

TULIP2

Purpose

Analyze new results for TULIP2 (using PlanetLab Landmarks) with TULIP1 (Using only PingER landmarks). We have used Speed net sites as our sample data. The location of these sites is already known from Speed Net database. The results using TULIP1 (PingER only sites) can be downloaded [here](#)

North America

There are about 52 Speednet sites in North America region. We conducted some first using TULIP1 (PingER only landmarks). We have 10 PingER landmarks in North America region. Then we conducted some more tests using TULIP2 (using both Pinger and Planetlab landmarks). We used about 80 Planetlab landmarks in North America region. When we compared the two results. there were some obvious improvements in the results. The results can be found [here](#) Excel sheet can be downloaded [here](#) . [Here](#) is the frequency of landmarks used in North America. The most frequent landmark used is Chicago_UnitedStates_PL.

Chicago_UnitedStates_PL

Europe

There are about 52 Speednet sites in Europe. We also compared TULIP1 and TULIP2 for Europe and there were obvious improvements in the results. We have 8 PingER landmarks in Europe. We used 48 Planetlab landmarks in Europe. The results for Europe can be found [here](#) . The results can be downloaded [here](#)

Interesting Observations

While doing the analysis we came across an interesting result for a speed net site. We conducted the initial tests on 2nd January,2008. When we tried to locate <http://www.g3pcs.com> IP address 208.109.181.237 the three sites using for triangulation were Eugene_UnitedStates_PL 12.5 ms, Seattle_UnitedStates_PL 15.2ms and TRIUMF_Vancouver 19.1 ms. The Speed database showed that the site was in Ephrata, WA (Latitude:47.32 Longitude: -119.55). Although there was some Error distance but we believed the Speed Net database to be correct because Eugene,Seattle and Vancouver are close to Ephrata.

Latter on (4th March,2008) we conducted some new tests. This time three different sites responded with min RTT. SanDiego_UnitedStates_PL 13.337 ms, LosAngeles_UnitedStates_PL 13.696ms and Riverside_UnitedStates_PL 14.342ms. The was located somewhere in California state. This is very interesting as we think that the site has moved since then. When we used the geoipool to locate the site it gave Scottsdale, Arizonan(Latitude: 33.6 Longitude -111.89). We have a Planet Lab landmark in Phoenix, Arizona but that did not responded. If that site would have responded we would have got better results. A landmark in Tuscon, AZ responded with 23ms.

So our conclusion is that the site has moved between 2nd January,2008 and 4th March,2008. Hostip.info and geobytes.com says the host is in Brooklyn, NY which is obviously wrong. The whois information from (www.ip-lookup.net) suggests the site is in Scottsdale, AZ which we think is correct. here is the whois information:

OrgName:	GoDaddy.com, Inc.
OrgID:	GODAD
Address:	14455 N Hayden Road
Address:	Suite 226
City:	Scottsdale
StateProv:	AZ
PostalCode:	85260
Country:	US

Locating PingER Sites

Using TULIP2 we located all PingER sites in North America. The results can be found [here](#) We conducted Tests both using alpha=100km/ms and 40km /ms Currently we are comparing the two results to see, where and how much improvement we are getting.

Alpha Comparison (100 km/ms vs 40 km/ms)

A series of three tests were performed to compare the value of 100 vs 40 for the value of alpha.

- The first test was performed on 3rd April,2008. The results of this test can be found [here](#). A total of 121 North American PingER sites were used in the test.The average error distance for alpha = 100 (km/ms) was 307 km and alpha = 40 (km/ms) was 300 Km. Frequency analysis of sites revealed that some the most frequent sites used were:

Landmarks	Frequenc y	
Chicago_UnitedStates_PL	34	
NewYork_UnitedStates_PL	31	
FNAL,Chicago	26	
Philadelphia_UnitedStates_PL	26	

Bloomington_UnitedStates_PL	22
Fairfax_UnitedStates_PL	11
Washington_UnitedStates_PL	11

- The second test was conducted on 24th April,2008. The results of this test can be found [here](#). The average error distance for alpha 100 (km/ms) was 238 km and the median value was 243km. For alpha = 40 km/ms the average error distance was 273 km and the median error distance was 183 km.
- Third test was conducted on 1st may,2008. The results of this test can be found [here](#).

Adding more precision to TULIP results

Previously the TULIP algorithm located a host only giving latitude and longitude as integers without any floating points, as a result a lot of precision was lost. Therefore the TULIP algorithm was improved to give floating point precision. In order to test the new accuracy some tests were conducted.

- The first test was conducted on 1st July,2008. [Here](#) are the results of the test. Here we compared only those results where the same landmarks were used.
- The second test was conducted on 2nd July,2008. [Here](#) are the results of the test. Some quick observations from the second test are:
 1. The results are very bad as compared to the previous ones because a lot of landmarks are failing. We are currently thinking on ways to improve on that.
 2. The maximum improvement using floating point was 124 Km.
 3. Stanford_UnitedStates_PL is giving funny results, will have look deeply into it to find out the cause.

Comparing results with old results after careful selection of landmarks

After careful selection of landmarks (removing non-responding landmarks and writing scripts to dynamically generate landmarks) on 20th Aug,1008 we obtained much better results. These results are compared to the old results in order to see the improvements. The results can be download [here](#) Here are some quick observations:

1. Menlo Park Landmark (Stanford) is giving wrong result (rtt 2ms) which is ruining the results. We need to disable this landmark since we already have landmark at SLAC.
2. There are some major improvements in results due to careful selection of landmarks.
3. the median error is 170km, 25% 100km, 75% 362km & IQR 262km. This is including the numbers in red.
4. Need to come up with a method to avoid bad results for replicated servers.

Abnormal Cases:

Satellite Links

Hosts that are on satellite links have very large delays. They cannot be located using the RTTs from a set of landmarks. Usually they have RTTs > 500ms. Most of the Central Asian countries (including Afghanistan) and some African countries use satellite links. Data from hosts in Kazakhstan, Burundi, Madagascar, Uganda, Afghanistan and Nigeria can be found [here](#). The three best Landmarks chosen gives an RTT greater than 500ms. If the RTT from the three best landmarks is greater than 500ms then our algorithm returns the host as satellite link and does not perform trilateration. This figure may be changed latter.

Unable to render {children}. Page not found: Replicated Servers.

Replicated Servers

Trilateration VS Multilateration

Here is the [data](#).