COMPUTER NETWORKS - I

Introduction

- what
- why
- How

- OSI model

  how a packet moves through an OSI network

- what happens when you enter a URL in your browser

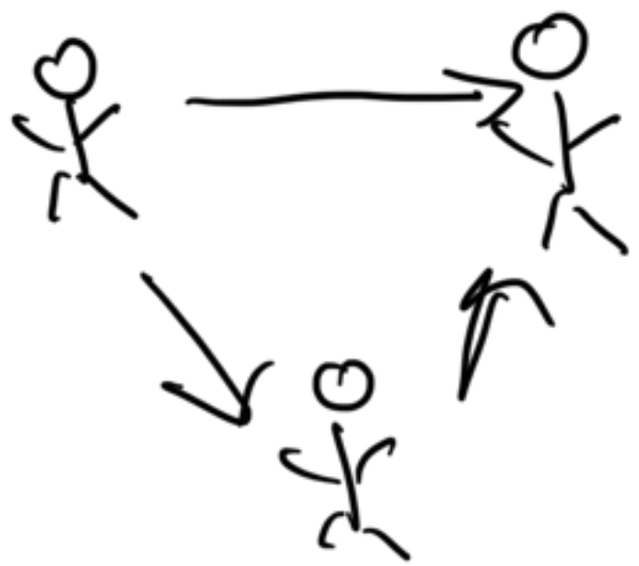
- Internet

- Protocols

DevOps
SRE

Network

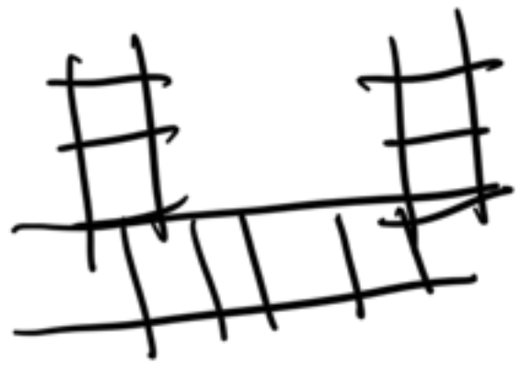
1. Social network
2. Railway network



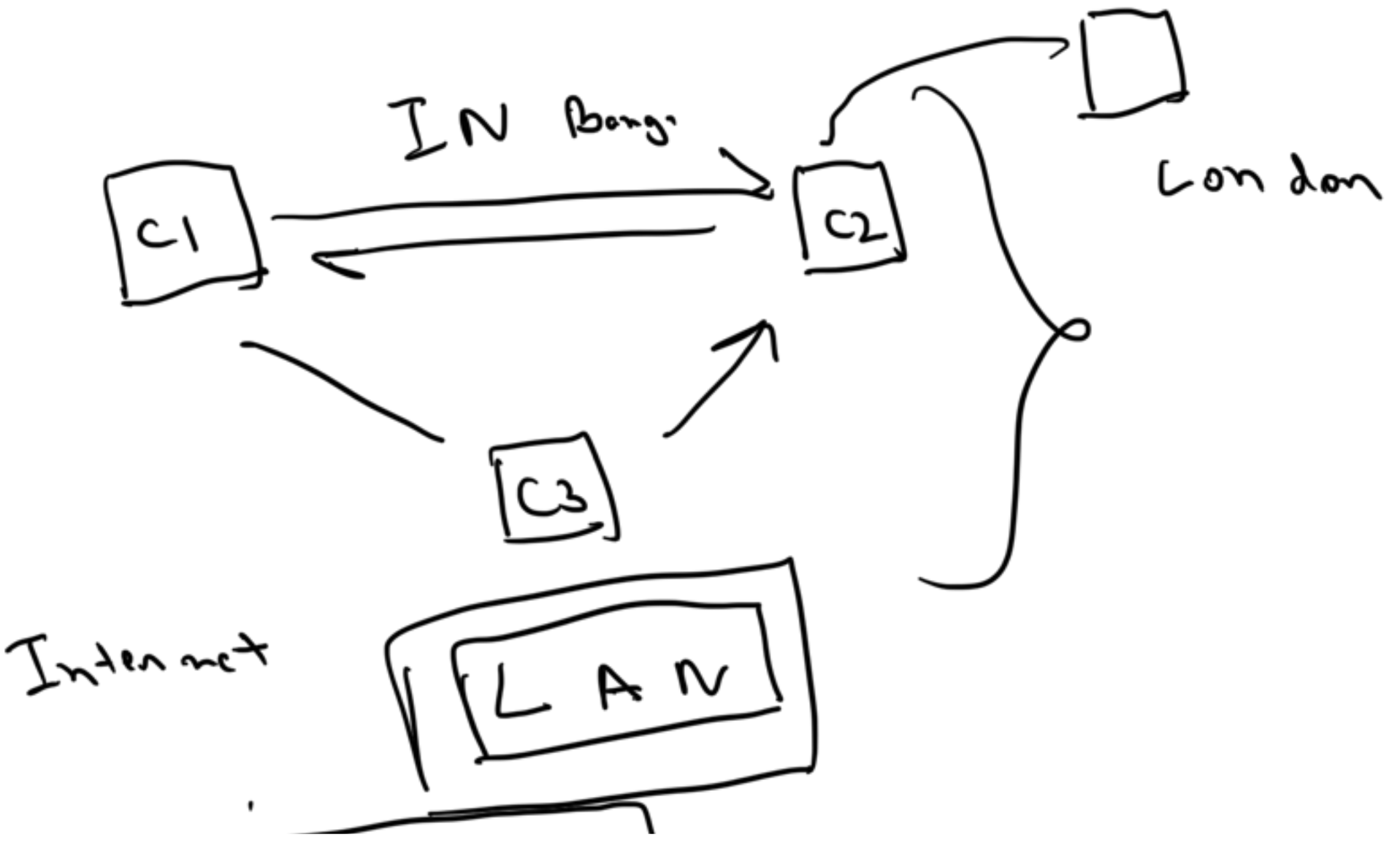
Interconnected

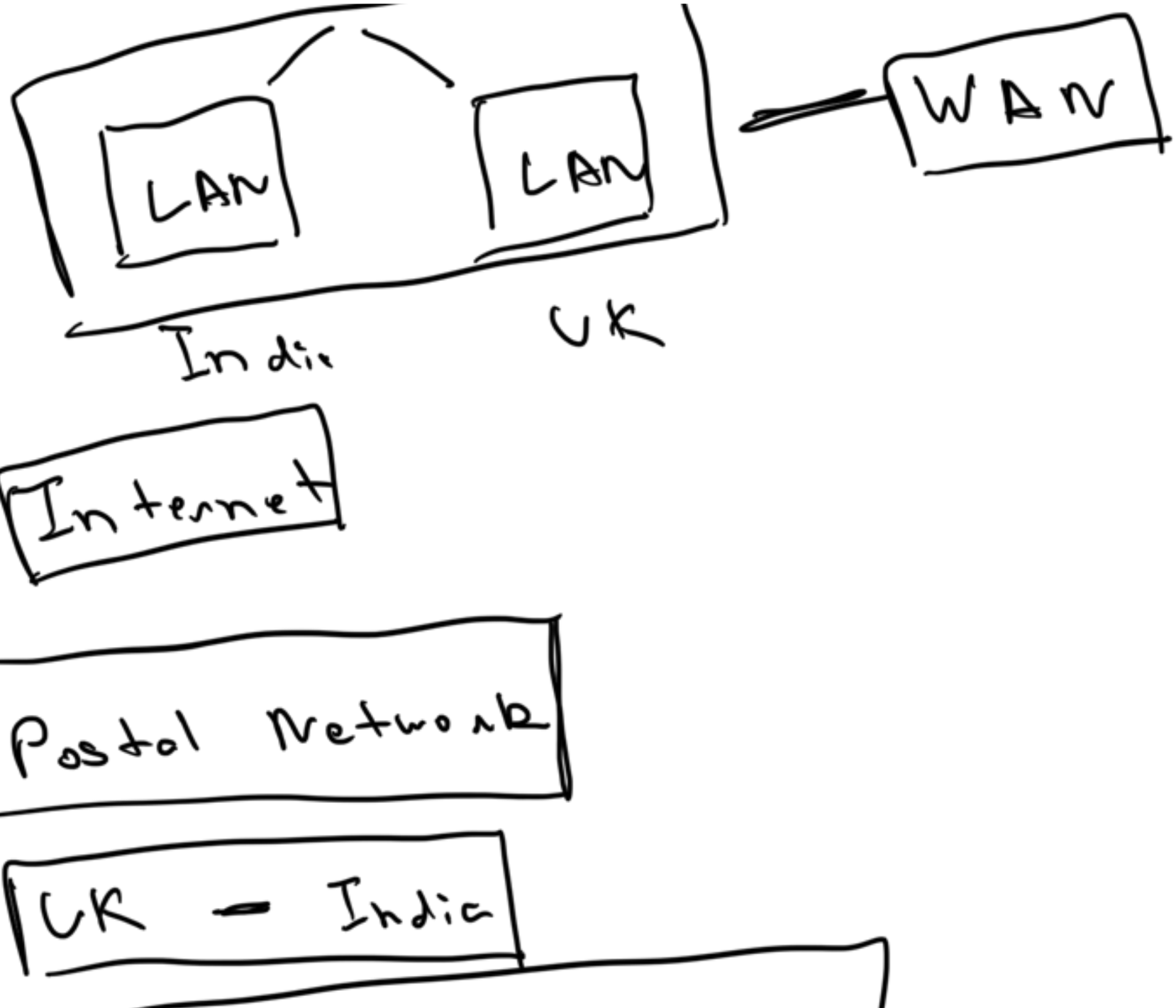
People

Railway



Computer – Computer network





Internet

Postal Network

UK - Indic

Why do we need networks

Sharing

1. Data – WAZE | WAY2B

2. Resources
   - printer
