

ME 133 - VM SETUP

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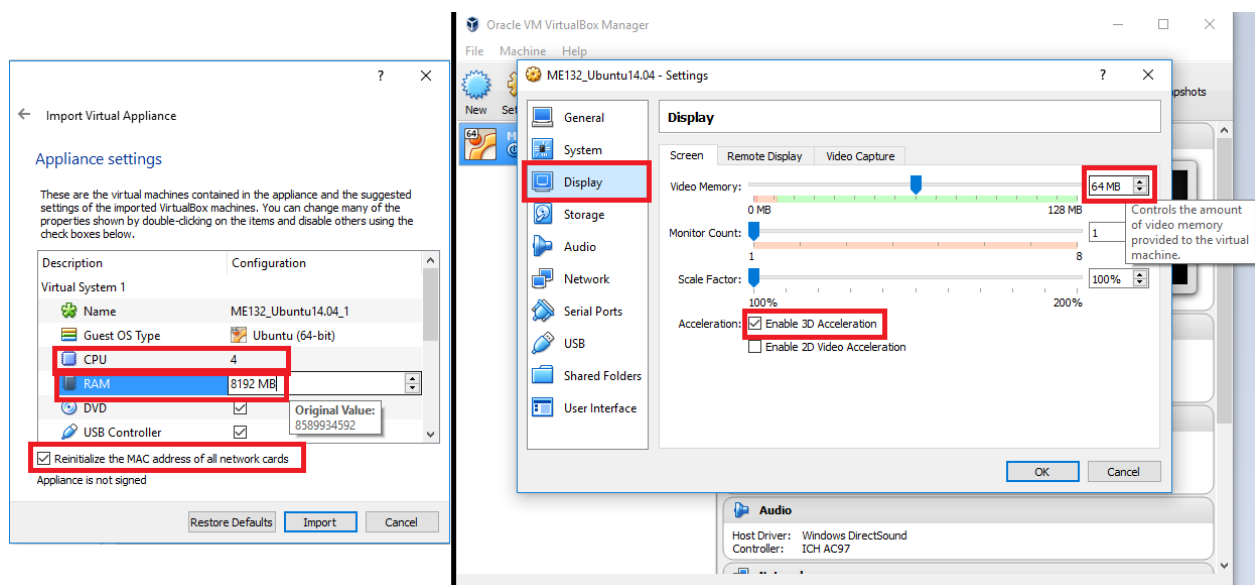
Due: Monday 10/30/2017

This guide describes how to open an Ubuntu virtual machine in the program VirtualBox, which will allow you to use the Robotic Operating System (ROS) to simulate and interface with a "TurtleBot" as well as the "Parrot Bebop 2" quadcopter. It also includes the Open Motion Planning Library (OMPL) GUI which we will use next quarter to test out a range of different motion planning algorithms.

VirtualBox Setup

VirtualBox is a free software package from Oracle that allows users to emulate a fully fledged computer inside another system running Windows, OS X, or Linux. We will be using it to run an Ubuntu 14.04 virtual machine that comes prepackaged with all of the programs and dependencies necessary to run OMPL and ROS with an interface to the Turtlebot and Parrot Bebop 2. You will likely need ≥ 4 GB but preferably ≥ 8 GB of RAM, and around 40GB of disk space to operate the virtual machine.

1. Download and install VirtualBox for whichever operating system you use (which is referred to as the 'host' OS) from this website: <https://www.virtualbox.org/wiki/Downloads>
2. Enable the Hardware Virtualization setting in your computer's BIOS settings (if it has one) by restarting and clicking F2/F12/del or whichever key you're prompted to during startup. The virtualization/VTx/VTd setting can usually be found under a menu named System Security or similar
3. Download the ME 133 virtual machine from the class website or from this link: http://robotics.caltech.edu/~jbowkett/ME133_VM.ova
4. Start VirtualBox and click *File -> Import Appliance*, then select the .ova file you downloaded in the previous step.



5. Change the CPU number to match the number of processors on your own system, and set RAM to half the amount you have on your system (e.g. for a PC with 8GB of RAM set the VM to 4096MB)
6. Check 'Reinitialize the MAC address...' and then click *Import*
7. Once importing is completed, select the ME133 VM and click *Settings*. Under *Display* set Video Memory to 64MB and check 'Enable 3D Acceleration'
8. Click okay to close the settings menu and then select *Start*. Once the virtual machine has booted you can log in using the password 'me133'
9. Next, we will open the turtlebot simulator to make sure your machine can handle running it inside the VM. First, open what is called the Linux 'terminal' by pushing the buttons *CTRL + ALT + T*. This is what we use to issue written commands to the computer.
10. Start the Turtlebot simulator by typing the following command then pressing enter:
(Don't type the \$ as this just shows the following text is a terminal command)
\$ roslaunch turtlebot_stage turtlebot_in_stage.launch
11. You should see a large window appear showing a Turtlebot in the middle of a set of rooms. If you want to drive the Turtlebot around (not required) you can open another terminal with *CTRL + ALT + T*, type the following command, and follow the instructions that appear to use the keyboard to operate the robot:
\$ roslaunch turtlebot_teleop keyboard_teleop.launch
HOMEWORK DELIVERABLE: Take a screenshot in your host operating system showing the virtual machine running with the turtlebot simulator open and submit it along with the rest of your homework.
12. To close any program you opened in a terminal (such as the simulator or keyboard controller), click back into that terminal and push *CTRL + C*. You can then explore the virtual machine further or shut it down using the menu with the cog icon on the top right of the screen.

Instructions to run natively on Ubuntu

If you wish to run the labs natively on your own Ubuntu computer you may do so, as you will likely get better performance in the simulator and other programs. However, the TAs will not be able to provide full support for installing and getting the various packages running, though are happy to answer any questions you might have. Note that ROS versions correspond to Ubuntu releases, for instance 'Indigo' only works with 14.04, and 'Kinetic' only works with 16.04. You will need to install the following packages for next week's ROS tutorial, submit a screenshot of the working simulator with the HW:

<http://wiki.ros.org/indigo/Installation/Ubuntu> for Ubuntu 14.04 or
<http://wiki.ros.org/kinetic/Installation/Ubuntu> for Ubuntu 16.04 and
http://wiki.ros.org/turtlebot_simulator