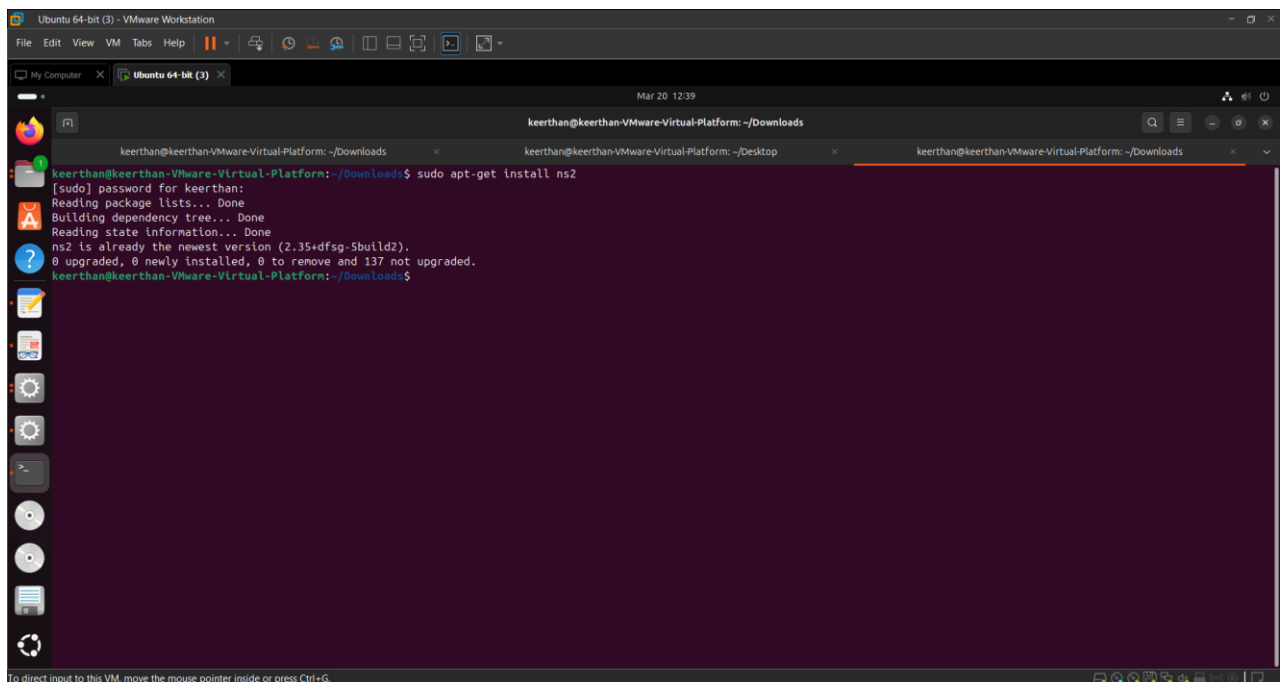


COMPUTER NETWORK

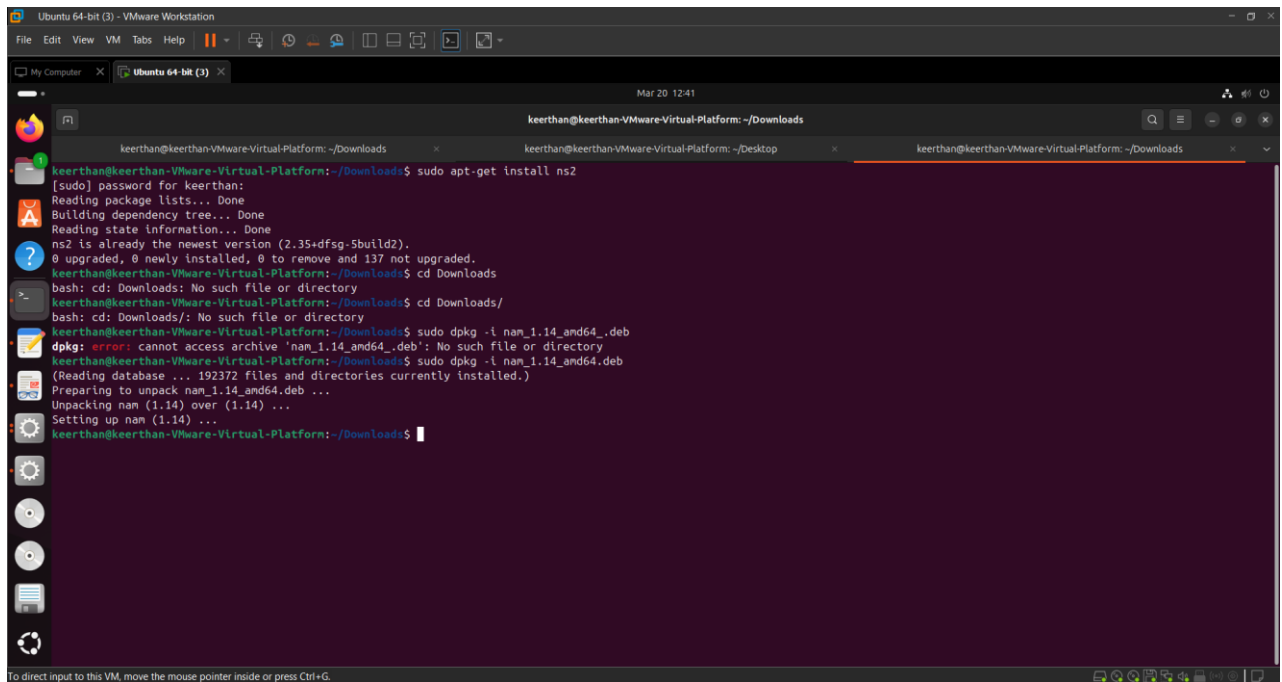
Name	Keerthan P.V
SRN	PES2UG23CS272

Step1:- Install NS2 on Ubuntu:



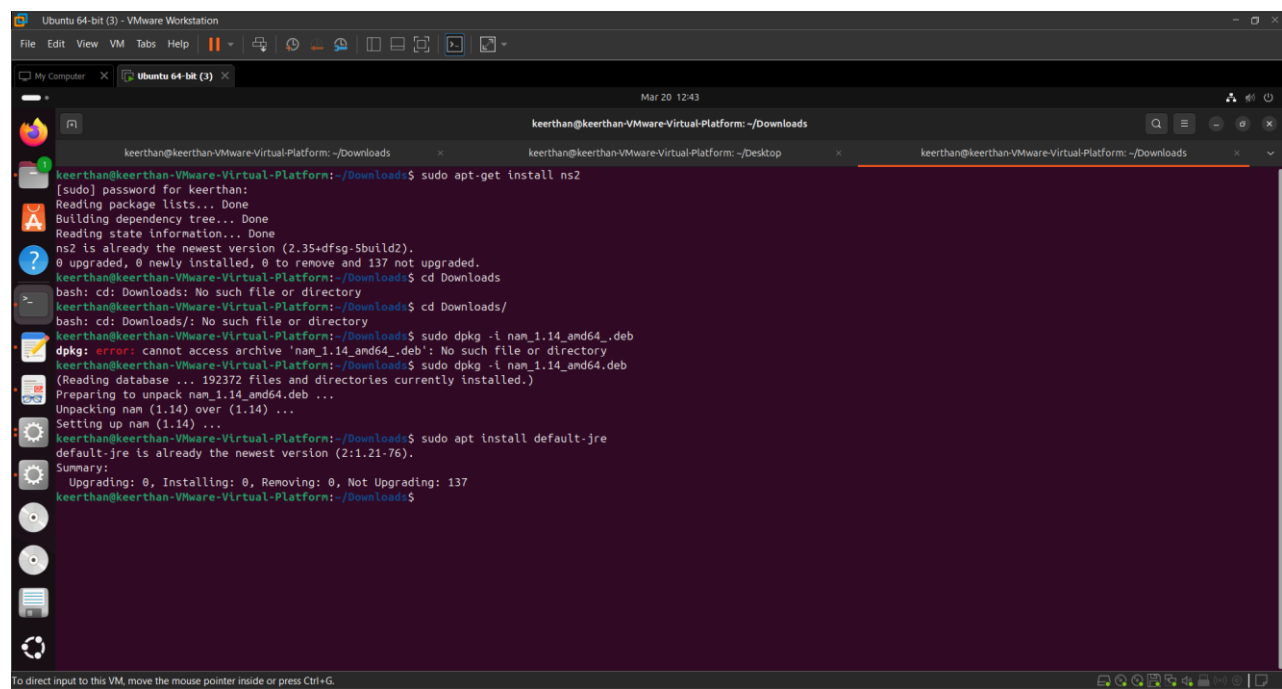
```
Ubuntu 64-bit (3) - VMware Workstation
File Edit View VM Tabs Help
My Computer x Ubuntu 64-bit (3) x
Mar 20 12:39
keerthan@keerthan-VMware-Virtual-Platform: ~/Downloads
keerthan@keerthan-VMware-Virtual-Platform: ~/Downloads
keerthan@keerthan-VMware-Virtual-Platform: ~/Downloads$ sudo apt-get install ns2
[sudo] password for keerthan:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
ns2 is already the newest version (2.35+dfsg-5build2).
0 upgraded, 0 newly installed, 0 to remove and 137 not upgraded.
keerthan@keerthan-VMware-Virtual-Platform: ~/Downloads$
```

Step 2:- Navigate to Downloads folder and install the deb file



```
keerthan@keerthan-VMware-Virtual-Platform: ~/Downloads
[keerthan@keerthan-VMware-Virtual-Platform: ~/Downloads]$ sudo apt-get install ns2
[sudo] password for keerthan:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
ns2 is already the newest version (2.35+dfsg-5build2).
0 upgraded, 0 newly installed, 0 to remove and 137 not upgraded.
keerthan@keerthan-VMware-Virtual-Platform: ~/Downloads$ cd Downloads
bash: cd: Downloads: No such file or directory
keerthan@keerthan-VMware-Virtual-Platform: ~/Downloads$ cd Downloads/
bash: cd: Downloads/: No such file or directory
keerthan@keerthan-VMware-Virtual-Platform: ~/Downloads$ sudo dpkg -i nam_1.14_and64_.deb
dpkg: error: cannot access archive 'nam_1.14_and64_.deb': No such file or directory
keerthan@keerthan-VMware-Virtual-Platform: ~/Downloads$ sudo dpkg -i nam_1.14_and64.deb
(Reading database ... 192372 files and directories currently installed.)
Preparing to unpack nam_1.14_and64.deb ...
Unpacking nam (1.14) over (1.14) ...
Setting up nam (1.14) ...
keerthan@keerthan-VMware-Virtual-Platform: ~/Downloads$
```

