

INSTALLATION OF NS2 APPLICATION IN WINDOWS OS

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Abstract: In the network research area, it is very costly to deploy whole network without the simulation process because if we deploy with actual products then it may be costly and consume more time. If we use simulation tools then we can apply many protocols and algorithm to validate and verify network. Network simulators are also predominantly useful in allowing the network designers to test new networking protocols or to change the existing protocols or create its own protocols in a controlled and reproducible approach. In this paper, there is presentation of a comprehensive survey on current network simulators. It considers main features, their advantages and disadvantages. This paper be a good reference source for those who feel difficult to find the appropriate network simulators for their research or practical requirements. This paper also help we want to work on simulator on windows OS.

Keywords: NS2, cygwin, simulator, NS2 in Windows

I. INTRODUCTION

Simulation is a very significant new technology to save time and money. It can be applied to different science, engineering, education or other application fields for different purposes. Computer assisted simulation can model imaginary and real-life objects. Different variables and objects can be used to predict the behavior of the system. Computer simulation can be used to assist the modeling and analysis in many natural systems. Typical application areas include physics, chemistry, biology, and human-involved systems in economics, finance or even social science. Other significant areas are in the engineering such as civil engineering, structural engineering, mechanical engineering, and computer engineering. Application of simulation technology into networking area such as network traffic simulation, however, is comparatively new. The network simulation means that the computer assisted simulation of networking algorithms or systems by using software engineering. The application field is smaller than general simulation and it is natural that more definite requirements will be placed on network simulations. For example, the network simulations may put more prominence on the performance and validity of a distributed protocol or algorithm rather than the real-time visibility features of the simulations. Moreover, since network technologies is developing very fast that is why the network simulations always require open platforms which should be scalable enough to include different efforts and different packages in the simulations of the whole network. Internet has also a characteristic that it is structured with a uniformed network stack (TCP/IP) that all the different layers technologies can be implemented differently but with a uniformed interface. Network simulators are used by people from different areas such as academic researchers, industrial developers, and Quality Assurance (QA) to design, simulate, verify, and analyze the performance of different networks protocols. They can also be used to evaluate the effect of the different parameters on the protocols and generate new protocol. With network simulator help, one can design different network topologies using various types of nodes such as end-hosts, hubs, network bridges, routers, optical link-layer devices, and mobile units. here there is comparison of some network simulators and also explanation of how t install NS2 in Windows OS because the Windows OS system is dominant in market but NS2 works only in UNIX based OS. So this paper is useful for those who want to use NS2 as simulator but in Windows OS.

II. OTHER NETWORK SIMULATOR

Some of the network simulators are commercial which means it is not free. They do not provide the source code of its software or the affiliated packages to the general users for free. All the users have to pay to get the license to use their software. One typical example is the OPNET. Commercial simulator has its advantage and disadvantage. The benefit is that it generally has complete and advanced documentations. However, the open source network simulator is disadvantageous in this aspect, and generally there are not enough specialized people working on the documentation. This problem can be serious when the different versions come with many new things but NS2 simulator is the best choice in open source because it provides all the functionality which is provided by commercial products. The only disadvantage is that it does not provide good GUI.

	Network simulators name
Commercial	OPNET, QualNet
Open source	sourceNS2, NS3, OMNeT++, SSFNet, J-Sim

TABLE 1: - NETWORK SIMULATOR

III. REASON WHY REQUIRE TO INSTALL NS2 IN WINDOWS OS

Currently there are many network simulators that have different features. A some of the current network simulators include OPNET, NS-2, NS-3, OMNeT++, REAL, SSFNet, J-Sim, and QualNet. However, in this paper, we do not propose to cover all the available network simulators. Some analysis and compare from the others slightly to get a better vision of the main features of a certain network simulator.

The OPNET is commercial software and is a little different from others and we will introduce in the first place. NS2 are the most popular one in academia because of its open-source and plenty of components library. A lot of non-benefit organizations contribute a lot in the components library and it has been proved that the development mode of NS2 is very successful.

