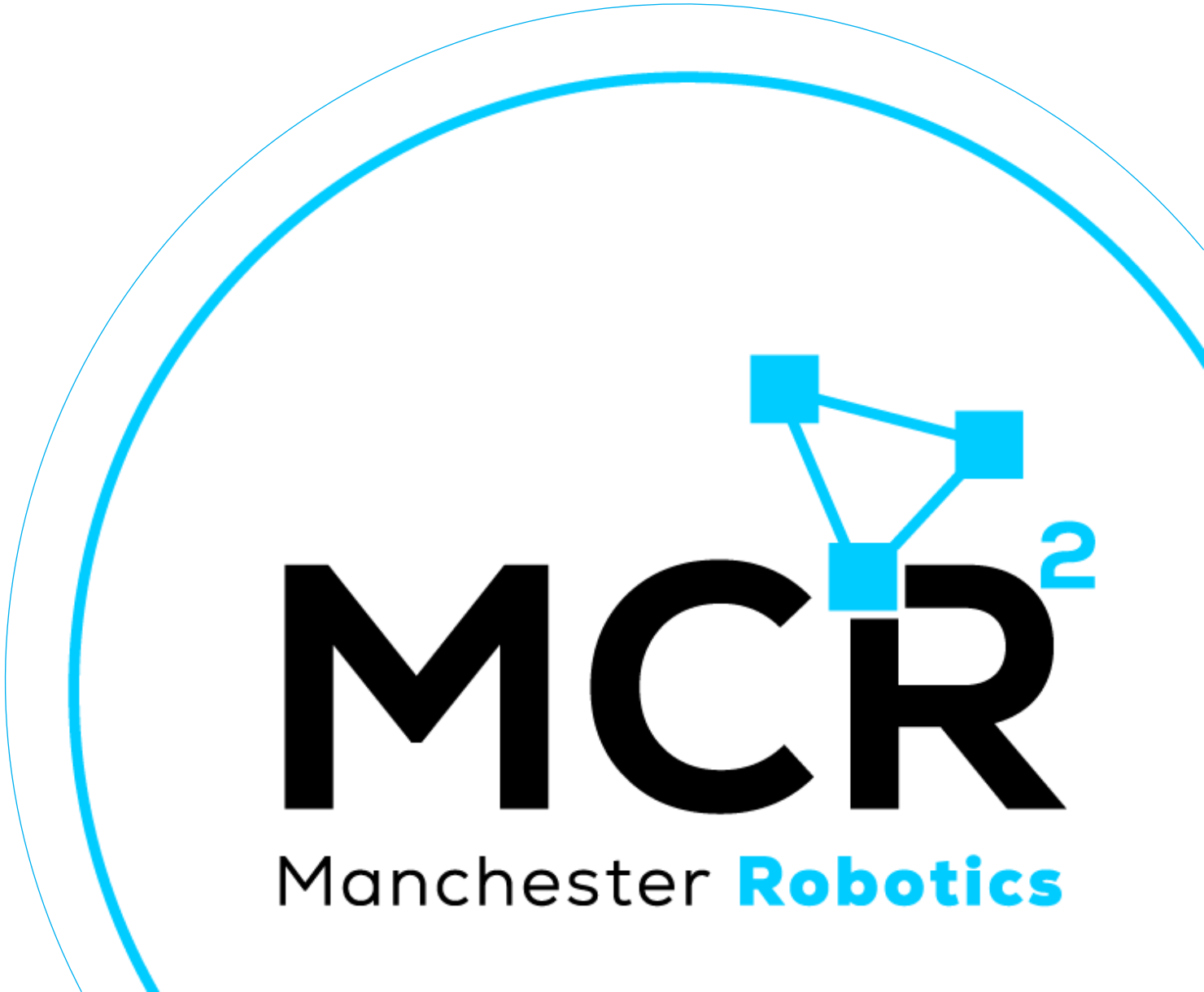
{Learn, Create, Innovate};

