

# NS-2 Simulation

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Achintya Nath

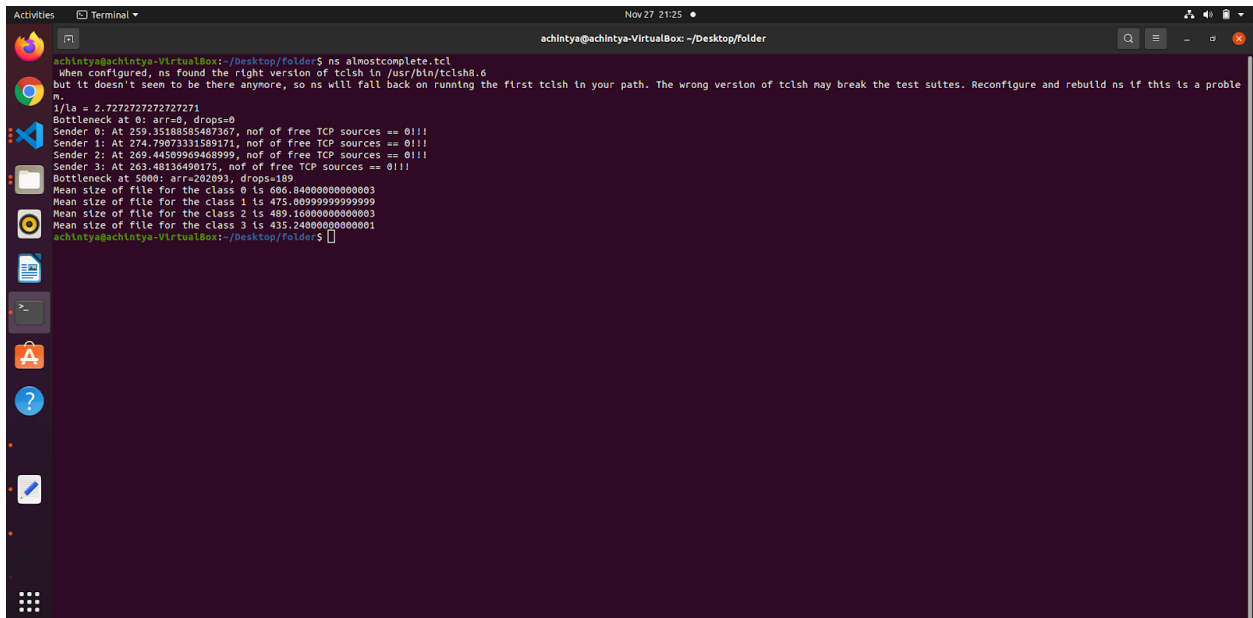
The github link to the project is

[https://github.com/achintyanath/CSN-341\\_Network\\_Simulator](https://github.com/achintyanath/CSN-341_Network_Simulator)

