

Recitation 2: DNS

DNS is a big system! These notes cover the highlights. You should make sure you're comfortable with the examples covered in Section 4.4 of the textbook. Come to office hours with questions if you have them!

Basic DNS lookup: See Lecture 2 for this. Important points: for a lookup of `eecs.mit.edu`, the root nameserver will refer the client to the `edu.` nameserver; that nameserver will refer the client to the `mit.edu.` nameserver; that nameserver will be able to answer the query for `eecs.mit.edu`.

- Pro: Delegation; no nameserver has to keep track of the entire hostname-to-IP mapping
- Cons: Lots of queries in general, lots of queries to the root specifically

Enhancements (not the best term, these are pretty crucial to DNS functionality)

- Initial query can go to any nameserver, not just the root
- *Recursive* queries: a nameserver can issue queries on behalf of a client.

It's not clear yet why these enhancements help! We still have a lot of queries, still seems like we need to go to the root for most things. So in comes:

- Caching. DNS clients and nameservers keep a cache of known mappings. A mapping expires after a time set by the nameserver in charge of that mapping.

These enhancements allow DNS to scale to the size of the Internet. A drawback of caching: if a hostname-to-IP address mapping changes, the change won't go fully into effect until all of the cache entries for the previous mapping have expired; and these cache entries could exist in *many* (millions) of DNS clients/nameservers. The people in charge of DNS nameservers know this, and can set short cache-expiry times for mappings that change often, and can also keep multiple servers alive (the old and new one) until all cache entries have expired.

- When we get to the distributed-systems part of 6.1800, we'll be able to talk about DNS as providing — or not providing — particular forms of *consistency*.

Discussion

- **Who's impacted by DNS?** Tons of people. You. Internet users, developers, nameserver operators, anyone who uses the internet, ICANN, small businesses, large businesses,...
- **What's good about DNS's design?** It scales thanks to its hierarchical design (and things like caching), it's reliable in many ways (multiple physical nameservers per zone, e.g.), it's fairly high-performing for a system so large, nice delegation
- **What's bad about DNS's design?** Many people consider its lack of security and trustworthiness to be a downside.