Step 3 :- install java

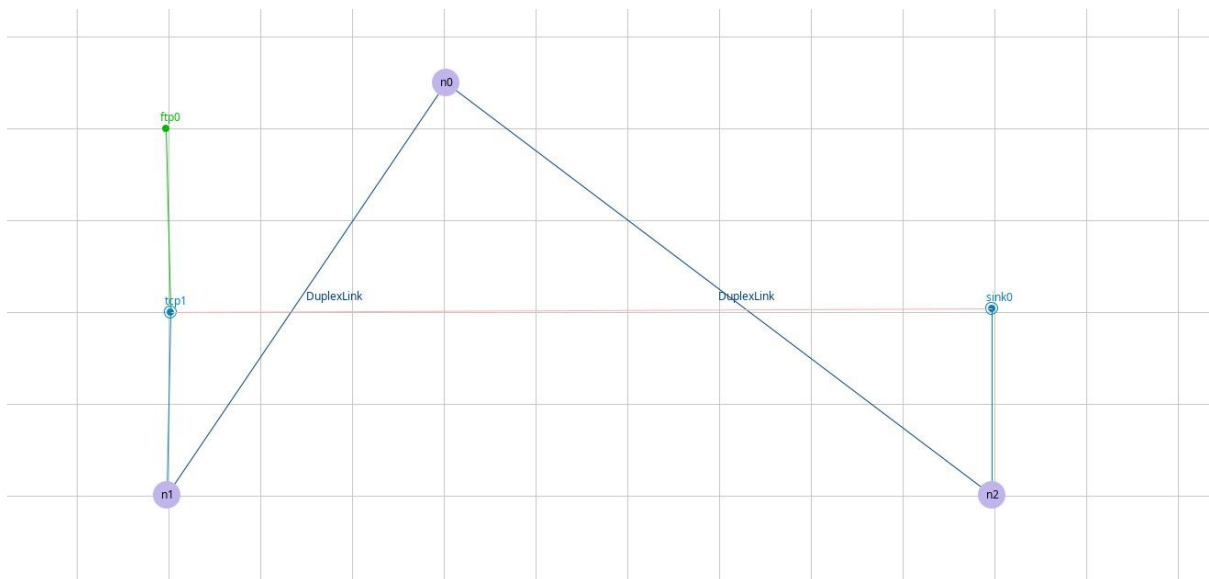


```
keerthan@keerthan-VMware-Virtual-Platform: ~/Downloads
[keerthan@keerthan-VMware-Virtual-Platform: ~/Downloads]$ sudo apt-get install ns2
[sudo] password for keerthan:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
ns2 is already the newest version (2.35+dfsg-5build2).
0 upgraded, 0 newly installed, 0 to remove and 137 not upgraded.
keerthan@keerthan-VMware-Virtual-Platform: ~/Downloads$ cd Downloads
bash: cd: Downloads: No such file or directory
keerthan@keerthan-VMware-Virtual-Platform: ~/Downloads$ cd Downloads/
bash: cd: Downloads/: No such file or directory
keerthan@keerthan-VMware-Virtual-Platform: ~/Downloads$ sudo dpkg -i nam_1.14_and64_.deb
dpkg: error: cannot access archive 'nam_1.14_and64_.deb': No such file or directory
keerthan@keerthan-VMware-Virtual-Platform: ~/Downloads$ sudo dpkg -i nam_1.14_and64.deb
(Reading database ... 192372 files and directories currently installed.)
Preparing to unpack nam_1.14_and64.deb ...
Unpacking nam (1.14) over (1.14) ...
Setting up nam (1.14) ...
keerthan@keerthan-VMware-Virtual-Platform: ~/Downloads$ sudo apt install default-jre
default-jre is already the newest version (2:1.21-76).
Summary:
  Upgrading: 0, Installing: 0, Removing: 0, Not Upgrading: 137
keerthan@keerthan-VMware-Virtual-Platform: ~/Downloads$
```

```

Ubuntu 64-bit (3) - VMware Workstation
File Edit View VM Tabs Help
My Computer x Ubuntu 64-bit (3) x
keerthan@keerthan-VMware-Virtual-Platform: ~/Downloads
keerthan@keerthan-VMware-Virtual-Platform: ~/Downloads
keerthan@keerthan-VMware-Virtual-Platform: ~/Downloads
keerthan@keerthan-VMware-Virtual-Platform: ~/Downloads$ cd Downloads/
keerthan@keerthan-VMware-Virtual-Platform: ~/Downloads$ sudo apt-get install ns2
[sudo] password for keerthan:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
ns2 is already the newest version (2.35+dfsg-5build2).
0 upgraded, 0 newly installed, 0 to remove and 135 not upgraded.
keerthan@keerthan-VMware-Virtual-Platform: ~/Downloads$ sudo dpkg -i nam_1.14_and64.deb
dpkg: warning: downgrading nam from 1.15-8 to 1.14
(Reading database ... 192377 files and directories currently installed.)
Preparing to unpack nam_1.14_and64.deb ...
Unpacking nam (1.14) over (1.15-8) ...
Setting up nam (1.14) ...
Processing triggers for nam-db (2.12.1-3) ...
keerthan@keerthan-VMware-Virtual-Platform: ~/Downloads$ sudo dpkg -i nam_1.14_and64.deb
(Reading database ... 192372 files and directories currently installed.)
Preparing to unpack nam_1.14_and64.deb ...
Unpacking nam (1.14) over (1.14) ...
Setting up nam (1.14) ...
keerthan@keerthan-VMware-Virtual-Platform: ~/Downloads$ sudo apt install default-jre
default-jre is already the newest version (2:1.21-76).
Summary:
Upgrading: 0, Installing: 0, Removing: 0, Not Upgrading: 136
keerthan@keerthan-VMware-Virtual-Platform: ~/Downloads$ chmod +x NSG2.1.jar
keerthan@keerthan-VMware-Virtual-Platform: ~/Downloads$ java -jar NSG2.1.jar
keerthan@keerthan-VMware-Virtual-Platform: ~/Downloads$ chmod +x NSG2.1.jar
keerthan@keerthan-VMware-Virtual-Platform: ~/Downloads$ java -jar NSG2.1.jar
java.awt.Color[r=238,g=238,b=238]
java.awt.Color[r=238,g=238,b=238]
java.awt.Color[r=238,g=238,b=238]

