

# Hacker Tools: Virtual machines and installing Ubuntu

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Adapted from Julius Putra Tanu Setiaji's 2019 Hacker Tools run  
1 September 2020

# Where are we?

Introduction

Linux & Virtual Machines

Linux Install Fest

Guest Additions

Nifty Tricks with VM

Conclusion

# NUS Hackers



<https://nushackers.org>

hackerschool

Friday Hacks

Hack&Roll

Hacker Tools

# Required Software

- Download and install VirtualBox
- Download Ubuntu 20.04 ISO file

You can find the link to download both of these on our Facebook event page or in our Telegram channel.

# What is a Hacker?

A **hacker** is someone who strives to solve problems in elegant and ingenious ways.

Hack as in hackathon.

Read more at <https://www.nushackers.org/why/>

Examples: Richard Stallman, Linus Torvalds, Jamie Zawinski, Steve Wozniak, Ken Thompson, Dennis Ritchie

# Hacker Tools

Inspired by MIT CSAIL's The Missing Semester of Your CS Education (<https://missing.csail.mit.edu/>), which was originally called Hacker Tools.

Learn to make the most of the tools that hackers have been using for decades.

In this class, we'll help you learn how to make the most of tools that productive programmers use.

# Where are we?

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Brief Introduction to Linux & Unix

Virtual Machine: What? Why?

Virtual Machine: Setting up

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# What is Linux?

A Unix-like operating system kernel.

The most popular kernel in the world!

Android, Chromebooks, most routers, most servers,  
supercomputers

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<sup>1</sup>The most fundamental part of an operating system – it is a bridge between other software running on the computer and the hardware

# What is Unix?

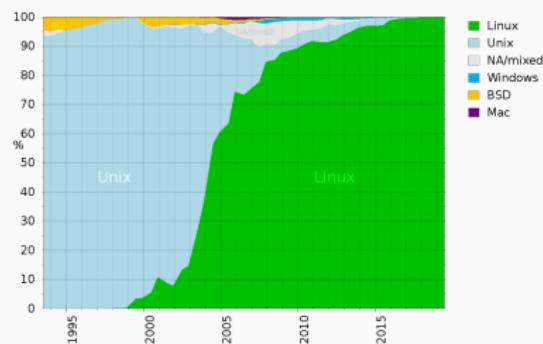
A family of multi-tasking, multi-user operating system, first released in 1973.

The first popular multi-user Windows was Windows 2000!

Examples: macOS, iOS, SunOS/Solaris, BSD, AIX, HP-UX

Most popular family of operating systems in the world!

# Most Popular OS Family in the world!



# Why should I use Linux?

Most development tools are designed for Unix-like systems, so the development experience is better.

Useful skill: most technology companies use Unix-like systems as servers.

If you are a computing student, sooner or later you will end up developing for/on a Unix-like platform

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# What is a VM?

A virtual machine is a simulated computer.

You can configure a guest virtual machine with some operating system and configuration and use it without affecting your host environment.

# Why use a VM?

Experiment with operating systems, software, and configurations without risk.

For running software that only runs on a certain operating system.

For experimenting with potentially malicious software.

# Useful Features

## Isolation

Isolating the guest from the host, so you can use VMs to run buggy or untrusted software reasonably safely.

## Snapshots

Snapshots capture the entire machine state.

You can make changes to your machine, and then restore to an earlier state.

# Disadvantages

VMs are generally slower than running on bare metal.

Competes for resources with the host OS.

May be unsuitable for certain applications, e.g. games and high-performance computing.

# Examples



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# Why VirtualBox?



We are going to use VirtualBox, because:

- It is FOSS (free, open-source software)
- It has a GUI (graphical user interface)
- It is cross-platform

