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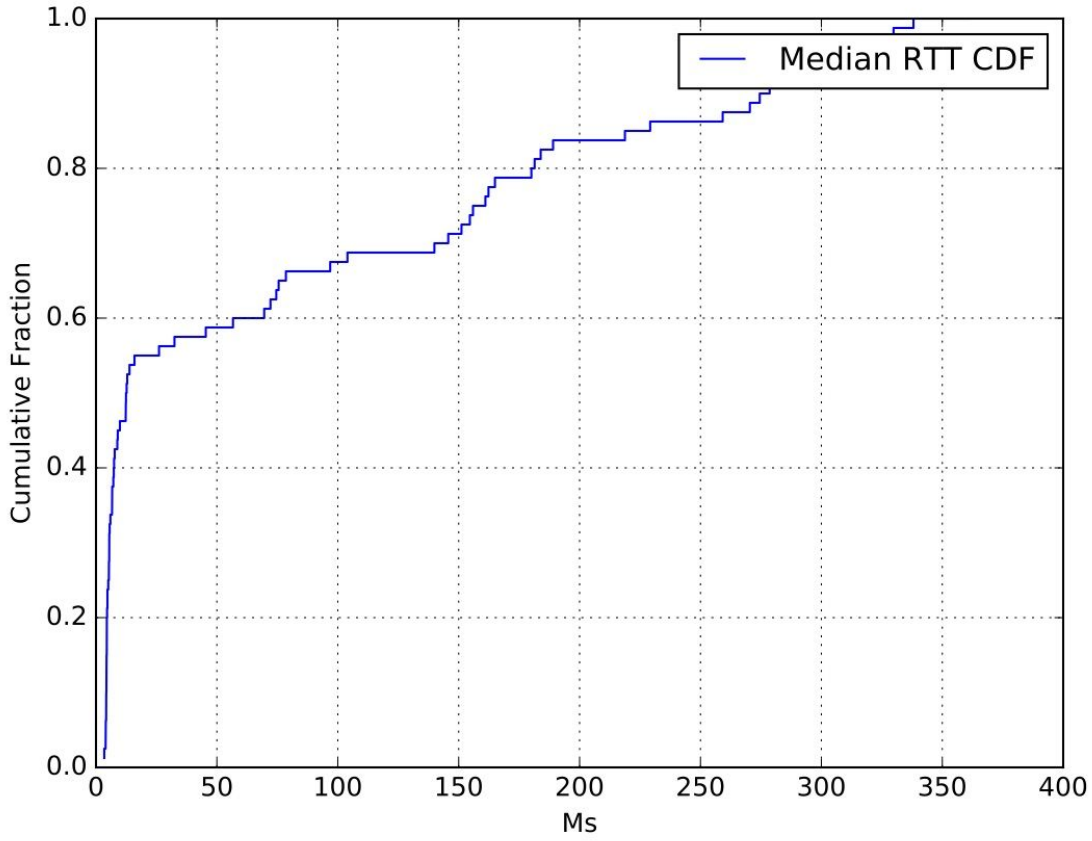
CS 168 Project 3

Part 1

1. The percent that do not respond is 20.0%, and the percent with at least 1 drop: 25.0%

CDF:



2.

Median RTT (each site):

- Google.com: 4.66
- Todayhumor.co.kr: 89.22
- Taobao.com: 312.84
- Zanvarsity.ac.tz: 321.09

