System Design ≡ HLD.

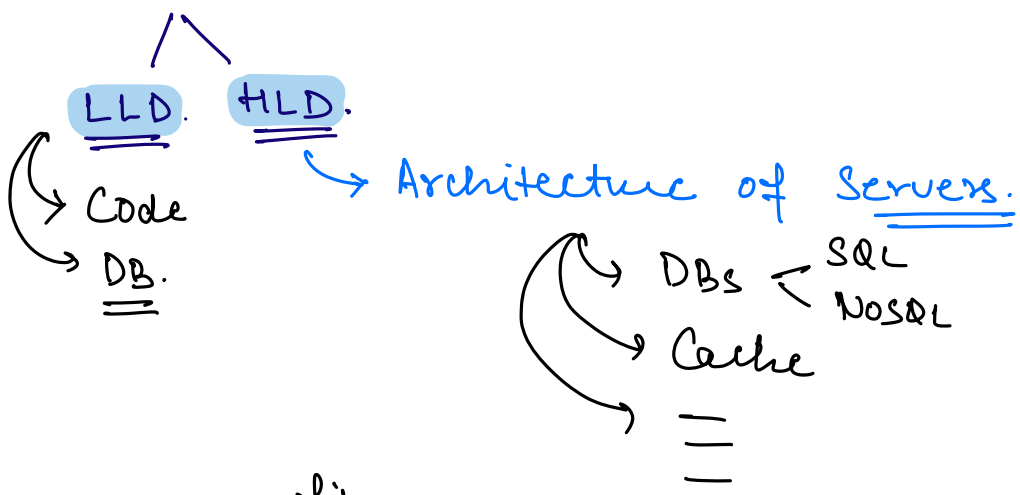
Agenda:

→ Intro to System Design & CN.

→ Case study : del.icio.us

→ How Internet works ?

HLD.



Q.

SORT → SORT ↗ nlogn.

Size : 10 PB

file.sort()

↓

RAM.

1 PB = 1000 TB

↓

1 TB = 1000 GB

1 PB = 10^6 GB.

HLD. : Solve problems at Scale!

Case Study : del.icio.us

↓

2003

YT : 2004

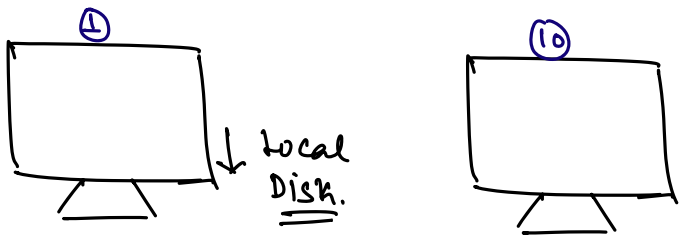
Chrome : 2008

AWS : 2006.

⇒ Simple Bookmarking website.

⇒ Cyber Cafe

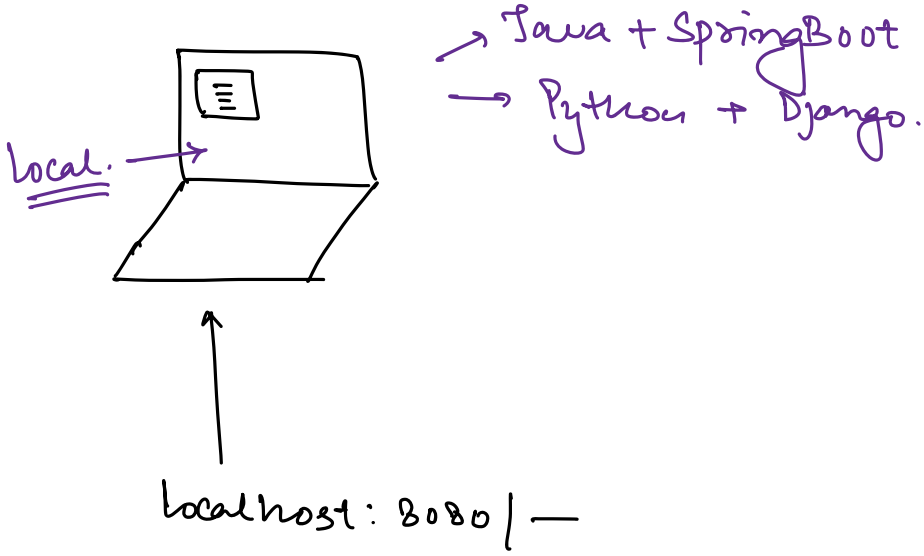
↳ Internet Explorer.