```



Components in the Diagram:

1. **Nodes (n0, n1, n2)** ○ These represent networking devices (computers, routers, or switches).
 - Each node is identified by labels: n0, n1, and n2.
2. **Links (Connections between nodes)** ○ **Duplex Link:** Bidirectional connections between nodes (n0↔n1 and n0↔n2).
 - The red line in the middle may indicate a different type of connection (perhaps a bottleneck link).

3. **Agents (ftp0, sink0)**
 - **FTP (ftp0):** Likely represents a **File Transfer Protocol (FTP)** application running on a node to generate traffic.
 - **Sink (sink0):** A receiving endpoint, meaning this node collects data being sent.
4. **Traffic Sources (tcp1)**
 - A **TCP (Transmission Control Protocol) agent** at node n1, possibly generating FTP traffic.
 - Connected to ftp0, which sends data.

Steps to Create this Network Topology (NS-2 or NS-3)

1. **Create the Nodes:**
2. set n0 [\$ns node]
3. set n1 [\$ns node]
4. set n2 [\$ns node]
5. **Create Links Between Nodes:**
6. \$ns duplex-link \$n0 \$n1 10Mb 5ms Drop Tail
7. \$ns duplex-link \$n0 \$n2 10Mb 5ms Drop Tail
8. **Attach Agents (TCP and Sink):**
9. set tcp1 [new Agent/TCP]
10. \$ns attach-agent \$n1 \$tcp1
11. set sink0 [new Agent/TCP Sink]
12. \$ns attach-agent \$n2 \$sink0
13. **Attach Traffic Source (FTP) to TCP Agent:**
14. set ftp0 [new Application/FTP]
15. \$ftp0 attach-agent \$tcp1
16. **Run Simulation & Terminate:**
17. \$ns run

Summary of the Process

- **Step 1:** Create nodes (n0, n1, n2).
- **Step 2:** Connect nodes using duplex-link.
- **Step 3:** Attach a **TCP agent** (tcp1) to n1 and a **TCP Sink** (sink0) to n2.
- **Step 4:** Attach an **FTP application** (ftp0) to tcp1.
- **Step 5:** Execute the simulation (\$ns run).

Save

Save as

```
$ns duplex-link $n0 $n2 100.0Mb 10ms DropTail
$ns queue-limit $n0 $n2 50
```

#Give node position (for NAM)

```
$ns duplex-link-op $n0 $n1 orient left-down
$ns duplex-link-op $n0 $n2 orient right-down
```

```
#=====
```

Agents Definition

```
#=====
```

#Setup a TCP connection

```
set tcp1 [new Agent/TCP]
$ns attach-agent $n1 $tcp1
set sink0 [new Agent/TCPSink]
$ns attach-agent $n2 $sink0
$ns connect $tcp1 $sink0
$tcp1 set packetSize_ 1500
```

```
#=====
```

Applications Definition

```
#=====
```

#Setup a FTP Application over TCP connection

```
set ftp0 [new Application/FTP]
$ftp0 attach-agent $tcp1
$ns at 1.0 "$ftp0 start"
$ns at 2.0 "$ftp0 stop"
```

