Later, however, Torvalds consented to "Linux"

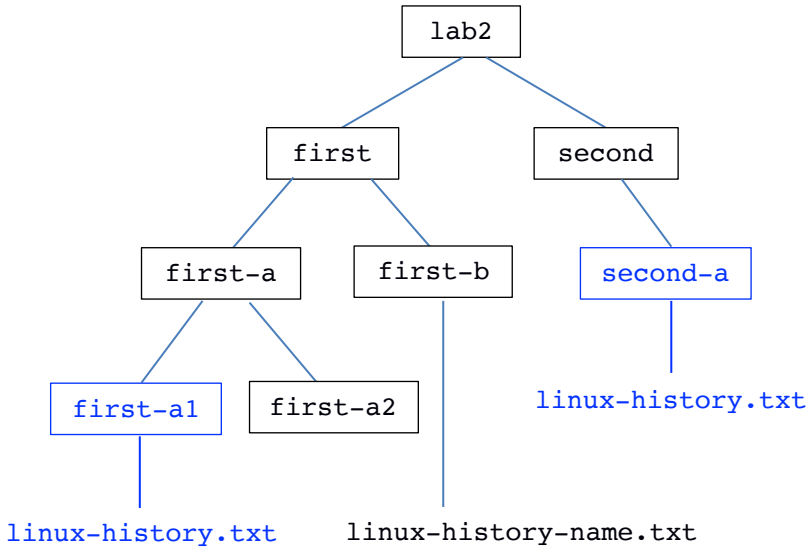
17. Go back to Terminal. Use `tail` command to check the file content in order to make sure the content is just appended.

```
$ cd ~/lab2/first/first-b
$ tail linux-history.txt
```

18. In `first-b`, rename `linux-history.txt` file to `linux-history-name.txt`. Before renaming, please make sure you go to the right path because we have two files with the same name in different directories.

```
$ pwd
$ mv linux-history.txt linux-history-name.txt
```

19. Copy directory first-a1 (included any files and subdirectories in there) to directory second and rename directory name to be second-a. Thus, after you are done that, you will have files and directories like this:




```
$ cd ~/lab2
$ cp -R first/first-a/first-a1 second/second-a
```

20. In your home directory, find all .txt files that their names are contained “linux”
```
$ cd ~
$ find . -name “*linux*.txt”
```

21. Search all files that have word “Freax” in their file contents.
```
$ grep -r “Freax” ~
```

22. Delete directory `first-a2`
```
$ cd first/first-a/
$ rm -r first-a2
```

23. Check a current file permission for directory second
```
$ ls -l ~/lab2
```

24. Use `chmod` command to change the permission of directory `second` (included all subdirectories and files), which allows all users in the same group can write, and other users cannot do anything with this file. Then, check its permission to make sure it is correct.
```
$ cd ~/lab2/
$ chmod -R g+w second
$ chmod -R o-rwx second
```

25. Run exit command to exit script and save your work. Then, run another exit to quit Terminal.
```
$ exit
```

26. Rename `output.txt` on your home directory to be yourID.txt and submit it to mycourses.ict.mahidol.ac.th.