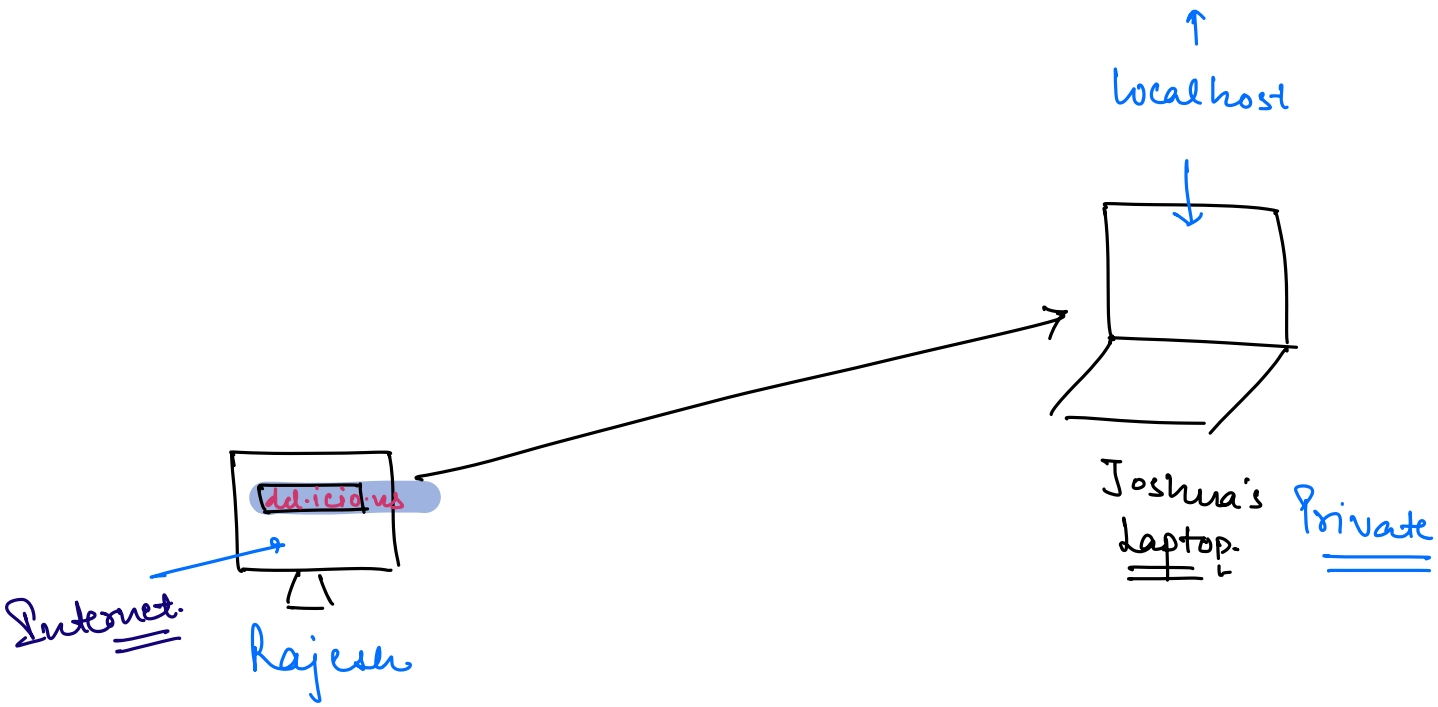


del.icio.us

⇒ MVP.

