



SDN Environment Setup

Install ONOS in VM

Outline

- Objective
- Experiment Environment
- Installation
 - VirtualBox 6.1.46
 - Add VM
 - SDN development environment

Objective

- Prepare a operational environment
 - VirtualBox: Open-source cross-platform virtualization application
 - Run virtual machines
 - Ubuntu: Open-source operating system
 - A most popular OS for software development/
 - Bazel:
 - Free SW tool for “automation of building and testing of SW”.
 - ONOS: Open Network Operating System in SDN
 - Offer a graphic interface for observing network topology
 - OVS: Open vSwitch
 - a multilayer software switch licensed under the Open source Apache 2 license.
 - Mininet: Network Emulator
 - Make virtual network environment setup easily

Outline

- Objective
- **Experiment Environment**
- Installation
 - VirtualBox 6.1.46
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Experiment Environment

- Ubuntu Desktop 22.04
- Minimum Hardware Requirements:
 - 2 Cores (CPUs)
 - 8GB RAM
 - 30GB HDD

Outline

- Objective
- Experiment Environment
- **Installation**
 - VirtualBox 6.1.46
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VirtualBox Installation (1/7)

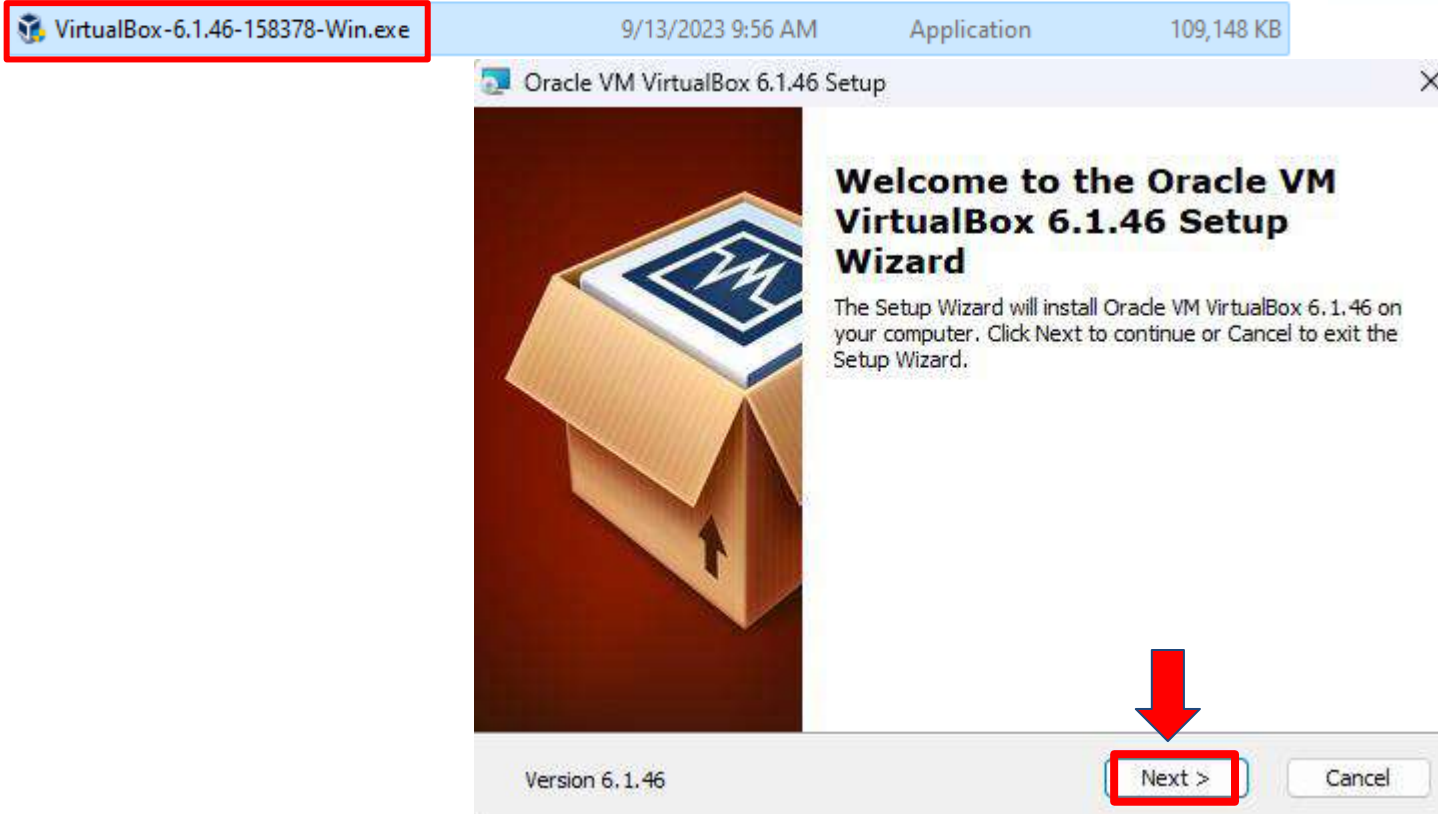
- Go to [official download page](#)
- Download the “platform packages” for your OS



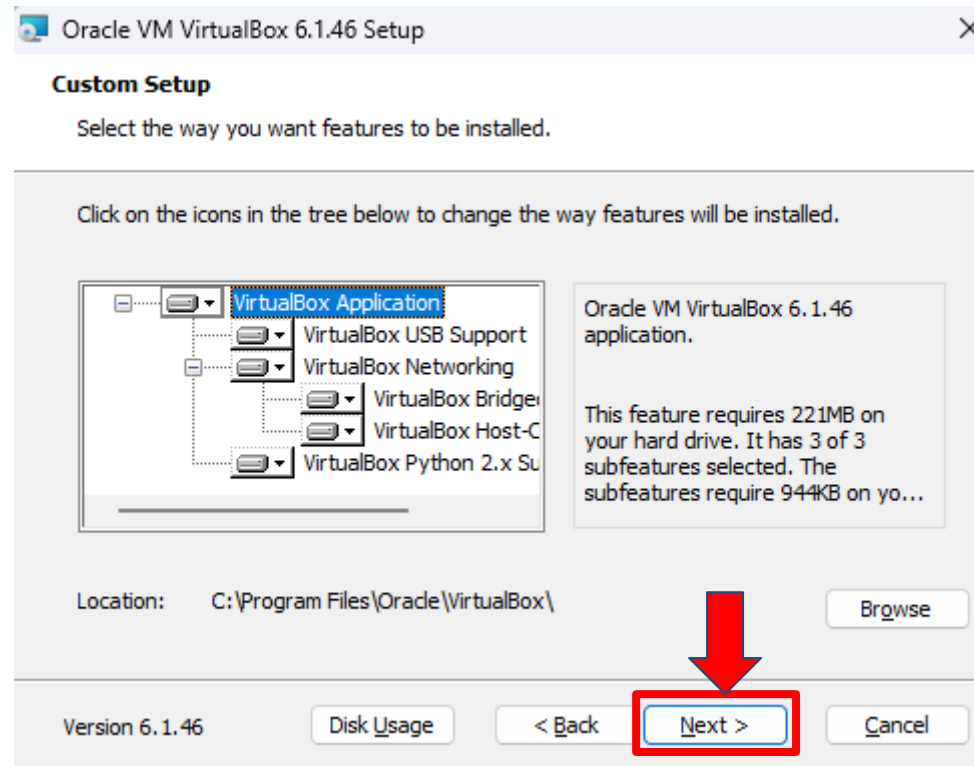
VirtualBox Installation (2/7)

- Start installation

✓ Today

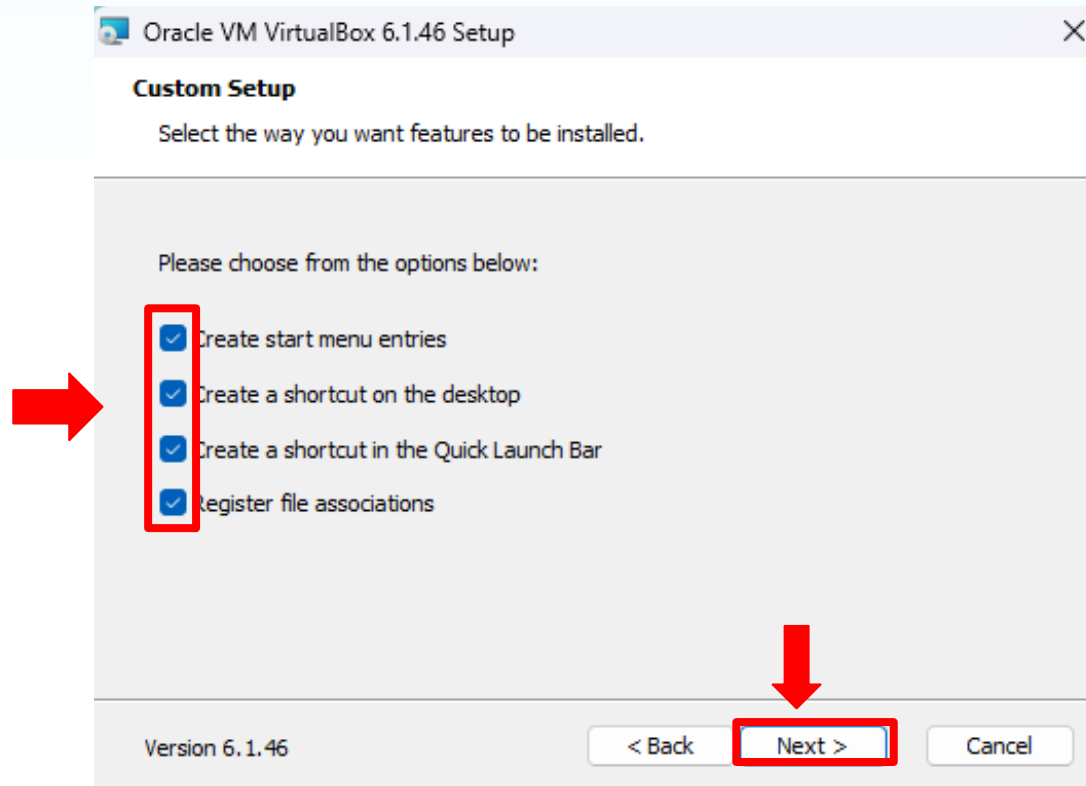


VirtualBox Installation (3/7)

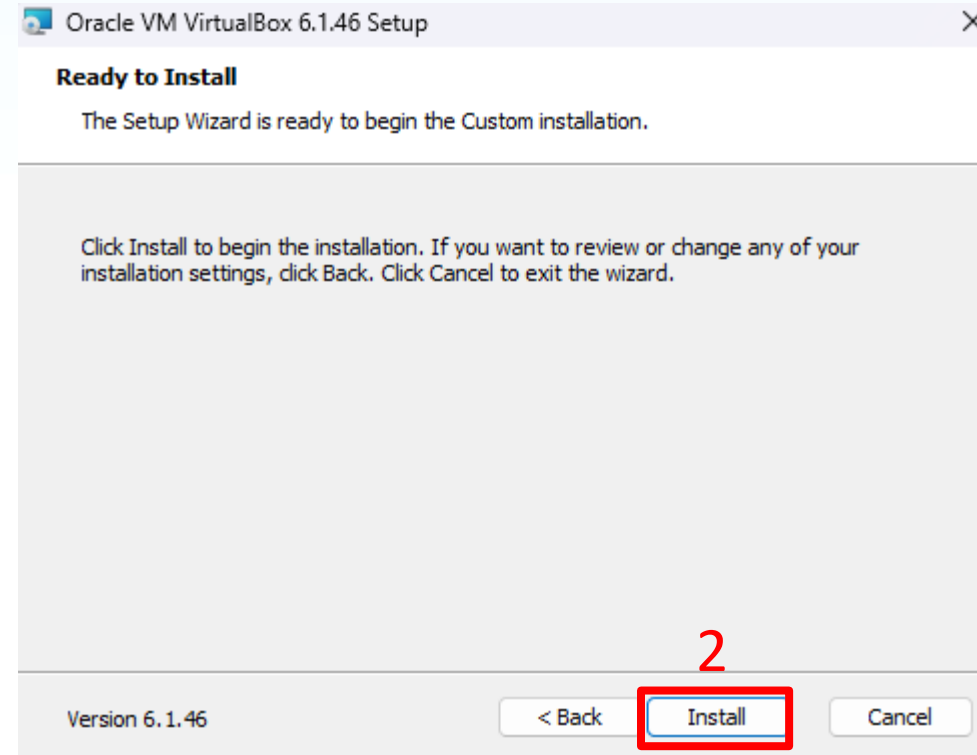


Change installation path if you want

VirtualBox Installation (4/7)



