LAB ASSIGNMENT-4

CSN-361
Computer Networks Laboratory

Submitted by - Prateek Mali
Enrollment no. - 17114059 (CSE)

Problem Statements

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.

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.

1

Implementations details

I have written ns2 code to simulate a three node network with duplex links among them as given and studied 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.

I have also visualized it using nam.

Steps -

1. Event Scheduler Object creation.
2. Creating trace objects and nam objects.
3. Create the network.
4. Creating Duplex-Link.
5. Finish.

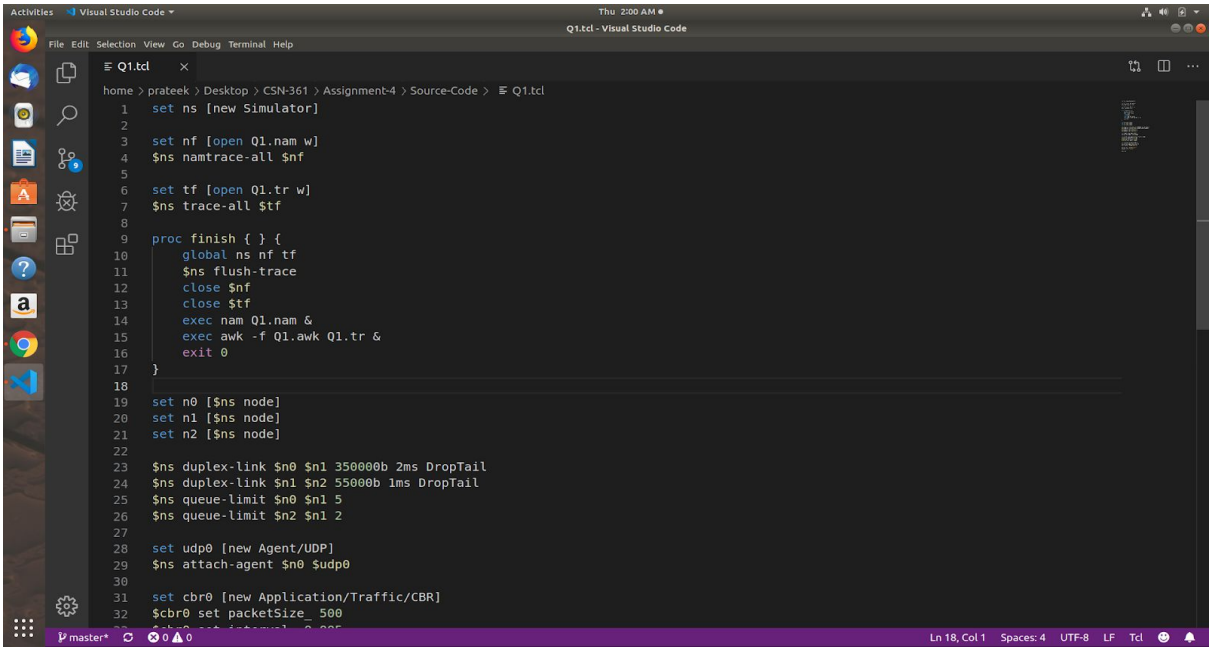
Variations -

Bandwidth-1	Bandwidth-2	Queue Size-1	Queue Size-2	n
300000b	50000b	5	3	115
200000b	40000b	6	4	130
210000b	41000b	5	4	129
250000b	25000b	5	3	121
350000b	55000b	5	2	113
320000b	60000b	5	3	112

