LAB 7

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Q1)

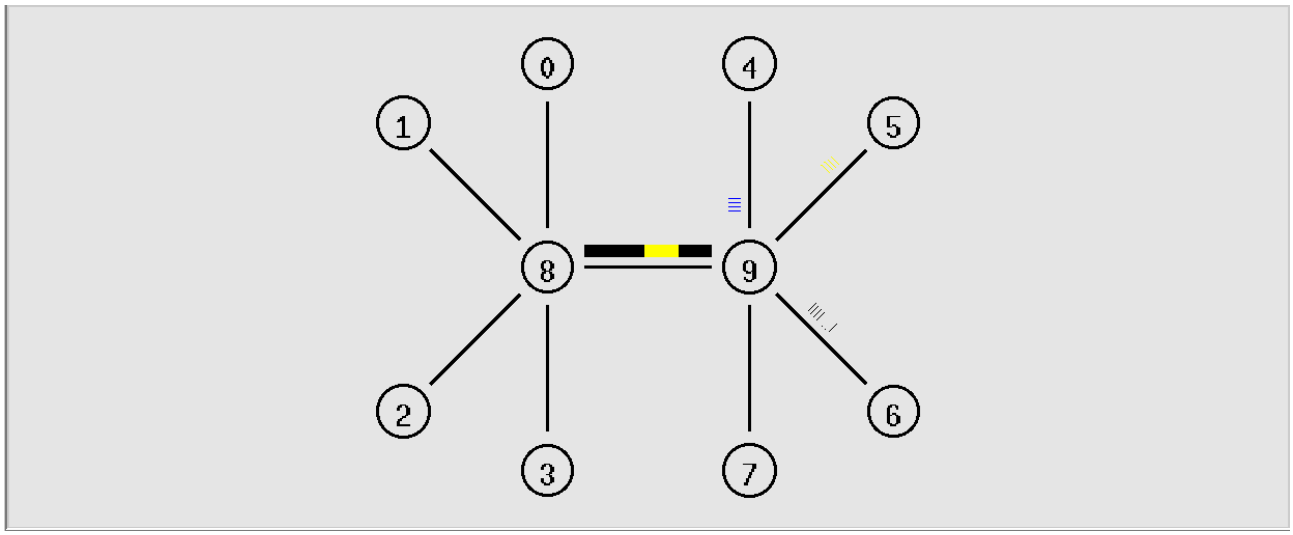
Useing Droptail

```
 set ns [new Simulator]

#Define different colors for data flows
$ns color 1 Blue
$ns color 2 Red
$ns color 3 Yellow

#Open the nam trace file
set nf [open out.nam w]
$ns namtrace-all $nf
set file1 [open qm.out w]

#Define a 'finish' procedure
proc finish {} {
        global ns nf
        $ns flush-trace

        #Close the trace file
        close $nf

        #Execute nam on the trace file
        exec nam out.nam
        exit 0
}
```

```
#Create five nodes
set s0 [$ns node]
set s1 [$ns node]
set s2 [$ns node]
set s3 [$ns node]
set d0 [$ns node]
set d1 [$ns node]
set d2 [$ns node]
set d3 [$ns node]
set r0 [$ns node]
set r1 [$ns node]

#Create links between the nodes
$ns duplex-link $s0 $r0 100Mb 25ms DropTail
$ns duplex-link $s1 $r0 100Mb 25ms DropTail
$ns duplex-link $s2 $r0 100Mb 25ms DropTail
$ns duplex-link $s3 $r0 100Mb 25ms DropTail
$ns duplex-link $d0 $r1 100Mb 25ms DropTail
$ns duplex-link $d1 $r1 100Mb 25ms DropTail
$ns duplex-link $d2 $r1 100Mb 25ms DropTail
$ns duplex-link $d3 $r1 100Mb 25ms DropTail
$ns duplex-link $r0 $r1 10Mb 25ms DropTail
$ns duplex-link-op $s0 $r0 orient down
$ns duplex-link-op $s1 $r0 orient right-down
$ns duplex-link-op $s2 $r0 orient right-up
$ns duplex-link-op $s3 $r0 orient up
$ns duplex-link-op $r0 $r1 orient right
$ns duplex-link-op $r1 $d0 orient up
$ns duplex-link-op $r1 $d1 orient right-up
