CSN-361

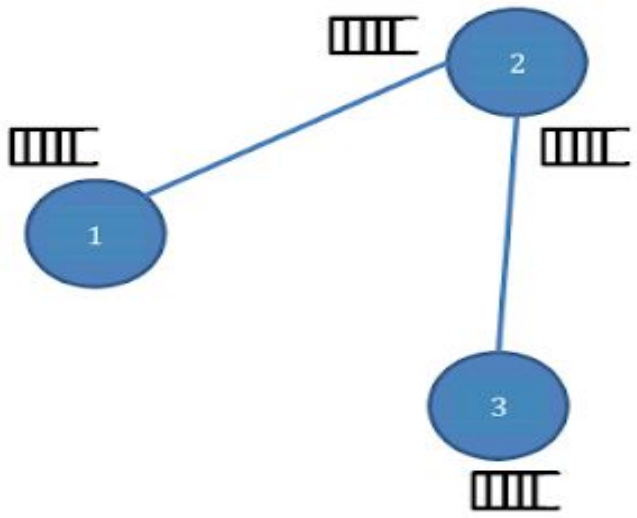
Assignment -4

Abhijeet Shakya

17114002

Problem Statement 1

Write a Network Simulator (NS2) code to simulate a three node network with duplex links among them as shown in figure. Show the topology using NAM. Study the variation in number of packets dropped with the variation of the queue size in the nodes and with the variation of the bandwidth of the links.



SOLUTION:

We can find number of dropdowns using grep command:

Grep -o 'd' traceOutput1.tr | wc -l

```
set ns [new Simulator]

set nf [open PA1.nam w]

$ns namtrace-all $nf

set tf [open PA1.tr w]

$ns trace-all $tf
```

```
proc finish { } {
        global ns nf tf
        $ns flush-trace
        close $nf
        close $tf
        exec nam PA1.nam &
        exit 0
}

set n0 [$ns node]
set n2 [$ns node]
set n3 [$ns node]

$ns duplex-link $n0 $n2 300000b 2ms DropTail
$ns duplex-link $n2 $n3 50000b 1ms DropTail

$ns queue-limit $n0 $n2 5
$ns queue-limit $n2 $n3 3

set udp0 [new Agent/UDP]
$ns attach-agent $n0 $udp0
set cbr0 [new Application/Traffic/CBR]
$cbr0 set packetSize_ 500
```

$cbr0 set interval_ 0.005

$cbr0 attach-agent $udp0

set null0 [new Agent/Null]

