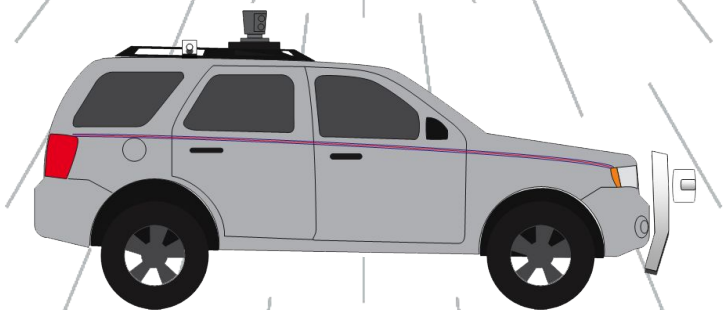
THE UNIVERSITY OF ARIZONA

# CAT VEHICLE REU 2019

## *Getting started:* Setting up development environment

Rahul Bhadani <rahulbhadani@email.ariona.edu>



# Before we proceed ...

- We will be working on Ubuntu 18.04 most of the time.
- Programming tools required: C++, MATLAB/Simulink, Python, C++
- All work must be committed to version control: we will use git.engr.arizona.edu
  - I highly recommend committing your work every hour or whenever you think you have achieved something
- We will use latex to write reports and any papers.
- Make sure your system has sufficient disk space [> 100 GB is recommended]

# Course page

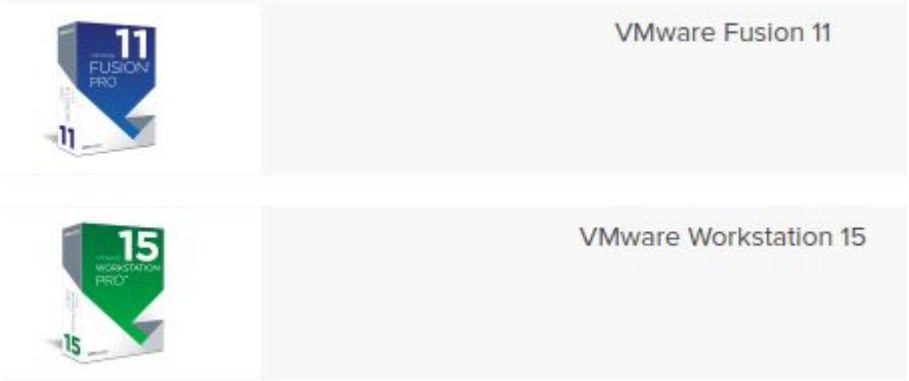
- Course Discussion: https://piazza.com/class/jwck37wbfos2ai
- When in doubt ask questions on Piazza. It is possible that someone already knows the answer.