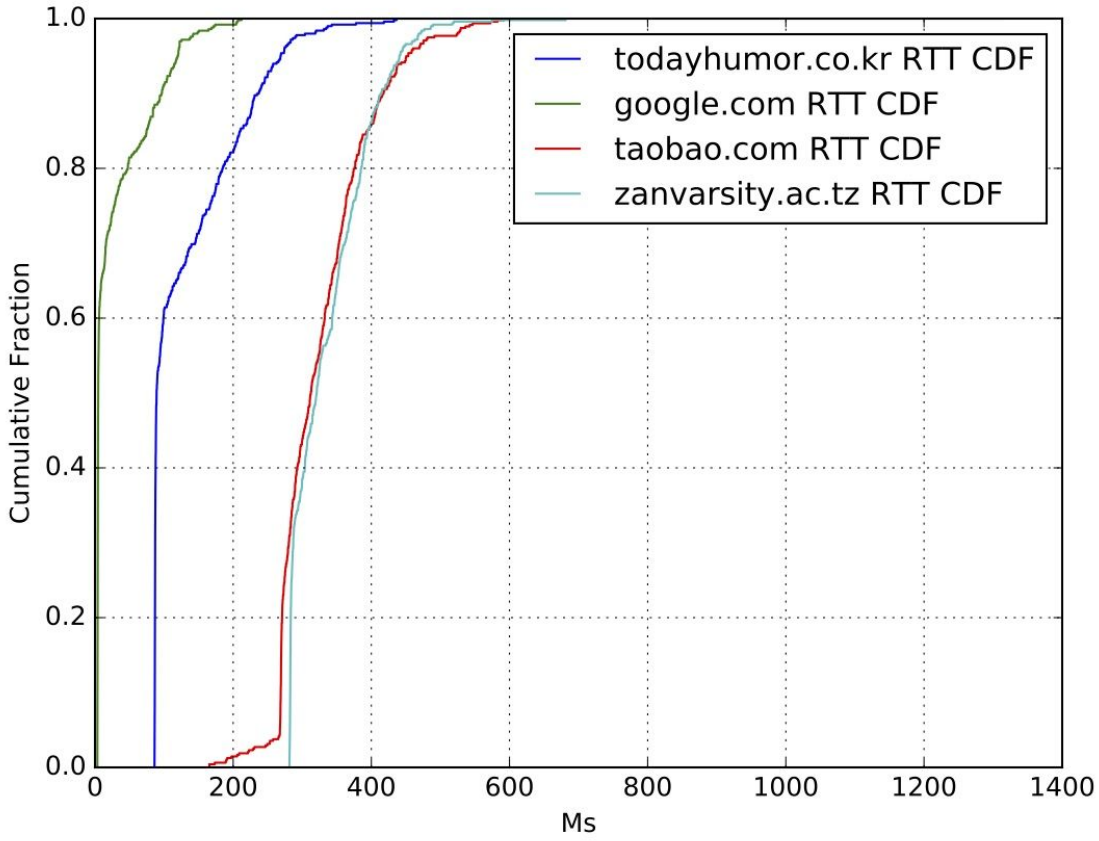
Maximum RTT (each site):

Google.com: 221.56
Todayhumor.co.kr: 543.85
Taobao.com: 1314.87
Zanvarsity.ac.tz: 685.49

Loss Rate (each site):

Google.com: .008%
Todayhumor.co.kr: .004%
Taobao.com: .044%
Zanvarsity.ac.tz: .002%

CDF:



3.

The speed of light is: 186,282 miles per second

The distance to Mountain View is: 35.23 miles

The distance to Zanzibar is: 9,953.5 miles

It should take 0.18912186 miliseconds from Berkeley to Mountain View at the speed of light, so it should take a ping 0.37824372 miliseconds round trip.. The median ping time was 4.663 miliseconds though. The multiplier for this server is 12.3280301918.

It should take 53.4324304 miliseconds from Berkeley to Zanzibar at the speed of light, so it should take a ping 106.8648608 miliseconds round trip. The median ping time was 321.086 miliseconds though. The multiplier for this server is 3.00459849567.

Reasons for delayed ping time:

Not all links are fiber optics, and even in fiber optics, data travels at maximum speed, a fractional amount of the speed of light. Also, there is time delay for switching and forwarding - at each switch/router, packet must be unpacked in the sense that the header must be read so an appropriate forwarding destination can be determined.

Part 2

1.

Berkeley is directly connected to: AS2152
Most AS traversed: zanvarsity.ac.tz
Least AS traversed: berkeley.edu
Load Balanced Sites: google.com, facebook.com, allspice.lcs.mit.edu, todayhumor.co.kr, www.city.kobe.lg.jp, zanvarsity.ac.tz

No, observed routes are not always stable over time:

Google.com: 5 unique routes
Facebook.com: 5 unique routes
www.berkeley.edu: 1 unique route
Allspice.lcs.mit.edu: 1 unique route
Todayhumor.co.kr: 5 unique routes
www.city.kobe.lg.jp: 5
www.vutbr.cz: 1
Zanvarsity.ac.tz: 5

Advantage of stable routing: With fewer possible next hops for a specific site, more destination entries can be held in the cache, making cache lookup marginally faster.

2.

