

PROJECT 2

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Motivation:

Internet has developed vastly over the time and it has become one of the most essential needs of the humankind. There have been many developments in the technology used by the internet which leads us to the question that is there any stability in the internet path, and if there is to what extent the stability remains. The study of internet path stability and its measurement is primary requirement and important. This study will clarify how the routing is done in the internet where is the lag in the system.

Methodology:

To check the stability of the internet path there are two basic command PING and TRACEROUTE these two commands generate the result of packet transmission and hop count from one node to any another node respectively. We have use the planet-lab test bed to carry out this study, it is the biggest internet testbed where we can perform tasks over the global scale. We have chosen 10 nodes from the available nodes on planet lab and the divided them into 5 pairs each node performed the PING and TRACEROUTE at specific time interval from one node to another in a pair.

The 10 nodes that I had chosen are given below with the pairing done in between them.

Pair One (Trans Atlantic Pair)

Node 1: planetlab4.mini.pw.edu.pl

Node 2: planetlab3.rutgers.edu

Pair Two (Trans Pacific)

Node 3: planetlab5.ie.cuhk.edu.hk

Node 4: planetlab3.cs.uoregon.edu

Pair Three (Inter Continental)

Node 5: planetlab1.cs.purdue.edu

Node 6: plink.cs.uwaterloo.ca

Pair Four

Node 7: planetlab-2.calpoly-netlab.net

Node 8: planetlab04.cs.washington.edu

Pair Five

Node 9: planetlab5.eecs.umich.edu

Node 10: planetlabone.ccs.neu.edu

I developed a script in shell which would run PING and TRACEROUTE command and write the output in dedicated file on each node and put that file in the crontab, so it would run every hour and generate the desired row data.

And to retrieve the data I used my local machine and the scp command by which I can copy the data from remote server to my local machine.

Now to process the row data I used the awk tool to sort through the semi-structured data and do analysis on the sorted data.

Hardware: Ubuntu 16.04 OS and windows 10 OS

Software used: Terminal, planet-lab, win-scp, MS Excel.

Analysis:

Q1

Hosts	MIN	MAX	AVG	SD
planetlab1.cs.purdue.edu	46.189557446	171.7174936	65.4391787	30.371344
planetlab-2.calpoly-netlab.net	21.9661404255	25.237387234	22.4696723404	0.813017021277
planetlab3.cs.uoregon.edu	221.10529	223.1155	221.92758	0.827855
planetlab3.rutgers.edu	111.4310	112.3011	111.62274	0.380278
planetlab04.cs.washington.edu	21.9815617021	25.1219191489	22.5246255319	0.770438297872
planetlab4.mini.pw.edu.pl	111.433165414	112.454774436	111.636962406	0.414695488722
planetlab5.eecs.umich.edu	28.8882	29.6084	29.0066	0.2597
planetlab5.ie.cuhk.edu.hk	221.1225	223.1241	221.9257	0.83946
planetlabone.ccs.neu.edu	28.891177	30.19235	29.04561	0.38704
plink.cs.uwaterloo.ca	46.09991	148.8387	64.310217	26.47341

The Above table give the data of min max average and standard deviation in the ping done on the individual node over the period of more than the 2 weeks. The data that are of the trans-Atlantic and trans-Pacific have the higher value and the node that are on the same continent have the less amount of time. The path length of the inter-continental node is less as compared to the node located on the different continents. The path length of the nodes which goes from trans-Atlantic or trans-Pacific are largest and have the largest.

Q2

Node selection was done based on availability and the uptime and after pinging the node was selected for the test. There were many temporary outages as shown in the table below and there

was no permanent outage. This outages may be caused with the outage in the intermediate machine and re-routing of the network.

Node pair	Node name	temporary	permanent	Total
1	planetlab4.mini.pw.edu.pl	1605	0	1605
1	planetlab3.rutgers.edu	22	0	22
2	planetlab5.ie.cuhk.edu.hk	1196	0	1196
2	planetlab3.cs.uoregon.edu	1838	0	1838
3	planetlab1.cs.purdue.edu	1410	0	1410
3	plink.cs.uwaterloo.ca	219	0	219
4	planetlab-2.calpoly-netlab.net	-	0	-
4	planetlab04.cs.washington.edu	0	0	0
5	planetlab5.eecs.umich.edu	819	0	819
5	planetlabone.ccs.neu.edu	237	0	237

Q3

The outages observed in the study are temporary so it are mostly occurred on the core and not on the edge.

Q4

The reliability of continental links such as us – us and us-ca were more than the that of the inter-continental links

Q5

I did not observe any kind of fluttering in any node pair.

Q6

The table below shows that the number of hope from node A to B is not always same as the. But in some cases there might be some similarity.

Node pair	Node name	Same no of hop count	Different no of hop count
1	planetlab4.mini.pw.edu.pl	139	127
1	planetlab3.rutgers.edu		
2	planetlab5.ie.cuhk.edu.hk	12	224
2	planetlab3.cs.uoregon.edu		
3	planetlab1.cs.purdue.edu	0	235
3	plink.cs.uwaterloo.ca		
4	planetlab-2.calpoly-netlab.net	235	0
4	planetlab04.cs.washington.edu		
5	planetlab5.eecs.umich.edu	0	231
5	planetlabone.ccs.neu.edu		

Q7

There were no such triangular routing detected in any of the node pair.

Conclusion:

The stability in the internet routing is not so change according to the reference provided.