(High Level Design)

Naman Bhalla

Aug 31 — Feb 26

1. Exp Setting
2. What is HLD
3. How Internet Works
   - → Private/Public IP
   - → Static/Dynamic IP
   - → DNS
4. Load Balancers
   - → work
   - → reg server
   - → Server has died.

Case Study of Del.icio.us

Expectations

if <2 yo SWE experience

↳ have a backlog in prev modules.

⇒ clear Backlog first.

else:

go through these classes LIVE

→ ≥ SDE 2 ⇒ HLD is v.vv. imp

What is HLD

1.) Problem Solving
↳ not coding

2.) Some cmpl parts (Project Module)
↳ OAuth
↳ Redis
↳ Kafka

LLD4 : Project

Int / Adv

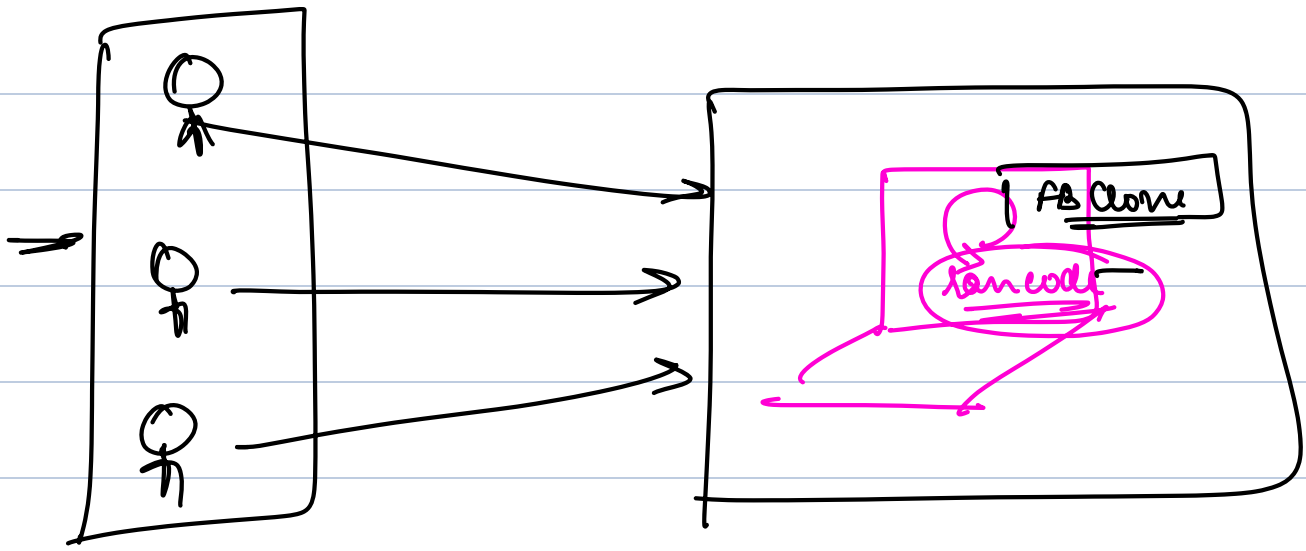
LLD 3
↓
HLD
↓
LLD4 (Project)
↓
Electives

