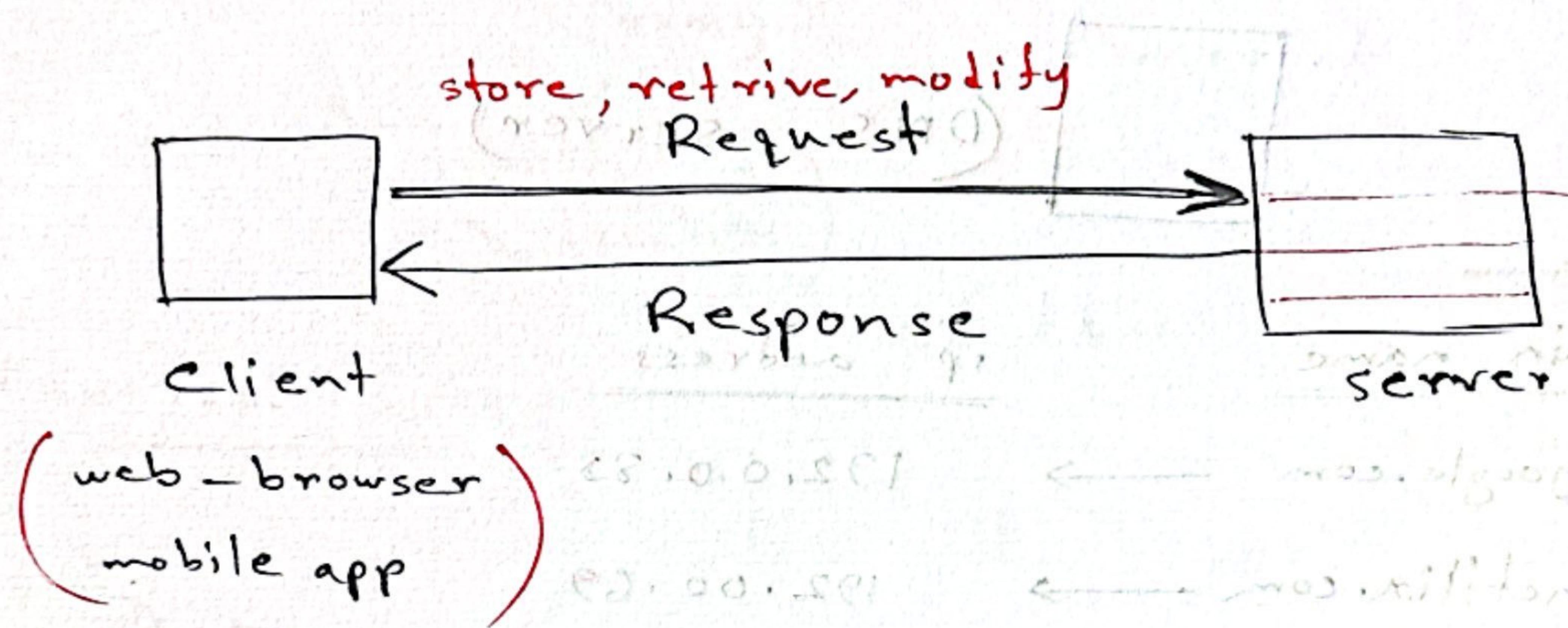


System Design Fundamental

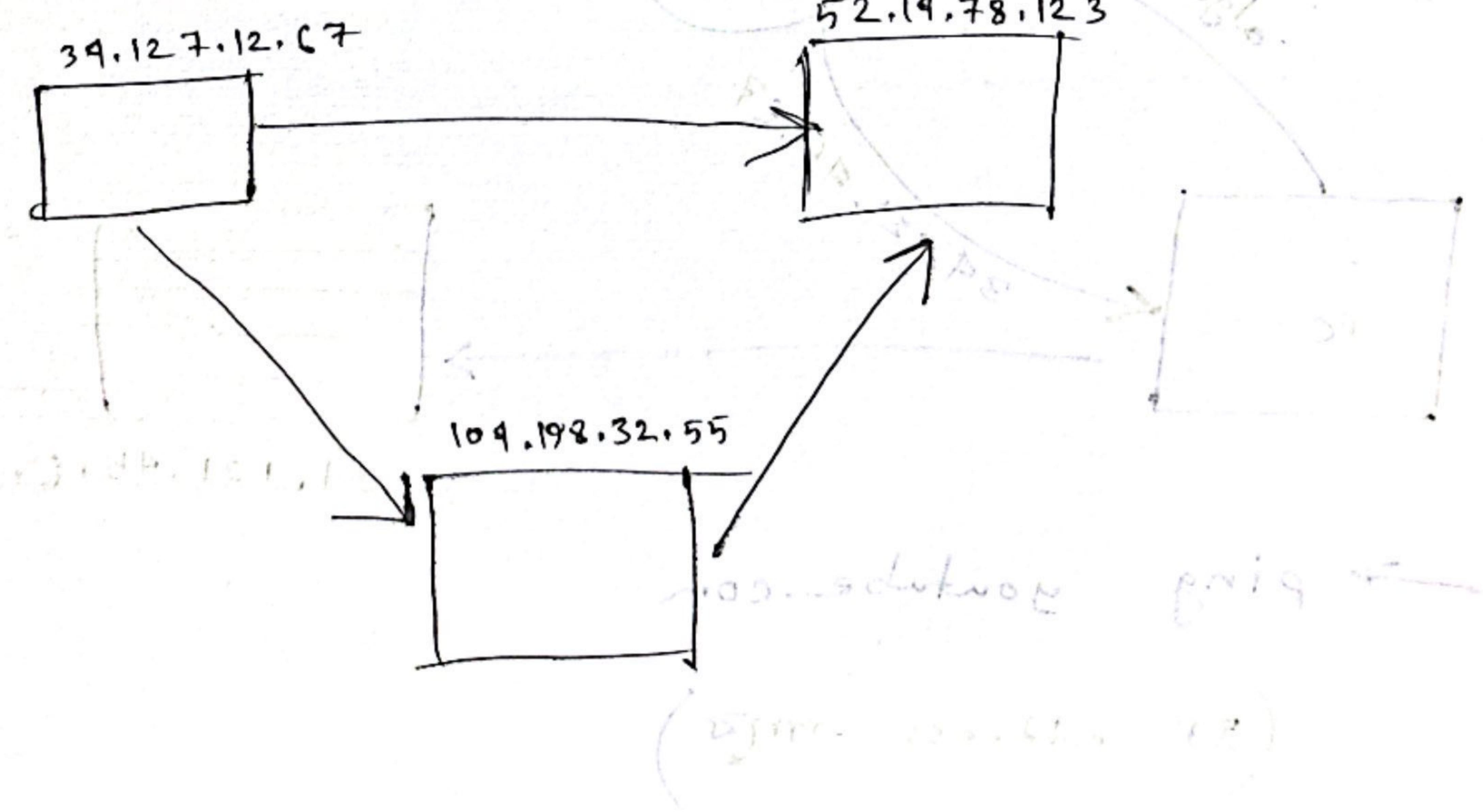
- (Ashish Pratap Singh).

1. Client - Server Architecture



2. (IP - Address)

Domain name system (DNS)



①

lokjanibnöt spisal mastepe

②

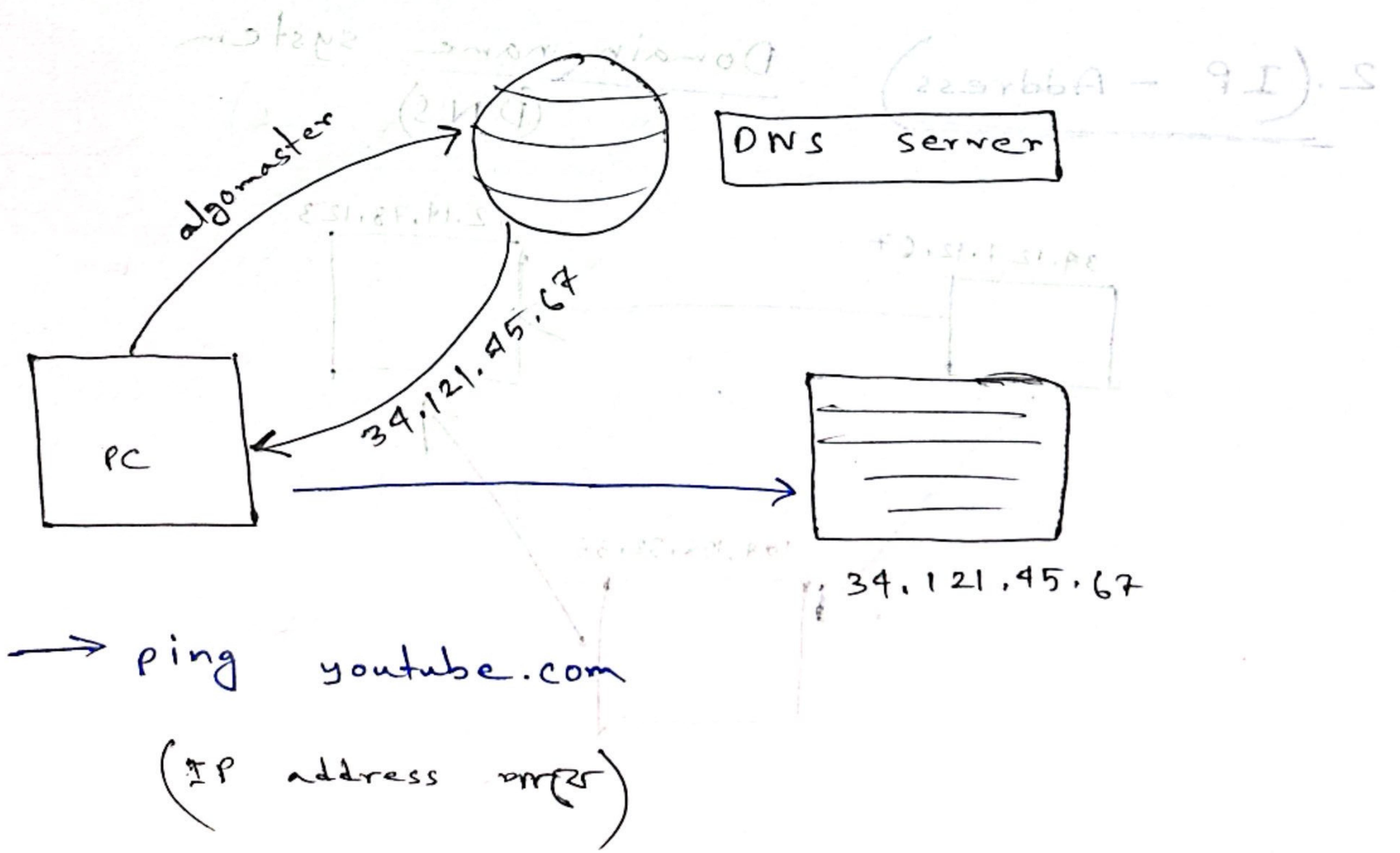
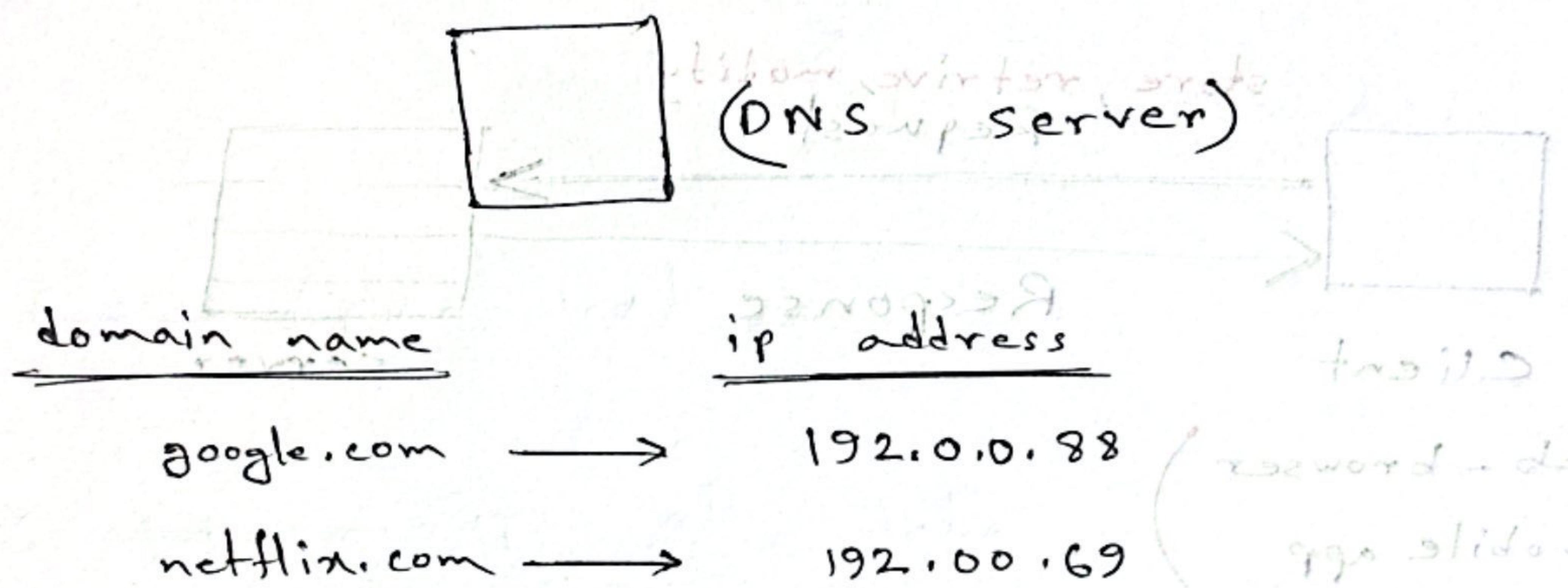
Domain Name:-