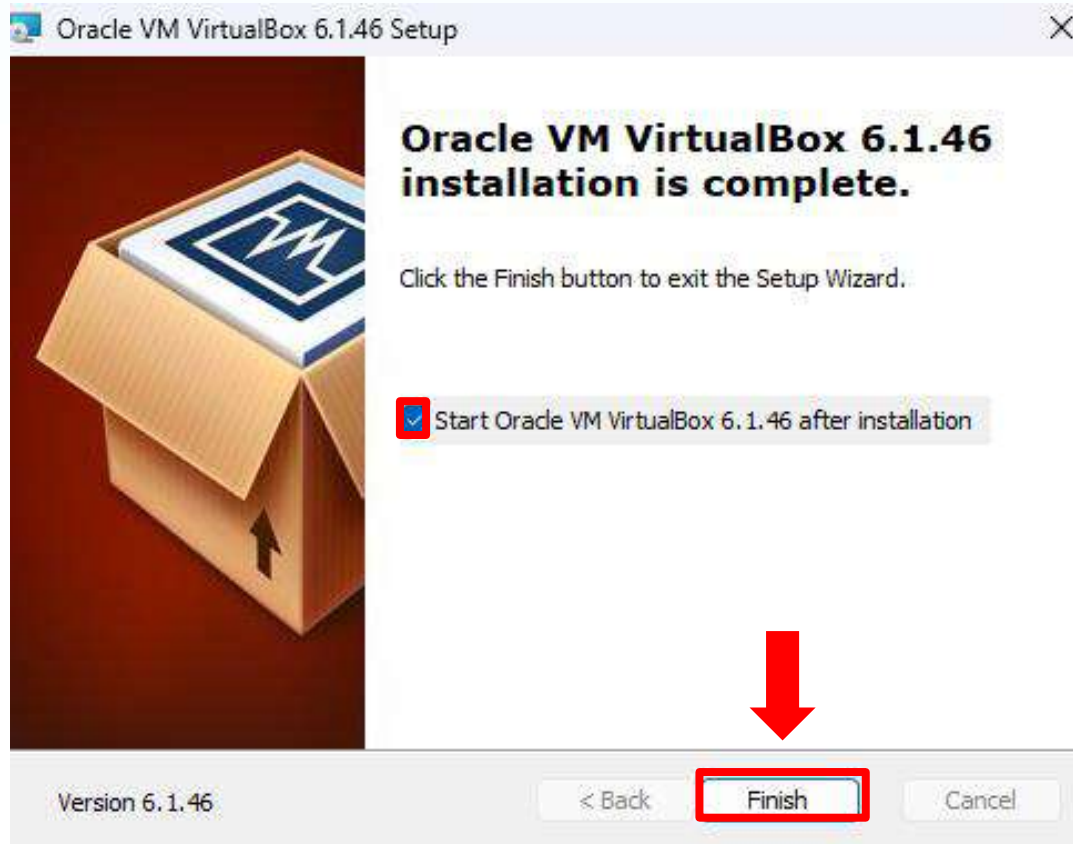
VirtualBox Installation (5/7)



VirtualBox Installation (6/7)



VirtualBox Installation (7/7)



Outline

- Experiment Environment
- Installation
 - VirtualBox 6.1.46
 - Add VM
 - Download image file
 - Virtual machine setting
 - Ubuntu installation
 - SDN development environment

Download image file (1/10)

- Download image file (.iso) first
 - <https://www.ubuntu-tw.org/modules/tinyd0/>
 - **Ubuntu Desktop 22.04**

The screenshot shows the Ubuntu Taiwan website's download page. The navigation bar at the top includes links for '下載' (Download), '新聞' (News), '論壇' (Forum), '星球' (Planet), 'Wiki', and '聯絡我們' (Contact Us). Below the navigation bar, there are links for '下載 Ubuntu', 'Ubuntu 行為規範 (第二版)', 'Ubuntu@Taiwan 論壇規範', and 'IRC 聊天室'. A search bar with 'Google 技術強化' is also present.

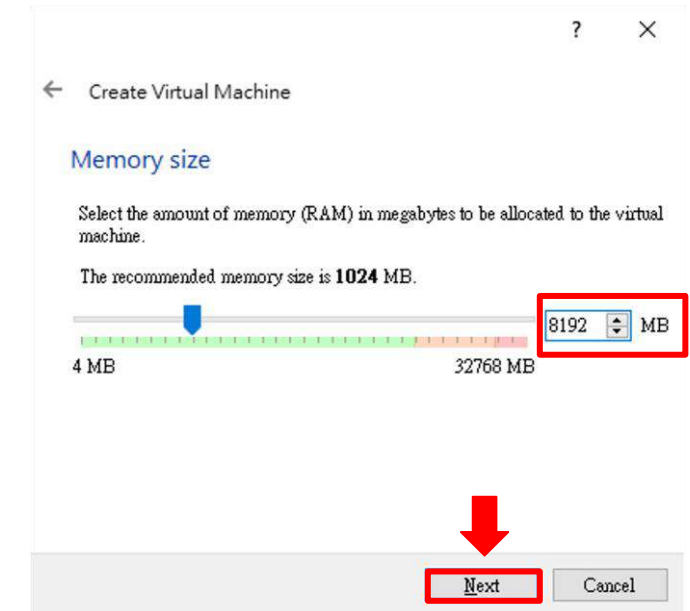
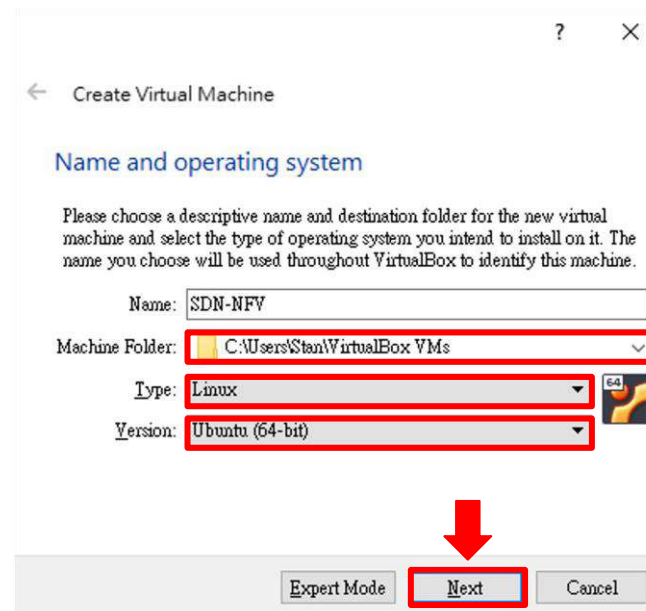
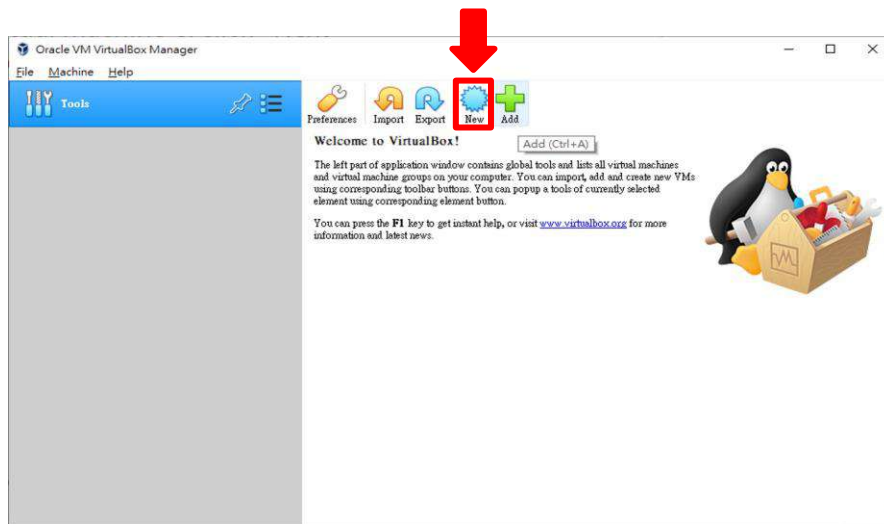
The main content area is titled 'Ubuntu 行為規範 (第二版)' and '下載 Ubuntu'. It is divided into four columns:

- 發行版 (Release):** Two radio buttons are shown: 'Ubuntu 桌面版本' (selected) and 'Ubuntu 伺服器版本'. A red box highlights the 'Ubuntu 桌面版本' button.
- 版本 (Version):** A list of LTS versions is shown: '22.04 LTS (5 + 5 年支援)', '20.04 LTS (5 + 5 年支援)', '18.04 LTS (5 + 5 年支援)', '16.04 LTS (5 + 5 年支援)', and '14.04 LTS (5 + 5 年支援)'. A red box highlights the '22.04 LTS (5 + 5 年支援)' option.
- 電腦架構 (Architecture):** Two radio buttons are shown: '32 位元版本' and '64 位元版本' (selected). A red box highlights the '64 位元版本' button.
- 下載選項 (Download Options):** A checkbox for '下載 BitTorrent 種子' is shown. Below it, a '開始下載' button is highlighted with a red box. A note below the button says '或是 至此瀏覽所有版本及檔案'.

Additional text on the page includes: '不同發行版具備不同的圖形環境與配套軟體。如果您不知道如何選擇，請選擇 Ubuntu 桌面版本。' and '目前一般電腦大多使用 64 位元架構，故從 18.04 開始，桌面版也將不再提供 32 位元版本。另外，目前在下載區無 Mac 版本可下載。'

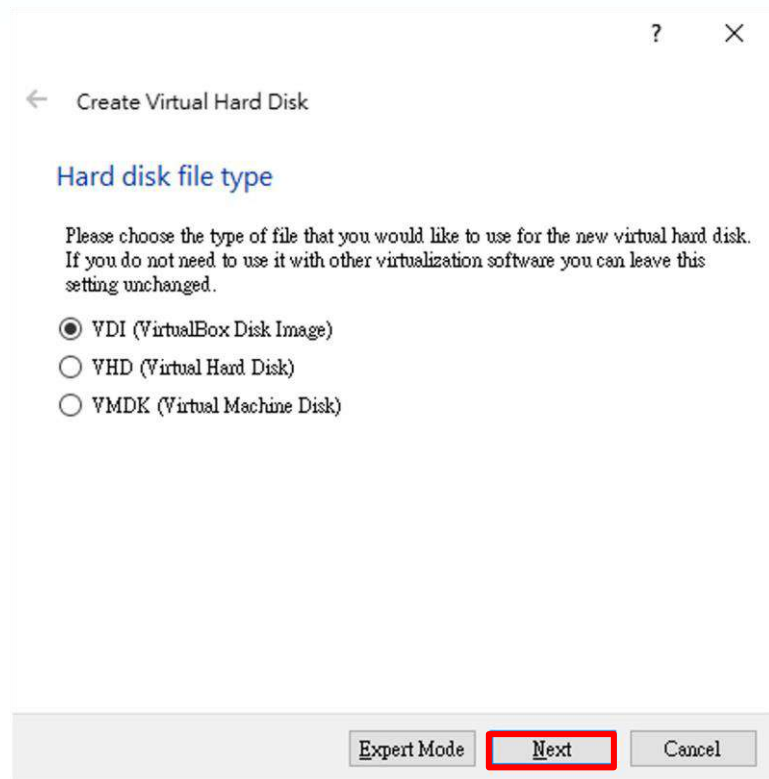
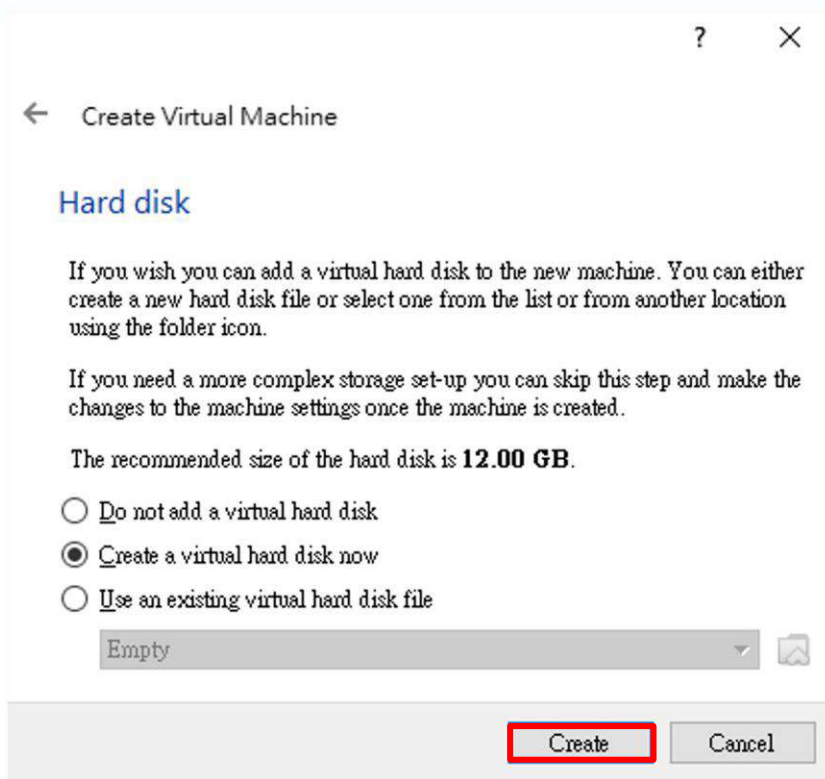
Virtual machine setting (2/10)

1. Start VirtualBox & Click “New”
2. Name the virtual machine (SDN-NFV), then click “Next”
3. Adjust the memory size to 8192MB, then click “Next”



