



REPORT

Installation of Ubuntu, ns3 and **compiling** first script for Network Animator (nam)

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Subject: ISPN and ComNets

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Vmware .exe and Ubuntu .iso downloading and installation

Download fresh .exe copy of vmware workstation (likely to be VMWare WS 11) from https://my.vmware.com/web/vmware/info/slug/desktop_end_user_computing/vmware_workstation/11_0

Install it on your machine in the regular manner

Now, download Ubuntu 14.04 LTE or newer version from Ubuntu official site for Free from <http://www.ubuntu.com/download/desktop>

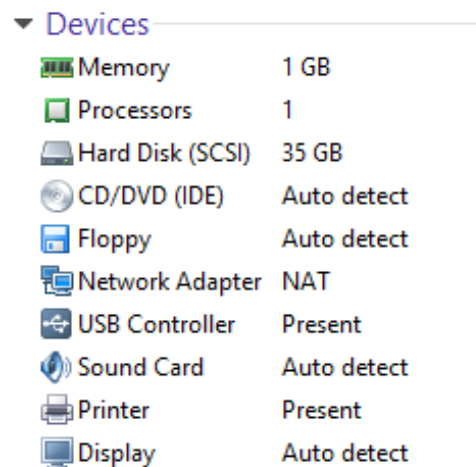
Creating new machine for running Ubuntu and Installation of Ubuntu

Open vmware workstation and go to File>New

In the next window, select Ubuntu 14.04 - 32bit operating system and use the default specifications for the machine except changing the SCSI hard drive size to >15GB as shown in Fig. 1

Locate the downloaded .iso of Ubuntu 32bit and proceed with making machine.

This above step will take few seconds. You need to power up your new machine so that in installation begins



▼ Devices	
Memory	1 GB
Processors	1
Hard Disk (SCSI)	35 GB
CD/DVD (IDE)	Auto detect
Floppy	Auto detect
Network Adapter	NAT
USB Controller	Present
Sound Card	Auto detect
Printer	Present
Display	Auto detect

Fig. 1: Machine Specifications

Setting Ubuntu dimension for efficient use

After you are finished with the installation process, you will see a login screen. Logging into the Administrator account will lead you to your newly installed Ubuntu desktop as shown in Fig.2.

Now you need to set resolution of Ubuntu desktop by right click on the screen and making it equal to your parent machine dimensions.

The go to vmware preferences in the edit menu and mark the resolution of guest for having full screen Ubuntu environment on your vmware.

