NS3 Simulator Installation

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For the installation of NS3, VMware workstation is required to be installed, along with an Ubuntu system.

- 1. Download VMWare workstation from the website: <u>https://my.vmware.com/en/web/vmware/downloads/info/slug/desktop_end_user_compu_ting/vmware_workstation_player/15_0</u>
- Download Ubuntu 20.04.01 Desktop AMD 64 from the website: <u>https://ubuntu.com/download/desktop</u>
- 3. Install VMWare workstation onto the computer system and open it
- 4. Set up the VMware workstation:
 - a. Create a new virtual machine by selecting "Create New Virtual Machine."

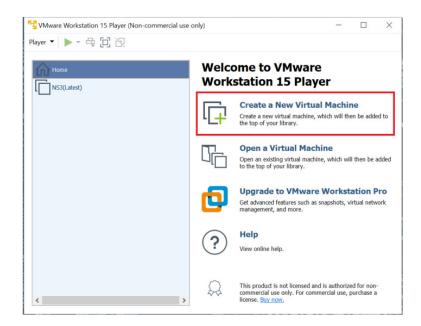


Figure 1: Creation of a new VM.

b. In the installer wizard, select installer disc image file(iso) and select the downloaded Ubuntu 20.04.01 AMD 64 iso file by browsing through the computer download files.

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Home		Welcome to VMware Workstation 15 Player Image: Create a New Virtual Machine Create a New Virtual Machine Create a new virtual machine, which will then be added to the top of your library.		e	system. How will you install the guest operating system? Install from: Installer disc: No drives available () Installer disc image file (iso):				
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Figure 2: Installation with a disc image file(iso).

- c. Name the machine and set the password.
- d. Configure the Hardware:
 - i. For memory: set the value to 4600 MB or above.
 - ii. For faster VMware, set processors to 2.
- 5. Power on the virtual machine and let the machine update.
- 6. Within the Virtual machine, download NS3 on the VM by opening Mozilla firefox and downloading from the NS3 website.
- 7. Install prereq packages on Ubuntu using terminal:
 - a. Open the terminal by right clicking the desktop and select "open in terminal."
 - b. Paste in this code and then press enter:

sudo apt-get install g++ python3 python3-dev pkg-config sqlite3 python3setuptools git qt5-default mercurial girl.2-goocanvas-2.0 python-gi python-gi-cairo python3-gi python3-gi-cairo python3-pygraphviz girl.2gtk-3.0 ipython3 openmpi-bin openmpi-common openmpi-doc libopenmpi-dev autoconf cvs bzr unrar gdb valgrind uncrustify doxygen graphviz imagemagick texlive texlive-extra-utils texlive-latex-extra texlivefont-utils dvipng latexmk python3-sphinx dia gsl-bin libgsl-dev libgsl23 libgslcblas0 tcpdump sqlite sqlite3 libsqlite3-dev libxml2 libxml2-dev cmake libc6-dev libc6-dev-i386 libclang-6.0-dev llvm-6.0-dev automake python3-pip libgtk-3-dev synaptic vtun lxc uml-utilities

c. After the packages have finished downloading, paste in this code and press enter: sudo pip3 install cxxfilt

8. After installing the required packages, create a folder named workspace in the home directory and then put the NS3 tar package into the workspace. See example figure below.

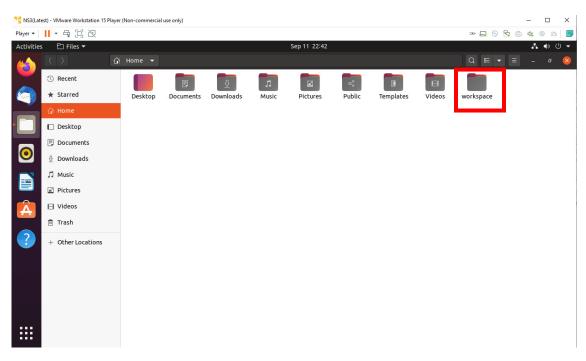


Figure 3: workspace folder created in home directory

9. Go to terminal and input these commands consecutively after each command finishes executing:

 cd

cd workspace

tar xjf <name of NS3 downloaded file name>

cd $\langle name \mbox{ of extracted NS3} \rangle$

./build.py --enable-examples --enable-tests

10. Test the NS3 build and installation success by running test.py in the ns directory using the following commands:

```
cd ns-<version number>
./test.py
```

