# Day 15 – Networking Concepts: DNS, IP, Subnets & Ports

## Task 1: DNS – How Names Become Ips

**1-What happens when you type google.com in a browser?**

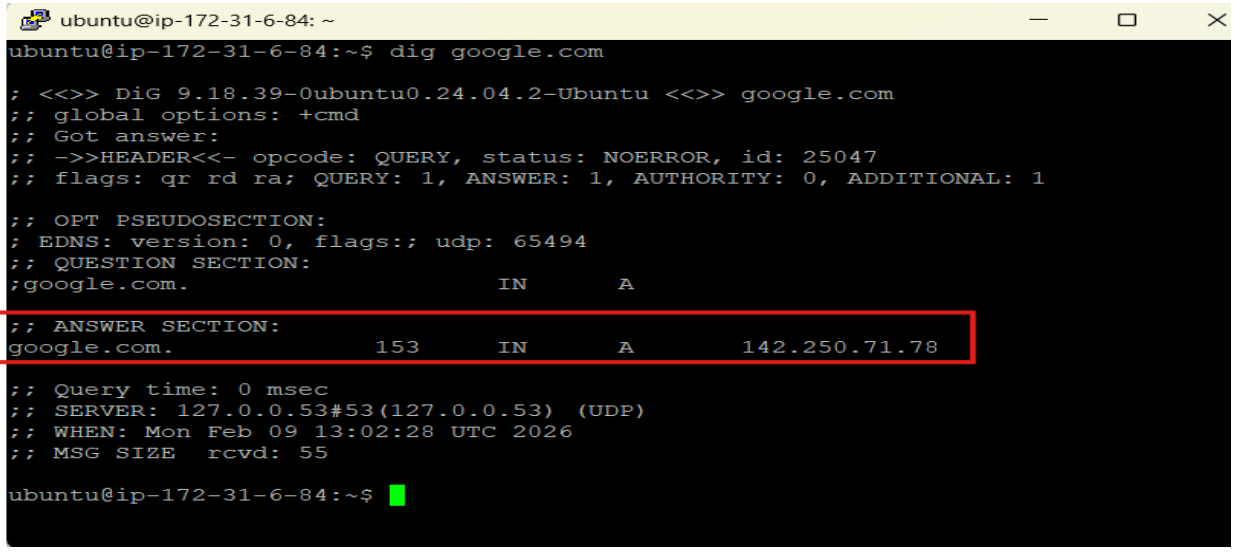
When you type google.com, your system asks a DNS resolver for its IP address.
The resolver checks cache first; if not found, it queries root → TLD → authoritative DNS servers.
The final IP address is returned to the browser, which then connects to that IP using HTTP/HTTP.

**2-DNS Record Types**

- **A** – Maps a domain name to an IPv4 address
- **AAAA** – Maps a domain name to an IPv6 address
- **CNAME** – Alias of one domain name to another
- **MX** – Mail server responsible for receiving emails
- **NS** – Specifies authoritative name servers for a domain

**Command:**

# dig google.com



## Task 2: IP Addressing

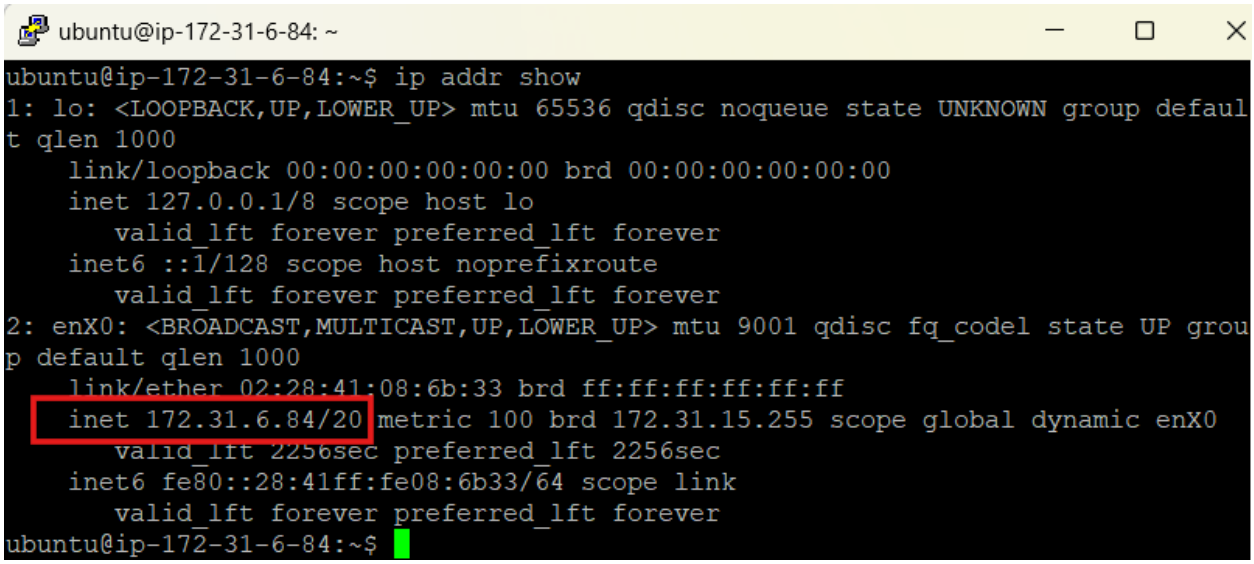
### 1-What is an IPv4 address?