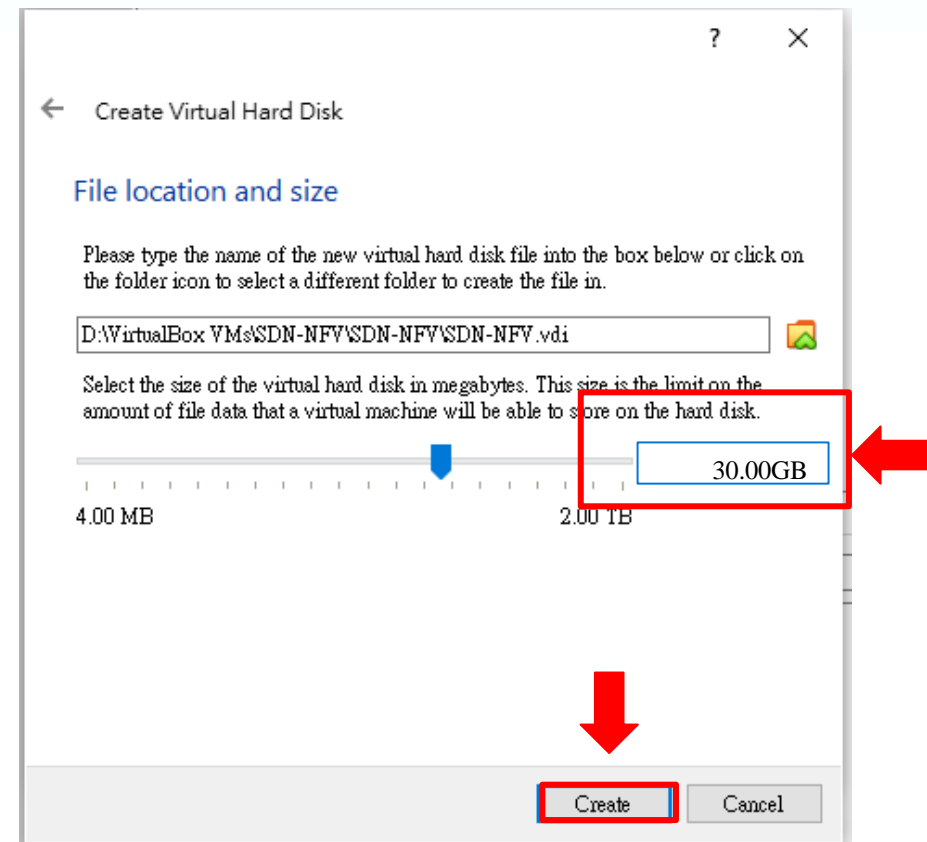
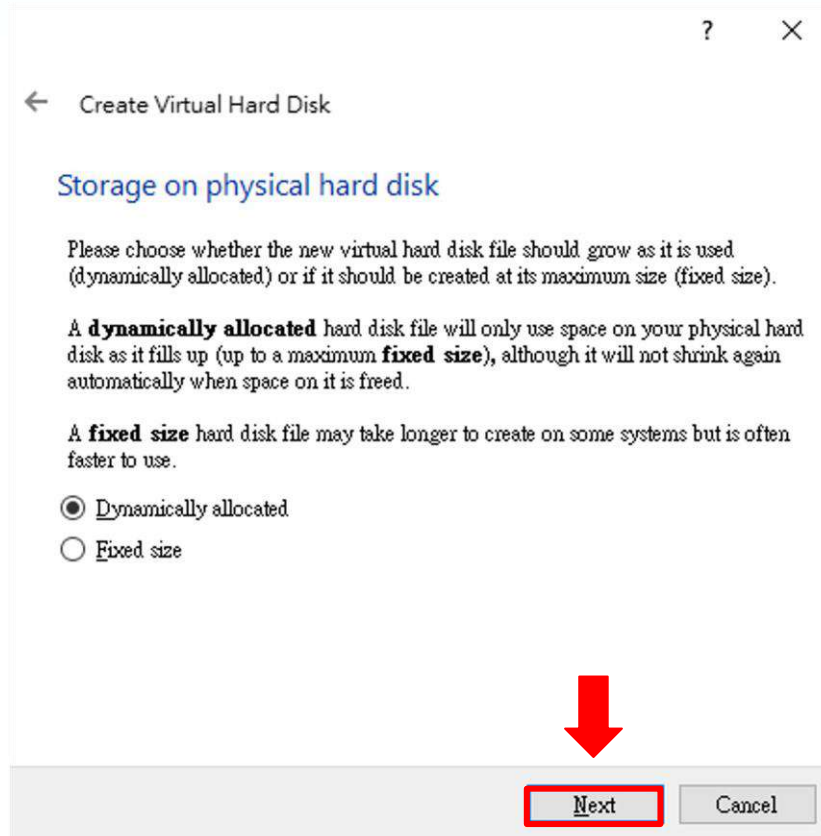
Virtual machine setting (3/10)

1. Click “Create”
2. Click “Next”



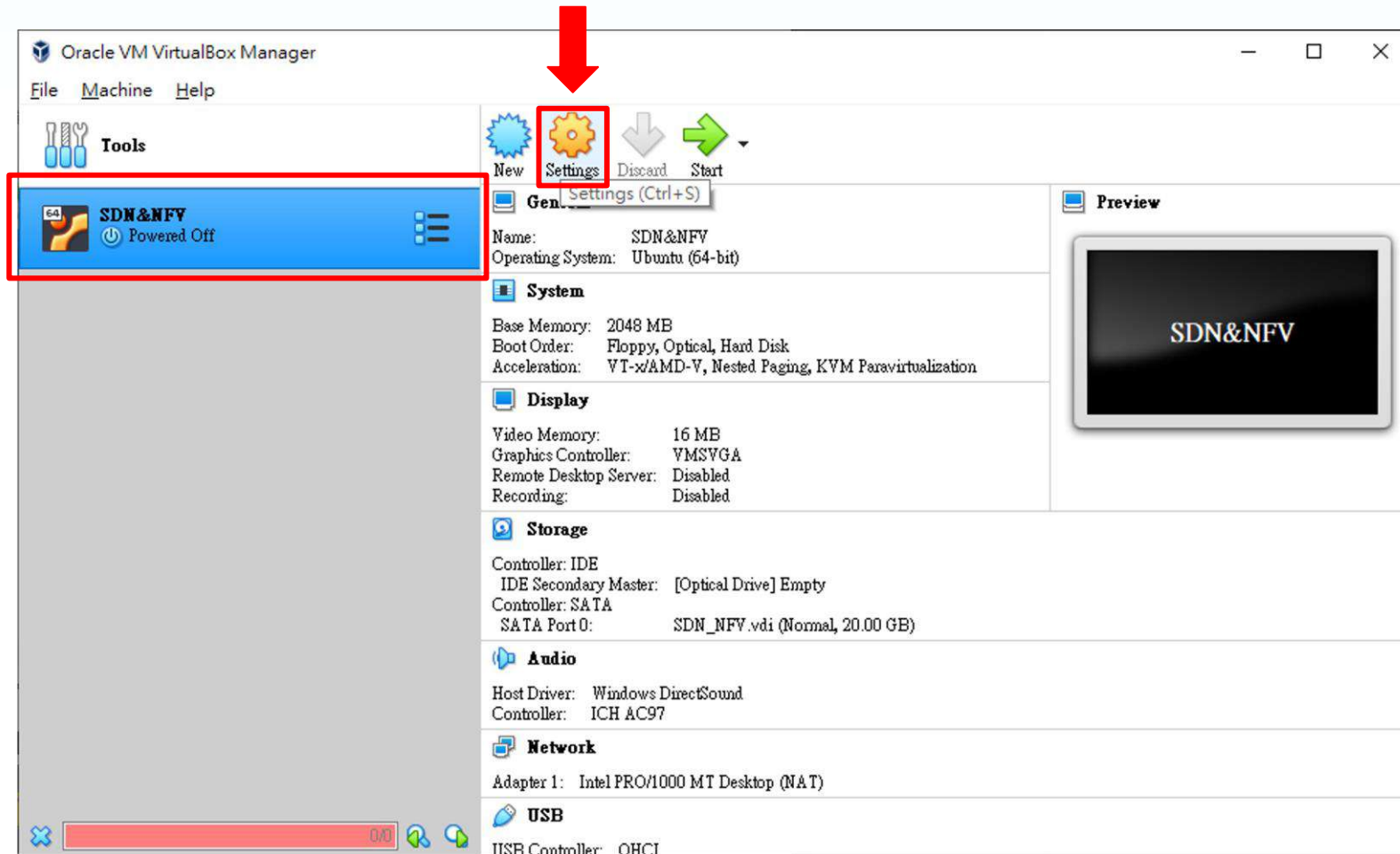
Virtual machine setting (4/10)

1. Click “Next”
2. Adjust the size of virtual HD to **30GB**, then click “Create”



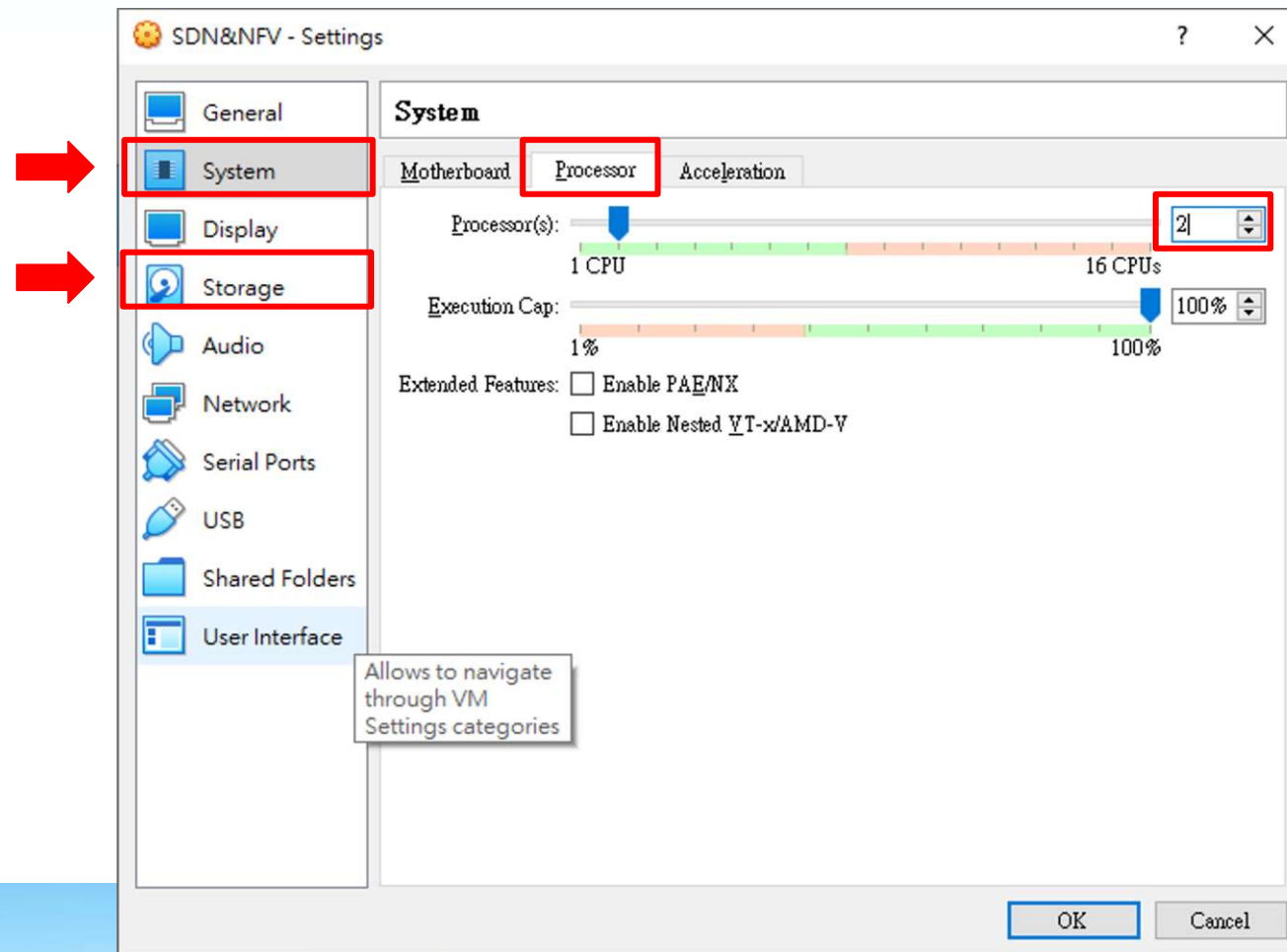
Virtual machine setting (5/10)

- Click “Settings”