# Installing Virtual Machine

# Install VMWARE Workstation

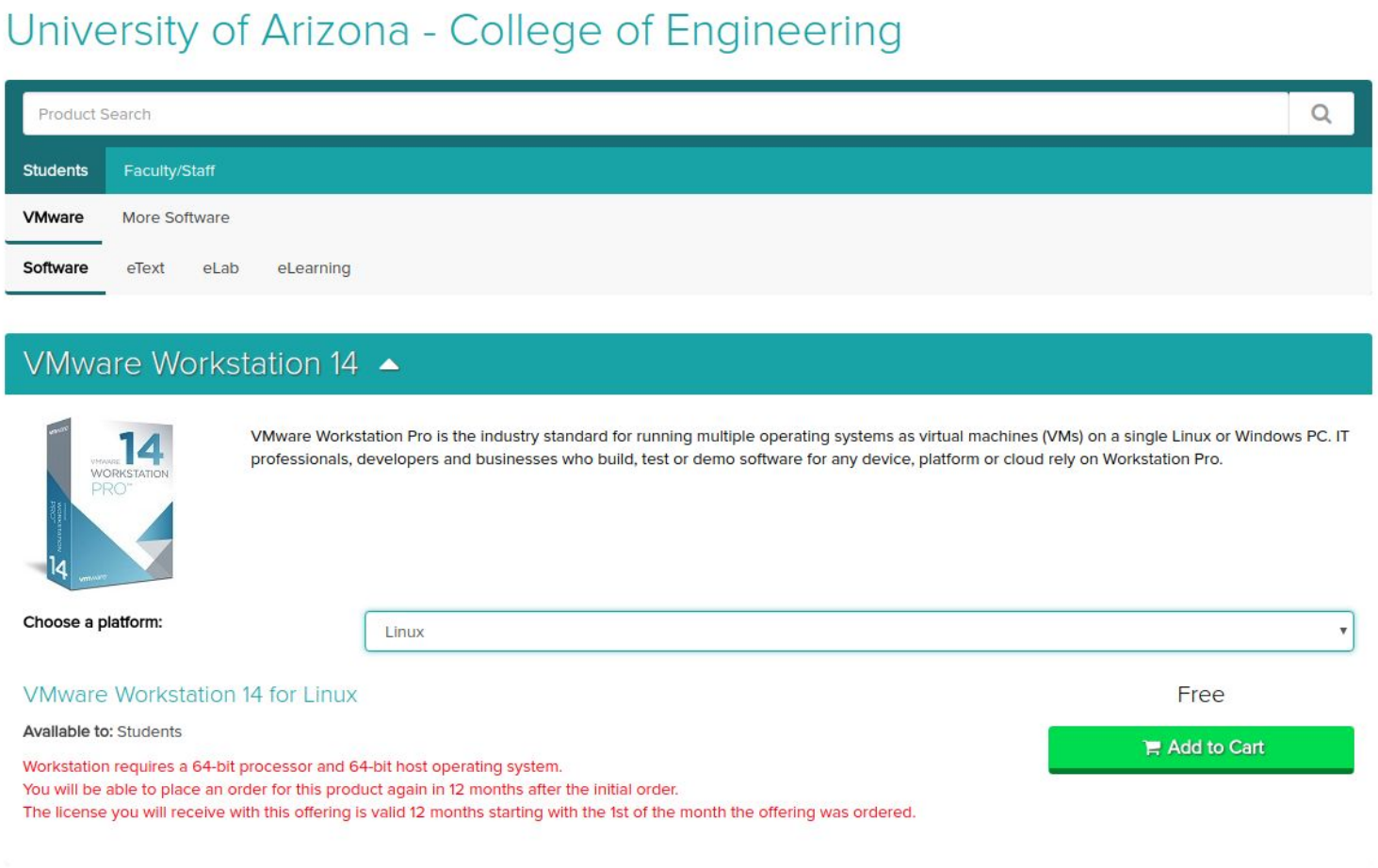

- Not required if you are already using a native Ubuntu 18.04 system
- Got to https://support.engr.arizona.edu/
- Click VMware and Others Web Store
- You will be asked to login using your NetId
- Select VMware Workstation Player 15 for Windows or any linux machine

