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Installing Network Simulator 2 (NS2) on Ubuntu 14.04

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1 Introduction

Network simulators are tools used to simulate discrete events in a network and which helps to predict the behaviours of a computer network. Generally the simulated networks have entities like links, switches, hubs, applications, etc. Once the simulation model is complete, it is executed to analyse the performance. Administrators can then customize the simulator to suit their needs. Network simulators typically come with support for the most popular protocols and networks in use today, such as WLAN, UDP, TCP, IP, WAN, etc.



Most simulators that are available today are based on a GUI application like the NCTUNS while some others incl. NS2 are CLI based. Simulating the network involves configuring the state elements like links, switches, hubs, terminals, etc. and also the events like packet drop rate, delivery status and so on. The most important output of the simulations are the trace files. Trace files log every packet, every event that occurred in the simulation and are used for analysis. Network simulators can also provide other tools to facilitate visual analysis of trends and potential trouble spots. Most of the simulation is performed in discrete time intervals where events that are

in the queue are processed one after the other in an order.

Since simulation is a complex task, we cannot guarantee that all the simulators can provide exact

or accurate results for all the different type of information. Examples of network simulators are: ns, NCTUNS, NetSim, etc.

ns2 is a name for series of discrete event network simulators like ns-1, ns-2 and ns-3. All of them are discrete-event network simulators, primarily used in research and teaching. ns2 is free software, publicly available under the GNU GPLv2 license for research, development, and use.

This post deals with the installation of "ns2" also called the "network simulator 2" in Ubuntu 14.04.

2 Download and Extract ns2

Download the all in one package for ns2 from [here](#)

The package downloaded will be named "ns-allinone-2.35.tar.gz". Copy it to the home folder. Then in a terminal use the following two commands to extract the contents of the package.:

```
cd ~/
tar -xvzf ns-allinone-2.35.tar.gz
```

All the files will be extracted into a folder called "ns-allinone-2.35".

3 Building the dependencies

Ns2 requires a few packages to be pre installed. It also requires the GCC- version 4.3 to work correctly. So install all of them by using the following command:

```
sudo apt-get install build-essential autoconf automake libxmu-dev
```

One of the dependencies mentioned is the compiler GCC-4.3, which is no longer available, and thus we have to install GCC-4.4 version. The version 4.4 is the oldest we can get. To do that, use the following command:

```
sudo apt-get install gcc-4.4
```

The image below shows the output of executing both the above commands. If you have all the dependencies pre-installed, as I did, the output will look like the image below:

```

akshay@akshay-UBPC: ~
akshay@akshay-UBPC:~$ sudo apt-get install build-essential autoconf automake libxmu-dev
[sudo] password for akshay:
Reading package lists... Done
Building dependency tree
Reading state information... Done
autoconf is already the newest version.
automake is already the newest version.
build-essential is already the newest version.
libxmu-dev is already the newest version.
0 upgraded, 0 newly installed, 0 to remove and 39 not upgraded.
akshay@akshay-UBPC:~$ sudo apt-get install gcc-4.4
Reading package lists... Done
Building dependency tree
Reading state information... Done
gcc-4.4 is already the newest version.
0 upgraded, 0 newly installed, 0 to remove and 39 not upgraded.
akshay@akshay-UBPC:~$

```

Once the installation is over, we have to make a change in the "ls.h" file. Use the following steps to make the changes:

Navigate to the folder "linkstate", use the following command. Here it is assumed that the ns folder extracted is in the home folder of your system.

```
cd ~/ns-allinone-2.35/ns-2.35/linkstate
```