(Digit gitaro deintia)

algomaster.io → 34.121.45.67

pratikshidra - 192.0.0.2 - 192.0.0.1

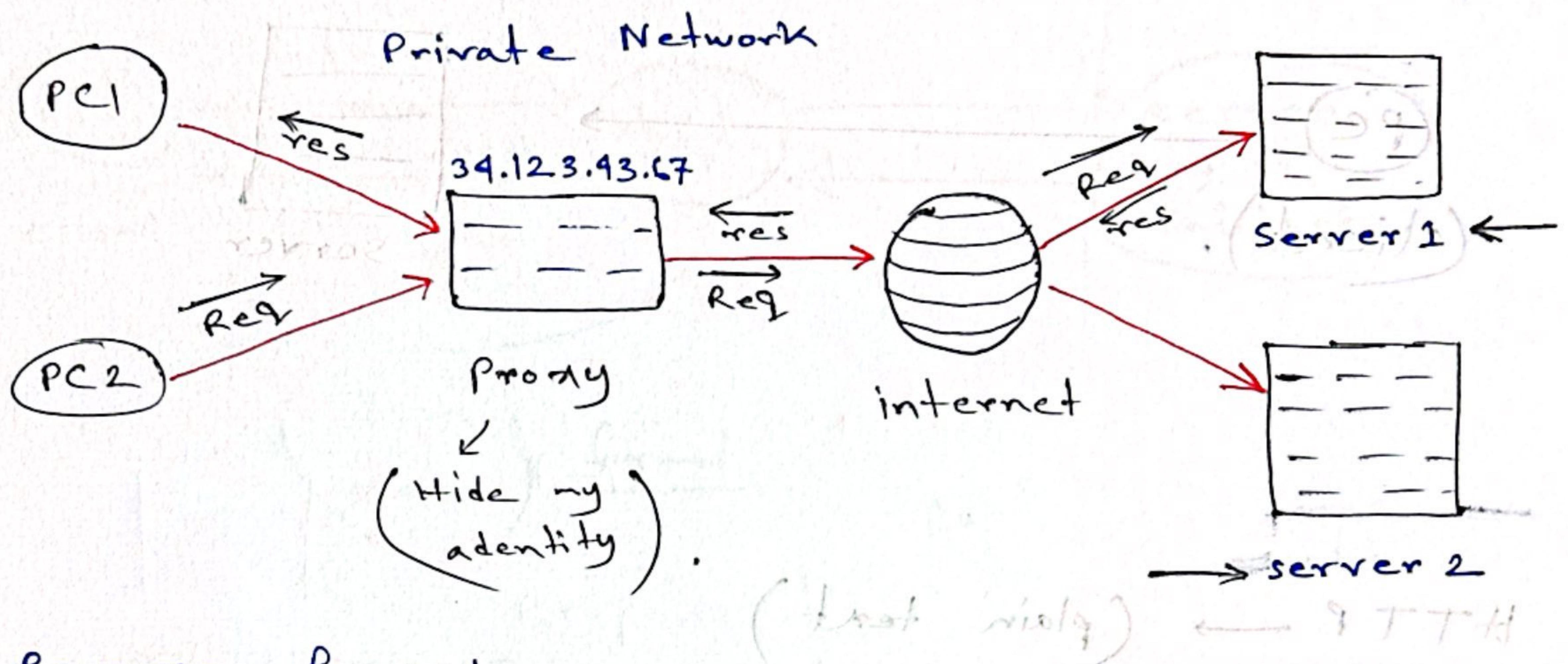
3. Domain Name System (DNS)



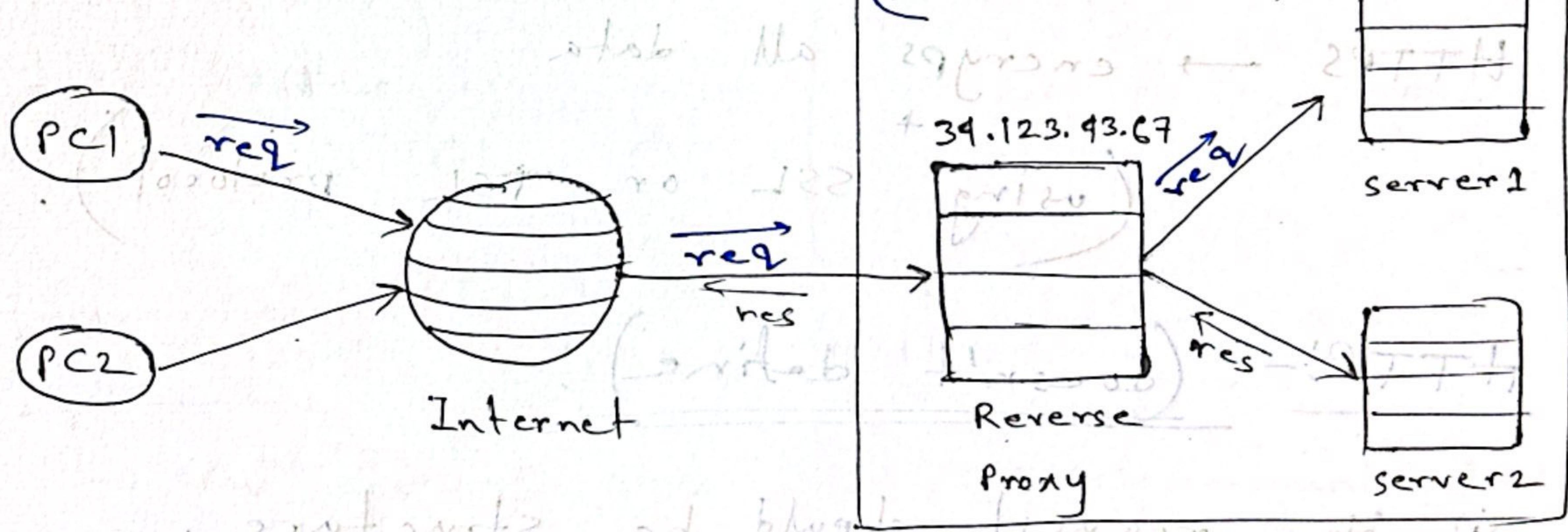
Q. Proxy / Reverse Proxy :-

29TH JUNE 2023

9TH JUNE 2023



Reverse Proxy :-

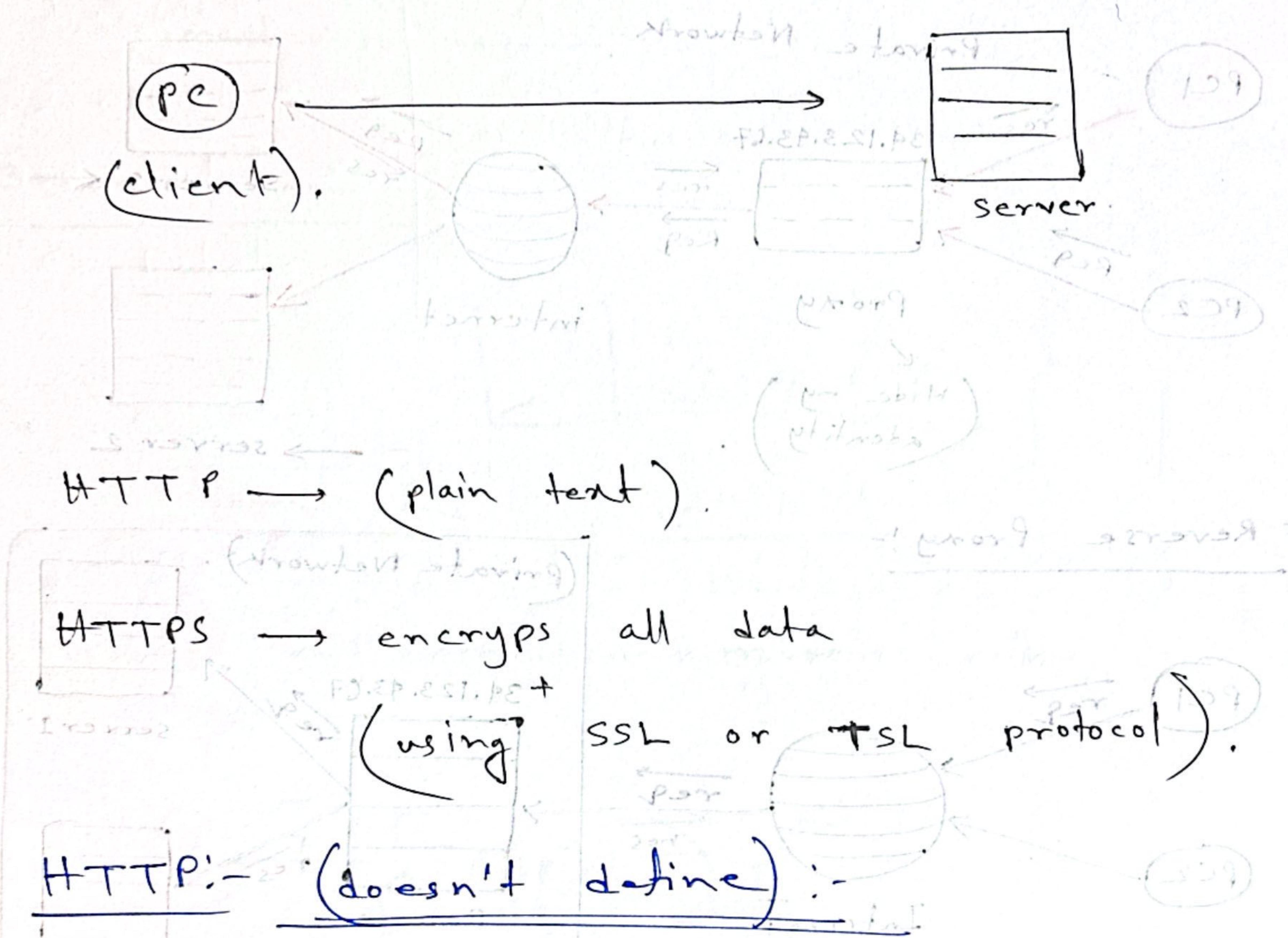


⑤ Latency :-

All application blocks → slow (10-20 ms) (ii)

high latency → (forwarded to application layer)

HTTP / HTTPS

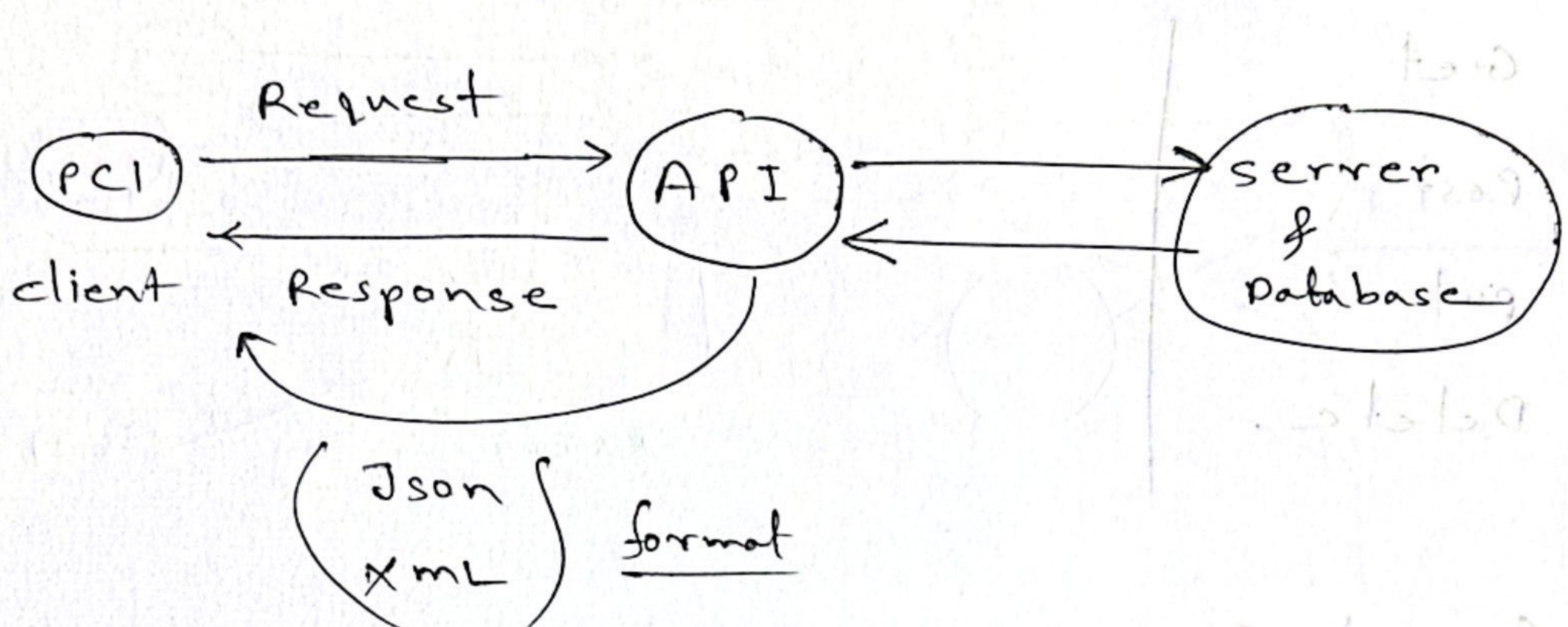


i) How request should be structure.

ii) What format response should be in?

iii) How diff. clients should interact with a server?