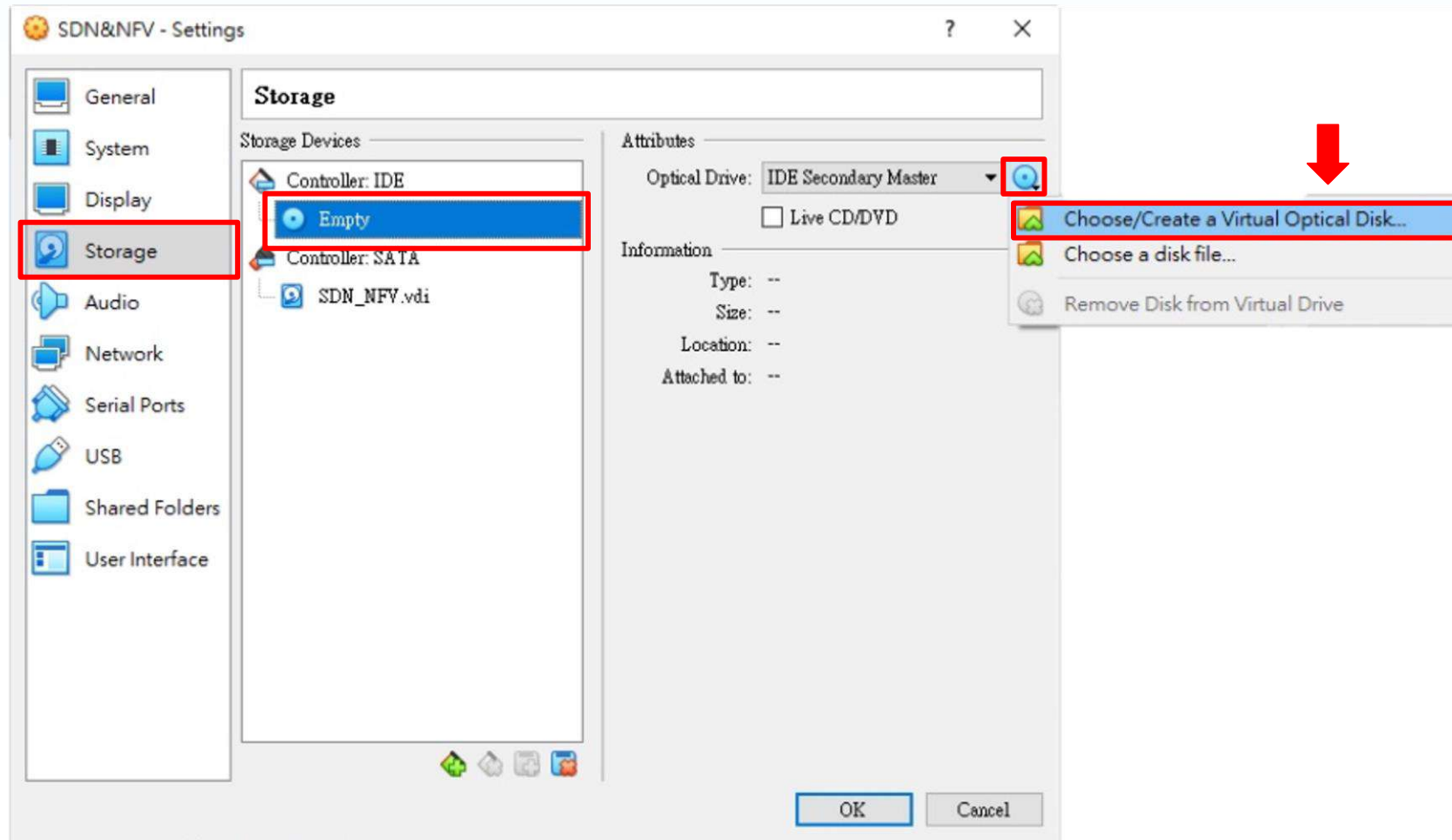
Virtual machine setting (6/10)

- System > Processor
 - Set 2 CPUs, then click “Storage”



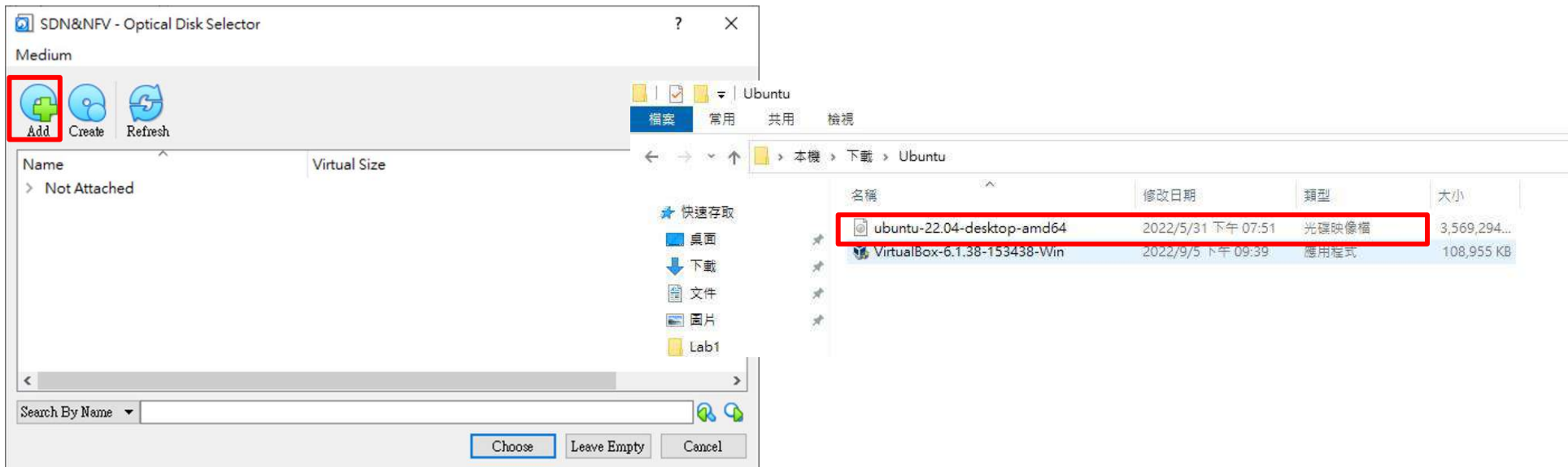
Virtual machine setting (7/10)

- Storage > Controller: IDE



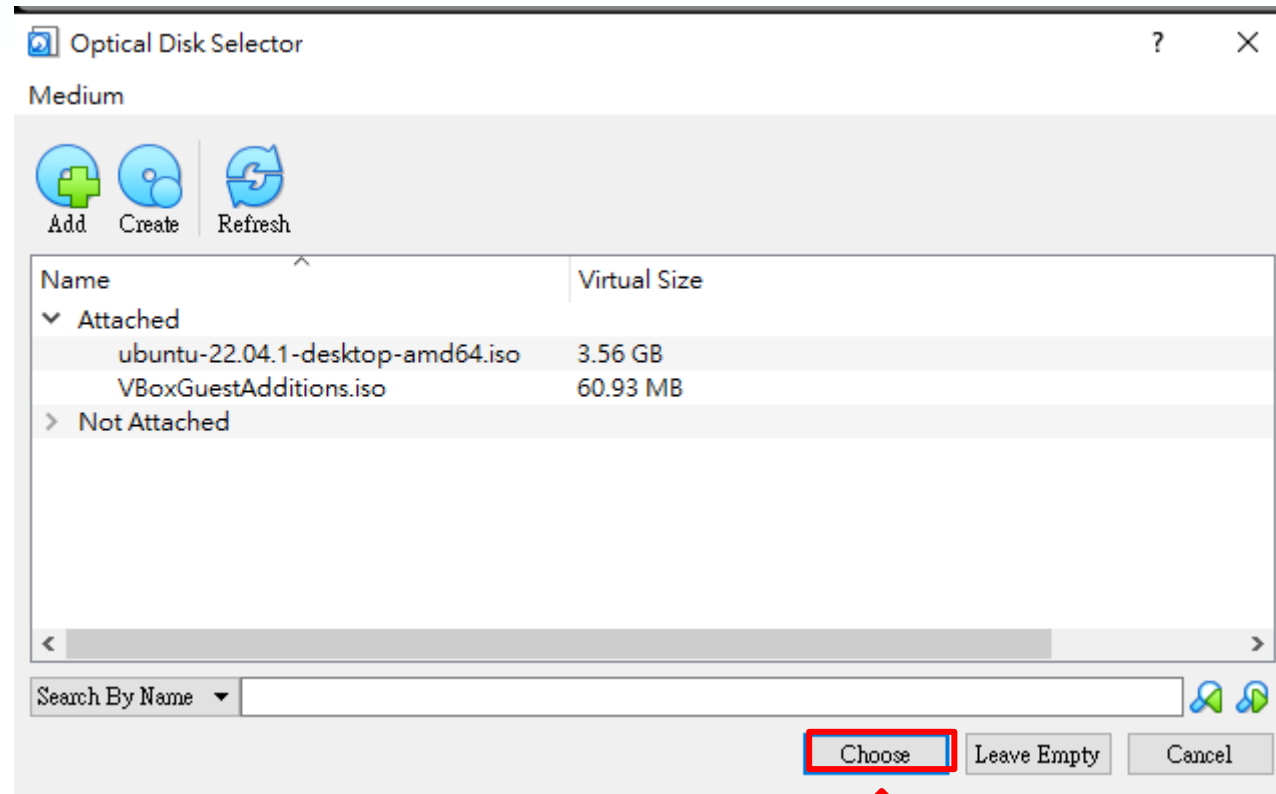
Virtual machine setting (8/10)

1. Click “Add”
2. Choose the previously downloaded image file (.iso)
3. Click “Open”



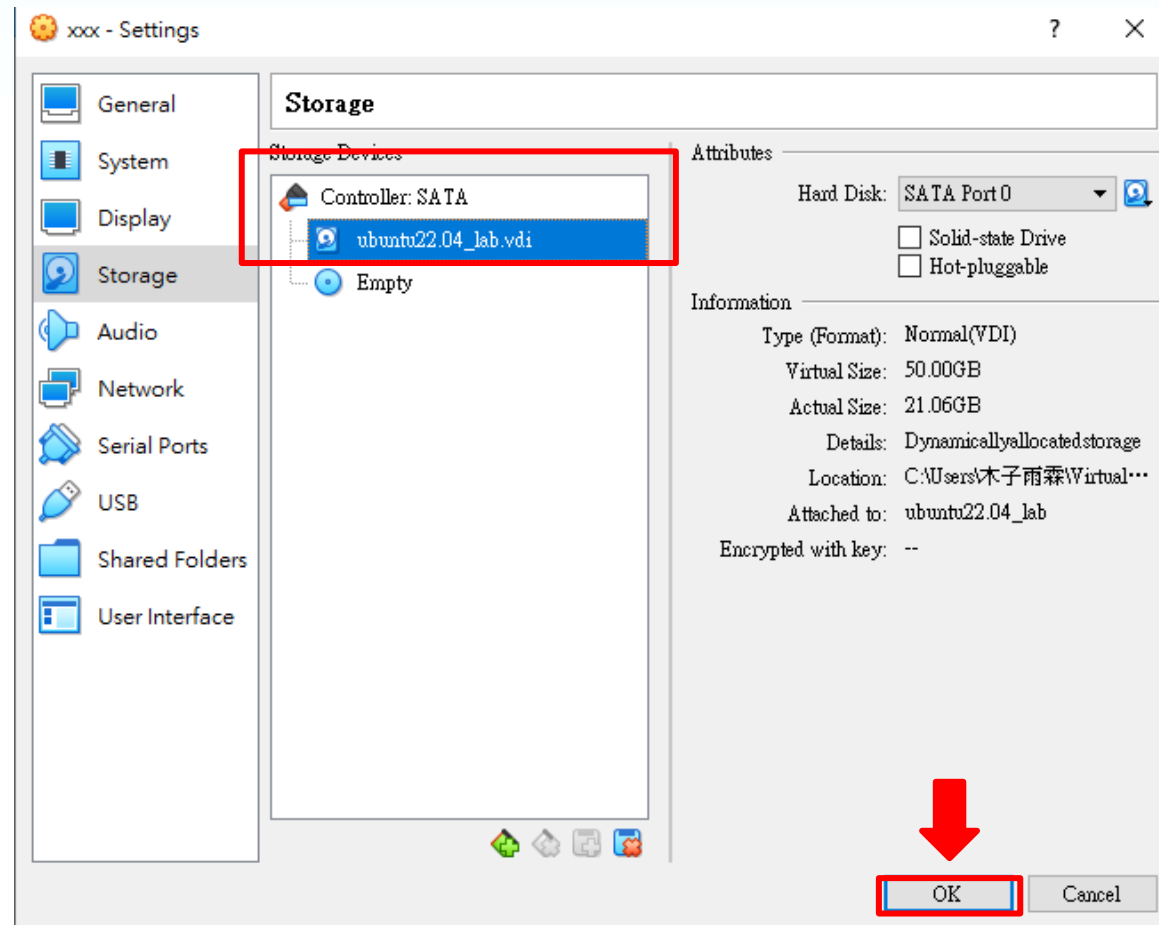
Virtual machine setting (9/10)

- Click “Choose”