- SignUp, login, logout
- Save Bookmark
- get Bookmarks





IP Address

- IPV4 → 4Bytes : A.B.C.D → 0-255
  - 1B = 8b
  - 4Bytes → 32bits.
  - 2^{32} ≈ 4Billion
- IPV6.
  - 128 bit.
  - 2^{128}

ISP

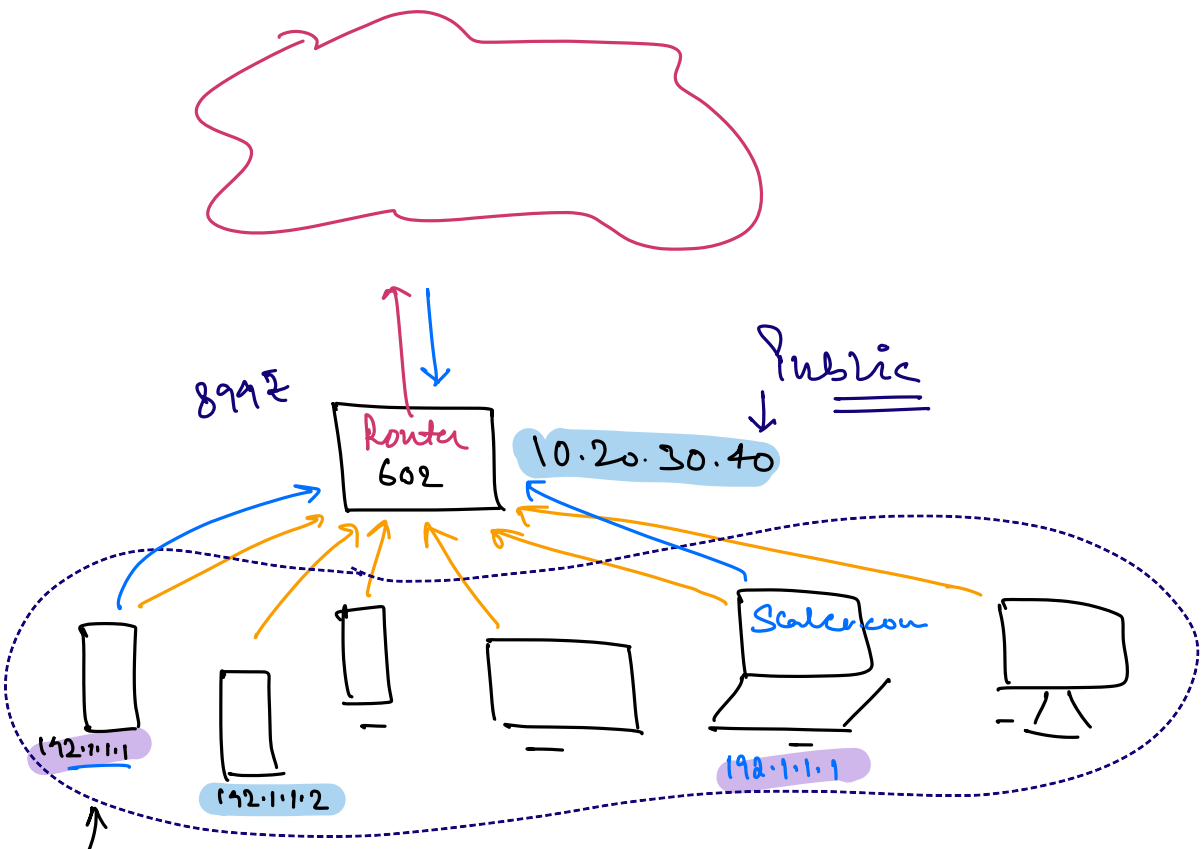
ICANN

↑

Airtel. JIM Ip's.