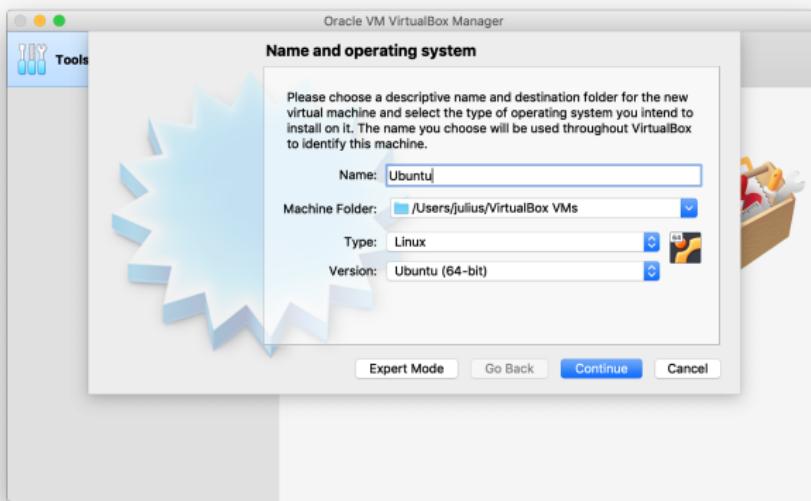
Possible disadvantages: owned by Oracle, quite power-hungry (on macOS)

# VirtualBox main UI



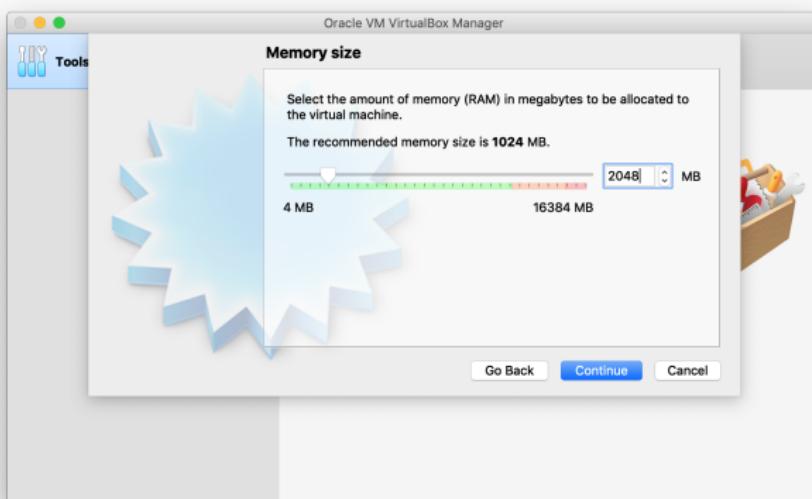
Click on “Add”

# Creating new VM



Use Ubuntu as the name. VirtualBox should detect the type and variation automagically.

# Set amount of memory allocated



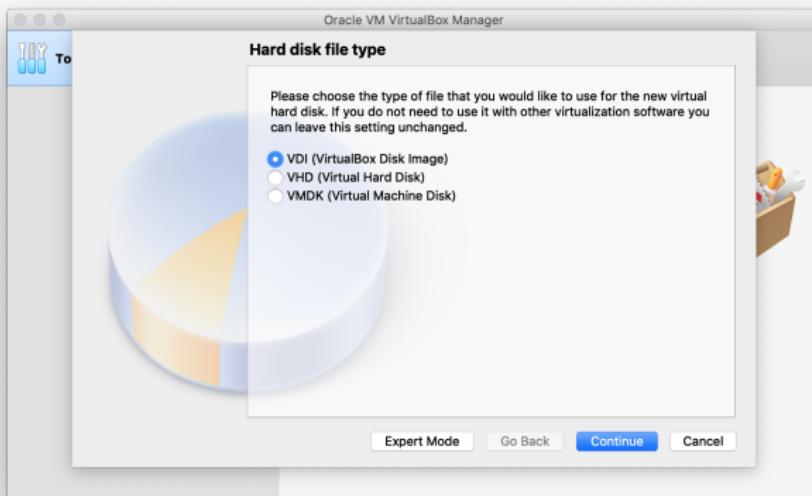
Ubuntu has a minimum of 512 MiB and recommends 2 GiB, but in general do not exceed 1/4 of the amount of physical RAM available.