7. API → (Application programming Interfaces)



API STYLE :-

- ③ REST
- ② GraphQL

REST

How client and servers communicate over HTTP in a structured way.

→ Rest is stateless

→ Every request is independent

→ Everything is Treated as a resources

eg users, orders, products.

Rest - Uses Standard HTTP method.

1. Get

2. Post

3. put

4. Delete.

9. Graph QL :-

(GraphQL lets clients ask for exactly what they need - nothing more, nothing less)

REST API

Get 1 →

Get 2 →

GRAPH QL

query { }

in HTTP

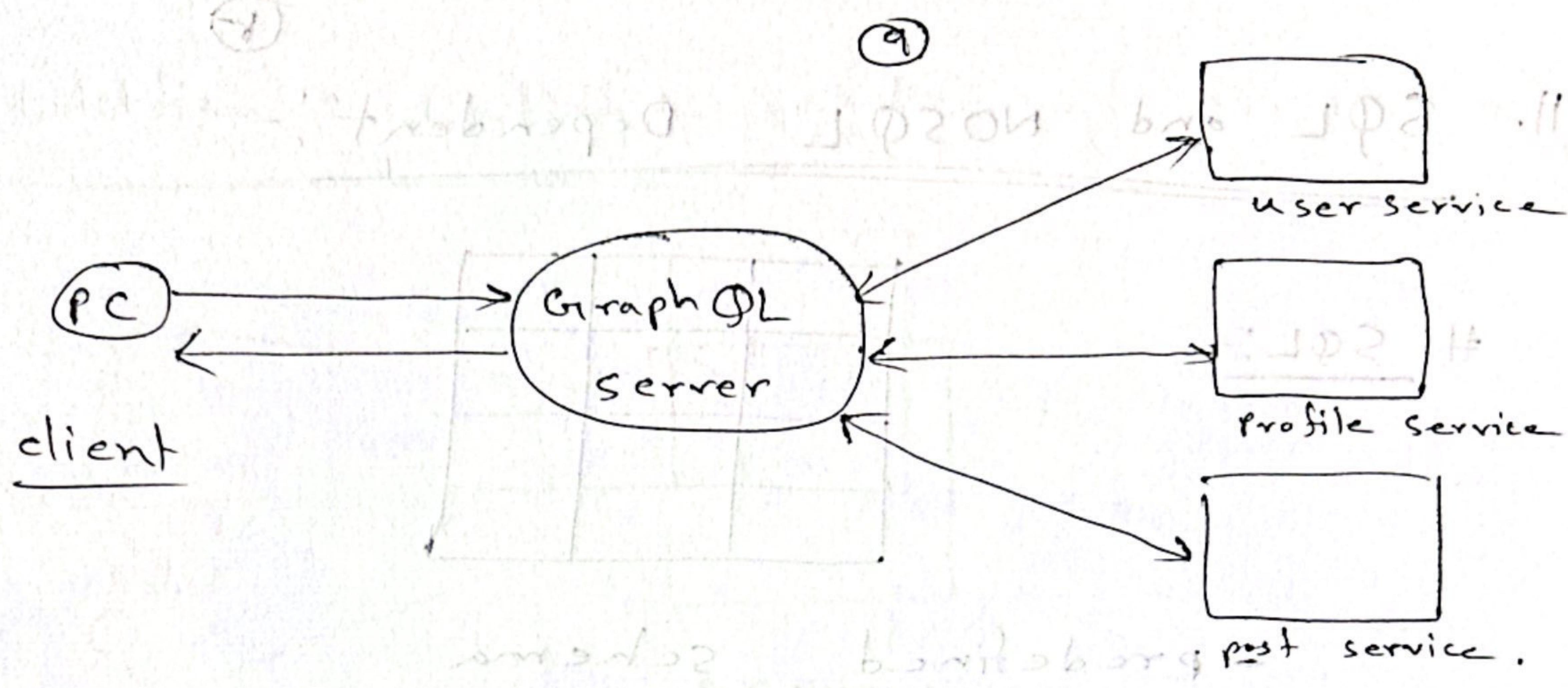
→ { }

→ { }

↳ GraphQL is simpler than REST

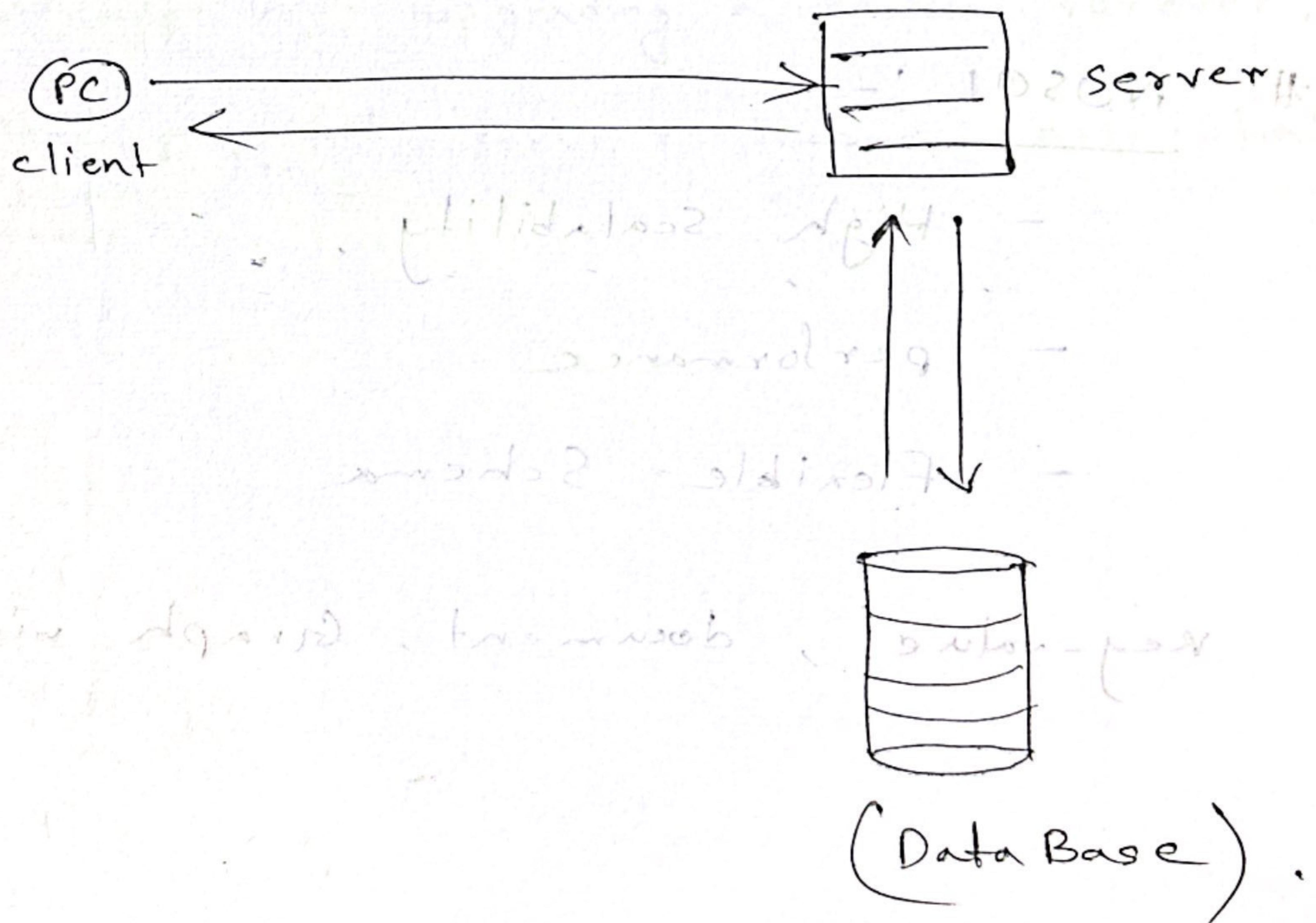
↳ REST is good for simple applications

↳ GraphQL is good for complex applications



Where is the actual Data stored ?

⑩ Database:-



11. SQL and NoSQL Dependent:-

SQL:-

- predefined schema
- Acid properties
- Strong consistency.
- structured Relationship.