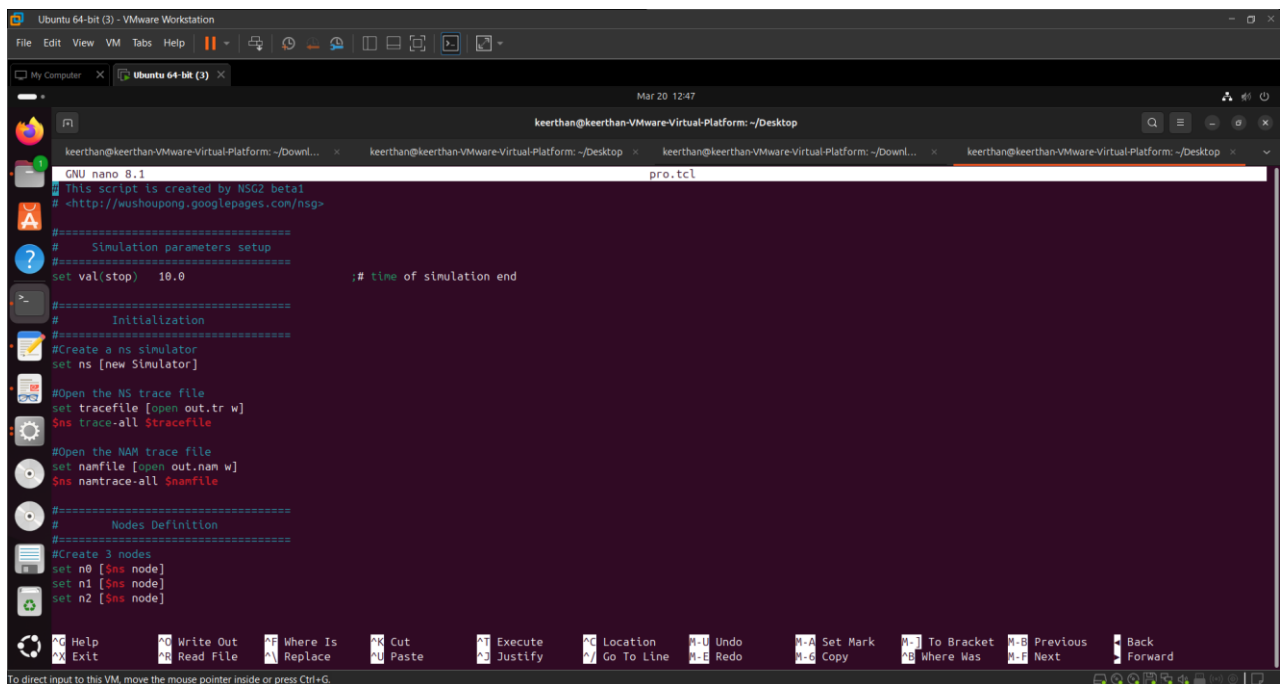
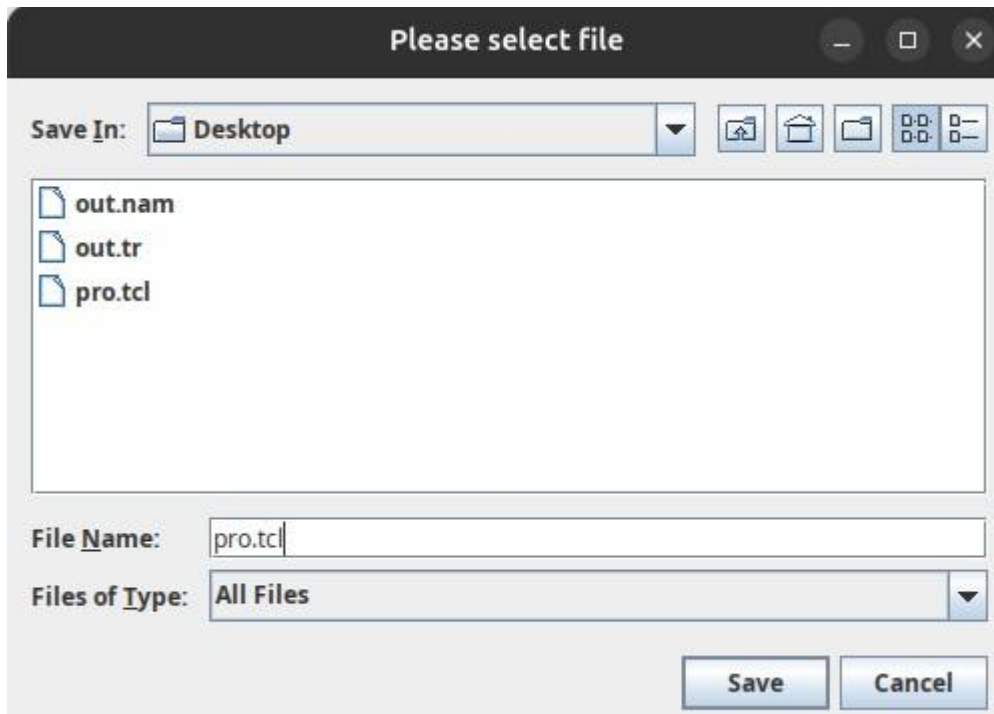
```
#=====
```