# Create Virtual Hard Disk (1/4)



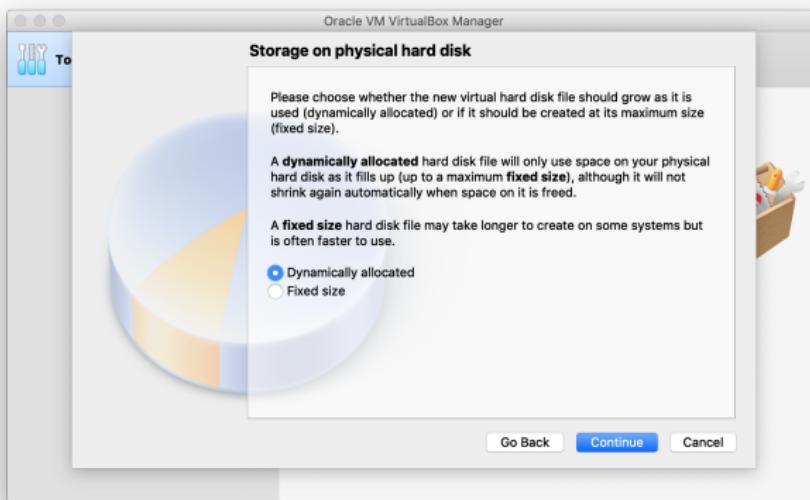
Our virtual machine also needs a virtual hard disk

# Create Virtual Hard Disk (2/4)



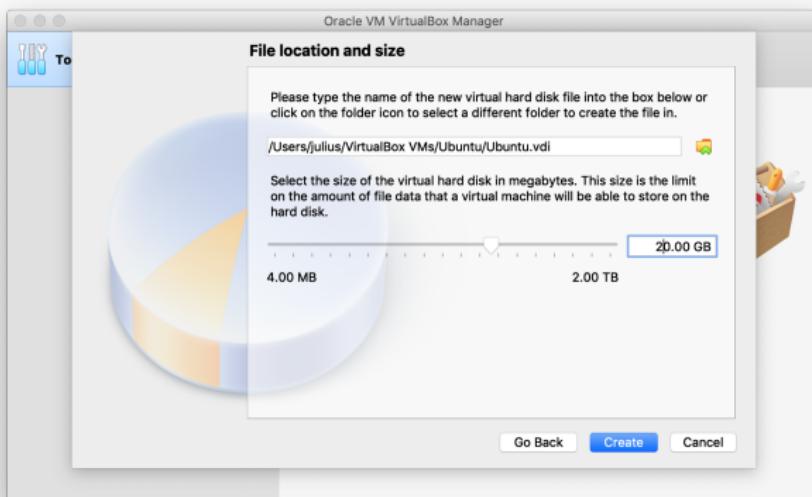
Use the default virtual HD format for best performance.

# Create Virtual Hard Disk (3/4)



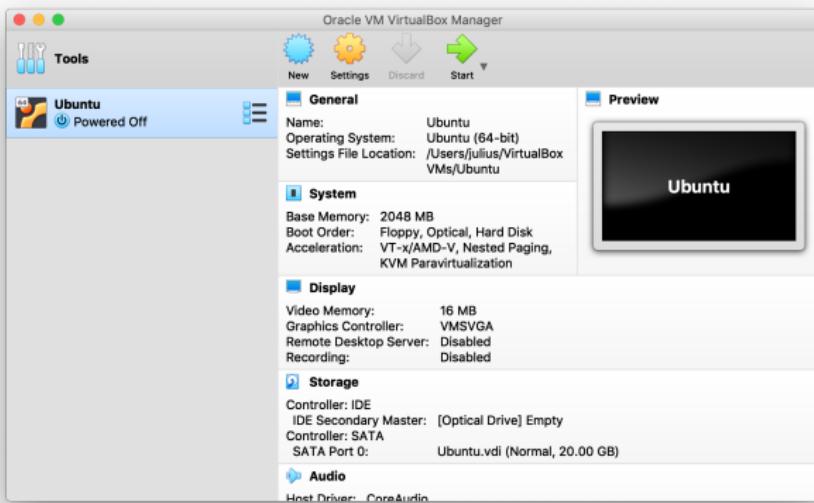
Keep it dynamically-sized so the virtual HD will only take up as much space as it currently needs.