OMNeT++

Modular discrete event simulator implemented in C++. Getting started with it is quite simple, due to its clean design. OMNeT++ also provides a powerful GUI library for animation and tracing and debugging support. Its major drawback is the lack of available protocols in its library, compared to other simulators [4]. However, OMNeT++ is becoming a popular tool and its lack of models is being decrease by current assistance. Additionally, several new proposals for localization and MAC protocols for WSN have been developed with OMNeT++, under the Consensus project, and the software is publicly available. Nevertheless, most of the available models have been developed by independent research groups and do not share a common interface, what makes difficult to combine them. As an example, not even the localization and MAC protocols developed in the harmony project are compatible.

Advantages:

- Powerful Graphical User Interface(GUI) (making tracing and bugging easier)
- Simulate power Consumption problem and give detail of energy consumption

Limitation:

- Number of protocol is not large enough, so we need to work with some protocols.
- Compatibility problem (not portable), it is not portable with other system.

QualNet

A Commercial derivation of GloMoSim based on C++. It was released in 2000 by Scalable Network Technology (SNT).GloMoSim is academic research version (an open source) but QualNet[5] is commercial version. It is GUI based model used for design, animation and analysis.

Key Features:

- High fidelity commercial protocol and device models.
- Comparative performance evaluation of alternative protocol at each layer.
- Built in measurement on each layer.

- Modular layer stack design.
- Scalability via support for parallel execution.

Demerits:

- Difficult installation on Linux
- Slow Java based UI.
- Very expensive

NS 2

NS-2 is the abbreviation of Network simulator version two, which first been developed by 1989 using as the REAL network simulator [3][4]. Now, NS-2 is supported by Defense Advanced Research Projects Agency and National Science Foundation. NS-2 is a discrete event network simulator built in Object-Oriented extension of Tool Command Language and C++. People can run NS-2 simulator on Linux Operating Systems or on Cygwin, which is a Unix - like environment and command line interface running on Windows. NS - 2 is a popular non-specific network simulator can used in both wire and wireless area. This simulator is open source and provides online document.

Language:

- Object-Oriented extension of Tool Command Language and C++ and OTCL

Key feature:

- NS-2 extensibility features.
- Object oriented design allow creating and using of new protocol.
- It provide visualization tool - NAM (Network Animator)

Limitation:

However, this simulator has some limitations [3][4].

- People who want to use this simulator need to be familiar with writing scripting language and modeling technique; the Tool Command Language is somewhat difficult to understand and write.
- Sometimes using NS-2 is more complex and time consuming than other simulators to model a desired job.
- NS-2 provides a poor graphical support, no Graphical User Interface (GUI); the users have to directly face to text commands of the electronic devices.
- Due to the continuing changing the code base, the result may not be consistent, or contains bugs
- It normally works on UNIX based system.

Network Simulator-2 (ns-2) is an open source, discrete event network simulator. It is used for the simulation of network protocols with different network topologies. It is capable of simulating wired as well as wireless networks. NS-2 was built in C++ and provides the simulation interface through OTcl, an object-oriented dialect of Tcl. The user describes a network topology by writing OTcl scripts, and then the main NS program simulates that topology with specified parameters. In ns-2, arbitrary network topologies can be defined that are composed of routers, links and shared media [2]. The physical activities of the network are processed and queued in form of events, in a scheduled order. These events are then processed as per scheduled time that increases along with the processing of events. However, the simulation is not real time; it is considered virtual [1].

IV. REQUIREMENTS AND ASSUMPTIONS

- ❖ Requirements
 - Free disk space of 5GB required
 - Minimum 256MB RAM suggested
- ❖ Assumptions
 - Windows installed in Drive partition "C"