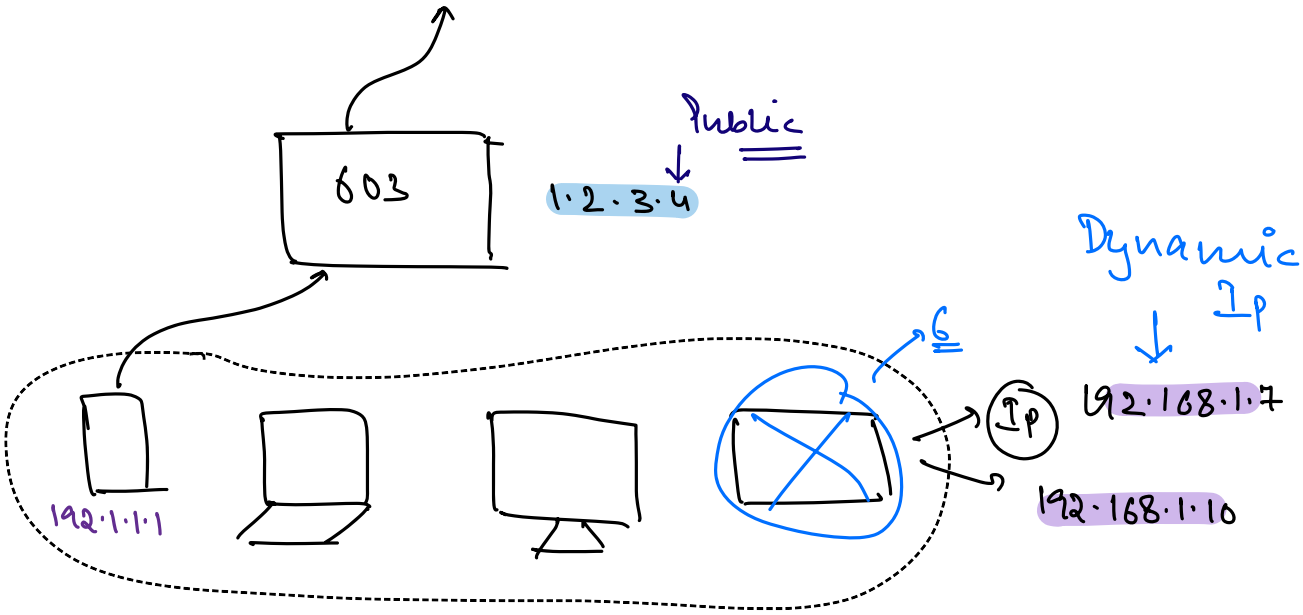
↓

20M



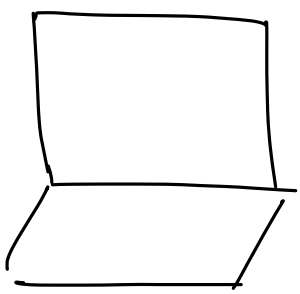
→ NAT

→ SubNet.



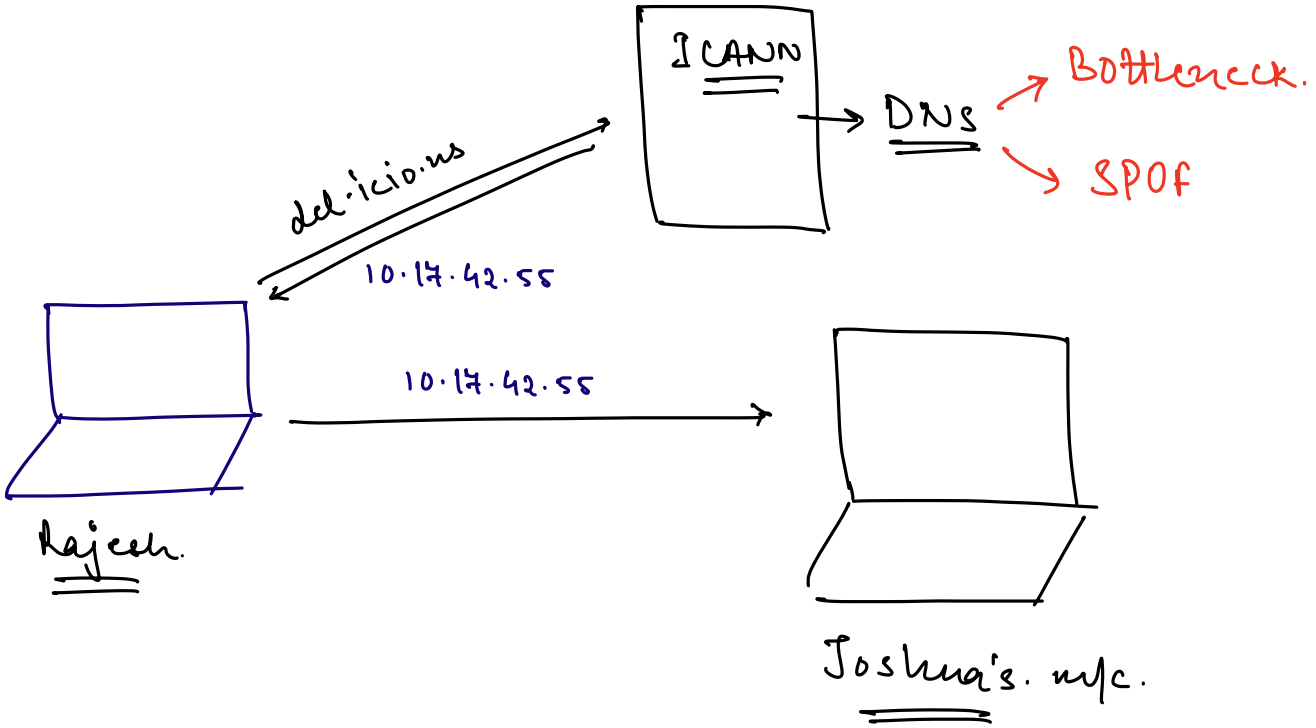
DHCP.