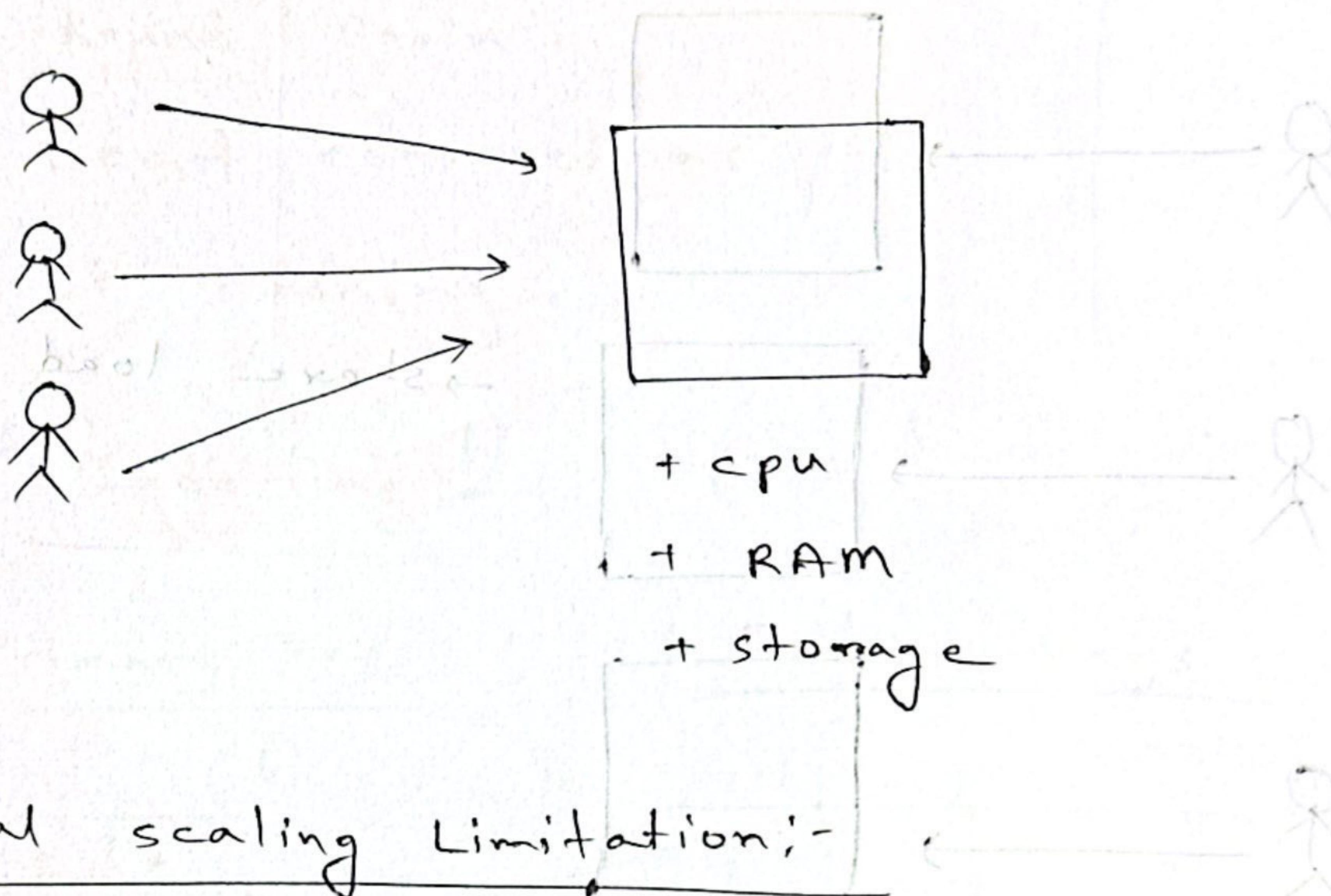
NoSQL:-

- High scalability.
- performance
- Flexible Schema

key-value, document, Graph, wide-column

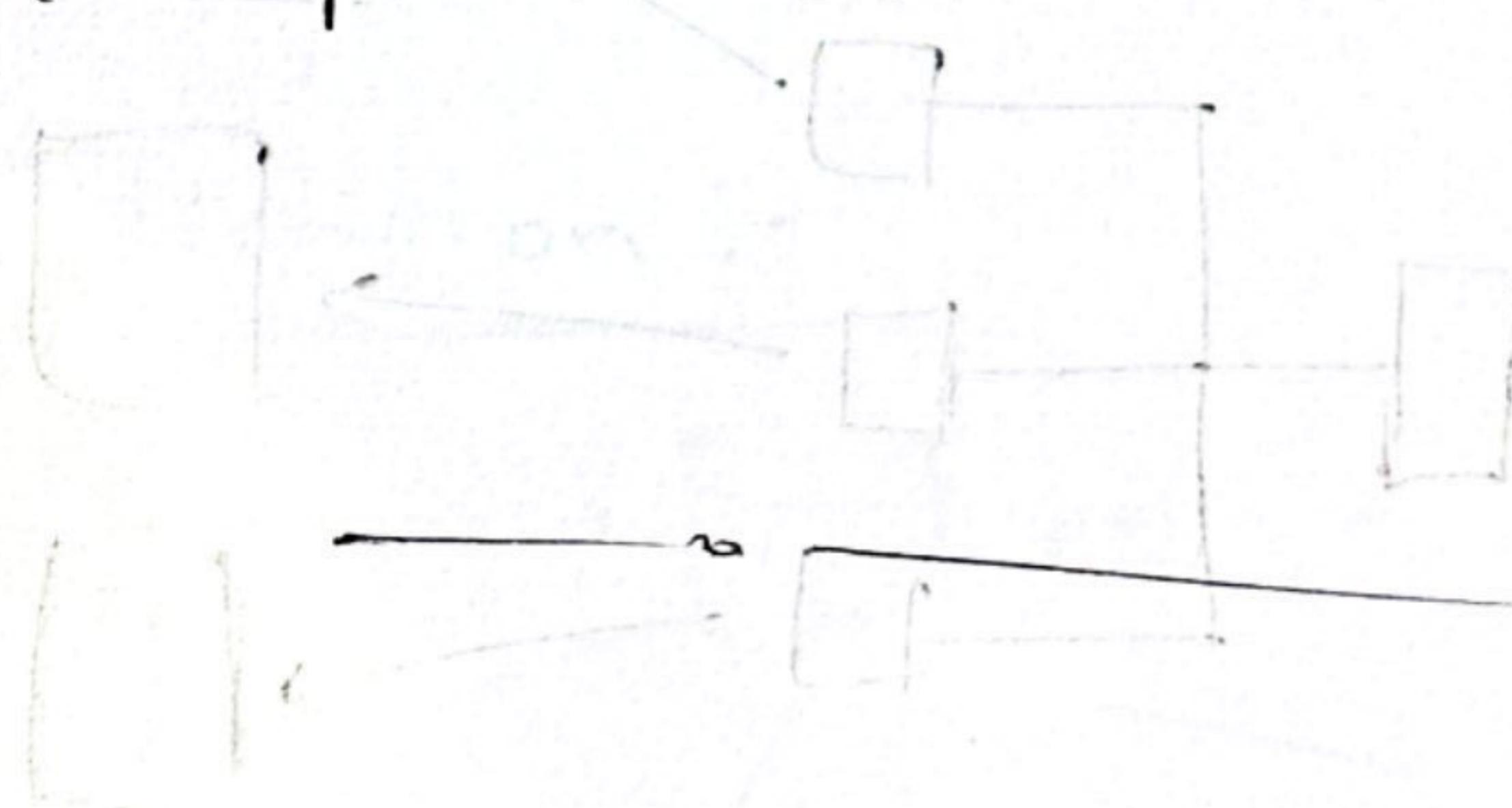
12. vertical scaling :-

(a)

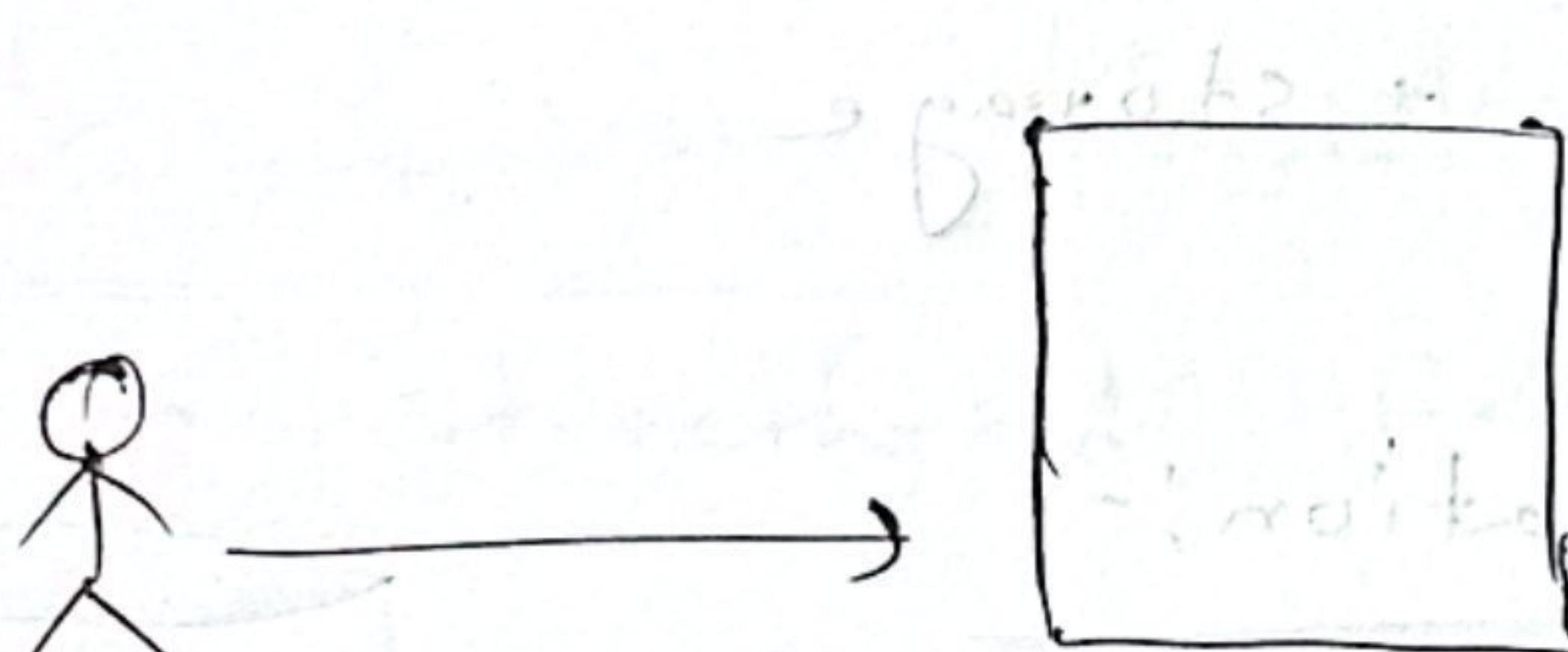
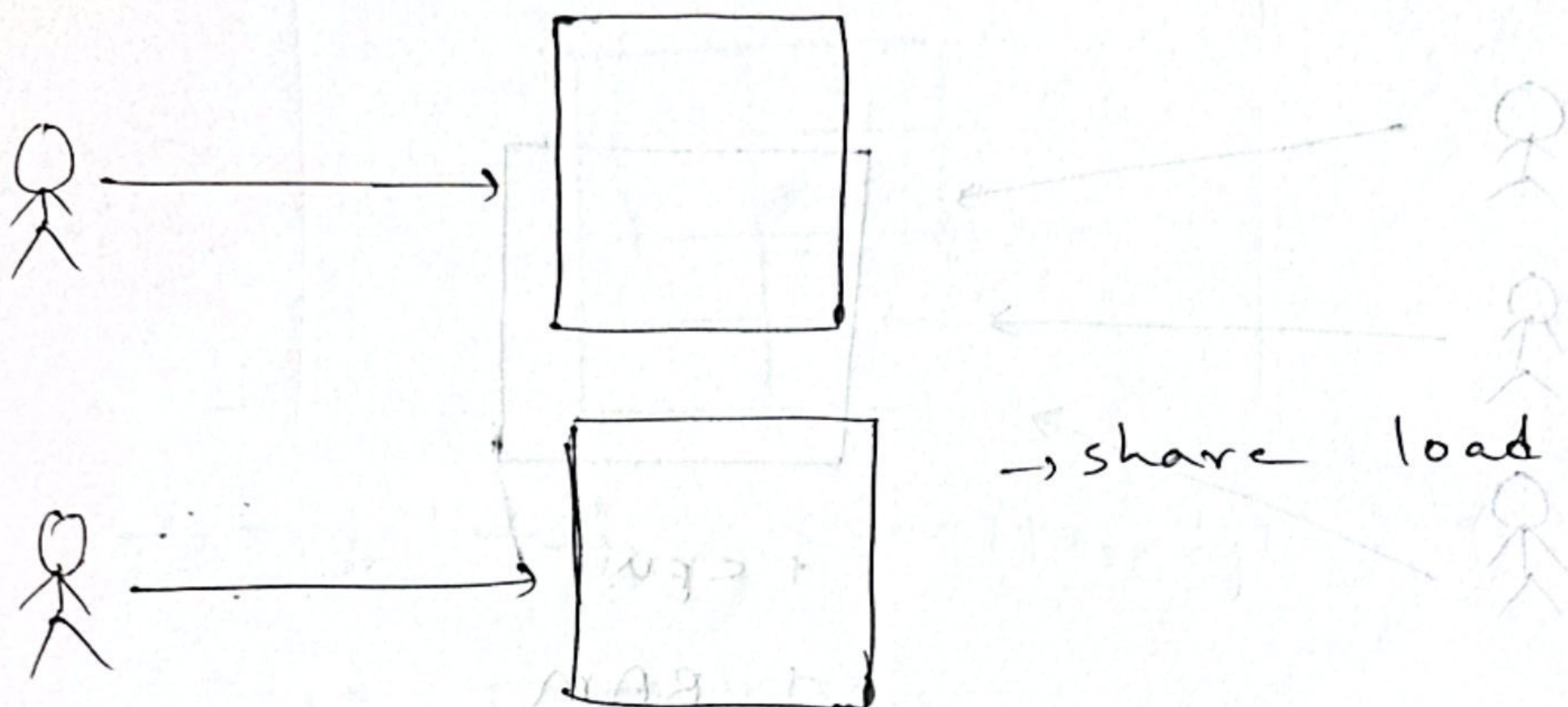


vertical scaling Limitation:-

- i) You can't keep upgrading a server forever.
- ii) More powerful servers become exponentially more expensive.
- iii) Single point failure.



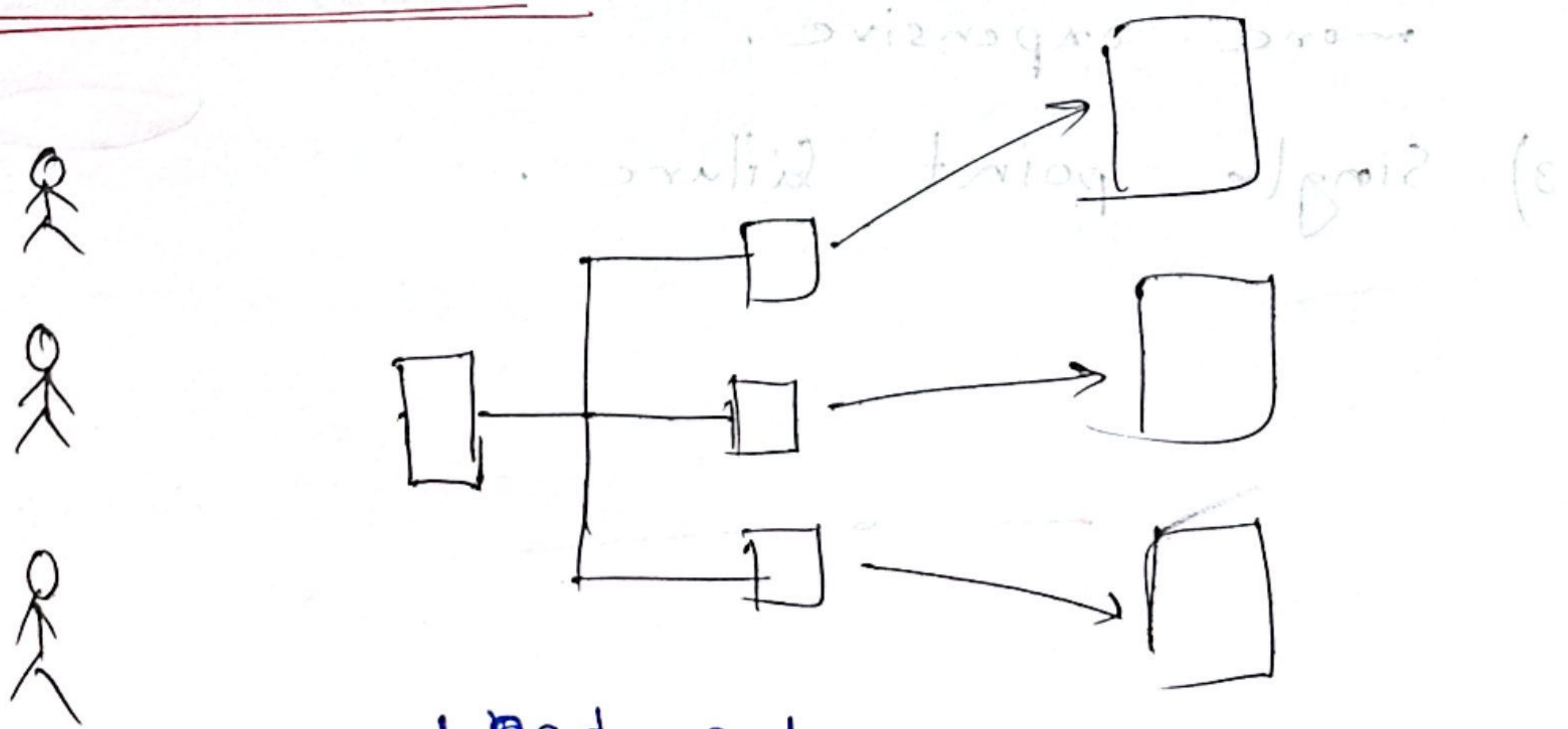
13. Horizontal scaling :-



→ can not increase more server = more capacity.

