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Assignment - B1

Title :- study of network simulation

objective :- To learn & understand network simulation NS2

Problem statement :-

study of any network simulation tools to create a network with three nodes & establish a TCP connection between node 0 & node 1 such that node 0 will send TCP packet to node via node 1

Theory :-

- Network Simulator :-

- A network simulator is a software that predicts the behaviour of computer network.
- In simulator, the computer network is modeled with devices, links, applications etc. & the performance is analysed

Types of network simulator :-

Commercial & open source simulator :-

Commercial : OPNET, QualNet.

Open Source : NS2, NS3, OMNeT++, SSFNet, J-Sim

2. Simple Vs Complex :-

- Simple network simulator enable users to represents a network topology, specifying the nodes on network, the links between those nodes & traffic between the nodes.
- Complex allows the user to specify everything about the protocols used to process trafic.

* In this assignment a file ends with '.tcl' is an OTCL script that creates the simple network configuration & runs the simulation scenario.

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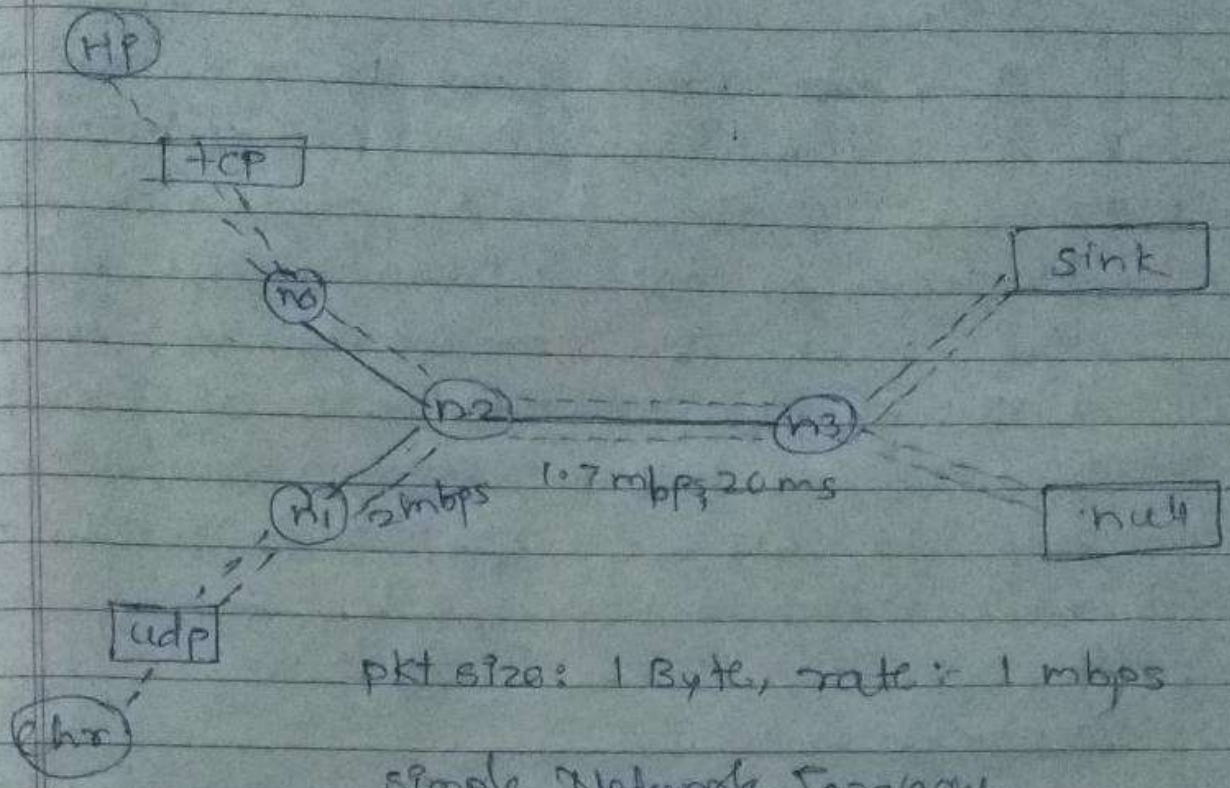


pkt size: 1 Byte, rate: 1 mbps

Simple Network Topology.

