Updated on: August 26, 2022

CS 3035, Fall 2022
In-Lab Exercise 2

~~August 25, 2022~~ Now Due: August 30, 2022 (by class time 1:50 PM)

For today's lab exercise, we will:

1. Complete the Ubuntu OS installation on VirtualBox or UTM.
2. Run the basic commands listed in this document in the Ubuntu terminal.
3. Install required compilers, interpreters, and a text editor. You may chose to install any text editor of your choice or use the one that comes pre-installed with Ubuntu (gedit). Some popular options are Sublime Text and Nano.
4. ~~You will be required to submit a lab report **due by end of class.**~~ The instructions for the lab report are at the end of this handout.

Instructions

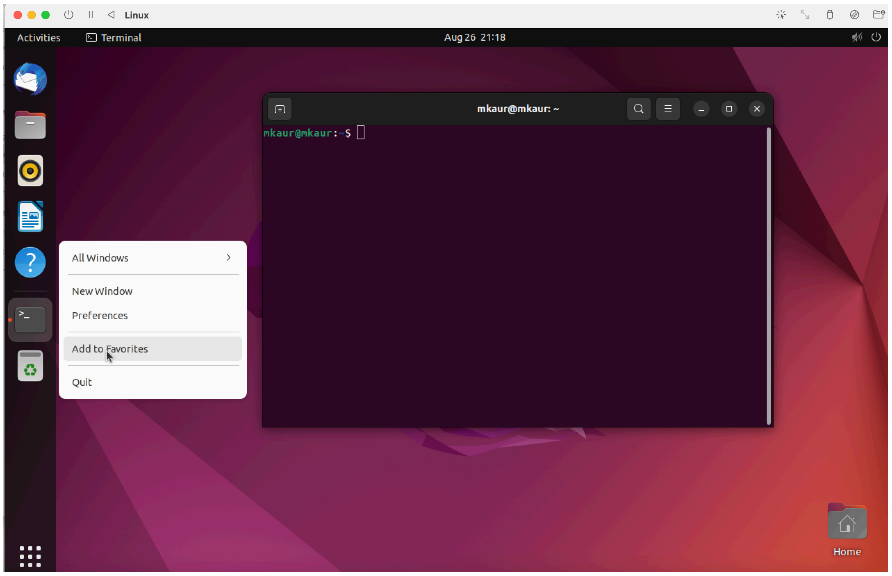
To install the Ubuntu OS:

1. VirtualBox: Please follow instructions from last lab.
2. UTM: Instructions will be shown by instructor. Also available at UTM's website: https://mac.getutm.app/gallery/ubuntu-20-04.

Please note that we need the Ubuntu VMs to have 2048 MB RAM and 40 GB virtual hard drive, preferably. If your computer is short on memory, you may chose 1024 MB RAM.

Basic Linux commands:

Open your Ubuntu terminal , click on 'Activities' (top-left corner), and type Terminal in the search bar. To avoid having to look up the terminal in the search bar, once your terminal is open, right click on the terminal icon in the left panel, and select "Add to Favorites". Look at Screenshot 1 below for clarification.



```
mkaur@mkaur:~$ 
```

Adding Terminal to the favorites bar

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Please run the following commands in red in the terminal. Please read the explanation of each command carefully as well.