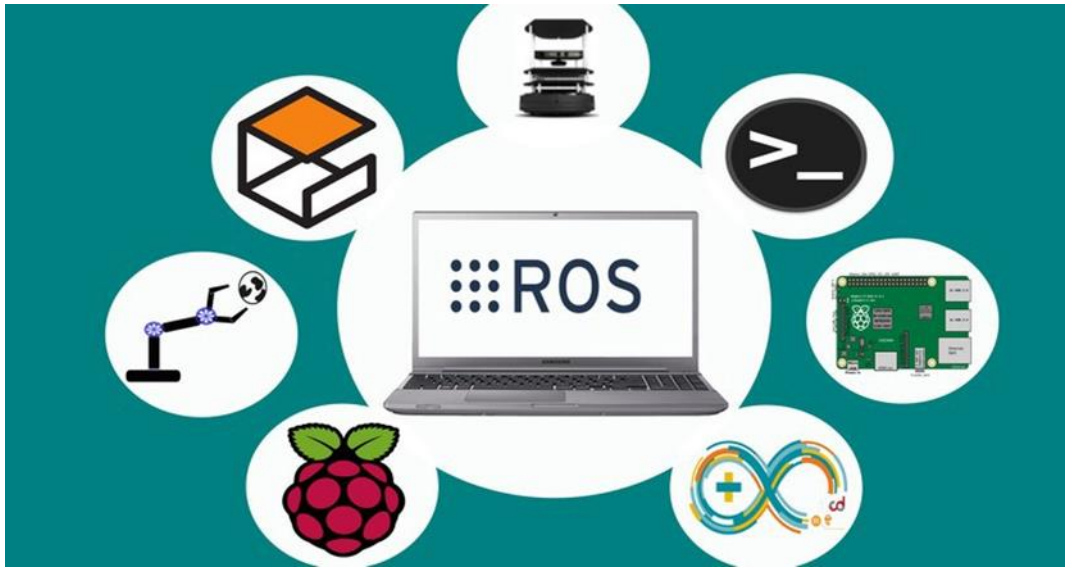
Getting Started with ROS

Installation



What is ROS?

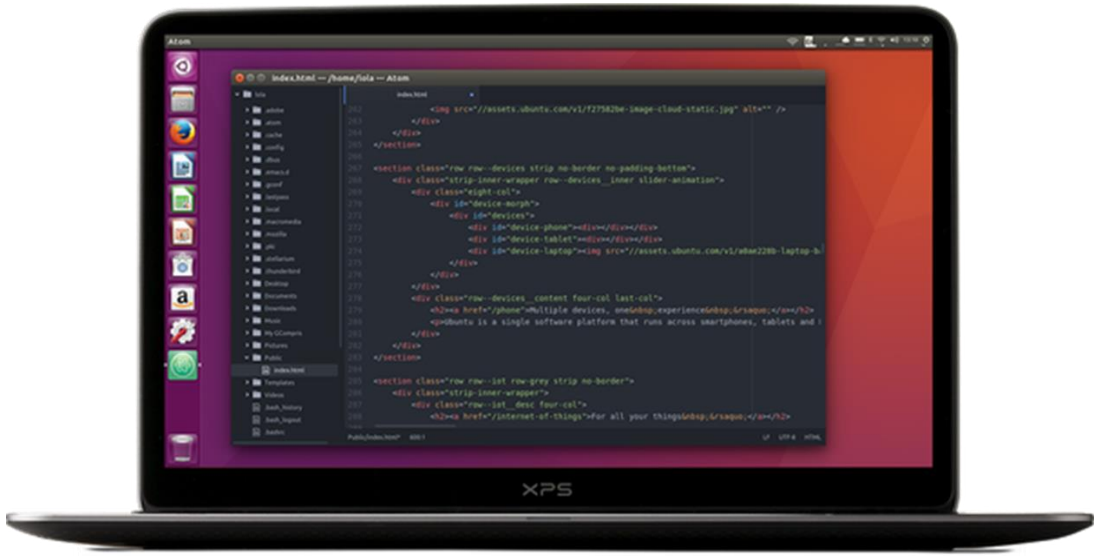
- **R**obot **O**perating **S**ystem
- Contrary to popular belief, ROS is not an operating system.
- “The ROS is a set of software libraries and tools that help you build robot applications. From drivers to state-of-the-art algorithms, and with powerful developer tools, ROS has what you need for your next robotics project. And it's all open source.”