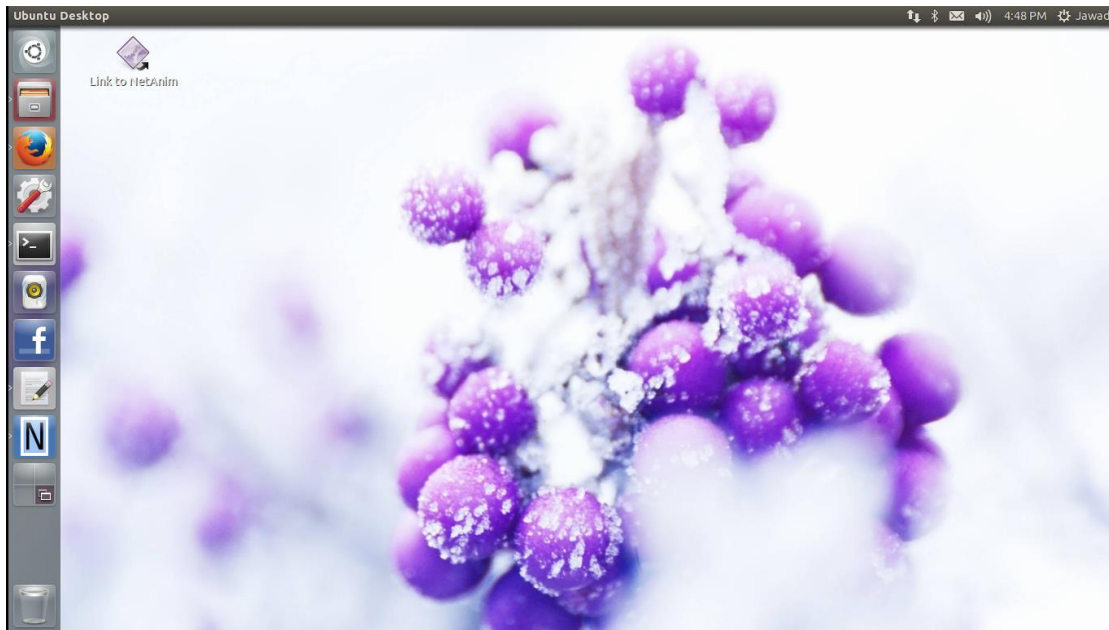


Fig. 2: The Ubuntu Desktop

Installation of prerequisites for ns3 simulator

There are several techniques followed now a days for installation of ns3 and indeed several versions of ns3.

We will install ns-3-dev as we are going to run developmental tasks on it

Follow the instruction manual given on <https://www.nsnam.org/wiki/Installation>

The core of ns-3 requires a gcc/g++ installation of 3.4 or greater, and Python 2.4 or greater

All Ubuntu download and install commands are prefixed by `sudo apt-get install <package name>` followed by your Admin password

Install the following packages one by one using the above syntax in terminal that can be found by searching it in the computer programs by clicking on the Ubuntu icon in the upper left corner of the Ubuntu desktop screen.

1. gcc g++ python
2. Mercurial
3. Python-dev
4. Qt4-dev-tools
5. Bzr
6. Cmake libc6-dev libc6-dev-i386 g++-multilib
7. 7z
8. Sqlite3 sqlite
9. Valgrid gdb
10. Flex bison tcpdump

(other packages are listed in (<https://www.nsnam.org/wiki/Installation>))

Note: Copy/Paste works in terminal. Change the copy/paste short cuts from keyboard shortcuts settings in the Ubuntu as you are familiar with Ctrl+C and Ctrl+V version of these shortcuts. By default its Ctrl+Alt+C/V

Solving prerequisite issues using bake

Bake is one of the convenient way to install all packages and also installing ns3 into the machine

Universal technique: if you get in trouble with downloading any package that you need on Ubuntu and you are not aware of its presence on the Ubuntu github. You should use the following universal search technique using terminal

```
apt-cache search <package name>
```

This will give u a list of available packages ready to download. For example you want to download vlc player and you don't know its store name

Type: apt-cache search vlc, and it will give you something like shown in Fig. 3.

All you need to do is type sudo apt-get install vlc-nox and press enter plus password

```
videolan-doc - documentation for the VideoLAN streaming solution
vlc - multimedia player and streamer
vlc-data - Common data for VLC
vlc-dbg - debugging symbols for vlc
vlc-nox - multimedia player and streamer (without X support)
```

Fig. 3: Package installation and finding

Using bake

Download mercurial using the technique given in the previous slide if u haven't downloaded it till now. Go to home directory and then to resource in the terminal view using the below command

```
Cd
```

```
Cd resource
```

Note: just type: cd res<tab_key>

Now, type hg clone http://code.nsnam.org/bake bake

Your resources now have Bake copied

- ▶ As you are now in resource directory, cd bake will lead you to bake directory.
- ▶ Here type ./bake.py check and you will see the list of dependencies that are currently required by ns3 for its installation as shown in Fig. 4
- ▶ An ok to a module means that module is not required. You can download the missing module by typing its name prefixed by apt-cache search in the terminal. Then install it using sudo apt-get install <package_name>
- ▶ Remember that you have to append the path of this folder if you want to check dependencies outside this folder in the terminal using procedure given on

