UCT MSc in Computer Science 2023

Networks and Internet Systems: Assignment

Due date: 8 September 2023

In this assignment, you are to analyze the Internet topology interconnecting African universities. You will use a distributed Internet measurement platform called Ripe Atlas[1] to study geo-topology and performance towards 20 universities in Africa. You will select universities' web-servers as targets for your measurements (you can only select a maximum of 3 universities from each country). You will choose as many probes as vantage points from each of the countries selected (select countries where you can find at least 3 Ripe probes). You schedule to repeat ping and traceroute measurements from each probe to every target server (from each probe to every target, repeat 3 times a day for 3 days). It is highly recommended to automate the Ripe Atlas measurements, e.g using Atlas-Cousteau.[2] You can use Maxmind[3] database to determine the ASN and country of each IP in the traceroute data.

Analysis Task-1: intra-country measurements - analyse ping and traceroute results from vantage points and target servers within each country.

Analysis Task 2: intercountry measurements - analyse ping and traceroute between probes and web servers that are in different countries.

For both Task-1 and Task-2, you will need to analyse at least the following: 1) end-to-end delays; 2) AS-level hops (number of ASN hops, and ASN paths); 3) country-level hops (which countries are traversed between source and destination).

In the end, you will write a report to: (1) discuss your observations, particularly in terms of Internet delays and geo-location of paths; (2) plot and discuss a geo-topology map that combines the results from the two tasks.

What to submit:
Submit a report of **5-7-pages** (including the graphs and topologies). The report should include discussion of the tasks undertaken, methods, the results and discussion of the results. You will submit a zip-folder containing the report, as well as measurement/analysis scripts and data.

** to use Ripe Atlas, you will first need to register an account[4]. Once you have done so, you should let me know the email address you are using for Ripe Atlas, and I will transfer to your account the credit you need to run experiments.

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[1] https://atlas.ripe.net/
[2] https://github.com/RIPE-NCC/ripe-atlas-cousteau
[3] https://dev.maxmind.com/geoip/geoip2/geoip2-city-country-csv-databases/
[4] https://access.ripe.net/registration