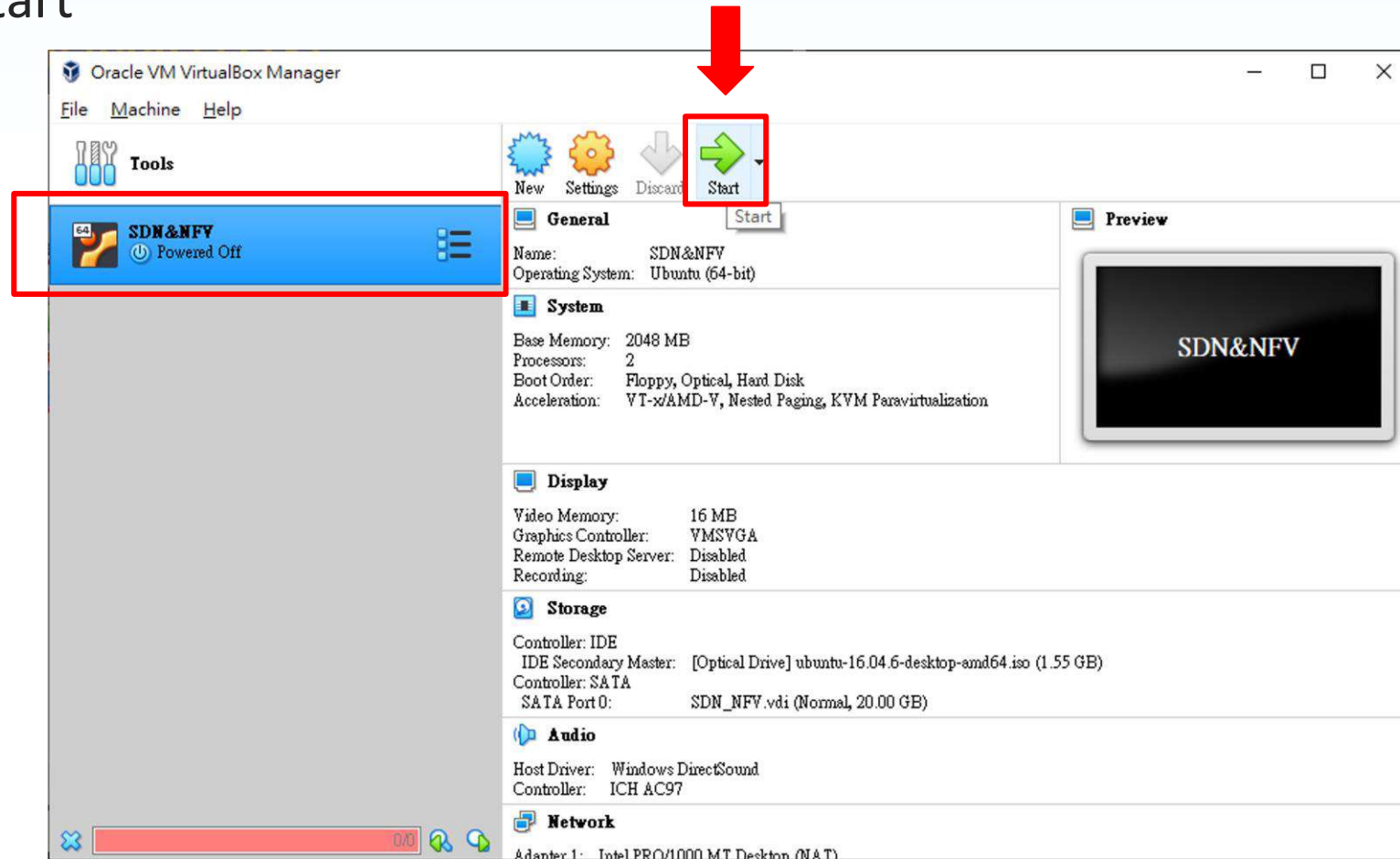
Virtual machine setting (10/10)

- Make sure all settings are right, then click “OK”



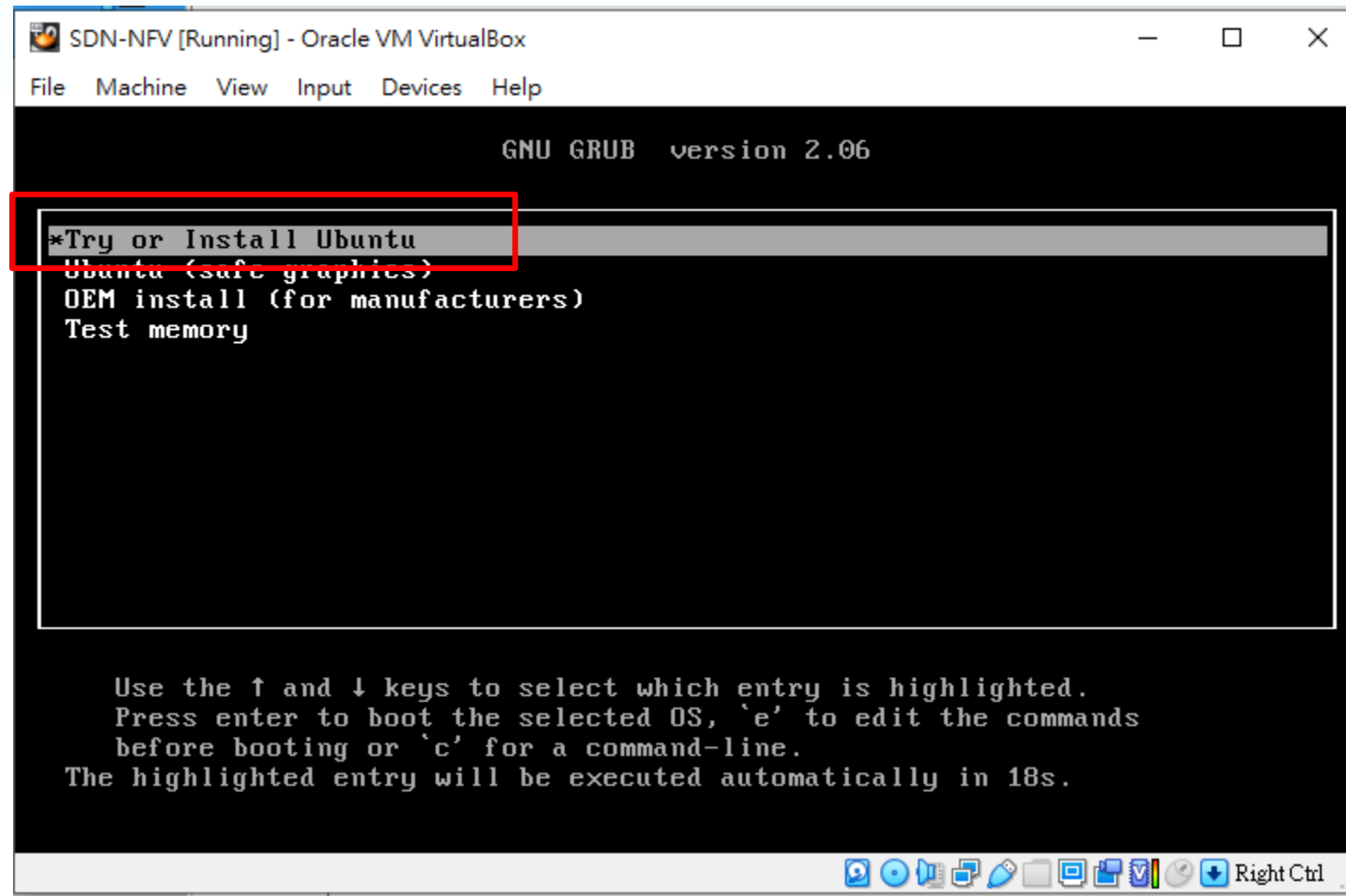
Ubuntu Installation (1/12)

- Click “Start”

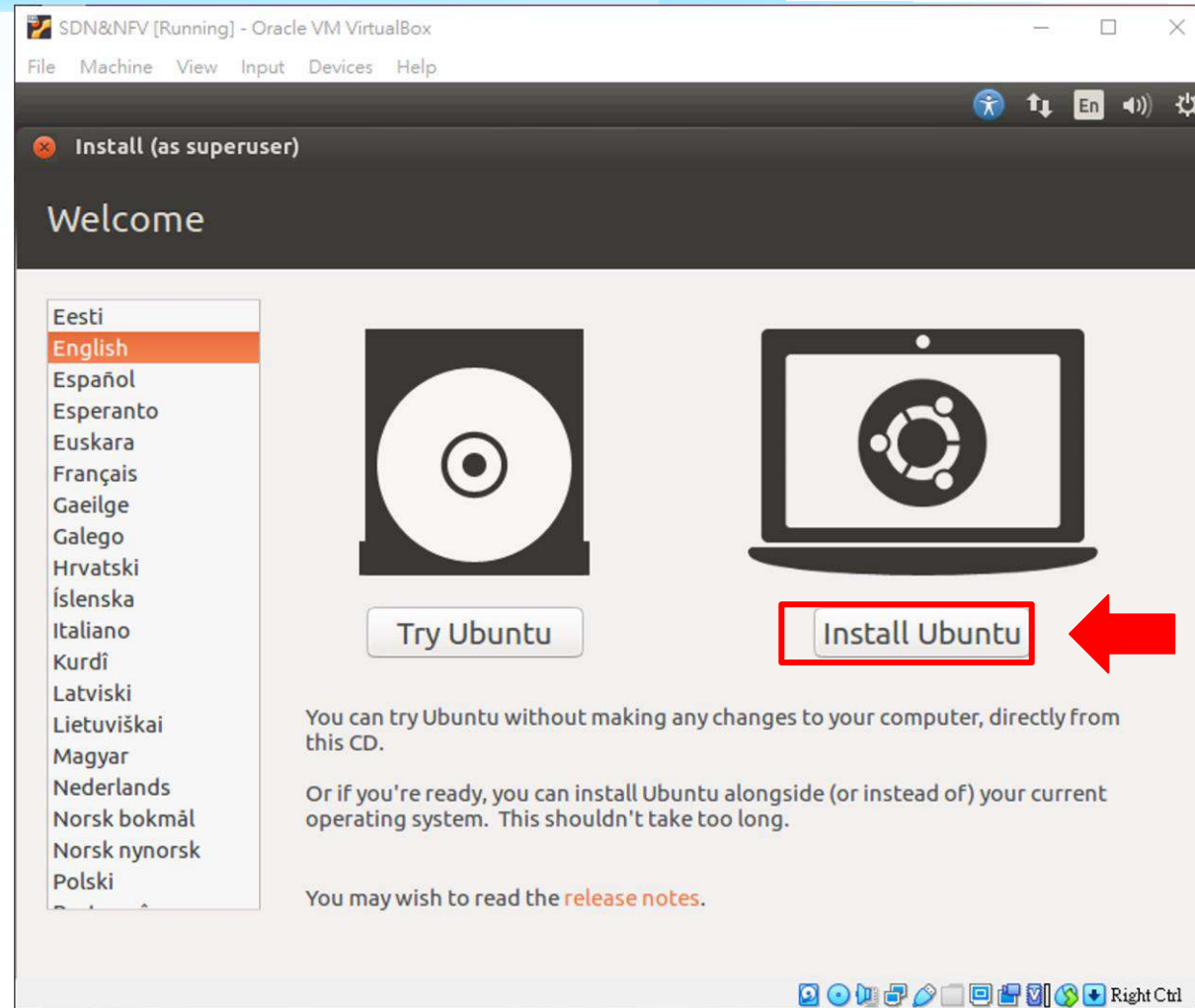


Ubuntu Installation (2/13)

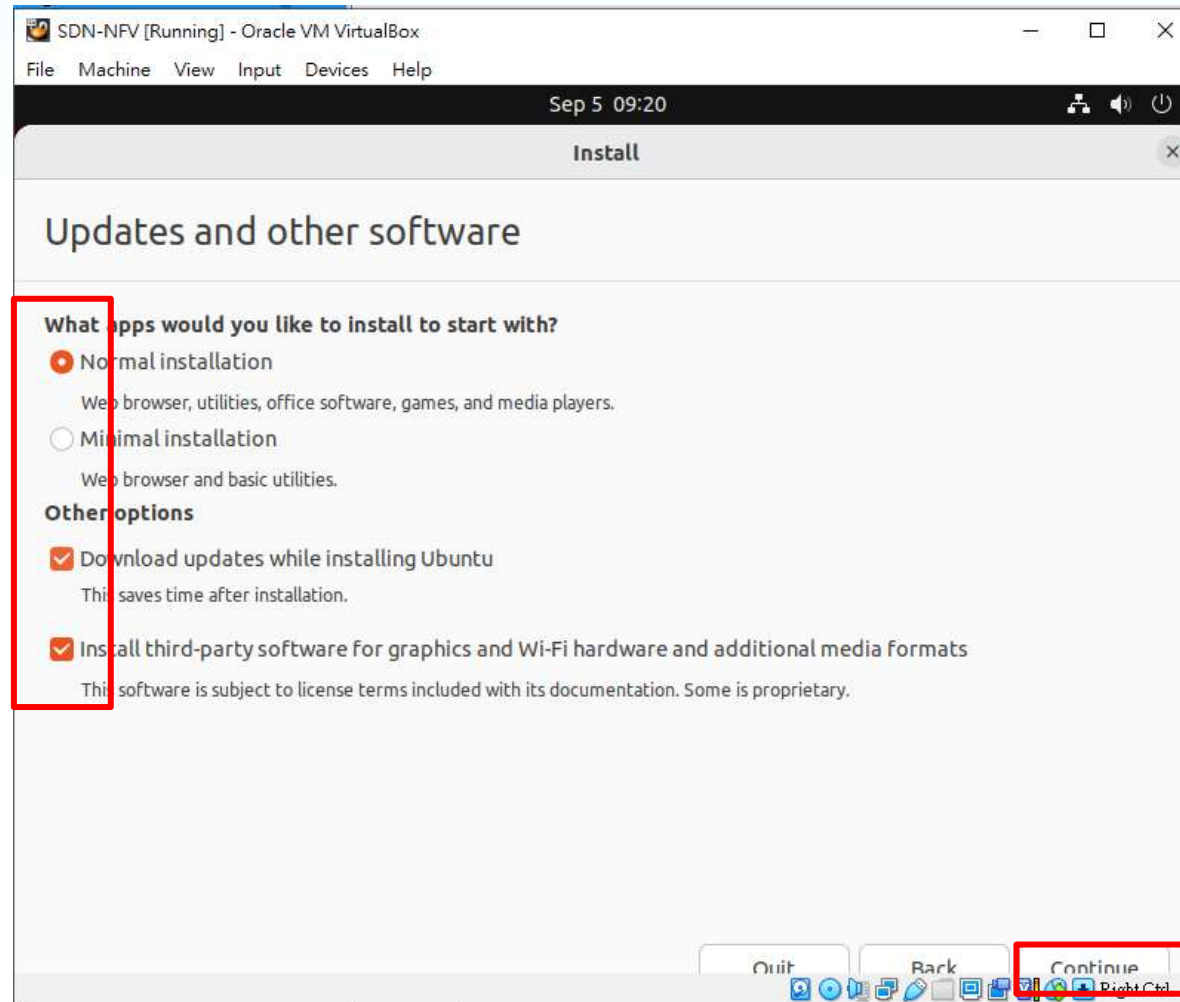
Choose “Try or install Ubuntu” and press “Enter”