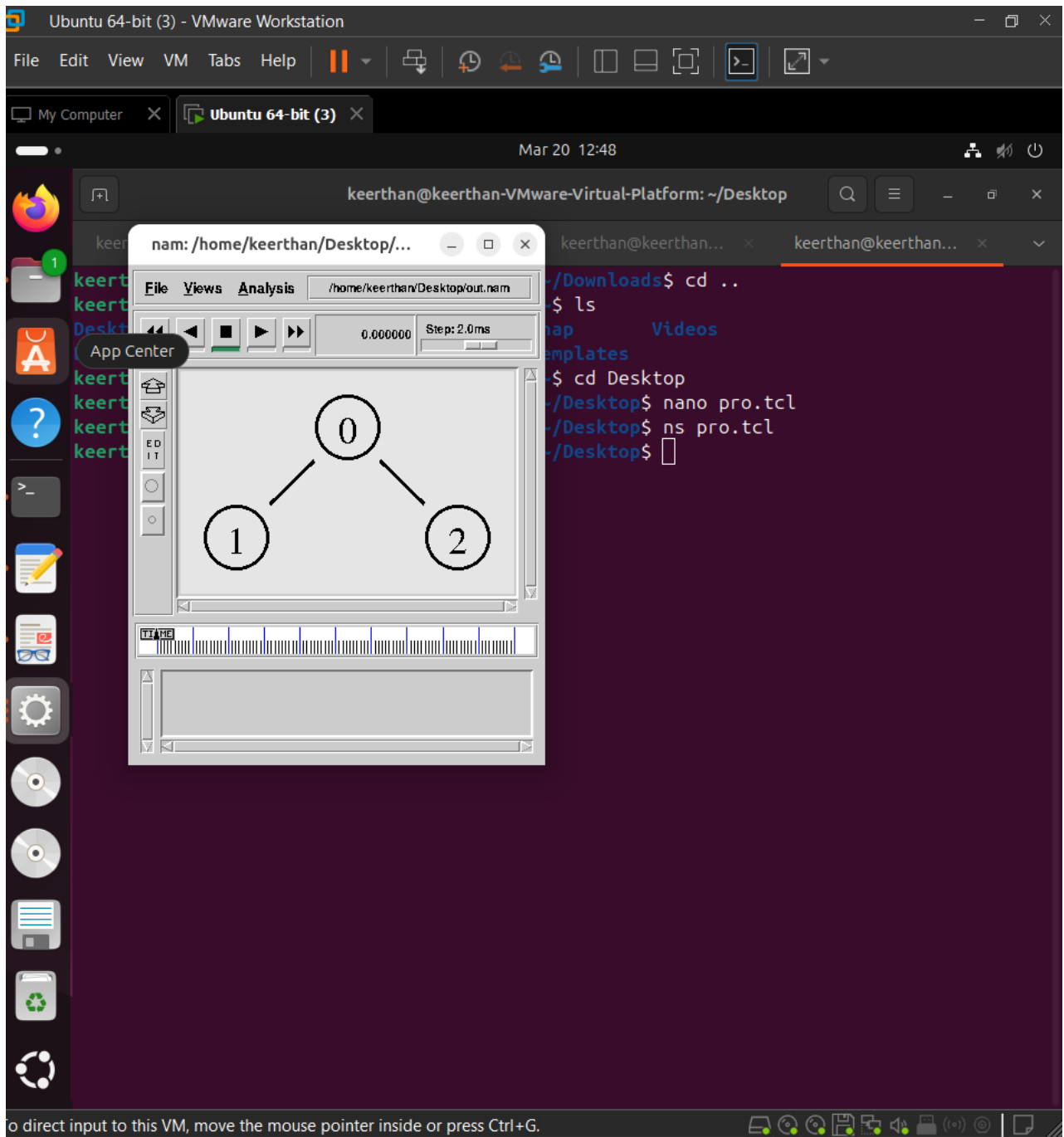
Termination

```
#=====
```

#Define a 'finish' procedure

```
proc finish {} {
    global ns tracefile namfile
    $ns flush-trace
    close $tracefile
    close $namfile
}
```





Ubuntu 64-bit (3) - VMware Workstation

File Edit View VM Tabs Help

My Computer Ubuntu 64-bit (3)

Mar 20 12:50

keerthan@keerthan-VMware-Virtual-Platform: ~/Desktop

keerthan@keerthan... x keerthan@keerthan... x keerthan@keerthan... x keerthan@keerthan... x

