SSN COLLEGE OF ENGINEERING, KALAVAKKAM
(An Autonomous Institution, Affiliated to Anna University, Chennai)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

NETWORKS LAB
EXERCISE 11

Name: Jayannthan P T *Dept: CSE 'A'* *Roll No.: 205001049*

Performance Evaluation of TCP and UDP

Aim:

To write TCL script to evaluate the performance of TCP and UDP sharing a bottleneck link.

Code:

TCL File

```
set ns [new Simulator]

$ns color 1 Blue
$ns color 2 Red

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

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

set n(0) [$ns node]
set n(1) [$ns node]
set n(2) [$ns node]
set n(3) [$ns node]
set n(4) [$ns node]
set n(5) [$ns node]

$ns duplex-link $n(0) $n(2) 2Mb 10ms DropTail
$ns duplex-link $n(1) $n(2) 2Mb 10ms DropTail
$ns simplex-link $n(2) $n(3) 0.3Mb 100ms DropTail
$ns simplex-link $n(3) $n(2) 0.3Mb 100ms DropTail
$ns duplex-link $n(3) $n(4) 0.5Mb 40ms DropTail
$ns duplex-link $n(3) $n(5) 0.5Mb 40ms DropTail
```

```
$ns queue-limit $n(2) $n(3) 10

$ns duplex-link-op $n(0) $n(2) orient right
$ns duplex-link-op $n(1) $n(2) orient down
$ns simplex-link-op $n(2) $n(3) orient right
$ns simplex-link-op $n(3) $n(2) orient left
$ns duplex-link-op $n(3) $n(4) orient down
$ns duplex-link-op $n(3) $n(5) orient right

set tcp [new Agent/TCP]
$tcp set packetSize_ 1000
$ns attach-agent $n(0) $tcp
set sink [new Agent/TCPSink]
$ns attach-agent $n(4) $sink
$ns connect $tcp $sink
$tcp set fid_ 1

set udp [new Agent/UDP]
$ns attach-agent $n(1) $udp
set null [new Agent/Null]
$ns attach-agent $n(5) $null
$ns connect $udp $null
$udp set fid_ 2

set ftp1 [new Application/FTP]
$ftp1 attach-agent $tcp
$ftp1 set type_ FTP
$tcp set packet_size_ 1000
$ftp1 set rate_ 1mb
$ftp1 set random_ false

set cbr2 [new Application/Traffic/CBR]
$cbr2 attach-agent $udp
$cbr2 set type_ CBR
$cbr2 set packet_size_ 1000
$cbr2 set rate_ 1mb
$cbr2 set random_ false

$ns at 0.0 "$ftp1 start"
$ns at 0.0 "$cbr2 start"
$ns at 5.0 "$ftp1 stop"
$ns at 5.0 "$cbr2 stop"
$ns at 4.9 "$ns detach-agent $n(0) $tcp ; $ns detach-agent $n(4) $sink ; $ns detach-agent
$n(1) $udp ; $ns detach-agent $n(5) $null"
$ns at 5.0 "finish"

$ns run
```

