Introduction :

A Domain Name System (DNS) is essentially the phone book for any network – including the internet. Every time when we browse any website or host, it need to be converted to an unique IP address for the communication. The DNS system does this work. To resolve host name into an IP address we need to query in domain name servers. The servers either iteratively or recursively resolve the Ip address and after that, the communication started. In our assignment we have tried to resolve “A” type query iteratively.
A iterative query means after every query is sent to correspondence server the response will come directly from the server to the host machine. But in recursive query system after a query is sent to a server the response will not come until the work is completed. It will automatically send request for resolving IP address from root server to tld server, from tld server to authoritative servers, and finally resolve the IP.

Program Design :

- We designed the program using java language.
- The program will follow UDP connection.
- The program will initially expect a input of host name which we want to be resolved.
- A query is formed according to the format of dns query message and send it to the root server.
- Then a static root server will search if it can resolve it or not.
- If not, then the root server will give some top level domain server name and address.
- We need to convert the response message to readable message.
- Then we search in TLD for getting authoritative domain name server and address.
- After that we search for the ip address of the host name.
- The program can only work for “A”, “CNAME” type.

- In the response message we need to consider every byte very carefully about what does it mean.
- Now if the additional answer section does not contain IP addresses of additional authoritative servers then the root server again need to be called to resolve the IP address of authoritative name server.
- If the answer section contain CNAME type record then the canonical name address is sent to the root to find the IP address.
- But if the record type is SOA that means the host is not exist. So it prints the message “Host doesn’t exist” and stop the resolving.
- If the response time for resolving the DNS query is greater than a certain time the query will be stopped to be resolved and next root server will be called to resolve the query.

Description :

The program will take an input of a host name which we want to be resolved. After that a query message will be formed. The query message will be converted into bytestream. Then the datagram socket will be opened to pass the query message and make datagram packet to sent to the root server. The root server will response and send a response message. The response message will contain the some section which is defined for all DNS response message. We set queries iteratively. First it will search for root server then top level domain name server then additional name server. If the answer section contain any additional name server address then it resolve the additional name servers IP address first then go to solve the host IP address. Sometimes the message will contain CNAME type query then we need to resolve the canonical name server’s IP address for our desired IP address. But when any response take much time than a certain fixed amount of time we stopped the query and resend the query in another root server for resolving. The process will be continued until we find the valid IP address for the query.

Limitations :

We have tested our program for various host names and it has resolved the IP address of the corresponding host names. So we expect our program will work for all kind of host names.

Resources:

- To learn the DNS query message format we follow the website: https://routley.io/tech/2017/12/28/hand-writing-dns-messages.html