Getting Started with ROS

What do we need to start working?

- Minimum Requirements*:
  - Processor: i5 or higher
  - RAM: 8 GB or higher
  - Storage: 20 Gb
  - Graphics: Dedicated GPU



Ubuntu

*This requirements are the minimum for the activities designed.

Getting Started with ROS

- A new version of ROS is released with each Linux distribution. **We will use ROS Noetic in this course** (released with **Ubuntu 20.04**).
- Currently, another version of ROS called ROS2 is available, Ubuntu 22.04.
- A revision of the ROS structure, known as ROS2, aims to increase the framework's robustness for industrial applications and distributed systems.
- Furthermore, ROS2 allows real-time applications.

ROS Melodic Morenia
Released May, 2018
LTS, supported until May, 2023
Recommended for Ubuntu 18.04

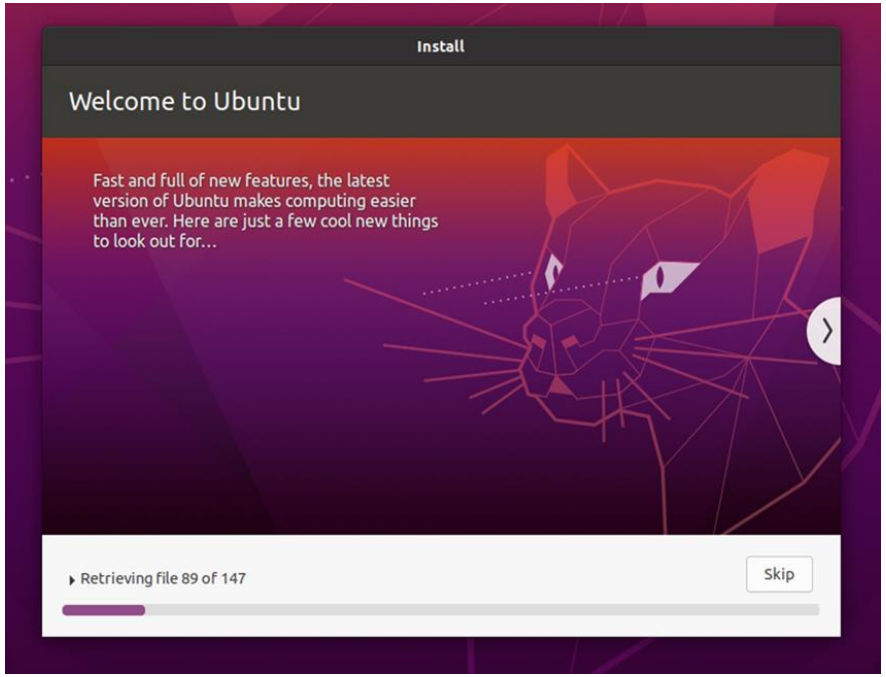
ROS Noetic Ninjemys
Released May, 2020
Latest LTS, supported until May, 2025
Recommended for Ubuntu 20.04

Installing Ubuntu

Installing Ubuntu

The recommended way of installing Ubuntu for robotics is as the main operating system or by dual booting it alongside the default Windows or Mac OS.

It can also run on a virtual machine, but this will limit features, and the performance speed could be affected.

