Configuring a virtual machine with VirtualBox and Ubuntu

Introduction

We will be experimenting with software vulnerabilities throughout this class. We will use a virtual machine to **sandbox** (https://en.wikipedia.org/wiki/Sandbox_(computer_security)) our experiments to avoid unintentionally harming your computer.

Virtualization technology (https://en.wikipedia.org/wiki/Virtualization) allows a single physical machine to run multiple instances of an operating environment. For example, Amazon AWS hosts many separate instances of Windows and Linux on a single physical server. The *host* machine is the physical device, such as your laptop or a lab computer. The *guest* machine is the virtual environment that runs withinin the virtualization technology on your host machine. In this class, we run **Oracle's VirtualBox** (https://www.virtualbox.org/) on the host machine and use it to run a guest instance of **Ubuntu Linux** (https://www.ubuntu.com/).

Instructions

Configuring VirtualBox

1. (Skip this step if using a lab machine). Download and install **VirtualBox** (https://www.virtualbox.org/wiki/Downloads).
2. Download the **latest LTS release of Ubuntu** (https://www.ubuntu.com/download/desktop), e.g., 18.04.1 LTS. This will download an approximately 1.8GB file.
3. Open VirtualBox and click the "New" button. Give it a name (like "Ubuntu"), make sure the Type=Linux and the Version=Ubuntu (XX-bit) where XX **matches your computer's processor architecture** (https://www.computerhope.com/issues/ch001121.htm) (i.e., 32 or 64). Click 'Next'
4. Set the memory size to half of your computer's total memory. Click 'Next'
5. Leave the options on the 'Hard Disk' screen unchanged. Click 'Next'
6. Leave "Hard disk file type" set to VDI. Click 'Next'
7. On "Storage on physical hard disk", I recommend changing to "Fixed size" as it will make the virtual machine run faster. Click 'Next'
8. On "File location and size", you can use the default values or change them if you wish. I recommend that you make the disk size 20GB is you have room. Make sure the disk size is >= 10GB. Click 'Create'. It will take a few minutes to allocate the space.

9. You will be taken to the "Oracle VM Virtual Box Manager." Right click the guest VM you just created and select Settings. Click the System icon and then the Processor tab. Set the number of processors equal to half your physical CPU cores, or 1. Click 'OK' to save.
10. Select the guest VM you created and click 'Start'.
11. A new screen will open up with a pop-up labeled 'Select start-up disk'. Click the folder icon in the bottom right to browse to the Ubuntu .iso file that you downloaded in Step 2. Click 'Start'. After a few minutes, the Ubuntu installation screen will appear.

Configuring Ubuntu

1. Ubuntu's installation "Welcome" screen should be showing inside VirtualBox. Select the option to "Install Ubuntu". Continue to walk through the installation. On the screen that says "Updates and other software", change to "Minimal Installation". Otherwise, use the default settings.
    - Even though you may see scary words like "formatting" and "destroying data", these are in reference to the virtual hard disk you created when setting up the VM. Your actual hard disk will not be harmed.
2. On the **"Who are you?"** screen, you must pick a username and password that you will remember. These should not be your UNCW username or password. Make sure to write these down somewhere.
3. Ubuntu will now finish installing. This can take quite some time depending on your computer's processing resources and network connection.
4. You will be prompted to restart after Ubuntu installs. Simply click the Restart button.
    - Ubuntu doens't know that it is running in a virtual machine. So when you do things like restart, sleep, or shutdown the "computer", you are only affecting the VM running in VirtualBox and not your actual computer.
5. After you restart, you will see an Ubuntu screen prompting you to "Please remove the installation medium, then press ENTER:". Go to the VirtualBox menu at the top of hte VM and select Devices->Optical Drives and select the Ubuntu ISO. Then select Devices->Optical Drives->"Remove disk from Virtual Device". Click 'Force Unmount" in the popup that appears.. Click on the Ubuntu screen and hit Enter. Ubuntu will reboot again.
6. Login with your user and password when Ubuntu starts.
7. **Open a Terminal window** (https://linuxconfig.org/how-to-open-a-terminal-on-ubuntu-bionic-beaver-18-04-linux) and run the following commands in order. Each command will take some time to execute. This will update Ubuntu and install some necessary tools. Note: If any of these steps fail because of something like 'dpkg locked', just wait a few minutes and try again.
    - `sudo apt update`
    - `sudo apt upgrade`
    - `sudo apt install build-essential perl`
8. Devices->Insert Guest Additions CD image.... Click Run when the popup appears, then enter your password. A terminal will open up and some commands will run automatically. This will take some time.

9. Restart Ubuntu by clicking the Power button in the top right. You are done with the setup.

Final Notes

Every security-minded person should become familiar with at least the basics of Linux and the Linux command line. While such training is not the focus of this course, you are strongly encouraged to **get to know the basics of the Linux operating system (https://ryanstutorials.net/linuxtutorial/)**.

You can create as many virtual machines as you like, including trying the different flavors of Linux. You can also install Windows and OSX in a virtual machine provided that you have license to the installation media. Feel free to experiment!