$ns duplex-link-op $r1 $d2 orient right-down
$ns duplex-link-op $r1 $d3 orient down
set tcp2 [new Agent/TCP]
$tcp2 set class_ 1
$ns attach-agent $s0 $tcp2
```

```
set traffic_ftp2 [new Application/FTP]
$traffic_ftp2 set interval_ 0.005
$traffic_ftp2 attach-agent $tcp2
set tcp3 [new Agent/TCP]
$tcp3 set class_ 2
$ns attach-agent $s1 $tcp3
set traffic_ftp3 [new Application/FTP]
$traffic_ftp3 set interval_ 0.005
$traffic_ftp3 attach-agent $tcp3
set tcp4 [new Agent/TCP]
$tcp3 set class_ 3
$ns attach-agent $s2 $tcp4
set traffic_ftp4 [new Application/FTP]
$traffic_ftp4 set interval_ 0.005
$traffic_ftp4 attach-agent $tcp4
set tcp5 [new Agent/TCP]
$ns attach-agent $s3 $tcp5
set traffic_ftp5 [new Application/FTP]
$traffic_ftp5 set interval_ 0.005
$traffic_ftp5 attach-agent $tcp5
set sink2 [new Agent/TCPSink]
$ns attach-agent $d0 $sink2
set sink3 [new Agent/TCPSink]
$ns attach-agent $d1 $sink3
set sink4 [new Agent/TCPSink]
$ns attach-agent $d2 $sink4
set sink5 [new Agent/TCPSink]
$ns attach-agent $d2 $sink5
$ns connect $tcp2 $sink2
$ns connect $tcp3 $sink3
$ns connect $tcp4 $sink4
$ns connect $tcp5 $sink5
$ns at 1.0 "$traffic_ftp2 start"
$ns at 1.0 "$traffic_ftp3 start"
$ns at 1.0 "$traffic_ftp4 start"
```

```
$ns at 1.0 "$traffic_ftp5 start"
$ns at 4.0 "$traffic_ftp3 stop"
$ns at 4.0 "$traffic_ftp2 stop"
$ns at 4.0 "$traffic_ftp4 stop"
$ns at 4.0 "$traffic_ftp5 stop"
set qmon [$ns monitor-queue $r0 $r1 $file1 0.1]
[$ns link $r0 $r1] queue-sample-timeout
$ns at 5.0 "finish"

#Run the simulation
$ns run
```