→ Load balancer is used to share traffic among servers.

14. Load Balancer:-



→ Load Balancer

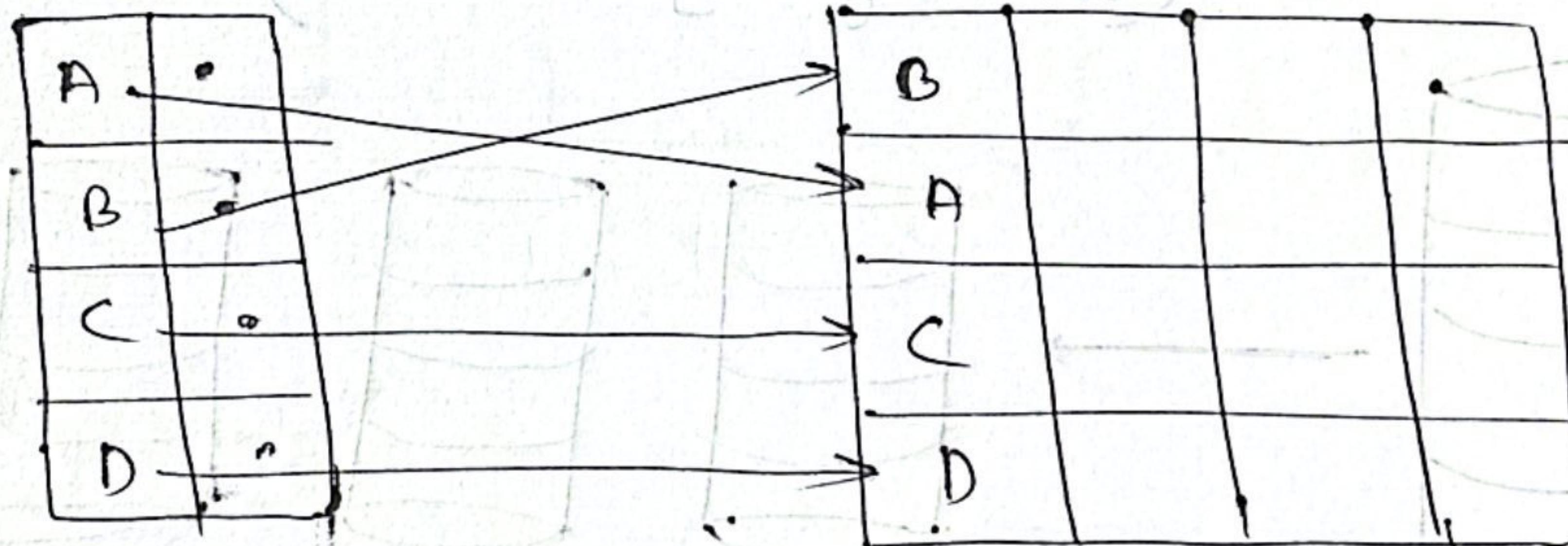
Load Balancing Algorithm:-

- i) Round Robin.
- ii) Least connections
- iii) IP Hashing.

15. Indexing :-

Primary Keys

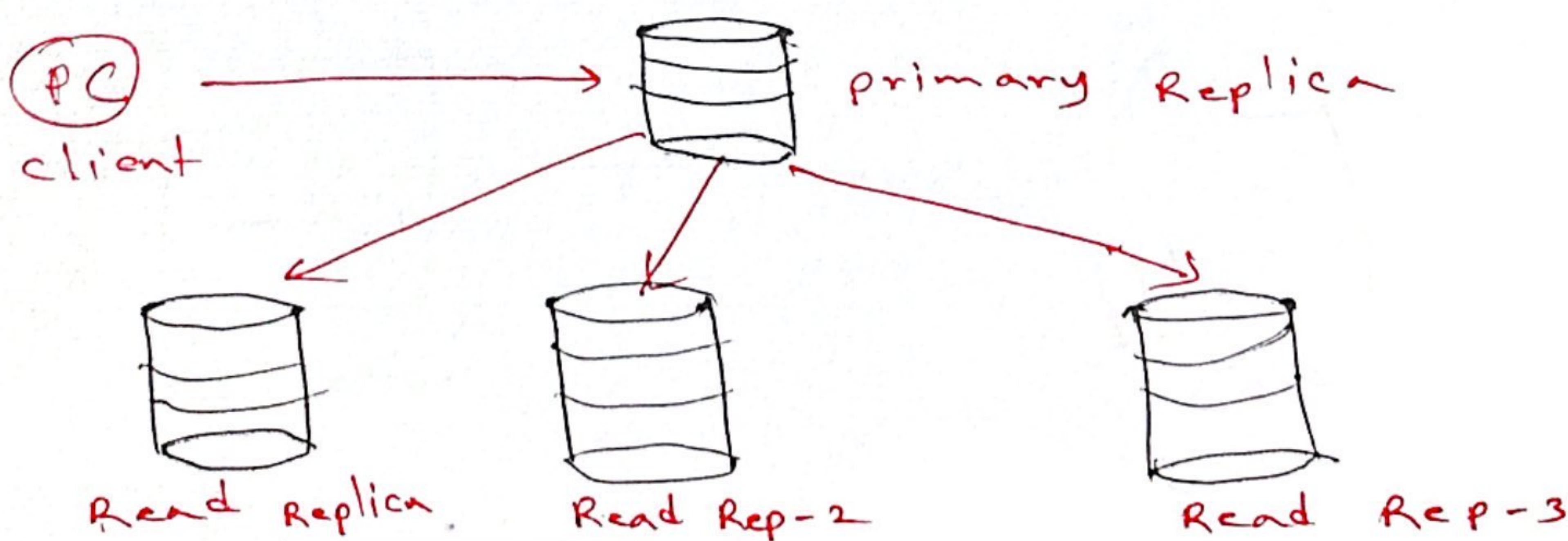
Foreign keys



(Index)

(table)

16 Replication :-

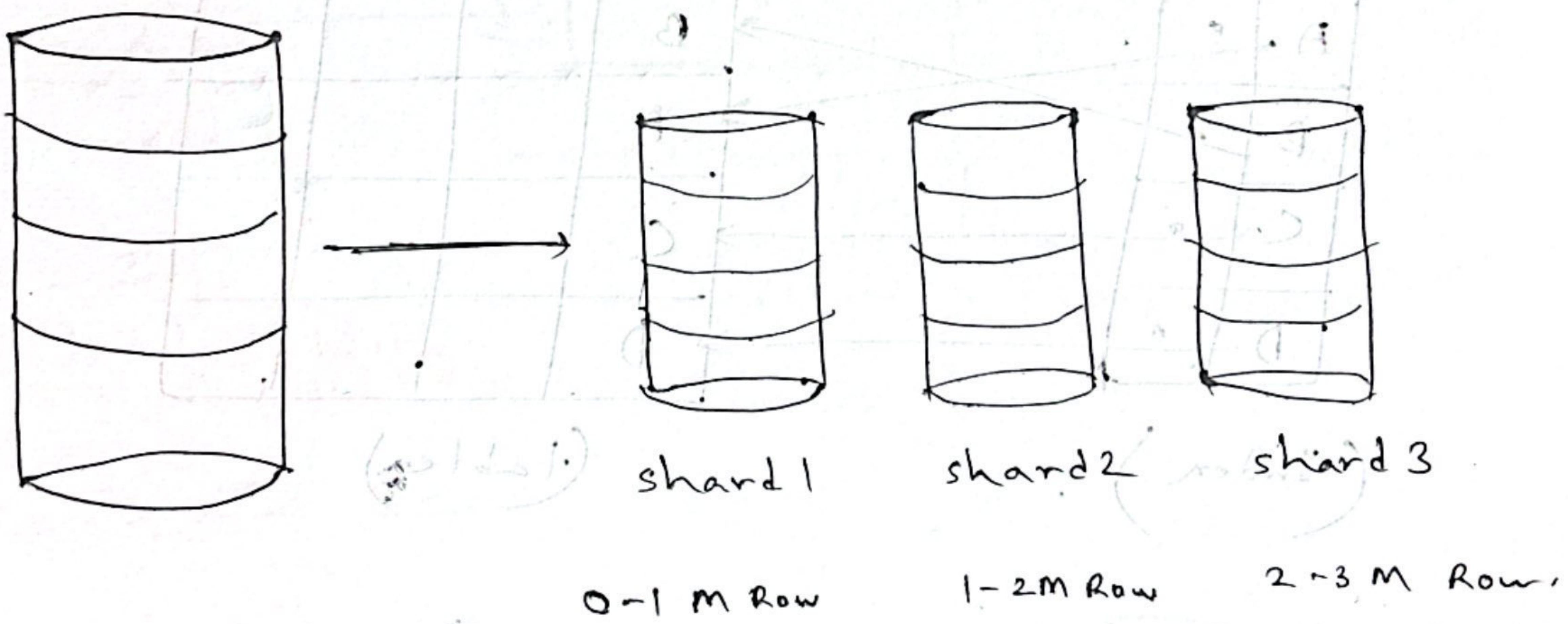


user-id	name	email	address
1	John	john@example.com	123 Main St
2	Jane	jane@example.com	456 Elm St
3	Bob	bob@example.com	789 Oak St

(million of user) | (terabytes of data)

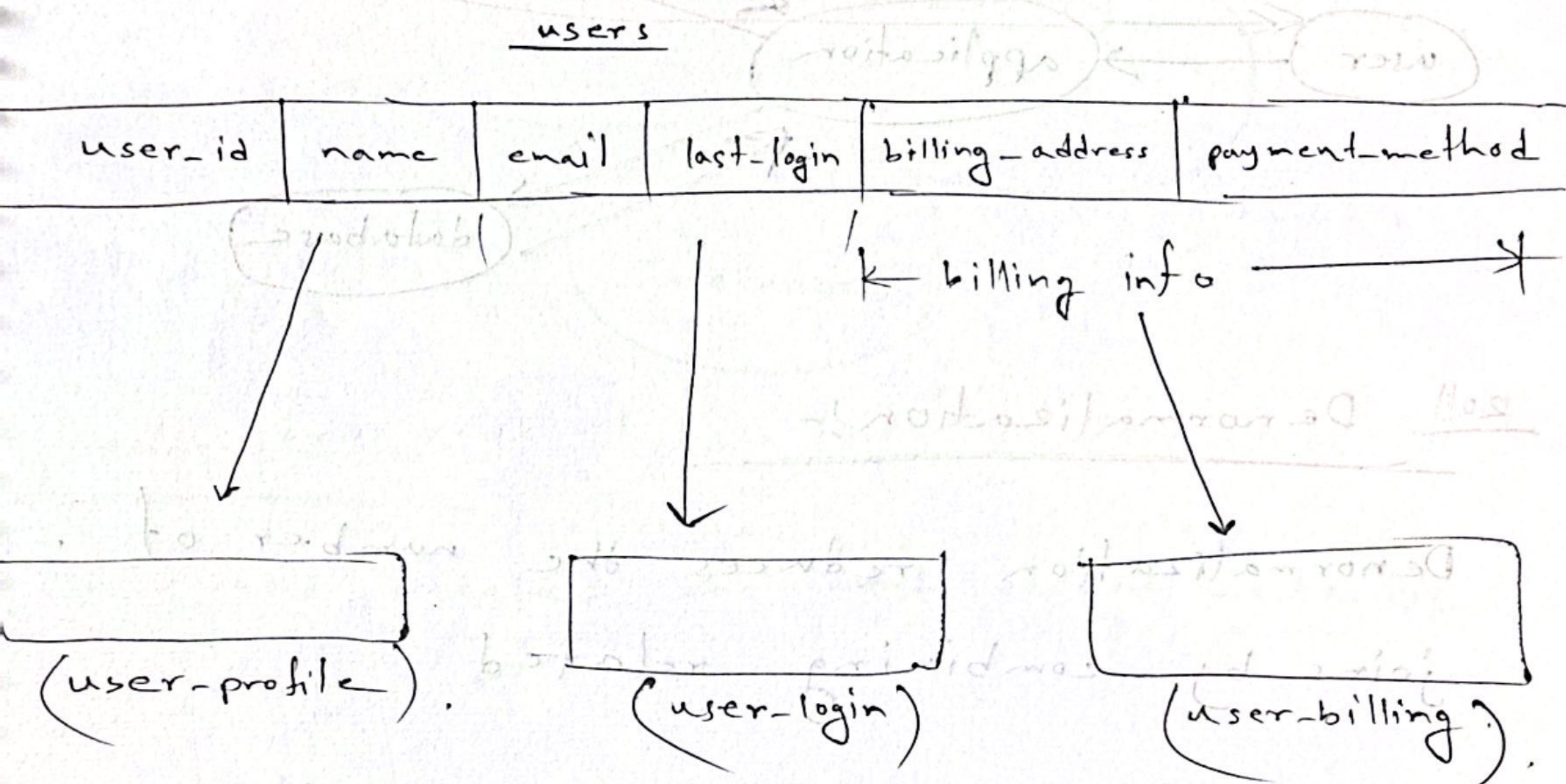
17. Sharding :- (Rows)

