CSE534: Fundamentals of Computer Networks
Assignment 1: All about DNS
-Faheem Ali

Part A:
Implemented a DNS Resolver like the dig tool to perform domain name lookups. The code is written in python and used dnspthon external library. It performs an iterative loop and resolves the domain starting from the root then going down the hierarchy.

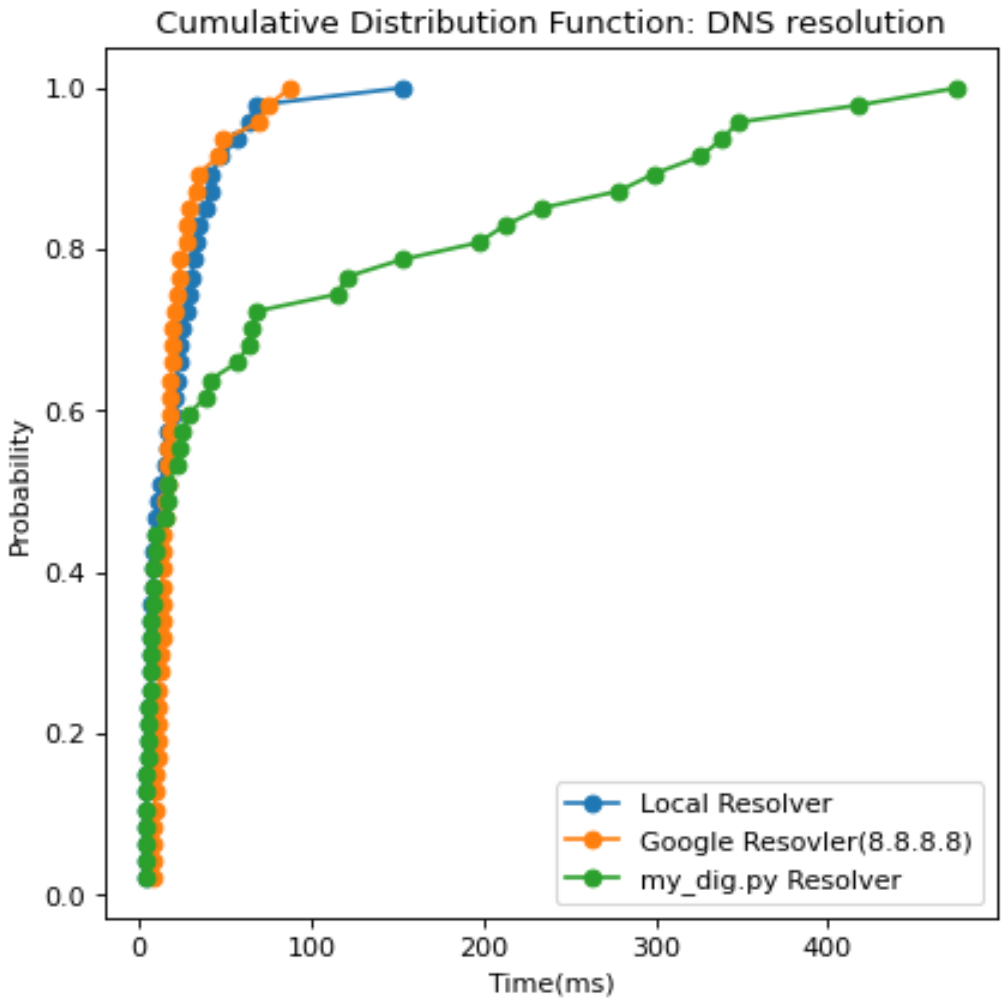
Part B:

Built up on dig tool in Part A to implement the feature that authenticates responses to domain name lookups. We start with iterating over the domain and query the root for DNSKEYSs. The root returns us the RRSET(Pub KSK and Pub ZSK). We create the DS of the Pub KSK and match it with the ones we have provided by ICAN for the root servers. We also verify that the RRSET is authentic and sent by root by verifying the RR_SIG of the RR_SET. Next, we ask the root server for the next child domains record. The root server replies with the NS records and ips for the TLDs. Root server also return a DS for the TLD that we use subsequently to verify the authenticity of the TLD response.
We continue this process iteratively until we find the answer for what we are looking.

Part C:

We test the performance of three DNS resolvers which include:
> Local DNS Resolver
> Google DNS Resolver (8.8.8.8)
> my_dig tool that we created

Below you can see the Cumulative Distribution Function for the same. The data is gathered by taking the average of time taken for top 50 websites for over 10 runs each. We perform this for all the DNS resolvers mentioned above. From the figure we can observe that google dns resolver and local dns resolver are fast and have comparable resolution times. Our implemented resolver is slow due to lack of optimizations like caching etc.


Cumulative Distribution Function: DNS resolution
Probability
1.0
0.8
0.6
0.4
0.2
0.0
0
100
200
300
400
Time(ms)
Local Resolver
Google Resovler(8.8.8.8)
my_dig.py Resolver