

15-744 Computer Networks — Spring 2016

Homework 3

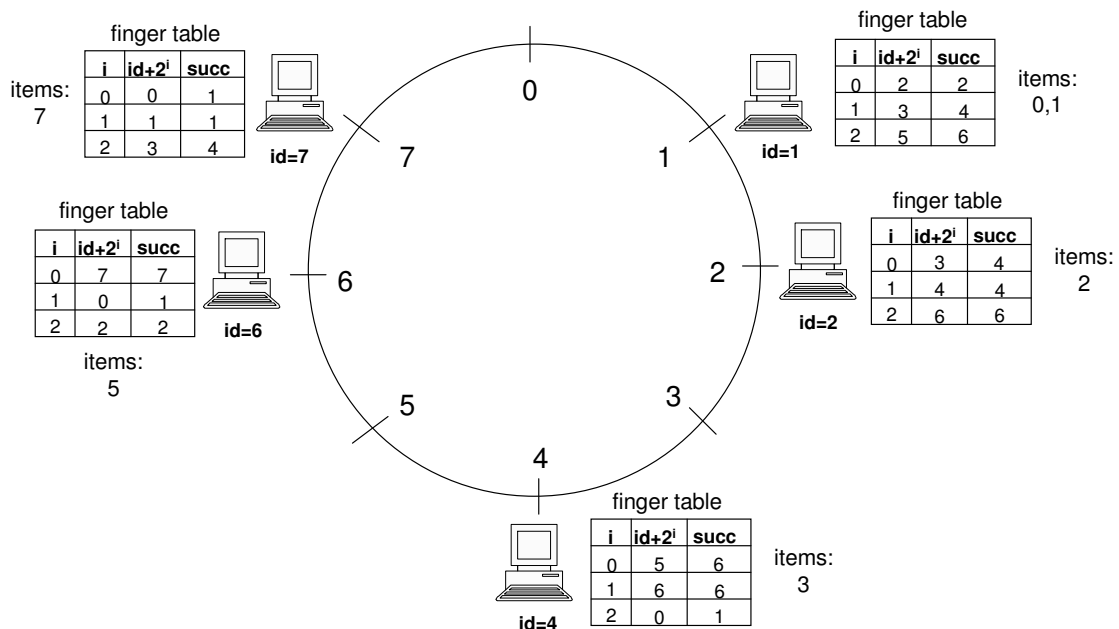
Due by 4/13/2016

(to be submitted in the beginning of class in hard copy)

Name:

A DHTs

1. Srini, in fear that the RIAA will shut down his centralized P2P server (like Napster), sets up a Chord DHT for lookups and routing in his peer to peer network. Unfortunately (or fortunately, for you), Srini's P2P network is not very popular and only consists of five peers at the moment with finger tables and items illustrated below. For example, *node 4* has *item 3*.



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B Privacy

2. Name two examples of potentially private information that TCP/IP traditionally exposes to the network, but that the network doesn't actually need.

C Using dig to explore DNS

3. In this question, you will use the unix utility **dig** to explore the contents of DNS messages and try its recent extension of EDNS0.

The format of a **dig** request is simple. Just type: **dig www.cs.cmu.edu** to perform a look-up for that DNS name. As you now know, DNS requests can do more than just ask for the IP address corresponding to a single DNS name. Type **dig cs.cmu.edu ANY** to see DNS records of all types that are associated with the domain 'cs.cmu.edu'.

- (a) What IP address did the computer you are logged into contact to make the DNS request? Where do you think this server is located?
- (b) List all of the different types of records received as a result of your query. For each record, explain its purpose, using one of the entries provided in the reply as a concrete example.
- (c) Use **dig** to find the TTL for the DNS mappings of 'www.cnn.com' and 'www.cs.stanford.edu'. What are they? If your boss asks you to provide two positive and two negative effects of having a short DNS TTL for the company's e-commerce site, what would you say?

- (d) Use `dig www.google.com` to find out the list of server IPs used for `www.google.com`.
- (e) Use `dig @ns1.google.com www.google.com` to find out the list of server IPs used for `www.google.com` if we delegate the DNS lookup to Google DNS `ns1.google.com`. Is the list the same to the last question? If not, can you explain why?
4. You can also use `+noresurse` to disable recursive DNS look up. Try `dig +norecurse www.ikea.com`. This will run iterative queries to go all the way down the name hierarchy and find the IP address of `www.ikea.com`. Please explain, for each step, what is the TTL and where the DNS server may be located?
5. In this quesiton, you will use the EDNS-enabled `dig`. Please follow the instructions on this page to compile `dig` with EDNS client-subnet support: <https://www.gsic.uva.es/~jnisigl/dig-edns-client-subnet.html>.
- (a) Let's first do a DNS lookup for `www.google.com` with a specific client IP prefix in 128.2.214.0/24, which is in GHC. you can use `bin/dig/dig @ns1.google.com www.google.com +client=128.2.214.0/24`. What is the returned IP address? Note that this has to be done with the new EDNS-enabled `dig`, rather than the built-in unix `dig`.
- (b) Now let's do a DNS lookup for `www.google.com` with a specific client IP prefix in 169.229.216.200/24, which is in Berkeley. What is the returned IP address?
- (c) Are the returned IP address the same? Why?

- (d) Assuming you are using CMU campus network, please ping the two returned IP addresses separately. Do you see very similar/different RTTs? Please explain the similar/different RTTs.