For the following public route servers:

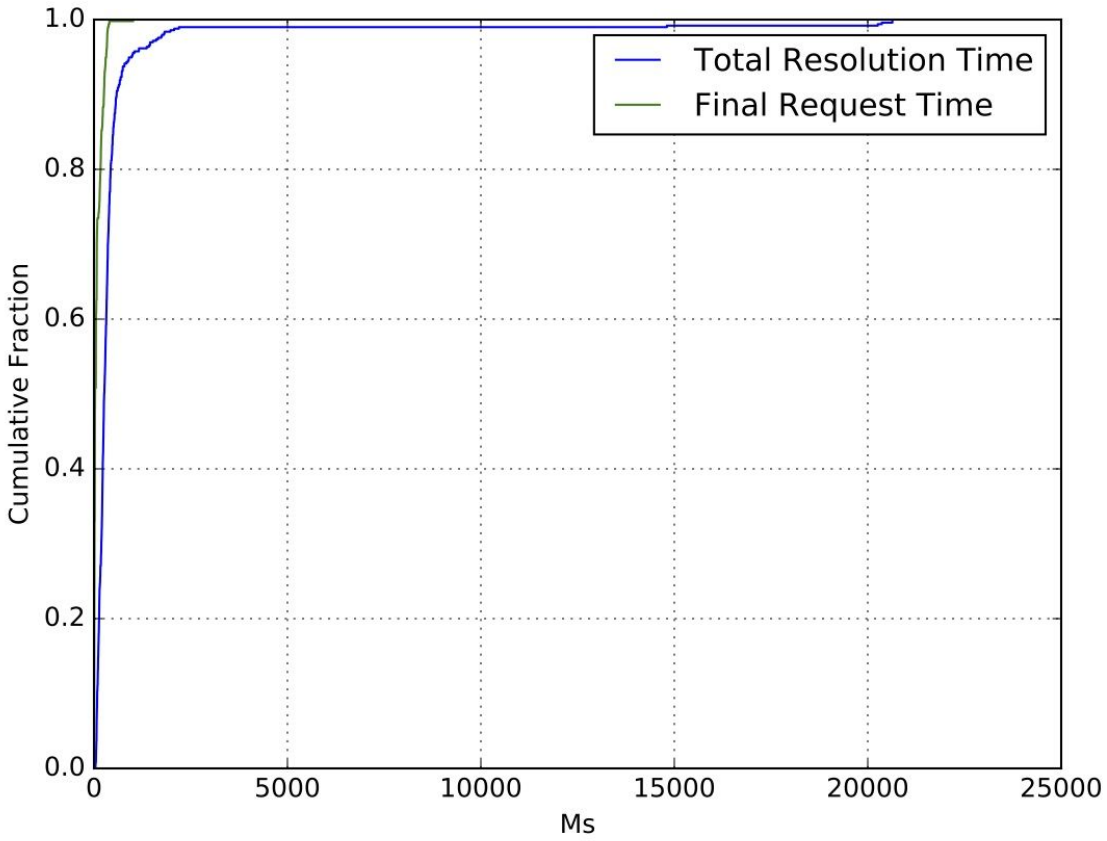
- tpr-route-server.saix.net
    - 13 hops from computer to server
    - 16 hops from server to computer
- route-server.ip-plus.net
    - 14 hops from computer to server
    - 13 hops from server to computer
- Route-views.oregon-ix.net
    - 8 hops from computer to server
    - 8 hops from server to computer
- Route-views.on.bb.telus.com
    - 10 hops from computer to server
    - 17 hops from server to computer

None of the routes (0) are symmetric. In other words, all of the routes (4) are asymmetric. Asymmetric routing can occur because each router can have a different idea of where to forward packets for a certain destination, so when you look a set of routes to/from a source/destination, then the routes may be asymmetric because routers encountered along the way may have different ideas about where to direct packets heading to certain destinations. The routing policies of certain providers that the packet may encounter along the way can directly lead to this. Route asymmetry can also be the result of load balancing efforts.

Part 3

A. The average root TTL in the 5 iterations of the top Alexa websites was 188675.08 seconds. The average TLD TTL was 172,800 seconds. The average other name server TTL was 125,518.89 seconds. The average terminating entry TTL was 8,029.39 seconds.

B.



C. There were 10 changes within the first trial and 14 changes total between the two trials.
D. There were 0 changes within the other country's DNS results and 28 changes between our local DNS results and that of the other country.
E. A likely reason that the DNS returned different IP addresses is because it tries to return the ip address with the fastest round trip / ping time.
F. The times would be shorter because DNS results are cached (for as long as TTL), and since we would already have some of the requests cached, then the DNS resolution times would be shorter.