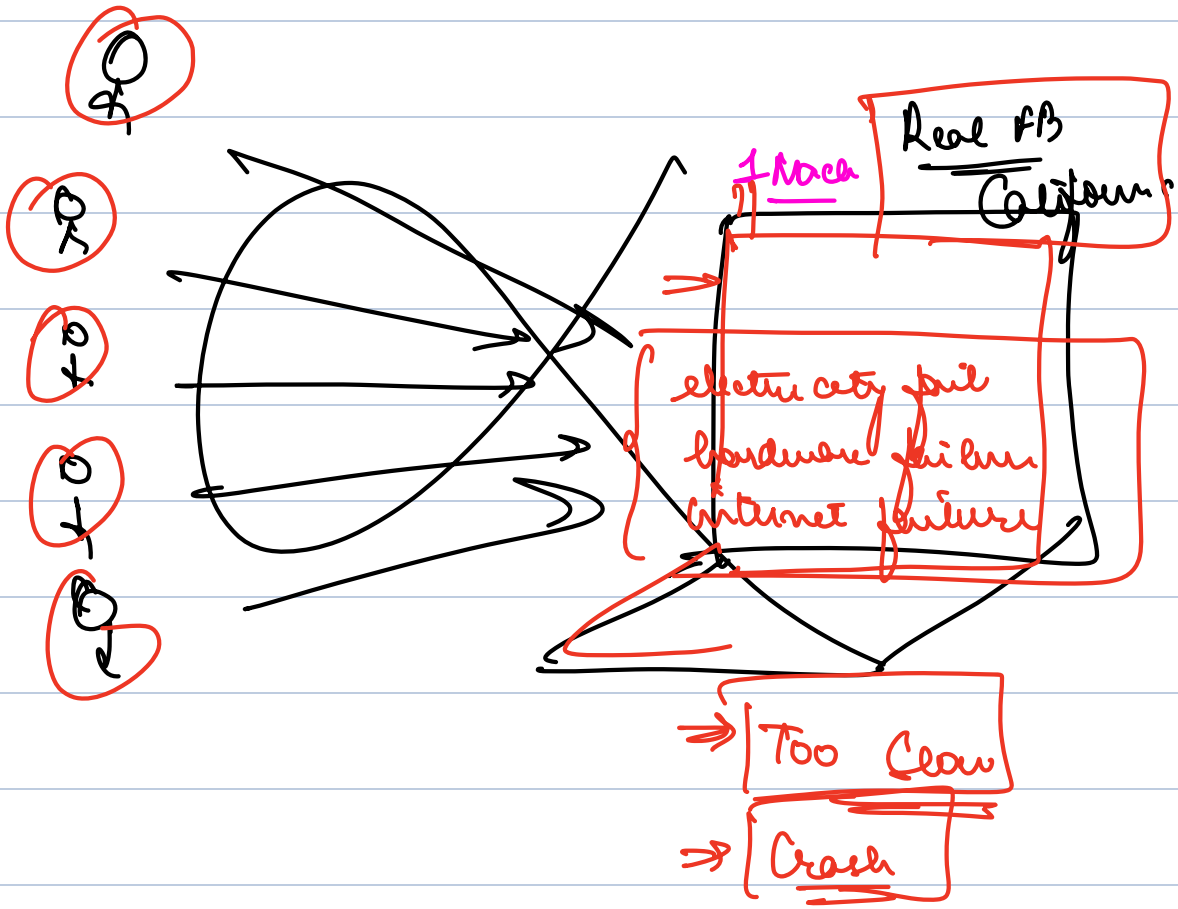
Beg

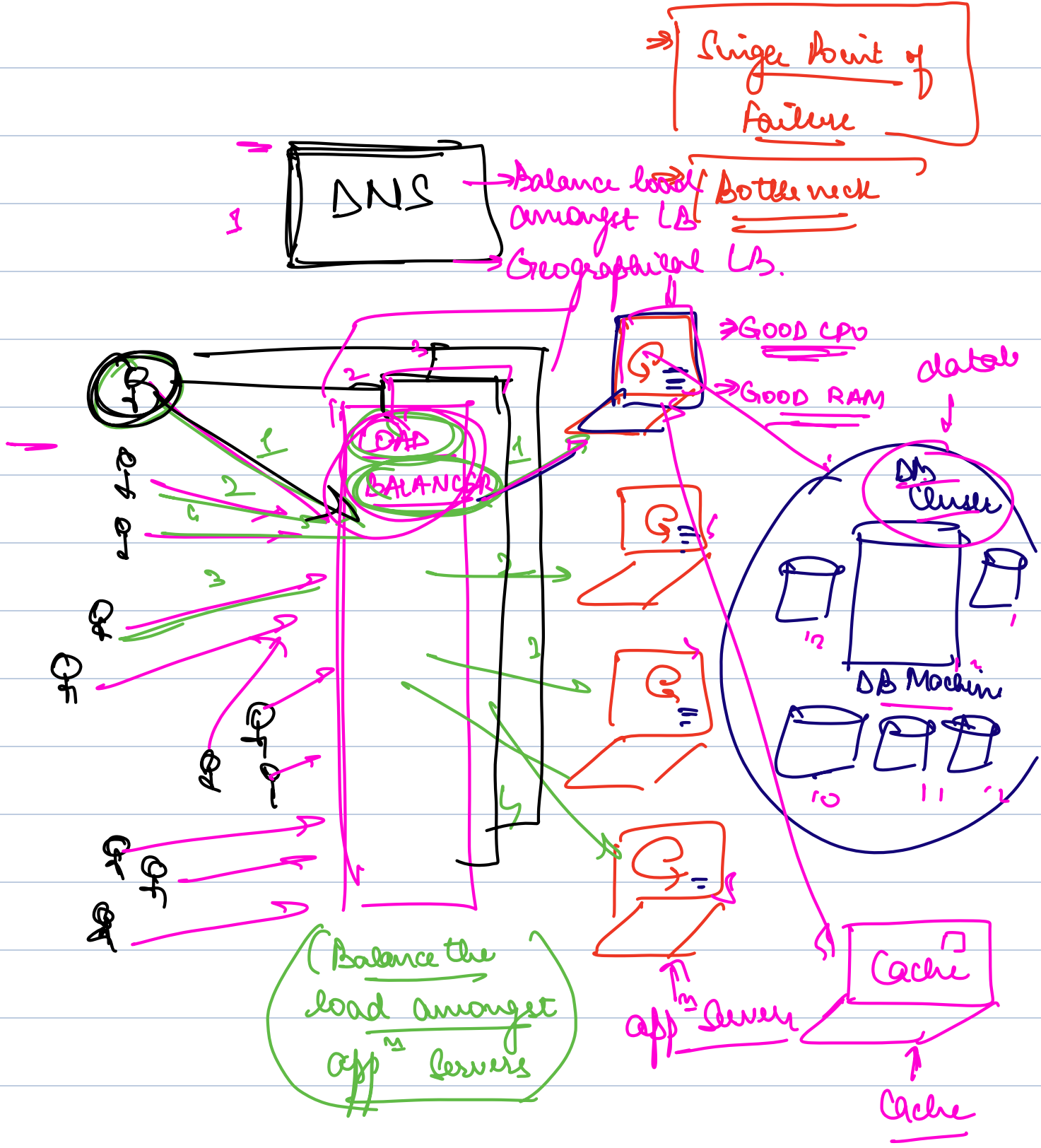
LLD 3
↓
LLD 4
↓
HLD

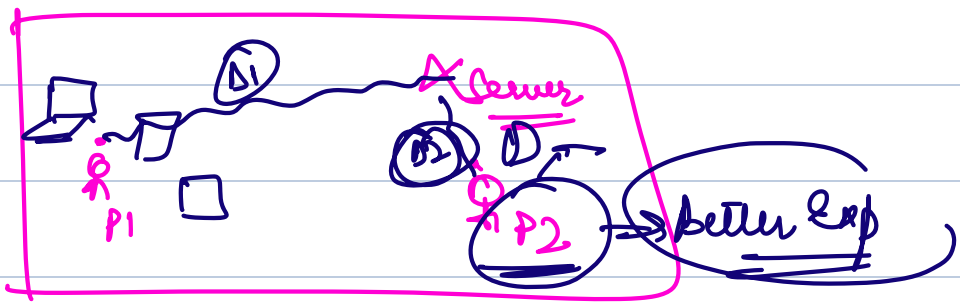
What is HLD

- High
- Level
- Design






Single Point of Failure
DNS
Balance load amongst LB
Bottleneck
Geographical LB.
GOOD CPU
GOOD RAM
database
LOAD BALANCER
DB Cluster
DB Machine
Balance the load amongst app^n servers
app^n Server
Cache
Cache


Server
P1
P2
Better Exp

HLD or **System Design**

Study of how diff infra layer will work together to serve an appⁿ (eg FB) at desired scale (2B users) at desired efficiency (≈ 50ms)

Case Study : Del.icio.us

2003

→ Bookmarks Storage website

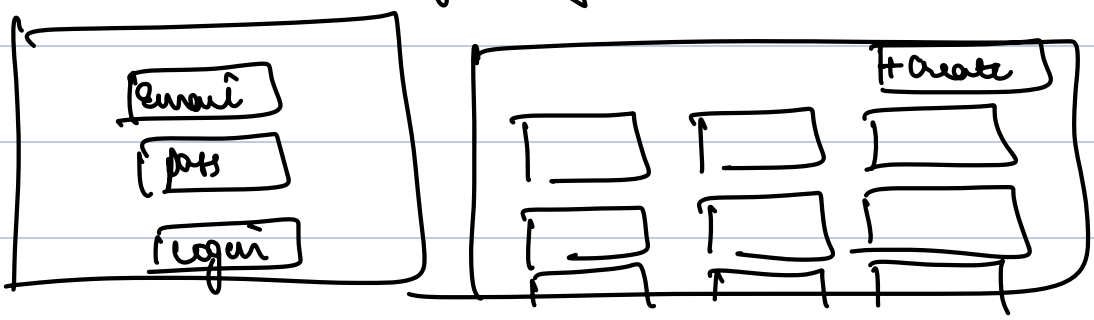
College Student!

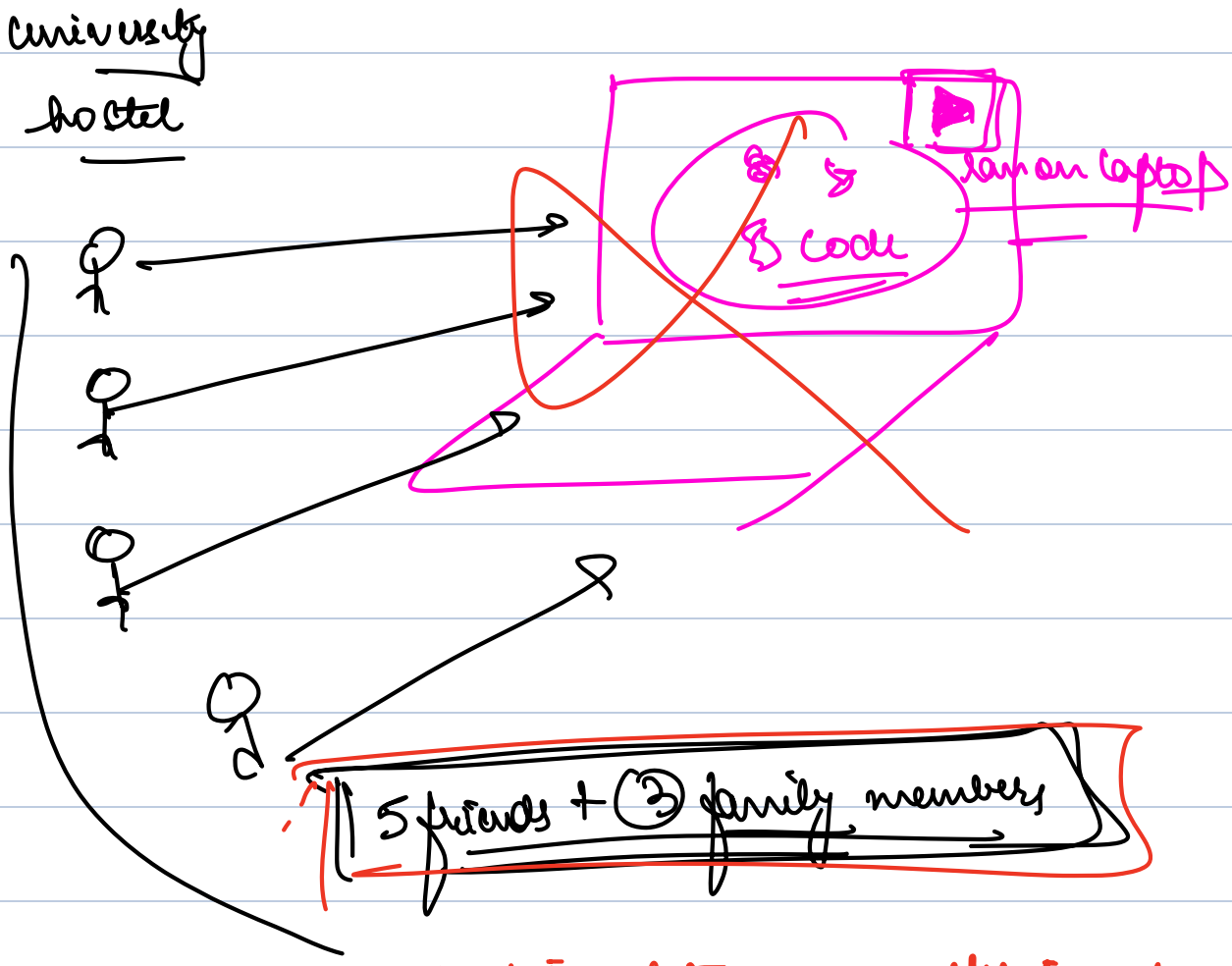
Create an appⁿ/website that allows people to save website

⇒ login()

⇒ saveBookmark (title, url)

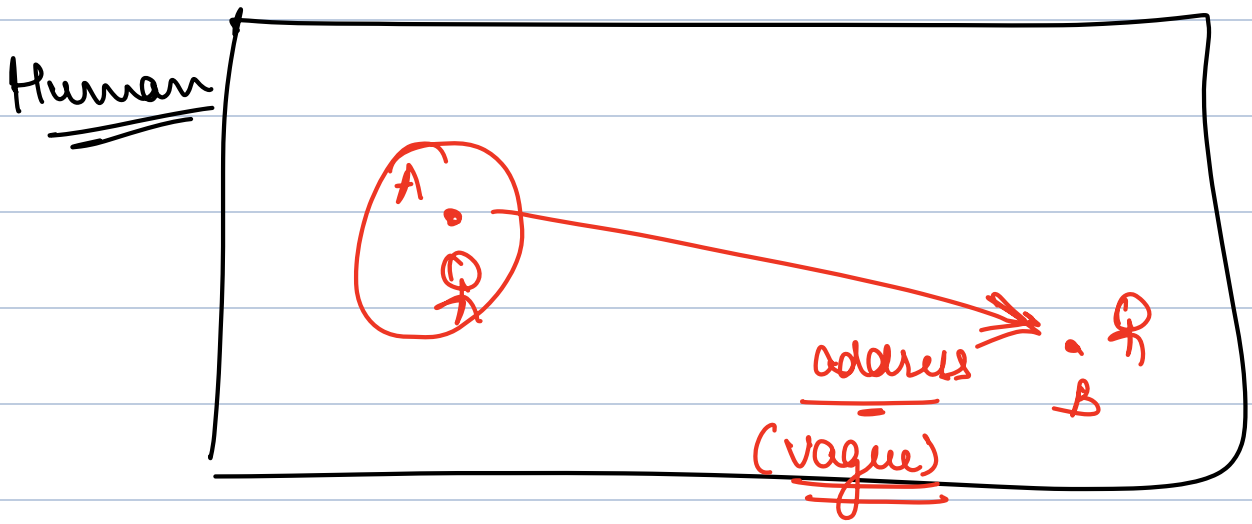
⇒ getMyBookmarks()



