

Mastering Domain Names and DNS

Module 1: Introduction

Introduction - Domains

1. What is a Domain Name?

- A domain name is a human-readable address used to access websites on the internet. For example, in the URL "**www.truehost.com** ", "**truehost.com**" is the domain name.
- In other words, a domain name is the name of your website.
- They provide a way to identify and locate resources on the internet using friendly names instead of numeric IP addresses such as 87.124.231.54

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2. Addon Domain.

An **addon** domain is a secondary domain that is added to a hosting account. It functions as a separate website with its own content.

- For example, if your hosting package is, say, Truehost Silver Hosting, this package allows 3 domains, that is, 1 primary domain and other 2 more domains.

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- The addon domain can be hosted on the same hosting and must be a registered domain.
- For example, you can have **Example.com** as the main domain and **example.net** as a separate addon domain.
- When adding an addon domain to your hosting, the said addon domain must be pointed to your hosting provider's nameservers.

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- For example, let's say we have a domain called “**myblog.com**” and we want to add it to our hosting package at Truehost. For it to work, the domain must meet **either** of the following requirements.
 1. Be using Truehost default nameservers - ***ns1.cloudoon.com, ns2.cloudoon.net, ns3.cloudoon.org***
 2. Must be pointed to the Server's shared IP address , that is , if using a different DNS manager such as cloudflare, ensure the A record at Cloudflare points to the server's IP address.

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3. Parked Domains

- A parked domain (AKA an alias domain) is a domain name that is linked to the same content as another domain. It doesn't have its own separate website but instead points to the primary domain's website.
- Example: If your main website is "**example.com**" and you own "**example.net**" as well, you can park "example.net" on top of "example.com". Visitors who type in "example.net" will be redirected to "example.com" and see the same content.

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4. Subdomains

- **Definition:** A subdomain is a prefix added to an existing domain name that you already own, creating a separate section of the website.
- Example: If your domain is "example.com", a subdomain could be "**blog.example.com**" or "**shop.example.com**". Each subdomain can have its own unique content and structure while still being part of the main domain.

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- Domain structure.

Red - Main domain. **Blue** - Addon domain. **Pink** - Sub-domains.



**Here the We have a main domain, additional addon domains, and sub-domains
Sub-domains can be created from main, addon and even existing sub-domains.**

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5. IN-ADDR.ARPA Domain

- The IN-ADDR.ARPA domain (or zone) provides mapping of IP addresses to names within a zone, enabling a client (or resolver) to request a hostname by providing an IP address. Some security-based applications require this function, also known as reverse-lookup.
- The file that stores the IN-ADDR.ARPA data is made up of Pointer records and additional name server records, including Start of Authority (SOA) records, similar to other DNS zone files.

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5. IN-ADDR.ARPA Domain

- Within the IN-ADDR.ARPA zone file, IP addresses are listed in reverse order, and 'in-addr.arpa' is appended to the address. A query for a host with an IP address of 1.2.3.4 would require a PTR query with the target address of 4.3.2.1.in-addr.arpa.
- See attached in next slide the result of the example below.
- Example : **<https://intodns.com/woza.co.ke>**

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5. IN-ADDR.ARPA Domain

- Result of <https://intodns.com/woza.co.ke>

		Reverse MX A records (PTR)	Your reverse (PTR) record: 166.128.98.87.in-addr.arpa -> sbg1062.truehost.cloud You have reverse (PTR) records for all your IPs, that is a good thing.
WWW		WWW A Record	Your www.woza.co.ke A record is: www.woza.co.ke -> woza.co.ke -> [87.98.128.166] [Looks like you have CNAME's]
		IPs are public	OK. All of your WWW IPs appear to be public IPs.

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5. IN-ADDR.ARPA Domain

- **Example 2.** On your terminal type the command below followed by the IP address you want to perform reverse lookup.
- *host 87.98.128.166*



```
dann@home1ab:~$ host 87.98.128.166
166.128.98.87.in-addr.arpa domain name pointer sbg1062.truehost.cloud.
dann@home1ab:~$
```

The image shows a terminal window with a dark background. At the top, there are navigation icons and tabs for 'Vaults', 'SFTP', and 'Local Terminal'. The terminal content shows a user named 'dann' at 'home1ab' running the command 'host 87.98.128.166'. The output is '166.128.98.87.in-addr.arpa domain name pointer sbg1062.truehost.cloud.'. A red rectangular box highlights the command and its output.

