Question 6: Write a step by step solution to the following problem.

Consider the Internet in the picture below, in which zones are indicated with a dashed line. There is only

one DNS server per zone and it happens to have the same name as the highest node in each zone: yale.edu,

cs.yale.edu, rutgers.edu, cs.rutgers.edu, rdl.edu, tdl.gov, tld.net and root-servers.net. The only servers

supporting recursive querying are cs.yale.edu and cs.rutgers.edu.

For each of the queries below, list in order all the DNS servers contacted by the resolver. Assume there is no

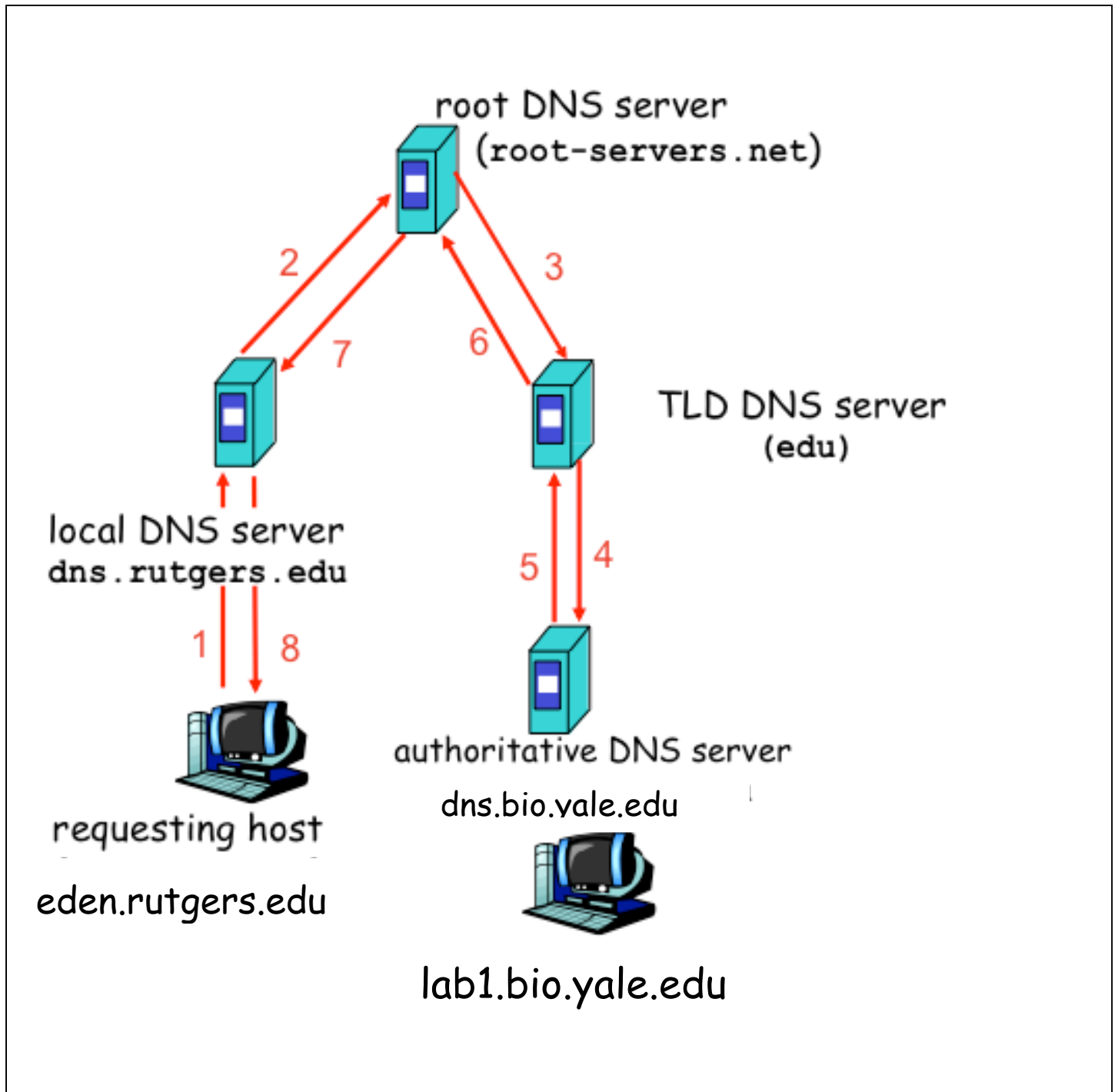caching performed at any level of the hierarchy.