$ns attach-agent $n3 $null0

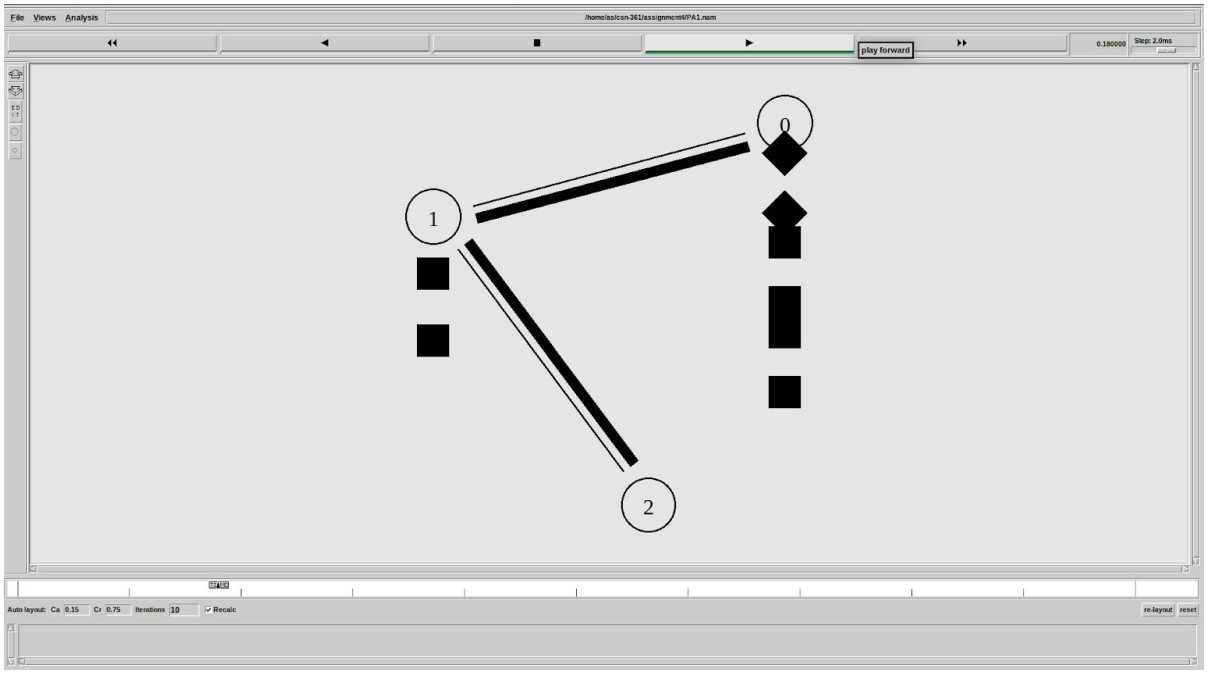
$ns connect $udp0 $null0

$ns at 0.1 "$cbr0 start"

$ns at 1.0 "finish"

$ns run

Screenshots:



Problem Statement 2

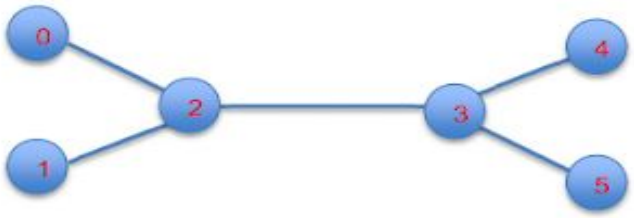
Write a Network Simulator (NS2) code to simulate the transmission of ping messages over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion. Study the variation in number of packets dropped with the variation of the queue size in the nodes and with the variation of the bandwidth of the links.

Nodes are connected as follows:

0-2, 1-2, 2-3, 3-4 and 3-5

Packet transmissions:

0-4 and 5-1



SOLUTION:

We can find number of dropdowns using grep command:

Grep -o 'd' traceOutput2.tr | wc -l

#Event Scheduler Object creation.

set netSimInstance [new Simulator]

#Creating trace objects and nam objects.

```
set namFile [open namOutput.nam w]
$netSimInstance namtrace-all $namFile

set traceFile [open traceOutput.tr w]
$netSimInstance trace-all $traceFile

#Finish procedure
proc finish {}  {
        global netSimInstance traceFile namFile
        $netSimInstance flush-trace
        close $traceFile
        close $namFile
        exec nam namOutput.nam &
        exit 0
        #exec gawk -f Q2.awk traceOutput.tr &
}

 #Create the network
set node0 [$netSimInstance node]
set node1 [$netSimInstance node]
set node2 [$netSimInstance node]
set node3 [$netSimInstance node]
set node4 [$netSimInstance node]
```

```
set node5 [$netSimInstance node]


 #Creating Duplex-Link
$netSimInstance duplex-link $node0 $node2 .1Mb 10ms DropTail
$netSimInstance duplex-link $node2 $node1 .1Mb 10ms DropTail
$netSimInstance duplex-link $node2 $node3 .1Mb 10ms DropTail
$netSimInstance duplex-link $node3 $node4 .1Mb 10ms DropTail
$netSimInstance duplex-link $node3 $node5 .1Mb 10ms DropTail


 Agent/Ping instproc recv {from rtt} {
        $self instvar node_
        puts "node [$node_ id] received ping answer from \
        $from with round-trip-time $rtt ms."
}


set pingAgent0 [new Agent/Ping]
set pingAgent1 [new Agent/Ping]
set pingAgent2 [new Agent/Ping]
set pingAgent3 [new Agent/Ping]
set pingAgent4 [new Agent/Ping]
set pingAgent5 [new Agent/Ping]



$netSimInstance attach-agent $node0 $pingAgent0
```

```
$netSimInstance attach-agent $node1 $pingAgent1
$netSimInstance attach-agent $node2 $pingAgent2
$netSimInstance attach-agent $node3 $pingAgent3
$netSimInstance attach-agent $node4 $pingAgent4
$netSimInstance attach-agent $node5 $pingAgent5


$netSimInstance queue-limit $node0 $node2 2
$netSimInstance queue-limit $node2 $node1 2
$netSimInstance queue-limit $node2 $node3 2
$netSimInstance queue-limit $node3 $node4 1
$netSimInstance queue-limit $node3 $node5 1

$netSimInstance connect $pingAgent0 $pingAgent4
$netSimInstance connect $pingAgent5 $pingAgent1

$netSimInstance at 0.1 "$pingAgent0 send"
$netSimInstance at 0.2 "$pingAgent0 send"
$netSimInstance at 0.3 "$pingAgent0 send"
$netSimInstance at 0.4 "$pingAgent0 send"
$netSimInstance at 0.5 "$pingAgent0 send"
$netSimInstance at 0.6 "$pingAgent0 send"
$netSimInstance at 0.7 "$pingAgent0 send"
$netSimInstance at 0.8 "$pingAgent0 send"
```