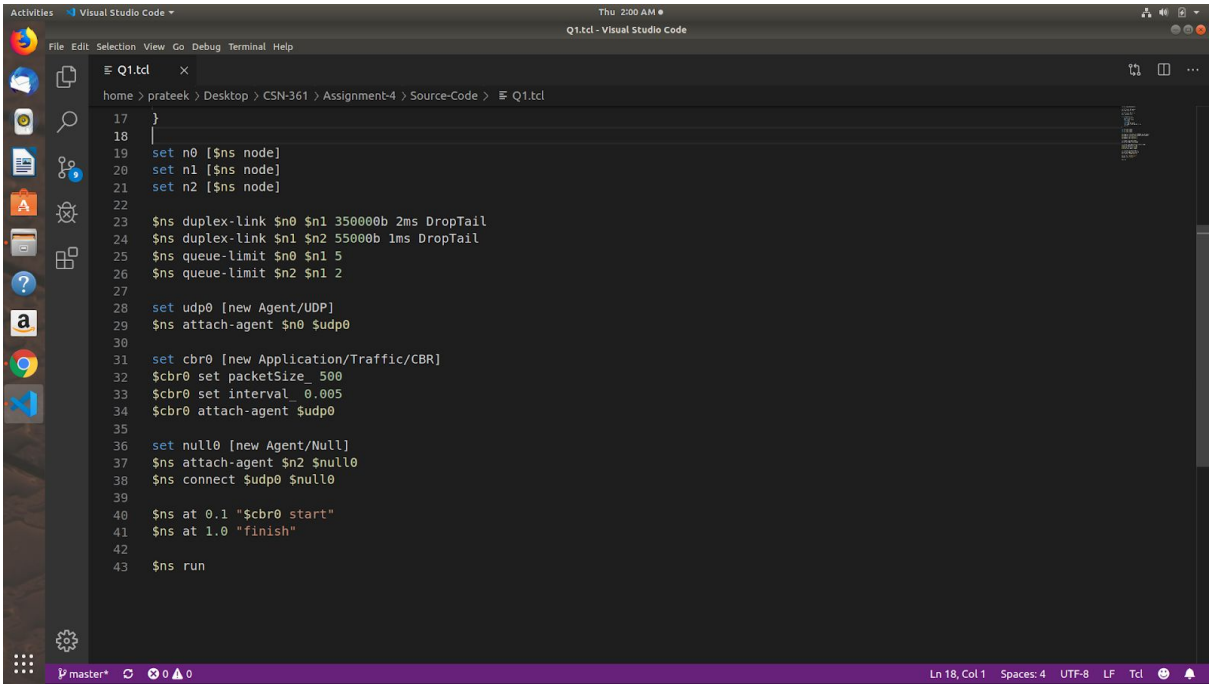
Data Structures used

- Nodes, Agent
- No other major Data Structure used

Code Snippets

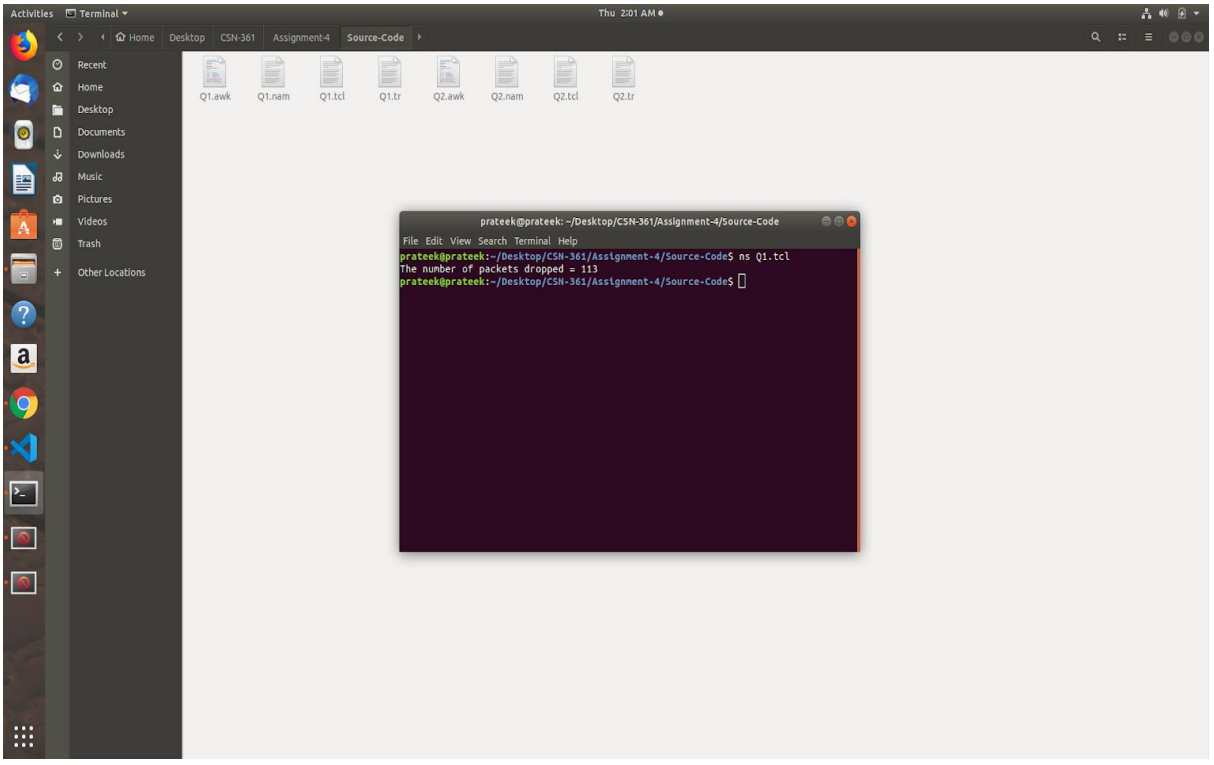


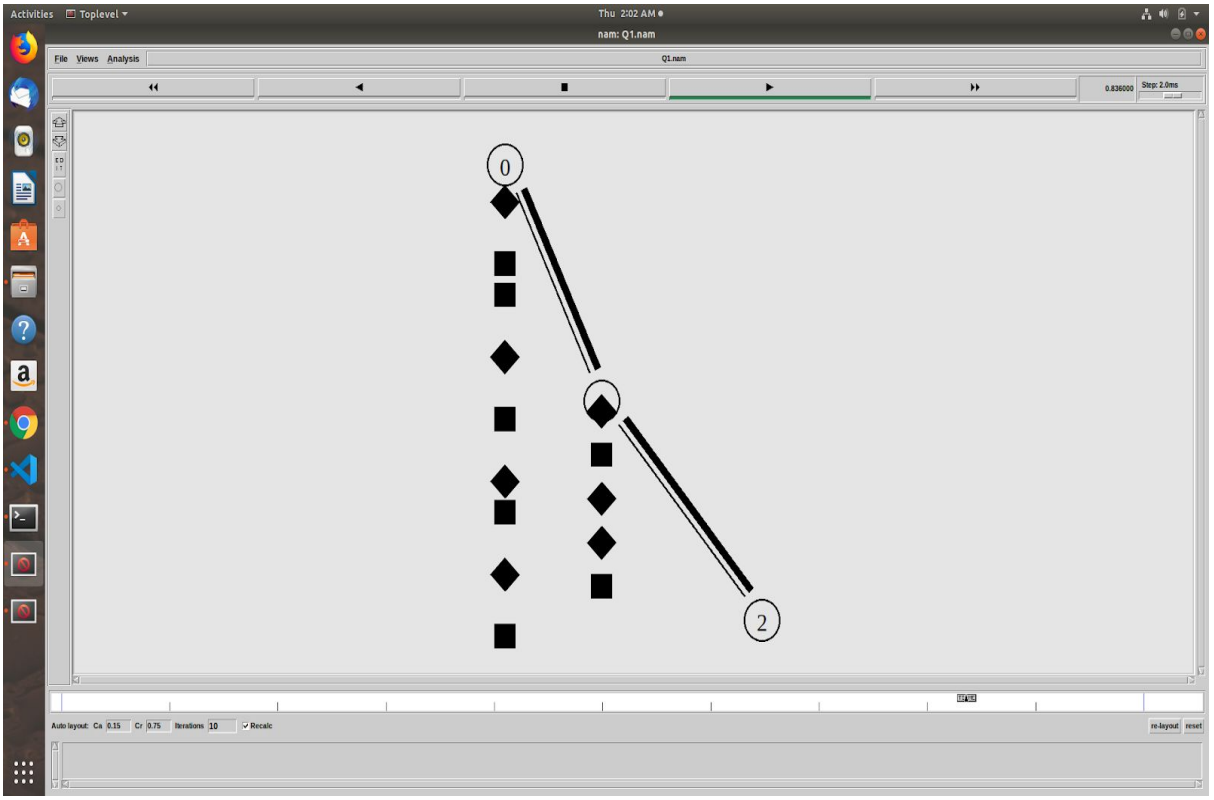
```tcl
set ns [new Simulator]

set nf [open Q1.nam w]
$ns namtrace-all $nf

set tf [open Q1.tr w]
$ns trace-all $tf

proc finish { } {
    global ns nf tf
    $ns flush-trace
    close $nf
    close $tf
    exec nam Q1.nam &
    exec awk -f Q1.awk Q1.tr &
    exit 0
}

set n0 [$ns node]
set n1 [$ns node]
set n2 [$ns node]

$ns duplex-link $n0 $n1 350000b 2ms DropTail
$ns duplex-link $n1 $n2 55000b 1ms DropTail
$ns queue-limit $n0 $n1 5
$ns queue-limit $n2 $n1 2

set udp0 [new Agent/UDP]
$ns attach-agent $n0 $udp0

set cbr0 [new Application/Traffic/CBR]
$cbr0 set packetSize_ 500
```



```tcl
}

set n0 [$ns node]
set n1 [$ns node]
set n2 [$ns node]

$ns duplex-link $n0 $n1 350000b 2ms DropTail
$ns duplex-link $n1 $n2 55000b 1ms DropTail
$ns queue-limit $n0 $n1 5
$ns queue-limit $n2 $n1 2

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 $n2 $null0
$ns connect $udp0 $null0

$ns at 0.1 "$cbr0 start"
$ns at 1.0 "finish"

$ns run
```