Public + Static



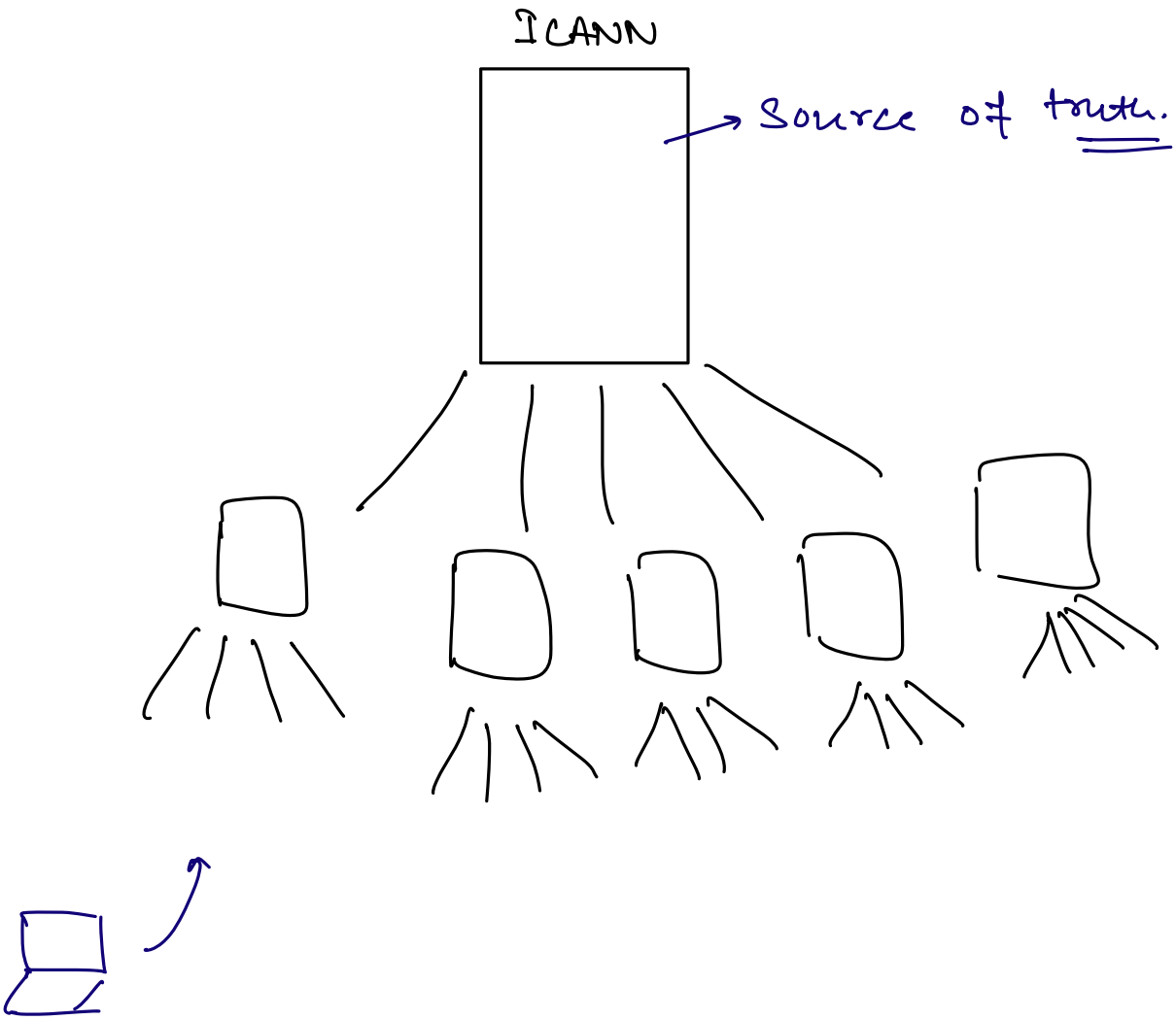
ICANN.

