

PDE4430 Software Installation

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Aim

The purpose of this pre-lab is to introduce you to the installation of VMWare virtual machine and robot operating system (ROS) system in your personal computer for the future use of simulating your robot in a virtual environment.

Objectives

- Install and verify that the virtual machine and ROS are up and running
- Introduce you to the virtual system for simulating a mobile robot and its environment
- Become familiar with preparation of ROS architecture
- Get ready for our future study of robot system design in a virtual environment

Materials

- Windows 8 or above
- Laptop with dual-core processor or above
- At least 4GB memory
- Preferably GPU
- Hard drive with at least 30GB free space

Introduction

This is a step-by-step tutorial for installing the VMWare virtual machine and ROS software framework, which is free of charge, in your personal computer and for us to use for designing a simulated environment in which our robot can manipulate with its arms and autonomously move around. The ROS software provides designers with the ability to design a mobile robot with the modern robot control software framework and is closely linked with artificial intelligence methods and algorithms. ROS also provides designers the ability to program their robot, either real or virtual, to interact with its surroundings via a range of sensors and actuators.

From this link <http://wiki.ros.org/Distributions>, you can see the evolution of ROS as a software framework. In our module, we will use ROS Noetic in Ubuntu 20.04. Please follow the below instructions to install the VMWare Player, Ubuntu 20.04 and ROS Noetic. Although a newer version of ROS, namely ROS 2, can work in Windows, the much more popular ROS (sometimes named ROS 1 to make difference from ROS 2), only works on Linux. ROS Noetic is the latest distribution of ROS 1.

Learning Outcomes

- Complete downloading and installing VMWare Player, Ubuntu 20.04 and ROS Noetic.
- Verify the correctness of the installation.
- Be able to use the learned method to install this software in your new computer in the future.

Downloading and Installing Software

1. VMWare

- Go to VMWare's corporate website to download VMWare Workstation Player 16 virtual machine software for free.
https://my.vmware.com/en/web/vmware/free#desktop_end_user_computing/vmware_workstation_player/16_0
- Select For Windows 64 bits OS and click "Download Now"
- Double-click on the downloaded executable and follow the prompts to install VMWare Workstation Player.

2. Ubuntu

- Go to the official Ubuntu site: <https://releases.ubuntu.com/>
- Click on the "64-bit PC (AMD64) desktop image" to download the Ubuntu 20.04 image. This file size is about 2.0GB so please prepare your hard disk to save it.

3. Installing Ubuntu using VMWare

- First, double click on the VMWare Player icon, then follow the instructions to install it.
- After you've installed the VMWare Player, run it by double-clicking its desktop icon, and then in the menu, click "Create a New Virtual Machine".
- There are three options "Install from"; Select the middle option, namely "Installer disc image file (iso)"; click the browse button, find, and select the Ubuntu 20.04 operating system image (a file with extension .iso) you just downloaded, and then click Next.
- Fill in the login information such as your username and password and take a note of the information for your future login to the system, click Next.
- Give a name to your virtual machine and enter the hard disk directory where the virtual machine can be installed. Please make sure that the hard disk directory you choose has at least 30GB of free space, then click Next.
- In the "Specify Disk Capacity" menu, keep all the default settings and click Next directly.
- Now enter the confirmation page, after confirming that everything is fine, click Finish.
- Wait 15 minutes, your virtual machine will be installed and configured.

4. Installing ROS Noetic

- Double-click the desktop VMWare Workstation 16 Player icon, and when you open the virtual machine, you'll see the name of the virtual machine you just created appear in the left box, double-click on the virtual machine name, you can open the virtual machine.
- In the opened virtual machine, use the Ctrl+Alt+T shortcut key to open a Terminal shell and execute the commands needed to install ROS Noetic by following the instructions here: <http://wiki.ros.org/noetic/Installation/Ubuntu>