Now open the file named "ls.h" and scroll to the 137th line. In that change the word "**error**" to "**this->error**". The image below shows the line 137 (highlighted in the image below) after making the changes to the ls.h file. To open the file use the following command:

```
gedit ls.h
```

```

root@akshay-UBPC: /home/akshay/ns-allinone-2.35/ns-2.35/linkstate
root@akshay-UBPC:/home/akshay/ns-allinone-2.35/ns-2.35/ cd ns-2.35/
root@akshay-UBPC:/home/akshay/ns-allinone-2.35/ns-2.35# ls
adc          bitmap      COPYRIGHTS  gaf          Makefile    plm          satellite   validate
allinone     CHANGES.html  dccp       gen          Makefile.in puma         scp         validate.out
aodv         classifier  delaybox   HOWTO-CONTRIBUTE  makefile.vc pushback     sensor-nets VERSION
aomdv        common      diffserv   imcp         mcast       qs           src_rtg     webcache
apps         conf        diffusion  indep-utils  mdart       queue        tcp         wpan
asim         config.guess  diffusion3  install-sh   mobile      rap          trace
autoconf.h   config.h     doc        lib          INSTALL.WIN32  mpls        README     test-all
autoconf.h.in  config.log  dsdv       LICENSES     nix         realaudio   tmix
autoconf-win32.h  config.status  dsr        link         ns.l        release.steps.txt  TODO.html
BASE-VERSION   config.sub   empweb     linkstate    ns_tclsh.cc routealgo    tools
baytcp        configure    emulate    linkstate    packmime    routing      tora
bin           configure.in  FILES      mac          pgm         rtproto
root@akshay-UBPC:/home/akshay/ns-allinone-2.35/ns-2.35# cd linkstate/
root@akshay-UBPC:/home/akshay/ns-allinone-2.35/ns-2.35/linkstate# gedit ls.h

```

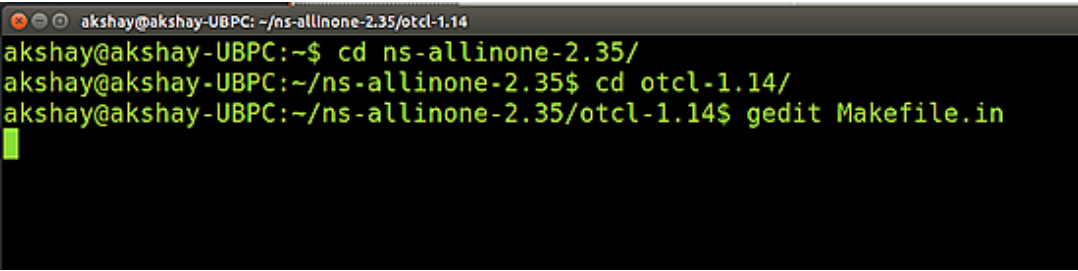
Save that file and close it.

```
// this next typedef of iterator seems extraneous but is required by gcc-2.96
typedef typename map<Key, T, less<Key> >::iterator iterator;
typedef pair<iterator, bool> pair_iterator_bool;
iterator insert(const Key & key, const T & item) {
    typename baseMap::value_type v(key, item);
    pair_iterator_bool ib = baseMap::insert(v);
    return ib.second ? ib.first : baseMap::end();
}

void eraseAll() { this->erase(baseMap::begin(), baseMap::end()); }
T* findPtr(Key key) {
    iterator it = baseMap::find(key);
    return (it == baseMap::end()) ? (T *)NULL : &(*it).second;
}
```