V. INSTALLATION PROCESS

- ❖ INSTALL INSTRUCTION FOR CYGWIN

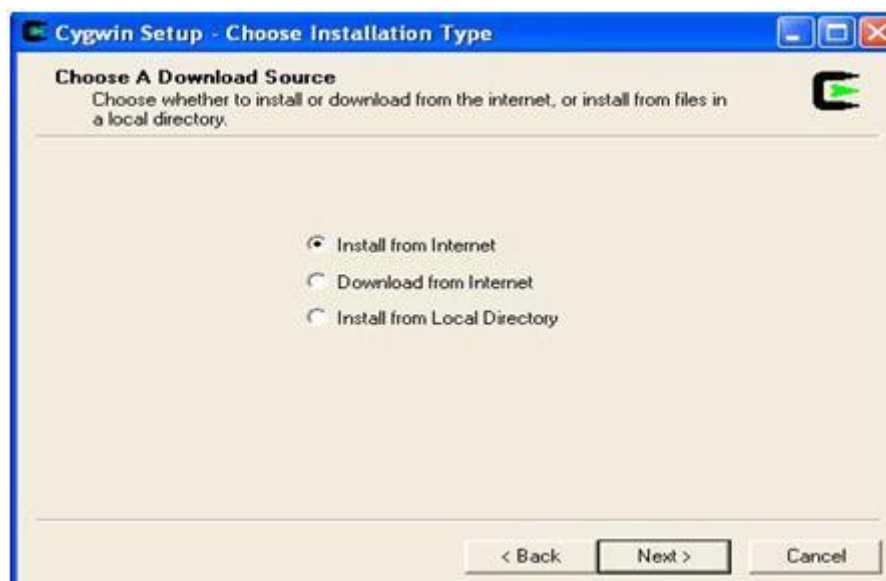
- a. Download CYGWIN using setup.exe from <http://www.cygwin.com>

- b. Run setup.exe



SCREENSHOT: - 1

- c. There are two ways to install after this step: Install from Internet or if you have all the packets already with you in your computer then you can choose install from local computer.



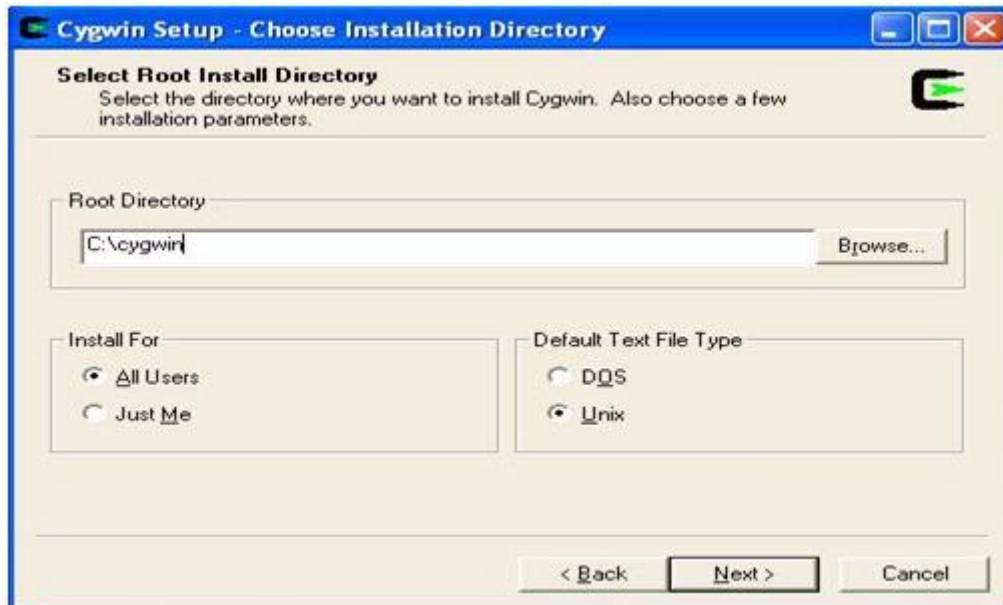
SCREENSHOT: - 2

This option is generally chosen, as everything is done automatically.