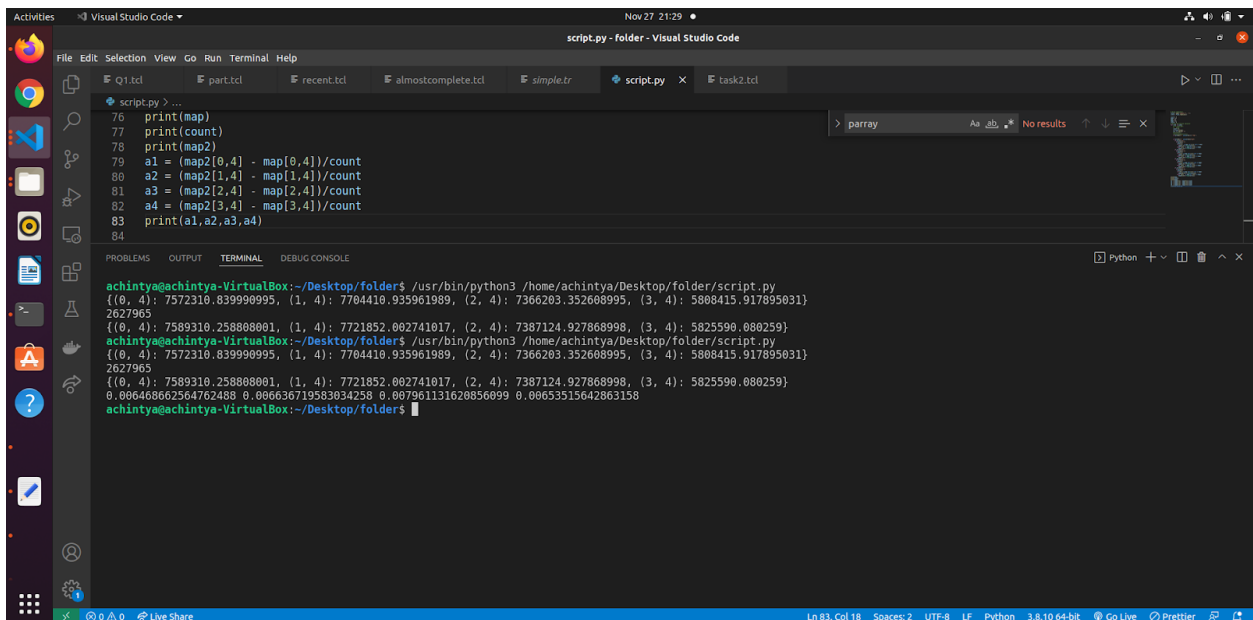
## Task 1

We simulate our result  $p = 0.1$  times

For  $p = 0.1\%$




```
achintya@achintya-VirtualBox: ~/Desktop/folder$ ns almostcomplete.tcl
When configured, ns found the right version of tcclsh in /usr/bin/tcclsh8.6
but it doesn't seem to be there anymore, so ns will fall back on running the first tcclsh in your path. The wrong version of tcclsh may break the test suites. Reconfigure and rebuild ns if this is a problem.
1/la = 2.7272727272727271
Bottleneck at 0: arr=0, drops=0
Sender 0: At 259.35188585487367, no of free TCP sources == 0!!!
Sender 1: At 274.7907331589171, no of free TCP sources == 0!!!
Sender 2: At 269.4459999468999, no of free TCP sources == 0!!!
Sender 3: At 263.48136490175, no of free TCP sources == 0!!!
Bottleneck at 5000: arr=202093, drops=189
Mean size of file for the class 0 is 486.84000000000003
Mean size of file for the class 1 is 475.00999999999999
Mean size of file for the class 2 is 489.16000000000003
Mean size of file for the class 3 is 435.24000000000001
achintya@achintya-VirtualBox: ~/Desktop/folder$
```



```
script.py > ...
76 print(map)
77 print(count)
78 print(map2)
79 a1 = (map2[0,4] - map[0,4])/count
80 a2 = (map2[1,4] - map[1,4])/count
81 a3 = (map2[2,4] - map[2,4])/count
82 a4 = (map2[3,4] - map[3,4])/count
83 print(a1,a2,a3,a4)
84

achintya@achintya-VirtualBox: ~/Desktop/folder$ /usr/bin/python3 /home/achintya/Desktop/folder/script.py
{(0, 4): 7572310.839990995, (1, 4): 7704410.935961989, (2, 4): 7366203.352608995, (3, 4): 5808415.917895031}
2627965
{(0, 4): 7589310.258808001, (1, 4): 7721852.002741017, (2, 4): 7387124.927868998, (3, 4): 5825590.080259}
achintya@achintya-VirtualBox: ~/Desktop/folder$ /usr/bin/python3 /home/achintya/Desktop/folder/script.py
{(0, 4): 7572310.839990995, (1, 4): 7704410.935961989, (2, 4): 7366203.352608995, (3, 4): 5808415.917895031}
2627965
{(0, 4): 7589310.258808001, (1, 4): 7721852.002741017, (2, 4): 7387124.927868998, (3, 4): 5825590.080259}
0.006468662564762488 0.006636719583834258 0.007961131620856099 0.00653515642863158
achintya@achintya-VirtualBox: ~/Desktop/folder$
```



Average Time Delay in every Class :

1. 0.006468662564762488
2. 0.006636719583034258
3. 0.007961131620856099
4. 0.00653515642863158

Average Bandwidth is now :