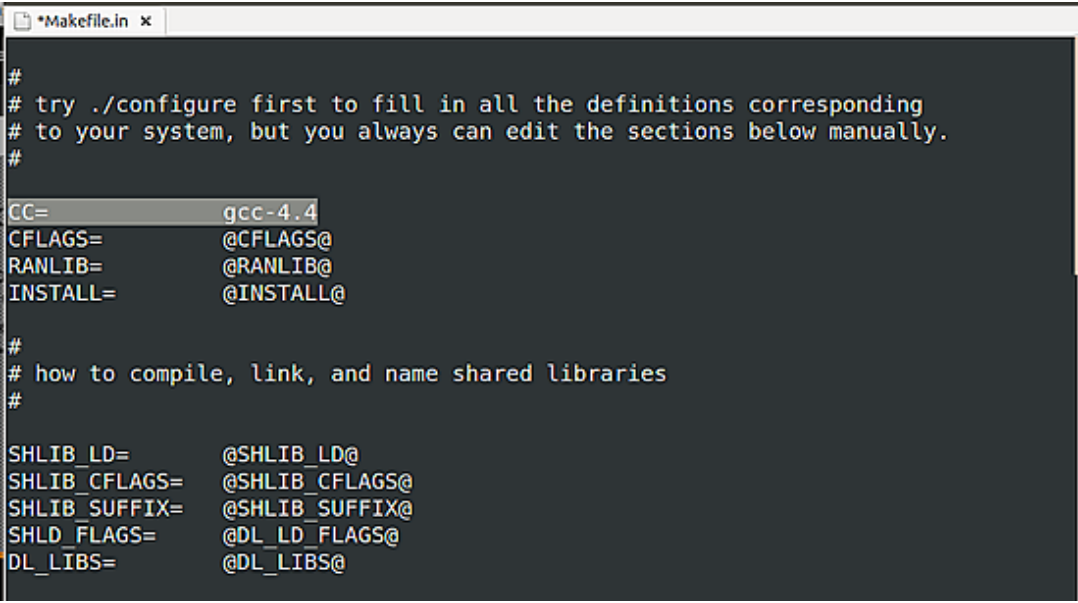
Now there is one more step that has to be done. We have to tell the ns which version of GCC will be used. To do so, go to your ns folder and type the following command:

```
Sudo gedit ns-allinone-2.34/otcl-1.13/Makefile.in
```



```
akshay@akshay-UBPC: ~/ns-allinone-2.35/otcl-1.14
akshay@akshay-UBPC:~$ cd ns-allinone-2.35/
akshay@akshay-UBPC:~/ns-allinone-2.35$ cd otcl-1.14/
akshay@akshay-UBPC:~/ns-allinone-2.35/otcl-1.14$ gedit Makefile.in
```


In the file, change Change CC= @CC@ to CC=gcc-4.4, as shown in the image below.



```
*Makefile.in x
#
# try ./configure first to fill in all the definitions corresponding
# to your system, but you always can edit the sections below manually.
#
CC= gcc-4.4
CFLAGS= @CFLAGS@
RANLIB= @RANLIB@
INSTALL= @INSTALL@
#
# how to compile, link, and name shared libraries
#
SHLIB_LD= @SHLIB_LD@
SHLIB_CFLAGS= @SHLIB_CFLAGS@
SHLIB_SUFFIX= @SHLIB_SUFFIX@
SHLD_FLAGS= @DL_LD_FLAGS@
DL_LIBS= @DL_LIBS@
```


4 Installation

Now we are ready to install ns2. To do so we first require root privileges and then we can run the install script. Use the following two commands:



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```
sudo su cd ~/ns-allinone-2.35/./install
```

The following is a snap of these commands:

```
root@akshay-UBPC: /home/akshay/ns-allinone-2.35
akshay@akshay-UBPC:~$ cd ns-allinone-2.35/
akshay@akshay-UBPC:~/ns-allinone-2.35$ ls
cweb          install       ns-2.35      sgb          tk8.5.10
dei80211mr-1.1.4  INSTALL.WIN32  otcl-1.14    tcl8.5.10    xgraph-12.2
gt-itm         nam-1.15      README      tclcl-1.20   zlib-1.2.3
akshay@akshay-UBPC:~/ns-allinone-2.35$ sudo su
[sudo] password for akshay:
root@akshay-UBPC:/home/akshay/ns-allinone-2.35# ./install
```

The image below shows how it looks upon successful execution

```
Please put /home/akshay/ns-allinone-2.35/bin:/home/akshay/ns-allinone-2.35/tcl8.5.10/unix:/home/akshay/ns-allinone-2.35/tk8.5.10/unix
into your PATH environment; so that you'll be able to run itm/tclsh/wish/xgraph.

IMPORTANT NOTICES:

(1) You MUST put /home/akshay/ns-allinone-2.35/otcl-1.14, /home/akshay/ns-allinone-2.35/lib,
into your LD_LIBRARY_PATH environment variable.
If it complains about X libraries, add path to your X libraries
into LD_LIBRARY_PATH.
If you are using csh, you can set it like:
    setenv LD_LIBRARY_PATH <paths>
If you are using sh, you can set it like:
    export LD_LIBRARY_PATH=<paths>

(2) You MUST put /home/akshay/ns-allinone-2.35/tcl8.5.10/library into your TCL_LIBRARY environmental
variable. Otherwise ns/nam will complain during startup.