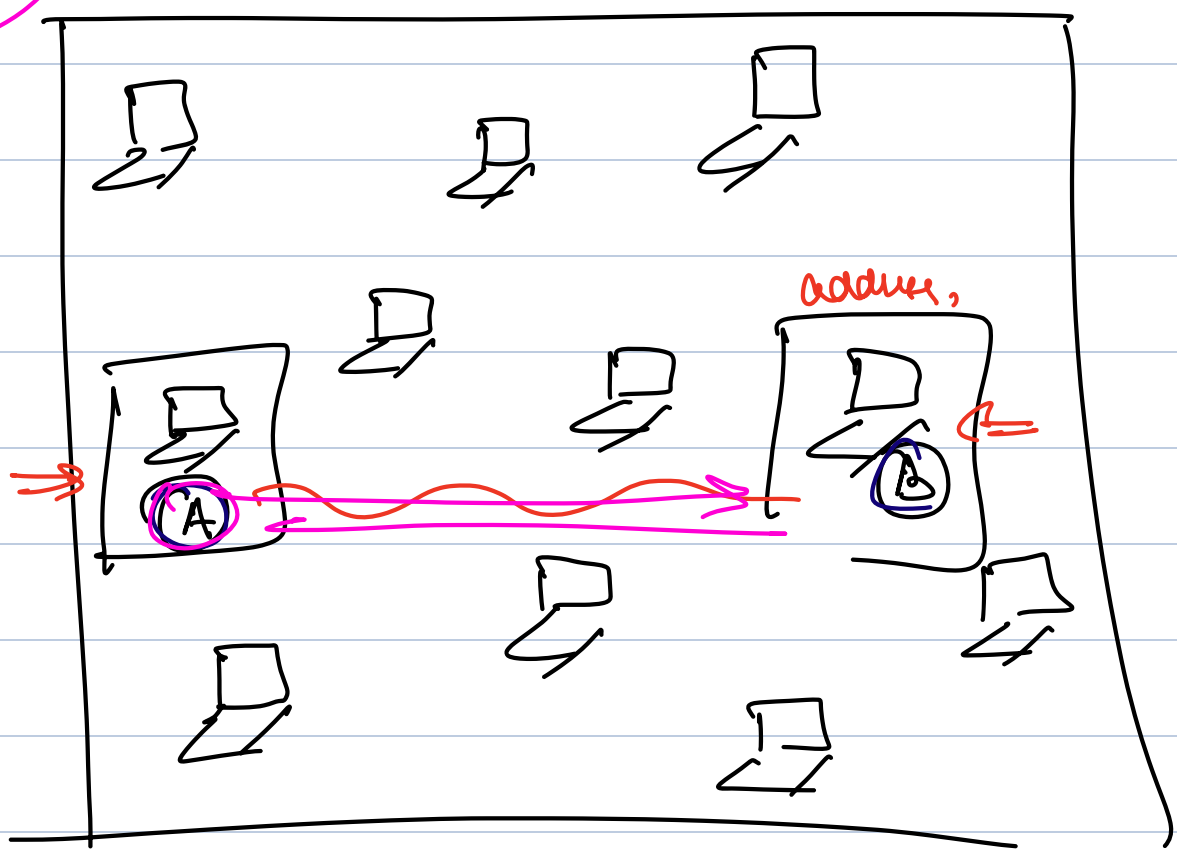


→ Unfortunately a website hosted on our laptops (even if we have internet) can't be accessed by other people in internet.

HOW INTERNET WORKS



Internet



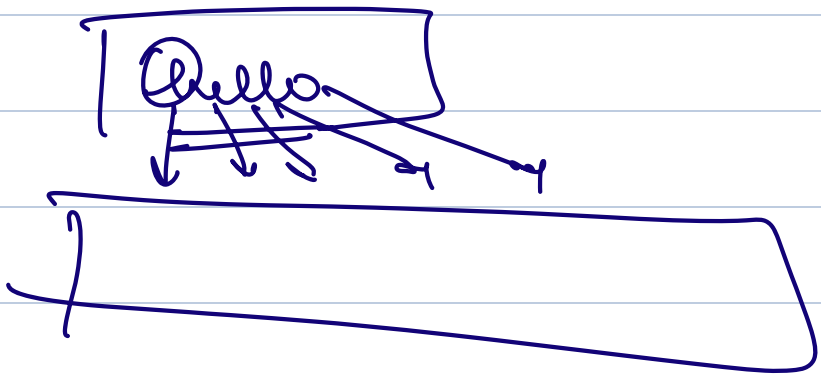
⇒ internet addresses can't be vague

⇒ Have to be absolute

comp dont understand english

if understand numbers

(Binary)



→ internet : need to assign addresses

→ addresses must be numbers.

IP address

Internet Protocol

32 Bits

IPv4 ⇒ version 4 of IP addr

4 nos

[0-255]

[0-255]

[A . B . C . D]

32 Bits

[0 -255]

[0 - 255]