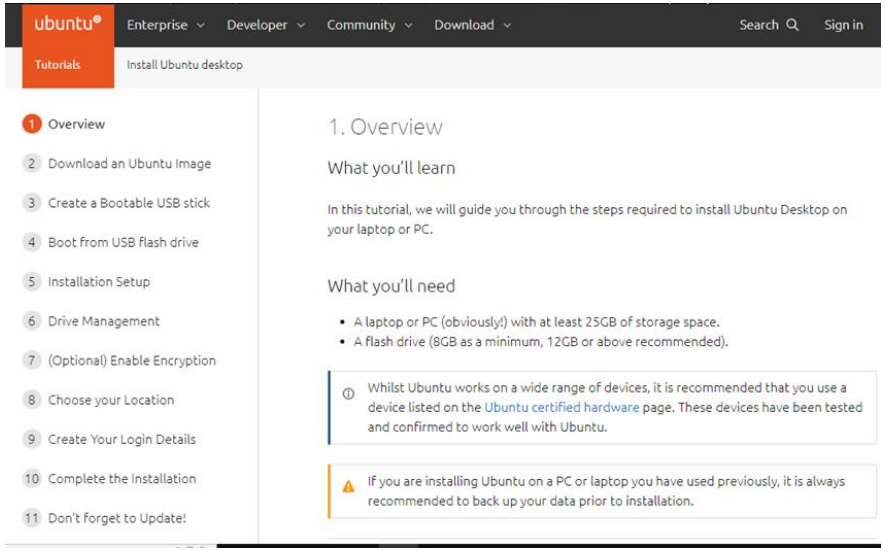


Installing Ubuntu

Quick Installation Guide Ubuntu as Main OS

Follow the tutorial on the official ubuntu website. Download the ubuntu 20.04 image here.

- On the left side of the webpage, all the steps for the installation are detailed.
- Once you click on each step, the installation details are described in the right panel.
- PROS: Easy installation, access in full to hardware.
- "CONS": Not possible if you need windows installed on the same machine.

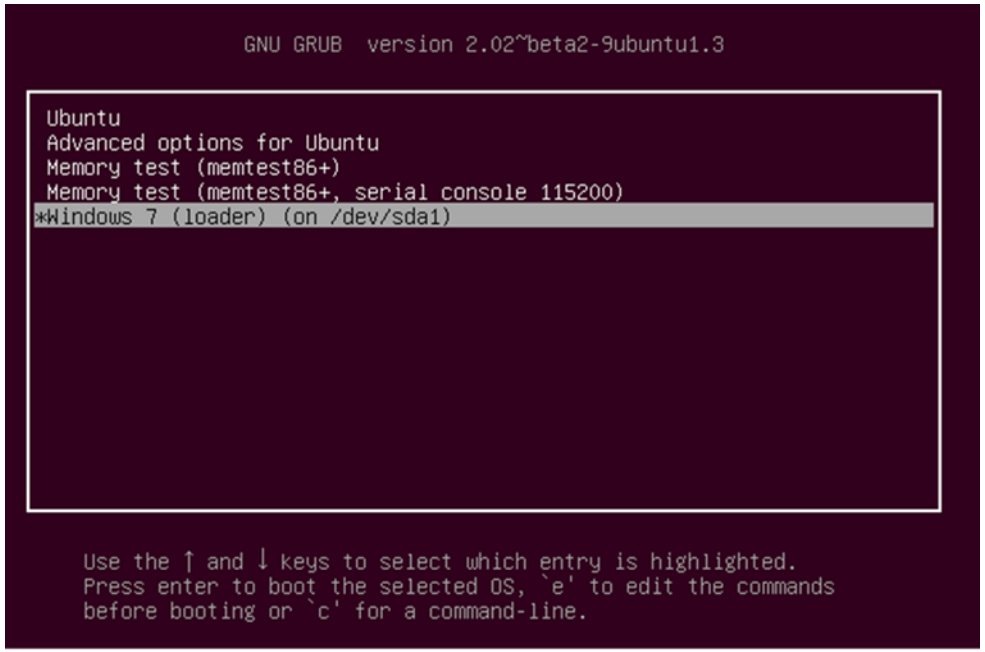


Installing Ubuntu

Dual Boot Installation

This installation requires preparing the computer first. This may vary depending on the computer brand, but the main steps are:

- Prepare the USB as the website indicates. (Step 1-4)
- You may need to modify some parameters from the BIOS configuration.
- Depending on how many partitions or how full the disc is, you may want to defrag and partition your hard drive using Windows. More info here.
- Change the booting option from the computer and keep following the steps on the website.
    - PROS: Relatively easy install, access in full to hardware .
    - CONS: a problem if you must use windows and don't have another machine.