   - compute power

Sharing
- data
- resources

Post office

Letter

MY address | RA → where this

EVIL COMPANY

→ Stop stealing my data

Text

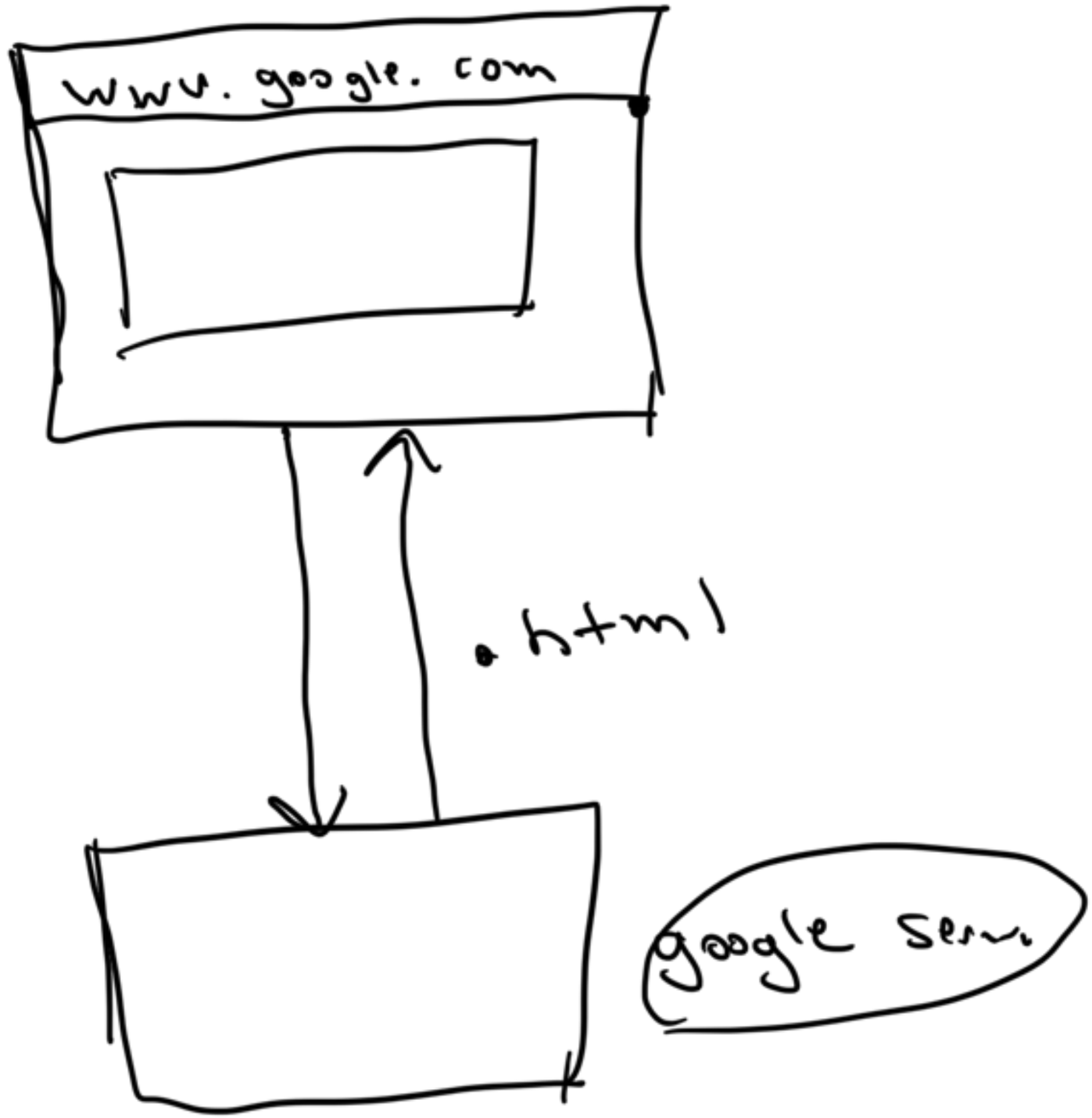
NAME → Address

google → name

← address

person → Room

→ Employee code



Name - Evil Company

google.com

Domain name

address

IP address

---

what happens when I type a URL

in the browser

(1) if a url on search query

String — https://www.google.com

parsing

fun:||

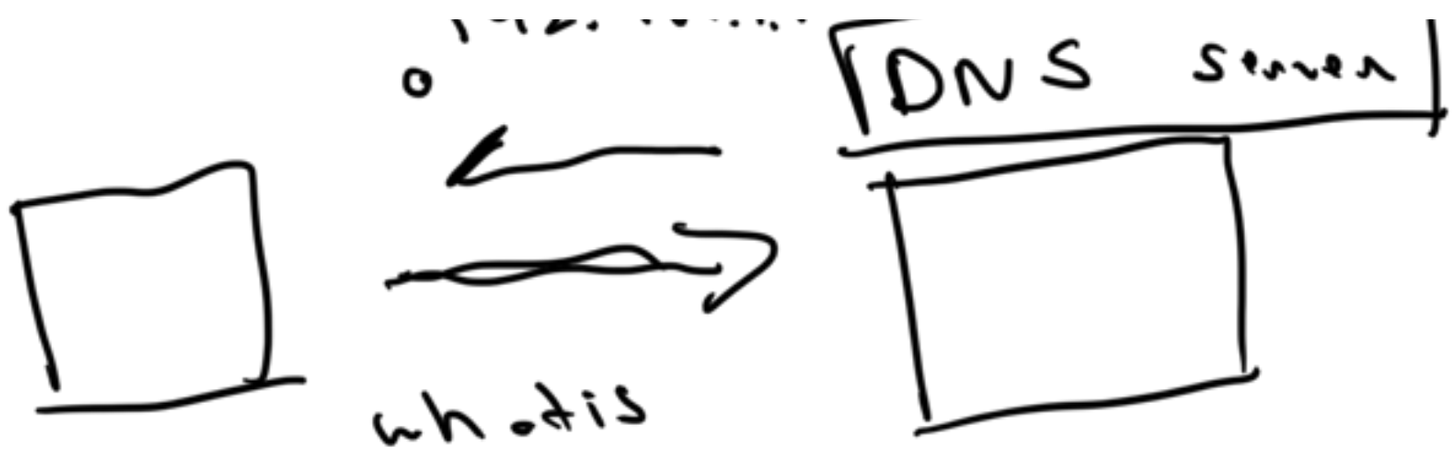
(2) Domain name → IP address

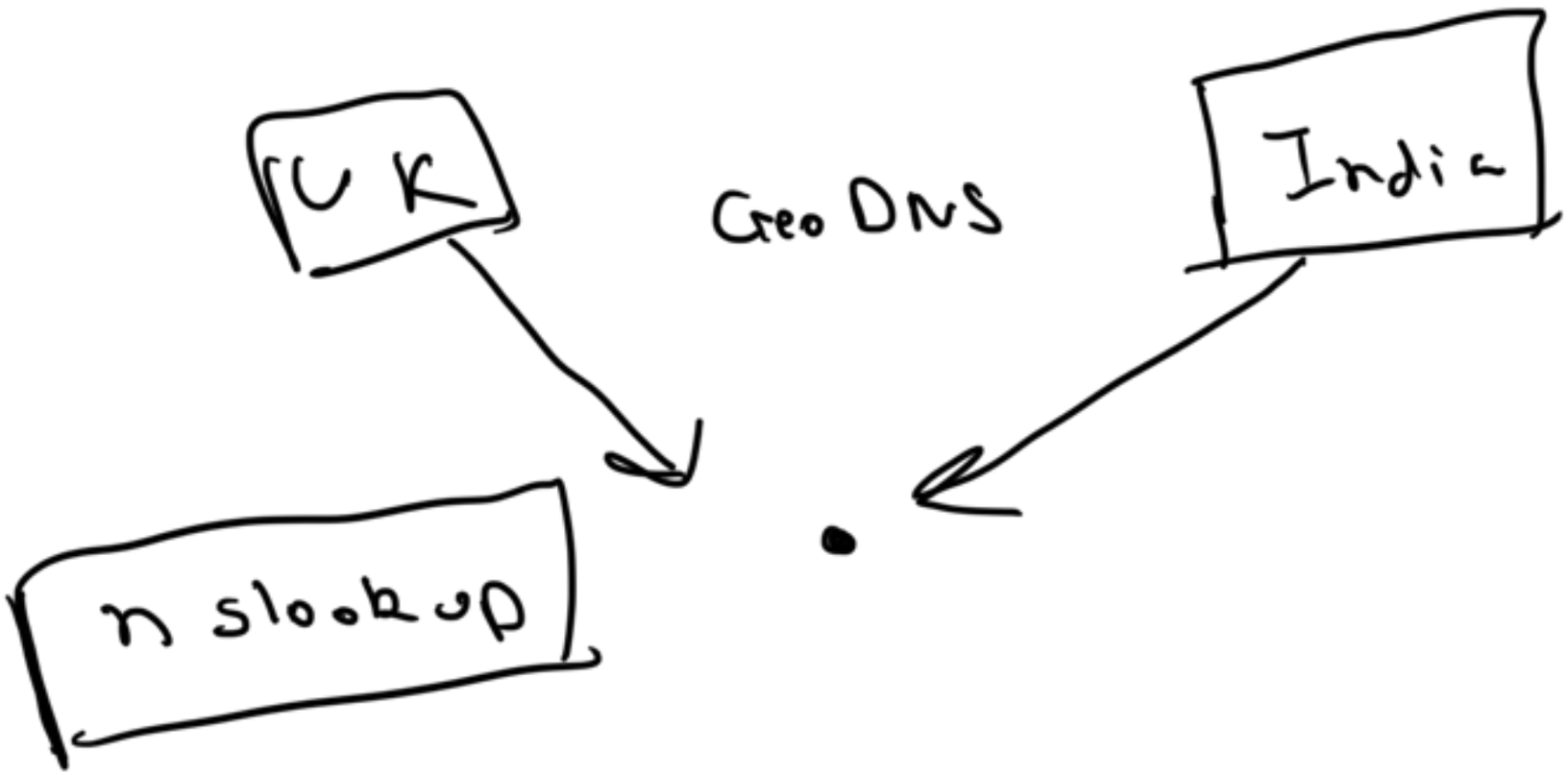
DNS resolution