Domain Name System (DNS) Overview

1. **The Domain Name System (DNS)** is like the phonebook of the internet, translating domain names into IP addresses that computers can understand.
 - When a user types a domain name into their browser, the DNS resolves this name into the corresponding IP address of the server hosting the website.
 - Example: When you access `woza.co.ke` on browser, this will be translated to its corresponding server IP : [87.98.128.166](#).
[allowing you to access the site.](#)

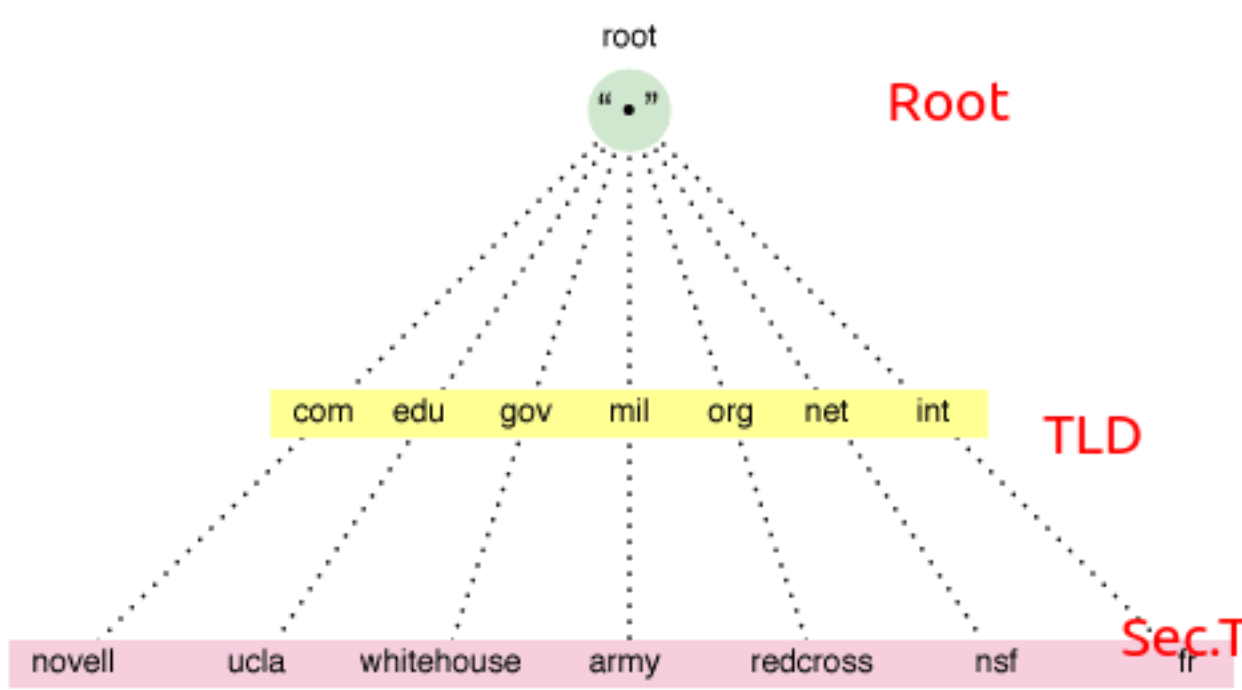
Domain Name System (DNS) Overview

2. The DNS hierarchy

- i) **Root Level:** The highest level of the DNS, represented by the "." symbol (rarely visible).
- ii) **TLD Level:** The top-level domain, such as ".com" or ".org".
- iii) **Second-Level Domain:** The part of the domain that comes before the TLD (e.g., "example" in "example.com").

