CAT VEHICLE REU 2019

Getting started: Setting up development environment

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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 GFB is recommended]

Course page

❖ Course page: https://rahulbhadani.github.io/teaching.html

❖ Course Discussion: https://piazza.com/class/jwck37wbfo52ai

❖ When in doubt ask questions on Piazza. It is possible that someone already knows the answer.

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Installing Virtual Machine

Install VMWARE Workstation

THE UNIVERSITY OF ARIZONA

College of Engineering
IT Support

IT Support Home Page

This is the main IT support site for the College of Engineering at the University of Arizona, Tucson. From this page, you can create or manage tickets that you have submitted. Access resources that are available to Engineering students, staff, and faculty.

There are also external links to Azure Development Tools for Teaching, formerly known as MSDN-AA licensing, and to E On The Hub website with VMWare and other applications. The are links to see what software we have available in the labs. Plus the ever popular FAQ's
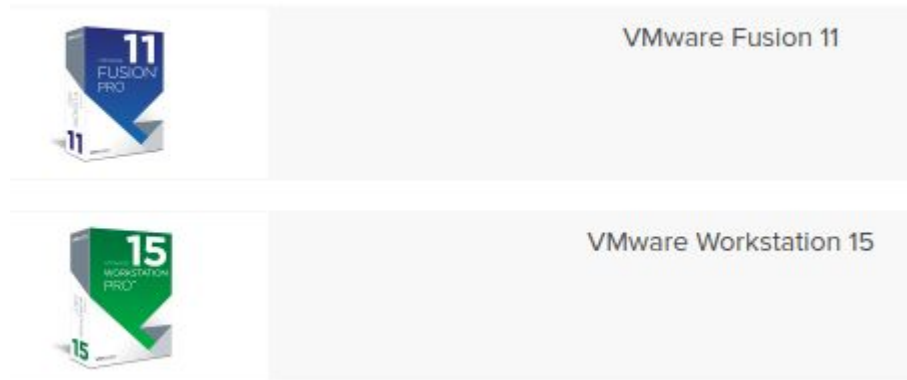
Support Tickets

My Support Tickets
New Ticket
FAQs

Software

VMware and Others Web Store
Azure Development Tools For Teaching(formerly know as MSDN-Licensing)
Lab Software
UofA Software Licensing

- ❖ Not required if you are already using a native Ubuntu 18.04 system

- ❖ Go 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

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Install VMWARE Workstation

VMware Fusion 11

VMware Workstation 15

❖ 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!

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Install VMWARE Workstation

Install VMWARE Workstation

University of Arizona - College of Engineering

| Product Search | 🔍 |

Students   Faculty/Staff

Details (Order Number: 100611207398)

Downloads

VMware Workstation 14 for Linux - Download

ⓘ Serial Number: XXXXX-XXXXX-XXXXX-XXXXX-XXXXX

Download

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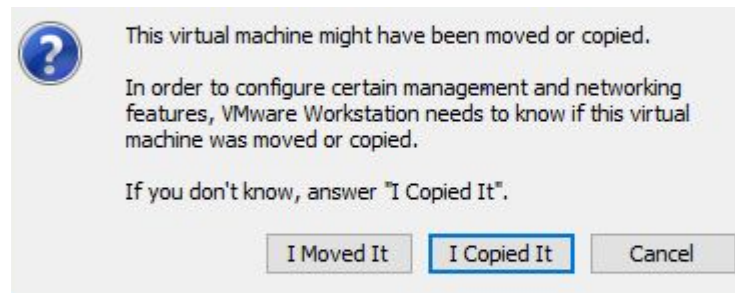# VMWARE – Alternative options

❖ If your U of A license is still not active, you can use free version of VMware player:
https://my.vmware.com/en/web/vmware/free#desktop_end_user_computing/vmware_workstation_player/15_0

Obtaining pre-configured Ubuntu 18.04

Download virtual disk

❖ Go to http://bit.ly/2JOcGtf 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 box like one shown below. Select 'I Copied it'.

This virtual machine might have been moved or copied.

In order to configure certain management and networking features, VMware Workstation needs to know if this virtual machine was moved or copied.

If you don't know, answer "I Copied It".

[I Moved It]   [I Copied It]   [Cancel]

❖ Ask for password in the class.

Installing ROS in a new system

Install ROS Melodic

❖ **<u>These steps are not required if you are using Ubuntu 18.04 in a VM</u>**

❖ 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 name-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`

Installing MATLAB

Download MATLAB

❖ In order to download MATLAB, you need to sign up to a 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"`

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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/`

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Installing WebGME

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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 ...

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

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