Browsers → Cache

→ hosts

Dns resolution



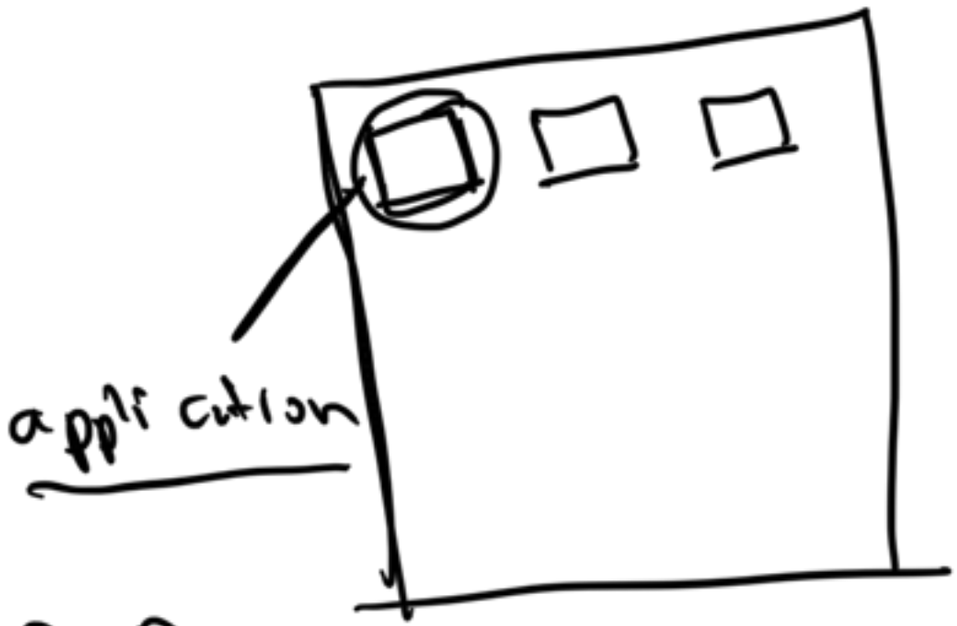


② Domain name → IP address

1 - google.com

2 - gmail

ports



PID - Port : 3000

80 8080

www.google.com → 80

① Ip adress

② Port → google.com

Social network

Common language → English

Browser → google.com

Protocols (Communication)

→ HTTP, TCP

HTTPS

Set of

— rules on how to communicate

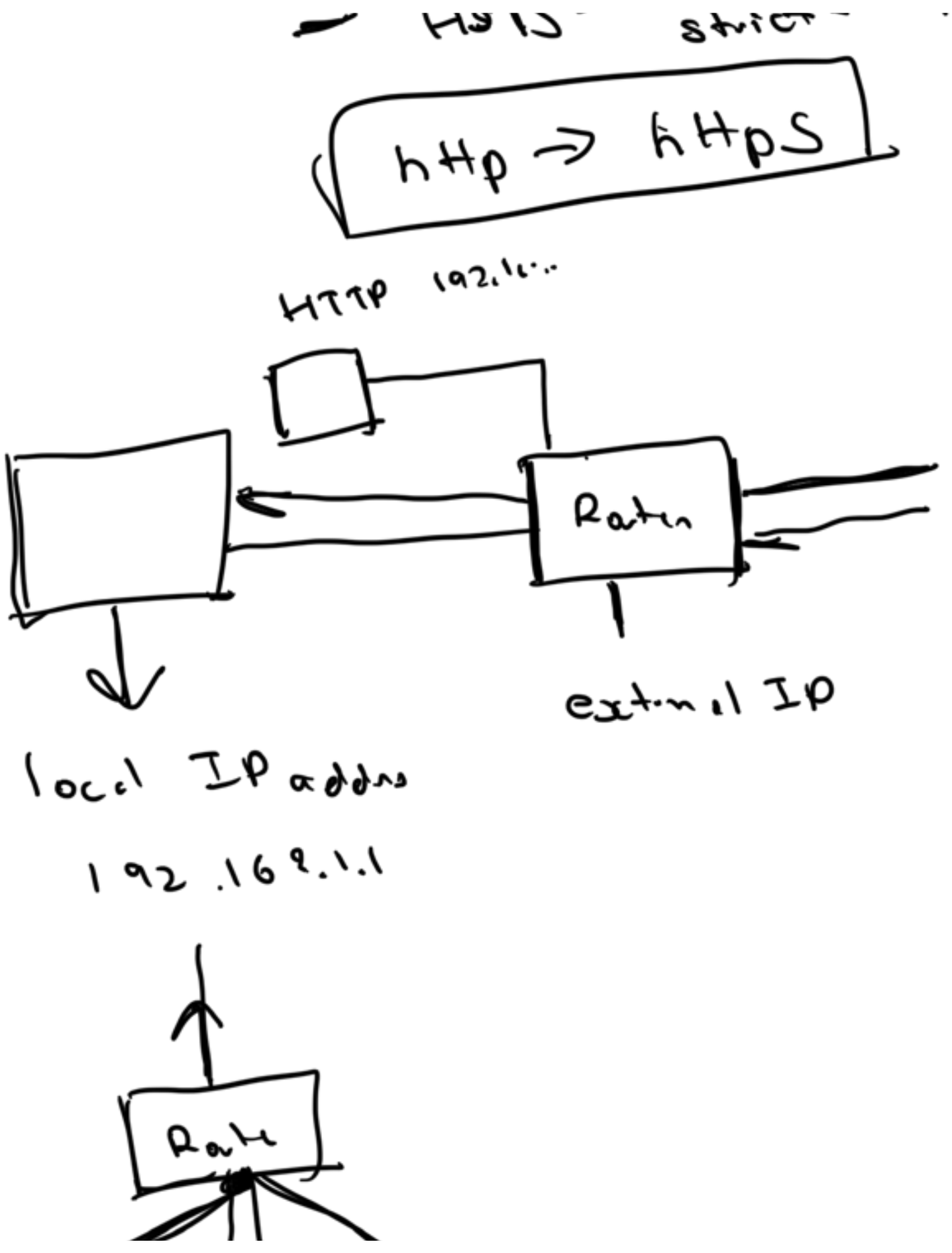
www.google.com

1. String parsing
2. DNS lookup
3. HTTPS: HTTP — Security

Browser

— list

— HTTP


http → https
HTTP 192.1...
Router
external IP
local IP address
192.168.1.1
Router

