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Homework #3 for protok11
Peter Boström <pbos@kth.se>
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1. DNS

- List the (names of the) name servers in the computer-science department (csc.kth.se)! (names, not
addresses)

;; QUESTION SECTION:
;csc.kth.se.            IN  NS

;; ANSWER SECTION:
csc.kth.se.     61851   IN  NS  ns2.nada.kth.se.
csc.kth.se.     61851   IN  NS  ns1.nada.kth.se.
csc.kth.se.     61851   IN  NS  a.ns.kth.se.
csc.kth.se.     61851   IN  NS  b.ns.kth.se.

Answer: a.ns.kth.se, b.ns.kth.se, ns1.nada.kth.se & ns2.nada.kth.se.

- List all the IP addresses in the list above! (Don't forget IPv6)

;; ADDITIONAL SECTION:
a.ns.kth.se.        7200    IN  A   130.237.72.246
a.ns.kth.se.        7200    IN  AAAA    2001:6b0:1::246
b.ns.kth.se.        7200    IN  A   130.237.72.250
ns1.nada.kth.se.    71261   IN  A   130.237.225.4
ns2.nada.kth.se.    77092   IN  A   130.237.222.4

Answer:
a.ns.kth.se => 130.237.72.246 + 2001:6b0:1::246
b.ns.kth.se => 130.237.72.250
ns1.nada.kth.se => 130.237.255.4
ns2.nada.kth.se => 130.237.255.4

- One of the (secondary) nameservers of kth.se is located in Gothenburg (Chalmers). Does its IP
address have any other name?

;; ANSWER SECTION:
252.253.16.129.in-addr.arpa. 2036 IN    PTR charybdis.cdg.chalmers.se.
252.253.16.129.in-addr.arpa. 2036 IN    PTR ns2.chalmers.se.

Answer: Yes; charybdis.cdg.chalmers.se

- To which mail agents may your email be delivered if you send an email to olofh@csc.kth.se? List
the names of all servers.

;; ANSWER SECTION:
csc.kth.se.     3590    IN  MX  0 mx4.nada.kth.se.
csc.kth.se.     3590    IN  MX  0 mx3.nada.kth.se.

Answer: mx3.nada.kth.se & mx4.nada.kth.se

- What if you use the alternative addresses olofh@kth.se and olofh@nada.kth.se?

;; ANSWER SECTION:
kth.se.         60  IN  MX  10 mx.kth.se.

;; ANSWER SECTION:
nada.kth.se.        3600    IN  MX  0 mx4.nada.kth.se.
nada.kth.se.        3600    IN  MX  0 mx3.nada.kth.se.

Answer: kth.se uses mx.kth.se, nada.kth.se uses the same MX names as csc.kth.se.

- Which name does the IPv4 address 193.11.23.1 correspond to?

;; ANSWER SECTION:
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65  1.23.11.193.in-addr.arpa. 9572  IN  PTR lab-fw.netlab.csc.kth.se.
66
67  Answer: lab-fw.netlab.csc.kth.se
68
69  - Which name does the 2001:700:0:503::aa:5302 correspond to?
70
71  2.0.3.5.a.a.0.0.0.0.0.0.0.0.0.0.3.0.5.0.0.0.0.0.0.0.7.0.1.0.0.2.ip6.arpa domain name pointer
    nn.uninett.no.
72
73  Answer: nn.uninett.no
74
75  - Assume you are an administrator at NADA and you wish to change the address of one of its
    nameservers. You want to shut-down the old server and replace it with a new, and for that you want
    to use a new IP address. Describe a method to accomplish this where the overlap between the old and
    new address is not more than a minute (When both addresses are simultaneously accesible). Which
    entries would you change, and at what period in time would you change them? When can you shut down
    the old server? You may want to express the method using a time-line. The TTL of the entry is 86400.
76
77  Answer:
78
79  First, change the TTL of the nameserver's address (A, AAAA) fields to 30 seconds (less than a
    minute).
80
81  Then wait for 86400 (old TTL) seconds, so that you know that no servers are caching the old address
    for more than 30 seconds.
82
83  Now change the nameserver's address field to the new IP, and set the TTL back to 86400 (in that
    order).
84
85  After 30 seconds, the old server can be unplugged. No servers will have this old address cached by
    now.
86
87
88  2. Distance-vector routing
89
90  In the network above, all routers run RIPv2 and all link metrics are one, except between A and C
    where the link metric is three. Assume an initial state for all routers, where only the directed
    connected networks are present in the router's routing tables. The destinations in the network are
    the /24 prefixes (not A, B, ...). There is no equal-cost-multi-path in the network (only one best
    path). Please note that no destinations in this example should have the metric zero!
91
92  2.1 Initial state
93  What is the initial RIP routing state of A? Express the routes in a routing table as follows:
94
95  A's Destination, Metric, Next-hop/-
96  B, 1, -
97  C, 3, -
98
99  2.2 First step
100
101 Assume C is the first router that sends a RIP update to all its neighbours. What is A's routing
    table after the RIP update from C is recieved?
102
103 C's table (Destination, Metric, Next-hop/-)
104 A, 3, -
105 B, 1, -
106 D, 1, -
107 E, 1, -
108
109 Merging this into A's table gives (adding 3 for metric to C):
110 B, 1, -
111 C, 3, -
112 D, 4, C
113 E, 4, C
114
115 2.3 Second step
116
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Assume B is the second router that sends a RIP update to all its neighbors. What is A's routing table after the RIP update from B is recieved? (B has also recieved an update from C).

B's table (Destination, Metric, Next-hop/-)
A, 1, -
C, 1, -
D, 2, C
E, 2, C
F, 1, -

Merging into A's table gives (adding 1 for metric to B):
B, 1, -
C, 2, B
D, 3, B
E, 3, B
F, 2, B

2.4 Final step

After convergence (stable state has been reached), what is the state of A's routing table?

B, 1, -
C, 2, B
D, 3, B
E, 3, B
F, 2, B

2.5 Split-horizon

Assume A uses split-horizon. Define A's distance vector sent on the 10.0.3.0/24 sub-network. That is, which <destination, metric> tuples are sent from A in a RIP response message to B? The state is after convergence.

Nothing, all traffic from A goes either directly to or through B.