- a.) 0.7504982600956Mbps
- b.) 0.5725840835153Mbps
- c.) 0.4915482102755Mbps
- d.) 0.5327982639780Mbps

Wi/W1 :

- 1.) 1
- 2.) 1.0259801800742006403498005839312
- 3.) 1.2307229726626512438407044381402
- 4.) 1.0102793835979808102661672255906

For  $p=0.5$

```
achintya@achintya-VirtualBox: ~/Desktop/folder
ns almostcomplete.tcl
When configured, ns found the right version of tclsh in /usr/bin/tclsh8.6
but it doesn't seem to be there anymore, so ns will fall back on running the first tclsh in your path. The wrong version of
f tclsh may break the test suites. Reconfigure and rebuild ns if this is a problem.
1/la = 2.7272727272727271
Bottleneck at 0: arr=0, drops=0
Sender 0: At 259.35188585487367, nof of free TCP sources == 0!!!
Sender 1: At 274.79073331589171, nof of free TCP sources == 0!!!
Sender 2: At 269.44509969468999, nof of free TCP sources == 0!!!
Sender 3: At 263.48136490175, nof of free TCP sources == 0!!!
Bottleneck at 5000: arr=202164, drops=1015
Mean size of file for the class 0 is 606.84000000000003
Mean size of file for the class 1 is 475.00999999999999
Mean size of file for the class 2 is 489.16000000000003
Mean size of file for the class 3 is 435.24000000000001
achintya@achintya-VirtualBox: ~/Desktop/folder$
```

```
script.py > ...
76 print(map)
77 print(count)
78 print(map2)
79 a1 = (map2[0,4] - map[0,4])/count
80 a2 = (map2[1,4] - map[1,4])/count
81 a3 = (map2[2,4] - map[2,4])/count
82 a4 = (map2[3,4] - map[3,4])/count
83 print(abs(a1),abs(a2),abs(a3),abs(a4))
84
85
86
achintya@achintya-VirtualBox: ~/Desktop/folder$ /usr/bin/python3 /home/achintya/Desktop/folder/script.py
{(0, 4): 7678722.820904971, (1, 4): 7853112.106406948, (2, 4): 7510936.124926995, (3, 4): 5964217.35680502}
2632192
{(0, 4): 7651796.286661988, (1, 4): 7823646.14433695, (2, 4): 7490316.647867016, (3, 4): 5952726.735561011}
0.01022969990144449 0.011194457725727289 0.0078335763728402 0.00436541910468866
achintya@achintya-VirtualBox: ~/Desktop/folder$
```



Average Time delay of each class is:

1. 0.01022969990144449
2. 0.011194457725727289  
0.0078335763728402
3. 0.00436541910468866

Average Bandwidth is now :

1. Mean\_Size/transmission time :
  - a)0.47457110636397914126183660287422
  - b)0.33946083795256940743204367661661
  - c)0.4995521603092729144210287527281
  - d)0.79761413887162828687814906853867

Wi/W1 :

- 1.) 1
- 2.) 1.0943094942742719049476472888537
- 3.) 0.76576795490687423262695802441992
- 4.) 0.42673970368106680875650475390967