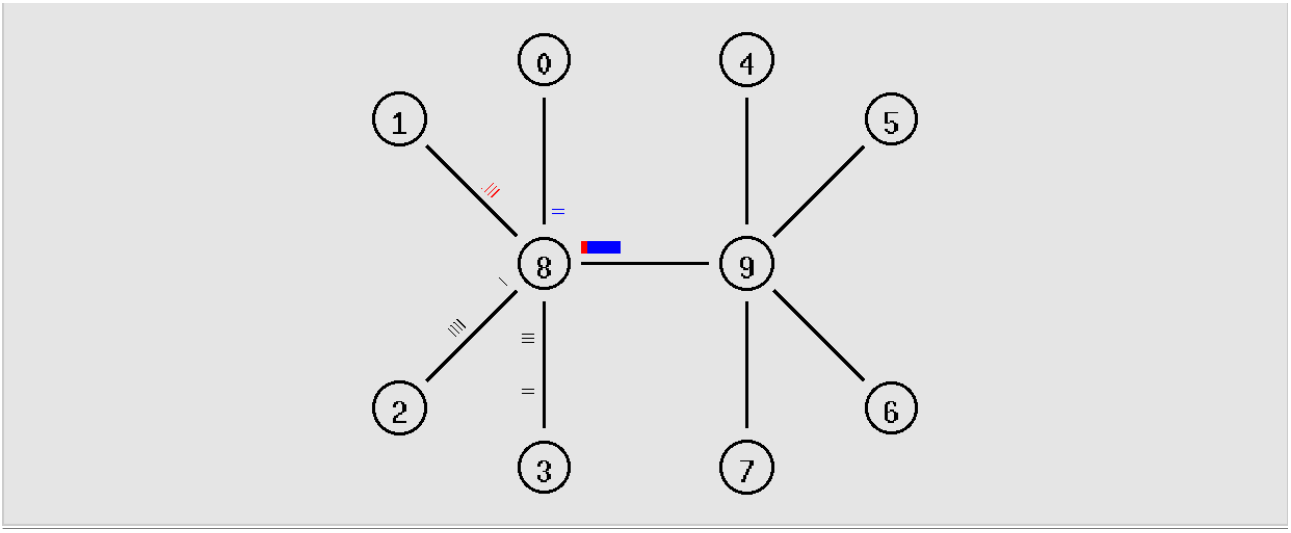
Using RED

```
set ns [new Simulator]

#Define different colors for data flows
$ns color 1 Blue
$ns color 2 Red

#Open the nam trace file
```

```
set nf [open out.nam w]
$ns namtrace-all $nf
set file1 [open qm.out w]

#Define a 'finish' procedure
proc finish {} {
global ns nf
$ns flush-trace

#Close the trace file
close $nf

#Execute nam on the trace file
exec nam out.nam
exit 0
}

#Create five nodes
set s0 [$ns node]
set s1 [$ns node]
set s2 [$ns node]
set s3 [$ns node]
set d0 [$ns node]
set d1 [$ns node]
set d2 [$ns node]
set d3 [$ns node]
set r0 [$ns node]
set r1 [$ns node]

#Create links between the nodes
$ns duplex-link $s0 $r0 100Mb 25ms RED
$ns duplex-link $s1 $r0 100Mb 25ms RED
$ns duplex-link $s2 $r0 100Mb 25ms RED
$ns duplex-link $s3 $r0 100Mb 25ms RED
$ns duplex-link $d0 $r1 100Mb 25ms RED
```

```
$ns duplex-link $d1 $r1 100Mb 25ms RED
$ns duplex-link $d2 $r1 100Mb 25ms RED
$ns duplex-link $d3 $r1 100Mb 25ms RED
$ns duplex-link $r0 $r1 10Mb 25ms RED
$ns duplex-link-op $s0 $r0 orient down
$ns duplex-link-op $s1 $r0 orient right-down
$ns duplex-link-op $s2 $r0 orient right-up
$ns duplex-link-op $s3 $r0 orient up
$ns duplex-link-op $r0 $r1 orient right
$ns duplex-link-op $r1 $d0 orient up
$ns duplex-link-op $r1 $d1 orient right-up
$ns duplex-link-op $r1 $d2 orient right-down
$ns duplex-link-op $r1 $d3 orient down
set tcp2 [new Agent/TCP]
$tcp2 set class_ 1
$ns attach-agent $s0 $tcp2
set traffic_ftp2 [new Application/FTP]
$traffic_ftp2 set interval_ 0.005
$traffic_ftp2 attach-agent $tcp2
set tcp3 [new Agent/TCP]
$tcp3 set class_ 2
$ns attach-agent $s1 $tcp3
set traffic_ftp3 [new Application/FTP]
$traffic_ftp3 set interval_ 0.005
$traffic_ftp3 attach-agent $tcp3
set tcp4 [new Agent/TCP]
$ns attach-agent $s2 $tcp4
set traffic_ftp4 [new Application/FTP]
$traffic_ftp4 set interval_ 0.005
$traffic_ftp4 attach-agent $tcp4
set tcp5 [new Agent/TCP]
$ns attach-agent $s3 $tcp5
set traffic_ftp5 [new Application/FTP]
$traffic_ftp5 set interval_ 0.005
$traffic_ftp5 attach-agent $tcp5
```

```
set sink2 [new Agent/TCPSink]
$ns attach-agent $d0 $sink2
set sink3 [new Agent/TCPSink]
$ns attach-agent $d1 $sink3
set sink4 [new Agent/TCPSink]
$ns attach-agent $d2 $sink4
set sink5 [new Agent/TCPSink]
$ns attach-agent $d2 $sink5
$ns connect $tcp2 $sink2
$ns connect $tcp3 $sink3
$ns connect $tcp4 $sink4
$ns connect $tcp5 $sink5
$ns at 1.0 "$traffic_ftp2 start"
$ns at 1.0 "$traffic_ftp3 start"
$ns at 1.0 "$traffic_ftp4 start"
$ns at 1.0 "$traffic_ftp5 start"
$ns at 4.0 "$traffic_ftp3 stop"
$ns at 4.0 "$traffic_ftp2 stop"
$ns at 4.0 "$traffic_ftp4 stop"
$ns at 4.0 "$traffic_ftp5 stop"
set qmon [$ns monitor-queue $r0 $r1 $file1 0.1]
[$ns link $r0 $r1] queue-sample-timeout
$ns at 5.0 "finish"


#Run the simulation
$ns run
```