An IPv4 address is a 32-bit numeric identifier assigned to a device on a network.
It is written in dotted-decimal format like 192.168.1.10 (4 octets, each 0–255).

- **Public vs Private IP**
  - **Public IP:** Routable on the internet (e.g., 8.8.8.8)
  - **Private IP:** Used inside internal networks (e.g., 192.168.1.10)
- **Private IP Ranges**
  - 10.0.0.0 – 10.255.255.255
  - 172.16.0.0 – 172.31.255.255
  - 192.168.0.0 – 192.168.255.255

**Command:**

**# ip addr show**



## Task 3: CIDR & Subnetting

- **What does /24 mean in 192.168.1.0/24?**

/24 means the first 24 bits are used for the network portion, leaving 8 bits for hosts.

- **Usable Hosts**

- **/24:** 254 usable hosts
- **/16:** 65,534 usable hosts
- **/28:** 14 usable hosts

- **Why do we subnet?**

Subnetting divides large networks into smaller ones to improve performance, security, and IP management.

| CIDR | Subnet Mask | Total IPs | Usable Hosts |
|---|---|---|---|
| /24 | 255.255.255.0 | 256 | 254 |
| /16 | 255.255.0.0 | 65,536 | 65,534 |
| /28 | 255.255.255.240 | 16 | 14 |

## Task 4: Ports – The Doors to Services

**What is a port?**

A port is a logical communication endpoint that identifies a specific service running on a system.

**Why do we need ports?**

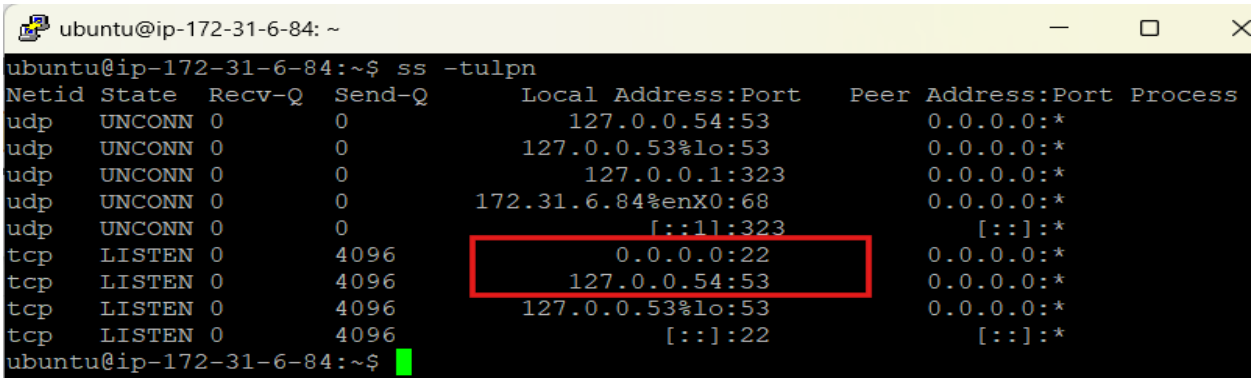
→Ports allow multiple services (web, database, SSH, etc.) to run on the same IP without conflict.

**Common Ports**

| Port | Service |
|---|---|
| 22 | SSH |
| 80 | HTTP |
| 443 | HTTPS |
| 53 | DNS |
| 3306 | MySQL |
| 6379 | Redis |
| 27017 | MongoDB |

**Command:**

**# ss -tulpn**




**Example matches:** 0.0.0.0:22 → SSH

## Task 5: Putting It Together

**1-curl http://myapp.com:8080 — what concepts are involved?**

→DNS resolves myapp.com to an IP address, then TCP connects to port 8080 on that IP using HTTP protocol.

**2- App can't reach DB at 10.0.1.50:3306 — what to check first?**

→Check network connectivity (ping), verify the database service is running on port 3306, and confirm firewall/security group rules allow access.

**What I Learned – Day 15 (Networking Concepts)**

1-I learned how DNS resolves domain names into IP addresses and the purpose of common DNS records.
2-I understood IPv4 addressing, the difference between public and private IPs, and their reserved ranges.
3-I learned CIDR and subnetting to calculate usable hosts and why networks are divided into smaller subnets.
4-I also learned how ports identify services and how DNS, IPs, subnets, and ports work together in real connections.