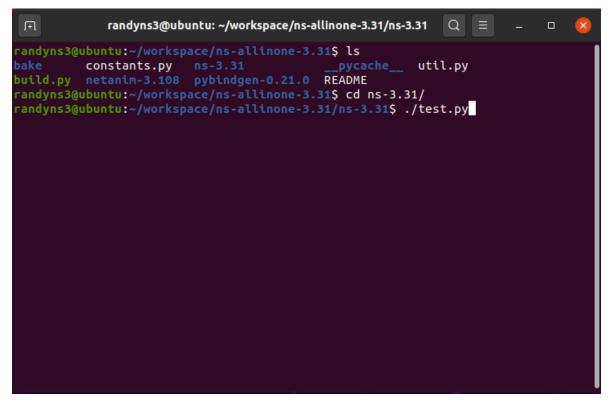


Figure 4: Testing the build and installation.

11. If all of the tests were passed, Congratulations! NS3 has now been installed successfully.

Building NetAnim and Running a Simulation

- 1. To build NetAnim, the qmake package will be utilized in the following process:
 - a. Go to the NetAnim directory pasting these commands in the terminal:
 - cd
 - cd workspace
 - cd <ns folder name>
 - cd <netanim folder name>
 - b. Clean make files using the command:

make clean

c. Make NetAnim using the commands:

qmake NetAnim.pro

make

- d. Test the NetAnim installation by pasting the following command in the terminal, while within the netanim directory:./NetAnim
- 2. If NetAnim opens, congratulations! NetAnim is now installed.
- 3. Building and Running simulation procedures:
 - a. Copy a .cc file to the scratch directory, located in the ns-<version#> directory.
 - b. Edit the copied .cc file to include the netanim library files by pasting
 in the following code to the code:
 #include "ns3/netanim-module.h"
 - c. Instantiate the animation interface into the code.
 - d. Exit the scratch directory by using the following command in the terminal:

cd ../

e. Paste in the following commands to the terminal: ./waf -run scratch/<name of cc file>

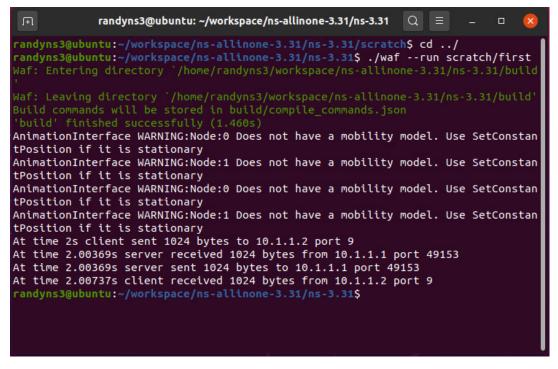


Figure 5:Building the cc file.

f. Run NetAnim by entering the netanim directory in the terminal and use the code:

./NetAnim

- g. Select the created xml file and run resulting simulation by following these procedures:
 - i. Click on the folder icon in the top left side, shown in Figure 6.

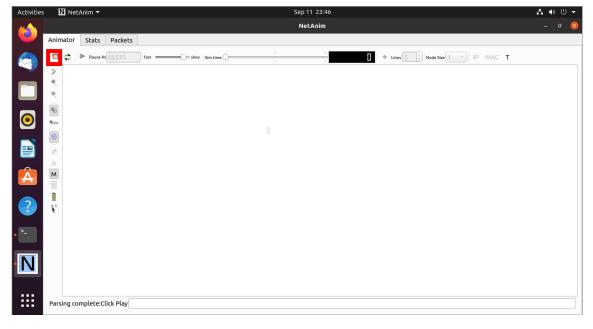


Figure 6: Selecting to open an XML file.

ii. Go into the ns-<version#> folder and select the xml file you built. Example shown in Figure 7.

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Figure 7: Selecting xml file.

iii. Run simulation by pressing the play icon. Example shown in Figure 8.

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Parsing complete:Click Play			

Figure 8: Pressing Play button.