8 Bits

192 . 168 . 1 . 1

10 . 1 . 11 . 41

2^32 unique add ≈ 4 Billion

⇒ >>>>> 4 Bon on internet

$(256)^4 \Rightarrow (2^8)^4 \Rightarrow (2^{32})$

4 Bn addr

> 4 Bn Machines

unfortunately can't give 4 IP addr unique

ICANN

⇒ NON Profit Org

⇒ Sell / auction IP addresses

⇒ wholesale

↳ ISPs

↳ cloud providers

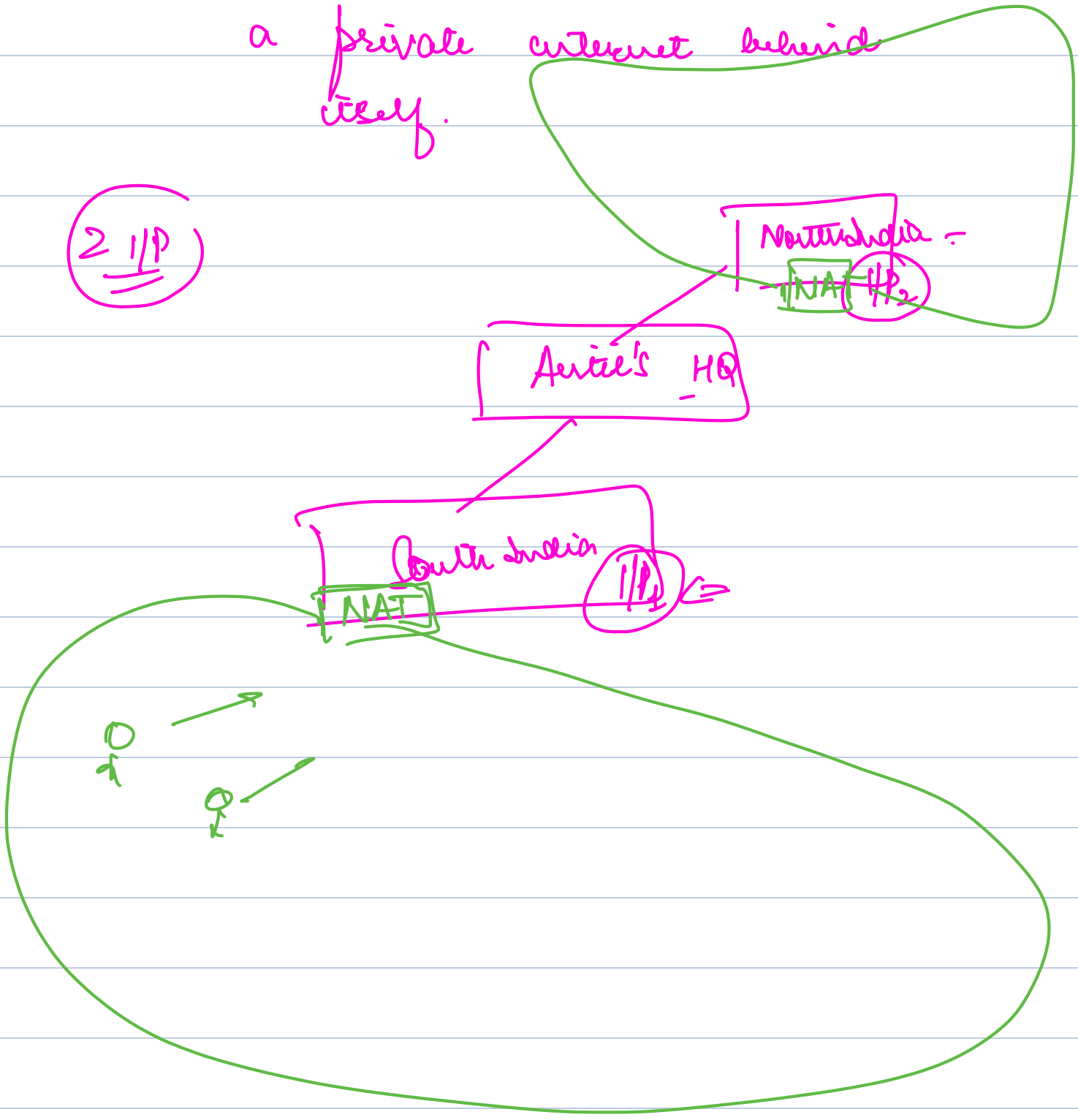
192. 11. aa. aa ⇒ AWS $2M USD/year

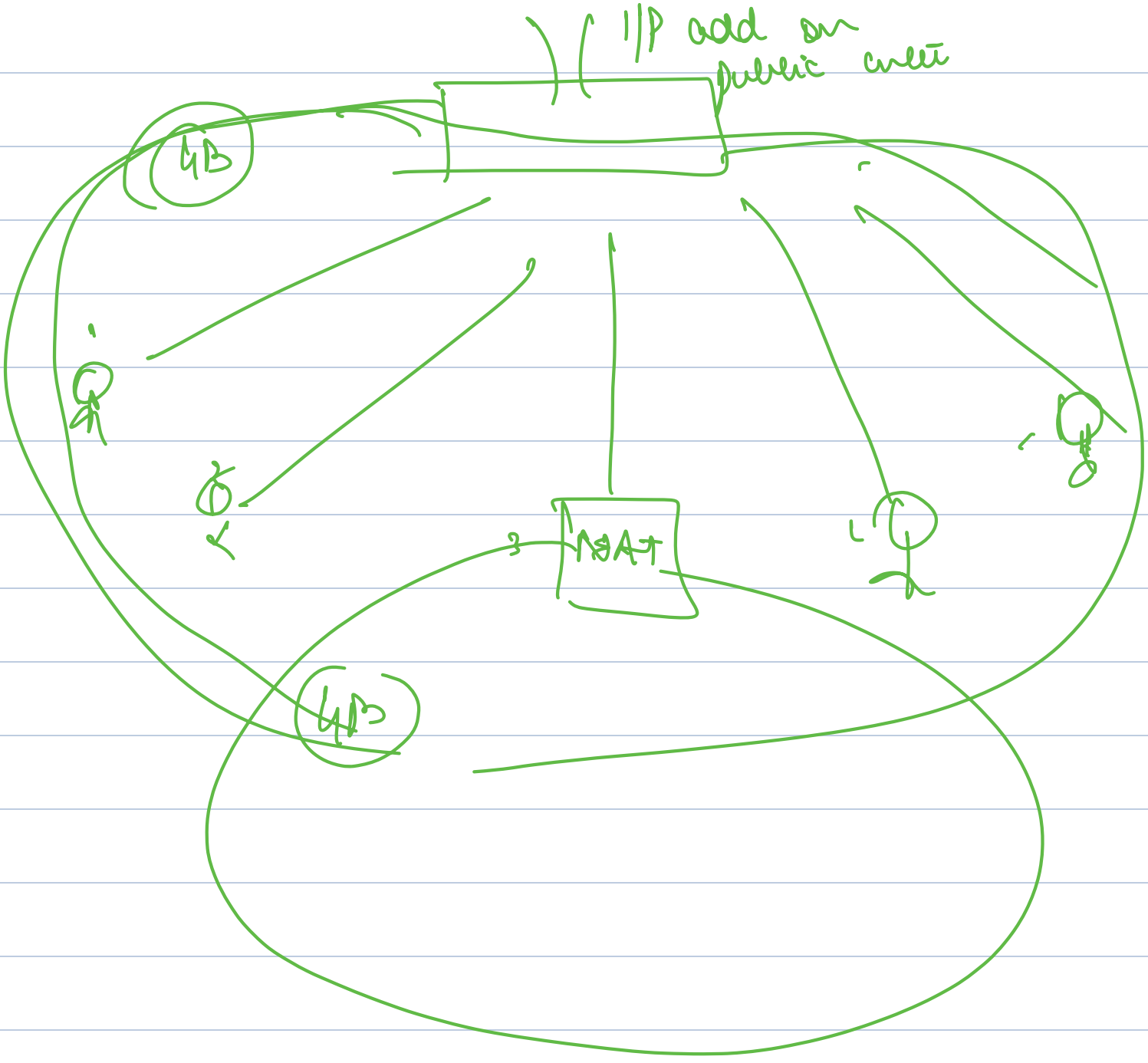
Airtel ⇒ 10M IP address

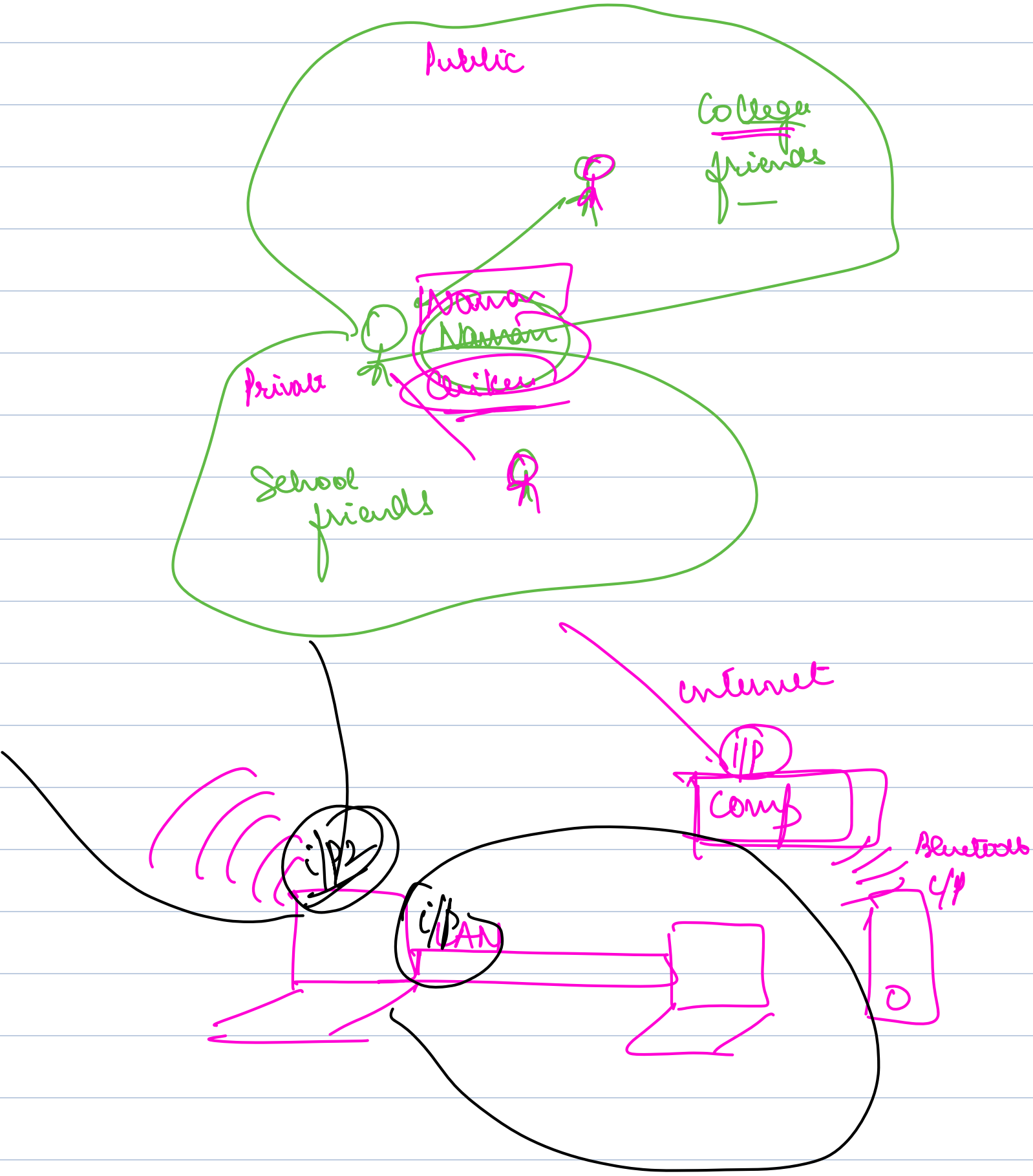
But 100 M customers

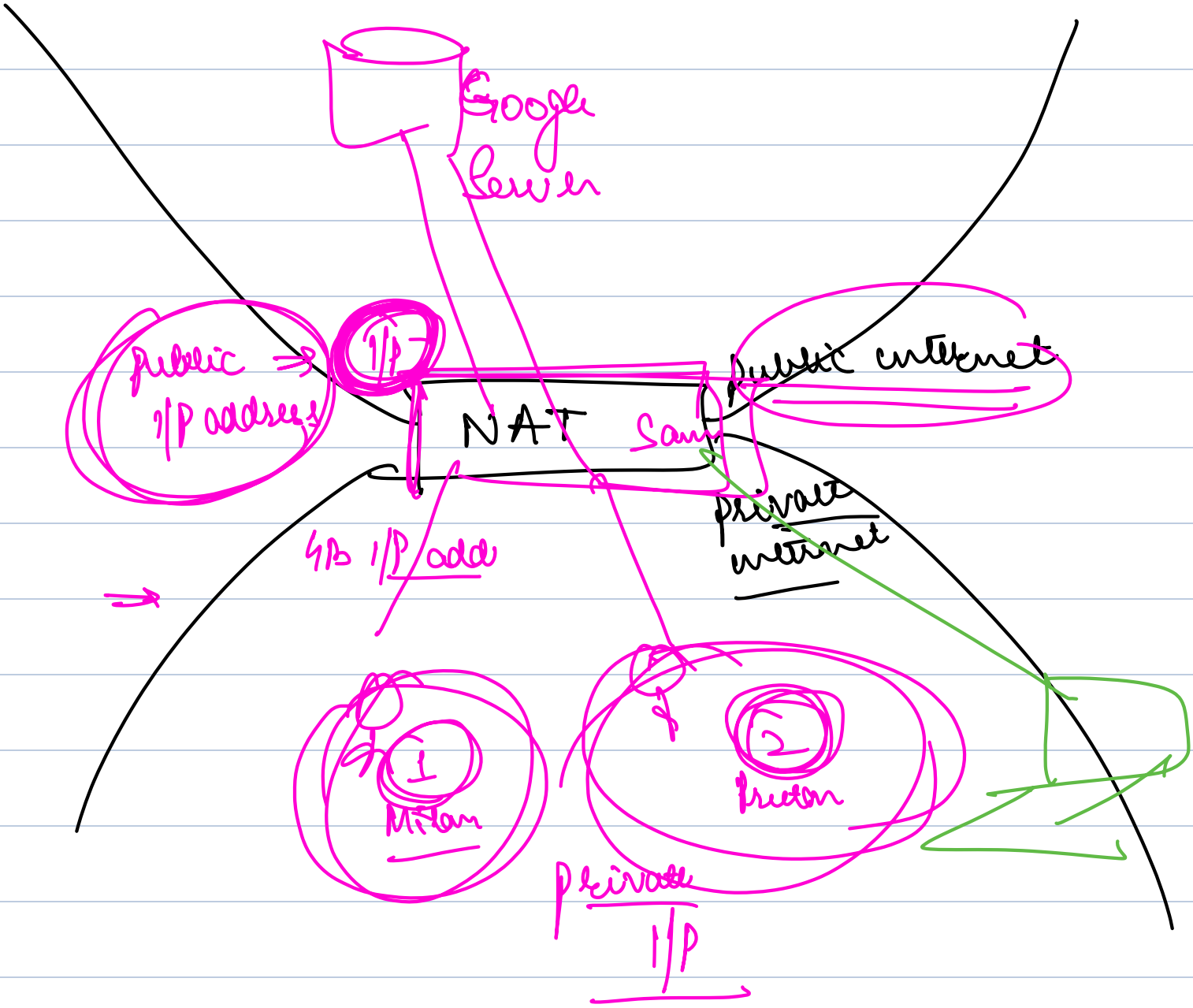
NAT (Network Address Translator)