GNU nano 8.1 out.nam

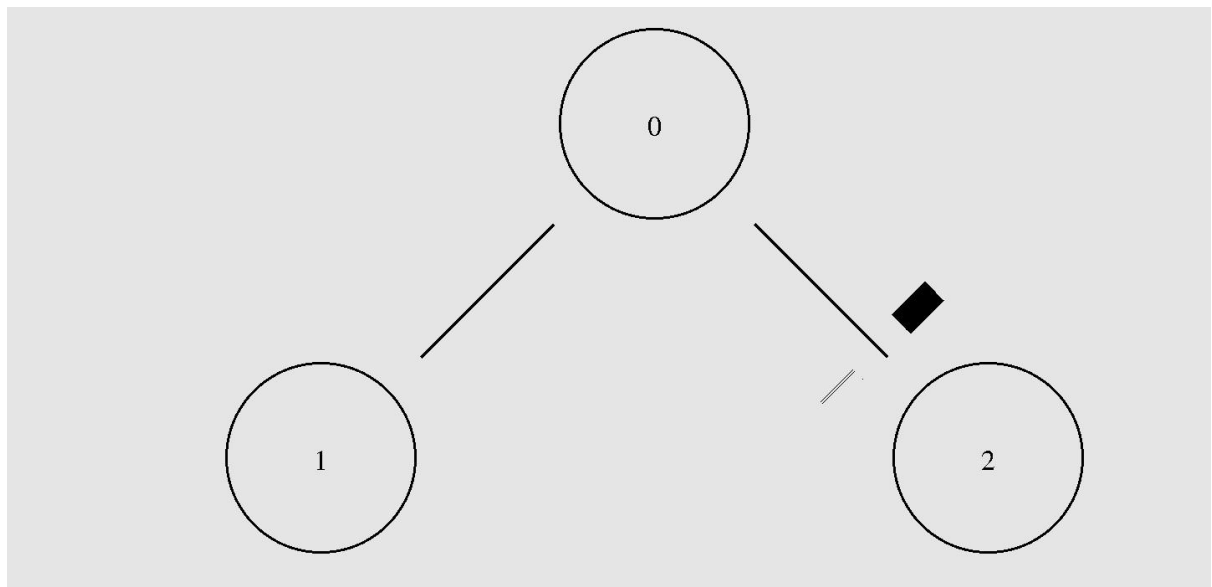
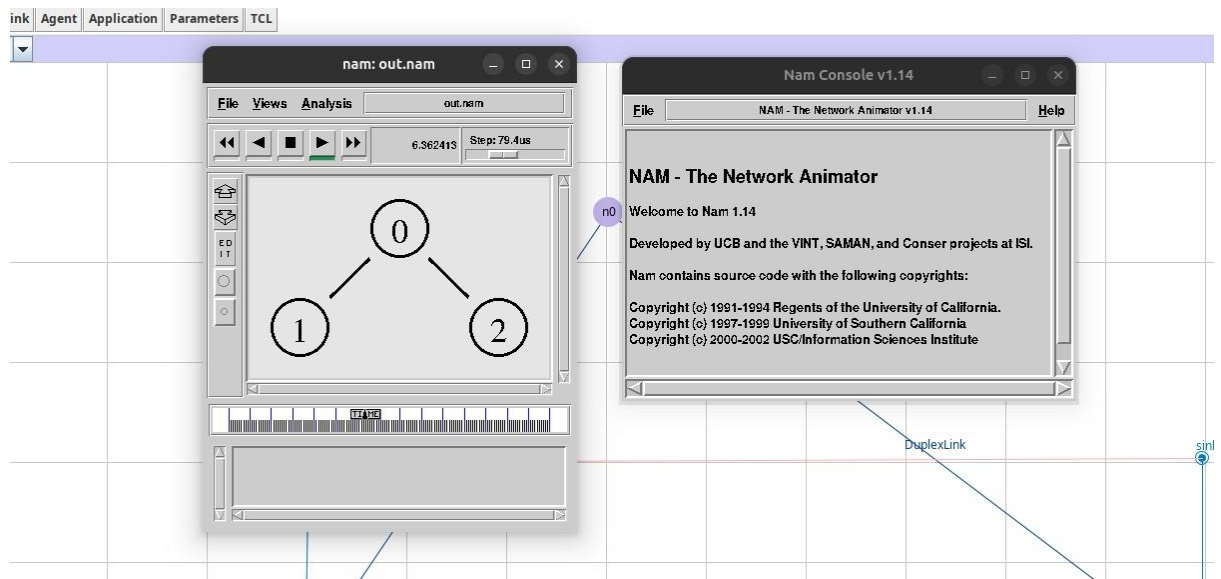
```
V -t * -v 1.0a5 -a 0
A -t * -n 1 -p 0 -o 0x7fffffff -c 30 -a 1
A -t * -h 1 -m 1073741823 -s 0
n -t * -a 0 -s 0 -S UP -v circle -c black -i black
n -t * -a 1 -s 1 -S UP -v circle -c black -i black
n -t * -a 2 -s 2 -S UP -v circle -c black -i black
l -t * -s 2 -d 0 -S UP -r 100000000 -D 0.01 -c black -o left-up
l -t * -s 1 -d 0 -S UP -r 100000000 -D 0.01 -c black -o right-up
+ -t 1 -s 1 -d 0 -p tcp -e 40 -c 0 -i 0 -a 0 -x {1.0 2.0 0 ----- null}
- -t 1 -s 1 -d 0 -p tcp -e 40 -c 0 -i 0 -a 0 -x {1.0 2.0 0 ----- null}
h -t 1 -s 1 -d 0 -p tcp -e 40 -c 0 -i 0 -a 0 -x {1.0 2.0 -1 ----- null}
r -t 1.0100032 -s 1 -d 0 -p tcp -e 40 -c 0 -i 0 -a 0 -x {1.0 2.0 0 ----- null}
+ -t 1.0100032 -s 0 -d 2 -p tcp -e 40 -c 0 -i 0 -a 0 -x {1.0 2.0 0 ----- null}
- -t 1.0100032 -s 0 -d 2 -p tcp -e 40 -c 0 -i 0 -a 0 -x {1.0 2.0 0 ----- null}
h -t 1.0100032 -s 0 -d 2 -p tcp -e 40 -c 0 -i 0 -a 0 -x {1.0 2.0 -1 ----- null}
r -t 1.0200064 -s 0 -d 2 -p tcp -e 40 -c 0 -i 0 -a 0 -x {1.0 2.0 0 ----- null}
+ -t 1.0200064 -s 2 -d 0 -p ack -e 40 -c 0 -i 1 -a 0 -x {2.0 1.0 0 ----- null}
- -t 1.0200064 -s 2 -d 0 -p ack -e 40 -c 0 -i 1 -a 0 -x {2.0 1.0 0 ----- null}
h -t 1.0200064 -s 2 -d 0 -p ack -e 40 -c 0 -i 1 -a 0 -x {2.0 1.0 -1 ----- null}
r -t 1.0300096 -s 2 -d 0 -p ack -e 40 -c 0 -i 1 -a 0 -x {2.0 1.0 0 ----- null}
+ -t 1.0300096 -s 0 -d 1 -p ack -e 40 -c 0 -i 1 -a 0 -x {2.0 1.0 0 ----- null}
- -t 1.0300096 -s 0 -d 1 -p ack -e 40 -c 0 -i 1 -a 0 -x {2.0 1.0 0 ----- null}
h -t 1.0300096 -s 0 -d 1 -p ack -e 40 -c 0 -i 1 -a 0 -x {2.0 1.0 -1 ----- null}
r -t 1.0400128 -s 0 -d 1 -p ack -e 40 -c 0 -i 1 -a 0 -x {2.0 1.0 0 ----- null}
+ -t 1.0400128 -s 1 -d 0 -p tcp -e 1540 -c 0 -i 2 -a 0 -x {1.0 2.0 1 ----- null}
- -t 1.0400128 -s 1 -d 0 -p tcp -e 1540 -c 0 -i 2 -a 0 -x {1.0 2.0 1 ----- null}
h -t 1.0400128 -s 1 -d 0 -p tcp -e 1540 -c 0 -i 2 -a 0 -x {1.0 2.0 -1 ----- null}
+ -t 1.0400128 -s 1 -d 0 -p tcp -e 1540 -c 0 -i 3 -a 0 -x {1.0 2.0 2 ----- null}
- -t 1.040136 -s 1 -d 0 -p tcp -e 1540 -c 0 -i 3 -a 0 -x {1.0 2.0 2 ----- null}
h -t 1.040136 -s 1 -d 0 -p tcp -e 1540 -c 0 -i 3 -a 0 -x {1.0 2.0 -1 ----- null}
```