Domain Name System (DNS) Overview

2. The DNS hierarchy



Domain Name System (DNS) Overview

3. DNS servers are distributed globally and handle the lookup requests, ensuring that when users access a domain, they are directed to the correct IP address.

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Types of Domain Names

1. Top-Level Domains (TLDs)

- i) TLDs are the last segment of a domain name, located after the final dot. Examples include ".com", ".net", and ".org".
- ii) The most popular TLD is ".com", which was originally intended for commercial entities but is now used globally for all types of websites.

Types of Domain Names

1. Top-Level Domains (TLDs)

iii) Types of TLDs:

- **Unrestricted TLDs:** Open for registration by anyone (e.g., .com, .net, .org).
- **Restricted TLDs:** Have specific requirements (e.g., .gov for government institutions, .edu for educational institutions).

Types of Domain Names

2. Country Code Top-Level Domains (ccTLDs)

ccTLDs are reserved for countries and sovereign states. They consist of two letters based on ISO country codes (e.g. ".ke" for Kenya).

- Some countries enforce strict registration requirements, limiting ccTLD usage to residents or businesses operating within their borders.
- In some cases, ccTLDs are used beyond their country borders for marketing purposes, like ".co" (originally for Colombia but now used for company-related websites).

Types of Domain Names

3. Generic Top-Level Domains (gTLDs)

- gTLDs are extensions that are not country-specific and cater to a broad range of uses. These include legacy gTLDs like ".com" and ".org", as well as new gTLDs such as ".shop", ".tech", and ".blog".
- New gTLDs were introduced to accommodate the growing need for domain names in specialized sectors. For example, ".law" is targeted at legal professionals, and ".store" is designed for e-commerce websites.
- gTLDs offer flexibility in branding, allowing businesses and individuals to choose domains that align with their niche or industry.

Examples of Generic Top-Level Domains (gTLDs)

1. Traditional/Legacy gTLDs:

- .com – Commercial websites (most common and popular)
- .org – Organizations, often non-profit
- .net – Originally intended for network providers, now widely used
- .gov – government entities (restricted)
- .edu – Educational institutions, mainly in the U.S. (restricted)
- .info – Informational websites
- .biz – Business websites

Examples of Generic Top-Level Domains (gTLDs)

1. Traditional/Legacy gTLDs:

- New gTLDs (Introduced to expand the domain space):
- .app – Apps or software
- .tech – Technology websites
- .shop – E-commerce websites
- .blog – Blogs and personal websites
- .xyz – General-purpose
- ***The above list is by no means exhaustive.***

How Domains Work

1. Domain Registration Process

- The process of registering a domain involves:
 - i) Choosing a domain name that reflects your brand or personal identity.
 - ii) Checking domain availability using a domain registrar. If the desired name is available, it can be purchased. If not, alternative names or extensions may be suggested.

How Domains Work

1. Domain Registration Process

- iii) Registering the domain with a registrar by providing necessary contact details and choosing the registration period (typically from 1 year(s)).
- iv) Selecting add-ons, such as DNS management, Email forwarding or WHOIS protection
- The domain is leased for a specified time. Once registered, the domain owner has control over the DNS settings and can link the domain to their website.

How Domains Work

1. Domain Resolution Process

- **Step 1:** When a user types a domain name in a browser, the request goes to a DNS resolver, usually provided by the internet service provider (ISP).
- **Step 2:** The DNS resolver checks its cache for the domain's IP address. If not found, it queries a DNS root server to identify the domain's TLD Server.
- **Step 3:** The DNS resolver then queries the TLD server, which points to the authoritative DNS server for the domain.