machine that allows to create a private internet behind itself.



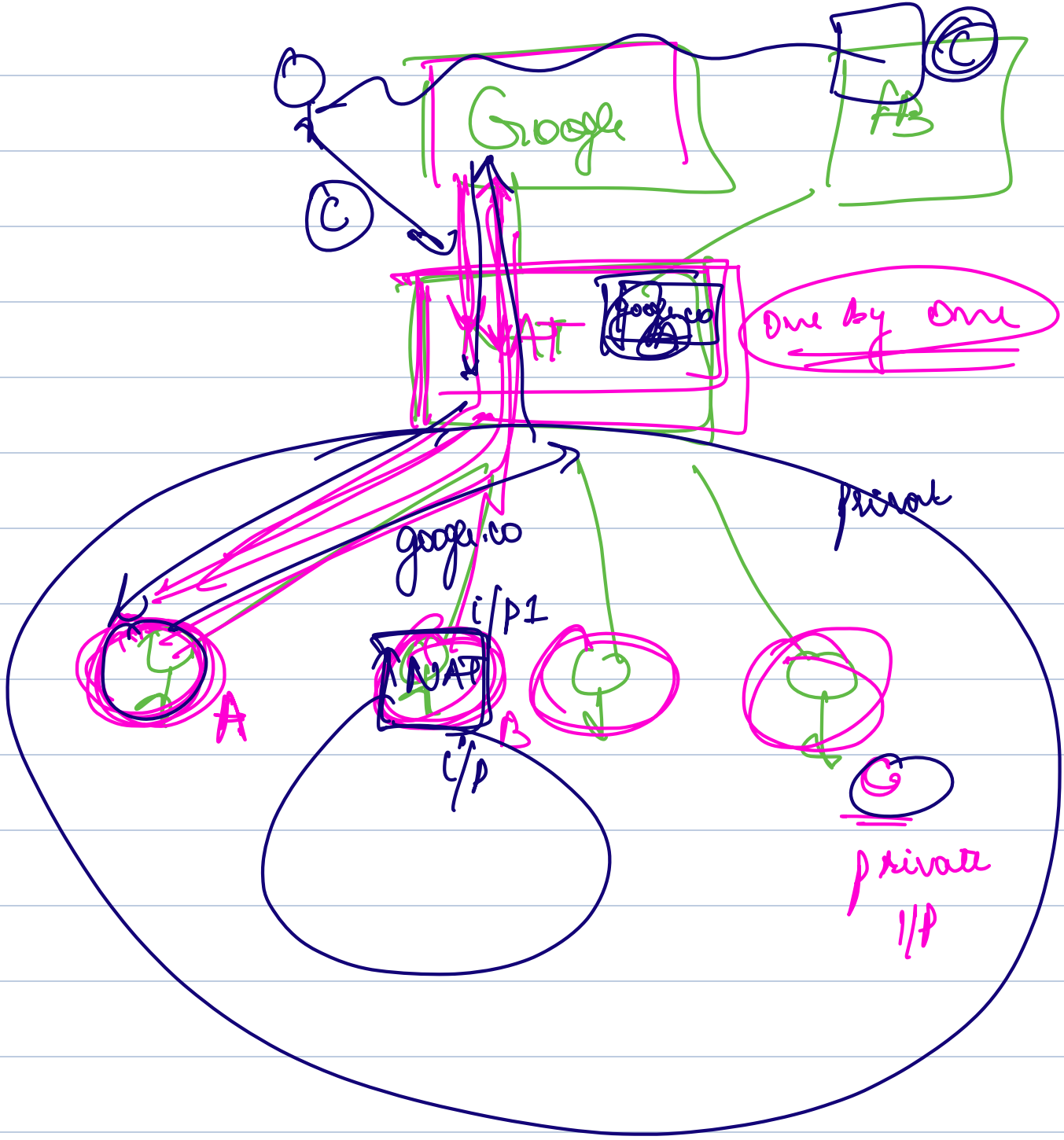

I/P add on
public crett
NP
NP
NSAT

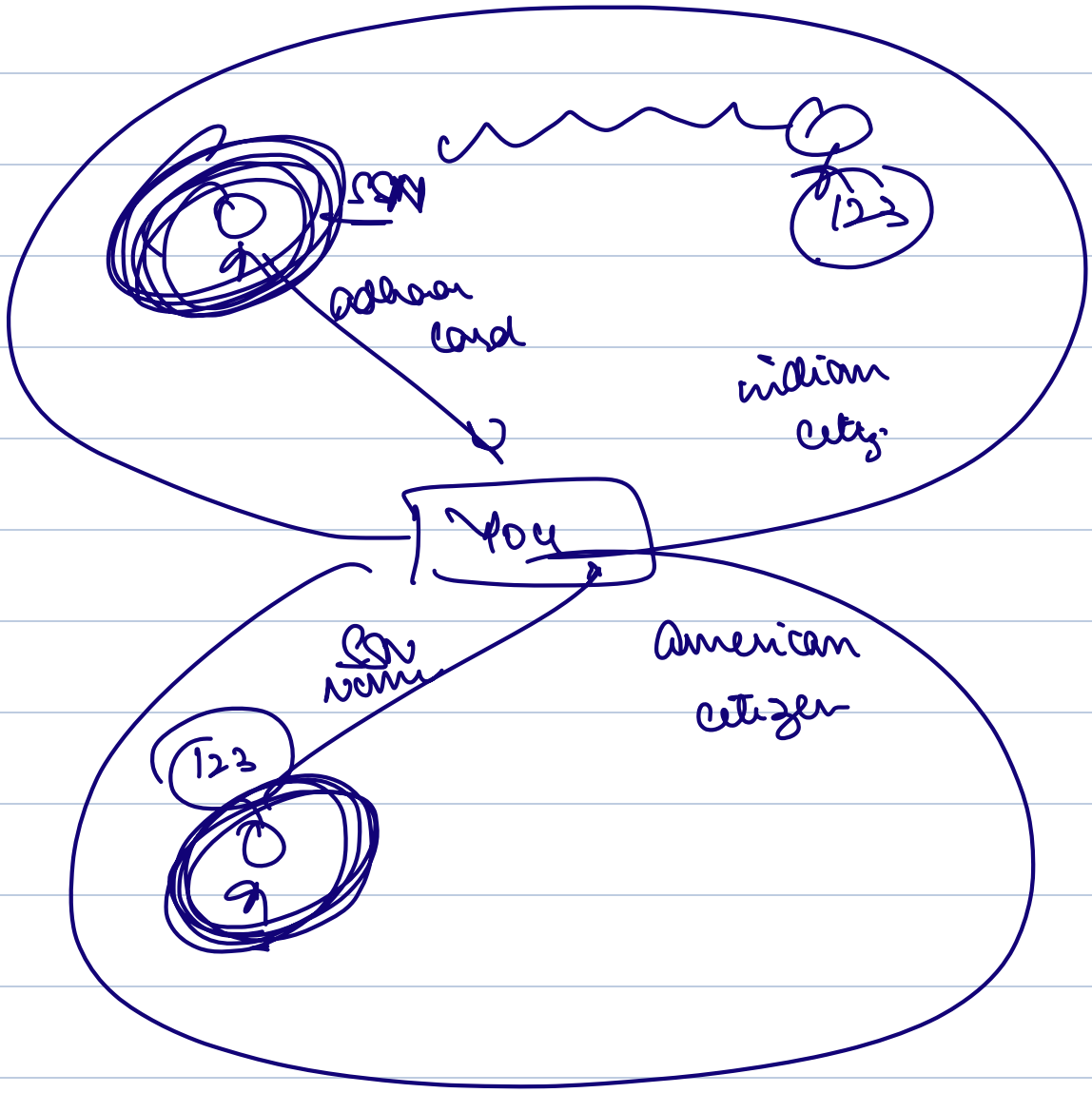

Public
College friends
Private
School friends
Internet
i/p
Comp
Bluetooth
i/p2
i/p
LAN