Using Adaptive RED

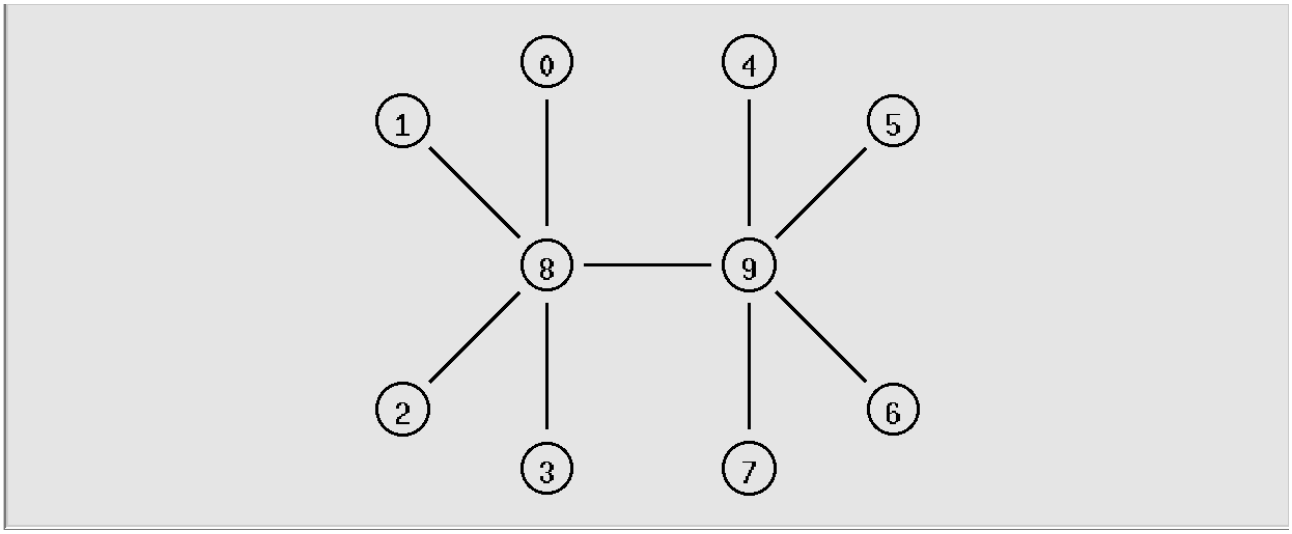
```
set ns [new Simulator]

#Define different colors for data flows
$ns color 1 Blue
$ns color 2 Red
$ns color 3 Yellow

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

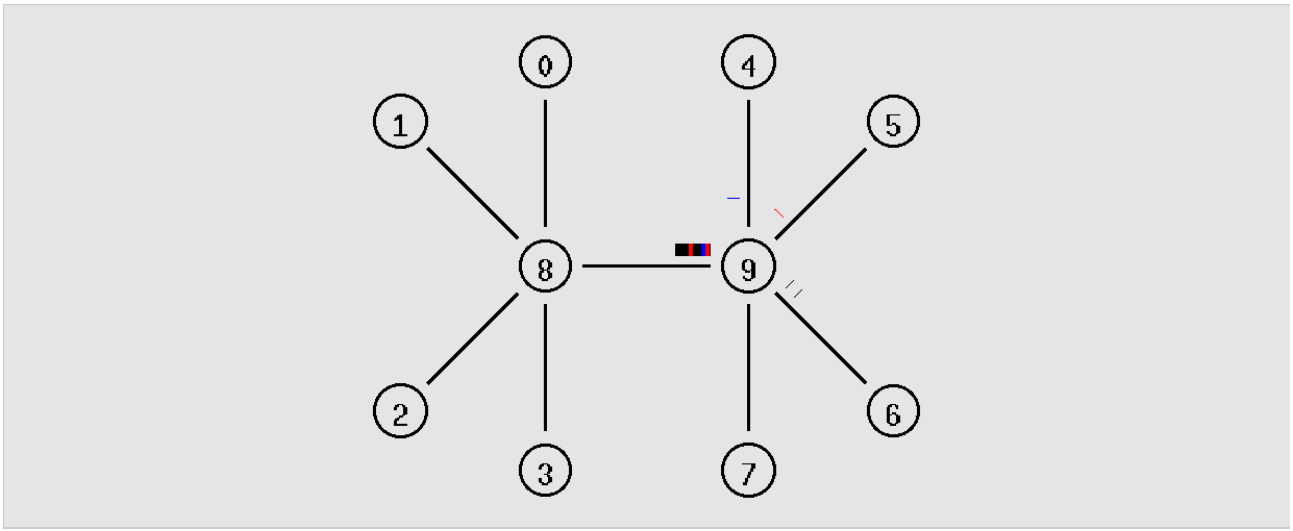
```
set file1 [open adaptive_red.out w]
#Define a 'finish' procedure
#Define a 'finish' procedure