# Create Virtual Hard Disk (4/4)



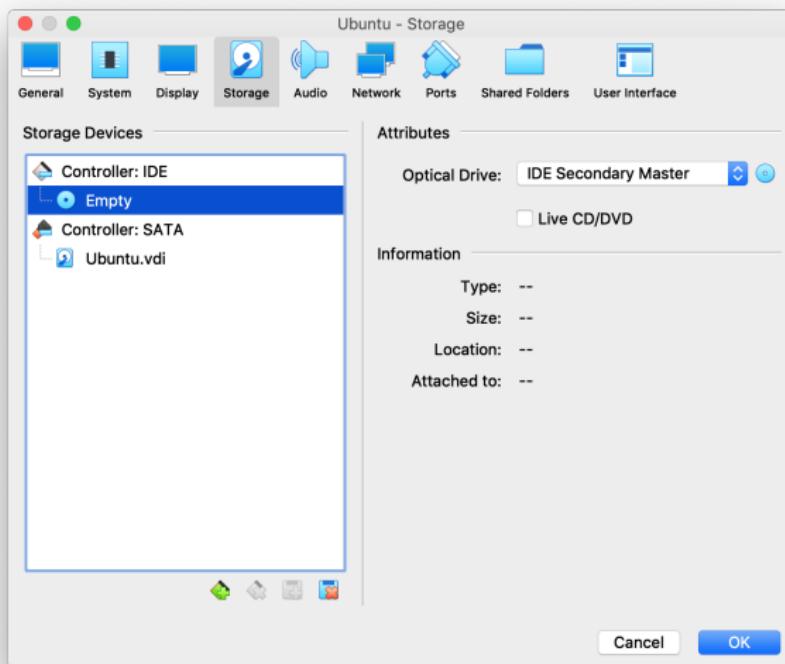
Ubuntu has a minimum of 10 GiB and recommends 25 GiB. In any case, we will be using the minimum installation, amounting to about 6 GiB.

# Back to the main UI

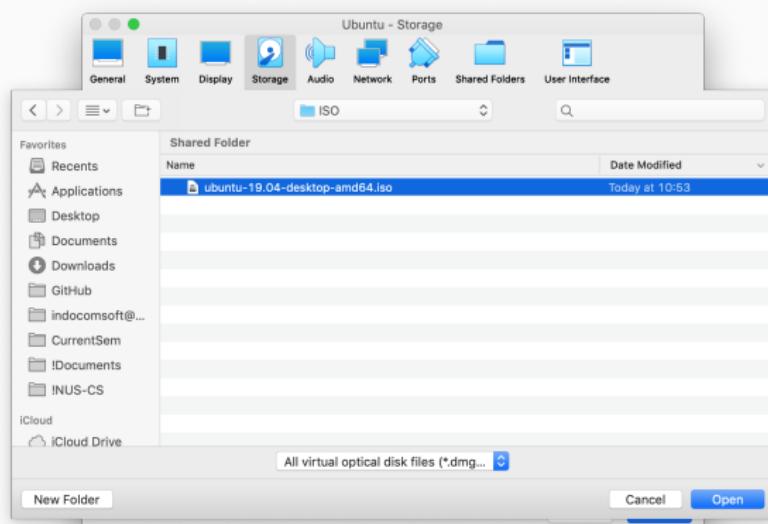


Click on “Settings”

# Settings



# Choose Disc



Choose your Ubuntu ISO file

# Finally

We are done with the VirtualBox set-up!

Feel free to go to settings later on and customise to your heart's desire.

For now, you can click “Start” in the main UI.

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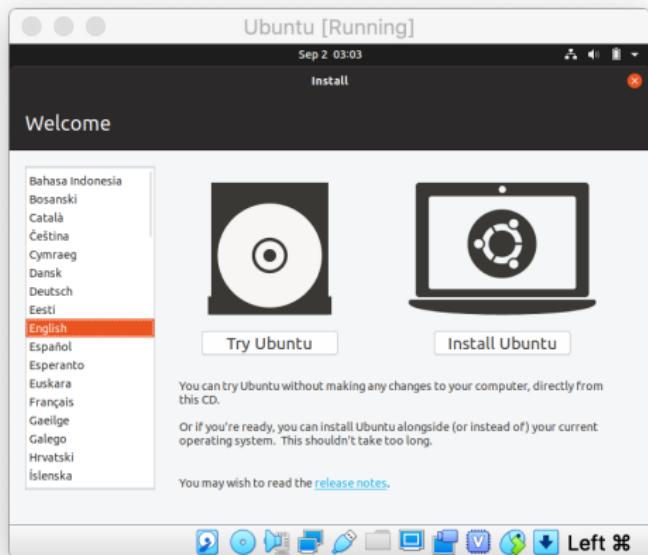
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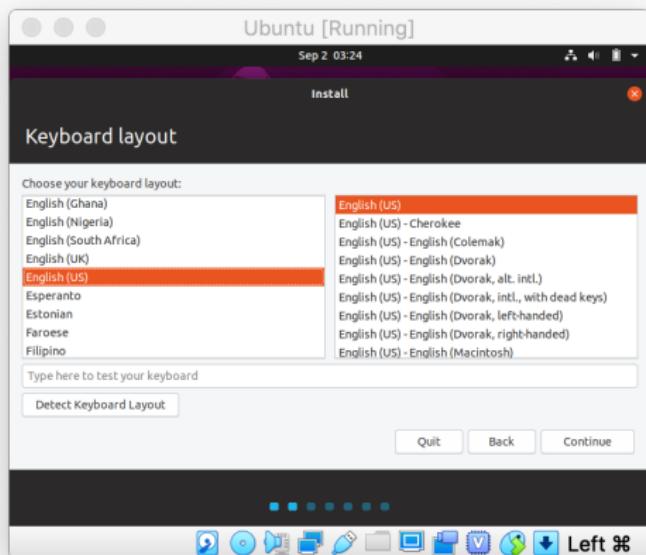
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# Booting Ubuntu