For  $p = 1\%$

```
achintya@achintya-VirtualBox: ~/Desktop/folder
ns almostcomplete.tcl
When configured, ns found the right version of tclsh in /usr/bin/tclsh8.6
but it doesn't seem to be there anymore, so ns will fall back on running the first tclsh in your path. The wrong version of
f tclsh may break the test suites. Reconfigure and rebuild ns if this is a problem.
1/la = 2.7272727272727271
Bottleneck at 0: arr=0, drops=0
Sender 0: At 259.35188585487367, nof of free TCP sources == 0!!!
Sender 1: At 274.79073331589171, nof of free TCP sources == 0!!!
Sender 2: At 269.44509969468999, nof of free TCP sources == 0!!!
Sender 3: At 263.48136490175, nof of free TCP sources == 0!!!
Bottleneck at 5000: arr=202164, drops=1015
Mean size of file for the class 0 is 606.84000000000003
Mean size of file for the class 1 is 475.00999999999999
Mean size of file for the class 2 is 489.16000000000003
Mean size of file for the class 3 is 435.24000000000001
achintya@achintya-VirtualBox: ~/Desktop/folder
```

```
almostcomplete.tcl - folder - Visual Studio Code
File Edit Selection View Go Run Terminal Help
almostcomplete.tcl
141
142 # Bottleneck Link between the nodes
143 $ns duplex-link $node_4 $node_5 10Mb 10ms DropTail
144
145 $ns queue-limit $node_0 $node_4 100000
146 $ns queue-limit $node_1 $node_4 100000
147 $ns queue-limit $node_2 $node_4 100000
148 $ns queue-limit $node_3 $node_4 100000
149 $ns queue-limit $node_4 $node_5 100000

PROBLEMS OUTPUT TERMINAL DEBUG CONSOLE
achintya@achintya-VirtualBox: ~/Desktop/folder$ /usr/bin/python3 /home/achintya/Desktop/folder/script.py
{(0, 4): 7820671.751906028, (1, 4): 7927581.157232035, (2, 4): 7710565.234775943, (3, 4): 6272509.1185199795}
2645661
{(0, 4): 7748926.4869990125, (1, 4): 7856757.656512032, (2, 4): 7643706.547920967, (3, 4): 6224082.956910997}
0.0271180690904617 0.026769680892602146 0.025271070955415413 0.018303993447755715
achintya@achintya-VirtualBox: ~/Desktop/folder$
```



Average time delay of each class :

- 1.) 0.02711808690040617
- 2.) 0.026769680892602146
- 3.) 0.025271070955415413
- 4.) 0.018303993447755715

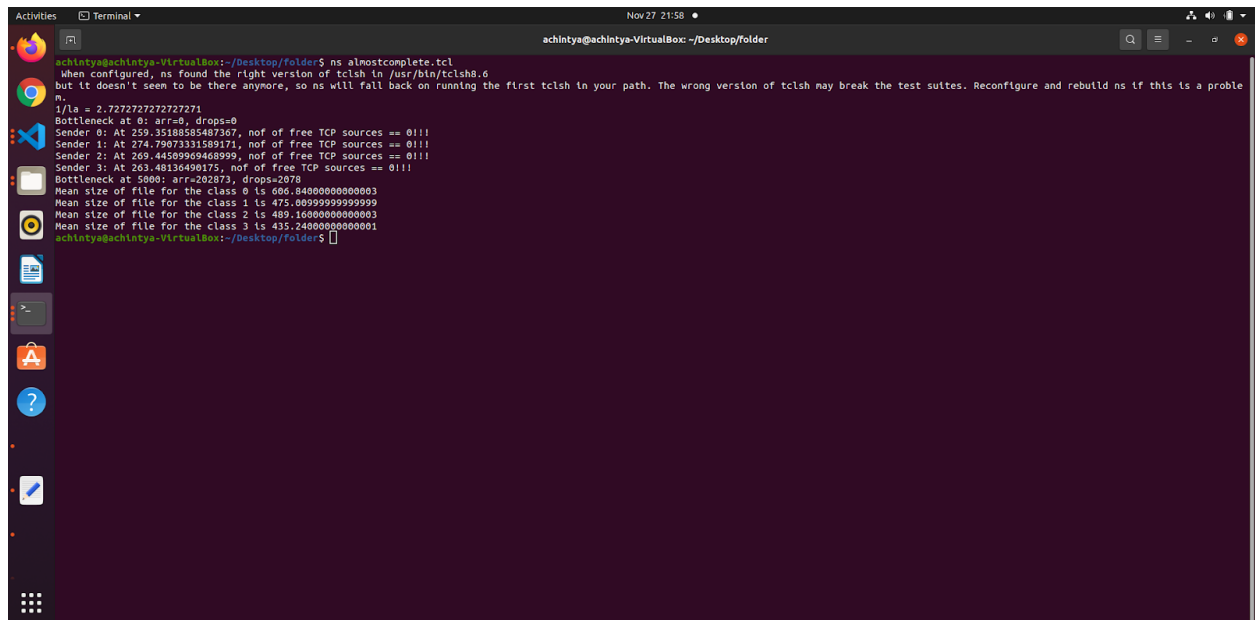
Average bandwidth :

