DNS - BASICS

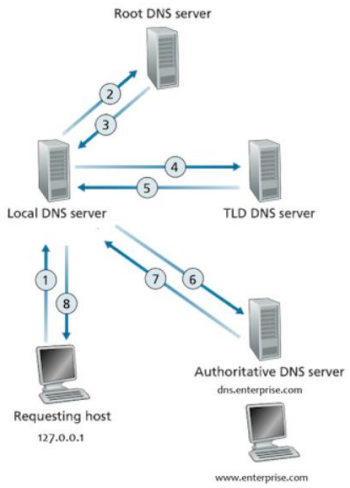
Imagine that you are trying to visit www.enterprise.com, but you don't remember the IP address the web-server is running on.

Assume the following records are on the TLD DNS server:

- (www.enterprise.com, dns.enterprise.com, NS)
- (dns.enterprise.com, 146.54.34.245, A)

Assume the following records are on the enterprise.com DNS server:

- (www.enterprise.com, west2.enterprise.com, CNAME)
- (west2.enterprise.com, 142.81.17.206, A)
- (enterprise.com, mail.enterprise.com, MX)
- (mail.enterprise.com, 247.29.8.150, A)



1.What transport protocol(s) does DNS use: TCP, UDP, or Both?

Both

2. What well-known port does DNS use?

53

3.In the above example, how many unique type of Resource Records (RR) are there at the authoritative enterprise.com DNS server?

3

4. Can you send multiple DNS questions and get multiple RR answers in one message? Answer with Yes or No

Yes

5. To which DNS server does a host send their requests to? Answer with the full name

Local DNS server

6. Which type of DNS server holds a company's DNS records? Answer with the full name

Authoritative DNS server

7. In the example given in the problem, what is the name of the DNS server for enterprise.com?

Dns.enterprise.com

8. When you make the request for www.enterprise.com, your local DNS requests the IP on your behalf. When it contacts the TLD server, how many answers (RR) are returned?

2

9. In the previous question, there were two responses, one was a NS record and the other an A record. What was the content of the A record? Answer with the format: "name, value"

Dns.enterprise.com, 146.54.141.123

10. Assume that the enterprise.com website is actually hosted on east4.enterprise.com, what type of record is needed for this?

CNAME

11. Now imagine we are trying to send an email to admin@enterprise.com, and their mail server has the name mail.enterprise.com. What type of record will contain the name of the enterprise.com domain and the name of its mailserver(s)?

MX

12. In that MX record, what are the contents? Answer with the format: "name, value"

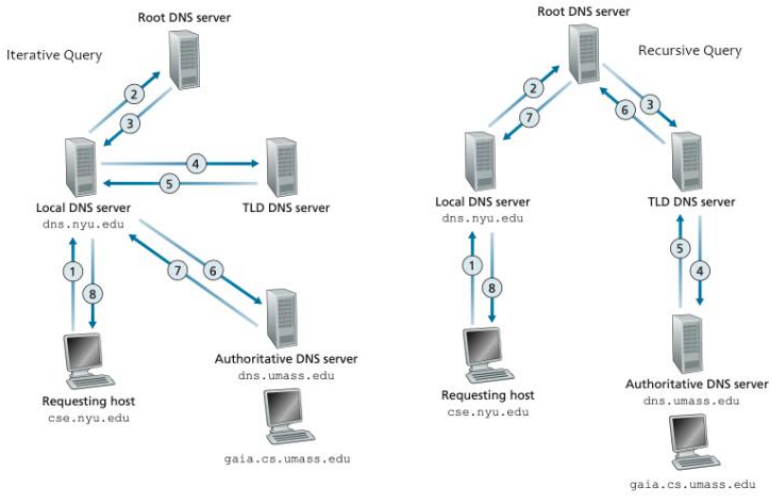
enterprise.com, mail.enterprise.com

13. Does your local DNS server take advantage of caching similar to web requests? Answer with Yes or No

Yes

DNS - ITERATIVE VS RECURSIVE QUERY

Assume that a user is trying to visit gaia.cs.umass.edu, but his browser doesn't know the IP address of the website. In this example, examine the difference between an iterative and recursive DNS query.