IP - LAN

unique

192.168.1.1

IP - External

DNS
- URL
- HSTS
- DNS → IP address →

C → S

- Browser open a connection
  - IP + PORT
- Connection close
- TCP connection

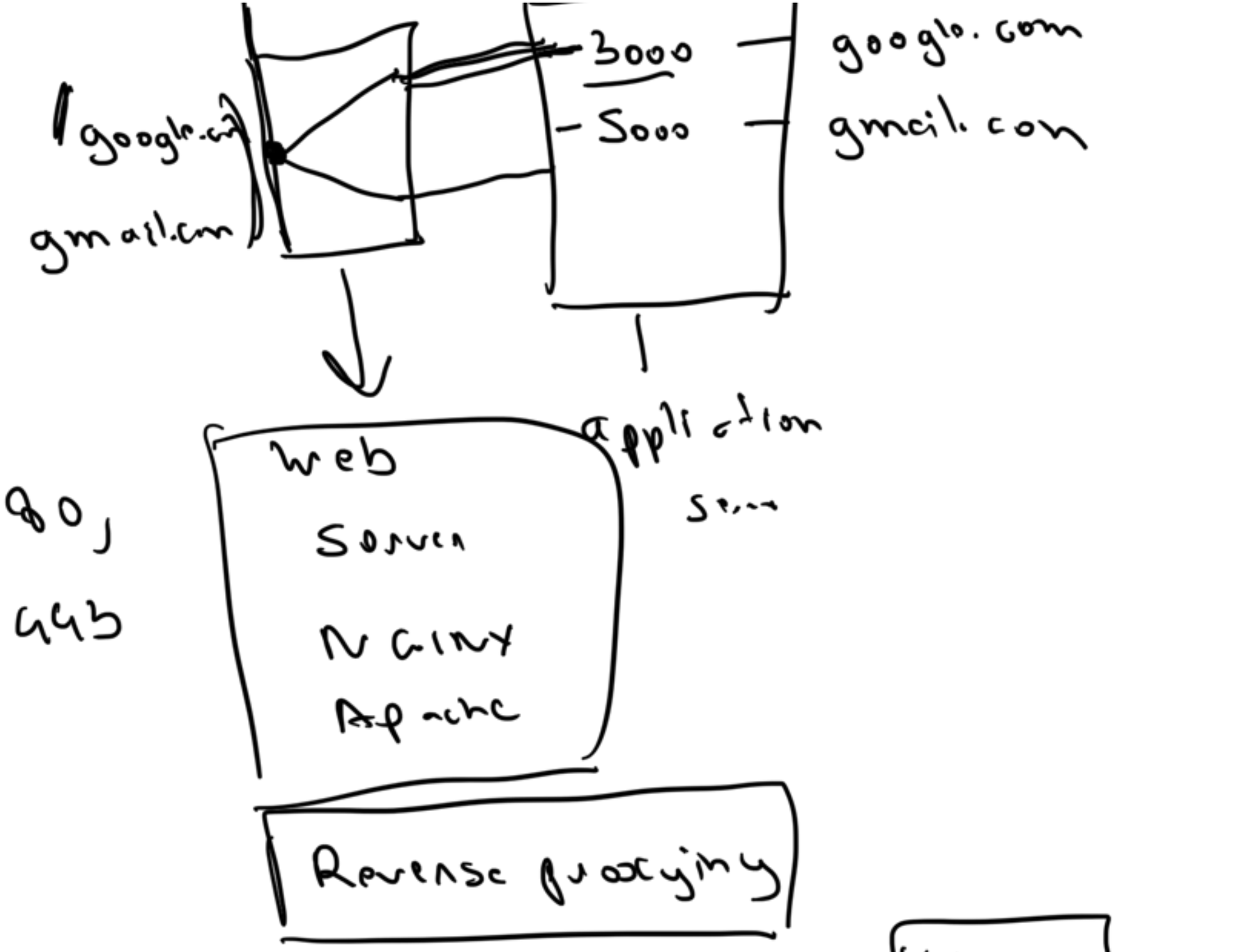
Airtel 1 - 10

BSNL 10 - 20

localhost → 127.0.0.1

10.1.2.5

HTTP 80 → 443 HTTPS


google.com
gmail.com
3000
5000
google.com
gmail.com
web
Server
Nginx
Apache
Application
Server
Reverse proxying
HLD