The Network shown in figure consist of 4 node (n0, n1, n2, n3) as shown in above fig. The duplex links between n0 & n2, n1 & n2 have 2mbps of bandwidth & 10 ~~mbps~~ ms of delay. The duplex link between n2 & n3 has 1.7 mbps of bandwidth & 20 ms delay.

Each node uses a droptail queue of which the max size is 10. A "Tcp" agent is attached to n0 & a connection is established to TCP "Sink" agent attached to n3. As default the max size of packet that a "TCP" agent can generate is 1KB/As A TCP "Sink agent generates & sends Ack packets to sender (Tcp agent) & frees received packets

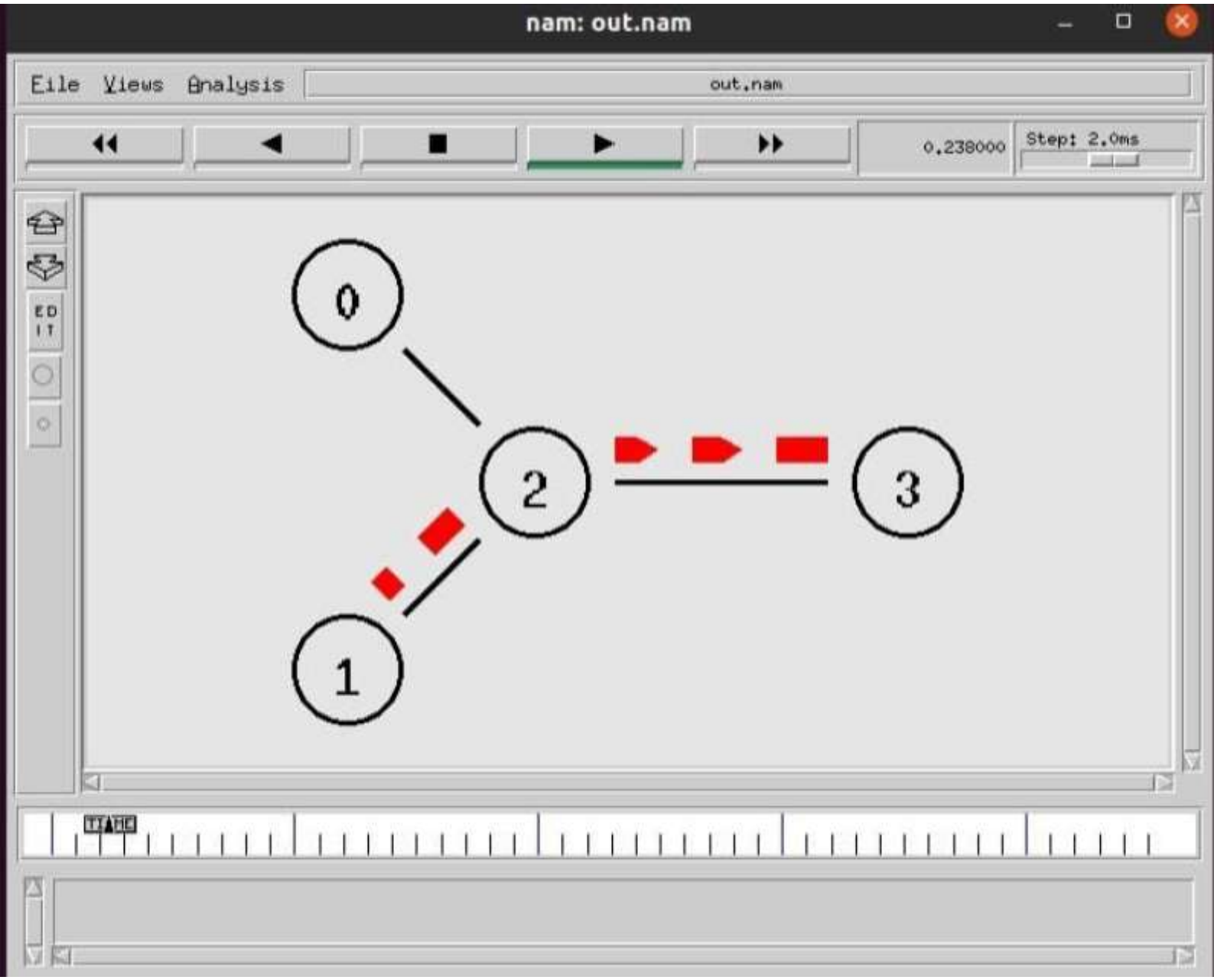
A "udp" agent that is attached to n1 is connected to a 'null' agent attached to n2. A 'null' & 'cbr' traffic generator are attached to 'tcp' & 'udp' agent resp. & the 'cbr' is configured to generate 1 KB packets at the rate of 1 mbps. The cbr is set to start at 0.1 sec & stop at 4.5 sec. & ftp is set to start at 1.0 sec & stop at 4.0 sec.