ITERATIVE

1.Between steps 1 and 2, where does the Local DNS server check first? Answer with 'User', 'DNS Local', 'DNS Root', 'DNS TLD', or 'DNS Authoritative'.

DNS ROOT

2. Between steps 2 and 3, assuming the root DNS server doesn't have the IP we want, where does the response link? Answer with 'DNS Local', 'DNS Root', 'DNS TLD', or 'DNS Authoritative'.

DNS TLD

3. Between steps 4 and 5, assuming the TLD DNS server doesn't have the IP we want, where does the response link? Answer with 'DNS Local', 'DNS Root', 'DNS TLD', or 'DNS Authoritative'.

DNS Authoritative

4. Between steps 6 and 7, the authoritative DNS server responds with the IP we want. What type of DNS record is returned?

type A

5. Which type of query is considered best practice: iterative or recursive?

Iterative

RECURSIVE

1.Between steps 1 and 2, where does the Local DNS server check first? Answer with 'User', 'DNS Local', 'DNS Root', 'DNS TLD', or 'DNS Authoritative'.

DNS Root

2. Between steps 2 and 3, where does the root DNS forward the request to? Answer with 'DNS Local', 'DNS Root', 'DNS TLD', or 'DNS Authoritative'.

DNS TLD

3. Between steps 4 and 5, where does the authoritative DNS forward the response to? Answer with 'DNS Local', 'DNS Root', 'DNS TLD', or 'DNS Authoritative'.

DNS TLD

4. In steps 6-8, the response is sent back in the reverse direction until it reaches the user. What type of DNS record is returned?

Type A

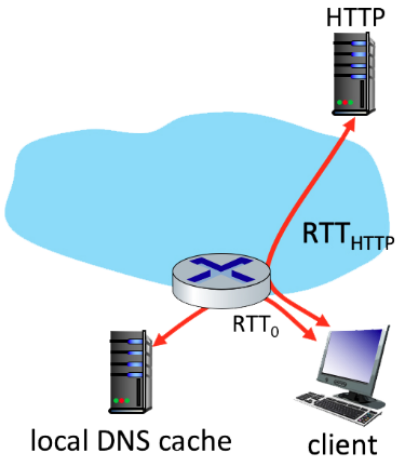
5. Which type of query is considered best practice: Iterative or Recursive?

Iterative

DNS AND HTTP DELAYS

Before doing this question, you might want to review sections 2.2.1 and 2.2.2 on HTTP (in particular the text surrounding Figure 2.7) and the operation of the DNS (in particular the text surrounding Figure 2.19).

Suppose within your Web browser you click on a link to obtain a Web page. The IP address for the associated URL is not cached in your local host, so a DNS lookup is necessary to obtain the IP address. Suppose that only one DNS server, the local DNS cache, is visited with an with an RTT delay of RTT_0 = 2 msecs. Initially, let's suppose that the Web page associated with the link contains exactly one object, consisting of a small amount of HTML text. Suppose the RTT between the local host and the Web server containing the object is RTT_{HTTP} = 65 msecs.



1.Assuming zero transmission time for the HTML object, how much time (in msec) elapses from when the client clicks on the link until the client receives the object?

132 = 2+2*65

2.Now suppose the HTML object references 10 very small objects on the same server. Neglecting transmission times, how much time (in msec) elapses from when the client clicks on the link until the base object and all 10 additional objects are received from web server at the client, assuming non-persistent HTTP and no parallel TCP connections?

1432 = 2+2*65+10*65+10*65

3. Suppose the HTML object references 10 very small objects on the same server, but assume that the client is configured to support a maximum of 5 parallel TCP connections, with non-persistent HTTP.

392 = 2+2*65 + 2*65 +2*65

4. Suppose the HTML object references 10 very small objects on the same server, but assume that the client is configured to support a maximum of 5 parallel TCP connections, with persistent HTTP.