$netSimInstance at 0.9 "$pingAgent0 send"

$netSimInstance at 1.0 "$pingAgent0 send"

$netSimInstance at 1.1 "$pingAgent0 send"

$netSimInstance at 1.2 "$pingAgent0 send"

$netSimInstance at 1.3 "$pingAgent0 send"

$netSimInstance at 1.4 "$pingAgent0 send"

$netSimInstance at 1.5 "$pingAgent0 send"

$netSimInstance at 1.6 "$pingAgent0 send"

$netSimInstance at 1.7 "$pingAgent0 send"

$netSimInstance at 1.8 "$pingAgent0 send"

$netSimInstance at 0.9 "$pingAgent0 send"

$netSimInstance at 2.0 "$pingAgent0 send"

$netSimInstance at 2.1 "$pingAgent0 send"

$netSimInstance at 2.2 "$pingAgent0 send"

$netSimInstance at 2.3 "$pingAgent0 send"

$netSimInstance at 2.4 "$pingAgent0 send"

$netSimInstance at 2.5 "$pingAgent0 send"

$netSimInstance at 2.6 "$pingAgent0 send"

$netSimInstance at 2.7 "$pingAgent0 send"

$netSimInstance at 2.8 "$pingAgent0 send"

$netSimInstance at 2.9 "$pingAgent0 send"

$netSimInstance at 0.1 "$pingAgent5 send"

$netSimInstance at 0.2 "$pingAgent5 send"

$netSimInstance at 0.3 "$pingAgent5 send"

$netSimInstance at 0.4 "$pingAgent5 send"

$netSimInstance at 0.5 "$pingAgent5 send"

$netSimInstance at 0.6 "$pingAgent5 send"

$netSimInstance at 0.7 "$pingAgent5 send"

$netSimInstance at 0.8 "$pingAgent5 send"

$netSimInstance at 0.9 "$pingAgent5 send"

$netSimInstance at 1.0 "$pingAgent5 send"

$netSimInstance at 1.1 "$pingAgent5 send"

$netSimInstance at 1.2 "$pingAgent5 send"

$netSimInstance at 1.3 "$pingAgent5 send"

$netSimInstance at 1.4 "$pingAgent5 send"

$netSimInstance at 1.5 "$pingAgent5 send"

$netSimInstance at 1.6 "$pingAgent5 send"

$netSimInstance at 1.7 "$pingAgent5 send"

$netSimInstance at 1.8 "$pingAgent5 send"

$netSimInstance at 0.9 "$pingAgent5 send"

$netSimInstance at 2.0 "$pingAgent5 send"

$netSimInstance at 2.1 "$pingAgent5 send"

$netSimInstance at 2.2 "$pingAgent5 send"

$netSimInstance at 2.3 "$pingAgent5 send"