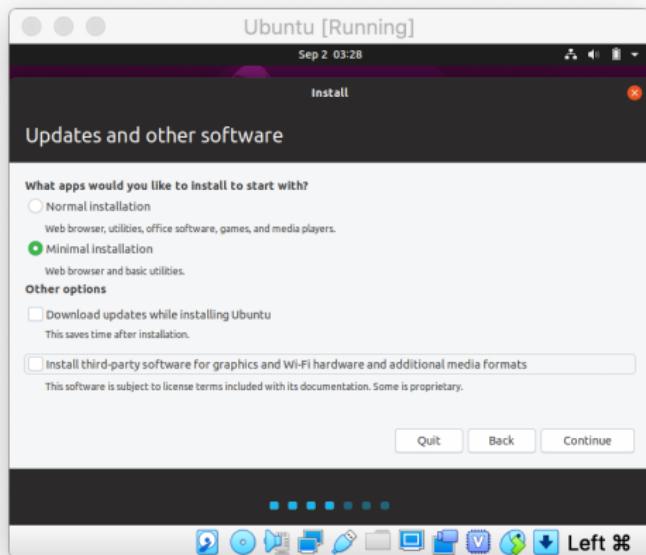
Once the VM starts and boots, you should see this screen.  
Choose “Install Ubuntu”

# Choose Keyboard Layout



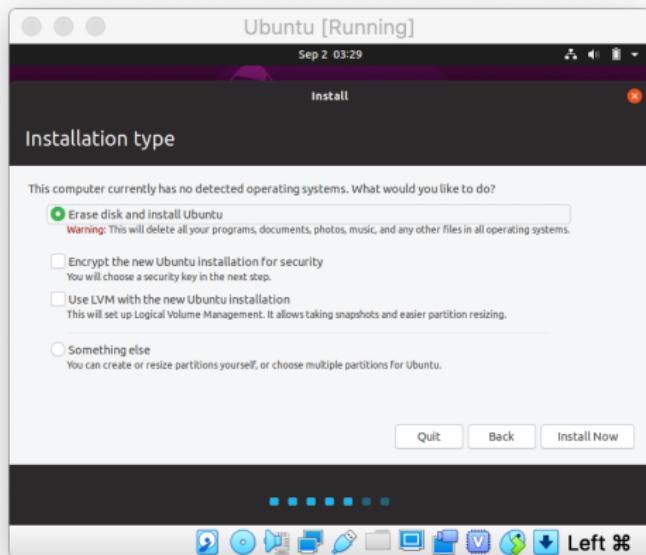
Choose your  
keyboard layout.  
Most computers  
sold in Singapore  
use English (US).

# Updates and Other Software



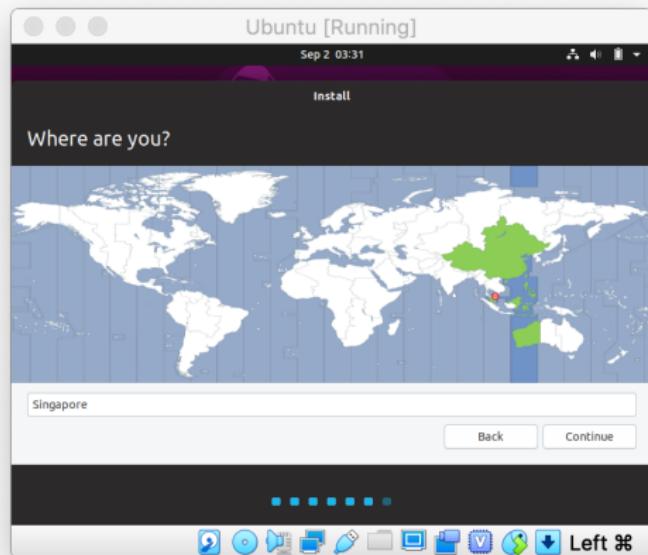
Choose minimal installation, and do not tick the checkboxes to save time on instalattion.