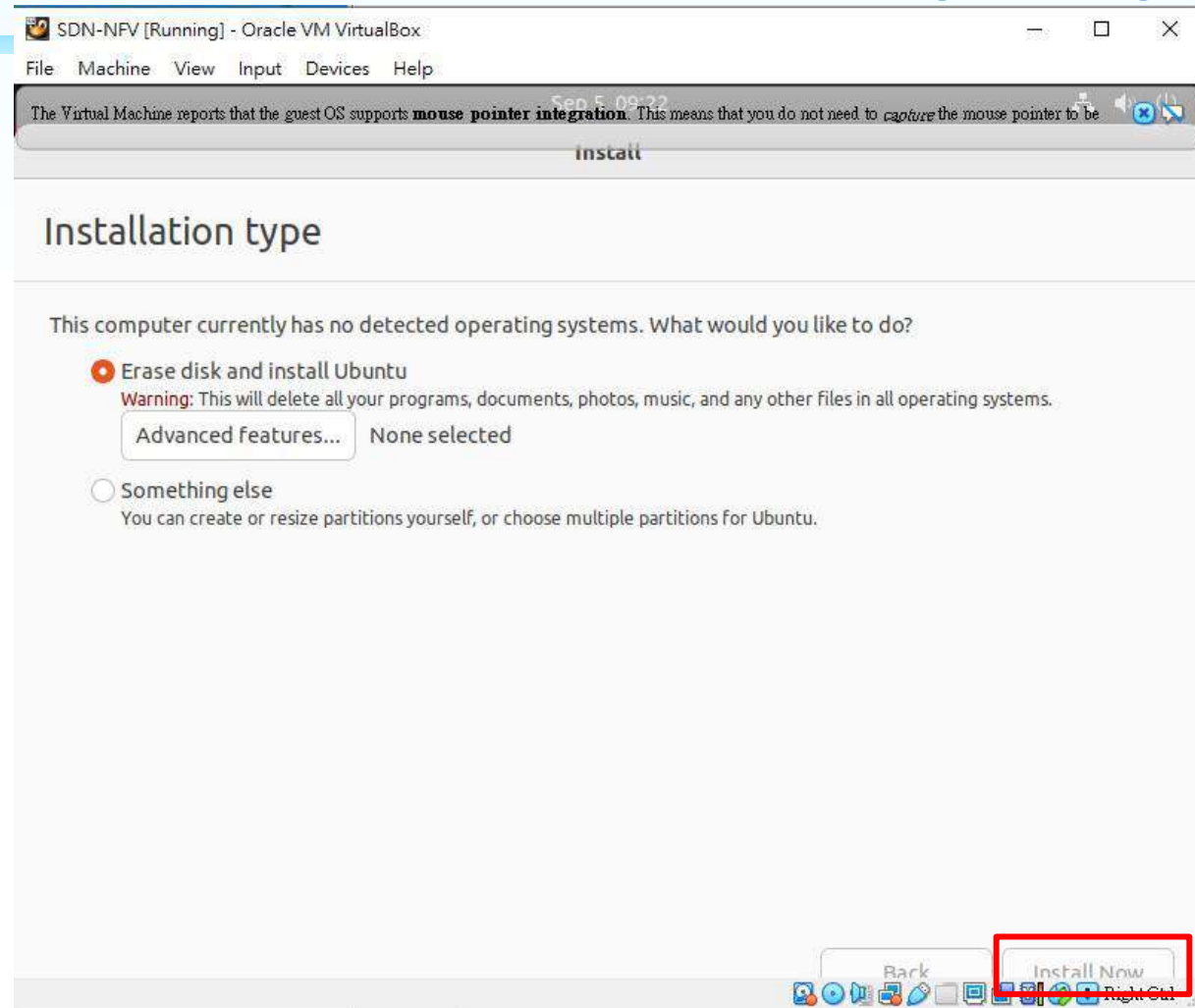
Ubuntu Installation (3/13)



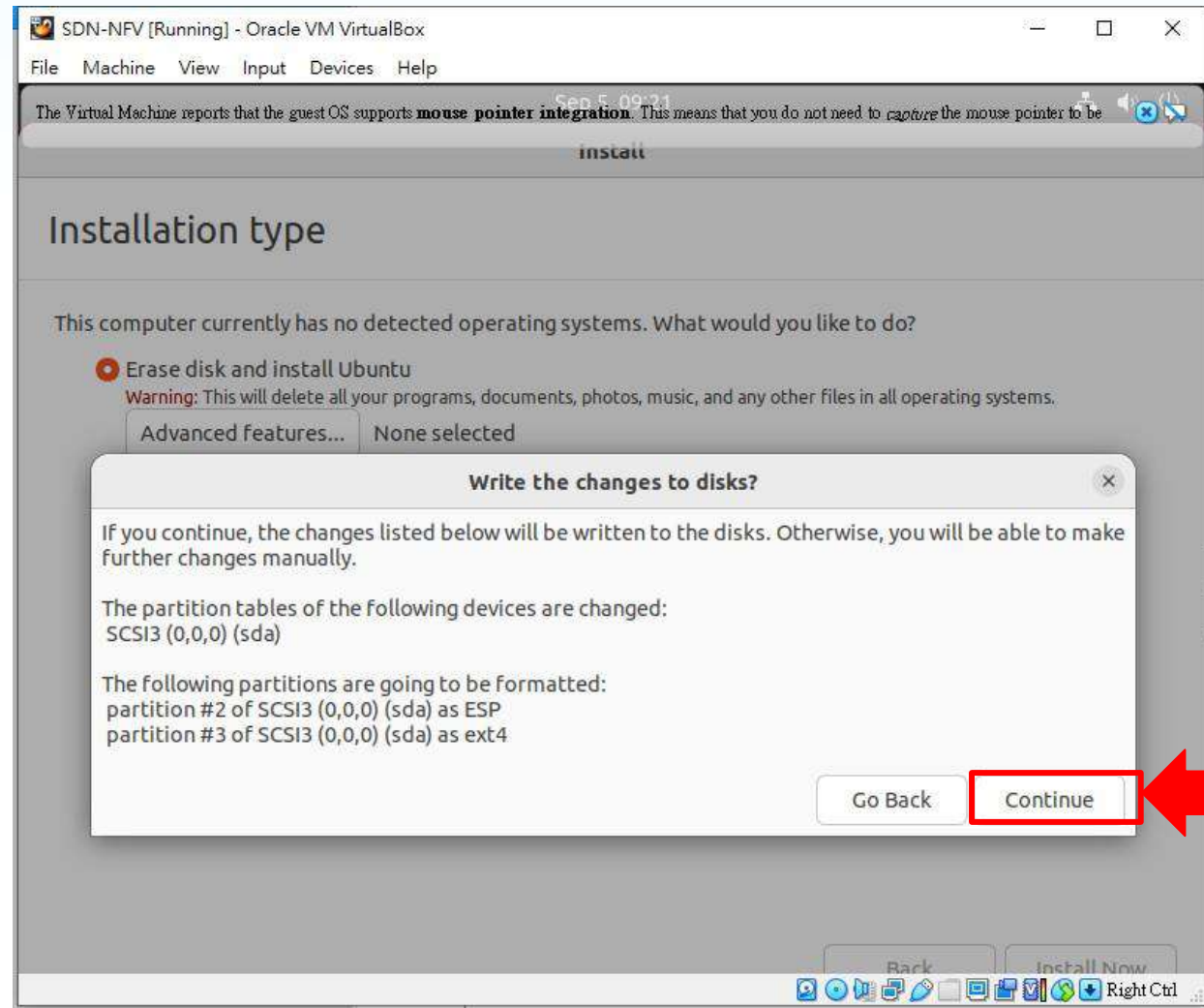
Ubuntu Installation (4/13)



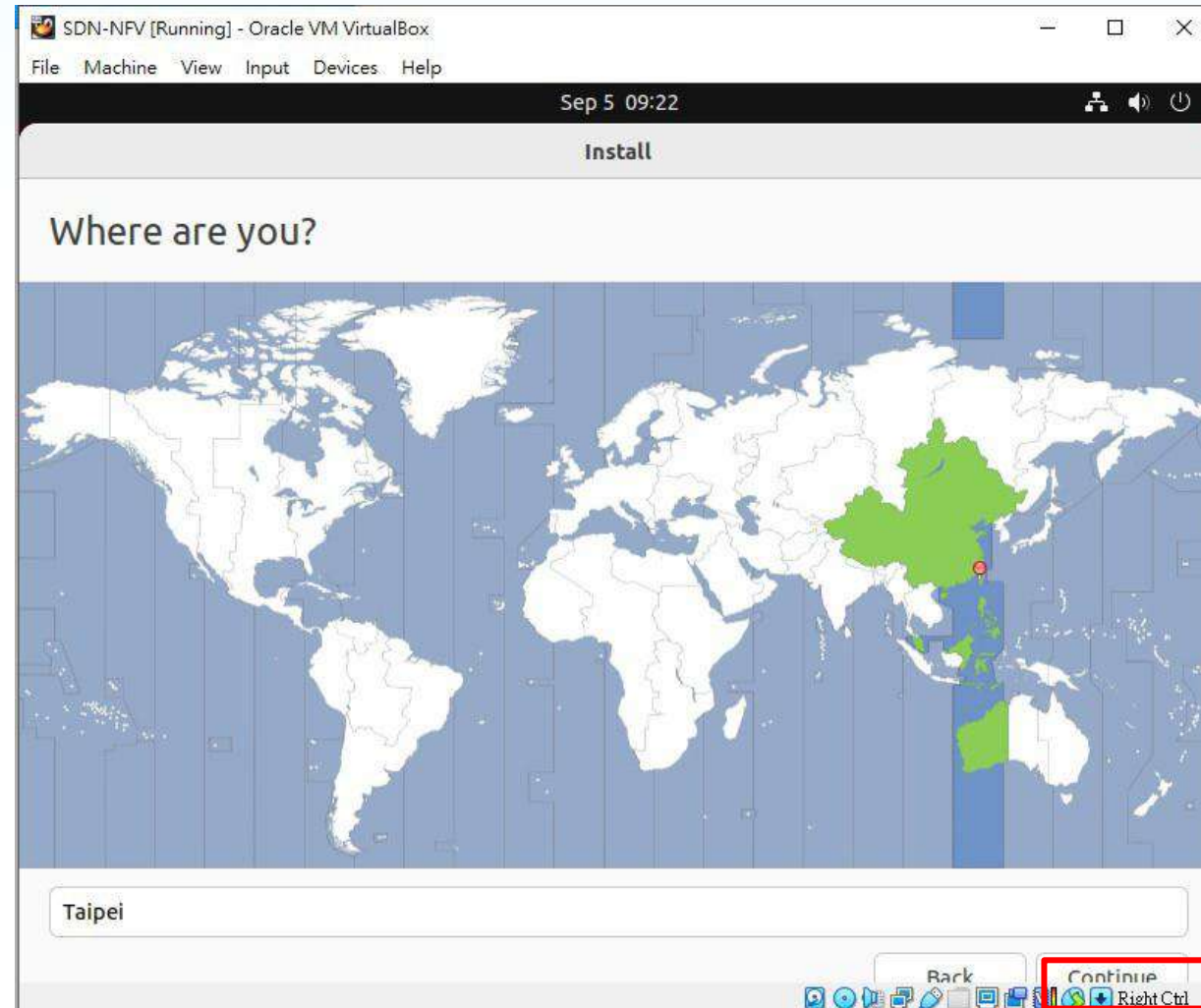
Ubuntu Installation (5/13)