- Download and then Install

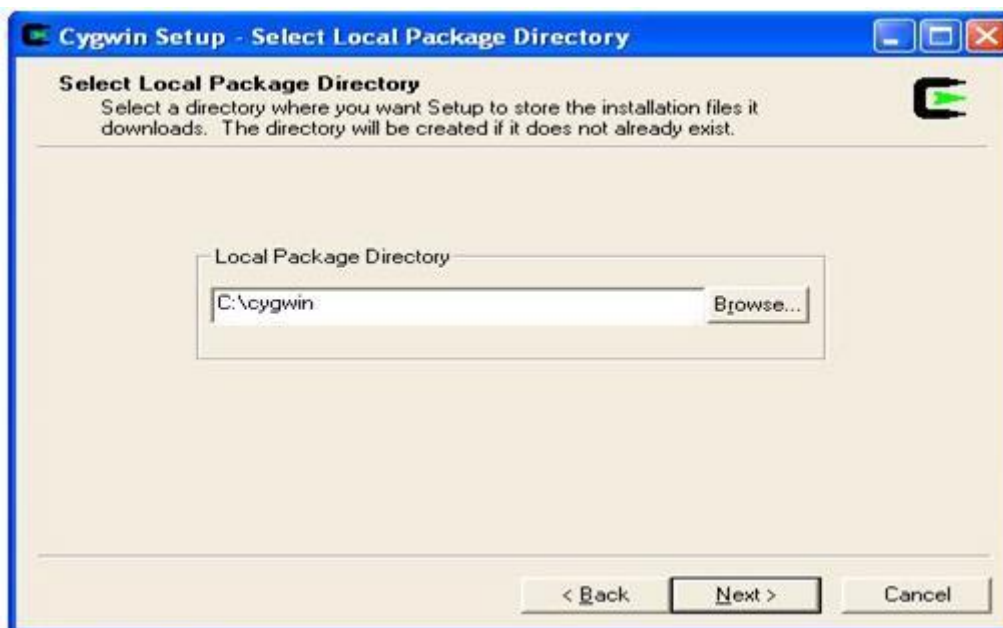
This option is desired when needed to install on large no. of machines.

- d. Selecting Root directory where CYGWIN is installed recommended root directory path is "C:\cygwin".