(sharding key = user-id)



18. Vertical Partitioning :-

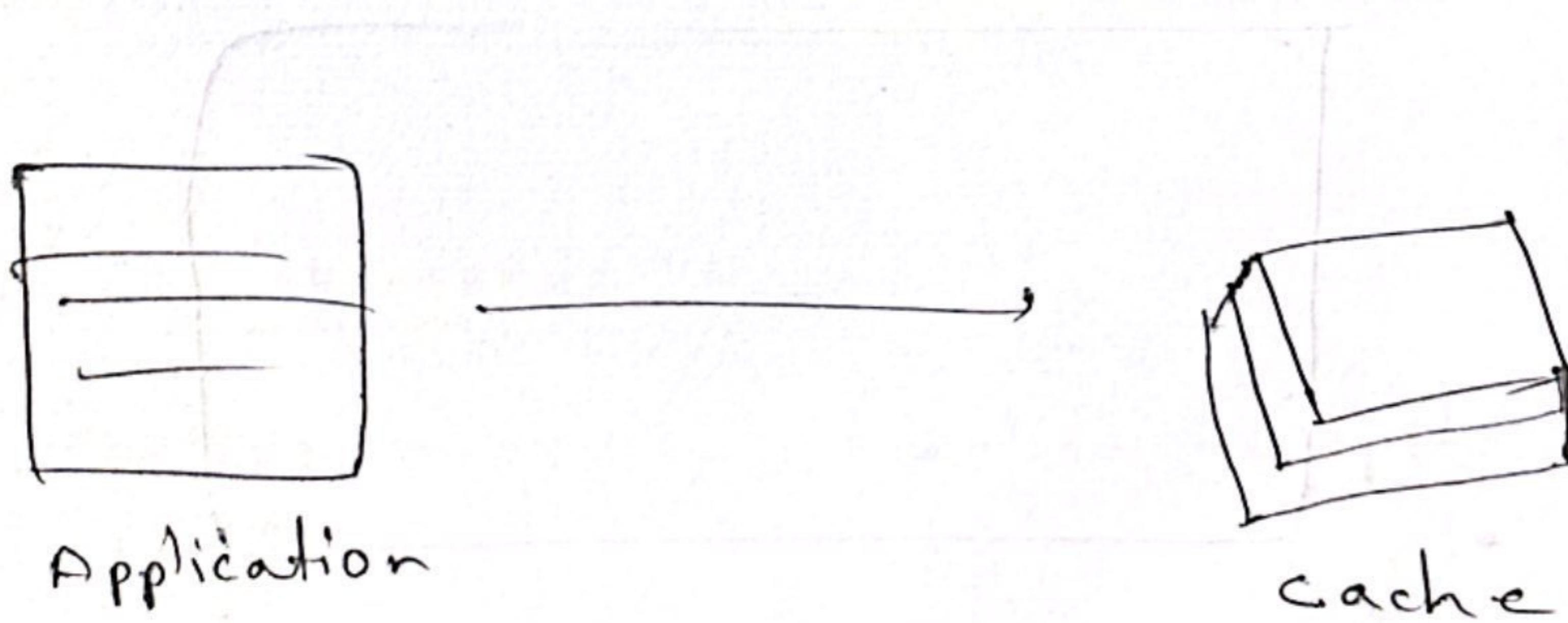
Split Database by columns.



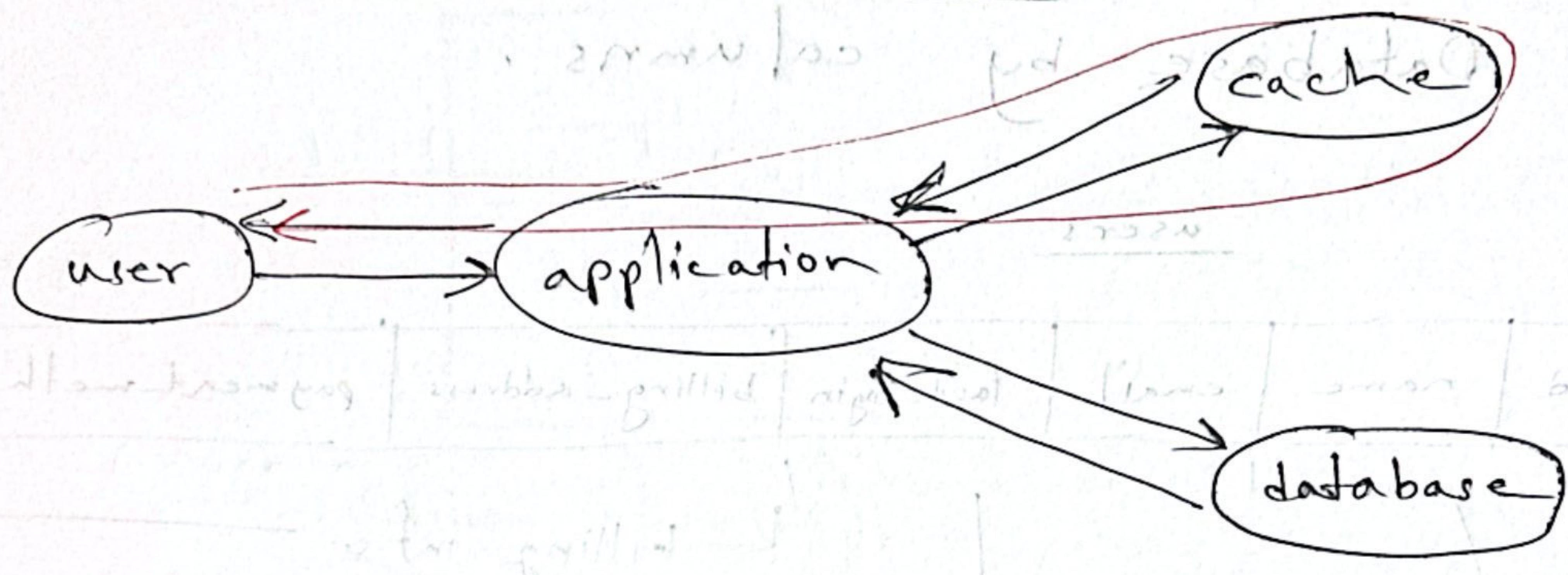
19/1 Caching :-

what if we ~~can't~~ could store Frequently Accessed Data in - memory ?

Accessed Data in - memory ?



cache - Aside Pattern :-

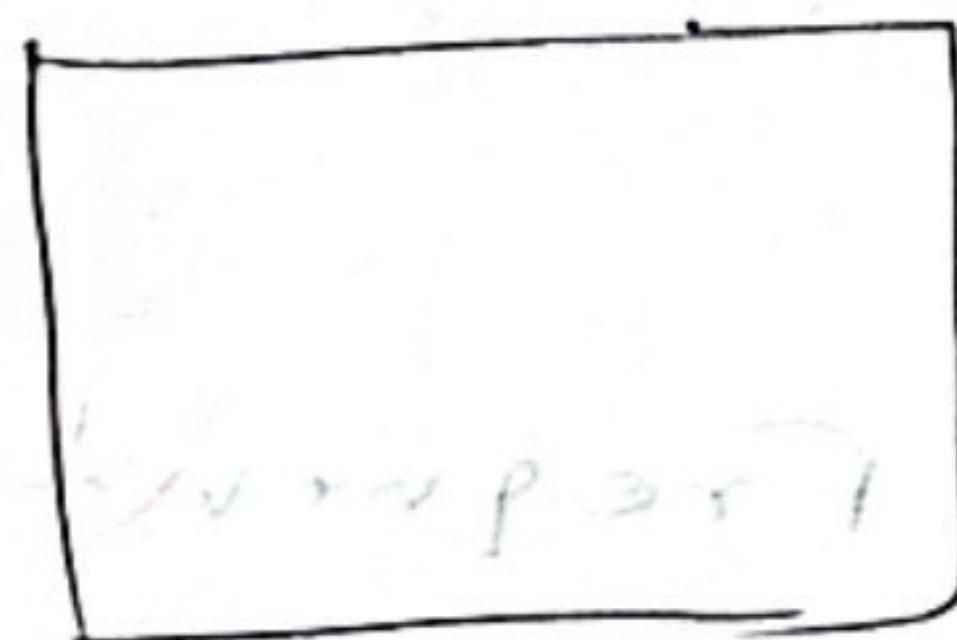


20. Denormalization:-

Denormalization reduces the number of joins by combining related data.

(Bridges) (Walls)