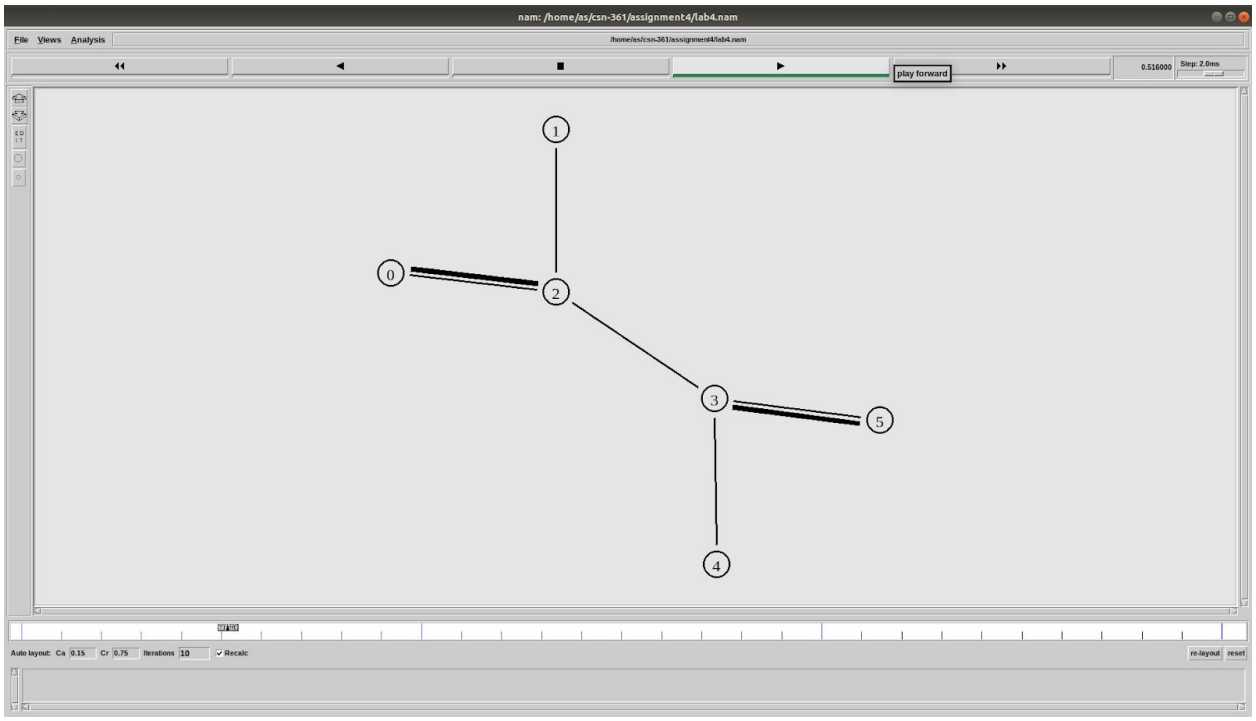
$netSimInstance at 2.4 "$pingAgent5 send"

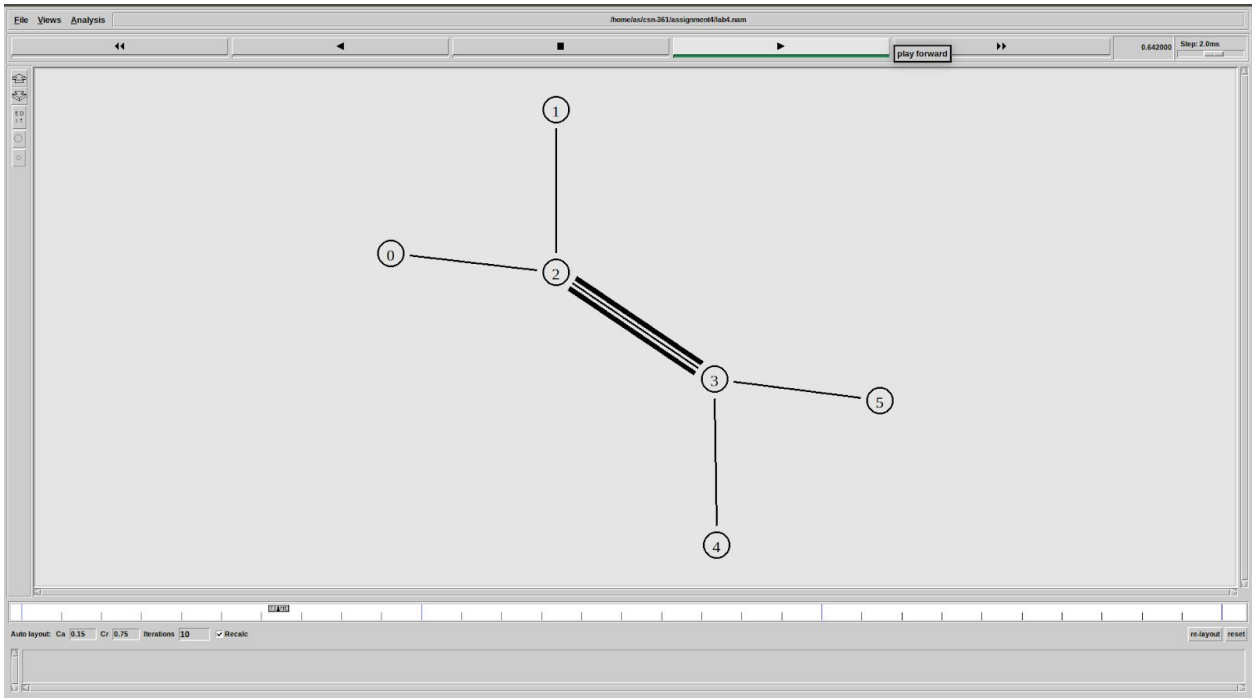
$netSimInstance at 2.5 "$pingAgent5 send"

