Install OpenRAVE

For this class we will be using OpenRAVE on Ubuntu 18.04 LTS. The official OpenRAVE documentation may say that it can be used on other systems but do not do so, **we require OpenRAVE running on Ubuntu 18.04 LTS**.

Dual boot Ubuntu 18.04 LTS

The first step to installing OpenRAVE is to install Ubuntu 18.04. The following instructions show how to install a second operating system (Ubuntu 18.04) on your Windows or Mac computer.

For those familiar with Virtual Machines, it is highly suggested that you dual boot your computer instead of using a virtual machine. Virtual machines run much much slower and have issues with hardware interfaces and simulation. OpenRAVE can but has a hard time working with virtual machines.

Warnings

1. ***This process could erase your computer's hard drive if you are not careful***
2. ***To be safe create a backup of your data***

Notes

1. Bootable USB is highly suggested
2. You will likely need to change the boot order of your computer to boot from USB/DVD before your hard drive this is different between most computers so you may need to look this up for your computer
3. If you know what you are doing you can manage how the system gets partitioned by selecting something else from the installation screen (before you do this remember you could accidentally erase your hard drive)

On Windows

1. Download
    a. Go to https://www.ubuntu.com/download/desktop
        i. You do not have to pay
2. Create Bootable media USB
    a. USB

i. Windows: https://tutorials.ubuntu.com/tutorial/tutorial-create-a-usb-stick-on-windows#0
ii. Install Ubuntu from bootable media

b. Follow this tutorial but first take look at the above warnings and notes
c. https://tutorials.ubuntu.com/tutorial/tutorial-install-ubuntu-desktop?_ga=2.210145232.452614588.1502481343-722303082.1482966000#0

3. Post installation
    a. Ubuntu should automatically change the boot order so that Ubuntu will boot automatically instead of your other OS
        i. If it does not then you'll need to go to your BIOS and change the boot order settings so that the Ubuntu comes before Windows

On Mac

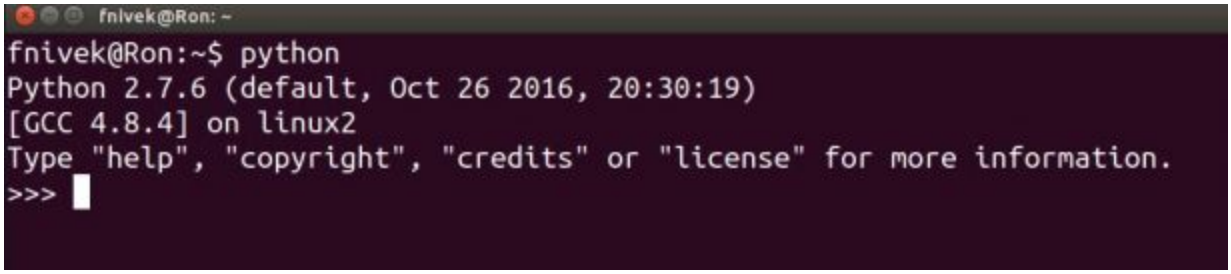
CAREFUL!!!: If you are using a new Macbook Pro, the version with touch bar and good audio, please use *Parallels Desktop* app in Mac App store and install Ubuntu 18.04 with it. Starting from the new Macbook Pro, dual boot on new MBP becomes super buggy and dangerous. Also, you might lose your warranty by doing it. The only way I know to run a Ubuntu on MBP reliably is *Parallels Desktop*. There are other options, but they are either too buggy or too expensive. Here is a link to Parallels Desktop:
https://www.parallels.com/landingpage/pd/general/?gclid=Cj0KCQjww8jcBRDZARIsAJGCSGtcJ2Xwi4NLH_cG4BsRu6to_XCq_LZI_RAMgC5h4aqfuXY_ZG8gTj4aAqg3EALw_wcB

For old MBP before 2016 (with white lighting apple on your laptop), Follow this video ***carefully***
https://www.youtube.com/watch?v=hnfwoR6XJvQ&vl=en

Installing Python

Great news: python is installed by default on Ubuntu 18.04. To make sure you have python installed you can open a terminal with ctrl+alt+t and type python. If you see something similar to the below picture you have a working python system. On the off chance python didn't get installed you can open a terminal with ctrl+alt+t and type the following:

sudo apt-get install python



Installing OpenRAVE

Fortunately, other researchers using OpenRAVE for their work were generous enough to release a set of scripts for installing the software from scratch along with all its dependencies. They made these scripts compatible with all Ubuntu versions, but we will all use Ubuntu 18.04 for consistency.

1. Navigate to https://github.com/crigroup/openrave-installation.
2. Ctrl+Alt+T to open a new terminal:
3. **git clone https://github.com/crigroup/openrave-installation.git**
    a. This line of code will clone the repository containing the installation scripts
4. Navigate to the cloned folder in your terminal (**cd openrave-installation)**
    a. Run these commands in the following order:
        i. **./install-dependencies.sh**
        ii. **./install-osg.sh**
        iii. **./install-fcl.sh**
        iv. **./install-openrave.sh**
    b. This will take a bit of time to run (~15 - 20minutes).