# Installation Type



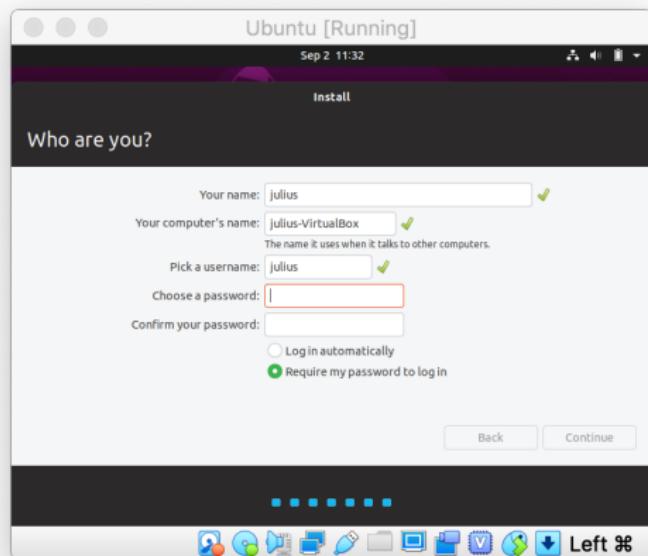
Choose “Erase disk and install ubuntu”, then “Install now”. Click “Continue” on the dialogue that shows up.

# Location



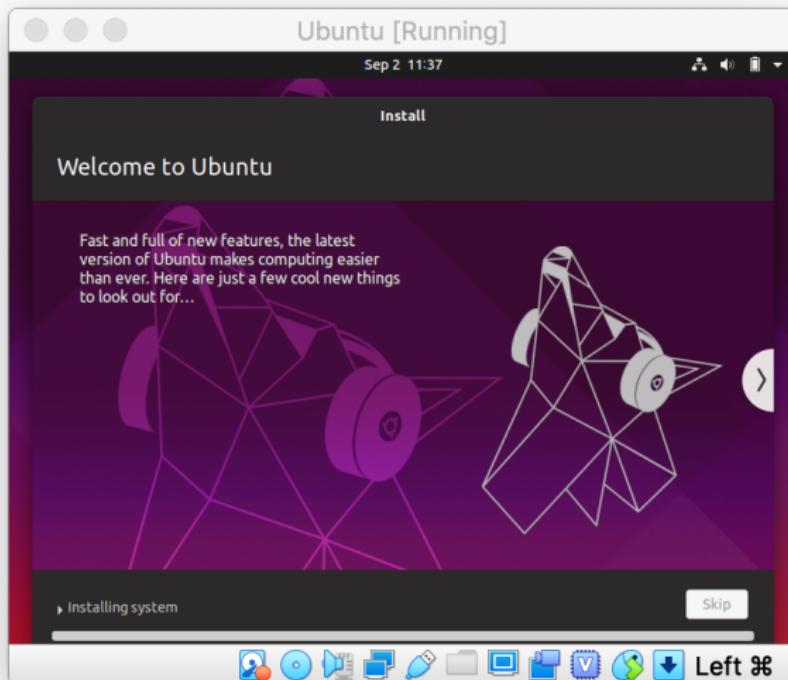
Ubuntu should already detect that you're in Singapore.

# Setting up username



Type in your name,  
and set a password.

# Sit back and relax



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# Guest Additions

VMs provide some software for better integration, e.g. shared clipboard, screen auto-resizing, etc.

VirtualBox calls them Guest Additions.

# Installing VirtualBox Guest Additions

Many Linux distributions offer the Guest Additions in their package repositories.

We will install it using the repositories:

```
sudo -i  
apt update  
apt install virtualbox-guest-utils \  
virtualbox-guest-x11
```

# Installing using the ISO

If you install Windows, or some other OS that does not have the Guest Additions in a package repository, then they can be installed via a CD image.

Devices ➤ Insert Guest Additions CD Image

This will insert the Guest Additions as a virtual CD.