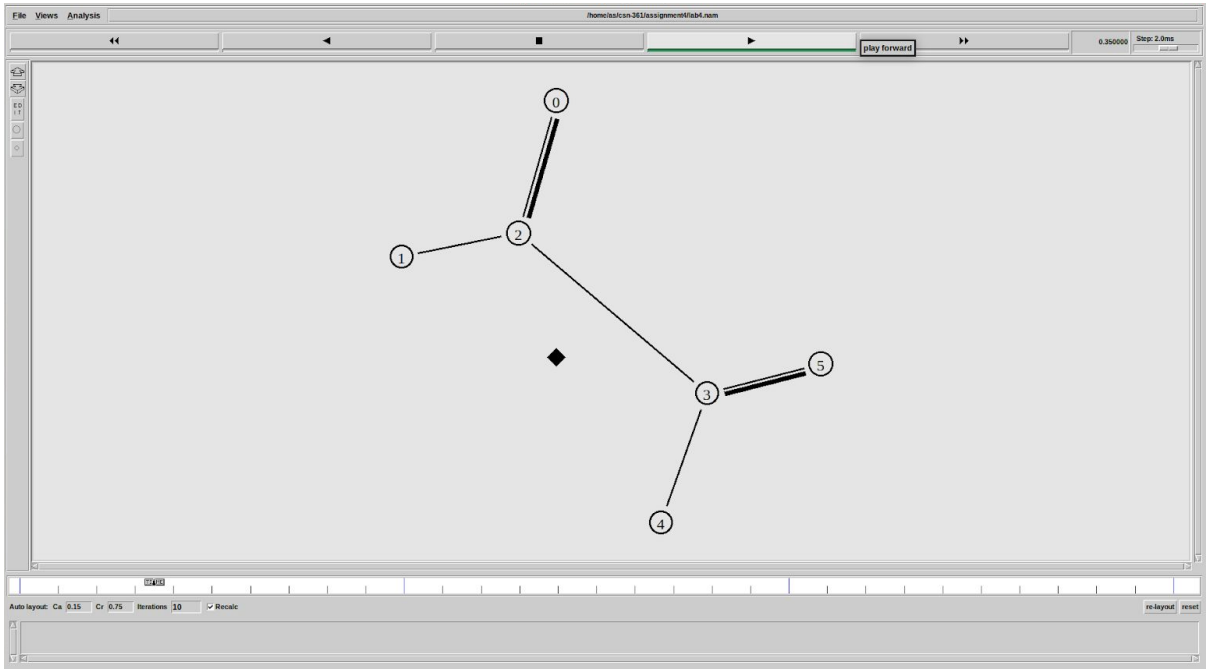
$netSimInstance at 2.6 "$pingAgent5 send"

