DNS - Domain Name System

What is DNS?

DNS (Domain Name System) is the 'phonebook of the internet'. It translates human-readable domain names (like example.com) into IP addresses (like 192.0.2.1) that computers use to communicate with each other.

What is DNS Resolution?

DNS resolution is the process of converting a domain name into its corresponding IP address. The client requests a DNS resolver to resolve a name. If it's not cached, the resolver queries the root DNS server, then the TLD (Top-Level Domain) server, then the authoritative DNS server for the final answer.

Types of DNS Queries

1. Recursive Query:
- The DNS resolver does all the work and returns the final answer to the client.
- Example: dig +recurse example.com @8.8.8.8

2. Iterative Query:
- The DNS server provides the best answer it has or a referral to another server.
- Example: dig +norecurse example.com @a.root-servers.net

3. Non-Recursive Query:
- Used when the resolver already has the answer cached or is authoritative.
- Example: dig +norecurse example.com @8.8.8.8

Types of DNS Records

- A: Maps a domain to an IPv4 address
- AAAA: Maps a domain to an IPv6 address
- CNAME: Alias for another domain name
- MX: Mail server record
- NS: Name server record
- PTR: Reverse DNS record

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- SOA: Start of Authority for the domain
- TXT: Text record, used for verification
- SRV: Service locator for protocols
- CAA: Authorizes certificate authorities

Types of DNS Servers

- Recursive Resolver: Does full resolution for clients
- Root Name Server: Top-level server that directs queries to TLDs
- TLD Server: Handles domains like .com, .org
- Authoritative Server: Stores actual DNS records

Common DNS Interview Questions

Basic:

1. What is DNS and why is it important?
2. What is an A record?
3. How does DNS resolution work?
4. Difference between recursive and iterative queries?

Intermediate:

5. Difference between CNAME and A records?
6. What is an MX record?
7. What happens when a DNS server is down?
8. How does DNS caching work?

Advanced:

9. What is DNS poisoning or spoofing?
10. How does DNSSEC work?
11. What is split-horizon DNS?
12. How do you troubleshoot DNS resolution issues?

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Useful DNS Commands

- dig example.com (A record)
- dig NS example.com (Name servers)
- dig MX example.com (Mail servers)
- dig -x 93.184.216.34 (Reverse DNS)
- dig +trace example.com (Trace resolution path)

Resources

- Cloudflare DNS Guide: https://www.cloudflare.com/learning/dns/what-is-dns/
- IANA Root Servers: https://www.iana.org/domains/root/servers
- RFC 1035 ? DNS Specification: https://datatracker.ietf.org/doc/html/rfc1035