Conclusion :-

We learnt & understood the concept of network simulation ns-2.

```
#Create a simulator object
set ns [new Simulator]

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

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

#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 four nodes
set n0 [$ns node]
set n1 [$ns node]
set n2 [$ns node]
set n3 [$ns node]

#Create links between the nodes
$ns duplex-link $n0 $n2 2Mb 10ms DropTail
$ns duplex-link $n1 $n2 2Mb 10ms DropTail
$ns duplex-link $n2 $n3 1.7Mb 20ms DropTail

#Set Queue Size of link (n2-n3) to 10
$ns queue-limit $n2 $n3 10

#Give node position (for NAM)
$ns duplex-link-op $n0 $n2 orient right-down
$ns duplex-link-op $n1 $n2 orient right-up
$ns duplex-link-op $n2 $n3 orient right

#Monitor the queue for link (n2-n3). (for NAM)
$ns duplex-link-op $n2 $n3 queuePos 0.5


#Setup a TCP connection
set tcp [new Agent/TCP]
$tcp set class_ 2
$ns attach-agent $n0 $tcp
set sink [new Agent/TCPSink]
```

```
$ns attach-agent $n3 $sink
$ns connect $tcp $sink
$tcp set fid_ 1

#Setup a FTP over TCP connection
set ftp [new Application/FTP]
$ftp attach-agent $tcp
$ftp set type_ FTP


#Setup a UDP connection
