

**Assignment 8 – Study of Network Simulator NS2**

**Date: 21/10/2022**

**Aim:**

To study the Network simulator NS2.

**Algorithm:**

1. Install NS2 as per instructions given in the document:
  - a. Download NS2 from <https://www.isi.edu/nsnam/ns/ns-build.html#allinone>
  - b. Click on current release 2.35.
  - c. Go to terminal
  - d. Type the following in terminal

```
$ tar -xvzf ns-allinone-2.35.tar.gz
$ sudo apt-get install build-essential autoconf automake libxmu-dev
$ sudo apt install g++-4.8
$ sudo apt install ns2
$ sudo apt-get install -y nam
$ ns
```
  - e. The installation is complete.
  - f. Save the program simple.tcl in a folder.
  - g. In the terminal, go to the folder where the program is saved and run it:

```
$ ns simple.tcl
```
  - h. The nam simulator will open. Click the play button to view the animation.

**Code:**

```
// A simple program using Network Simulator NS2
#Create a simulator object
set ns [new Simulator]

#Define different colors for data flows (for NAM)
$ns color 1 Blue
$ns color 2 Red
```

---

```
#Open the NAM trace file
set nf [open out.nam w]
$ns namtrace-all $nf

#Define a 'finish' procedure
proc finish {} {
    global ns nf
    $ns flush-trace
    #Close the NAM trace file
    close $nf
    #Execute NAM on the trace file
    exec nam out.nam &
    exit 0
}

#Create four nodes
set n0 [$ns node]
set n1 [$ns node]
set n2 [$ns node]
set n3 [$ns node]

#Create links between the nodes
$ns duplex-link $n0 $n2 2Mb 10ms DropTail
$ns duplex-link $n1 $n2 2Mb 10ms DropTail
$ns duplex-link $n2 $n3 1.7Mb 20ms DropTail

#Set Queue Size of link (n2-n3) to 10
$ns queue-limit $n2 $n3 10

#Give node position (for NAM)
$ns duplex-link-op $n0 $n2 orient right-down
$ns duplex-link-op $n1 $n2 orient right-up
$ns duplex-link-op $n2 $n3 orient right

#Monitor the queue for link (n2-n3). (for NAM)
$ns duplex-link-op $n2 $n3 queuePos 0.5

#Set up a TCP connection
set tcp [new Agent/TCP]
$tcp set class_ 2
$ns attach-agent $n0 $tcp
set sink [new Agent/TCPSink]
```

---

```
$ns attach-agent $n3 $sink
$ns connect $tcp $sink
$tcp set fid_ 1
```

```
#Set up a FTP over TCP connection
set ftp [new Application/FTP]
$ftp attach-agent $tcp
$ftp set type_ FTP
```

```
#Set up a UDP connection
set udp [new Agent/UDP]
$ns attach-agent $n1 $udp
set null [new Agent/Null]
$ns attach-agent $n3 $null
$ns connect $udp $null
$udp set fid_ 2
```

```
#Set up a CBR over UDP connection
set cbr [new Application/Traffic/CBR]
$cbr attach-agent $udp
$cbr set type_ CBR
$cbr set packet_size_ 1000
$cbr set rate_ 1mb
$cbr set random_ false
```

```
#Schedule events for the CBR and FTP agents
$ns at 0.1 "$cbr start"
$ns at 1.0 "$ftp start"
$ns at 4.0 "$ftp stop"
$ns at 4.5 "$cbr stop"
```

```
#Detach tcp and sink agents (not really necessary)
$ns at 4.5 "$ns detach-agent $n0 $tcp ; $ns detach-agent $n3 $sink"
```

```
#Call the finish procedure after 5 seconds of simulation time
$ns at 5.0 "finish"
```

```
#Print CBR packet size and interval
puts "CBR packet size = [$cbr set packet_size_]"
puts "CBR interval = [$cbr set interval_]"
```

#Run the simulation  
\$ns run

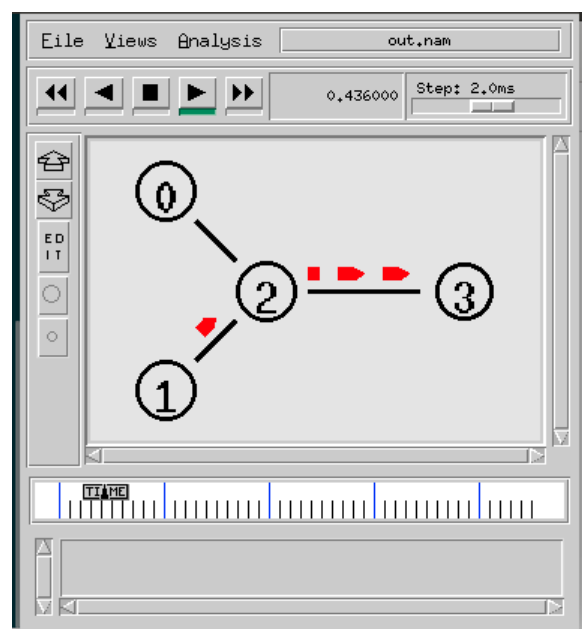
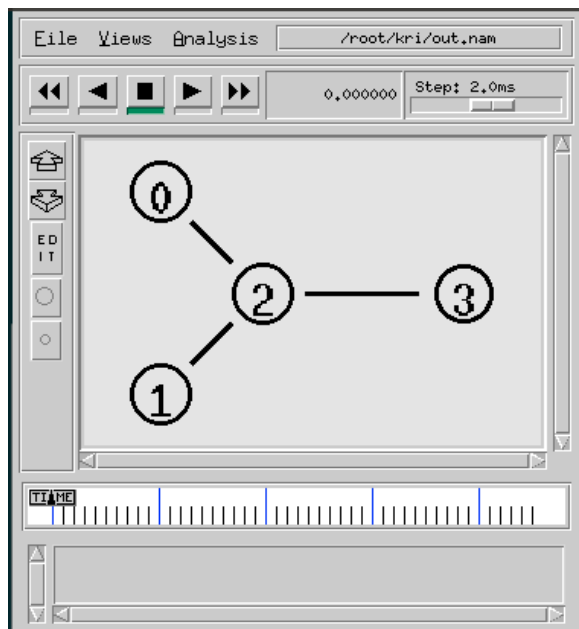
### Output:

Installation successful:

```
The following NEW packages will be installed:
  nam
0 upgraded, 1 newly installed, 0 to remove and 1 not upgraded.
Need to get 181 kB of archives.
After this operation, 666 kB of additional disk space will be used.
Get:1 http://in.archive.ubuntu.com/ubuntu xenial/universe amd64 nam amd64 1.15-3 [181 kB]
Fetched 181 kB in 1s (124 kB/s)
Selecting previously unselected package nam.
(Reading database ... 220797 files and directories currently installed.)
Preparing to unpack .../archives/nam_1.15-3_amd64.deb ...
Unpacking nam (1.15-3) ...
Processing triggers for man-db (2.7.5-1) ...
Setting up nam (1.15-3) ...
root@spl21:~/Downloads# ns
% exit
```

Output for simple.tcl in NAM:

```
root@spl21:~/kri# ns ns-simple.tcl
CBR packet size = 1000
CBR interval = 0.00800000000000000002
```



**Learning outcomes:**

- The Network Simulator NS2 was downloaded and installed successfully.
  - A simple program in tcl was written and executed.
  - The concepts of TCP and UDP connections were visualised using the NAM simulation for the program.
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