1. pwd
   - Usage: pwd
   - pwd informs us of our location within the Linux filesystem. It should tell you the directory you are currently in.
2. mkdir test_directory
   - Usage: mkdir <DIRECTORY NAME>
   - mkdir lets us create a new directory within the current directory we are in.
   - A directory in Linux is equivalent to a folder in Windows or Mac.
   - After executing this step, you have created a new directory called 'test_directory'.
   - **Run 'ls' after this step and take a screenshot of the output of ls.**
3. cd test_directory
   - Usage: cd <DIRECTORY NAME>
   - cd helps us navigate into the directory we have specified.
   - We can also specify DIRECTORY NAME using a path to it.
   - For instance, a directory named 'CS3035' located within our 'Home' directory can be written as CS3035/Home.
   - **Run 'pwd' after this step and take a screenshot of the output of ls.**
4. touch testfile
   - Usage: touch <FILE NAME>
   - touch helps us create a new file.
   - This file can have any extension we specify. For example, we could use testfile.txt to indicate a simple text file or testfile.py to indicate a Python code file.
   - **Run 'ls' after this step and take a screenshot of the output of ls.**
5. ls -lt
   - Usage: ls -lt (l is a lowercase 'L', not to be confused with upper case 'I')
   - ls lists the files within the directory we are currently in.
   - When we use the arguments '-lt', it indicates the results in a list form in a chronological order. There are many other arguments ls can use.
   - When we invoke this within our test_directory, it will list 'testfile'.
   - **Take a screenshot of the output of ls -lt.**
6. cp testfile testfile2
   - Usage: cp <FILE NAME TO COPY> <FILE NAME FOR THE COPY>
   - cp will copy the contents of the FILE NAME TO COPY (testfile) into the FILE NAME FOR THE COPY (testfile2)
   - If we want to copy one directory to another, we can use cp with a -r flag. Example: cp -r test_directory test_directory2.
   - If the FILE NAME or the DIRECTORY NAME FOR THE COPY does not exist, this command will create them before copying content over.
7. mv testfile2 ../
   - Usage: mv <FILE or DIRECTORY NAME> <LOCATION>
   - mv moves a file for directory rom its current location to the new location we specify.
   - The location '../' means one directory above the current directory in the file system tree in our Ubuntu system.
8. rm testfile
   - Usage: rm <FILE NAME>
   - rm deletes the file we specify.
   - 'rm -r' or 'rmdir' delete the directory we specify.
   - Please note that rm is a permanent deletion, there is no 'Trash' folder or directory in Linux. If you delete something, it can most likely not be recovered.

9. cd .. followed by rm -r test_directory
   - Here we are running two commands consecutively.
   - First we run 'cd ..' to navigate out of our current directory and into its parent directory.
   - Then we run the 'rm -r test_directory' command to delete the directory we created for this lab.
10. Additional commands for you to know. You don't need to run them.
   - sudo : If we prefix a command we are running with "sudo", we get additional "administrator privileges" required to install software in Ubuntu. This is why we need "sudo" before all installations.
   - apt / apt install : All softwares are available for installation in Ubuntu as packages. They can be accessed using the 'apt' utility. As long as we know the name of a package, we can use 'sudo apt install <package name> to install it.
   - man : Provides a helpful sheet of information about a tool or a utility in Linux that we want to know more about. Run 'man ls' as an example and see the number of arguments that ls can accept!
   - help : Similar to man but some utilities may not use it.

Required installations:
Open your Ubuntu terminal , click on 'Activities' (top-left corner), and type Terminal in the search bar. We will install the interpreters and compilers we need through the Terminal. Please run the following commands:

1. Before any of these installations, run the following command:
   1. sudo apt update
2. Install GHC, the Glasgow Haskell Compiler and related packages:
   1. sudo apt install ghc
3. Install nodejs and nodejs package manager, used for interpreting JavaScript:
   1. sudo apt install nodejs
   2. sudo apt install npm
4. Install the pip package manager, used to manage python addons:
   1. sudo apt install python3-pip
5. Install GCC, the GNU compiler for C
   1. sudo apt install build-essential

Lab Report

You will be required to submit a lap report. The lab report must include screenshots showing the output of the following commands (in red). Please label your screenshots to indicate what they are showing.

1. gcc -v
2. ghci followed by 42, followed by :quit
3. node -v
4. python3 - - version (no space between the two dashes '-')
   - *Python is already installed in Ubuntu. You will not need to install it.*
5. Outputs of the basic commands **(1-5)** in Linux