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Force shutdown the VM

Saving State & Snapshot

Go crazy and experiment!

# Force Shutdown the VM

You may need to run unstable software on the VM.

If the VM hangs, you can always force shutdown by closing and choosing “Power off the machine”, and quickly bring up the VM again.

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# Saving machine state

You need not shut down the OS to shut down your VM.

Instead, you can just save its state and “pause” the VM, to be resumed later.

Try closing the VM, and choose “Save the machine state”

# What is Snapshot?

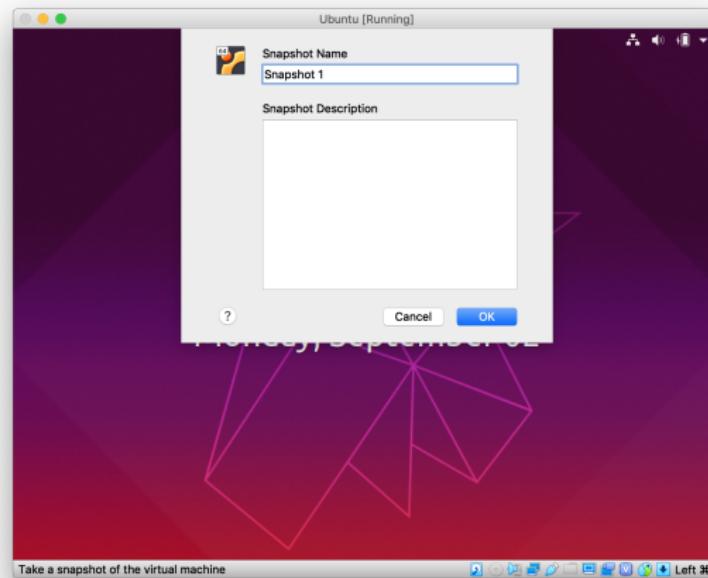
Captures the state of the VM at one particular time.

You can always get back to this state later on.

Useful for experimentation!

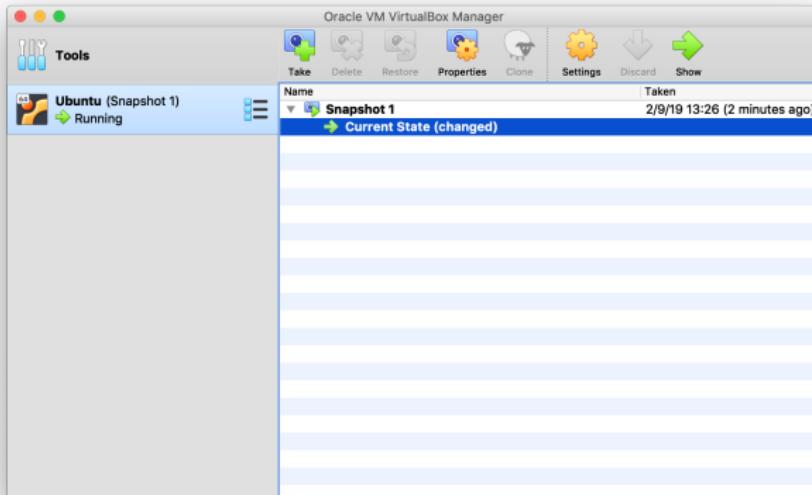
# Taking Snapshot in VirtualBox

Machine ➤ Take Snapshot



# See List of Snapshot in VirtualBox

On the main UI of VirtualBox, click the list icon besides the VM name (Ubuntu) and select “Snapshots”



# Restoring Snapshot in VirtualBox

To restore, your VM must be shut down.

In this case, we don't really care about the current state, so either shut down the OS, or close the VM and choose "Power off the machine"

In the list of snapshots, select the snapshot to restore, and click "Restore"

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# Some risky things to do

Open up the terminal (shortcut: **Ctrl**+**Alt**+**t**) and figure out what these commands do and try them out:

```
sudo rm -rf --no-preserve-root /  
:(():|:&}::
```

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# Possible Alternatives for Next Week's Hacker Tools

- On Windows 10, you can install WSL by following the instruction at <https://is.gd/wsl2019>
- macOS is already a Unix, so you can just use `Terminal.app`
- Or if you're already using Linux full-time, then great!

# Talk to us!

- Feedback: <https://tny.im/2020ht1>
- Next Hacker Tools:  
Shell and scripting, 8 September 2020, 6.30pm