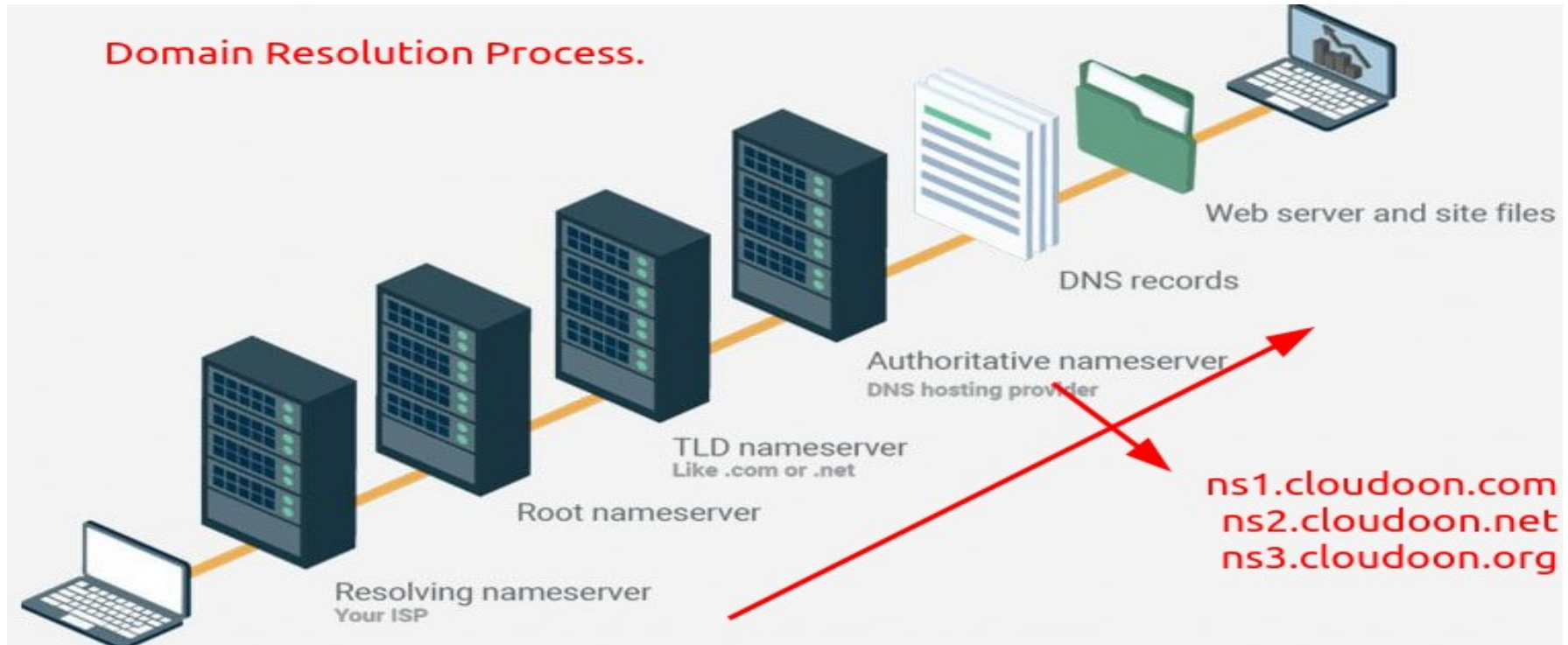
How Domains Work

Domain Resolution Process

- **Step 4:** The authoritative DNS server provides the IP address associated with the domain, allowing the browser to connect to the correct web server and load the website.
- **Simplified:** Browser -> DNS Resolver (Recursive Nameserver) -> DNS Root Server -> TLD DNS server -> Authoritative Nameserver.
- *NOTE: DNS is authenticated through a system called DNSSEC.*
- *NOTE: There are 13 DNS root servers across the world.*

Domain Resolution Process : Illustration.

Illustration



DNS Records Overview

- DNS records are essential for configuring how your domain behaves on the internet. Each record type serves a different purpose:
 1. **A Record:** Maps a domain to an IPv4 address. It is the most common type of DNS record. For example `www.woza.co.ke` maps to IP : `87.98.128.166`
 2. **CNAME Record:** Aliases one domain to another (e.g., `www.example.com` to `example.com`).

DNS Records Overview

3. **MX Record:** Specifies the mail server responsible for receiving email for the domain.
 4. **TXT Record:** Holds arbitrary text information, often used for email verification (e.g., SPF, DKIM, DMARC) or site verification for services like Google.
- Proper configuration of DNS records ensures the domain directs traffic appropriately for web hosting, email, and other services.