262 = 2+2*65+2*65

5. What's the fastest method we've explored: Nonpersistent-serial, Nonpersistent-parallel, or Persistent-parallel?

Persistent-parallel

ELECTRONIC MAIL AND SMTP

Look at the scenario below, where Alice sends an email to Bob.

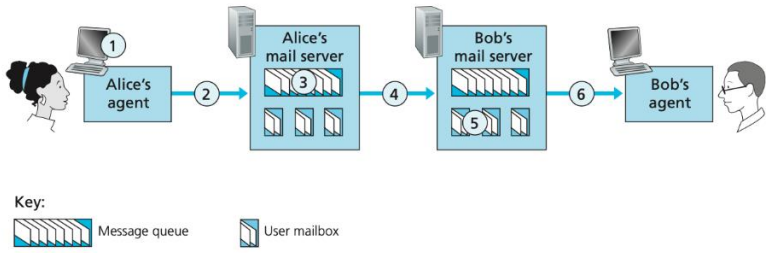


Figure 2.15 ♦ Alice sends a message to Bob

For the questions below, assume both Bob's and Alice's user agents use the POP3 protocol.

1.At point 2 in the diagram, what protocol is being used?

SMTP

2. At point 4 in the diagram, what protocol is being used?

SMTP

3. At point 6 in the diagram, what protocol is being used?

POP3

4. Does SMTP use TCP or UDP?

TCP

5. Is SMTP a 'push' or 'pull' protocol?

Push

6. Is POP3 a 'push' or 'pull' protocol?

Pull

7. What port does SMTP use?

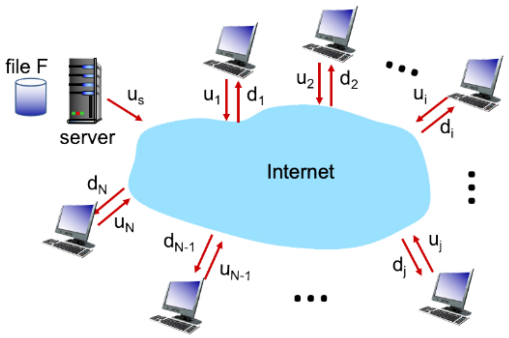
25

8. What port does POP3 use?

110

A COMPARISON OF CLIENT-SERVER AND P2P FILE DISTRIBUTION DELAYS

In this problem, you'll compare the time needed to distribute a file that is initially located at a server to clients via either client-server download or peer-to-peer download. Before beginning, you might want to first review Section 2.5 and the discussion surrounding Figure 2.22 in the text.



The problem is to distribute a file of size F = 3 Gbits to each of these 10 peers. Suppose the server has an upload rate of u = 52 Mbps.

The 10 peers have upload rates of: u_1 = 26 Mbps, u_2 = 17 Mbps, u_3 = 21 Mbps, u_4 = 19 Mbps, u_5 = 30 Mbps, u_6 = 22 Mbps, u_7 = 29 Mbps, u_8 = 30 Mbps, u_9 = 22 Mbps, and u_{10} = 20 Mbps

The 10 peers have download rates of: d_1 = 29 Mbps, d_2 = 23 Mbps, d_3 = 25 Mbps, d_4 = 16 Mbps, d_5 = 10 Mbps, d_6 = 10 Mbps, d_7 = 11 Mbps, d_8 = 10 Mbps, d_9 = 21 Mbps, and d_{10} = 27 Mbps

1.What is the minimum time needed to distribute this file from the central server to the 10 peers using the client-server model?

576.92 = 3x10^9*10/52x10^6

2. For the previous question, what is the root cause of this specific minimum time? Answer as 's' or 'ci' where 'i' is the client's number

S

3. What is the minimum time needed to distribute this file using peer-to-peer download?

300 = 3x10^9/10x10^6

4. For question 3, what is the root case of this specific minimum time: the server (s), client (c), or the combined upload of the clients and the server (cu)

c