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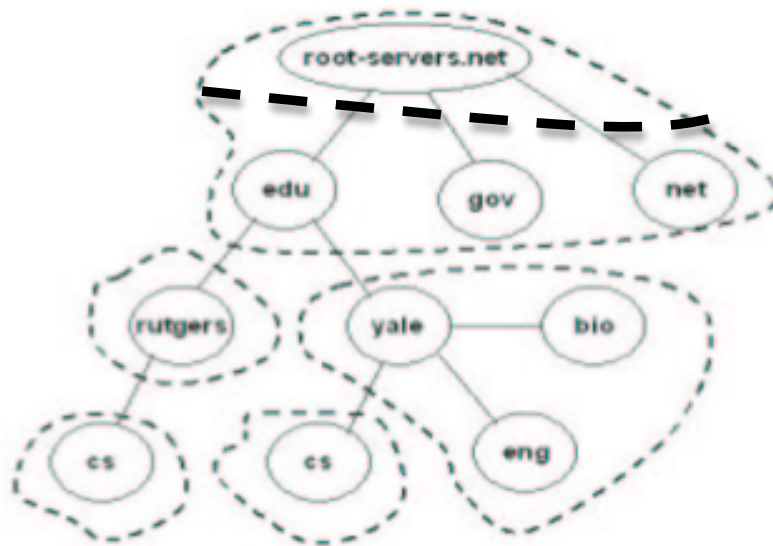
a) A machine called lab1.bio.yale.edu exists in the biology (bio) department at Yale, and a user on
   eden.rutgers.edu (rutgers) launches a query to resolve the name lab1.bio.yale.edu. List the steps and the
   names of the servers that will be contacted by DNS.
**We assume that none of the servers have the resolution of the name cached, thus all queries must
   be resolved and the final IP address must be obtained from the authoritative server in Yale**
   1. The requesting user on machine *eden.rutgers.edu* at rutgers queries for the resolution of the name
      lab1.bio.yale.edu
   2. The local DNS server (*dns.rutgers.edu*) processes they query from *eden.rutgers.edu* by issuing a
      query to the root DNS server (*root-servers.net*) on behave of *eden.rutgers.edu*
   3. The *root-servers.net* server processes they query from *dns.rutgers.edu* by issuing a query to the
      Top Level Domain (TDL) server (*edu*) on behave of *root-servers.net*
   4. The *edu* server processes they query from *root-servers.net* by issuing a query to the Authoritative
      DNS server (*dns.bio.yale.edu*) on behave of *edu*
   5. *dns.bio.yale.edu* resolves the query and answers back to *edu*
   6. *edu* obtains the resolve query and forwards it to *root-servers.net*
   7. *root-servers.net* obtains the resolve query and forwards it to *dns.rutgers.edu*
   8. *dns.rutgers.edu* obtains the resolve query and forwards it to *eden.rutgers.edu*

(5 points)

b) Draw a picture that illustrates the query resolution process you explained in the previous question. Make sure you label correctly so it is clear which step above correspond to the messages in the picture.

root DNS server
(root-servers.net)

2

3

7

6

TLD DNS server
(edu)

local DNS server
dns.rutgers.edu

5   4

1   8

authoritative DNS server

dns.bio.yale.edu

requesting host

eden.rutgers.edu

lab1.bio.yale.edu

(10 points)