↳ Domain : Ip Address.



DNS.

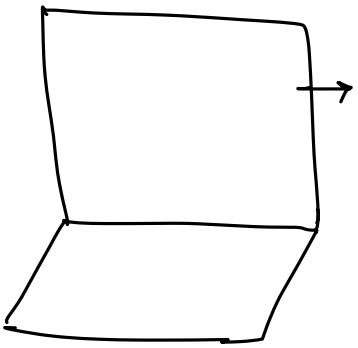
↳ Distributed, Decentralized & Reliable.



Scaler.com : 10.20.30.40

google.com : 1.2.3.7

Scaling Challenges.



2008.

- 128 MB RAM
- 40GB HDD
- 2 Core CPU.

⇒ 1M bookmarks / Day.

⇒ Store data

- user_id | email | password
- user_id | URL → 1000B

user_id → 4Bytes.

- 4B (unsigned)
- -2B to 2B.

user_id ⇒ 8B

Y7 → int → Y2B

1 Bookmark = 4B + 1000B

= ≈ 1KB.

1M Bookmarks/Day ⇒ $1 \times 10^6 \times 1KB$

⇒ 1GB.

1b

1B = 8b

1000B = 1KB

1000KB = 1MB

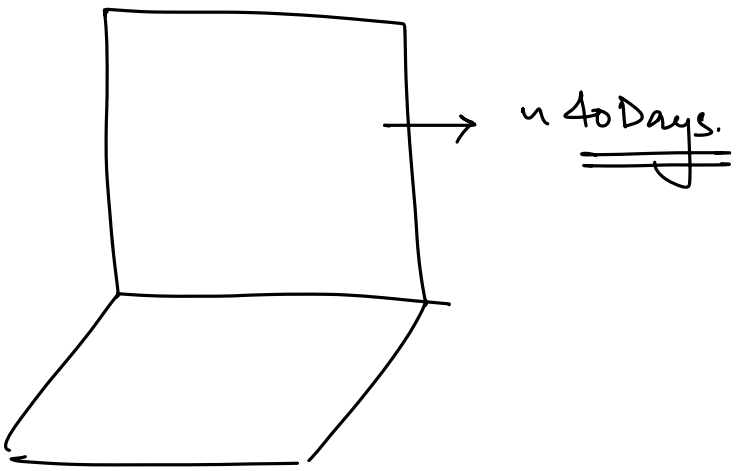
1000MB = 1GB

1000GB = 1TB

1000TB = 1PB

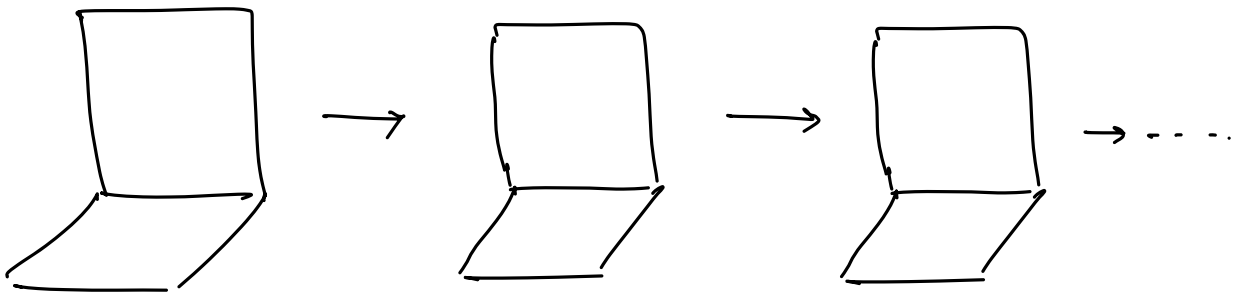
→ More HDD

→



≈ 40Days.

Scale Up.