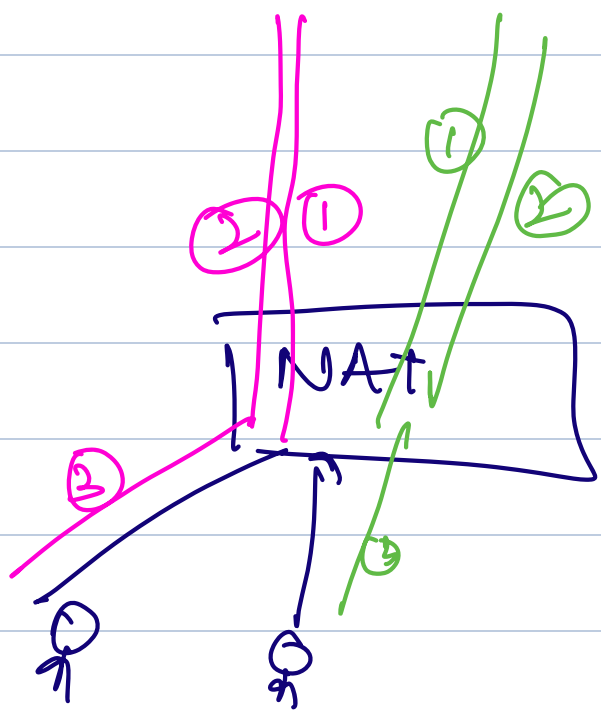


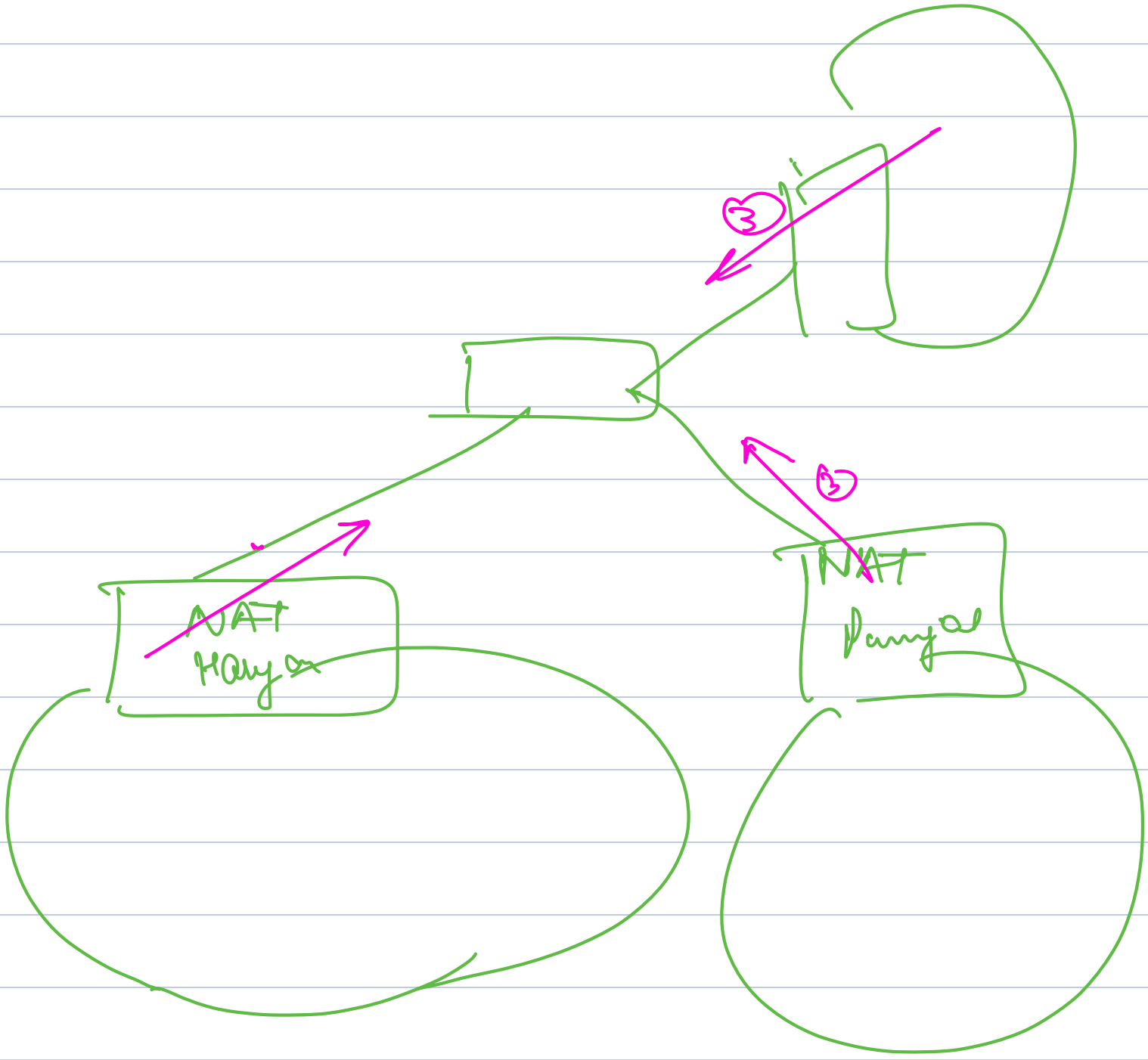
Reason 1 → Not Public IP address

JIO → 8K/MONTH


Google
FB
C
C
NAT
google.co
One by one
google.co
i/p1
NAT
A
B
C/p
private
private
I/P