google.com : 80
: 443

lvl 5000

lv2 6000

Web server

google.cn

gmail.cn

3000

5000

Request

proxying

URL

5000

5000

6000

6000

Addresses

- IP
- Port

LAN	Mobile
A	B

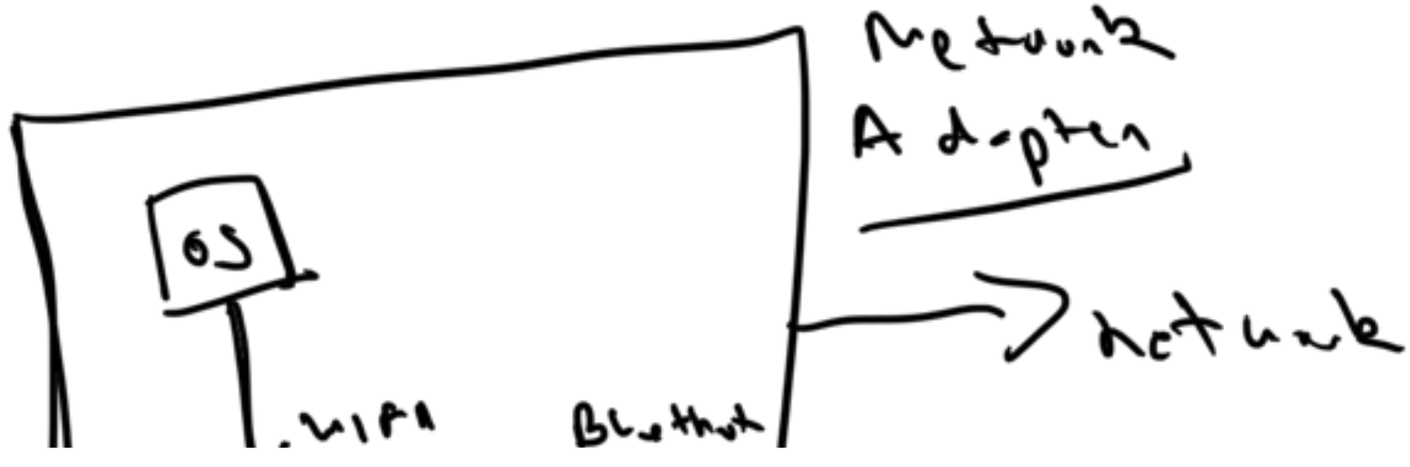
A == B

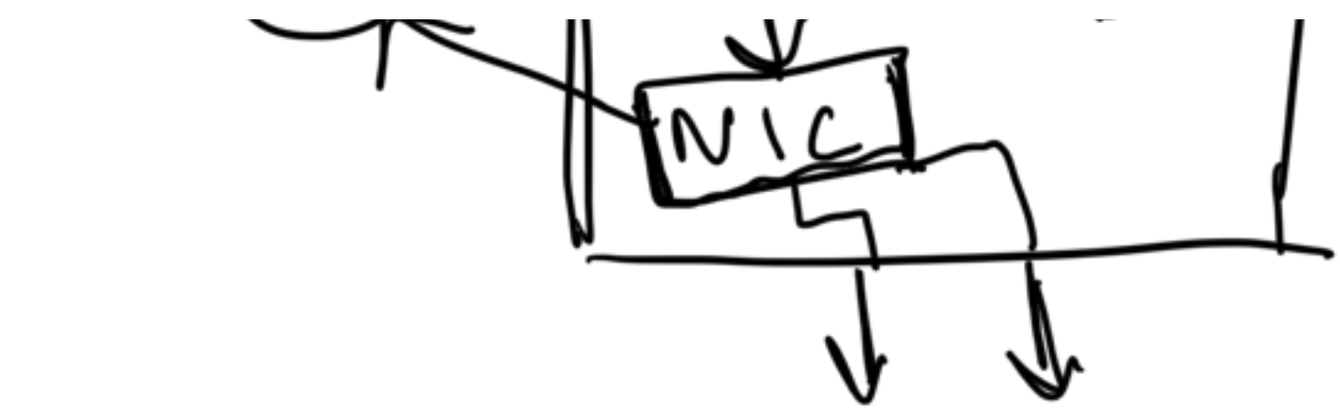
How can I identify my computer

MAC

MAC address

ID





Network Interface

Card

ADHAR

IP adress

MAC adress

Mac Address

- ARP

ip adr

mac adress

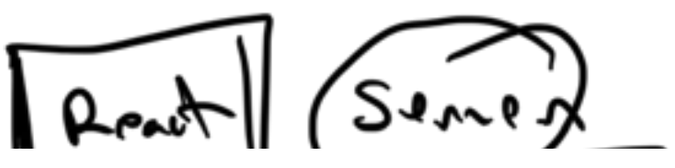
Dark Web

- TCP

NIC — MAC

6:04	6:10
10:34	10:40

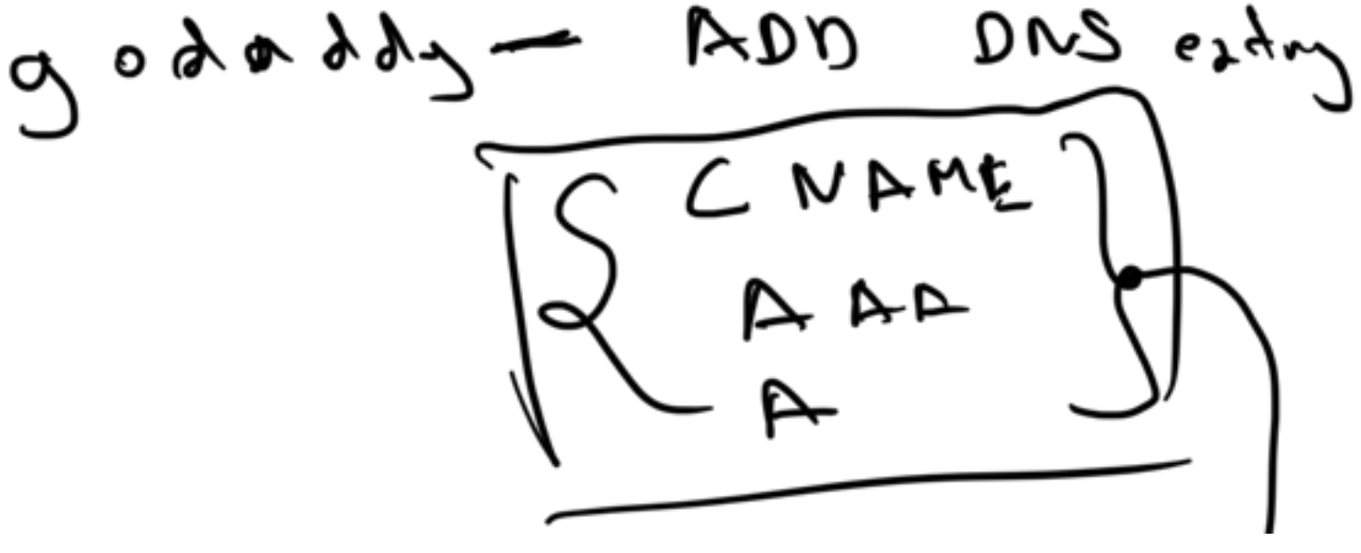
OSI model

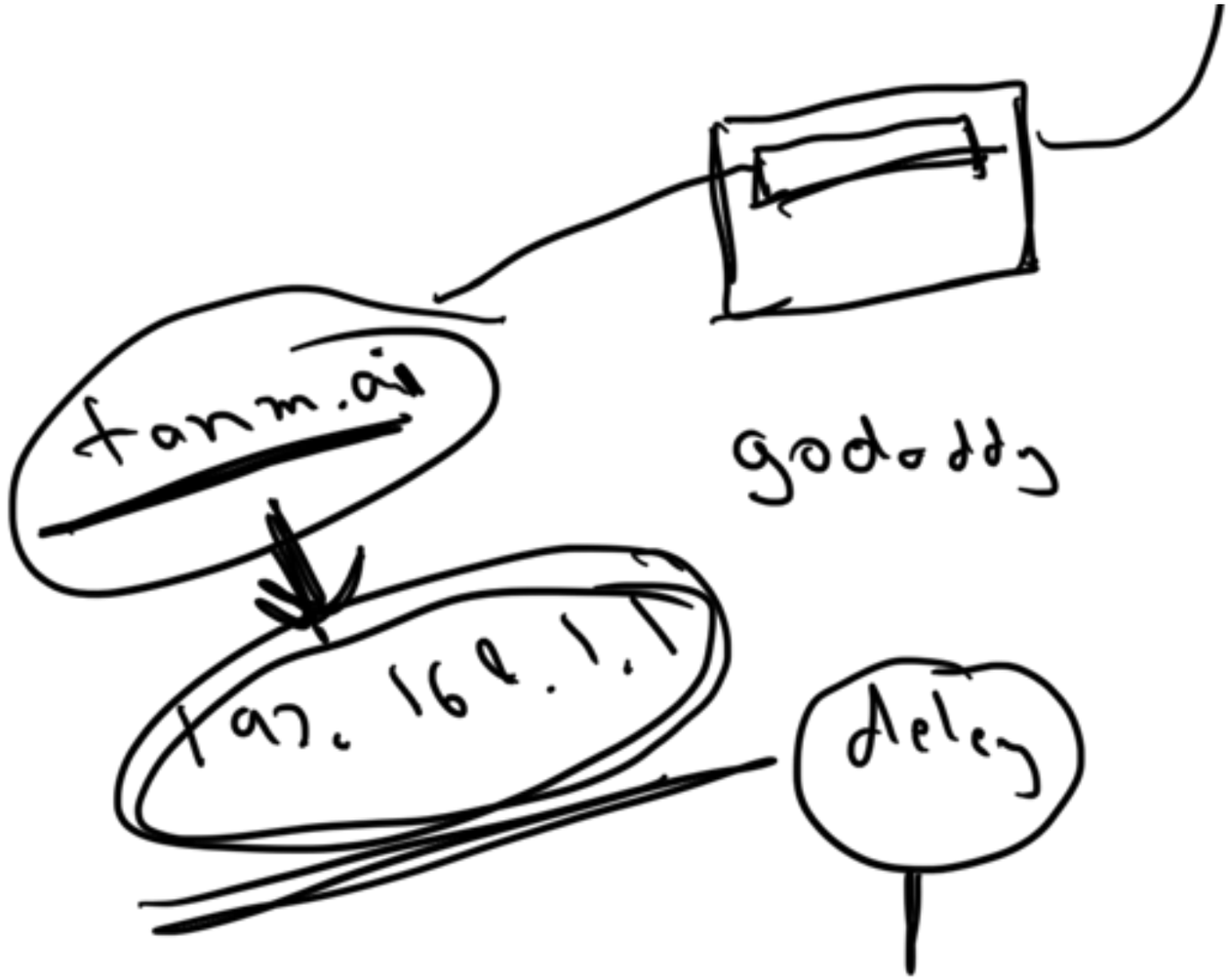



tanm.ai
dom ain


3000
tanm.ai


DNS entry


godaddy — ADD DNS entry
CNAME
AAA
A



domain

DNS

DNS prop.

