VM Installation Instructions Manual

CS498: Cloud Networking

1 Introduction

You can use an VM as the platform to complete the four programming assignments. Section 2 introduces two options to setup the VM environment. Section 3 discussed some common problems and tips for VM setup.

2 Installation

2.1 Option 1:Pre-Packaged VM

Software Requirements

- Download and install VirtualBox
- Download pre-packaged VM image `cloudnet.ova` (about 3GB): download it from Week 1: `Programming Assignment Preparation`.

VM Setup

1. Open Virtualbox Manager
2. From the menu bar, select `File` → `Import Appliance`
3. Click and choose `cloudnet.ova`
4. Ensure the following settings:
   (a) Under `Settings` → `System` → `Motherboard`: `Base memory` is ≥ `2048MB`
   (b) Under `Settings` → `System` → `Processor`: `CPU count` is ≥ `2`
   (c) Under `Settings` → `Display` → `Video`: `"Enable 3D Acceleration"` is checked, and `Video Memory` is ≥ `32MB`
   (d) Under `Settings` → `Network` → `Adapter 1`: Attached to `NAT`

Recommended: Configure the VM with additional processors and video memory.

5. Click `Import`

VM Username and Password

- Username: `cloudnet`
- Password: `cloudnet`
- Sudo password: `cloudnet`

2.2 Option 2: Clean VM Install

The details may vary minutely on different operating systems and corresponding versions of VirtualBox.

Software Requirements

- Download and install VirtualBox
- Download a Ubuntu 20.04.1 LTS image depending on your system architecture (32bit or 64bit)
- Download the code `mp3_mp4.zip` for MP3 and MP4, which contains the installation script to install software dependency: download it from Week 1: `Programming Assignment Preparation`.

2.2.1 Create a VM

1. Open VirtualBox Manager
2. From the menu bar, select `Machine` → `New`
3. Create a VM with the name `cloudnet`, type `Linux` and version `Ubuntu (64bit)`, and click `Next`
4. Set the memory size to at least `2048MB` and click `Next`
5. Select the bullet `Create a virtual hard disk now` and click `Create`
6. Select the default `VDI (VirtualBox Disk Image)` and click `Next`
7. Select the `Dynamically allocated` and click `Next`
8. Allocate at least `20GB` and click `Create`

2.2.2 Check VM network connection

- Make sure your host machine can access Internet, because we need to download software dependency for the programming assignments (automatically).
- Under `Settings` → `Network` → `Adapter 1`: Attached to `NAT`

2.2.3 Install Ubuntu 20.04.1 LTS on the VM

1. In the VirtualBox Manager, select the newly created VM `cloudnet`.
2. Click the `Settings` icon below the menu bar.
3. In the `Setting` menu, select `Storage` and click the 'add' button and choose `Add Optical Drive`, In the pop-up windows, select `Choose disk` and then select the downloaded Ubuntu 20.04.1 iso file. It should look like Figure 1. Click `OK` to close the setting.
4. In the VirtualBox Manager, double click to start the newly created VM. `cloudnet`. You will then be promoted to install Ubuntu as shown in Figure 2. Click `Install Ubuntu` and start to install the Ubuntu.
5. When promoted to `Updates and other software`, select `Minimal installation` and uncheck the two options in Other options, as shown in Figure 3.
6. When promoted to `Installation type`, select `Erase disk and install Ubuntu`, and click `Install Now`, as shown in Figure 4. In the pop up window, click `continue`, as shown in Figure 5.
7. When promoted to `Who are you?`, setup both username and password as `cloudnet`, as shown in Figure 6.
8. After successfully install Ubuntu, you may see Figure 7, click `Restart Now`.
9. When promoted to Figure 8, press enter and the Ubuntu iso disk will be automatically deleted from storage. If it does not, go to `Setting` → `Storage`, and delete the iso image manually.

2.2.4 Setup the programming environment on VM

1. Copy the downloaded code `mp3_mp4.zip` to the VM home directory.
2. Open `Terminal`, switch to the code directory
3. Install the dependency automatically by run `./install.sh -a`