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 five nodes
set s0 [$ns node]
set s1 [$ns node]
set s2 [$ns node]
set s3 [$ns node]
set d0 [$ns node]
set d1 [$ns node]
set d2 [$ns node]
set d3 [$ns node]
set r0 [$ns node]
set r1 [$ns node]
```

```
#Create links between the nodes
$ns duplex-link $s0 $r0 100Mb 25ms SFQ
$ns duplex-link $s1 $r0 100Mb 25ms SFQ
$ns duplex-link $s2 $r0 100Mb 25ms SFQ
$ns duplex-link $s3 $r0 100Mb 25ms SFQ
$ns duplex-link $d0 $r1 100Mb 25ms SFQ
$ns duplex-link $d1 $r1 100Mb 25ms SFQ
$ns duplex-link $d2 $r1 100Mb 25ms SFQ
$ns duplex-link $d3 $r1 100Mb 25ms SFQ
$ns duplex-link $r0 $r1 10Mb 25ms SFQ

#orientation
$ns duplex-link-op $s0 $r0 orient down
$ns duplex-link-op $s1 $r0 orient right-down
$ns duplex-link-op $s2 $r0 orient right-up
$ns duplex-link-op $s3 $r0 orient up
$ns duplex-link-op $r0 $r1 orient right
$ns duplex-link-op $r1 $d0 orient up
$ns duplex-link-op $r1 $d1 orient right-up
$ns duplex-link-op $r1 $d2 orient right-down
$ns duplex-link-op $r1 $d3 orient down

#tcp connection from s0
set tcp2 [new Agent/TCP]
$tcp2 set class_ 1
$ns attach-agent $s0 $tcp2
set traffic_ftp2 [new Application/FTP]
$traffic_ftp2 set interval_ 0.005
$traffic_ftp2 attach-agent $tcp2