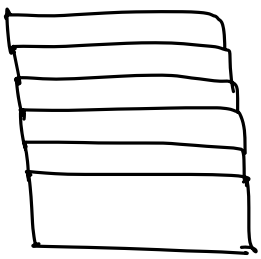


40GB HDD
128 MB RAM
2 Core CPU

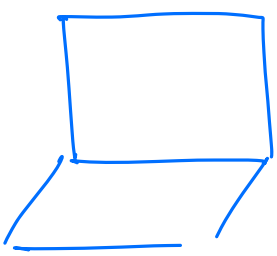
80GB HDD
256 MB RAM
4 Core CPU.

160GB
512 MB
4 Core CPU.

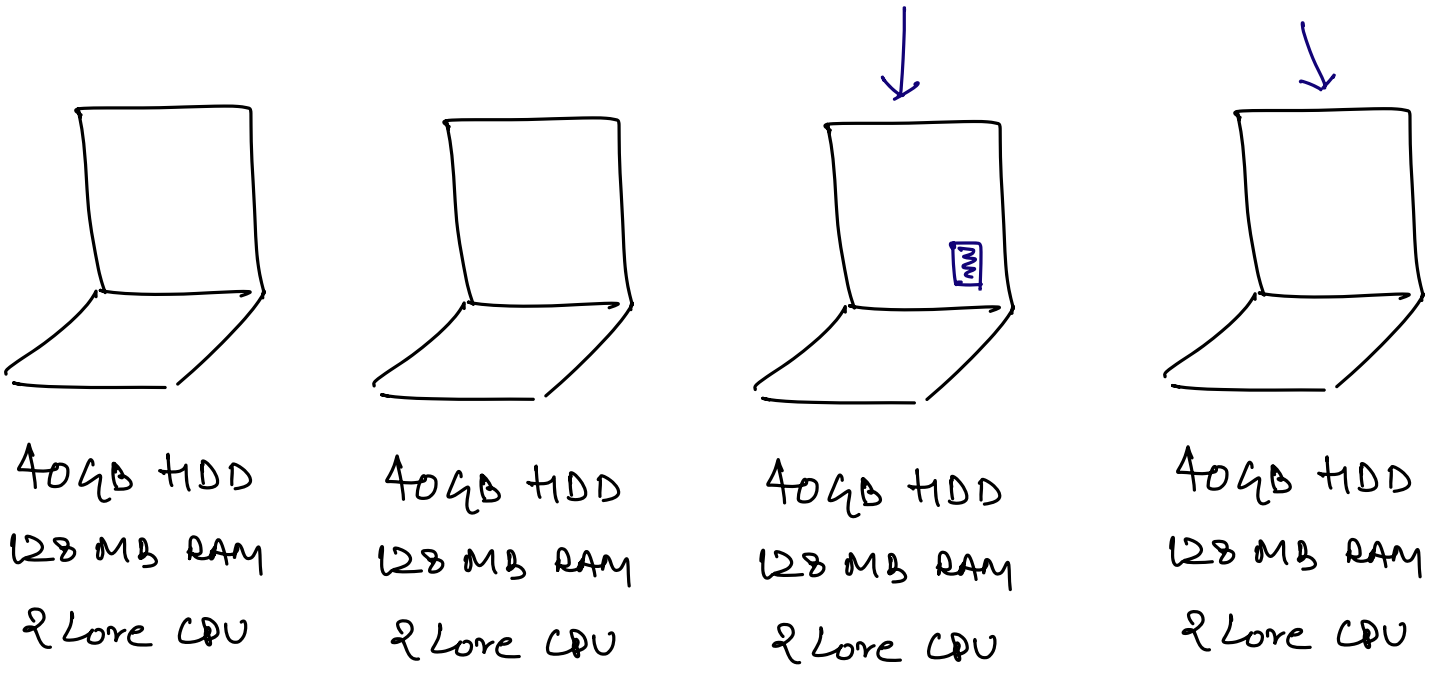
Vertical Scaling.



→ Limitation
→ Can't be done infinitely.
→ SPOF

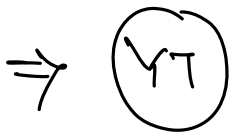


Horizontal Scaling



→ Can be done Infinitely.

→ No SPOF.

⇒ Lot of Challenges are there with Horizontal Scaling

1) Why Ip to register at DNS.
2) Data Sync issue.
3) load Balancing .....