REVIEWER: DNS and Proxy

Domain Name System (DNS)

Overview

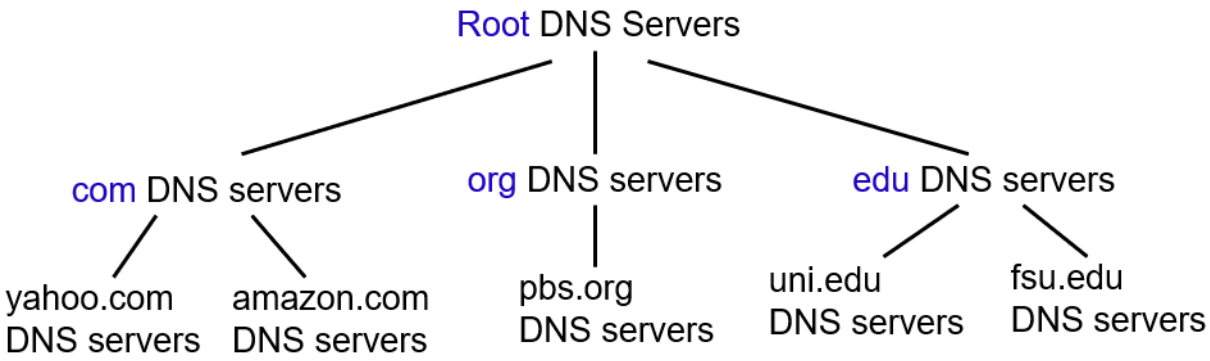
- **DNS (Domain Name System):** Maps human-readable hostnames to IP addresses and vice versa.
  Example: "google.com" → 142.250.190.78

Functions:

- **Host Aliasing:** Assigns multiple names to one server.
- **MX Records (Mail eXchanger):** Specifies mail servers for a domain.
- **Load Balancing:** Associates multiple IP addresses with a single hostname.

Architecture

- **Distributed, Hierarchical Database:**
  - Partitioned into multiple top-level domains (TLDs).
  - Root DNS servers store information about TLDs like .com, .org, .edu.



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DNS Hierarchy:

1. **Root Name Servers:**
   - Top-level servers contacted first during DNS queries.
   - Know locations of TLD DNS servers.
2. **TLD Servers:**
   - Handle queries for domain extensions (.com, .org, .cn, etc.).

    - Direct queries to appropriate **Authoritative Servers**.
3. **Local Name Servers:**
    - Known as "default name servers."
    - Cache DNS query results to reduce external queries.
    - Translate website names to IP addresses within a network.

DNS Queries

1. **Iterative Queries:**
    - Server provides the best answer it can (may direct the query elsewhere).
2. **Recursive Queries:**
    - Server continues querying until the answer is found.

Caching and Updating

- **Caching:**
    - Temporarily stores query results for faster future access.
    - Controlled by TTL (Time to Live).
- **Updating Records:**
    - **Dynamic Updates:** Via protocols like DDNS.
    - **Manual Updates:** Through DNS management tools.

Other Notes

- **Communication Protocol:** DNS uses UDP to exchange information.
- **Host Configurations:**
    - **Manual Configuration:** Add hostname/IP mappings manually (e.g., /etc/hosts file).
    - **Dynamic Host Configuration Protocol (DHCP):** Automates DNS configuration.

Proxy Servers

Overview

- **Server:** A system that provides resources, services, or programs to clients over a network.
- **Proxy Server:**
    - Acts as an intermediary between a user and a server.
    - Hides user details for security and privacy.

Types of Servers

- **Web Servers**
- **Database Servers**
- **File Servers**
- **Mail Servers**
- **Print Servers**
- **Game Servers**
- **Application Servers**

Functions of Proxy Servers

1. **Firewall and Data Filtering**
2. **Data Caching**
3. **Network Connection Sharing**

Types of Proxy Servers

1. **Reverse Proxy:**
    - Forwards requests to backend servers, appearing as if it came from the original server.
2. **Web Proxy:**
    - Forwards HTTP requests; only URLs are passed.
3. **Anonymous Proxy:**
    - Hides the original IP address.

4. **High Anonymity Proxy:**
    - Prevents detection of the original IP.
5. **Transparent Proxy:**
    - Intercepts communication without user configuration.
6. **CGI Proxy:**
    - Processes web requests and delivers results to the browser.
7. **Suffix Proxy:**
    - Used for bypassing web filters.
8. **Distorting Proxy:**
    - Generates false client IP addresses.
9. **TOR Onion Proxy:**
    - Routes traffic through global networks to obscure user location.
10. **I2P Anonymous Proxy:**
    - Encrypts communications for high-level privacy.
11. **DNS Proxy:**
    - Handles DNS queries and forwards them to domain servers.