Windows + Ubuntu

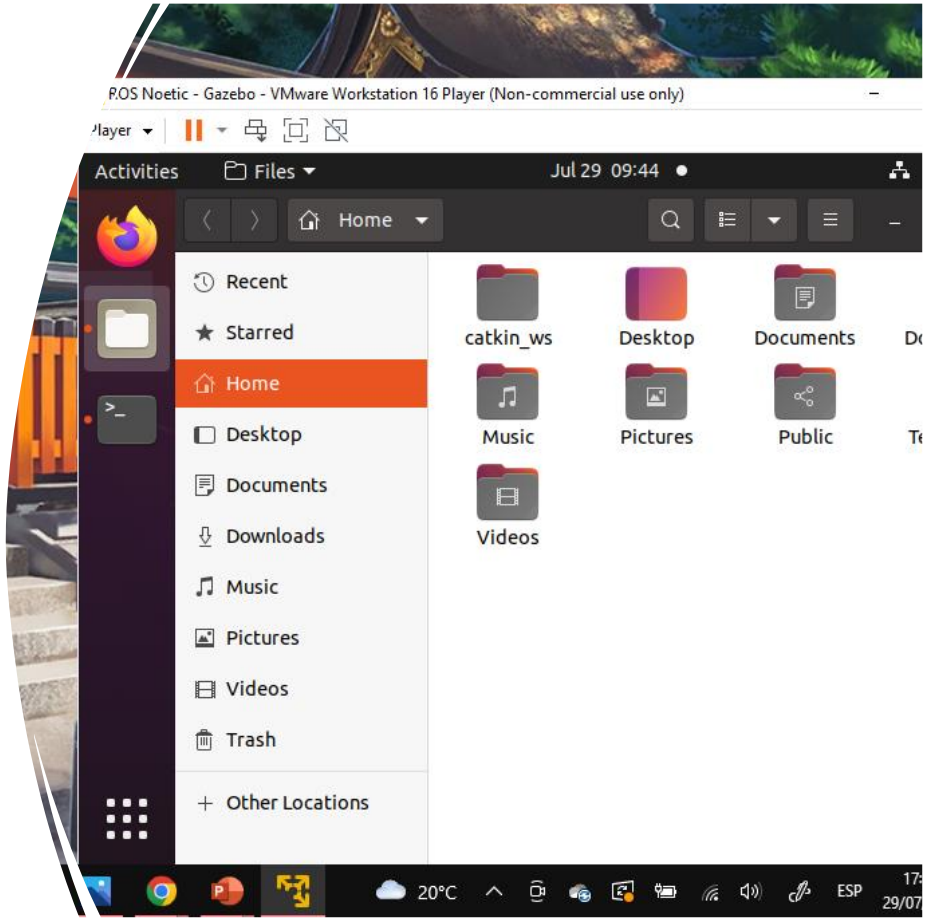
Installing Ubuntu (VM)

Virtual Machine vs. Standard Installation

A Virtual Machine (VM or guest OS) is an emulated Operated System done by software (Virtual Box and VMware most popular) installed in the main OS (host OS).

This could be helpful as a starting point (or a last resort), but it has some cons:

- The host OS and guest OS **share the same resources**, affecting both operations (especially for heavy simulations).
- VM requires drivers to **access the peripherical** (USB, Serial), which **could be not supported** or not fully working.
- The VM cannot have the same network as the host (main operative system), which would be a **problem for ROS projects that require multiple devices that communicate** with each other.



Installing Ubuntu Generic VM

Virtual Machine Installation

- Download the files:

  VMware software executable

- Install the VMware software.

- Open software to finish the installation.