# Install VMWARE Workstation

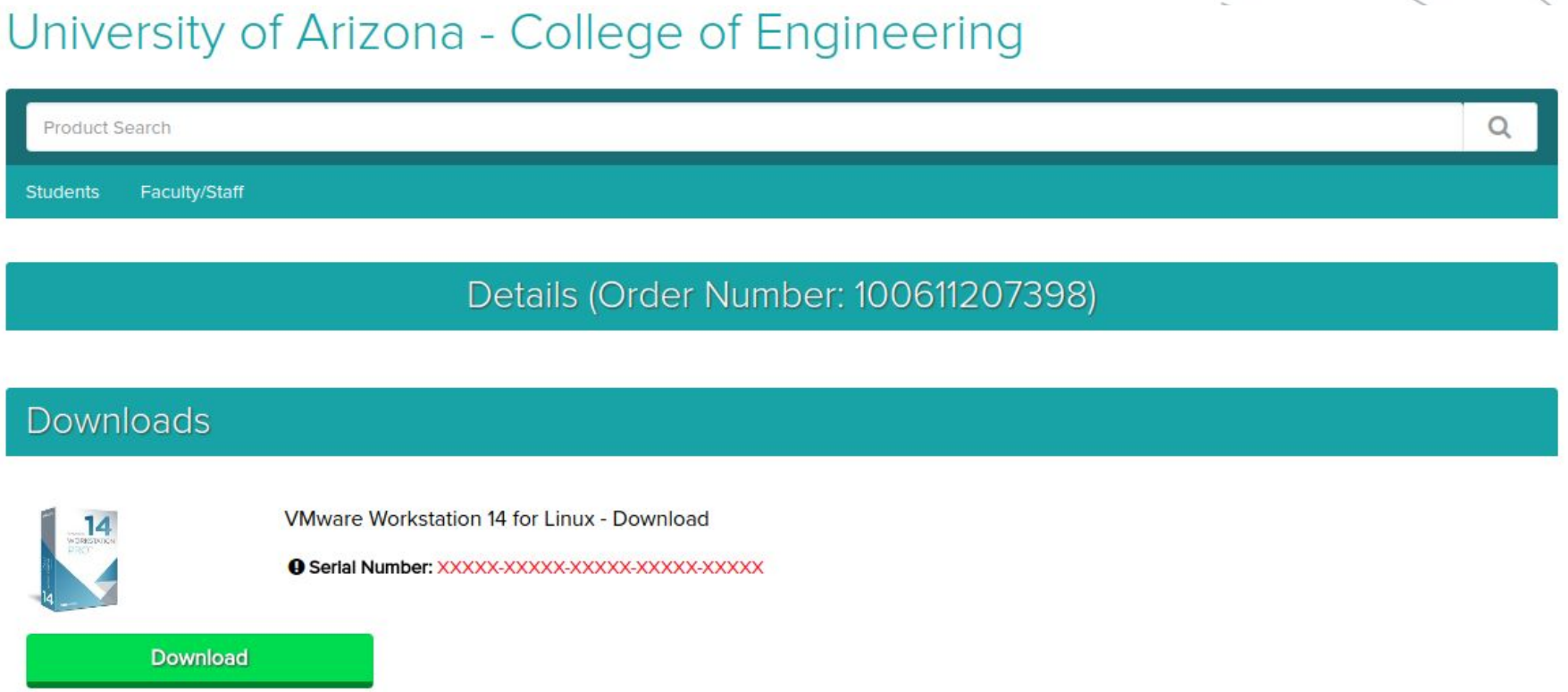



- Select VMware Workstation 15 for Windows or any linux machine
- Or VMware Fusion 11 for Mac
- Add to cart -> checkout
- Copy and save the serial number somewhere
- Download the software
- Enter serial key upon installation, if asked!

# Install VMWARE Workstation



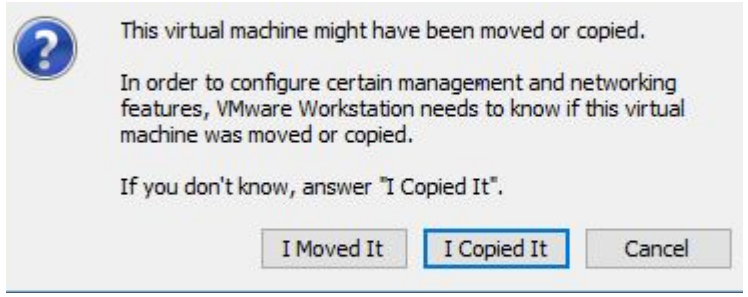
# Install VMWARE Workstation



# Obtaining pre-configured Ubuntu 18.04

# Download virtual disk

- Go to http://bit.ly/2l0cGtf and download the zip file.
- Unzip the zip file at any desired location.
- Start the Vmware workstation you installed in the previous step.
- From file-> open, select .vmx file from the folder you just unzipped.
- Click the green triangle button in the Workstation to boot the vm.
- You may see a dialogue like on shown below. Select 'I Copied it'.