SCREENSHOT: - 3

- e. Selecting directory where installation files are stored



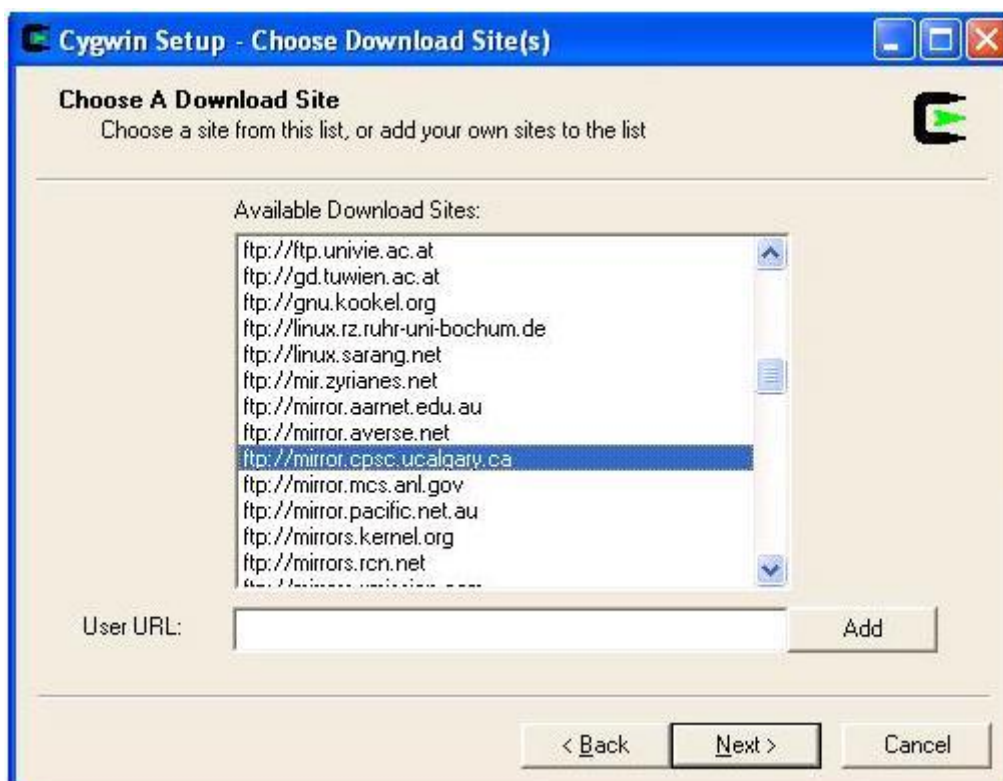
SCREENSHOT: - 4

- f. Selecting connection to internet: Direct connection preferred



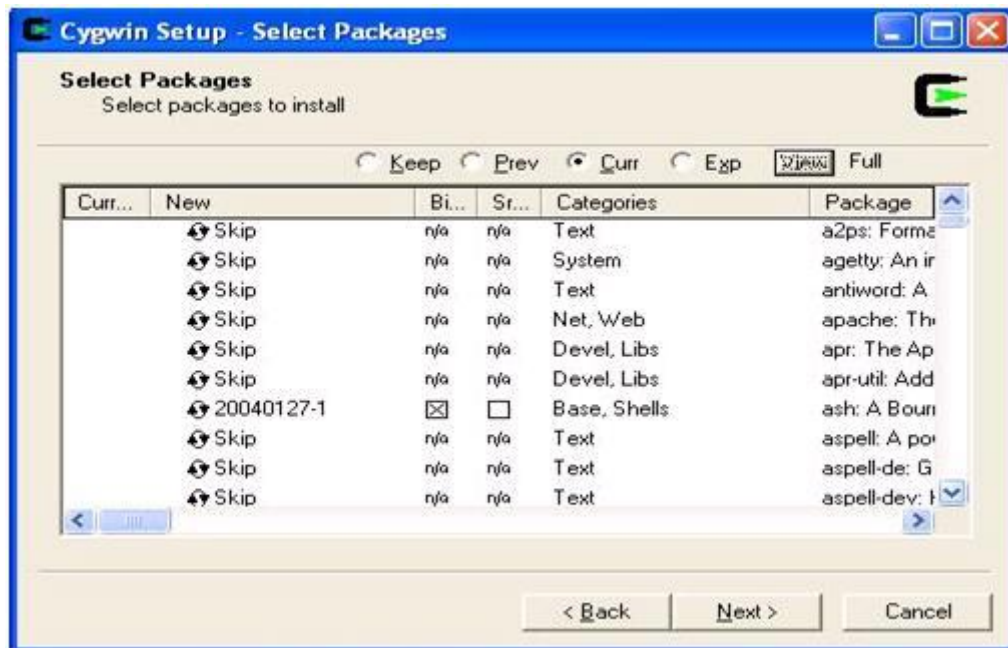
SCREENSHOT: - 5

- g. Selecting Mirror site to download cygwin. Select one of the mirror site, generally preference is made to site that's near to download location.