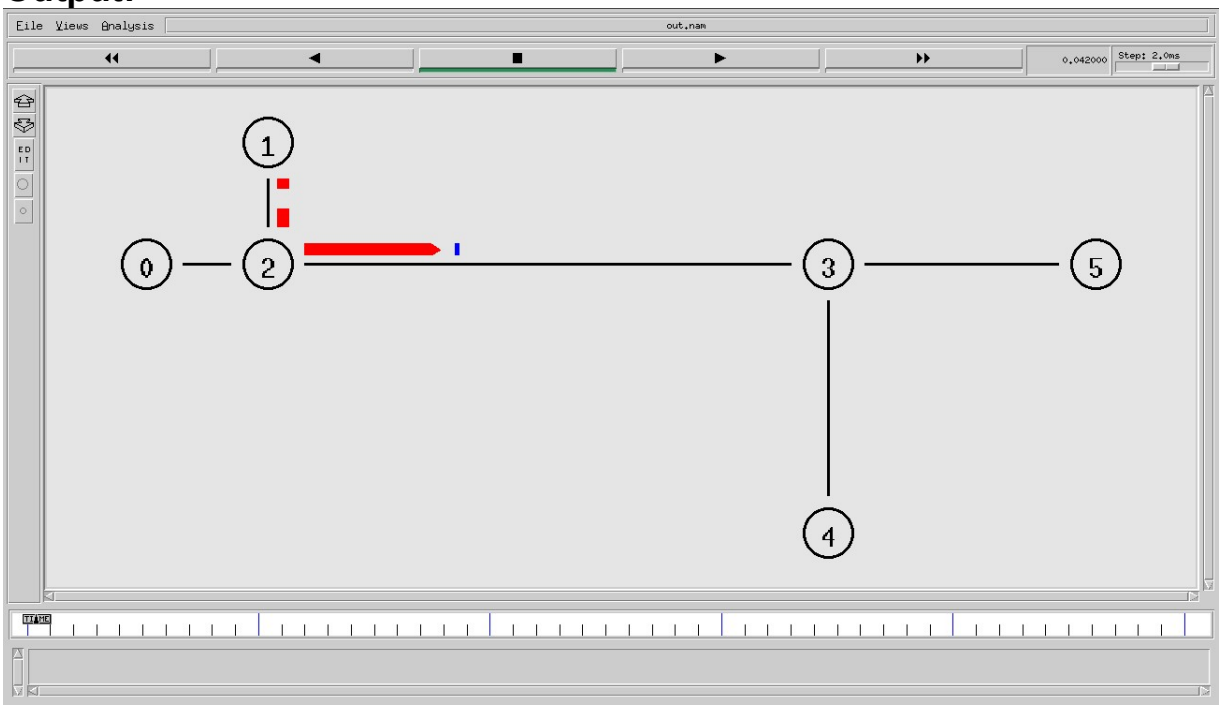
Awk file for UDP

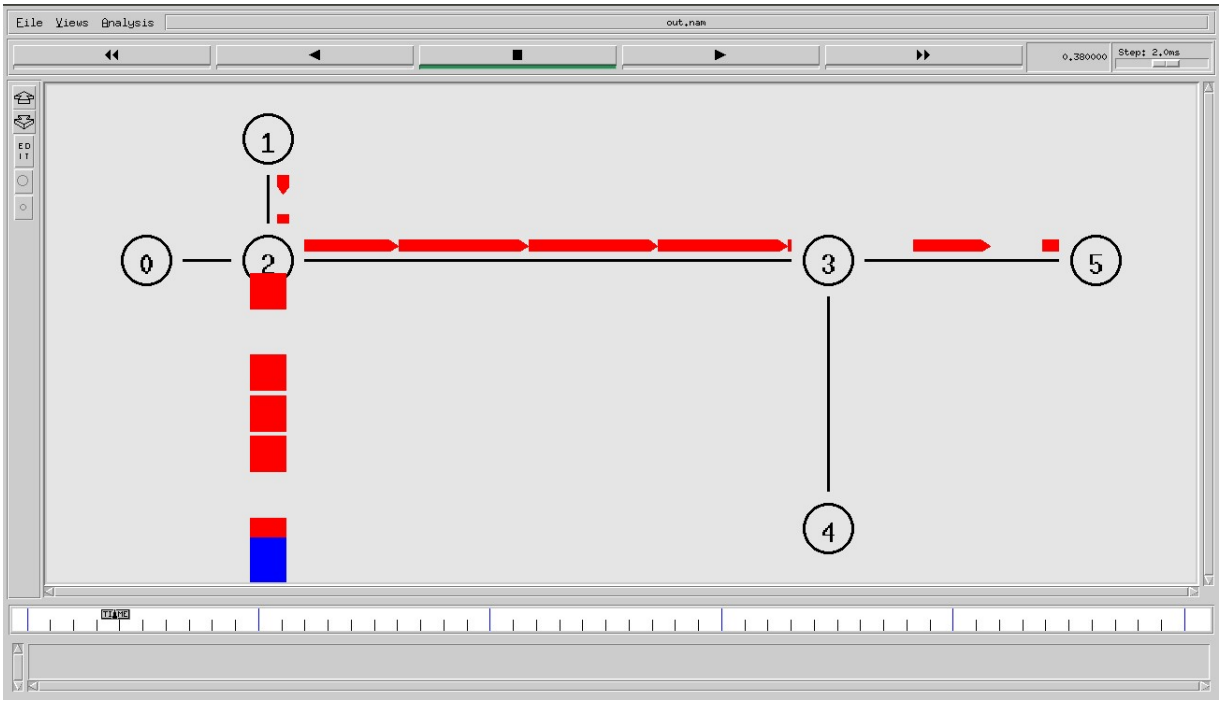
```
BEGIN {
    recvdSize = 0
    transSize = 0
    startTime = 400
    stopTime = 0
}

{
    event = $1
    time = $3
    send_id = $5
    rec_id = $7
    pkt_size = $11
    flow_id = $17
    type=$9

    # Store start time
    if (send_id == "1") {
        if (time < startTime) {
            startTime = time
        }

        if (event == "+") {
            # Store transmitted packet's size
            #transSize += pkt_size
            transSize+=1
        }
    }

    # Update total received packets' size and store packets arrival time
    if (event == "r" && rec_id == "5") {
        if (time > stopTime) {
            stopTime = time
        }
        # Store received packet's size
        if (flow_id == "2") {
            #recvdSize += pkt_size
            recvdSize+=1
        }
    }
}

END {
    printf("UDP throughput: %.2f packets/sec\n",recvdSize/stopTime)
    #printf("%i\t%i\t%.2f\t%.2f\t%.2f\n", transSize, recvdSize, startTime,
stopTime,recvdSize/stopTime)
}
```

Awk file for TCP

```
BEGIN {
    recvdSize = 0
    transSize = 0
    startTime = 400
    stopTime = 0
}

{
    event = $1
    time = $3
    send_id = $5
    rec_id = $7
    pkt_size = $11
    flow_id = $17
    type=$9

    # Store start time
    if (send_id == "0") {
        if (time < startTime) {
            startTime = time
        }

        if (event == "+") {
            # Store transmitted packet's size
            #transSize += pkt_size
            transSize+=1
        }
    }

    # Update total received packets' size and store packets arrival time
    if (event == "r" && rec_id == "4") {
        if (time > stopTime) {
            stopTime = time
        }
        # Store received packet's size
        if (flow_id == "1") {
            #recvdSize += pkt_size
            recvdSize+=1
        }
    }
}

END {
    printf("TCP throughput: %.2f packets/sec\n",recvdSize/stopTime)
    #printf("%i\t%i\t%.2f\t%.2f\t%.2f\n", transSize, recvdSize, startTime,
stopTime,recvdSize/stopTime)
}
```

Output:






```
ssn@ssn-c16:~/Downloads$ ns A11.tcl
ssn@ssn-c16:~/Downloads$ awk -f A11TCP.awk out.nam
Percentage of packets lost: 80.00 percent
TCP throughput: 6.58 packets/sec
ssn@ssn-c16:~/Downloads$ awk -f A11UDP.awk out.nam
Percentage of packets lost: 70.47 percent
UDP throughput: 36.22 packets/sec
```

Learning outcome:

Learnt to simulate and evaluate the performance of TCP and UDP sharing a bottleneck link has been written and executed.