Snapshot of running code





2

Implementations details

I have written a Network Simulator ns2 code to simulate the transmission of ping messages over a network topology consisting of 6 nodes as given and found the number of packets dropped due to congestion.

Steps -

1. Event Scheduler Object creation.
2. Creating trace objects and nam objects.
3. Create the network.
4. Creating Duplex-Link.
5. Finish.

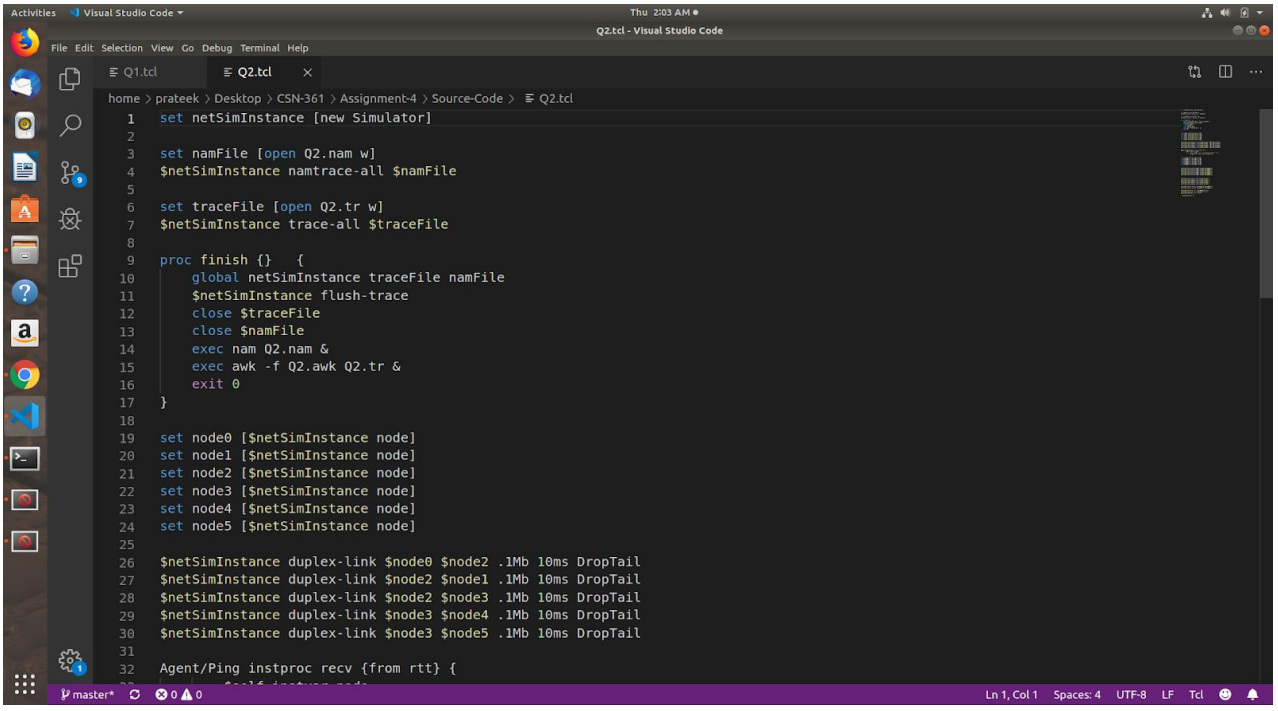
Variations -

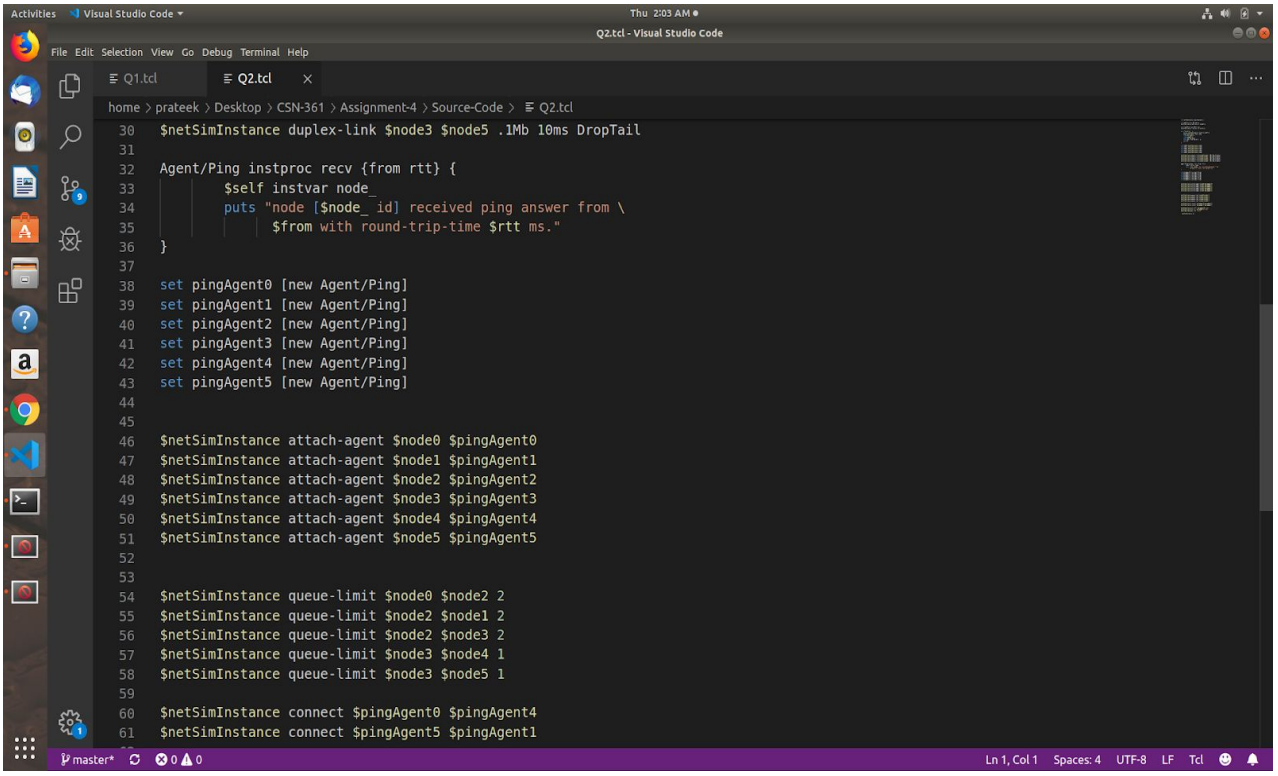
Not much variations observed.