SSN
123
address card
indian citizen
You
SSN
American citizen
123


NAT
1
2
1
2
3
3



Silicon Valley Bank

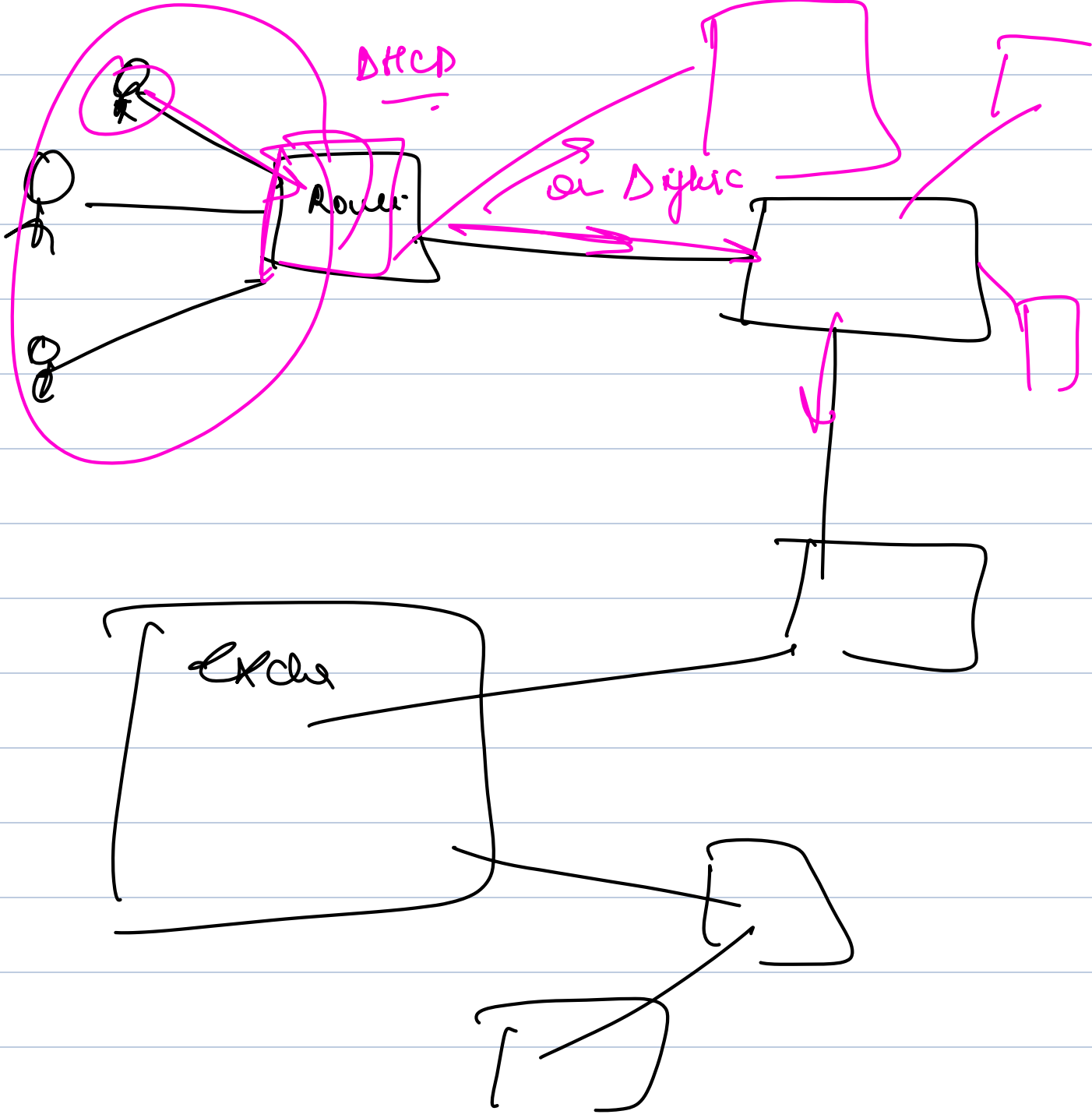
Dynamic I/P

10K/month ⇒ Public

→ On restart, the I/P add my change
⇒ Dynamic

Public + Static

→ 30K/month

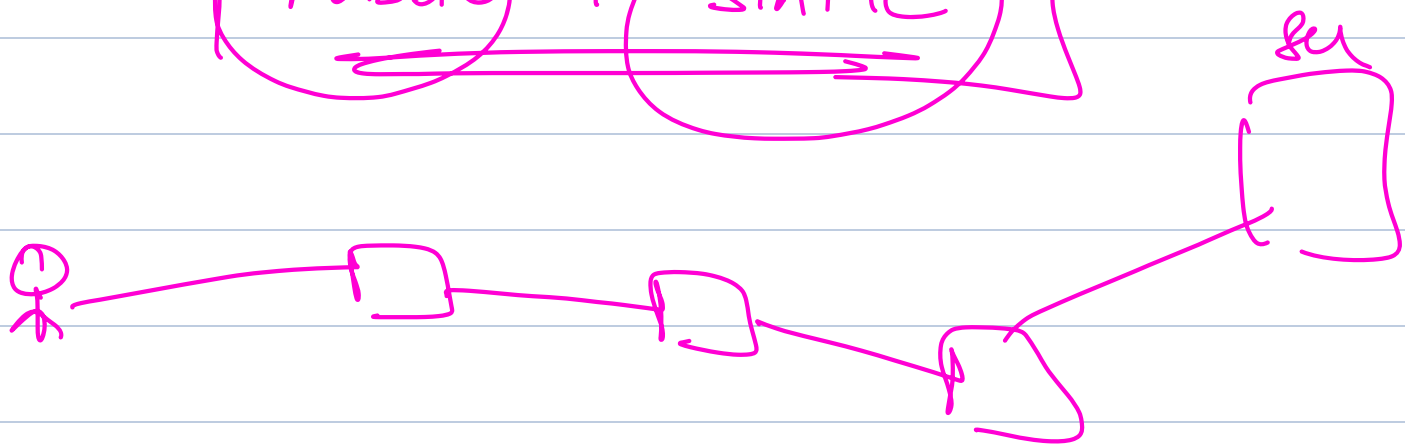


IPV6 → 128 bits

2^{128}

$= 10^{80} \approx$ # of atoms

PUBLIC + STATIC

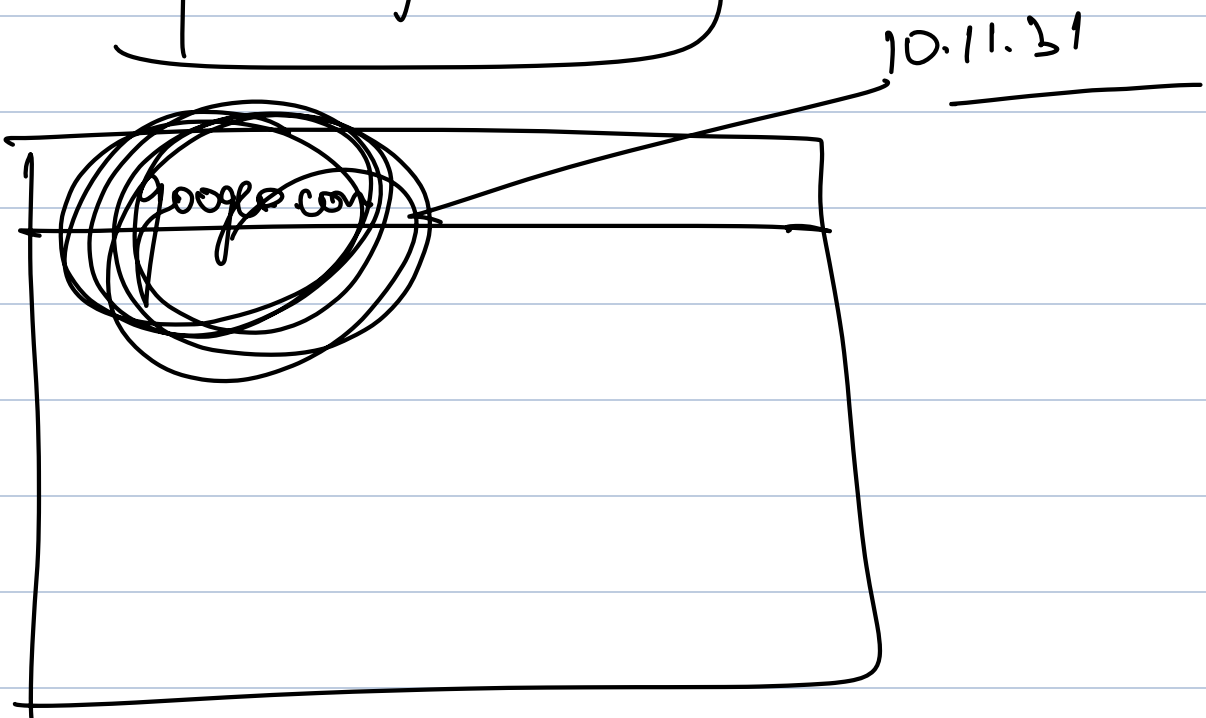