Test OpenRAVE

To make sure everything went well, we can run one of the tutorials. Open a terminal with Ctrl+Alt+T and type

openrave.py --example fastgrasping

You should see it searching for grasp poses until it finds one and the ask you to press any key to continue:

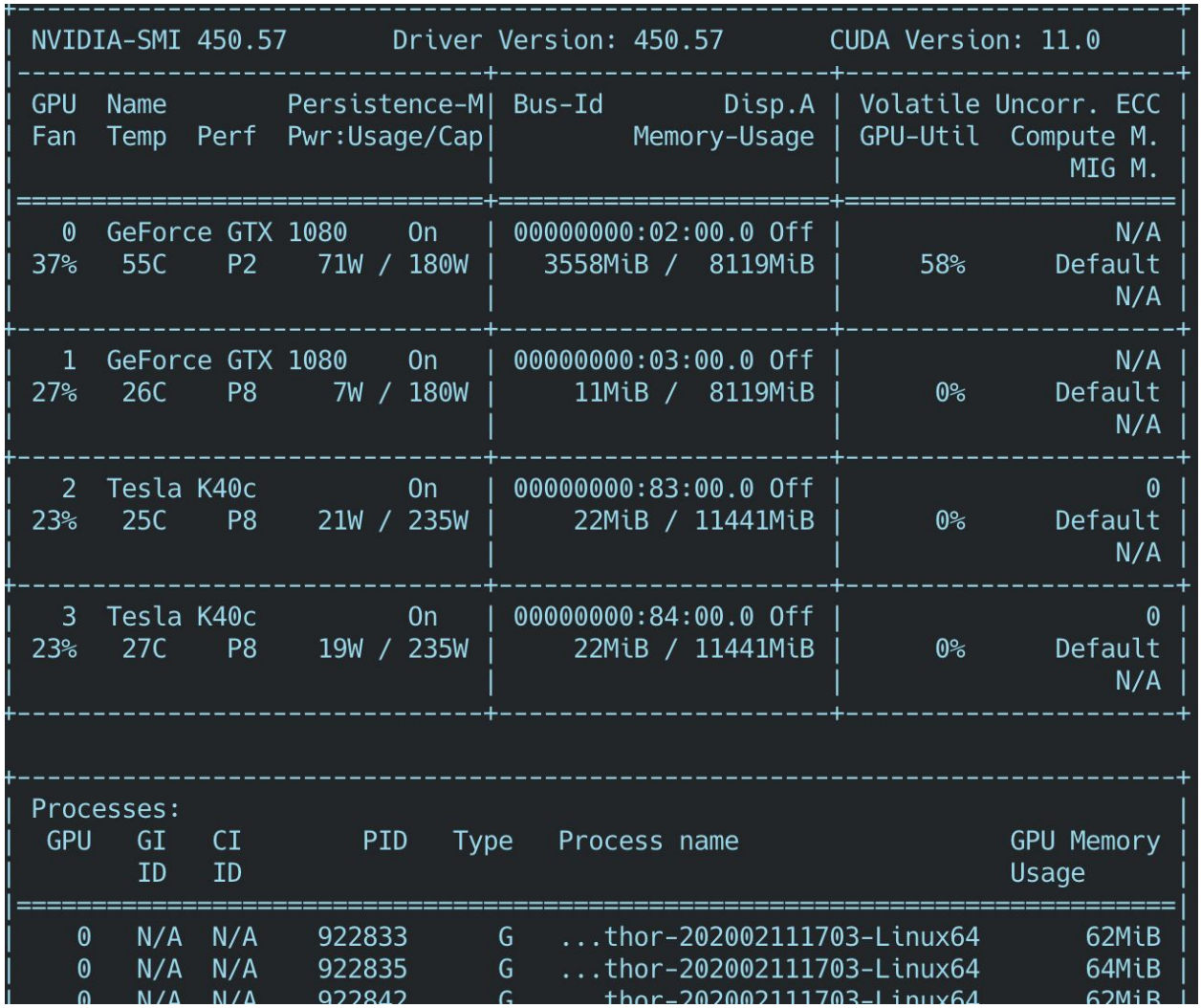
To try out more examples take a look at this website http://openrave.org/docs/0.8.2/examples/

Install Nvidia Graphics Drivers

If you don't have an nvidia graphics card then don't do this step. For those who do have an nvidia graphics card this step is optional but highly recommended because it will make your computer run much faster.

This website has the tutorial https://help.ubuntu.com/community/BinaryDriverHowto/Nvidia.

1. Open a terminal with Ctrl+Alt+T.
2. **sudo apt-get install nvidia-375**
3. Enter your password.
4. Restart your computer.
5. Check out your graphics card information by typing **nvidia-smi** into your terminal. You should see some formatted text that shows some information about your graphics card, CUDA version, and processes that are currently running on the gpu.

6. 

Anthony's Setup

This section explains some of the tools and software I use if you'd like some suggestions. I encourage you to explore other options and see what you like.

- I use git to backup, manage, organize and version-control my code: https://git-scm.com/book/en/v2/Getting-Started-Installing-Git. You can also register on Github to make your code public and share to others: https://github.com/.
- I use Sublime as my primary text editor/ide. You can use the free version.
    - https://www.sublimetext.com/
    - Sublime has tons of plugins you can use to customize how it functions
    - There are many other text editors available, each with slightly different design, interface, features, etc. Some examples include: PyCharm, Atom, and VSCode.

- (Absolutely optional) If you are comfortable with Python, I highly recommend to go through Google Coding style (even just a little). Good coding style goes a long way. It is good for you to review your code later and also for everyone else. Just go through the following link and learn some tricks to make your code safer and easier to read and understand: https://github.com/google/styleguide/blob/gh-pages/pyguide.md