① Why do we need networks

→ Sharing data

→ resources

② LAN, WAN

③ name → address

domain → ip address

name

④ 

(5) MAC address - physical

NIC - MAC

ARP | MAC address DNS

PORTS

p1 p2 — IP address

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① ipconfig

② whois , nslookup

4 billion

③ hosts

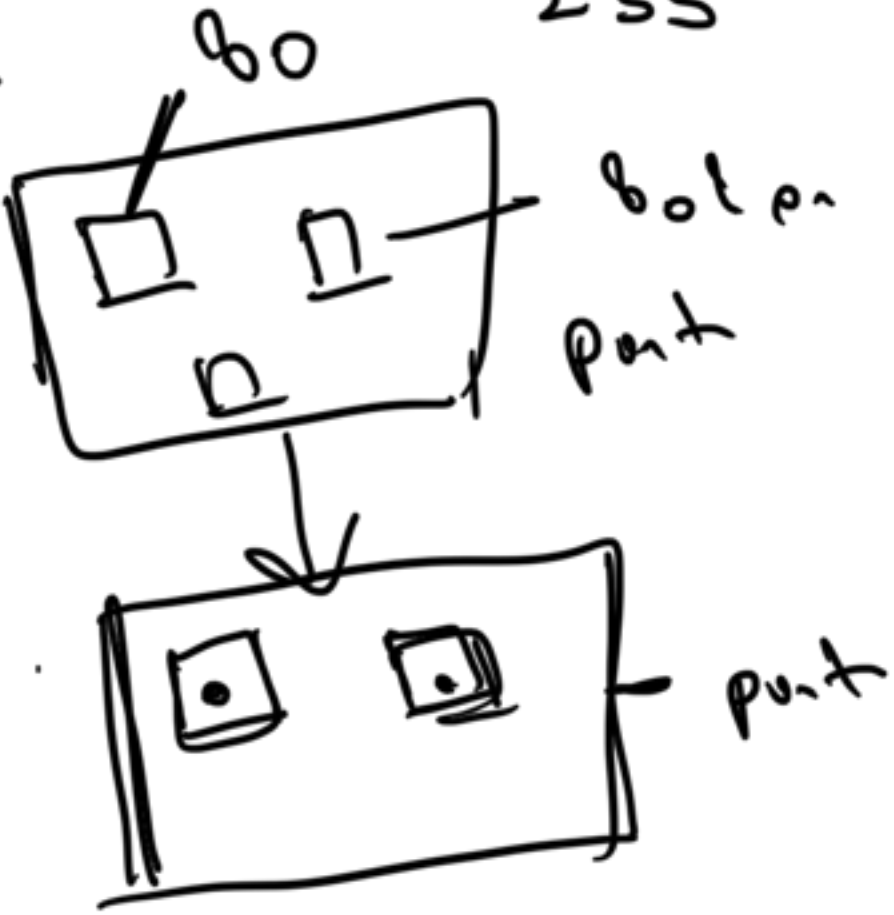
IPv4

192.168.1.1

255 255 255

255

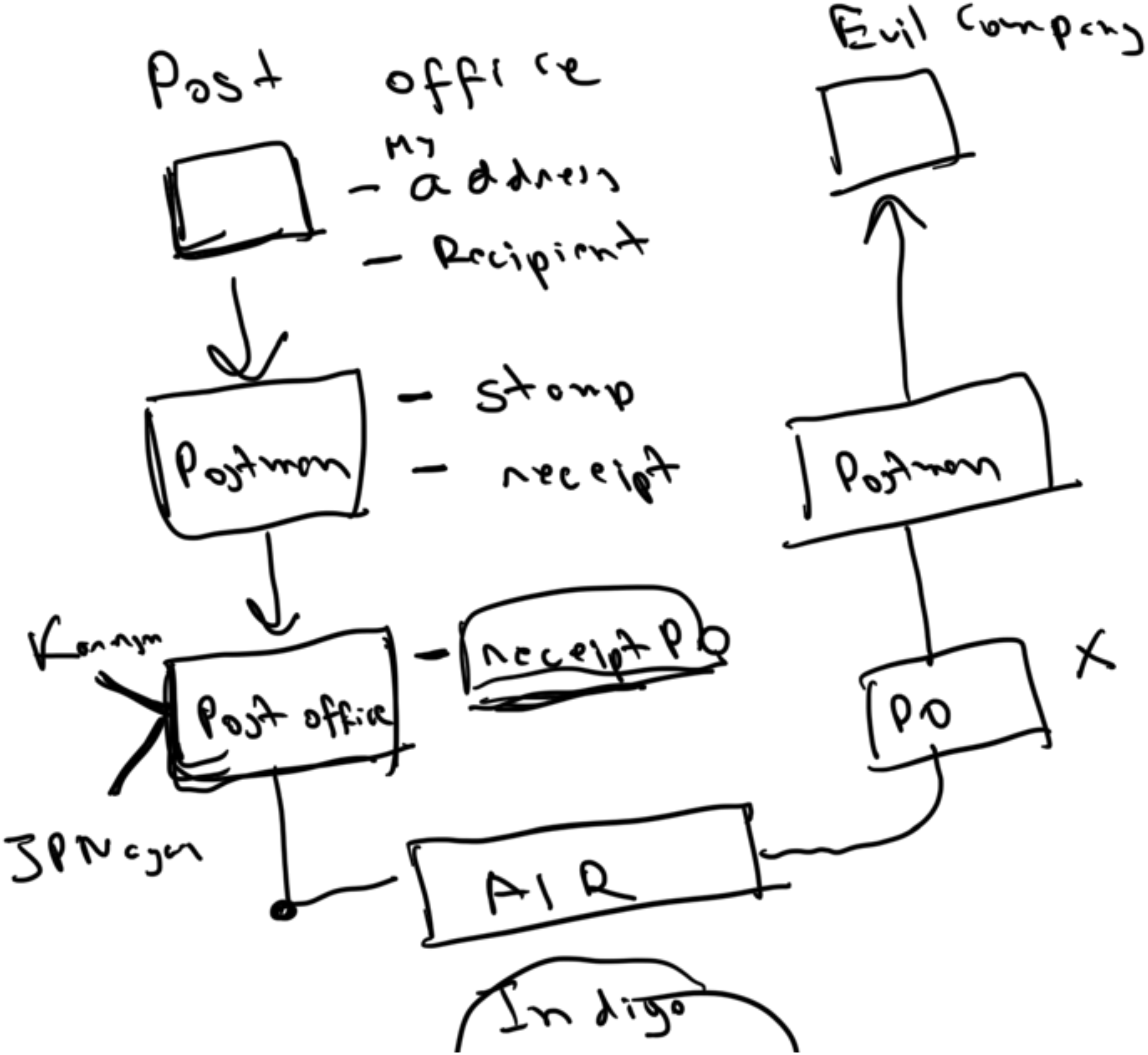
Snep a.th



Chrome – Tab – process

port

OSI model

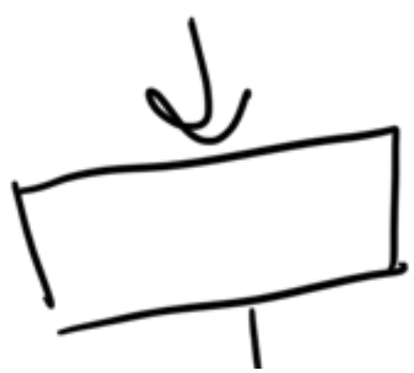

Post office
Evil Company
my address
Recipient
stamp
receipt
Postman
Postman
receipt PO
Post office
PO
X
AIR
Indigo

Air India

Software (Applications)

