INFO 310

Fall 2016

Week 9 – Lecture 1

HOUSEKEEPING

- Attendance
- Position Paper Turn-In
- Quick Lab Review

DNS – Domain Name System

- **DNS** is a hierarchical distributed naming system for computers, services, or any resource connected to the Internet or a private network. It associates various information with domain names assigned to each of the participating entities.
- Most prominently, it translates domain names, which can be easily memorized by humans, to the numerical IP addresses needed for the purpose of computer services and devices worldwide.
- The Domain Name System is an essential component of the functionality of most Internet services because it is the Internet's primary directory service

WIKIPEDIA
The Free Encyclopedia

A brief History

- ARPANET had no equivalent – manual process
  - Hosts.txt
    - /etc/hosts
    - %SystemRoot%\System32\drivers
    - LOCALHOST – 127.0.0.1
- DNS designed in 1983 at UC Irvine
- 1984 birth of BIND (Berkeley Internet Name Domain)
  - Today in Version 9.x, still considered the gold standard, but has viable competitors

Governing Bodies

US Department of Commerce

- *Agency*: National Telecommunications and Information Administration (NTIA)
  - *Delegates to*: Internet Corporation for Assigned Names and Numbers (ICANN)
    - *Operates*: Internet Assigned Numbers Authority (IANA)

Common types of (IPv4) DNS Resource Records

- A – Address Record, points to IP address
- CNAME – Canonical Name Record, always points to another name record, never an IP address. DNS will keep trying with the new name.
- MX – Mail Exchange Record – Which server handles email for the domain
- NS – Name Server Record, authoritative DNS server for the domain
- PTR – Pointer Record, points to a CNAME, but DNS stops there
- TXT – Text Record, arbitrary human readable text
- Not a record, but important: **TTL - TimeToLive**

Components

- TLD – Top-level Domain
  - Initially: Countries, Categories, and Multi-organizations
    - GOV / EDU / COM / MIL / ORG
  - As of 7/2015: 1058 TLDs
    - (incl. 730 gTLD, 301 ccTLDs)
- DNS root zone (The “dot”): Contains names and IPs of root servers and authoritative DNS servers for ach TLD
- Root Name Servers (13 total, A-M)
  - http://www.root-servers.org
  - BGP Anycast: 504 actual instances as of 10/2015

DNS Root Server Operators

A - VeriSign Global Registry Services

B – USC Information Sciences Institute

C - Cogent Communications

D - University of Maryland

E - NASA Ames Research Center

F - Internet Systems Consortium, Inc.

G - U.S. DOD DISA

H - U.S. Army Research Lab

I - Netnod

J - VeriSign Global Registry Services

K - RIPE NCC

L - ICANN

M - WIDE Project

Types of DNS Servers

- Resolving Name Server (“primed”)
- Root Name Server
- TLD Name Server
- Authoritative Name Servers
  - Primary (master)
  - Secondary (slave)
- Also
  - Caching Name Servers
  - Recursive Name Servers
  - Alternative roots (alt roots)

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