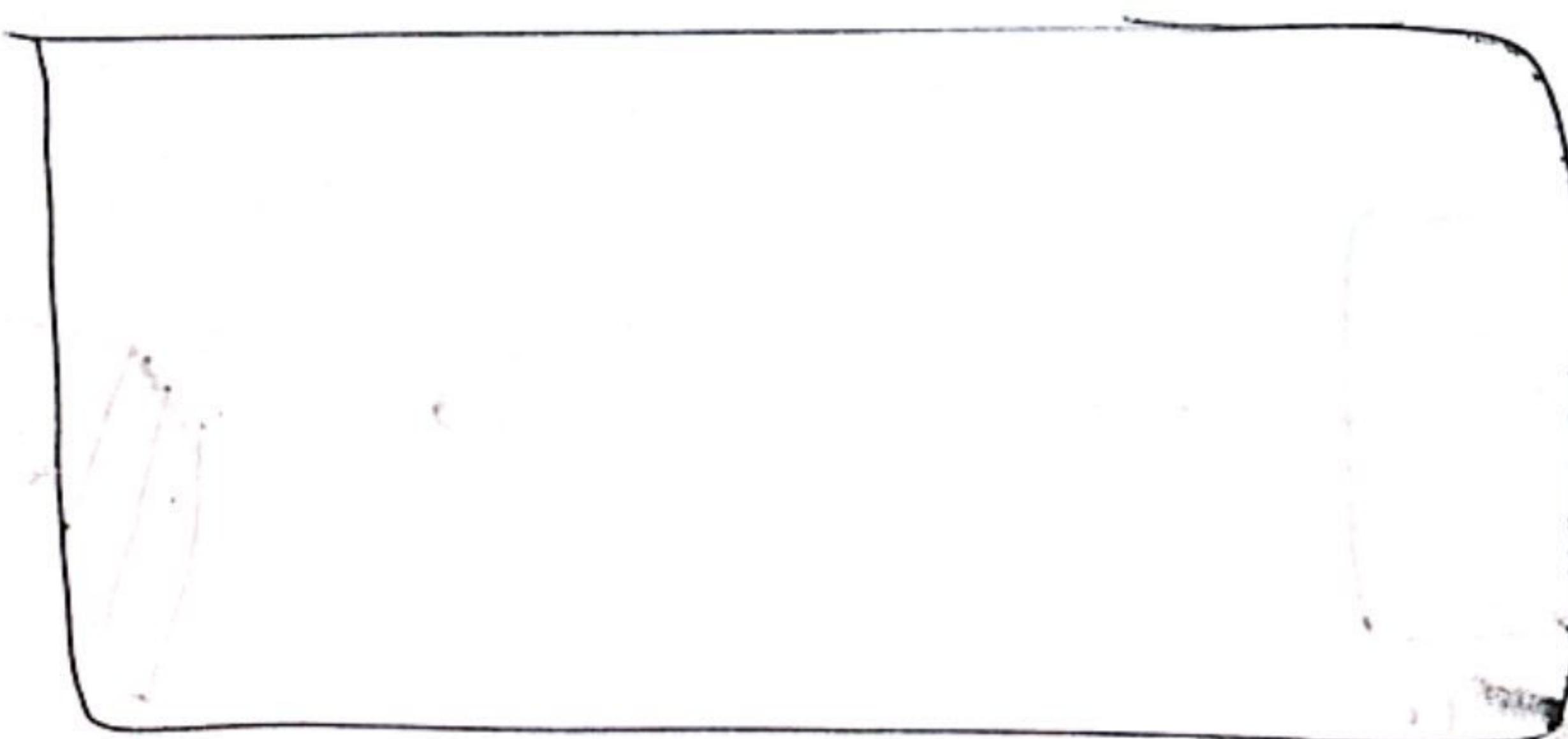
user table



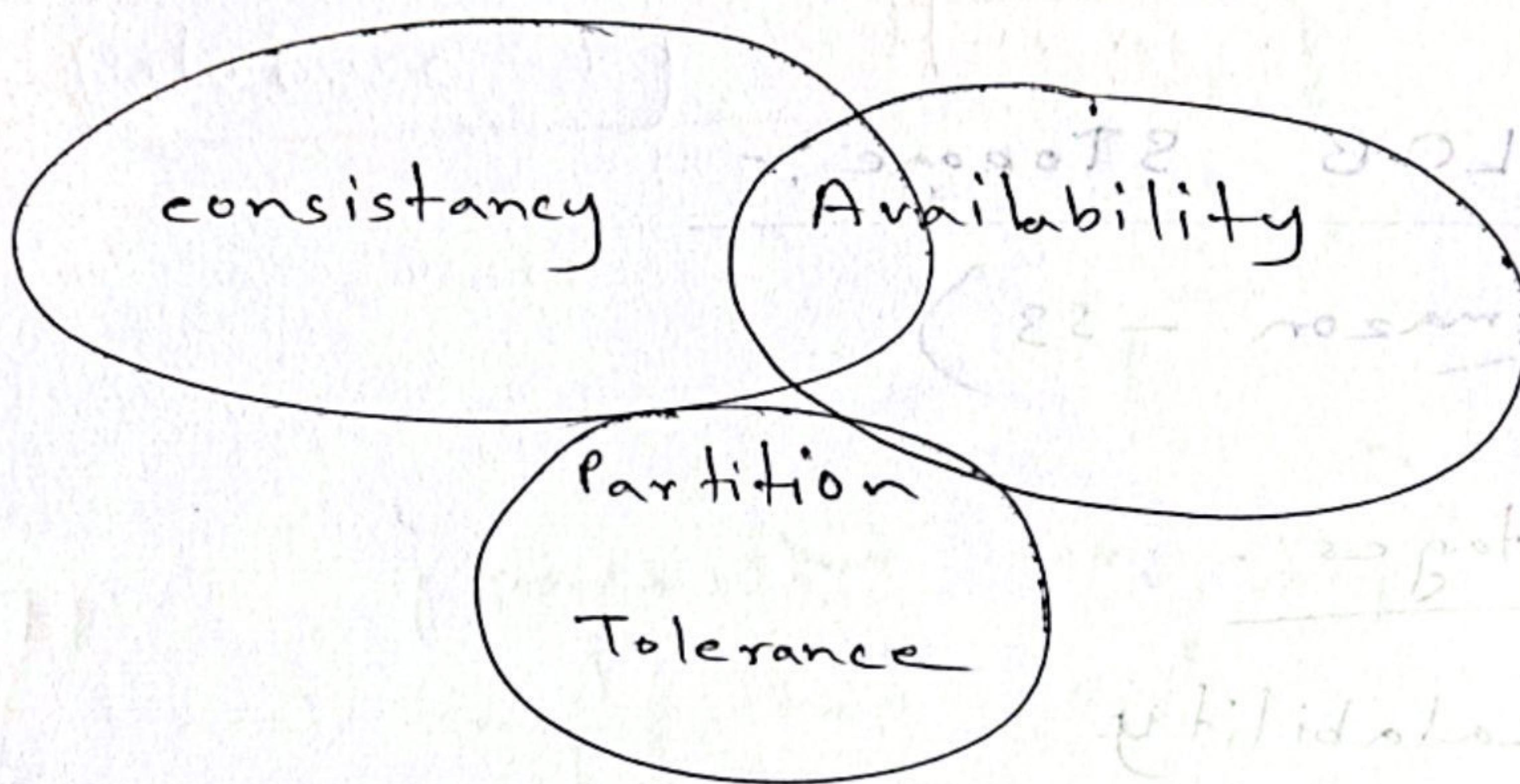
Order table



user_order table



21. CAP Theorem



Consistency:-

Every read receives the most recent write or an error.

Availability:-

Every request receives a response, without ensuring that it contains the most recent write.

Partition Tolerance:-

System continues to function despite network partitions.

cap-theorem explain — (algomaster) QAD . LE

22. BLOB STORAGE:-

(Amazon - S3).

Advantages:-

- scalability
- pay as you go model
- automatic replication
- easy access

Blob storage



Application

CDN (content delivery network):-

Geographic location.

HTML Pages

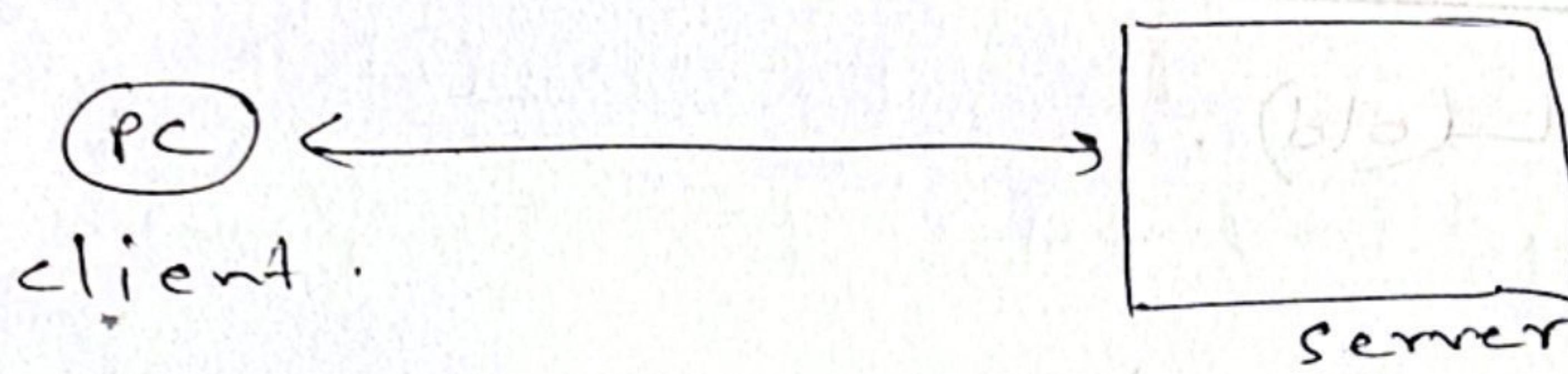
JS Files

Images

video

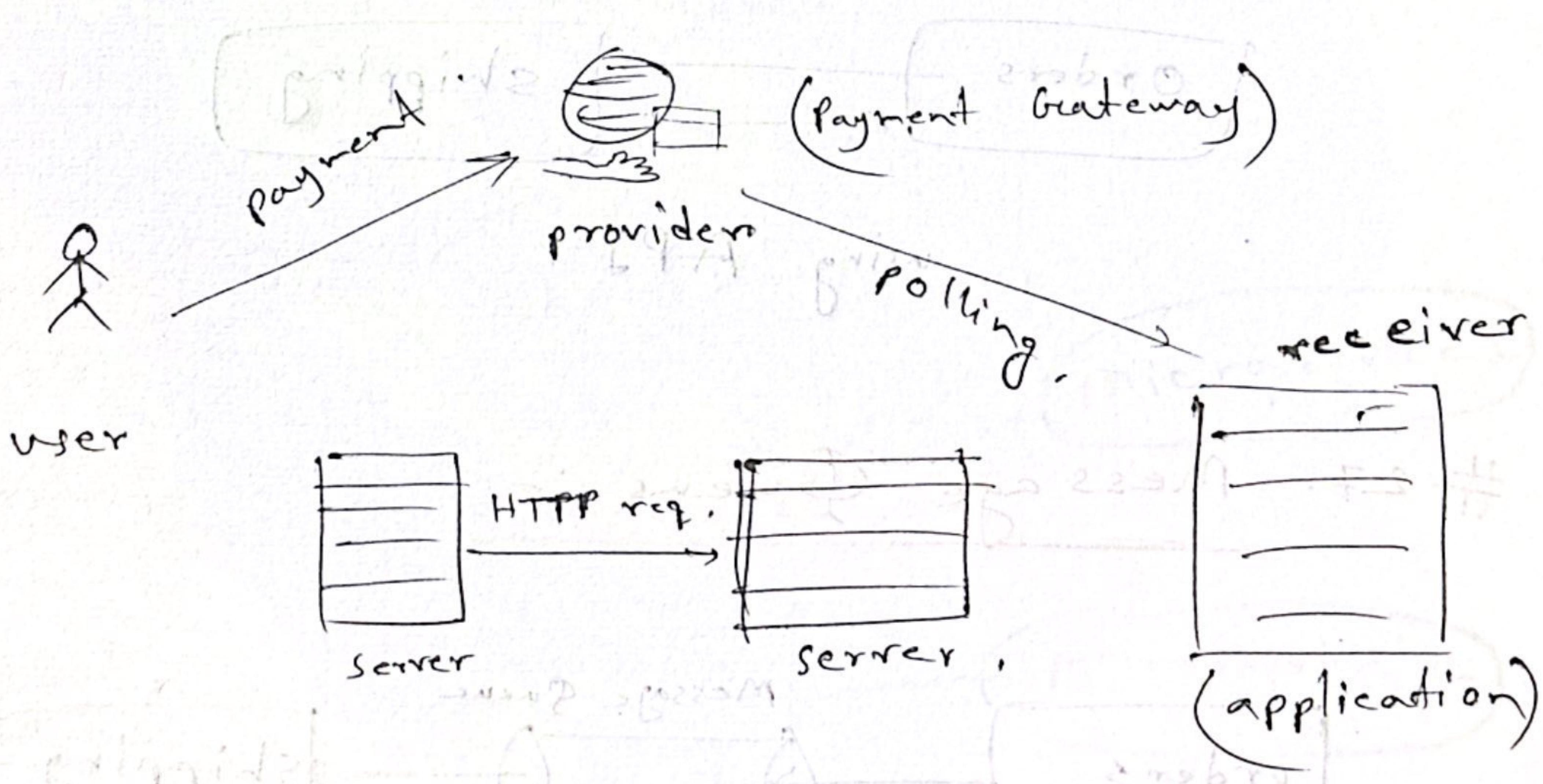
Web sockets :-

(29)



- (single persistent connection)
- Real time chat-application
- (Bi-directional messages)

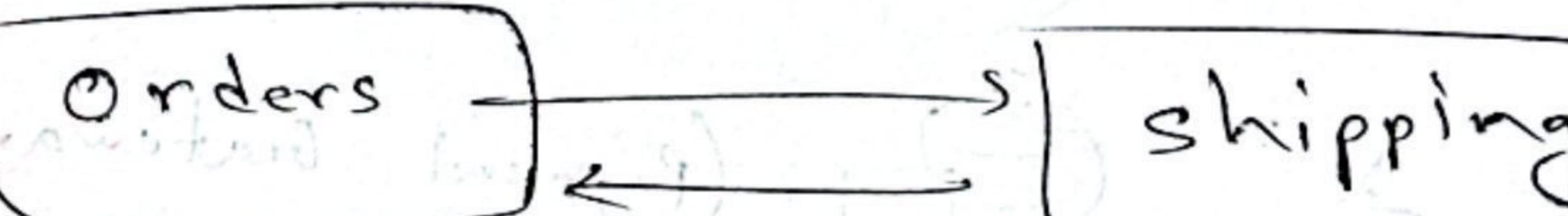
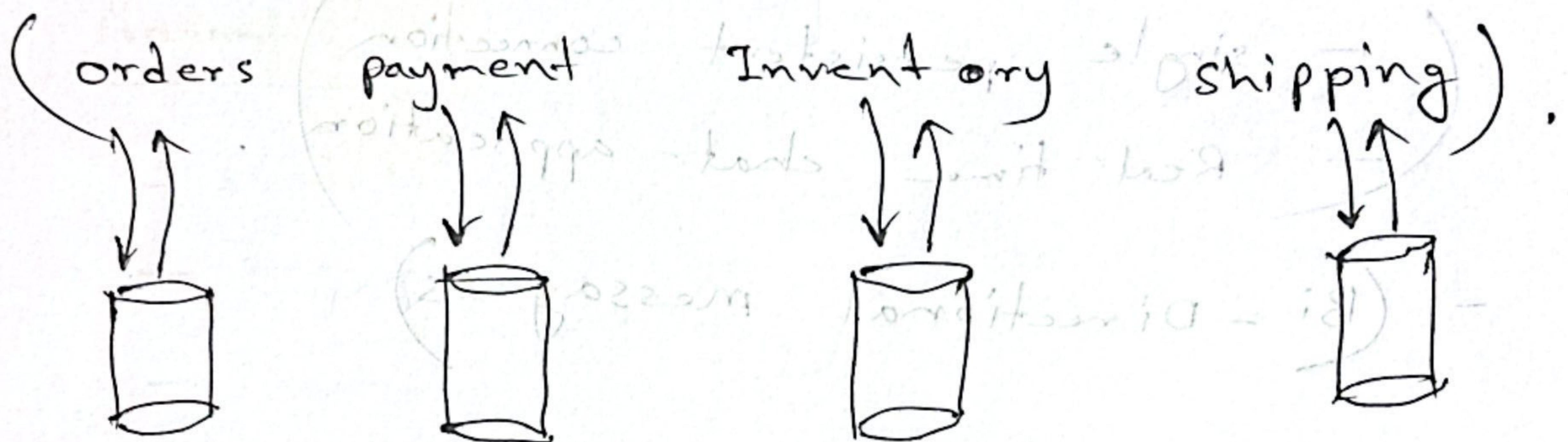
Web Hooks :-



Monolithic Arch :-

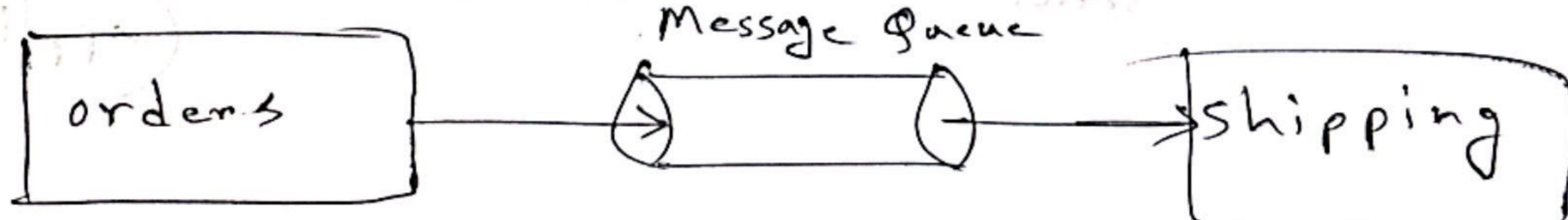
(old).