#tcp connection from s1
set tcp3 [new Agent/TCP]
$tcp3 set class_ 2
$ns attach-agent $s1 $tcp3
set traffic_ftp3 [new Application/FTP]
```

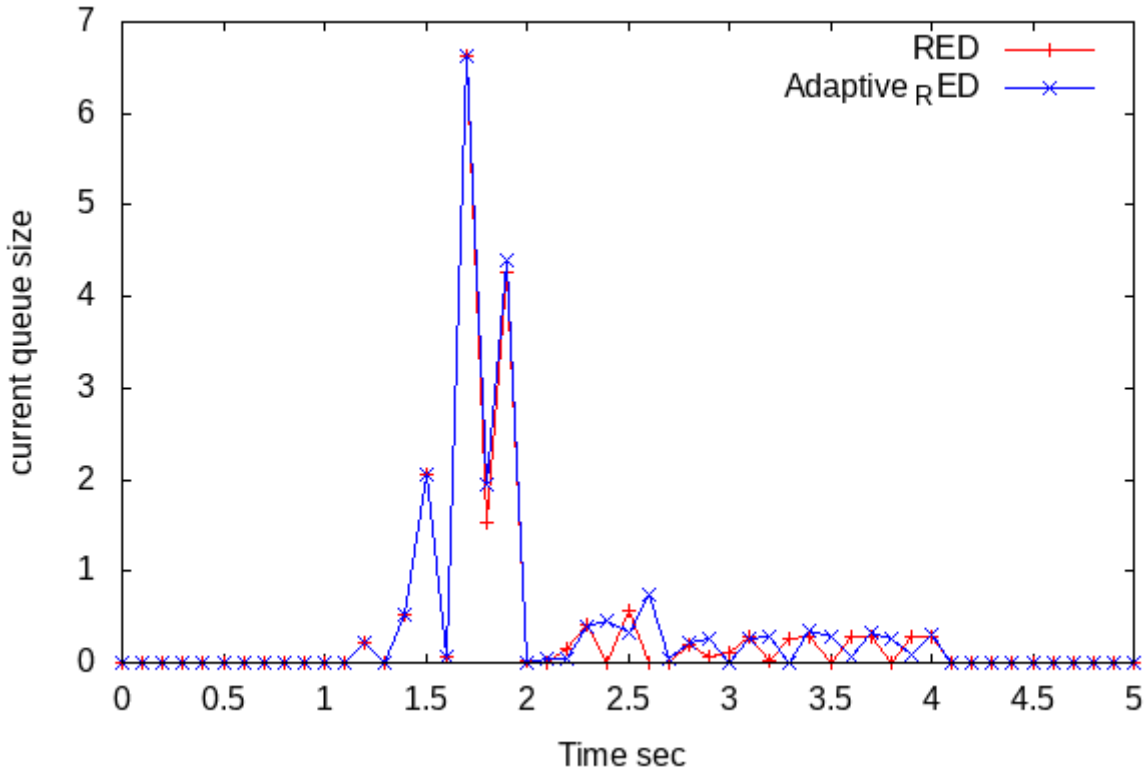
```
$traffic_ftp3 set interval_ 0.005
$traffic_ftp3 attach-agent $tcp3

#tcp connection from s2
set tcp4 [new Agent/TCP]
$tcp3 set class_ 3
$ns attach-agent $s2 $tcp4
set traffic_ftp4 [new Application/FTP]
$traffic_ftp4 set interval_ 0.005
$traffic_ftp4 attach-agent $tcp4

#tcp connection from s3
set tcp5 [new Agent/TCP]
$ns attach-agent $s3 $tcp5
set traffic_ftp5 [new Application/FTP]
$traffic_ftp5 set interval_ 0.005
$traffic_ftp5 attach-agent $tcp5


set sink2 [new Agent/TCPSink]
$ns attach-agent $d0 $sink2
set sink3 [new Agent/TCPSink]
$ns attach-agent $d1 $sink3
set sink4 [new Agent/TCPSink]
$ns attach-agent $d2 $sink4
set sink5 [new Agent/TCPSink]
$ns attach-agent $d2 $sink5

# connection between tcp and sinks
$ns connect $tcp2 $sink2
$ns connect $tcp3 $sink3
$ns connect $tcp4 $sink4
$ns connect $tcp5 $sink5
$ns at 1.0 "$traffic_ftp2 start"
$ns at 1.0 "$traffic_ftp3 start"
```

```
$ns at 1.0 "$traffic_ftp4 start"
$ns at 1.0 "$traffic_ftp5 start"
$ns at 4.0 "$traffic_ftp3 stop"
$ns at 4.0 "$traffic_ftp2 stop"
$ns at 4.0 "$traffic_ftp4 stop"
$ns at 4.0 "$traffic_ftp5 stop"


set qmon [$ns monitor-queue $r0 $r1 $file1 0.1]
[$ns link $r0 $r1] queue-sample-timeout


$ns at 5.0 "finish"
#Run the simulation
$ns run
```





Graph plot between RED vs Adaptive RED


RED
Adaptive RED
current queue size
Time sec
0
1
2
3
4
5
6
7
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5