[Read 6905 lines]

^G Help	^O Write Out	^F Where Is	^K Cut	^T Execute	^C Location
^X Exit	^R Read File	^\ Replace	^U Paste	^J Justify	^_ Go To Line

To direct input to this VM, move the mouse pointer inside or press Ctrl+G.

Output:



Ubuntu 64-bit (3) - VMware Workstation

File Edit View VM Tabs Help

My Computer Ubuntu 64-bit (3)

Mar 20 12:51

keerthan@keerthan-VMware-Virtual-Platform: ~/Desktop

keerthan@keerthan... x keerthan@keerthan... x keerthan@keerthan... x keerthan@keerthan... x

GNU nano 8.1 out.tr

```
+ 1 1 0 tcp 40 ----- 0 1.0 2.0 0 0
- 1 1 0 tcp 40 ----- 0 1.0 2.0 0 0
r 1.010003 1 0 tcp 40 ----- 0 1.0 2.0 0 0
+ 1.010003 0 2 tcp 40 ----- 0 1.0 2.0 0 0
- 1.010003 0 2 tcp 40 ----- 0 1.0 2.0 0 0
r 1.020006 0 2 tcp 40 ----- 0 1.0 2.0 0 0
+ 1.020006 2 0 ack 40 ----- 0 2.0 1.0 0 1
- 1.020006 2 0 ack 40 ----- 0 2.0 1.0 0 1
r 1.03001 2 0 ack 40 ----- 0 2.0 1.0 0 1
+ 1.03001 0 1 ack 40 ----- 0 2.0 1.0 0 1
- 1.03001 0 1 ack 40 ----- 0 2.0 1.0 0 1
r 1.040013 0 1 ack 40 ----- 0 2.0 1.0 0 1
+ 1.040013 1 0 tcp 1540 ----- 0 1.0 2.0 1 2
- 1.040013 1 0 tcp 1540 ----- 0 1.0 2.0 1 2
+ 1.040013 1 0 tcp 1540 ----- 0 1.0 2.0 2 3
- 1.040136 1 0 tcp 1540 ----- 0 1.0 2.0 2 3
r 1.050136 1 0 tcp 1540 ----- 0 1.0 2.0 1 2
+ 1.050136 0 2 tcp 1540 ----- 0 1.0 2.0 1 2
- 1.050136 0 2 tcp 1540 ----- 0 1.0 2.0 1 2
r 1.050259 1 0 tcp 1540 ----- 0 1.0 2.0 2 3
+ 1.050259 0 2 tcp 1540 ----- 0 1.0 2.0 2 3
- 1.050259 0 2 tcp 1540 ----- 0 1.0 2.0 2 3
r 1.060259 0 2 tcp 1540 ----- 0 1.0 2.0 1 2
+ 1.060259 2 0 ack 40 ----- 0 2.0 1.0 1 4
- 1.060259 2 0 ack 40 ----- 0 2.0 1.0 1 4
r 1.060382 0 2 tcp 1540 ----- 0 1.0 2.0 2 3
+ 1.060382 2 0 ack 40 ----- 0 2.0 1.0 2 5
- 1.060382 2 0 ack 40 ----- 0 2.0 1.0 2 5
r 1.070262 2 0 ack 40 ----- 0 2.0 1.0 1 4
+ 1.070262 0 1 ack 40 ----- 0 2.0 1.0 1 4
```

[Read 5172 lines]

^G Help ^O Write Out ^F Where Is ^K Cut ^T Execute ^C Location
^X Exit ^R Read File ^\ Replace ^U Paste ^J Justify ^_ Go To Line