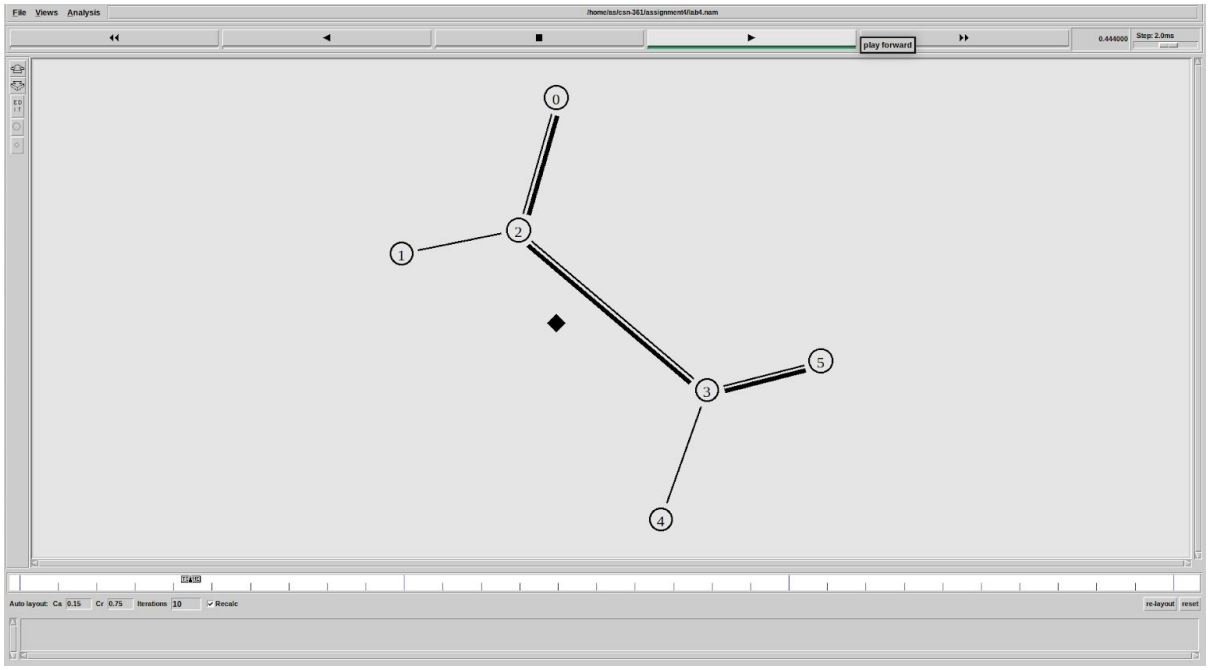
```
$netSimInstance at 2.7 "$pingAgent5 send"

$netSimInstance at 2.8 "$pingAgent5 send"

$netSimInstance at 2.9 "$pingAgent5 send"


$netSimInstance at 3.0 "finish"

 $netSimInstance run
```

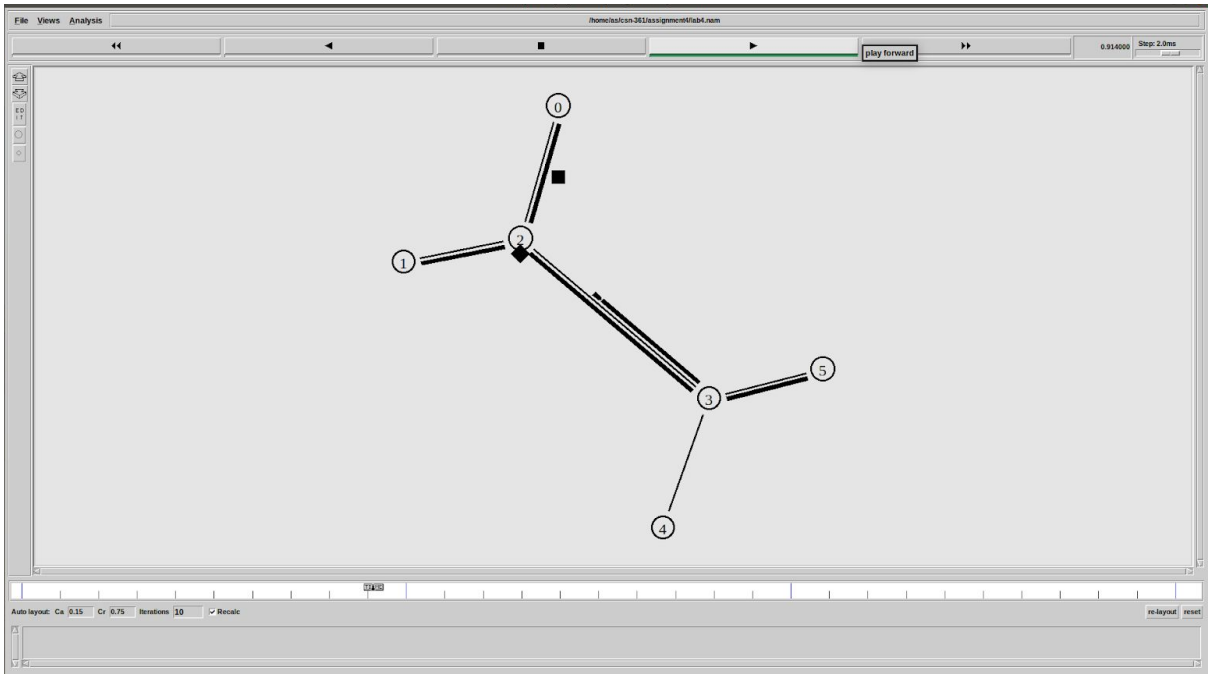
Screenshots:

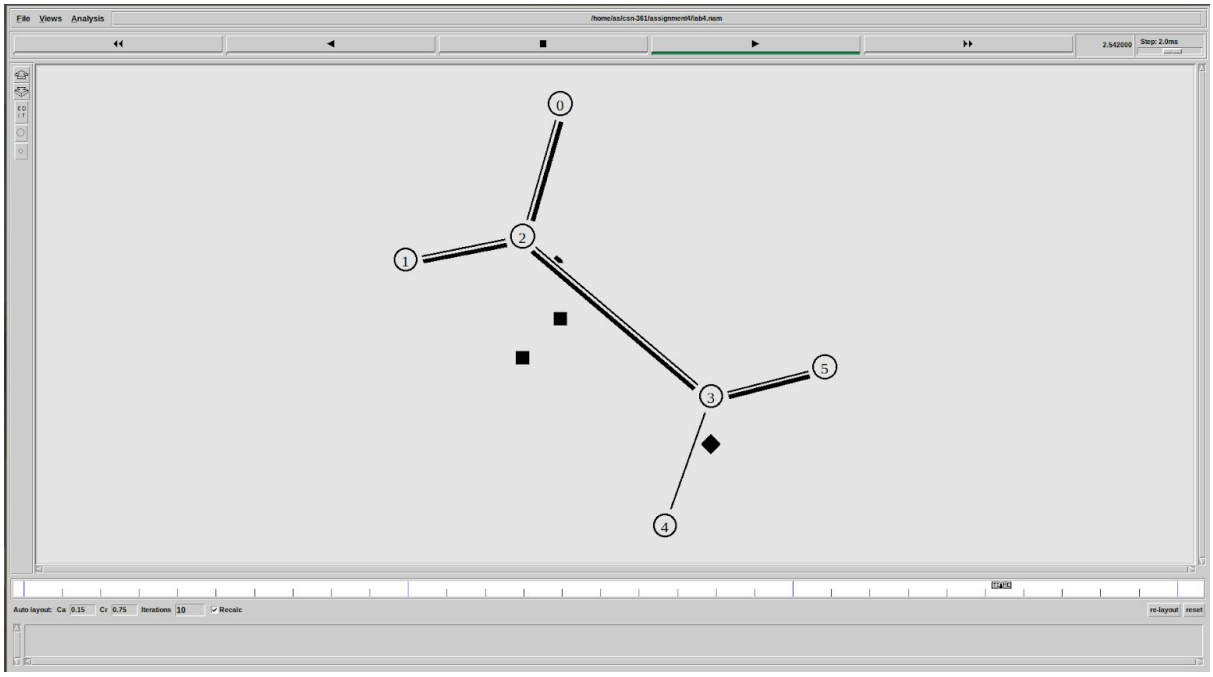

nam: /home/as/csn-361/assignment4/lab4.nam
File Views Analysis
/home/as/csn-361/assignment4/lab4.nam
play forward
0.516000
Step: 2.0ms
1
0
2
3
5
4
Auto layout: Ca 0.15 Cr 0.75 Iterations 10 Recalc
re-layout reset


File Views Analysis
/home/as/csn-361/assignment4/lab4.nam
play forward
0.642000
Step: 2.0ms
1
0
2
3
5
4
Auto layout: Ca 0.15 Cr 0.75 Iterations 10 Recalc
re-layout reset


File Views Analysis
play forward
0
1
2
3
4
5


File Views Analysis
play forward
0
1
2
3
4
5


File Views Analysis
play forward
0
1
2
3
4
5


File Views Analysis
0
1
2
3
4
5