

## CYSE 450 Lab 1

High level overview of steps:

1. Install VMware
2. Install and configure Raspberry Pi
3. Install ssh
4. Secure the device
5. Test and submit report

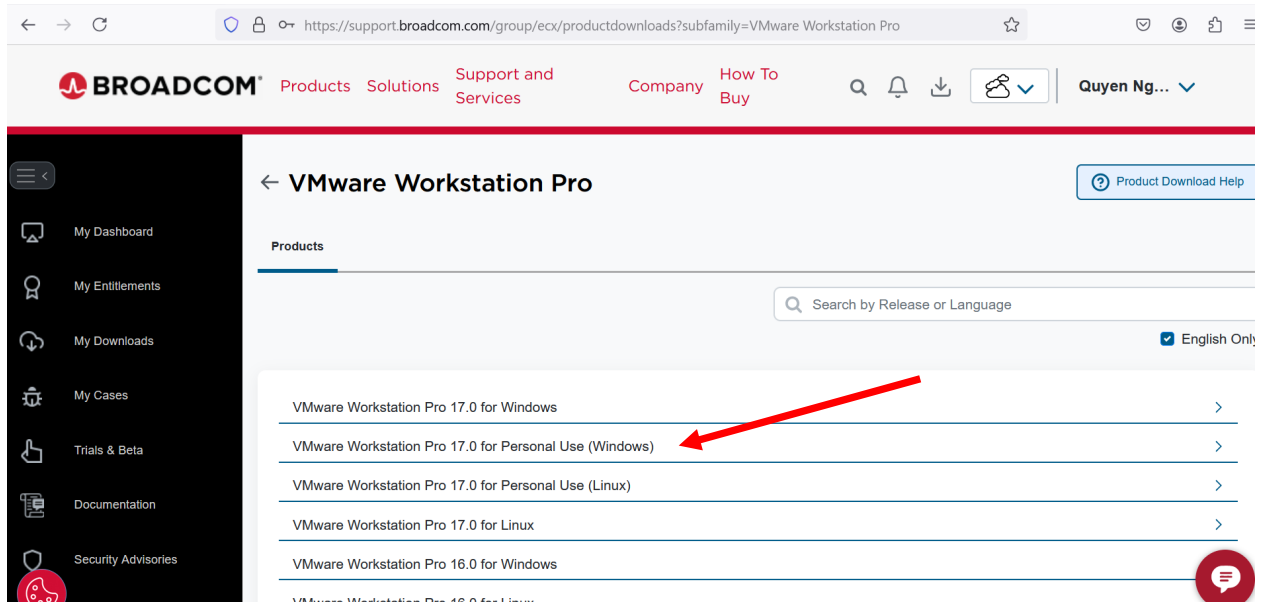
NOTE: If user 'pi' does not exist in your Raspberry Pi installation, you can skip the steps that involve user 'pi'.

Steps:

### 1. Install WMWare

Download and install VMWare on your laptop or desktop. Pick the most current version. Make sure to pick the correct version for your device and OS.

- For Windows, you can follow the link in this article:  
<https://www.pcworld.com/article/2388668/vmware-workstation-pro-how-to-install-the-free-professional-tool.html>



- For Mac, download VMware Fusion for macOS:  
<https://www.techspot.com/downloads/2755-vmware-fusion-mac.html>

Note: You may need to register to Broadcom Support before downloading the software:  
<https://support.broadcom.com/>.

## 2. Install Raspberry Pi

- a. Download and install Raspberry Pi machine on your VM:  
<https://www.raspberrypi.com/software/raspberry-pi-desktop/>.

You can follow the installation steps in:

<https://singleboardbytes.com/1010/install-raspberry-pi-desktop-windows-vmware.htm>

Requirements:

- Name your Pi machine "Pi <your GMU username> ". For example: "Pi qnguyeng".
  - During installation, make sure to create the superuser with "super"<your GMU username>"super". Example: "superqnguyeng".
- b. Configure two network adapters: one using NAT, and the other one "Host Adapter".

## 3. Install SSH

- a. Install and start the SSH. (Go to "Remote Access" section of the Pi documentation.)

<https://www.raspberrypi.com/documentation/computers/configuration.html#securing-your-raspberry-pi>

## 4. Secure the device

- a. Use the instructions in the Raspberry Pi reference below to secure your Pi:
  - Make sudo require a password
  - Update the OS and packages.
  - Improve SSH security.
    - Create users "alice", "bob", "jane" and "john"
    - Allow "alice" and "bob" to SSH to your Pi
    - Deny "jane" and "john" to SSH to your Pi
    - Restart SSH (skip key-based authentication)
  - Install and configure the firewall. You should enable the firewall and add the following firewall rules:
    - Only allow port 22 over tcp
    - Limit login attempts on ssh port using tcp
- b. Add user <your GMU username>. Note that this will be a regular user, without prefix "super".
- c. Add this user to the same groups as the superuser:
  - `$ groups <superuser group> <your GMU username>`

- `$ sudo usermod -G <list of groups, comma separated> <your GMU username>` (the command with parameters is on Raspberry website)
  - Modify the ssh config file so that the new user can use SSH.
- d. Install fail2ban and set **max retry to 3**.
- e. Install a telnet client
- `$ sudo apt install telnet`

## 5. Test and submit the report (15 pts)

Submit the screenshot(s) of the tests below to BlackBoard, CYSE 450, Lab1

- a. [1 pts] Show VMWare with your Raspberry Pi machine.
- b. [1 pts] Show the two network adapters being configured.
- c. [1 pts] Login to your Pi and show the version of the OS
  - `$ uname -a` (checks version of the OS)
  - `$ cat /etc/os-release`
- d. [1 pts] Connect to your network
  - Show the IP and MAC address network interface:
    - `$ ifconfig`
    - The MAC address is the 6 bytes after “ether”
- e. [1 pts] Do ssh to the Pi from a client
  - `ssh <username>@<Pi IP address>`
- f. [2 pts] Default userid security
  - `$ su <superuser>` (replace <superuser> with the one you created in Lab 1).
    - Show failed su command with passwords: <none>, pi, raspberry (passwords will not show on screen)
  - `$ su root`
    - Should not be able to login as user root with default, no, or weak password
    - Show failed su command with passwords: <none>, root, toor, raspberry (passwords will not show on screen)
- g. [2 pts] `$ su <your GMU username>`
  - Show failed su command with no password (passwords will not show on screen)
  - Show successful su command with correct password (password will not display)
- h. [2 pts] `$ sudo ufw status`
  - Firewall should block all but port 22
- i. [2 pts] Test SSH secure configuration from an SSH client
  - Show that “alice” and “bob” can ssh to your Pi machine
  - Show that “jane” and “john” cannot ssh to your Pi machine

- j. [2 pts] Test fail2ban
- Show that “alice” SSH login will be blocked after 3 unsuccessful attempts with incorrect passwords.

## 6. References

a. VMWare:

- <https://www.pcworld.com/article/2388668/vmware-workstation-pro-how-to-install-the-free-professional-tool.html>
- <https://www.techspot.com/downloads/2755-vmware-fusion-mac.html>

b. Raspberry Pi

- <https://www.raspberrypi.com/software/raspberry-pi-desktop/>
- <https://singleboardbytes.com/1010/install-raspberry-pi-desktop-windows-vmware.htm>
- <https://www.raspberrypi.com/documentation/computers/configuration.html#securing-your-raspberry-pi>