- 1.) 0.17902147809428581948 Mbps
- 2.) 0.14195462453383815968Mbps
- 3.) 0.15485216304857122895Mbps
- 4.) 0.19022734082255282091Mbps

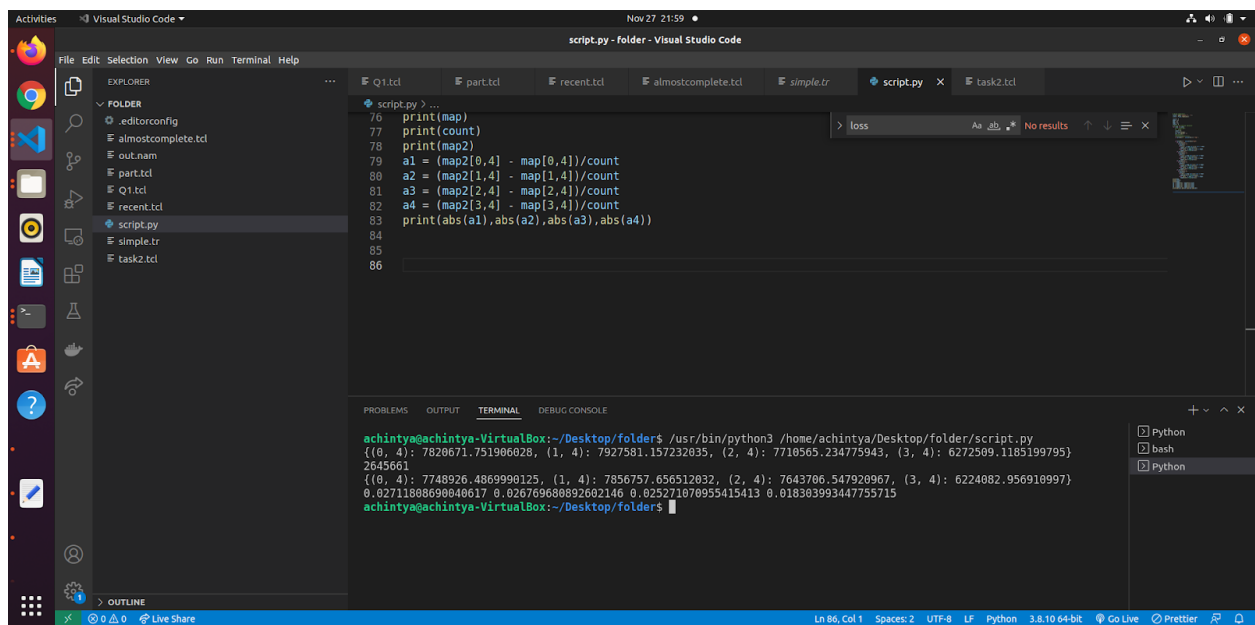
Wi/W1 :

- 5.) 1
- 6.) 0.98715226449846631197013598839331
- 7.) 0.93188988766891617580610069941449
- 8.) 0.67497362608870321756700143232157