CONTACTS | PHONEBOOK

Search

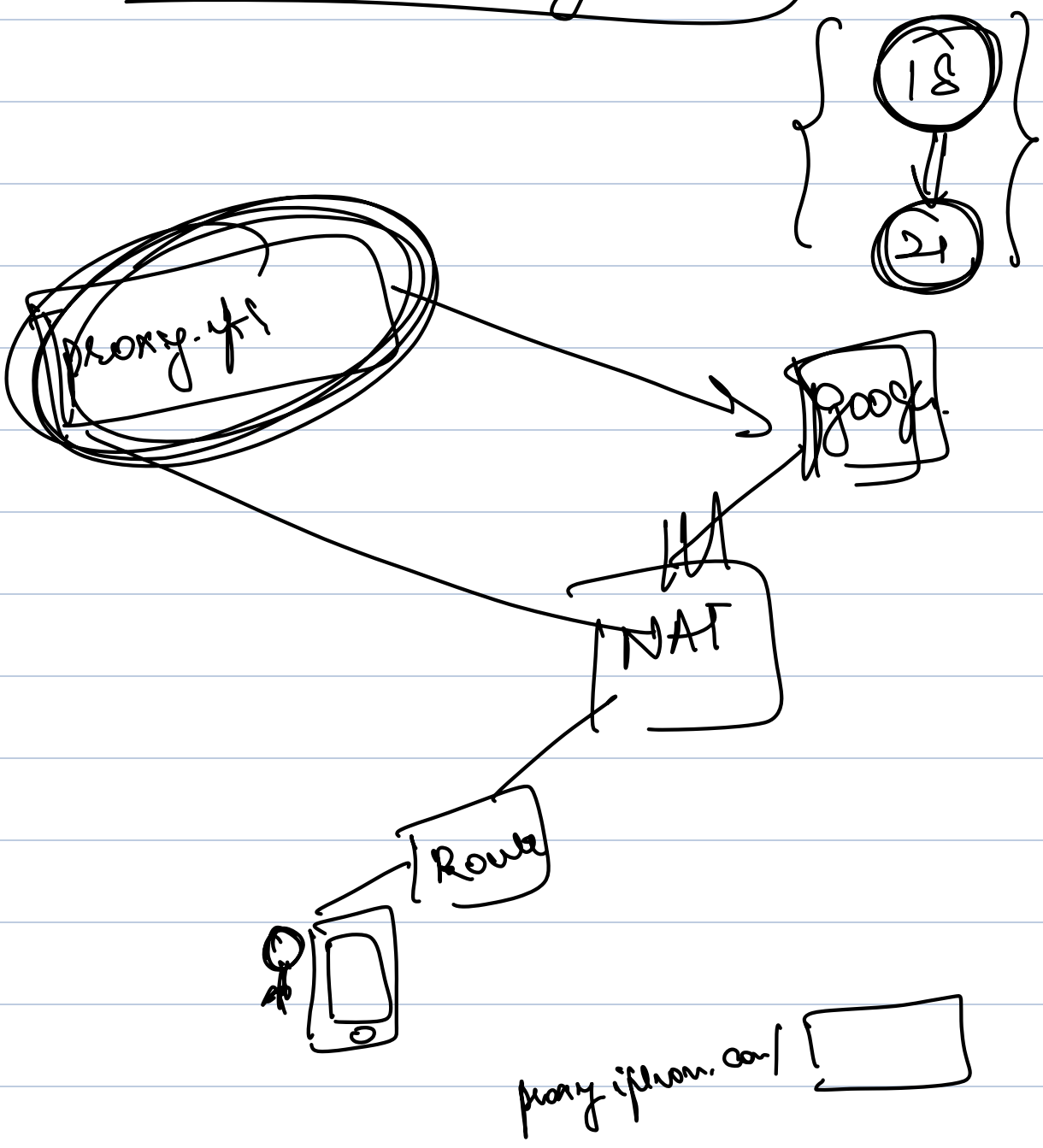
Call AMZ

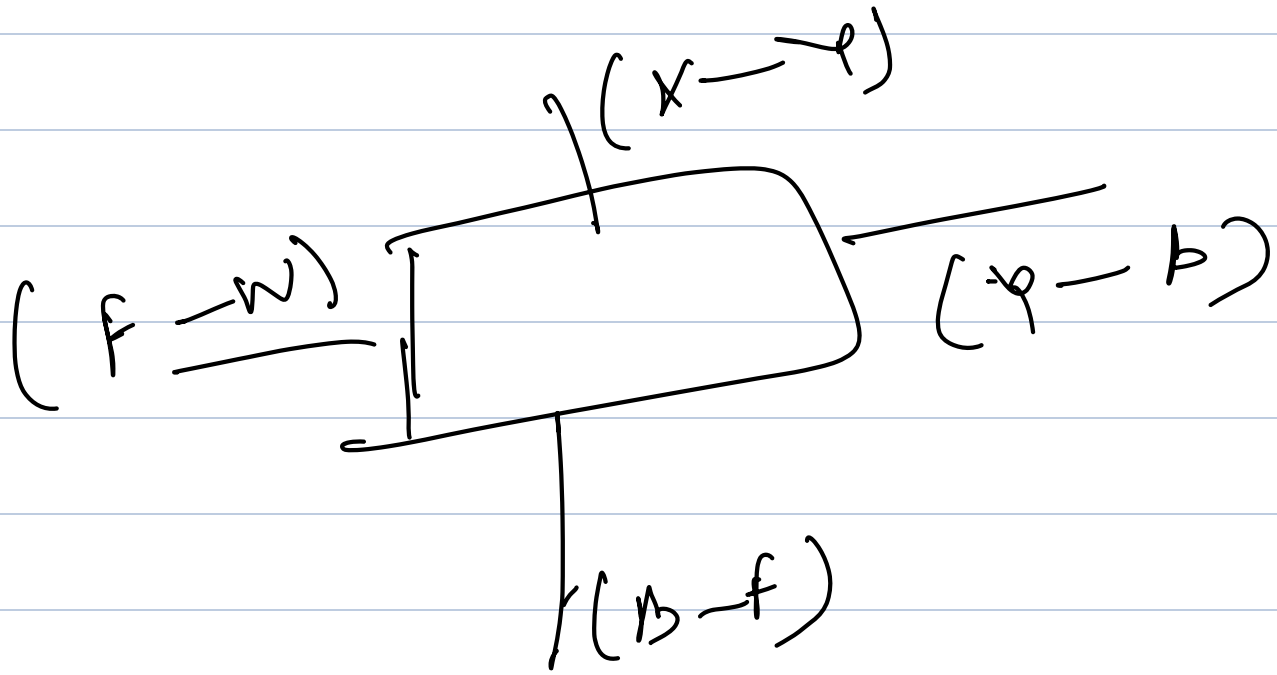
Name	Number
—	—
—	—

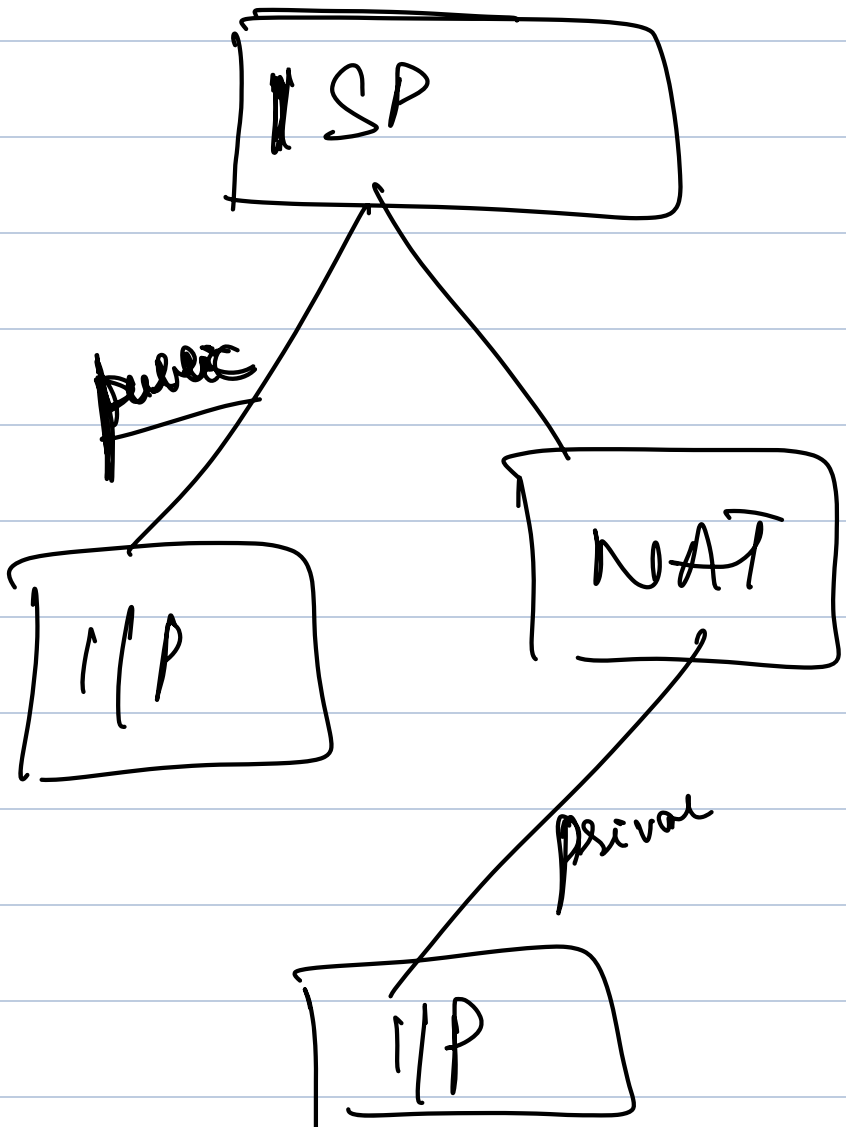


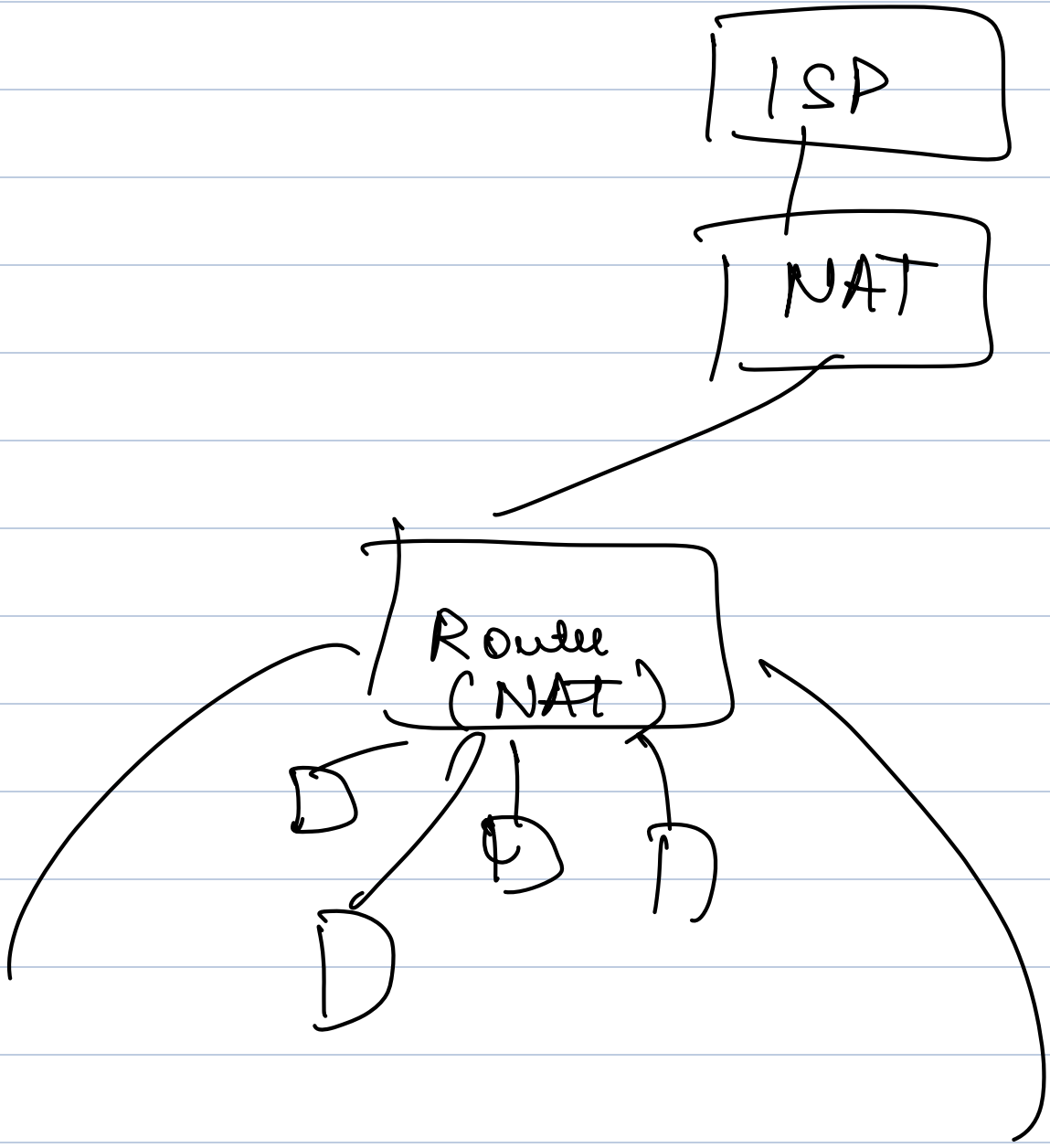
Next Class

- → DNS
- → IPV6
- → Load Balancers
- → Cone Hashing




(x — y)
(f — w)
(y — b)
(b — f)


ISP
public
IIP
NAT
private
IIP


ISP
NAT
Router
(NAT)