- Ask for password in the class.

# Installing ROS in a new system

# Install ROS Melodic

- **These steps are not required if you are using Ubuntu 18.04 in a VM**
- Follow the steps mentioned in http://wiki.ros.org/melodic/Installation/Ubuntu%C2%A0 to install ros in your new system.
- For CAT Vehicle development, we will require more packages.
- Install these packages:

```
sudo apt-get install ros-melodic-controller-manager -y
sudo apt-get install ros-melodic-ros-control ros-melodic-ros-controllers -y
sudo apt-get install ros-melodic-gazebo-ros-control -y
sudo apt-get install ros-melodic-image-transport-* -y
sudo apt-get install ros-melodic-joystick-drivers -y
```

# Configuring ROS for your system

- When you are using ROS in a shared network, it is required that your ubuntu hostname is unique to avoid nameo-resolution conflict.
- Change the hostname from `catvehicle` to your favorite hostname in `/etc/hostname` folder. E.g. You can choose your UofA netId.

```
sudo gedit /etc/hostname
```

- We will also change the name of localhost to refer your computer.

```
sudo gedit /etc/hosts
```

and replace `catvehicle` with your netId.

# Configuring ROS for your system

- In `.bashrc` file set the hostname for ROS_HOSTNAME to the same name you used for system hostname.
  - `gedit ~/.bashrc`
  - E.g. If you have set machine's hostname to `firstnamelastname`, then in .bashrc file, set the `ROS_HOSTNAME` to `firstnamelastname`.
  - Search ROS_HOSTNAME in the file .bashrc and change `export ROS_HOSTNAME=reu.local` to

    ```
    export ROS_HOSTNAME=firstnamelastname.local
    ```

# Download MATLAB

- In order to download MATLAB, you need to sign up to MATLAB account with your official University of Arizona email id [aka CAT MAIL]. After signing in with your U of A email id, download MATLAB installer for MATLAB R2019a.

- Once you install matlab, you need to add an alias in .bashrc for easy access to MATLAB
  - `alias matlab="/usr/local/MATLAB/R2019a/bin/matlab"`

# Configuring ROS for your system

- To run roscore on the local machine, change

```
export ROS_MASTER_URI=http://catvehicle.local:11311/
```

to

```
export ROS_MASTER_URI=http://firstnamelastname.local:11311/
```

# Installing MATLAB

# Obtain and install WebGME

- `npm install -g webgme-cli`
- At this point, I ask you to close the terminal and reopen it.
- `webgme init WebGMEFirstProject`
- `cd WebGMEFirstProject`
- `webgme start`
- Once dependencies are resolved, open a web browser and type http://localhost:8888
- Detailed documentation at
  - https://webgme.readthedocs.io/en/latest/getting_started/creating_a_repository.html
  - https://github.com/webgme/webgme-cli
- More on WebGME later …

# Installing WebGME

# Obtain and install WebGME

- WebGME stands for Web Generic Modeling Environment [more on this later …]
- Install nodejs: your system may already have nodejs. But we want only a specific version of nodejs. Hence if you have nodejs already installed, uninstall it.

```
➢ sudo apt-get remove nodejs
```

- Install nvm:

```
➢ curl -o- https://raw.githubusercontent.com/nvm-sh/nvm/v0.34.0/install.sh | bash
➢ source ~/.bashrc
➢ nvm install v12.3.1
➢
```

[See next slide]

# Obtain and install WebGME

- Installing MongoDB: follow steps at https://docs.mongodb.com/manual/tutorial/install-mongodb-on-ubuntu/

  to install mongodb on your Ubuntu machine. It is also possible that you already have MongoDB installed.

- `echo "deb [ arch=amd64 ] https://repo.mongodb.org/apt/ubuntu bionic/mongodb-org/4.0 multiverse" | sudo tee /etc/apt/sources.list.d/mongodb-org-4.0.list`
- `sudo apt-get update`
- `sudo apt-get install -y mongodb-org`
- `sudo service mongod start`