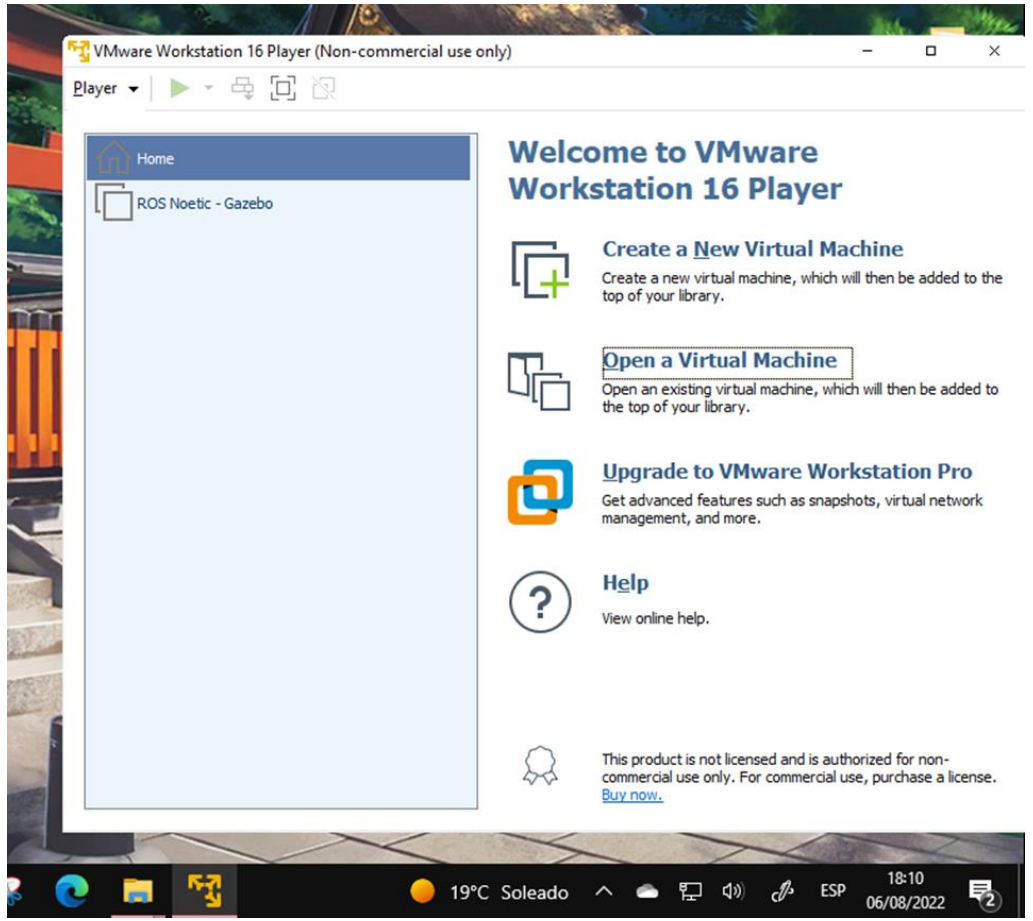
  NOTE: Select personal "non-commercial" use

- Click on "create a virtual machine".

- Select the OS iso file and installation folder, and the installation will start.

Note: The disk space and ram could be modified in this step. We recommend 20 GB and at least 4 GB (half the ram of the host)

- Once Ubuntu starts, you need to choose the user and password to continue the installation. After a restart, the VM should be working.



MCR2 Virtual Machine Installation

USER: Student
PASSWORD: admin

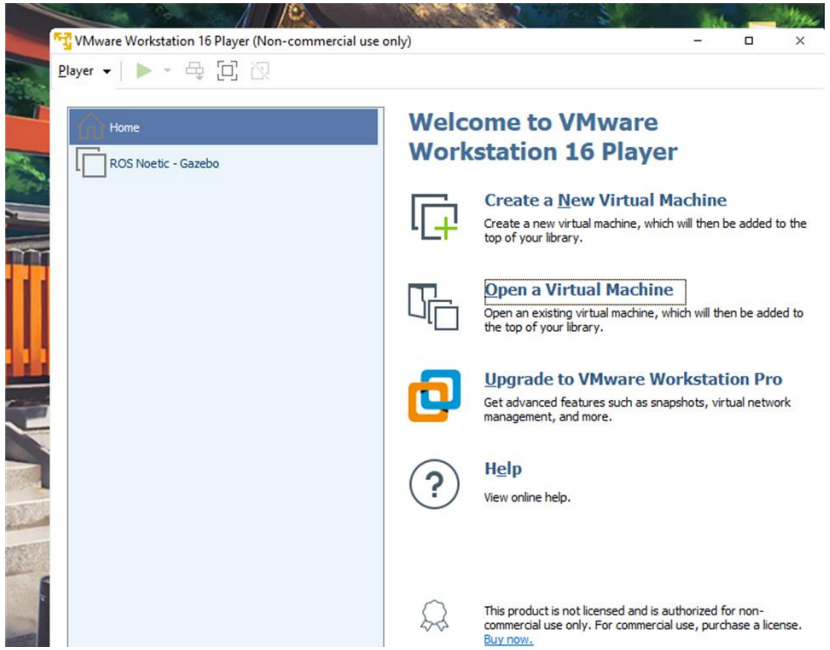
- Download and unzip the files:

  VMware software executable
  Preinstalled VM zip file
  (NOTE: This is a long file (~ 6GB).)

- Install the VMware software.
- Open the software, finish the setup, and license.

  NOTE: Select personal "non-commercial" use
- Click on "open virtual machine" and open the "Preinstalled VM" (you only must do this once). The virtual machine will start to be set up.

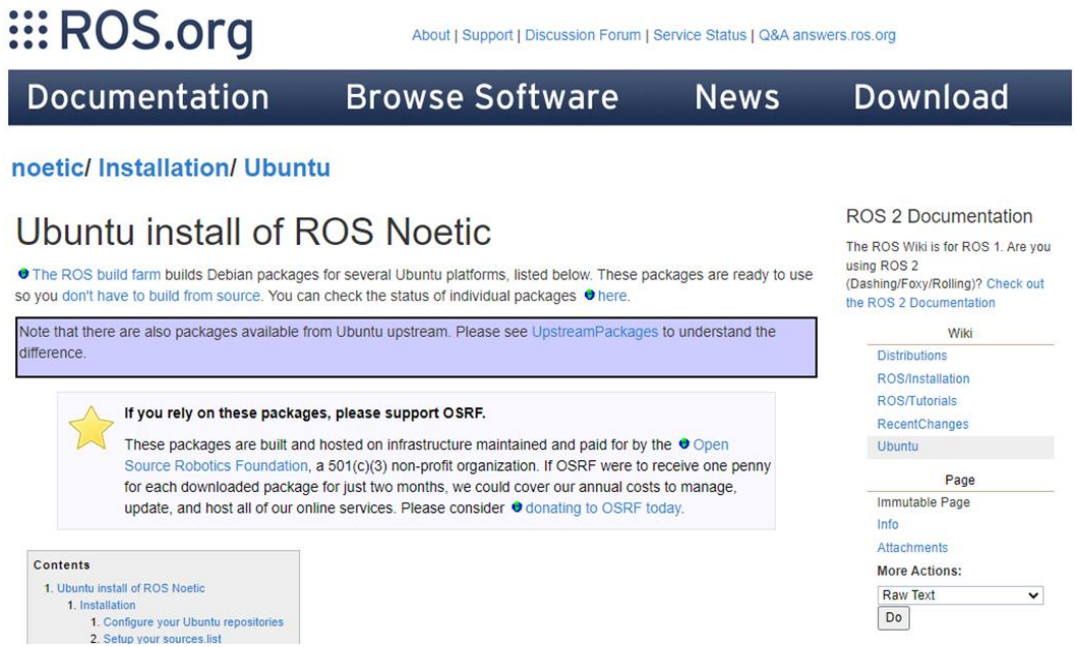
  NOTE: Choose the option "I copied it"
- The virtual machine should start up with Ubuntu and ROS installed!



Quick installation guide for ROS

ROS Installation

- Follow the tutorial on the official ROS website.
- The ROS installation is done using the terminal.
- In section 1.4, use the command for installing **Desktop-Full Install**.
- This will install Gazebo too.
- The following package is needed for this unit:




```
$ sudo apt-get install ros-noetic-ros-control ros-noetic-ros-controllers
```

ROS is installed

How do I know it is working correctly?

- If you finished the installation and everything went smoothly.
- Then, try the following command to start ROS:
    - `roscore`
- If the terminal displays a similar output to this image in the slide: Congratulations, you have Ubuntu and ROS running!