

# WEEK 4

## DNS IN DETAIL

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# 4.1 DNS IN DETAIL

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# 4.1 DNS IN DETAIL

## 1. INTRODUCTION

The Domain Name System (DNS) is a fundamental technology that enables the translation of human-readable domain names into machine-readable IP addresses. It serves as the backbone of the internet, acting as a distributed directory that facilitates the navigation and accessibility of websites, services, and resources. By functioning as a decentralized hierarchical system, DNS ensures efficient and reliable communication by resolving domain names to their corresponding IP addresses, allowing users to access websites and send emails without having to remember complex numerical addresses. Through its seamless operation, DNS plays a vital role in enabling the interconnectedness and functionality of the modern internet.

Answer the questions below

What does DNS stand for?

domain name system

Correct Answer

## 2. DOMAIN HIERARCHY

The domain hierarchy consists of three components: the Top-Level Domain (TLD), the Second-Level Domain, and subdomains. The TLD represents the rightmost part of a domain name, such as .com or .org, indicating its purpose or geographical location. Second-Level Domains precede the TLD and can be up to 63 characters long, comprising alphanumeric characters and hyphens. Subdomains are created by placing a prefix before the Second-Level Domain, separated by periods, and follow the same character restrictions. Multiple subdomains can be used, with a total length limit of 253 characters. This hierarchical structure allows for the organization and differentiation of websites and online services.

What is the maximum length of a subdomain?

63

Correct Answer

Which of the following characters cannot be used in a subdomain ( 3 b \_ - )?

-

Correct Answer

What is the maximum length of a domain name?

253

Correct Answer

What type of TLD is .co.uk?

cctld

Correct Answer

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### 3. RECORD TYPES

DNS records serve various purposes beyond websites and encompass different types. The most common ones include A records, which resolve to IPv4 addresses, and AAAA records, which resolve to IPv6 addresses. CNAME records point to another domain name, useful for creating subdomains that redirect to different locations. MX records specify the email servers handling a domain, prioritizing them for efficient email delivery. TXT records are versatile, allowing storage of free text data and often used for email authentication or domain ownership verification. These record types collectively contribute to the functionality and management of DNS for different aspects of online communication and services.

What type of record would be used to advise where to send email?

Correct Answer

What type of record handles IPv6 addresses?

Correct Answer

### 4. MAKING A REQUEST

When you make a DNS request, your computer first checks its local cache for the requested domain name. If not found, the request is sent to a Recursive DNS Server. If the result is in the server's cache, it's returned to your computer; otherwise, the server initiates a search starting from the root DNS servers. The root servers redirect the request to the appropriate Top Level Domain (TLD) server based on the domain's extension (e.g., .com). The TLD server provides the location of the authoritative server (nameserver) for the domain. The authoritative server stores the DNS records and sends the relevant record back to the Recursive DNS Server, which caches it and returns it to the original client. The response is cached locally according to its Time To Live (TTL) value, reducing future DNS requests.

What field specifies how long a DNS record should be cached for?

Correct Answer

What type of DNS Server is usually provided by your ISP?

Correct Answer

What type of server holds all the records for a domain?

Correct Answer

### 5. PRACTICAL

What is the CNAME of shop.website.thm? ANS=shops.myshopify.com

DNS Type

subdomain

Send DNS Request

user@thm:~\$ nslookup --type=CNAME shop.website.thm

Server: 127.0.0.53

Address: 127.0.0.53#53

Non-authoritative answer:

shop.website.thm canonical name = shops.myshopify.com

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What is the value of the TXT record of website.thm? THM{7012BBA60997F35A9516C2E16D2944FF}

```
user@thm:~$ nslookup --type=TXT website.thm
Server: 127.0.0.53
Address: 127.0.0.53#53

Non-authoritative answer:
website.thm text = "THM{7012BBA60997F35A9516C2E16D2944FF}"
```

What is the numerical priority value for the MX record? 30

```
user@thm:~$ nslookup --type=MX website.thm
Server: 127.0.0.53
Address: 127.0.0.53#53

Non-authoritative answer:
website.thm mail exchanger = 30 alt4.aspmx.l.google.com
```

What is the IP address for the A record of www.website.thm? 10.10.10.10

```
user@thm:~$ nslookup --type=A website.thm
Server: 127.0.0.53
Address: 127.0.0.53#53

Non-authoritative answer:
Name: website.thm
Address: 10.10.10.10
```

## 6. CONCLUSION

In conclusion, the DNS is a crucial technology that underpins the functioning of the internet. It allows for the translation of human-readable domain names into machine-readable IP addresses, facilitating seamless navigation and accessibility of websites and services. The DNS hierarchy, consisting of Top-Level Domains, Second-Level Domains, and subdomains, enables organization and differentiation within the online space. Various DNS record types serve different purposes, such as mapping to IP addresses, handling email services, and storing text-based data. Understanding how DNS requests are processed, from local cache to recursive servers, root servers, TLD servers, and authoritative servers, provides insight into the efficient resolution of domain names. Overall, DNS plays a vital role in maintaining the interconnectedness and functionality of the modern internet infrastructure.