set udp [new Agent/UDP]
$ns attach-agent $n1 $udp
set null [new Agent/Null]
$ns attach-agent $n3 $null
$ns connect $udp $null
$udp set fid_ 2

#Setup a CBR over UDP connection
set cbr [new Application/Traffic/CBR]
$cbr attach-agent $udp
$cbr set type_ CBR
$cbr set packet_size_ 1000
$cbr set rate_ 1mb
$cbr set random_ false


#Schedule events for the CBR and FTP agents
$ns at 0.1 "$cbr start"
$ns at 1.0 "$ftp start"
$ns at 4.0 "$ftp stop"
$ns at 4.5 "$cbr stop"

#Detach tcp and sink agents (not really necessary)
$ns at 4.5 "$ns detach-agent $n0 $tcp ; $ns detach-agent $n3 $sink"

#Call the finish procedure after 5 seconds of simulation time
$ns at 5.0 "finish"

#Print CBR packet size and interval
puts "CBR packet size = [$cbr set packet_size_]"
puts "CBR interval = [$cbr set interval_]"

#Run the simulation
$ns run
```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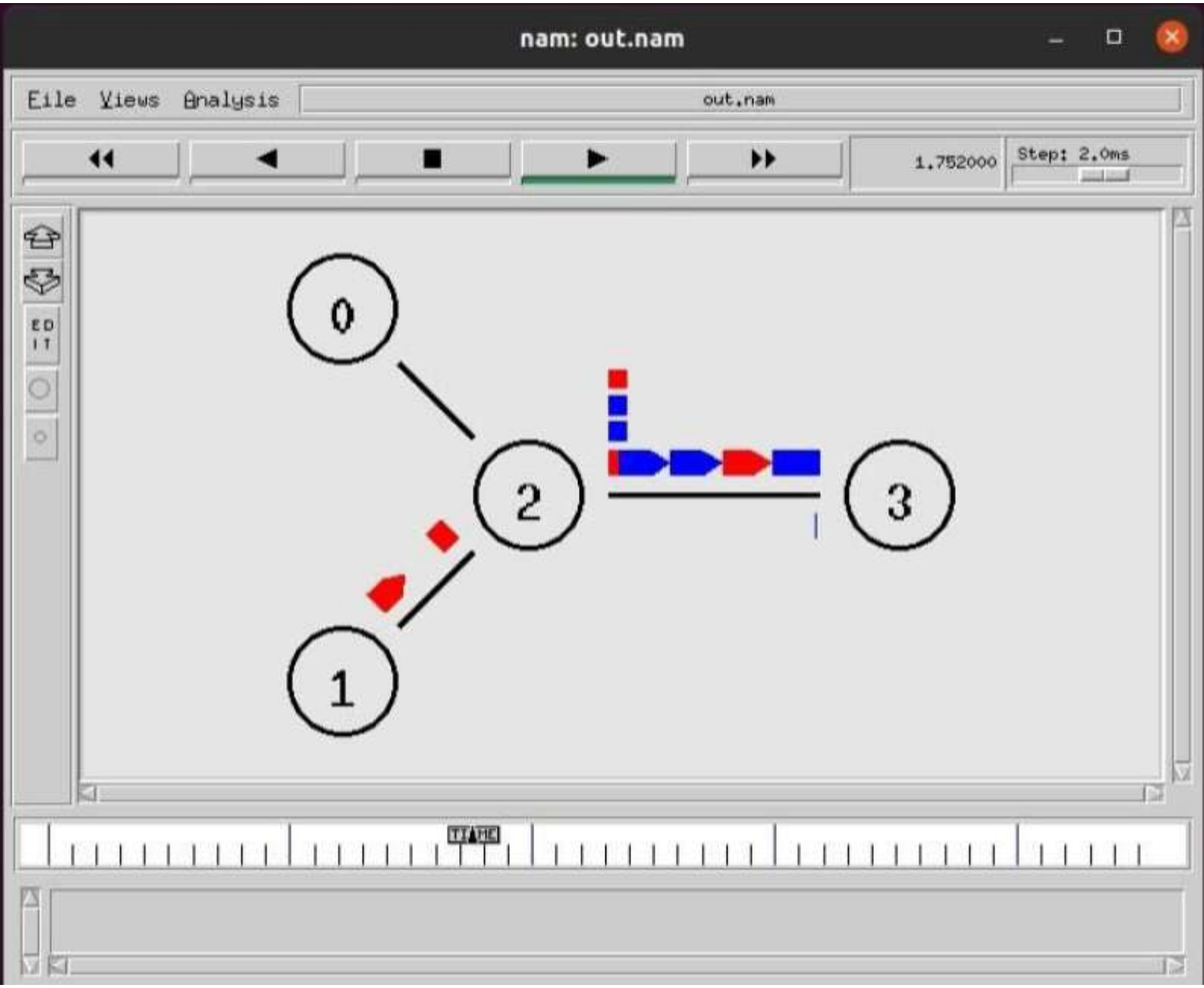
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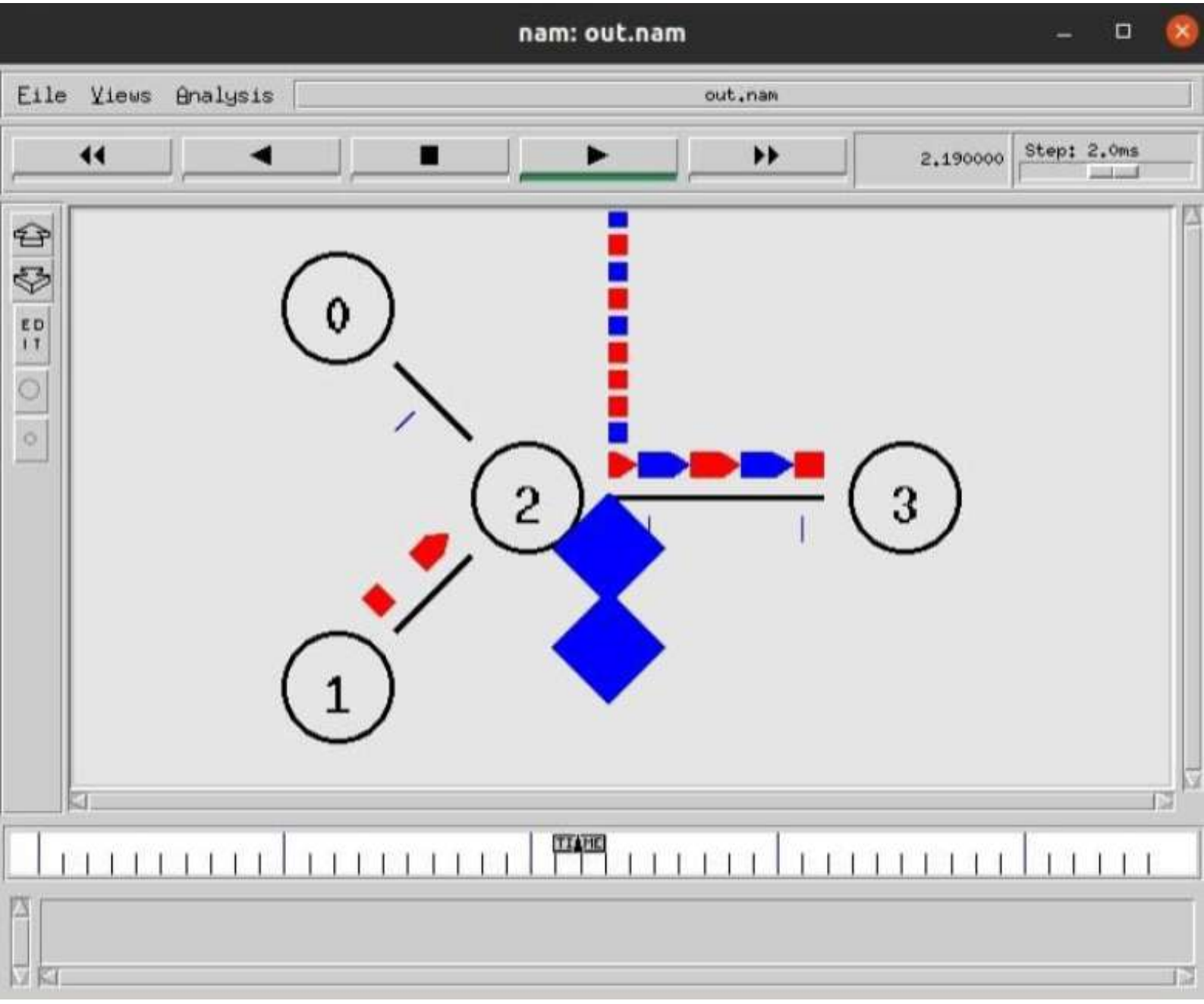
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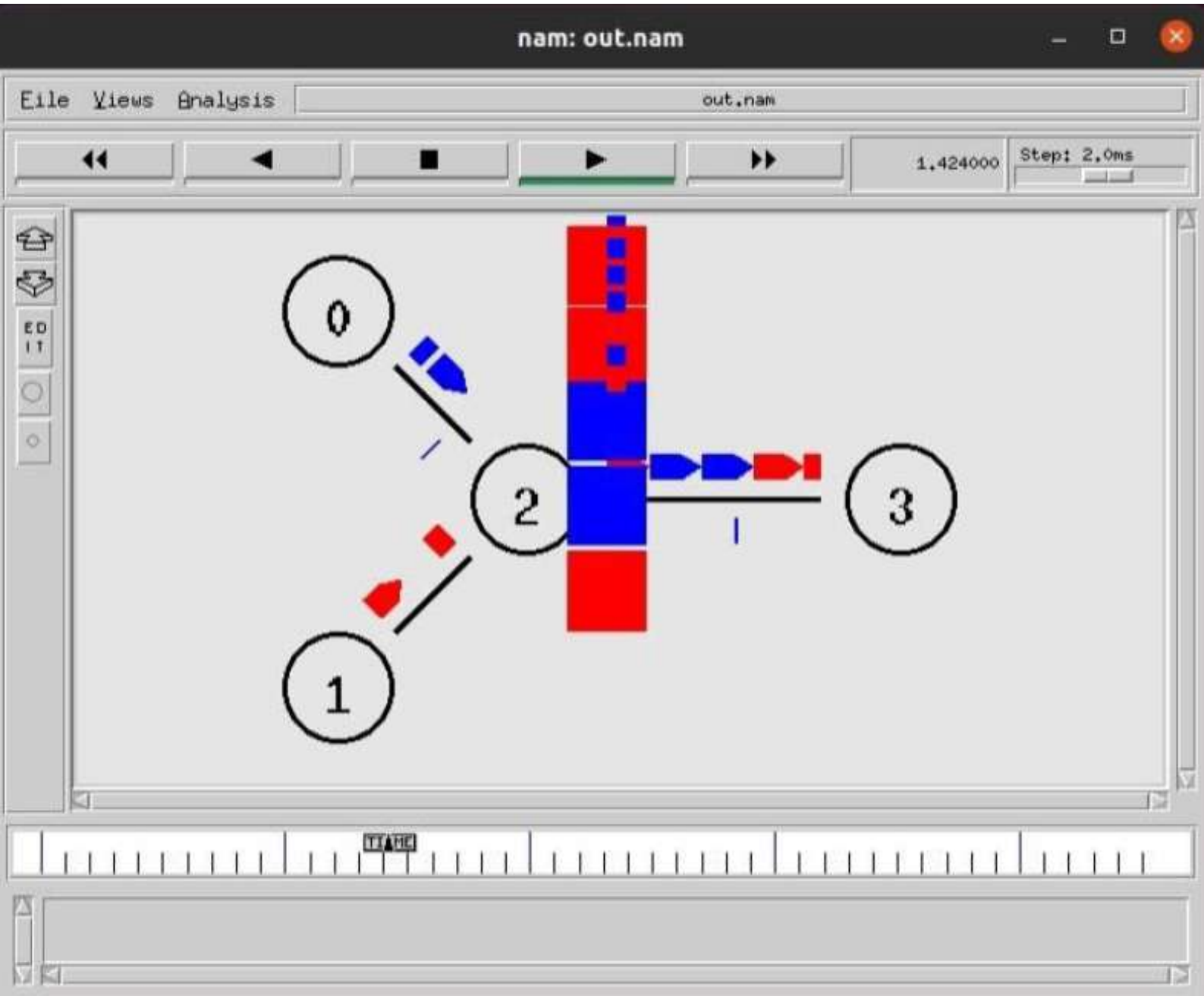
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