Homework 0 - Introduction to Linux

Due date: not for submission.
Guidelines:
If you have any questions regarding this assignment, **USE PIAZZA**.
Please note: asking your questions by email is not an option! Please do not send any emails regarding the assignment to the TAs.

The goals of this assignment are to setup your working environments and get you familiar with Linux on x64 platforms. The following homework assignment will be developed and tested under Linux, so it is very important for you to feel comfortable with the basic workflow of booting your Linux machine, working in the terminal, backing up your files, and so on.

1. Setup the working environments

The specific Linux distribution which we will use in this course is Ubuntu 18.04 LTS by Canonical, along with its default tool chain (e.g., GCC version 7.4.0). Since most of you probably use Windows or Mac personal computers, working with Linux is not immediate for you. You may install Ubuntu 18.04 LTS on your personal computer, but this is suboptimal for a few reasons:

1. Homework assignments require you to modify the Linux kernel.
2. Few of us can write perfect code the first time.
3. Errors in the kernel can render the machine unusable.

It is thus not recommended for you to modify the actual kernel of your Linux machine.
The preferable method is working on a virtual machine (VM): you will run your own Linux VM on top of a Windows host machine. The host intermediates between the VM and the physical hardware, such that a VM crash is no more than an application crash.
Now you will download VMware Player or VirtualBox and run a local Linux VM in it.

NOTE 1: If you're using a Mac laptop with an old ARM architecture CPU (i.e. M1-M2), please use this: https://osxdaily.com/2022/10/22/you-can-now-run-virtualbox-on-apple-silicon-m1-m2
NOTE 1: If the above doesn't help, use the attached instructions by Shaked Goldstein in the file "Installing_Course_Image_on_Apple_Sillicone.pdf".

1.1. Download and install local VM

1.1.1 VMware for Windows

1) Download the next version of "VMware Workstation 17 Player for Windows 64-bit Operating Systems" (you can look for the latest version if you want, but you don't need to): https://softwareupdate.vmware.com/cds/vmw-desktop/player/17.6.1/24319023/windows/core/VMware-player-17.6.1-24319023.exe.tar
   This software is a free virtual machine monitor which can host virtual machines.
2) Install the "VMware Workstation Player" you just downloaded. You don't need to add a licence, and make sure you choose "free for non-commercial use" when you open it for the first time.
3) Download a copy of the **course Linux image**:
   https://drive.google.com/file/d/15zTEByy5K_vFN9BmgWx9i_Tkq8t2hUFZ
   This image is specifically tailored for the course requirements, so you are obliged to work on this copy only. **No technical support we be given by the course staff for other versions of Linux distributions/kernels.**
4) Unzip the "ubuntu18.zip" file. You may need 7-Zip or p7zip for this step.
   The unzipped folder should contain a virtual disk file called "ubuntu18.vmx" file, which VMware treats just like a standard hard disk device. Your virtual disk has been preloaded with a copy of Ubuntu 18.04 LTS. You will have the root password for this machine, so you will have full privileges on the machine (for example, for "sudo" commands).
5) Optional: (Let your vm work in full resolution) Go to your "ubuntu18.vmx" file and open it in your favorite text editor (e.g. notepad++). Change the field "svga.guestBackedPrimaryAware" to "FALSE".
6) Start the VMware Workstation Player.
7) Double-click the *"Open a Virtual Machine"* and choose the *ubuntu18.vmx* in the unzipped folder.
8) Click *Power on this virtual machine*, and choose "Take Ownership" and "I copied it" if you are asked.
   Play the VM and wait until it loads; this may take a few minutes.
   It is recommended to download and install the "VMware Tools for Linux" that VMware suggests you to install.
9) Login as `student`, the password is `Aa1234567890`.
   a) Note: **DO NOT UPGRADE your ubuntu** from 18.04 to later version
10) Your Linux virtual machine is now on!
    Roll up our sleeves and start exploring it. Can you browse the internet? Can you open the terminal and run "date"? Can you shutdown the machine?

FAQ:

Q: I have an error message: "intel vt-x is disabled".
A: https://www.youtube.com/watch?v=co2b3RjMQeQ
Q: I Cannot login into the course's image due to "no more space left" in the image's memory
A: Use Console based-login(CTRL + ALT + Space, and then F2), then use console commands slike ls, cd, rm to delete some unnecessary files.
Q: Can I use Parallels?
A: We do not support Parallels in this course. Nevertheless, maybe using https://www.parallels.com/blogs/convert-vmware-to-parallels/ can help you.

1.1.2 VirtualBox

1) Download the software. This software is a free virtual machine monitor which can host virtual machines.
    a) **Mac (ARM processors) users** – we don't support Mac in this course. However, please check the next link that will might be helpful to you: https://osxdaily.com/2022/10/22/you-can-now-run-virtualbox-on-apple-silicon-m1-m2
    Note (https://www.virtualbox.org/ticket/21771) that you should use an old version of the software, like 7.0.8, as can be found here: https://www.virtualbox.org/wiki/Download_Old_Builds_7_0
    b) **Other users** - download "VirtualBox" from this landing page: https://www.virtualbox.org/wiki/Downloads
2) Install the "VirtualBox" you just downloaded.
3) Download a copy of the **course Linux image**: https://drive.google.com/file/d/1QODAhMGq27IfTNU7H4_T6AJQkj643z8E
This image is specifically tailored for the course requirements, so you are obliged to work on this copy only. **No technical support we be given by the course staff for other versions of Linux distributions/kernels.**
4) Unzip the "ubuntu18_vbox.zip" file. You may need 7-Zip or p7zip for this step.
The unzipped folder should contain a file called "ubuntu18_vbox.ova" file, which VirtualBox can import and treats just like a standard hard disk device. Your virtual disk has been preloaded with a copy of Ubuntu 18.04 LTS. You will have the root password for this machine, so you will have full privileges on the machine (for example, for "sudo" commands).
5) Start VirtualBox.
6) Select the option "Import Appliance" under "File" menu.
7) The above action will open the "Appliance to Import" window. Here, browse and select the "ubuntu18_vbox.ova" file, and click on the "Next" button.
8) In the next window VirtualBox will show you all the VM settings. Just click on the "Import" button to continue. This action will start the import process.
9) Once the importing has been done, you will see the imported virtual machine in the VM VirtualBox Manager. Just select the VM, and click on the "Start" button to power on the VM.
11) Login as `student`, the password is `Aa1234567890`.
12) Your Linux virtual machine is now on!
Roll up our sleeves and start exploring it. Can you browse the internet? Can you open the terminal and run "date"? Can you shutdown the machine?

2 Get familiar with Linux

Please go over the first tutorial of MATAM (234124), which can be downloaded from the course website, and make sure you understand the concepts and tools that are described there.
You can practice your Linux skills in the new virtual machines that you set up in the previous sections.

Also, complete the other tutorials under HW0 on the course site (not mandatory, but very recommended).

Have a nice journey!
-- Course Staff