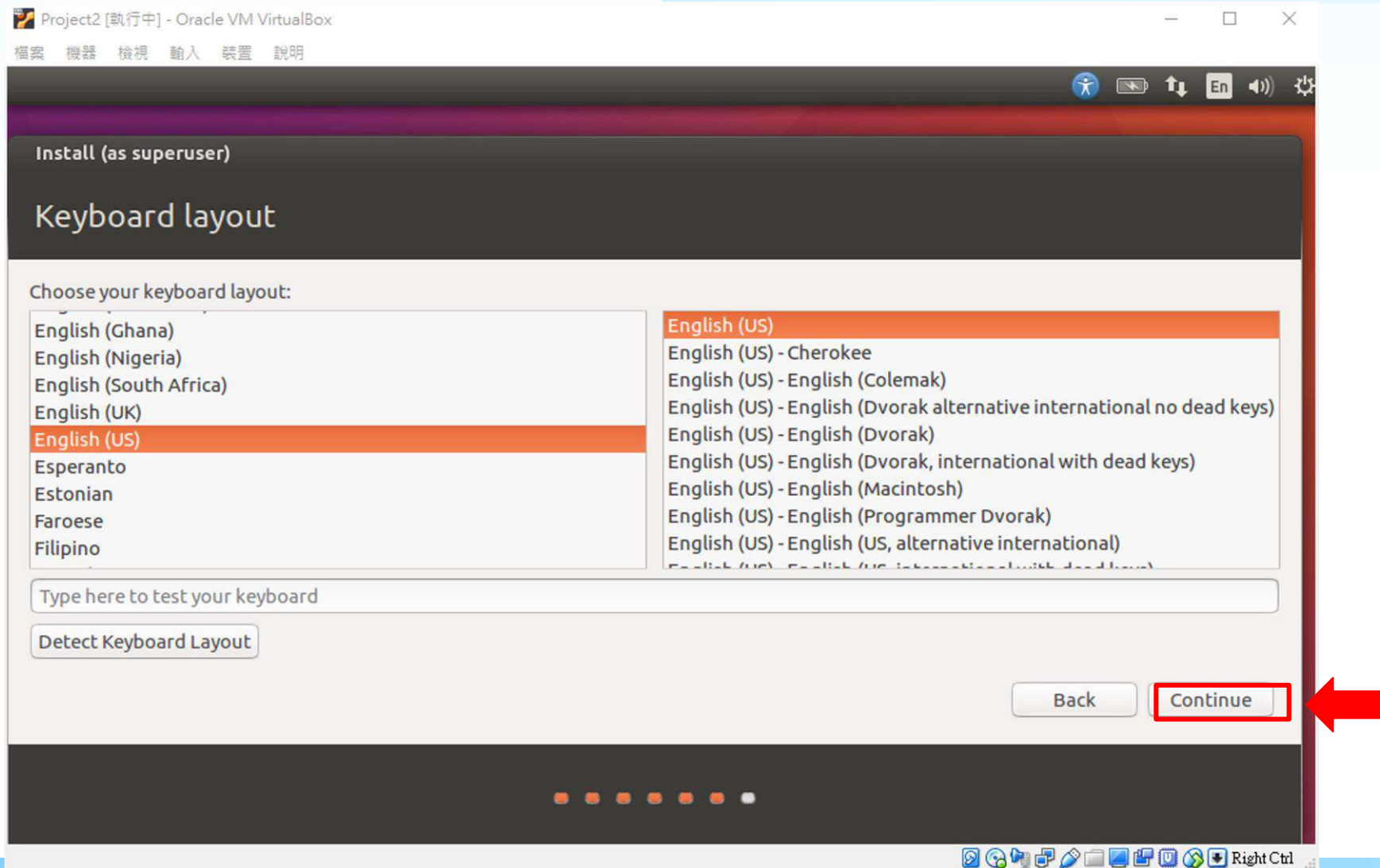
Ubuntu Installation (6/13)



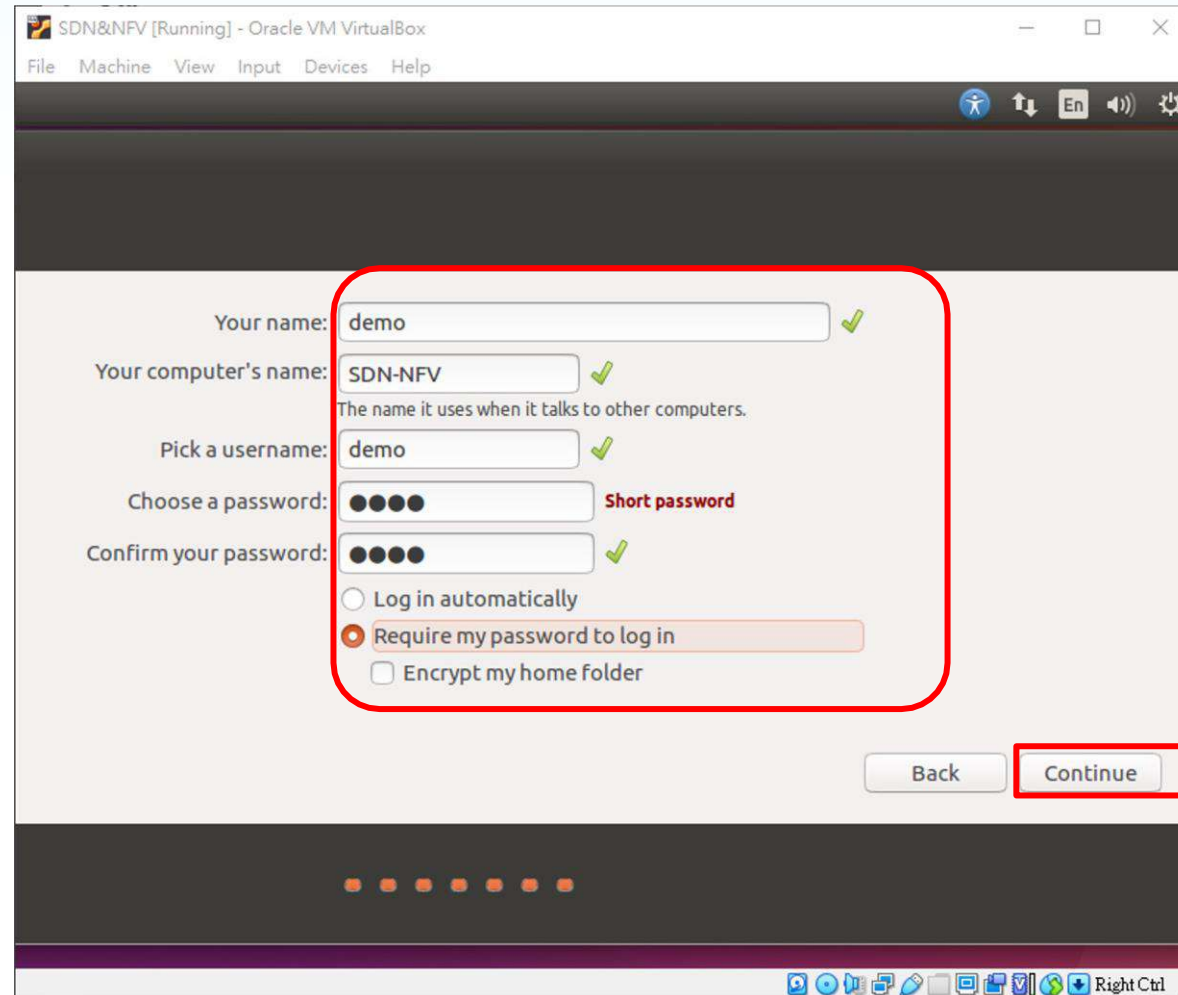
Ubuntu Installation (7/13)



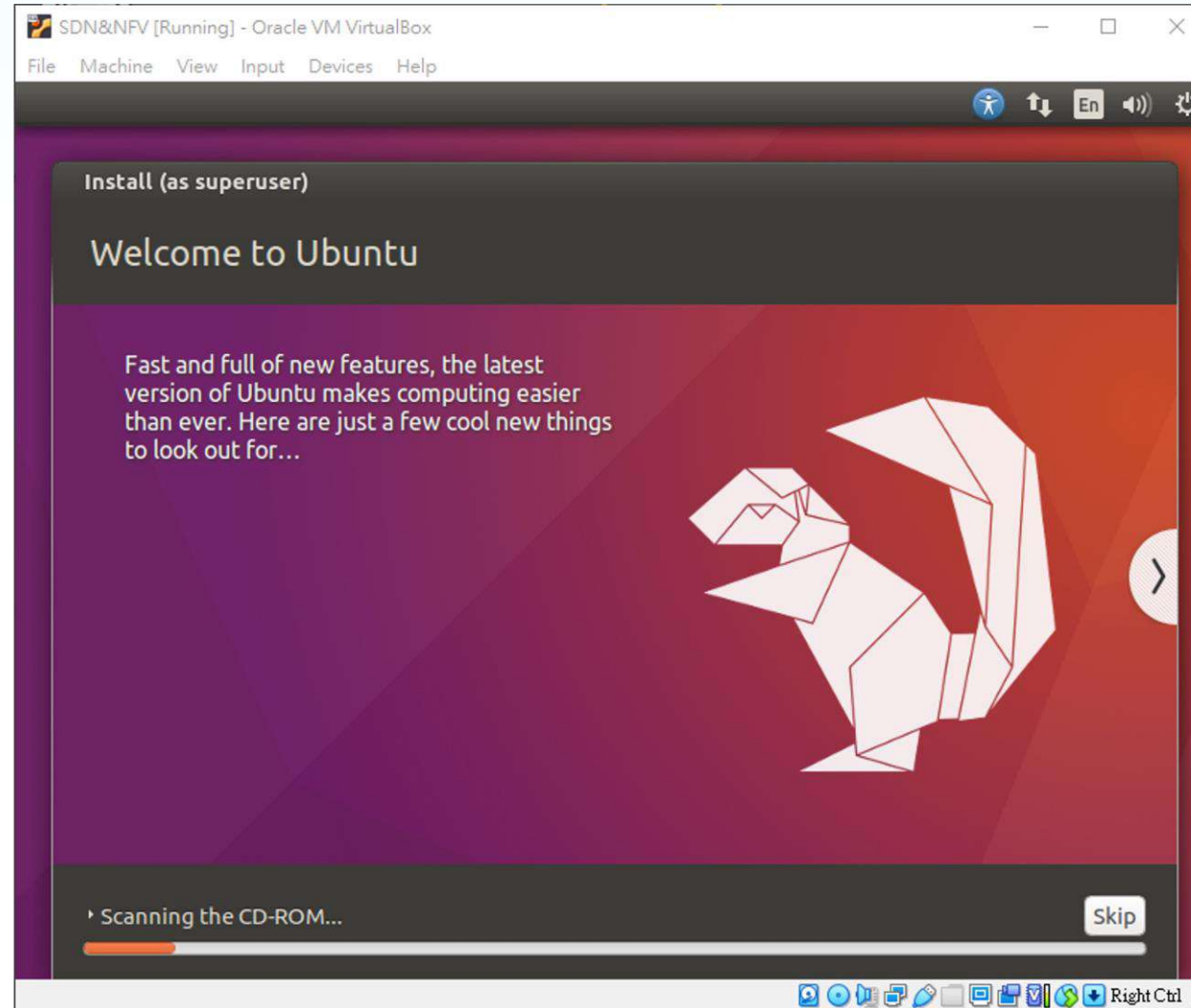
Ubuntu Installation (8/13)



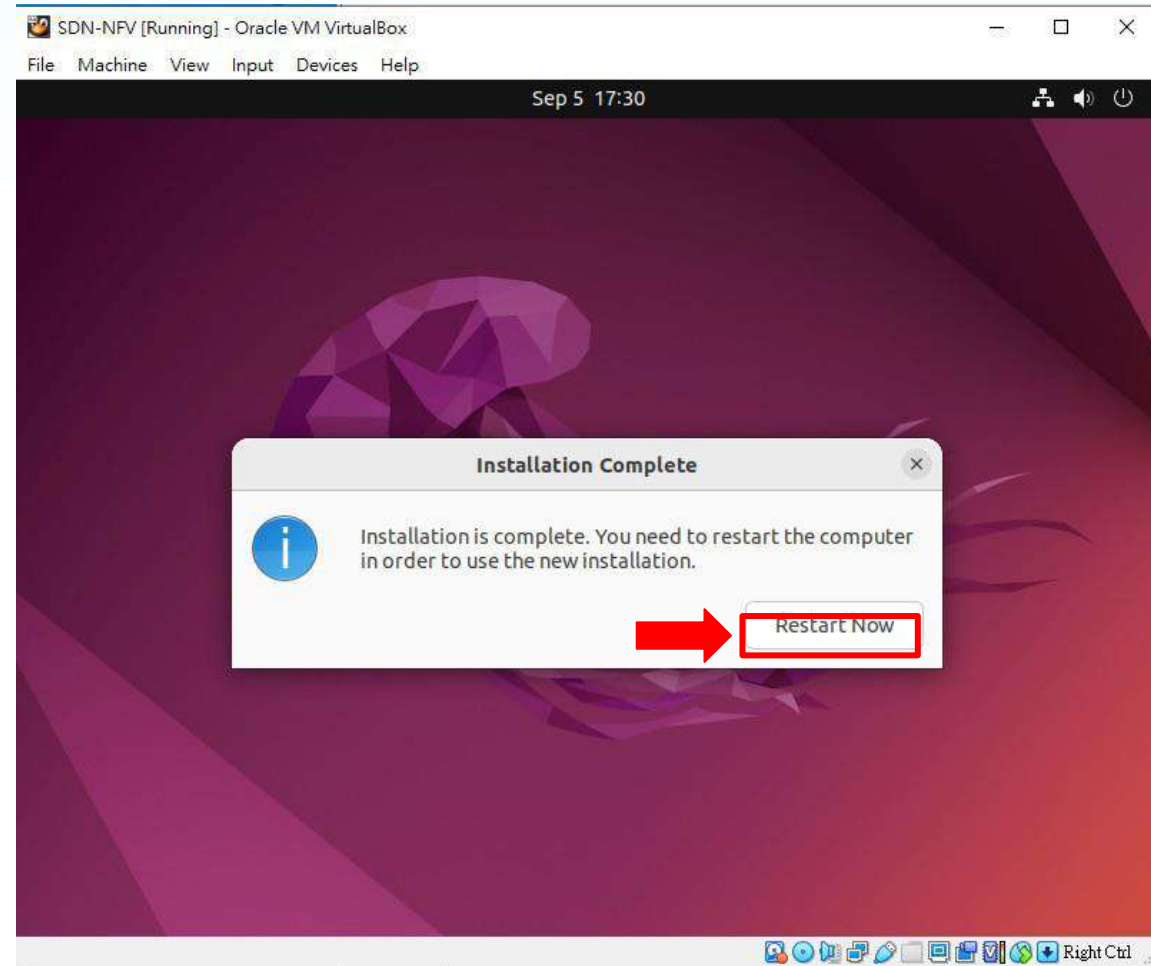
Ubuntu Installation (9/13)