<https://www.nsnam.org/docs/bake/tutorial/html/bake-tutorial.html>

```

jawad@ubuntu: ~/bake
configuration/reconfiguration. Default: bakefile.xml.
--debug          Prints out all the error messages and problems.
--noColor       Print messages with no color
-V              Prints the version of Bake
jawad@ubuntu:~/bake$ ./bake.py check
> Python - OK
> GNU C++ compiler - OK
> Mercurial - OK
> CVS - OK
> GIT - OK
> Bazaar - OK
> Tar tool - OK
> Unzip tool - OK
> Unrar tool - OK
> 7z data compression utility - OK
> XZ data compression utility - OK
> Make - OK
> cMake - OK
> patch tool - OK
> autoreconf tool - OK

> Path searched for tools: /usr/local/sbin /usr/local/bin /usr/sbin /usr/bin /s
bin /bin /usr/games /usr/local/games bin
jawad@ubuntu:~/bake$

```

Fig. 4: The bake Check

- ▶ Add module that you want to download using bake by typing `bake.py configure -e ns-3.17` or `bake.py configure ns-3-dev`
- ▶ The deploy the module by typing `bake.py deploy`
- ▶ If commands does not work with just there names start `bake.py` with a dot and a forward slash like `./bake.py deploy`
- ▶ The deploy is the convenience two commands `bake.py download` and `bake.py build` as these two are combined in one
- ▶ Hurrah! You have configured ns3 in your resource folder

Compiling first script using ns3

Configuration of ns3 with waf tool for script compilation

- ▶ Waf is by default copied into your ns-3-dev folder so you don't need to get it again from ns3 site.
- ▶ Waf acknowledges g++ for its use for source coding
- ▶ Type these two strings one by one in your terminal after you cd into ns-3-dev folder `CXXFLAGS="03" ./waf configure` and then `CXXX=g++3.4 ./waf configure`
- ▶ Type `./waf -d optimized configure; ./waf` while your are in ns-3-dev folder
- ▶ You have successfully built 2200 .cc files and you can find them all in your build folder from desktop file explorer as well.
- ▶ The test scripts are present in `~/resource/ns-3-dev/examples/tutorial/`
- ▶ Copy `first.cc` in to the `~/resource/ns-3-dev/scratch/` and rename it to `myfirst.cc` or whatever you prefer
- ▶ Run the following command in terminal while you cd in ns-3-dev `./waf --run scratch/myfirst ("—" is a double minus and file name is without .cc) or just ./waf --run myfirst`

- ▶ Hurrah! Your script is ready and waiting for you in build directory

Installation of network animator (NetAnim)

This package is already available inside allinone package

Converting example script to NetAnim ready .xml animation

- ▶ Before you run ./waf command. Open the myfirst.cc in text editor and add this line before simulation.run();

```
AnimationInterface anim ("animation.xml");
```

```
anim SetConstantPosition (nodes.Get(0), 1.0, 2.0); //or any other coordinate
```

```
anim SetConstantPosition (nodes.Get(1), 2.0, 3.0);
```

- ▶ This will generate a .xml file ready to be used in network animator and the file will be in the place where you are now in the terminal

Running .xml animation via NetAnim

- ▶ Cd into ~/resource/netanim/

Type:

1- make clean

2- qmake NetAnim.pro

3- make

-4 ./NetAnim (case sensitive)

(First 3 are one time only commands)

- ▶ Open animation.xml as shown in Fig. 5 and run it.

It is a good practice that you copy the shortcut of animator and place it on desktop