After these steps, you can now run the ns validation suite with
cd ns-2.35; ./validate

For trouble shooting, please first read ns problems page
http://www.isi.edu/nsnam/ns/ns-problems.html. Also search the ns mailing list archive
for related posts.

root@akshay-UBPC:/home/akshay/ns-allinone-2.35#
```

It took almost 6 minutes to build and install ns2 on my system. But before we run it, we need to add the build path to the environment path.

5 Setting the Environment Path

The final step is to tell the system, where the files for ns2 are installed or present. To do that, we have to set the environment path using the ".bashrc" file. In that file, we need to add a few lines at the bottom. The things to be added are given below. But for the path indicated below, many of those lines have **"/home/akshay/ns-allinone-2.35/...."**, but that is where I have my extracted folder. Make sure you replace them with your path. For example, if you have installed it in a folder **"/home/abc"**, then replace **"/home/akshay/ns-allinone-2.35/otcl-1.14"** with **"/home/abc/ns-allinone-2.35/otcl-1.14"**.

Do this for all the required lines.

```
sudo gedit ~/.bashrc
```

Lines to be added:

```
# LD_LIBRARY_PATH
OTCL_LIB=/home/akshay/ns-allinone-2.35/otcl-1.14
NS2_LIB=/home/akshay/ns-allinone-2.35/lib
X11_LIB=/usr/X11R6/lib
USR_LOCAL_LIB=/usr/local/lib
export LD_LIBRARY_PATH=$LD_LIBRARY_PATH:$OTCL_LIB:$NS2_LIB:$X11_LIB:$USR_LOCAL_LIB
# TCL_LIBRARY
TCL_LIB=/home/akshay/ns-allinone-2.35/tcl8.5.10/library
USR_LIB=/usr/lib
export TCL_LIBRARY=$TCL_LIB:$USR_LIB
# PATH
XGRAPH=/home/akshay/ns-allinone-2.35/bin:/home/akshay/ns-allinone-2.35/tcl8.5.10/unix:/home/akshay/ns-allinone-2.35/tk8.5.10/unix
#the above two lines beginning from xgraph and ending with unix should come on the same line
NS=/home/akshay/ns-allinone-2.35/ns-2.35/
NAM=/home/akshay/ns-allinone-2.35/nam-1.15/
PATH=$PATH:$XGRAPH:$NS:$NAM
```

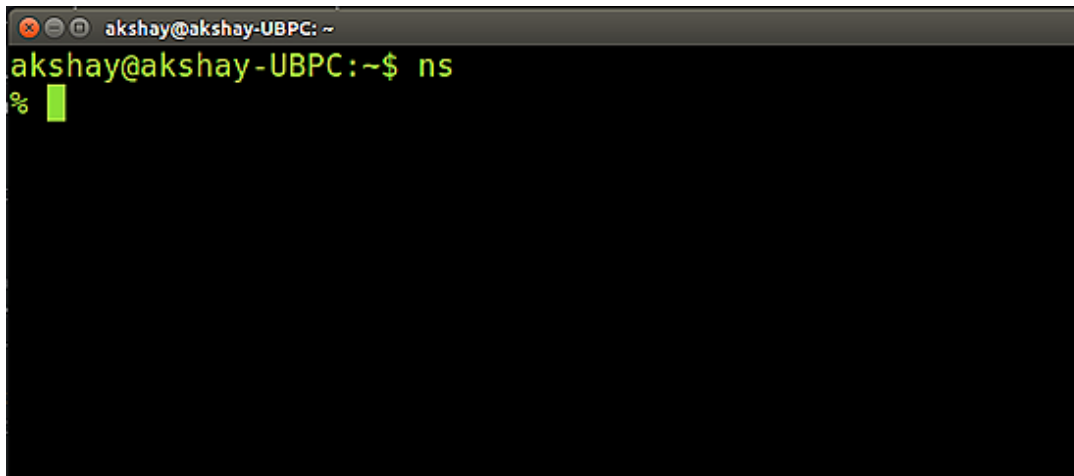
Once the changes have been made, save the file and restart the system.

6 Running ns2

Once the system has restarted, open a terminal and start ns2 by using the following command:

```
ns
```

If the installation is correct then the terminal looks like the image below :



```
akshay@akshay-UBPC: ~  
akshay@akshay-UBPC:~$ ns  
% █
```

7 Links

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Comments

From: Jaspreet Kaur

Reply

I m currently working on SAODV in manet. Can you please mail me the source code of SAODV in ns2. In which hash chain and digital signature is being embedded into AODV.

From: aaram

Reply

thank you so much. that was really helpful.

From: Mauricio

Reply

Excelent instructions. It works for me on Xubuntu.

From: mukesh verma

Reply

thanks a lot.....

From: Pardeep Peddy

Reply

Perfect guide.... installed straight away.

Thanks

From: Dave Mc

Reply

Works perfectly on Ubuntu 15.04,,Excellent instructions!

From: punitha

Reply

I could not save the file after making changes in the ls.h file. It is displaying a message as Could not save the file "/home/user/ns-allinone-2.35/ns-2.35/linkstate/ls.h". You do not have the permissions necessary to save the file. Please check that you typed the location correctly and try again. Can someone help me ?

From: Ravi Kumar

Reply

Perfect guided of ns2 installation.

From: Akshay

Reply

My ./install is not working as given above. The image you provided doesnt match with mine.

Output for mine is

.
. .
.

```
.Makefile:1601: warning: overriding commands for target `/home/akshay/Desktop/Networking'  
Makefile:1514: warning: ignoring old commands for target `/home/akshay/Desktop/Networking'  
Makefile:1603: warning: overriding commands for target `/home/akshay/Desktop/Networking'  
Makefile:1601: warning: ignoring old commands for target `/home/akshay/Desktop/Networking'  
Makefile:1605: warning: overriding commands for target `/home/akshay/Desktop/Networking'  
Makefile:1603: warning: ignoring old commands for target `/home/akshay/Desktop/Networking'
```


make: Circular /home/akshay/Desktop/Networking
make: Circular softs/ns-allinone-2.35/tcl8.5.10/unix/../macosx/configure
make: *** No rule to make target `softs/ns-allinone-2.35/tcl8.5.10/unix/../macosx/configure.ac',
needed by `softs/ns-allinone-2.35/tcl8.5.10/unix/../macosx/configure'. Stop.
tcl8.5.10 make failed! Exiting ...
For problems with Tcl/Tk see <http://www.scriptics.com>

From: pratibha

Reply

easy instructions.....thanks a lot.....

From: Pavan

Reply

Hey, I could install ns2 properly according to your steps! They even matched with snapshots associated with every command of yours. But when I restarted my system and tried giving 'ns' command, it says
"The program 'ns' is currently not installed. You can install it by typing:sudo apt-get install ns2"
I'll be very thankful if I get a response to my problem. :)

From: lichuhuang

Reply

Thank you!

From: Prasad

Reply

how to run NS2 on ubuntu

From: Ashish Malani

Reply

Thanks a lot !!
Very well explained

From: chandrabhan pradhan

Reply

Did not work in Ubuntu 15.04

From: ayoub sarvetani

Reply

thank you.

From: elmira

Reply

im working in vanet topic. in step 3 i have error and idont know how to fix it.please help me.
error schema: Reading package lists... Done
Building dependency tree
Reading state information... Done
Package autoconf is not available, but is referred to by another package.
This may mean that the package is missing, has been obsoleted, or
is only available from another source

E: Unable to locate package build-essential
E: Package 'autoconf' has no installation candidate
E: Unable to locate package automake
E: Unable to locate package libxmu-dev


From: lucas

Reply

thx a lot. It was of great help!

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Tutorial Info

Author: Akshay Pai
Tags: linux, ubuntu, networking

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