COMP 431 Internet Protocols & Services

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Worksheet 7, February 7

1) Consider the DNS name resolution processing that results from typing a *cnn.com* URL into a web browser. Assume the *cnn* page is composed of a base HTML page that contains references to three objects for so-called “banner ads” supplied by advertising agencies. The banner adds are images stored on web servers operated by the advertising agency or some third-party content distribution company. The URLs for the base page and three embedded objects (taken from a real web page) are:

*http://www.cnn.com* (Base page.)

*http://a30.g.akamai.net/f/30/1162/1h/images.cnn.com/ads/advertiser/worldcom/011/cnn.worldcom.gif*

*http://a76.h.akamai.net/f/76/1162/1h/images.cnn.com/ads/advertiser/cnn/011/234x60.career.gif*

*http://www2.cnn.com/cookie.crumb*

How much time does it take to perform the DNS name resolutions required to request all four URLs? Express your answer in terms of the number of DNS query/reply round trip times (RTTs) needed. Show clearly how you derived your answer.

In your analysis you may assume:

* The local name server is also an authoritative name server for the local domain.
* The local name server has a large cache but it is empty when processing for these URLs first begins, the URLs are processed in the order given above, and no other resolvers use the local server until all four URLs have been requested.
* The DNS query/reply round-trip time between any two DNS servers is constant and the same constant for all server pairs.
* The round-trip latency between the browser’s resolver and the local authoritative server is negligible.
* The local authoritative name server always sends iteratedqueries.
* For the host names in the above URLs, there is always a different authoritative name server for each domain in the name hierarchy.

Cnn.com

1 RTT to root for com TLD (NS)

1 rtt to com TLD for cnn (NS)

1 rtt to cnn authoritative A-record for ip

a30.g.akamai.net

1 RTT to root for net TLD (NS)

1 rtt to net TLD for Akamai (NS)

1 rtt to Akamai for g.akamai.net (NS)

1 rtt to Akamai authoritative name server for ip (A-record)

a76.h.akamai.net

1 rtt to Akamai for h (from cache) NS

1 rtt to Akamai h for ip (A-record)

www2.cnn.com

1 rtt to cnn authoritative name server (from cache) for ip (A-record)

2) For this problem use the *whois* and *nslookup* commands either on your laptop or on *classroom*. Start by reading the man page for these commands. Answer the following questions:

*a*) Use various *whois* databases on the Internet to obtain the names of two DNS servers. Indicate which *whois* databases you used.

Reddit.com - Registrar WHOIS Server: whois.gandi.net

Name Server: NS-557.AWSDNS-05.NET

Name Server: NS-378.AWSDNS-47.COM

Name Server: NS-1887.AWSDNS-43.CO.UK

Name Server: NS-1029.AWSDNS-00.ORG

*b*) Use *nslookup* to send DNS queries to three DNS servers: your local DNS server and the two DNS servers you found in part (*a*). Try querying for Type A, NS, and MX reports. Summarize your findings.

Non-authoritative answer:

Name: google.com

Address: 216.58.217.142

*c*) Use *nslookup* to find a Web server that has multiple IP addresses. Does the Web server at UNC or the CS Department have multiple IP addresses?

*d*) Use the ARIN (American Registry for Internet Numbers) *whois* database to determine the IP address range used by UNC.

Name Servers:

NS.UNC.EDU 152.2.21.1, 2610:28:3090:1004::10

NS2.UNC.EDU 152.2.253.100, 2610:28:3090:2005::10

FASTERPASS.ITS.UNC.EDU 152.19.240.8, 2610:28:3090:3002::10

3) In this problem, we use the useful *dig* command available on Linux to explore the hierarchy of DNS servers. Recall that a DNS server higher in the DNS hierarchy delegates a DNS query to a DNS server lower in the hierarchy, by sending back to the DNS client the name of that lower-level DNS server. First read the man page for *dig*, and then answer the following questions.

*a*) Starting with a root DNS server (from one of the root servers [*a*-*m*].*rootservers*.*net*), initiate a sequence of queries for the IP address for the CS department’s Web server by using dig. Show the list of the names of DNS servers in the delegation chain in answering your query.

*b*) Repeat part (*a*) for several popular Web sites, such as *google.com*, *yahoo.com*, or *amazon.com*.