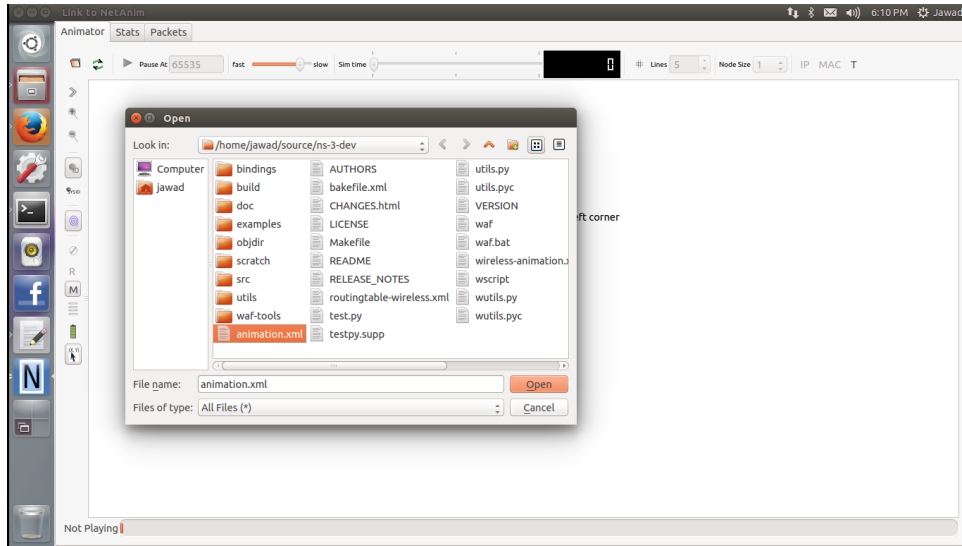


Fig. 5: Opening Animation

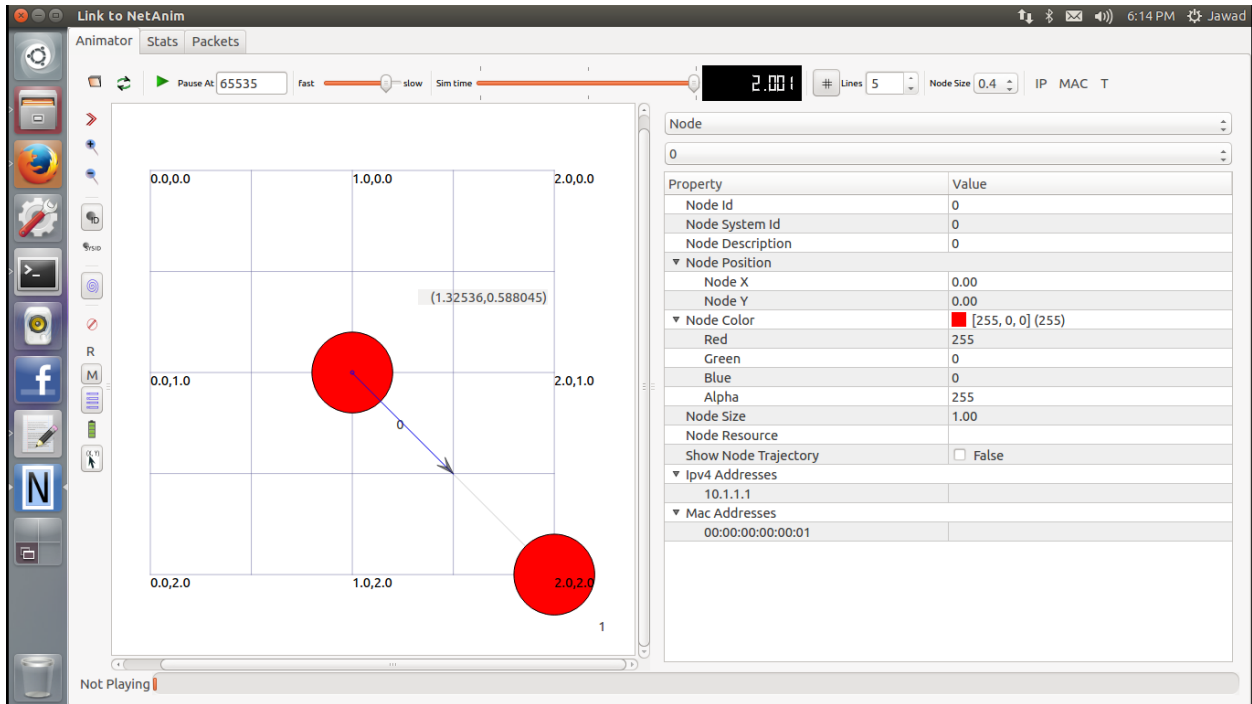


Fig. 6: Animation