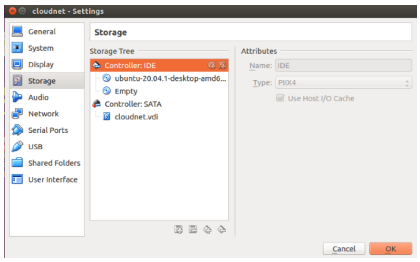

Figure 1: Add Ubuntu iso to storage

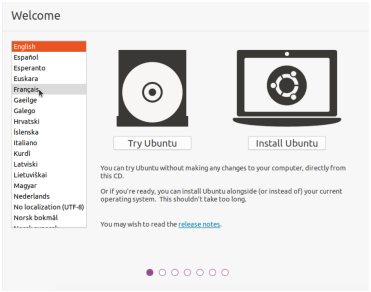

Figure 2: Ubuntu installation

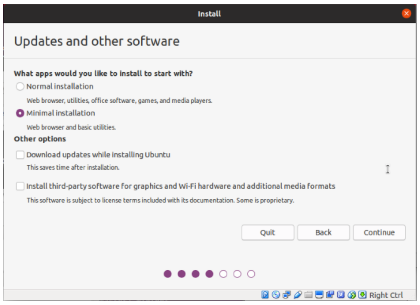

Figure 3: Ubuntu installation: Updates and other software

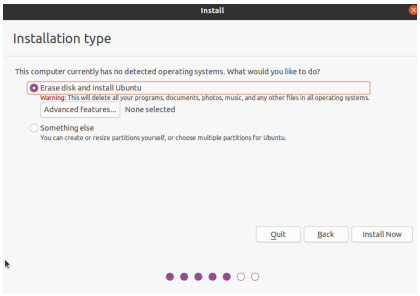

Figure 4: Ubuntu installation: Installation type

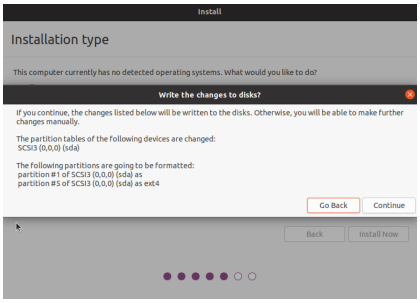

Figure 5: Ubuntu installation: Installation type

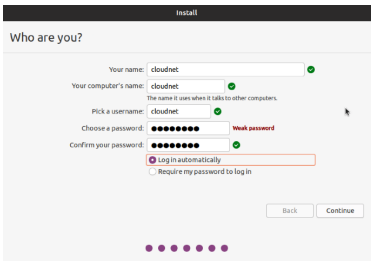

Figure 6: Ubuntu installation: who are you?

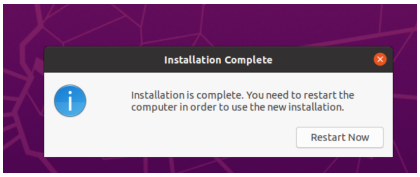

Figure 7: Installation Complete 1

Figure 8: Installation Complete 2

- This will install all required dependencies for all the programming assignments, including MP1 and MP2 (you will need to download the code separately for MP1 and MP2)
- Run `./install.sh -h` for more help
- It will take a while to install all the dependencies. It should finish without an error.

3 Tips and Common Problems

3.1 I want to modify VM setting: CPU, memory and video memory

1. In the VirtualBox Manager, select the newly created VM
2. Click the `Settings` icon below the menu bar
3. In the Settings menu, select `System` from the left side menu
4. Click on the `Processor` tab and increase the CPU count; Select `Display` from the left side menu to increase the `Video Memory`

3.2 Why my VM can't boot after I install Ubuntu?

This may because your video memory is too small. Try to set it to `128MB`.

3.3 How to download code/files to VM

Option 1 Directly download it using the web browser on VM: make sure you check VM network connection following Section 2.2.2.

Option 2 Use shared directory between host machine and VM. Before sharing folders, you must first install `Guest Additions`, please see Guest additions official guide. For more details about sharing folders, please refer to this article.

There are other options to copy files, including using `scp`, `Drag and Drop`, and using USB devices. Please search online and find the guidance that works for the operating system of your desktop/laptop.

3.4 When creating a new VM, there is no option for 64-bit Ubuntu in VirtualBox

This may be caused by several issues: virtualization extensions are not enabled or Hyper-V may conflict with VirtualBox.

Enable Virtualization Extensions Ensure you have enabled virtualization extensions (VT-x/AMD-V) in your system's BIOS. The exact instructions will depend on your motherboard, but generally the instructions follow:

1. Reboot your machine and open the `BIOS` menu. Depending on your system, this typically is done by pressing the delete key, the F1 key, the F4 key, or the Alt key
2. Open the `Processor` menu
3. Enable Intel Virtualization Technology (Intel VT-X). AMD-V extensions will already be enabled. The extensions may be also labeled "Virtualization Extensions" or "Vanderpool" or various other names
4. Select `Save & Exit`
5. Reboot the machine

Disable Hyper-V On Windows machines, Hyper-V can conflict with VirtualBox. Disable Hyper-V under `Settings` → `Control Panel` → `Turn Windows Features On or Off`.

3.5 I've enabled virtualization extensions but the VM does not start

Ensure virtualization extensions are enabled in VirtualBox for your new VM. In VirtualBox, select the VM and click Settings. On the left side menu, click System, then select the Acceleration tab. Make sure the box labeled Enable VT-x/AMD-V is checked.

3.6 My hardware doesn't support virtualization extensions

You can download a 32-bit version of the Ubuntu image and following the steps in Section 2.2.