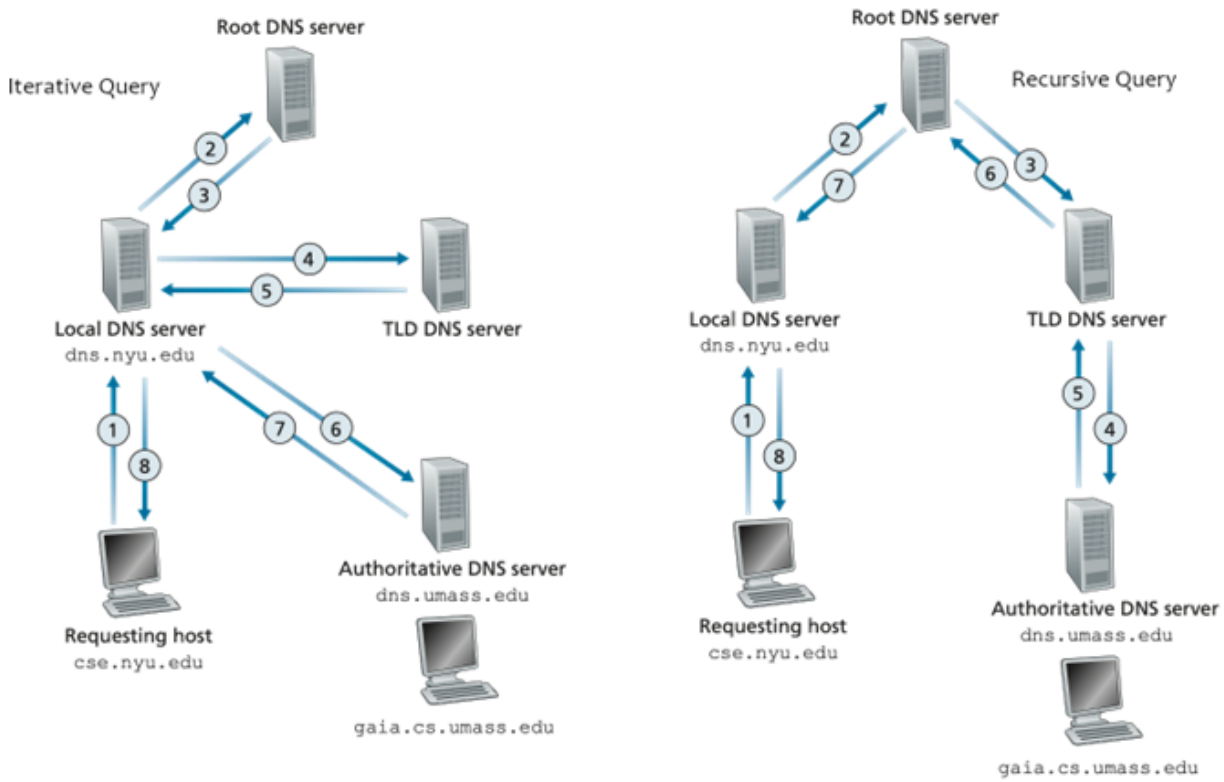
ECE4016 Assignment1

In this assignment, you are required to implement a simple `Local DNS Server`.

1: Introduction

The **Domain Name System (DNS)** is the hierarchical and decentralized naming system used to identify computers reachable through the Internet or other Internet Protocol (IP) networks. The resource records contained in the DNS associate domain names with other forms of information. These are most commonly used to map human-friendly domain names to the numerical IP addresses computers need to locate services and devices using the underlying network protocols, but have been extended over time to perform many other functions as well. The Domain Name System has been an essential component of the functionality of the Internet since 1985.(wikipedia)

Recursive query and Iterative query



2: Detialed grading rule

The local DNS server should have the following function:

- Listen and accept the DNS queries
- Send response to the clients

- Maintain a cache(**20 points**). If the ip address is quried before, it should be stored in the cache. if the answer for the query is found in cache, Local DNS Server send this answer to Client as the DNS response
- Support direct search to the public DNS server(**15 points**)
- Support recursive/iterative searching(**25 points**)
- Support A(**25 points**) and CNAME(**15 points**) type queries

3: Requirements

- Print the ip address of all the servers you pass by during the searching
- Use a variable `flag` to indicate whether ask the public server for the IP address. When the flag is set to be `0`, ask the public server for the IP address. When the flag is set to be `1` do the recursive/iterative searching
- Make sure your program works under ubuntu 20
- Show how to execute your code
- The programming language should be Python(version 3.7+)
- Dnspython is not allowed to use in this lab
- The server is required to work on port **1234** of **127.0.0.1**

4: Useful tools

There are some useful tools that may help you in your programming

- socket
- dnslib

5: Simple test by yourself

You can use `dig` to test your local NDS server.

An example test code:

- **dig www.example.com @127.0.0.1 -p 1234**
- **dig www.baidu.com @127.0.0.1 -p 1234**

6: Submission

- Due on **23:59, 16 Oct 2022**(Late submission within 5 minitues is allowed without punishment)
- Every 24h late delivery will be deducted 10%, and 48h late delivery will be allowed at most. After 48h, 0 marks will be given for this assignment

7: Honesty

We take your honesty seriously. If you are caught copying others' code, you will get an automatic **0** in this project. Please write your own code.