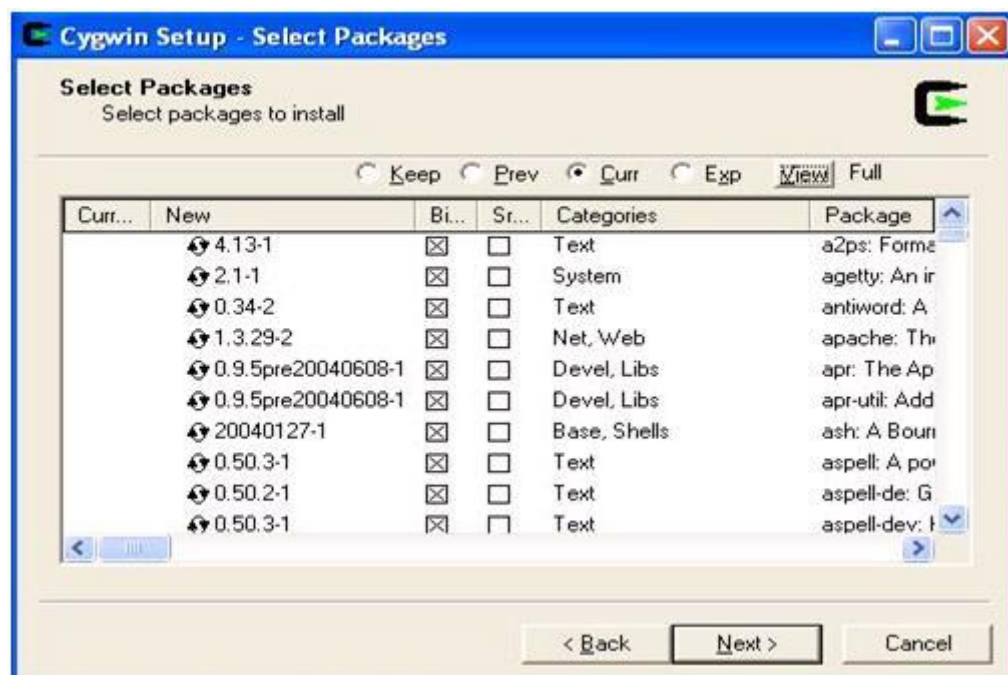
SCREENSHOT: - 6

- h. Selection of packages to install Since CYGWIN has lot of packages; it's desirable to install all packages. In order to achieve this, Click view button, until it shows "full".



SCREENSHOT: - 7

In order to make all packages installed, click the each of “skip” entry. After this step the installation window looks like this.



SCREENSHOT: - 8

Just click “Next” to make cygwin installed.

❖ INSTALLATION INSTRUCTION FOR NETWORK SIMULATOR (NS2)

- Download NS-2 installation file from : <http://www.isi.edu/nsnam/dist/ns-allinone-2.27.tar.gz>
- Save the above file in : C:\cygwin\

- c. Now open the cygwin window by clicking the cygwin shortcut on the desktop
- d. Inorder to extract the NS installation file , go to the location where the installation file is stored , by following commands:

```
cd c:  
cd cygwin/
```

- e. Extraction of files :
Extract the installation files by the following commands:

```
gzip -d ns-allinone-2.27.tar.gz  
tar -xvf ns-allinone-2.27.tar
```

by the above commands there will be directory created in the name of ns- allinone-2.27

- f. Installing the packages from extracted files : Commands to be executed :

```
cd ns-allinone-2.27
```

After the above step:

```
./install
```

This command will initiate the process of installing NS2.

IMP NOTE: if in the process, you get a prompt saying “package **diff** missing do u want to proceed, press Y for proceeding or N for exiting.

If all the above steps are followed there should not be any error in installing NS2. if in any case if u get an error message saying that package missing , it means that those packages are skipped at the time of installation so u have to install those packages by doing setup again .

- g. Validating NS2:

Move to the folder containing NS-2(i.e. ns-2.27) and then type the following command

```
./validate
```

This will test the installation of NS2 with the predefined examples.

❖ COMMAN ERROR GUIDELINE

- 1. It's always preferred to install cygwin as a normal user.
- 2. Check for display setting using at the prompt:

```
startx
```

This will open a Xserver window. Now open another instance of cygwin and

ERRORS:

- 2.1) While testing a script: if the following error comes :

```
bash::ns:: command not found ::
```

No need of .bashrc file update.

implies ~/.bash_profile file isn't read or not configured.

For which : add the following to .bash_profile and type

```
Source .bash_profile
```

```
export NS_HOME=/home/XXX/ns-allinone-2.27/
```

```
export PATH=$NS_HOME/tcl8.4.5/unix:$NS_HOME/tk8.4.5/unix:$NS_HOME/bin:$PATH
```

```
export LD_LIBRARY_PATH=$NS_HOME/tcl8.4.5/unix:$NS_HOME/tk8.4.5/unix:\ $NS_HOME/otcl-  
1.8:$NS_HOME/lib:$LD_LIBRARY_PATH
```

```
export TCL_LIBRARY=$NS_HOME/tcl8.4.5/library
```

for example here is a sample “.bash_profile” file ,

```
export NS_HOME=/cygdrive/c/cygwin/ns-allinone-2.27/
```

```
export PATH=$NS_HOME/tcl8.4.5/unix:$NS_HOME/tk8.4.5/unix:$NS_HOME/bin:$PATH export
```

```
LD_LIBRARY_PATH=$NS_HOME/tcl8.4.5/unix:$NS_HOME/tk8.4.5/unix:\ $NS_HOME/otcl-
```