26. Micro - services

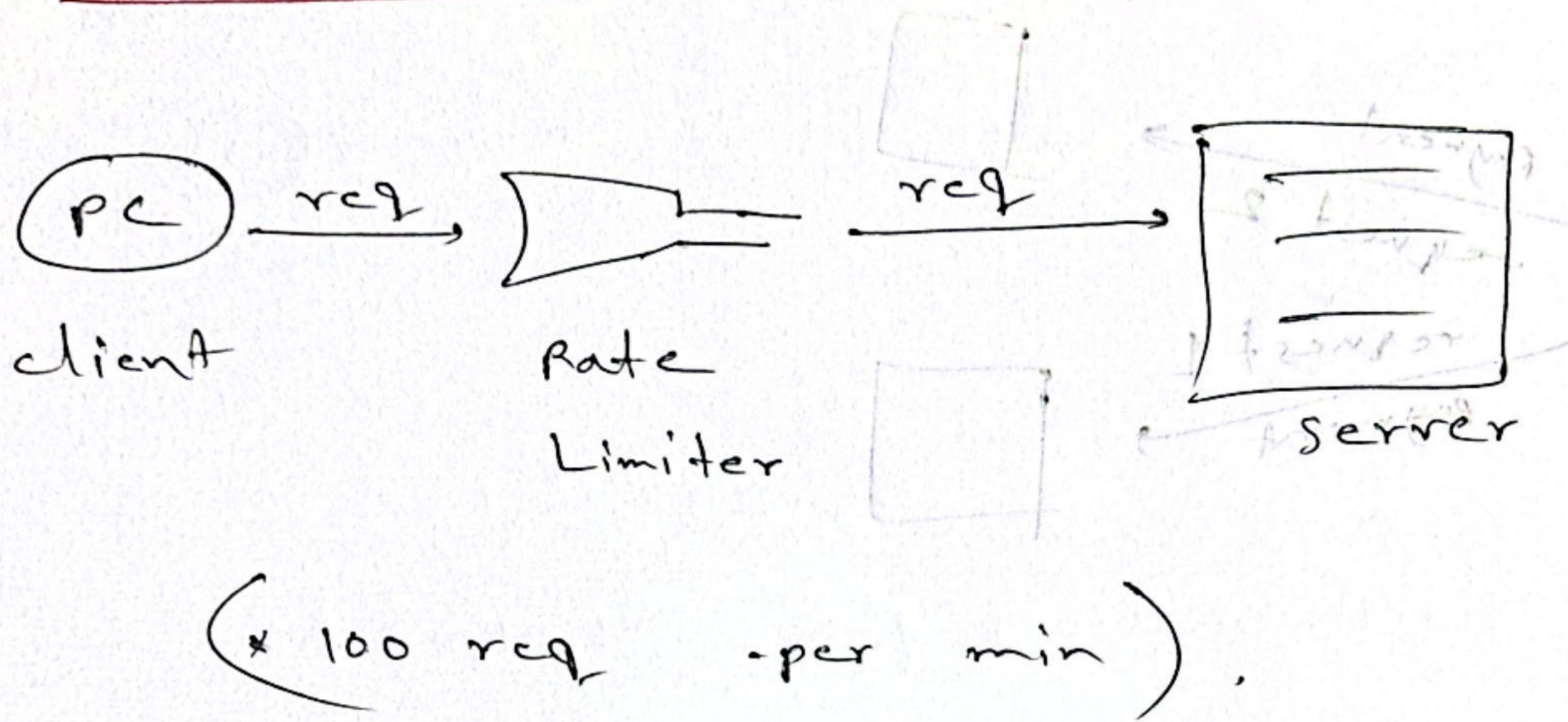


using API

27. Message Driven Arch



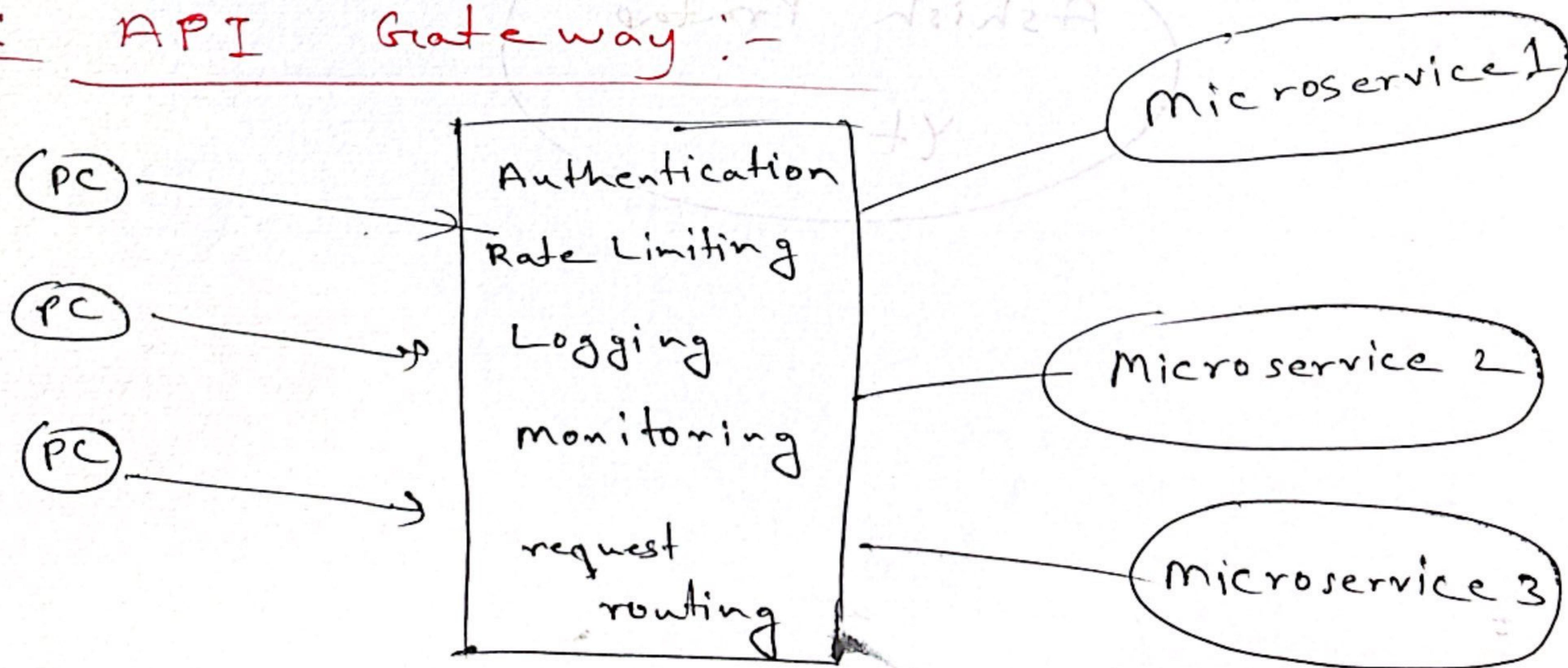
28. Rate Limiting:-



Rate limiting algorithm :-

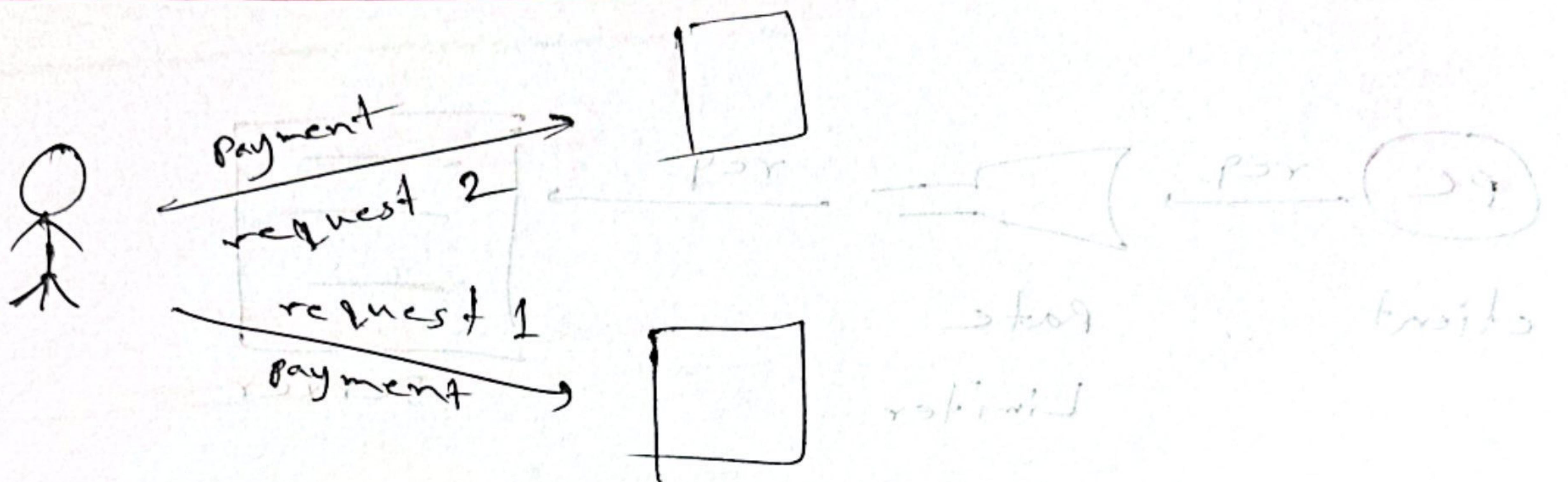
- Fixed window
- Sliding window
- Token Bucket

29: API Gateway:-

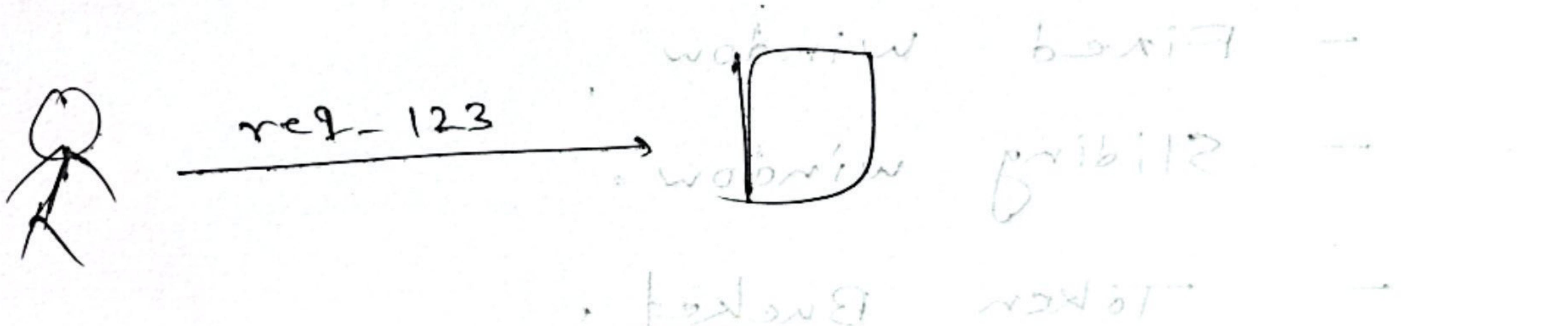
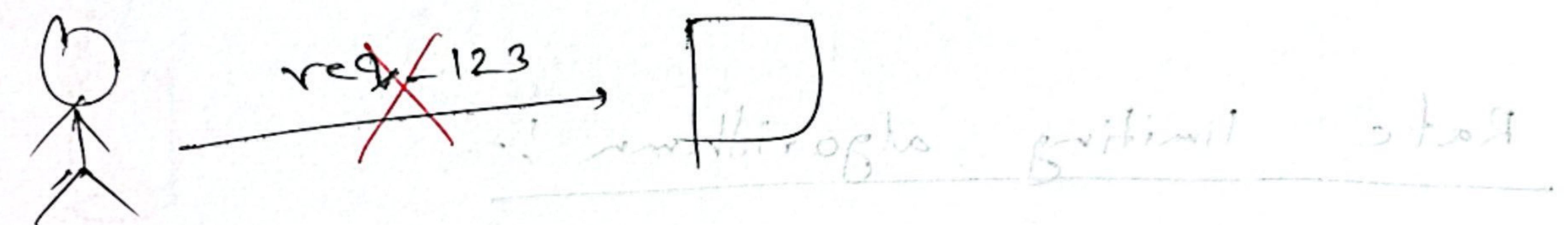


30. IDEMPOTENCY:-

(20)



(viewing per 001)



Ashish Pratap

Y+

Software Engineering

Final Exam