p = 5 %



```
achintya@achintya-VirtualBox: ~/Desktop/folder$ ns almostcomplete.tcl
When configured, ns found the right version of tcclsh in /usr/bin/tcclsh8.6
but it doesn't seem to be there anymore, so ns will fall back on running the first tcclsh in your path. The wrong version of tcclsh may break the test suites. Reconfigure and rebuild ns if this is a problem.
1/la = 2.7272727272727271
Bottleneck at 0: arr=0, drops=0
Sender 0: At 259.35188585487367, no of free TCP sources == 0!!!
Sender 1: At 274.7907331589171, no of free TCP sources == 0!!!
Sender 2: At 269.44589902468999, no of free TCP sources == 0!!!
Sender 3: At 263.48136490175, no of free TCP sources == 0!!!
Bottleneck at 5000: arr=202873, drops=2078
Mean size of file for the class 0 is 486.84800000000003
Mean size of file for the class 1 is 475.00999999999999
Mean size of file for the class 2 is 489.16000000000003
Mean size of file for the class 3 is 435.24000000000001
achintya@achintya-VirtualBox: ~/Desktop/folder$
```



```
script.py > ...
76 print(map)
77 print(count)
78 print(map2)
79 a1 = (map2[0,4] - map[0,4])/count
80 a2 = (map2[1,4] - map[1,4])/count
81 a3 = (map2[2,4] - map[2,4])/count
82 a4 = (map2[3,4] - map[3,4])/count
83 print(abs(a1),abs(a2),abs(a3),abs(a4))
84
85
86
```

```
achintya@achintya-VirtualBox: ~/Desktop/folder$ /usr/bin/python3 /home/achintya/Desktop/folder/script.py
{(0, 4): 7820671.751986028, (1, 4): 7927581.157232035, (2, 4): 7710565.234775943, (3, 4): 6272509.1185199795}
2645661
{(0, 4): 7748926.4869990125, (1, 4): 7856757.656512032, (2, 4): 7643706.547920967, (3, 4): 6224082.956910997}
0.02711888690040617 0.0267696880892602146 0.025271070955415413 0.018303993447755715
achintya@achintya-VirtualBox: ~/Desktop/folder$
```





Average time delay of each class:

0.02711808690040617

0.026769680892602146

0.025271070955415413

0.018303993447755715

Average Bandwidth:

a)0.17902147809428573 Mbps

b)0.14195462453383818657794135170018 Mbps

c)0.15485216304857122895888382345229 Mbps

d)0.19022734082255282098551794214314 Mbps

Wi/W1

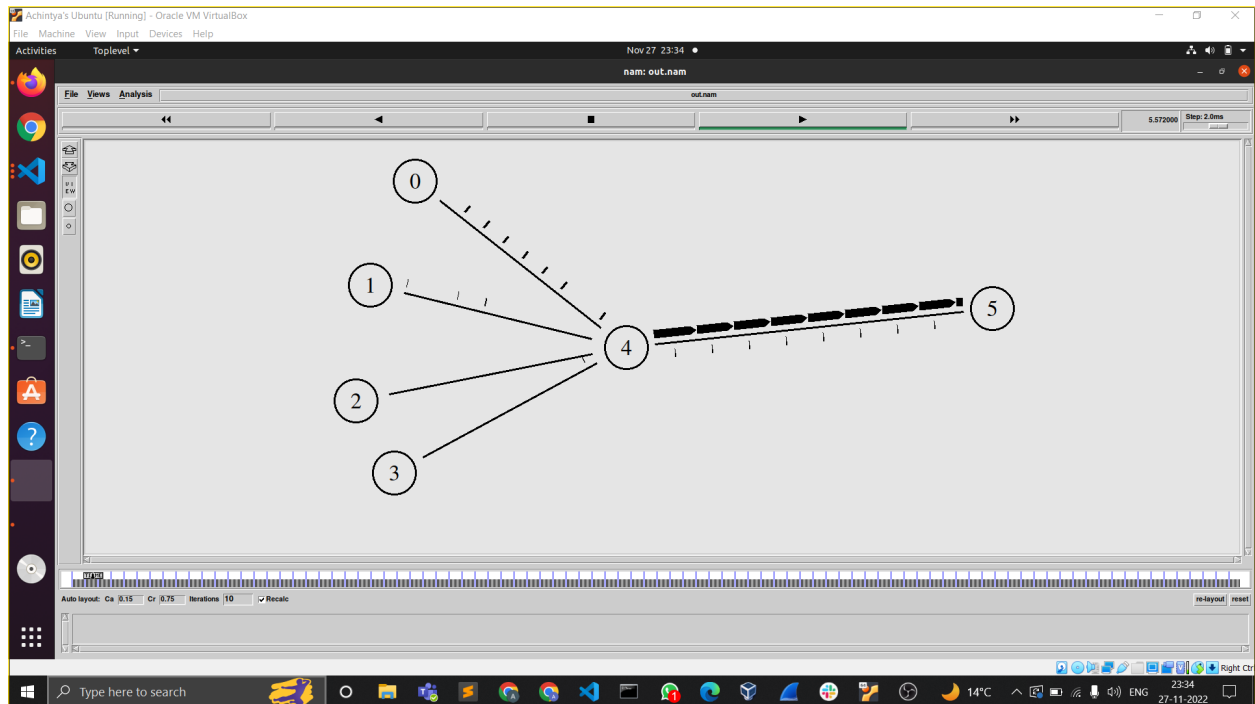
a.) 1

b.) 0.98715226449644490959581634002506

c.) 0.93188988766891617580610069941449

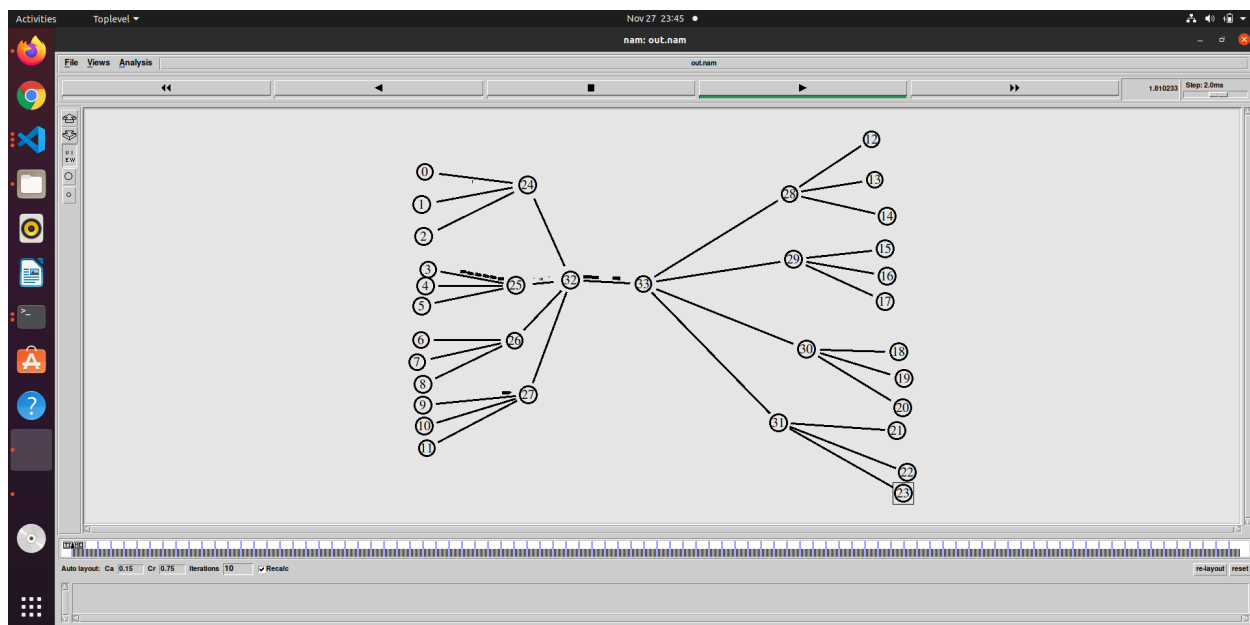
d.) 0.67497362608870321756700143232157

Confidence Interval : A confidence interval (CI) is a range of estimates for an unknown parameter. A confidence interval is computed at a designated *confidence level*; the 95% confidence level is most common, but other levels, such as 90% or 99%, are sometimes used. The confidence level represents the long-run proportion of corresponding CIs that contain the true value of the parameter



Video Stimulation can be found at the github of the repo

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The image displays a terminal window with a dark background and light-colored text. At the top, there's a title bar with icons for Activities, Terminal, and system status (time: Nov 27 23:48). Below the title bar, the prompt indicates the current directory is ~/Desktop/folder/. The user enters the command 'ns task2.tcl'. The output shows a Tcl script execution starting with 'l/a = 2.7272727272727271'. It then reports four TCP sources and their addresses. Following this, two error messages appear: 'Cannot connect to existing nam instance. Starting a new one...' and 'nam cannot recognize the trace file out.nam'. The user then runs 'ns task2.tcl ^C' to interrupt the process. This sequence of actions is repeated twice more, each time resulting in the same error messages. The terminal window includes standard Ubuntu desktop icons on the left and right sides.



The video demonstration can be found at the repo