Ubuntu Installation (10/13)

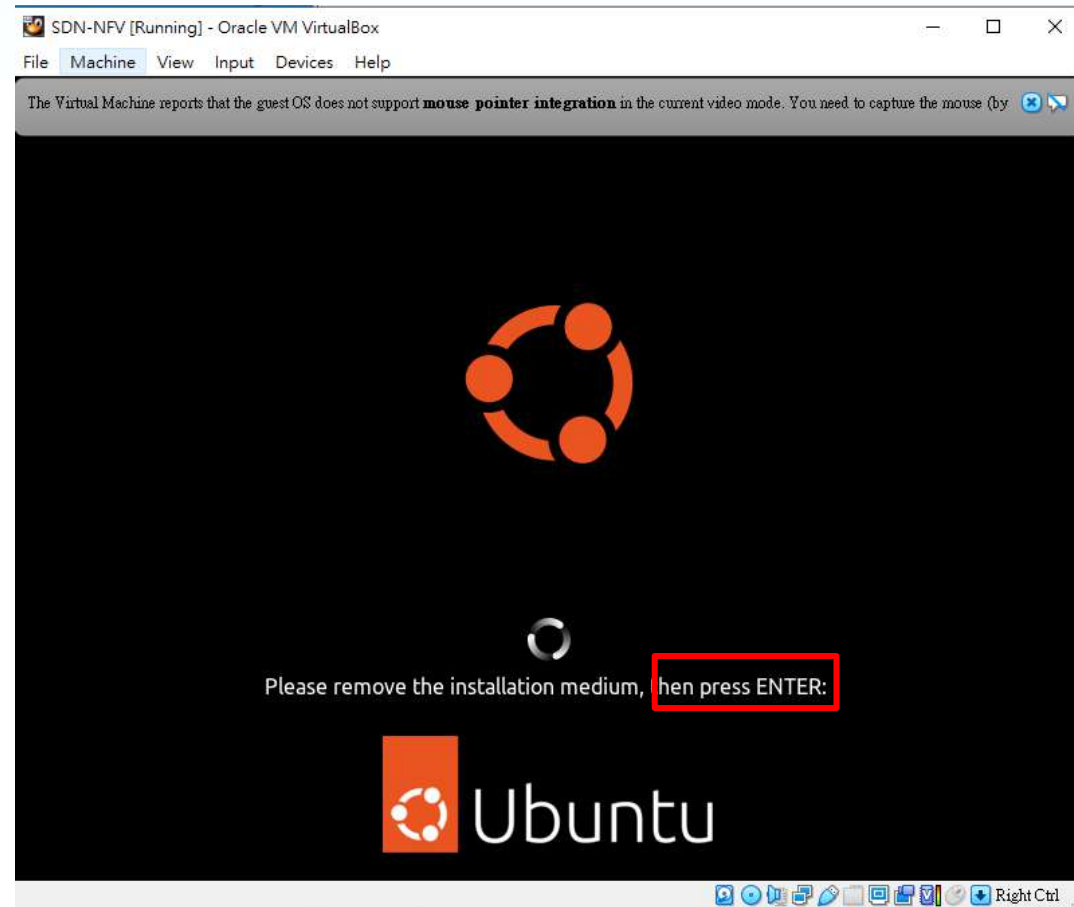


Ubuntu Installation (11/13)

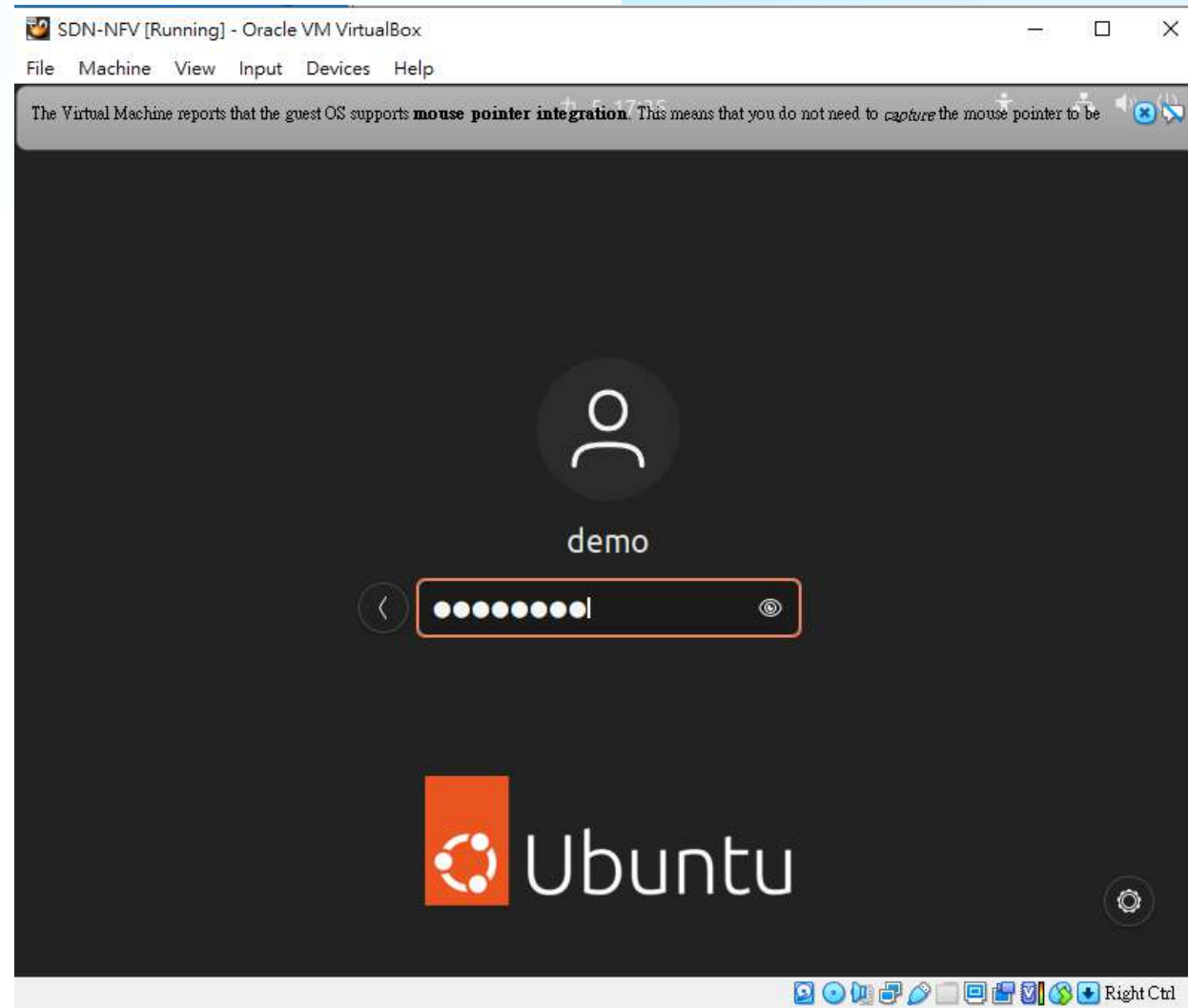


Ubuntu Installation (12/13)

- Press “Enter”, then VM will restart



Ubuntu Installation (13/13)

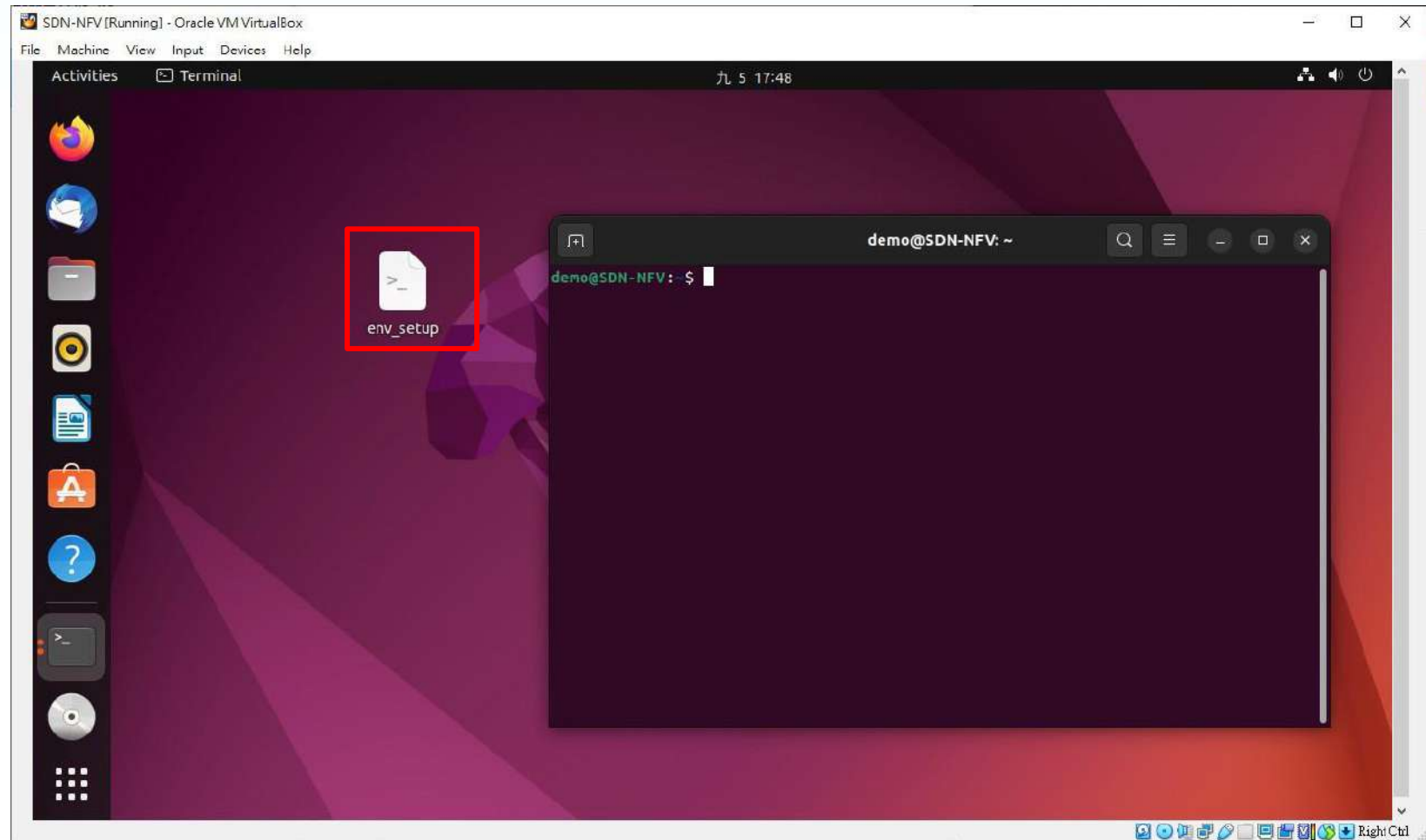


Outline

- Experiment Environment
- Installation
 - VirtualBox 6.1.2
 - Add VM
 - SDN development environment

SDN development environment (1/4)

- Download “env_setup” from e3
- Open terminal



SDN development environment (2/4)

- ❑ Go to directory where the “env_setup” is

```
$ cd ~/Desktop
```

- ❑ Change file permission to execute

```
$ chmod +x env_setup
```

- ❑ Execute the shell script

```
$ ./env_setup
```

```
demo@SDN-NFV:~$ cd ~/Desktop/  
demo@SDN-NFV:~/Desktop$ chmod +x env_setup.sh  
demo@SDN-NFV:~/Desktop$ ./env_setup.sh  
[sudo] password for demo: █
```


SDN development environment (3/4)

- ❑ It will take around 20 minutes (or more)
- ❑ Shell script will automatically install:
 - Bazelisk 1.12.0
 - ONOS 2.7.0
 - Mininet 2.3.0
 - OvS 2.17.2

SDN development environment (4/4)

- ❑ If the installation complete, you'll see finish message

```
make[1]: Leaving directory '/home/demo/ovs'
Start registering Open vSwitch service...
Created symlink /etc/systemd/system/multi-user.target.wants/ovs.service → /etc/s
ystemd/system/ovs.service.
Finished the installation of Open vSwitch.
*****
* The environment setup finished successfully! *
*****
demo@SDN-NFV:~/Desktop$
```

- ❑ Run the command

```
demo@SDN-NFV:~$ source ~/.bashrc
```

- ❑ After this, you have finished your environment setup