1. Protocol - HTTP, HTTPS
2. encryption
3. compression
4. router, wifi, ethernet

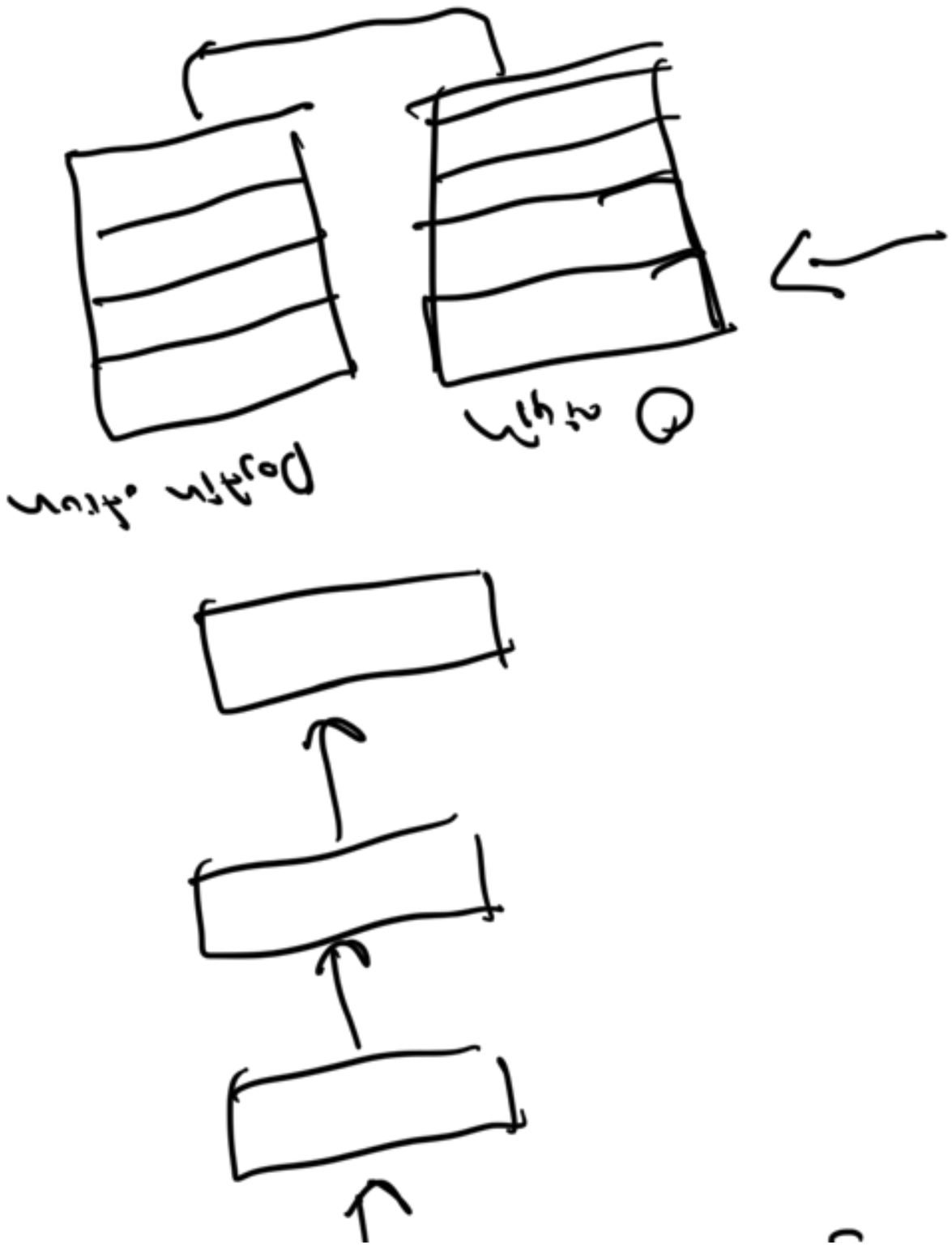
network packet



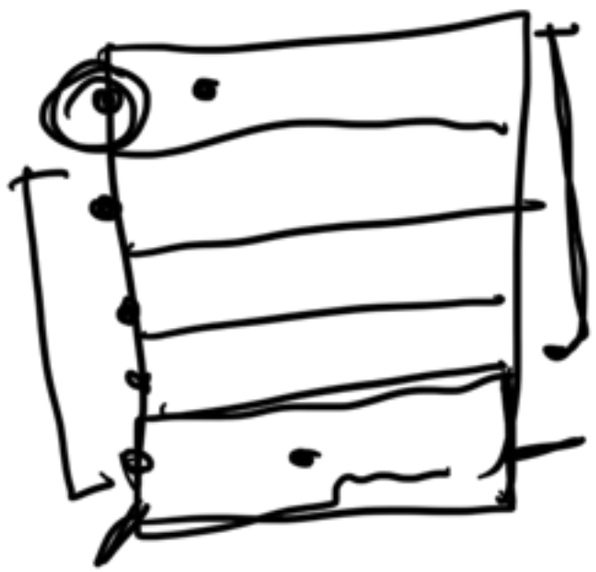
layers

OSI model

7 layers



abstraction - hiding things.



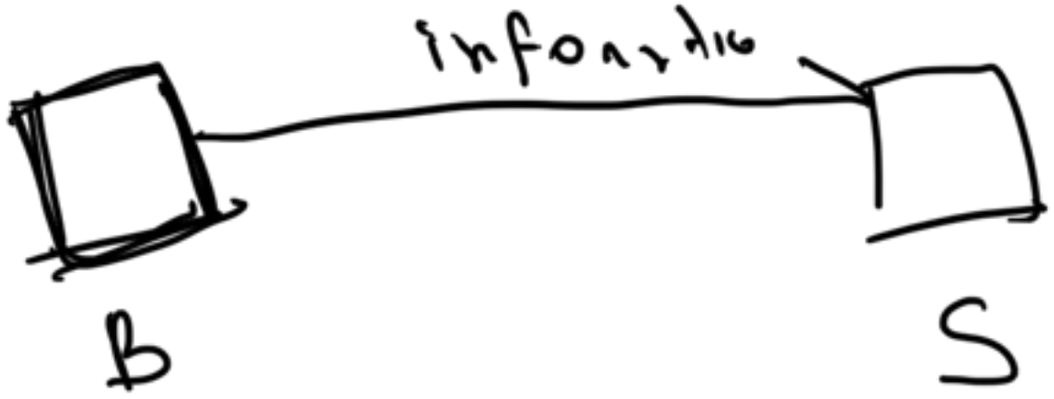
- abstraction
- standards

OSI model - open systems interconnect

theoretical

→ 7 layers

① - 7th Top - [Application]



① Human interaction

② → Presentation

• zip

① encrypting

② encoding | decoding | compressing

③ Session

Session – Session id
– Credentials
– Cookies

{ time zone: }

TCP/IP

7 A
6 P |||
5 S

Application

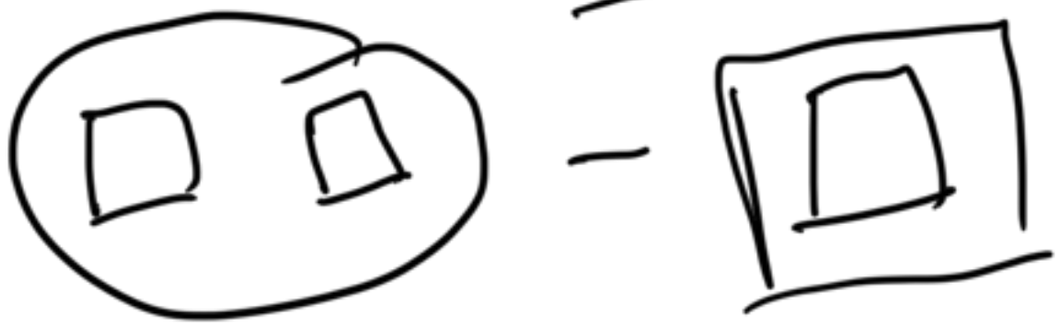
4 T

Transport layer

Small about

book > library

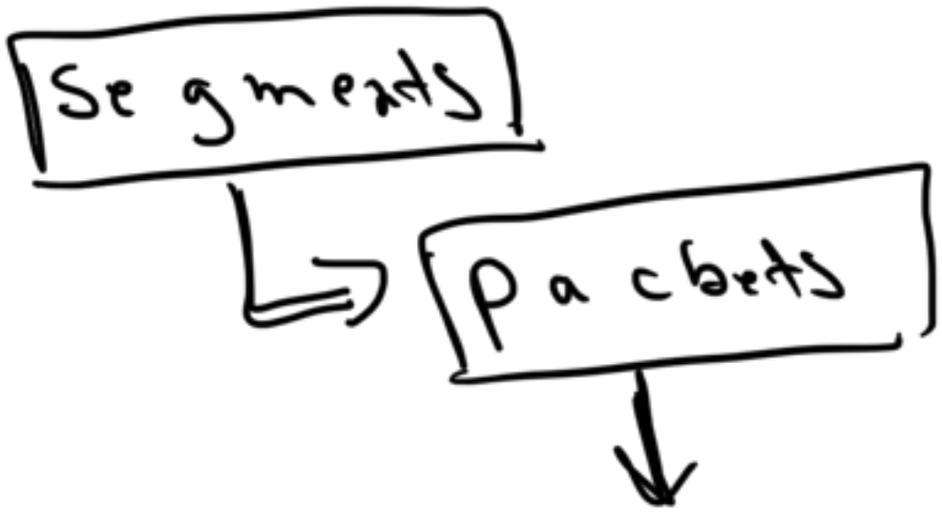
Segments



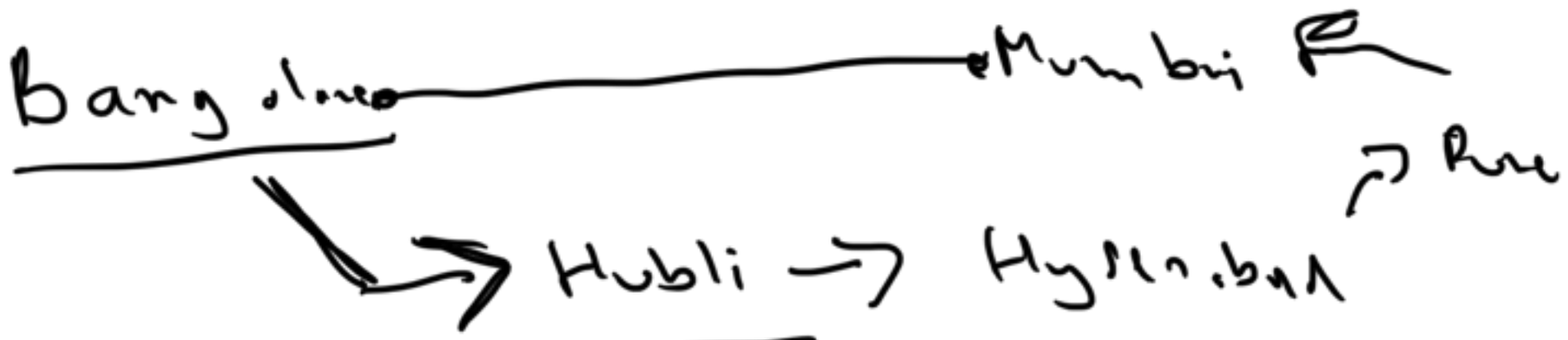
Transport layer

→ guarantee of success

③ Network layer



how to send this info.



network layer

IP address

network layer protocol

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hop A→D

A · B · C · D

hop by hop

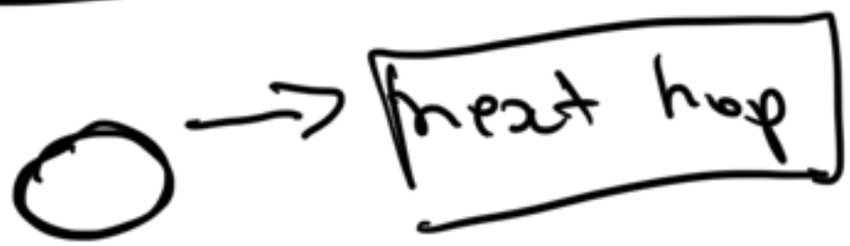
hop

---

traceroute	dig

- network layer.