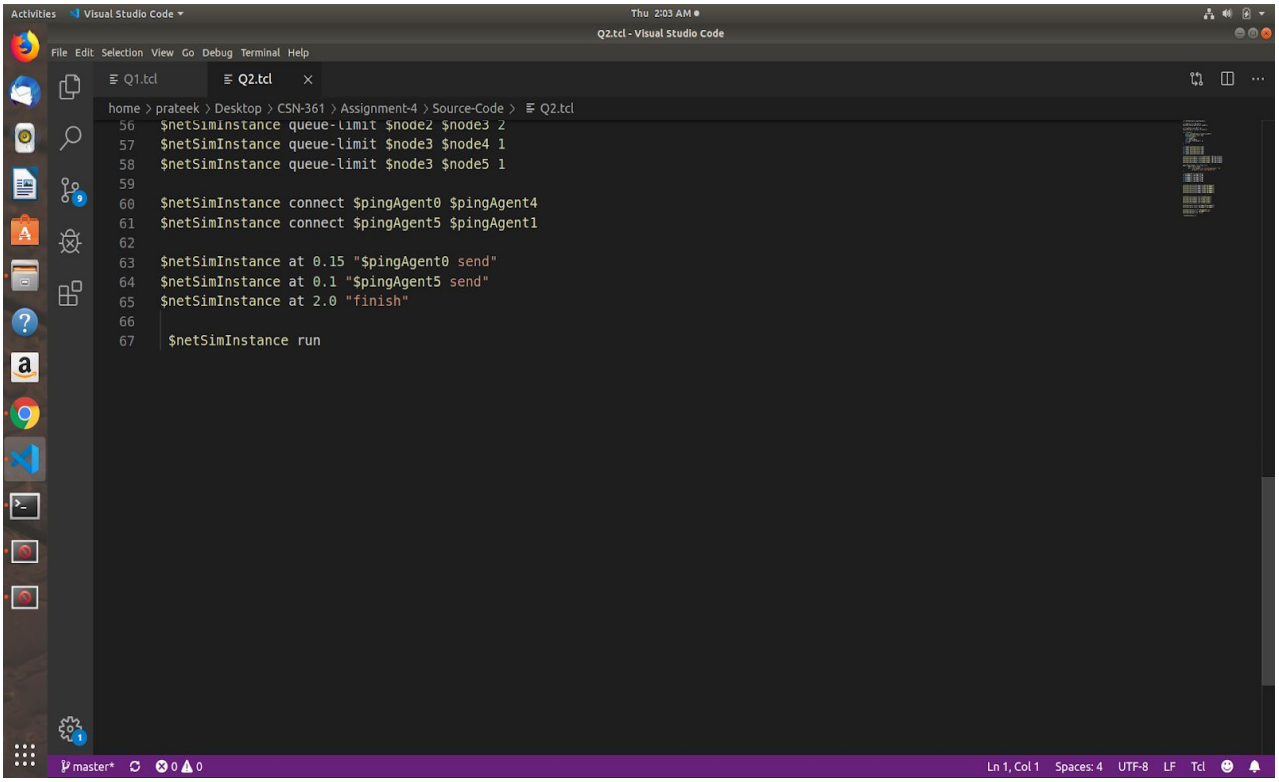
Data Structures used

- Nodes, Nodes Array, Agent.

Code Snippets




Activities
Visual Studio Code
Thu 2:03 AM
Q2.tcl - Visual Studio Code
File Edit Selection View Go Debug Terminal Help
Q1.tcl
Q2.tcl
home > prateek > Desktop > CSN-361 > Assignment-4 > Source-Code > Q2.tcl
$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
master*
0 0
Ln 1, Col 1
Spaces: 4
UTF-8
LF
Tcl


Activities
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File Edit Selection View Go Debug Terminal Help
Q1.tcl
Q2.tcl
home > prateek > Desktop > CSN-361 > Assignment-4 > Source-Code > Q2.tcl
$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
$netSimInstance at 0.15 "$pingAgent0 send"
$netSimInstance at 0.1 "$pingAgent5 send"
$netSimInstance at 2.0 "finish"
$netSimInstance run
master*
0 0
Ln 1, Col 1
Spaces: 4
UTF-8
LF
Tcl

Snapshots of running code