1.8:\$NS_HOME/lib:\$LD_LIBRARY_PATH

export TCL_LIBRARY=\$NS_HOME/tcl8.4.5/library

- ❖ Standard working principles for NS:
 - a. Step 1: Open CYGWIN bash prompt
 - b. Step 2: go to location of TCL file
 - c. Step 3: type startx

Then u will find the following screen shot.

```

/cygdrive/c/cygwin/ns-allinone-2.27
Farhan@aggarpc3 ~
$ c:
bash: c:: command not found

Farhan@aggarpc3 ~
$ cd c:

Farhan@aggarpc3 /cygdrive/c
$ cd cygwin

Farhan@aggarpc3 /cygdrive/c/cygwin
$ cd ns-allinone-2.27

Farhan@aggarpc3 /cygdrive/c/cygwin/ns-allinone-2.27
$ dir
INSTALL.WIN32      bottleneck.tcl      man                outt1.nam          tk8.4.5
New\ Text\ Document.txt  cweb              nam-1.10           outt1.tr           xgraph-12.1
README             gt-itm            ns-2.27            sgb               zlib-1.1.4
WinFile            include           otcl-1.8           t1.tcl
WinFilet1          install           out.nam            tcl8.4.5
bin                lib               out.tr             tclcl-1.15

Farhan@aggarpc3 /cygdrive/c/cygwin/ns-allinone-2.27
$ startx
    
```

SCREENSHOT: - 9

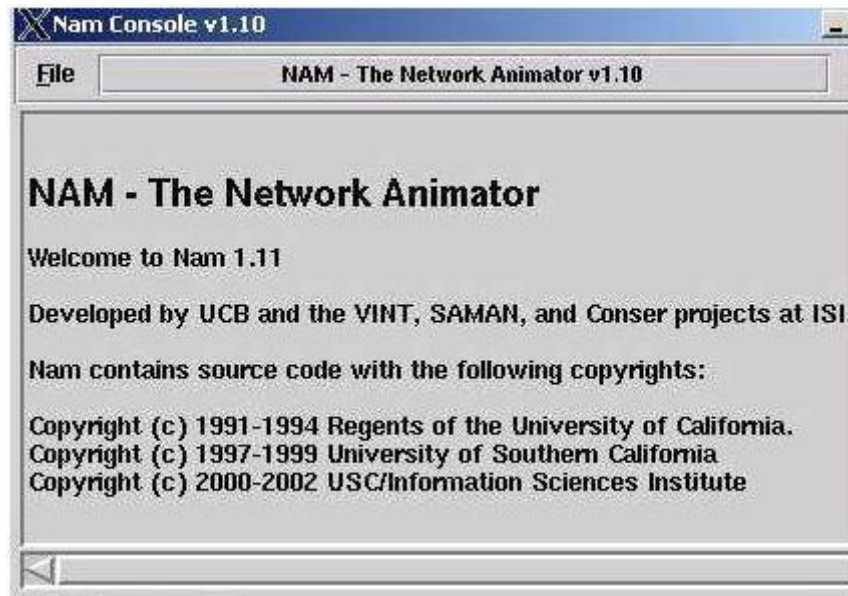
Once the above command “startx” is entered. The following window is opened

```

/cygdrive/c/cygwin/ns-allinone-2.27
Farhan@aggarpc3 /cygdrive/c/cygwin/ns-allinone-2.27
$ nam
[
    
```

SCREENSHOT: - 10

Do all the operations in the above window. Like compiling ur tcl scripts etc.



SCREENSHOT: - 11

VI. CONCLUSION

Now days most of uses the windows based operating system in their personal computer. If there is any application like NS2 which only works UNIX based operating system. At that time those all need to require to install UNIX OS in there computer and use dual boot system. But the above method is useful who want to simulate the network with free application NS2 in Windows OS. This works properly in windows OS with all features which we get in UNIX OS. So this method save the energy, memory and effort.

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