Data link layer



Obfuscation

6 → Software | App

Random

Software

Data link

1st — Physical

ethernet / wifi → 101010

1 0

7 Application — google.com — Server

Application → HTTP

HTTPS

FTP, SMTP

SHA , RSA

6 Presentation — compression + encryption

5 Session
- tokens
- cookies
- credentials

SSL
TLS

4 Transport — Segmentation

TCP UDP

guarantees delivery

not guaranteed

TCP

3 Network- routing → IP
ARP

2 Data link hop info. Ethernet wifi 802.11

1 Physical physical

TCP/IP

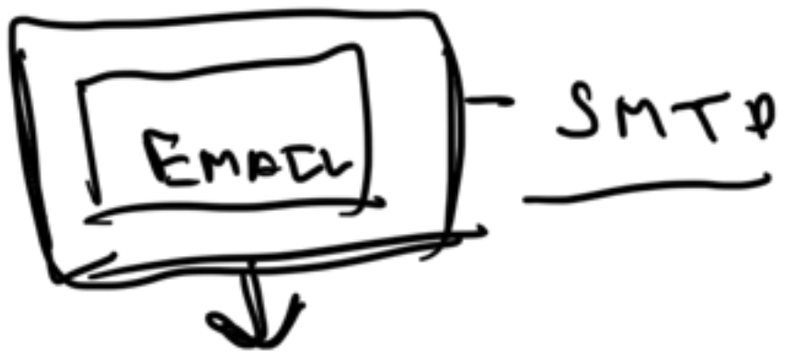
① Application + P + Session
= Application

② Physical + Data link

What actually happens when you send an email

1. Client → outlook , gmail

1. Application → SMTP



2. Presentation

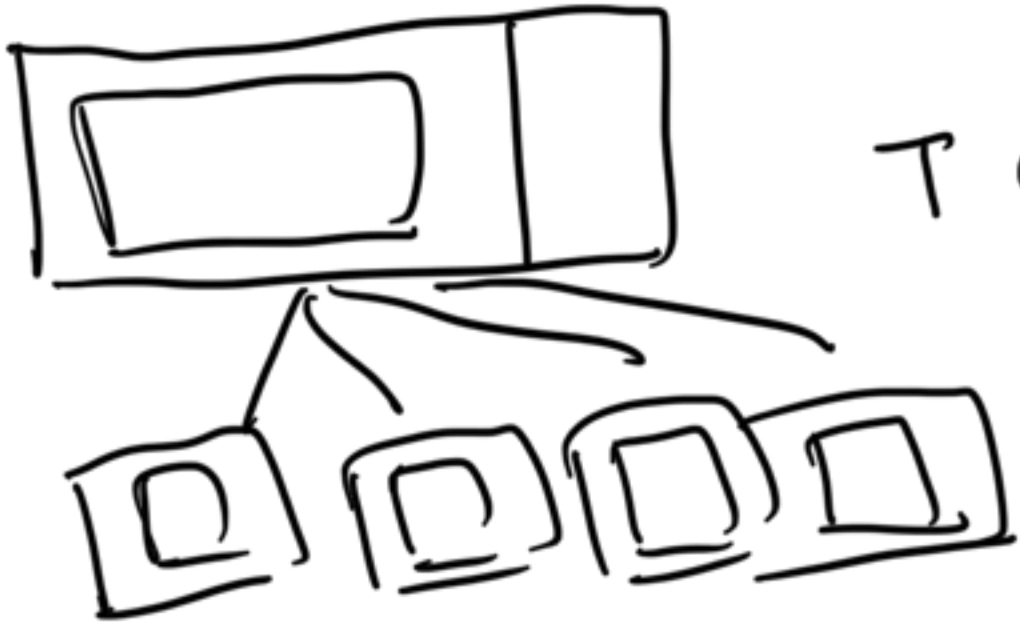
— encrypted

— compressed

(3) Session — email id

— token

— credentials

(4)  TCP

(3) Network layer hops

(2) DLL next hop

(3) physical transfer

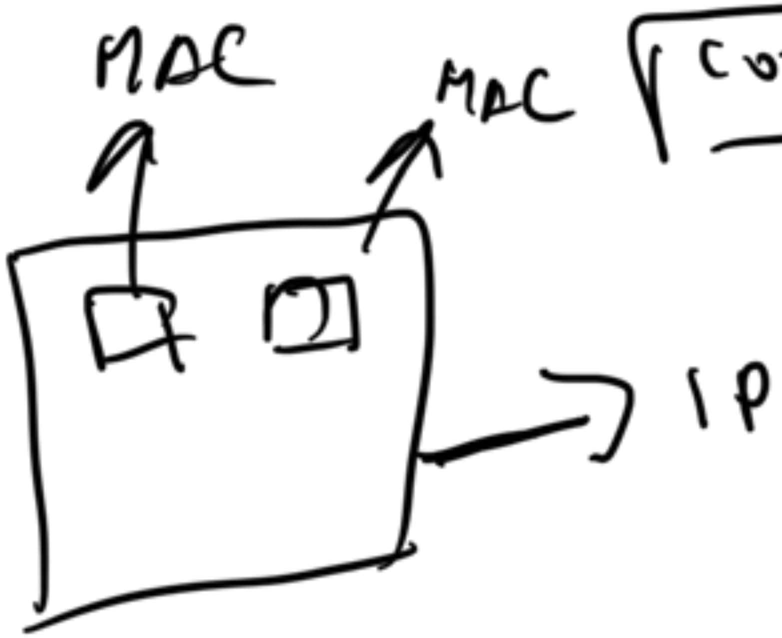
MAC address

↳ physical

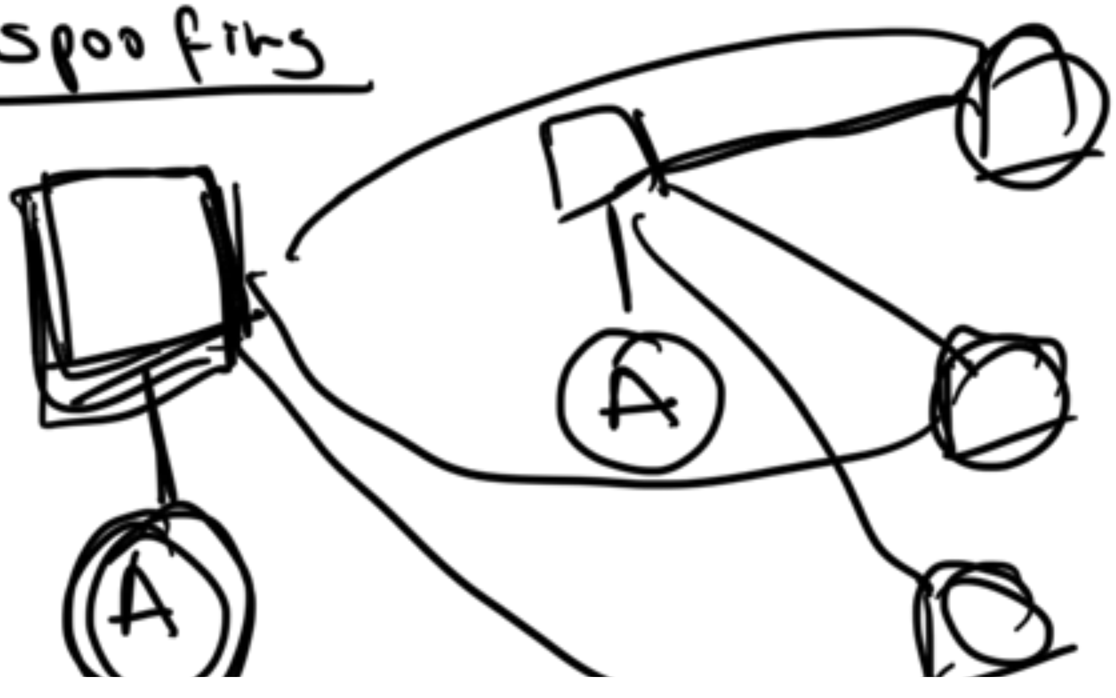
↳ unique

Local – not unique

MAC → uniquely identify a computer



MAC spoofing



DNS spoofing

Wireshark

A /a → 5000

B /b → 6000

nginx

→ 5000 apache

/a

encryption