#ASLI ENGINEERING

Sharding and Partitioning

SWIPE

BY

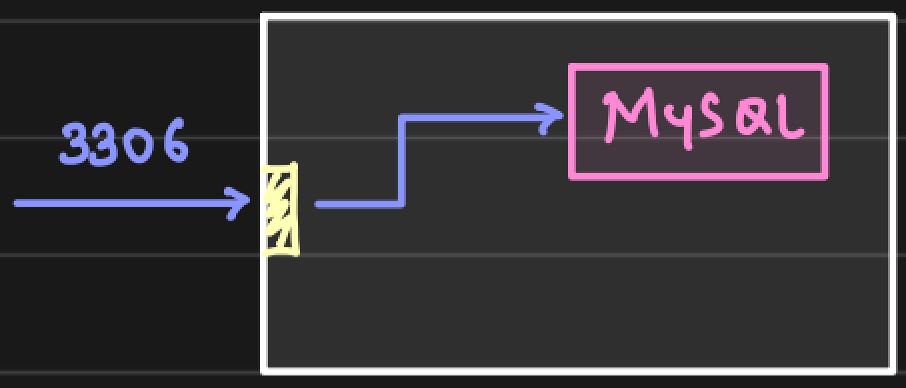
ARPIT BHAYANI

Sharding and Partitioning

Sharding : method of distributing data across multiple machines

Partitioning: splitting a subset of data within the same instance

How a database is scaled ?

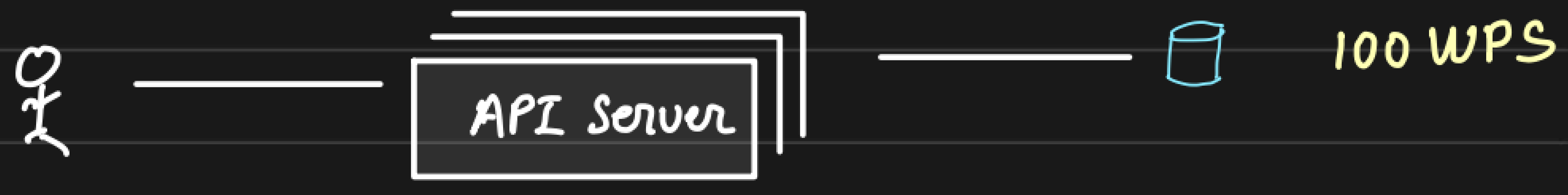


Virtual Server
EC2 machine

A database server is just a database process (mysqld, mongod) running on an EC2 machine.

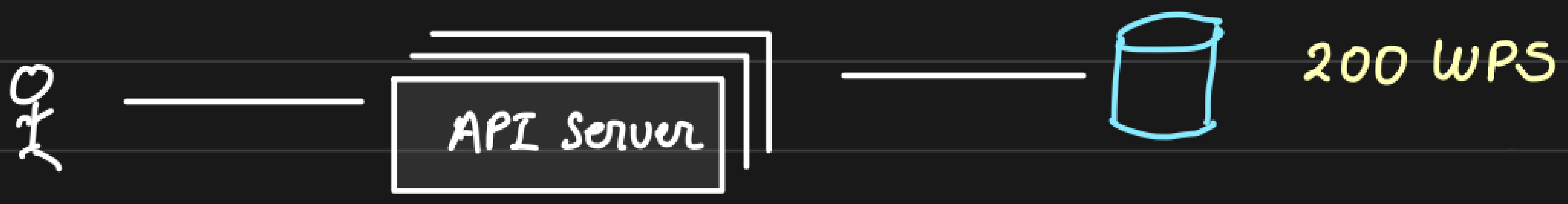
And we represent this as

You put your database in production, serving real traffic



You are getting more users, that your DB is unable to manage

you scale up your DB ... give it more CPU, RAM and DISK



Bulkier server + Read Replica

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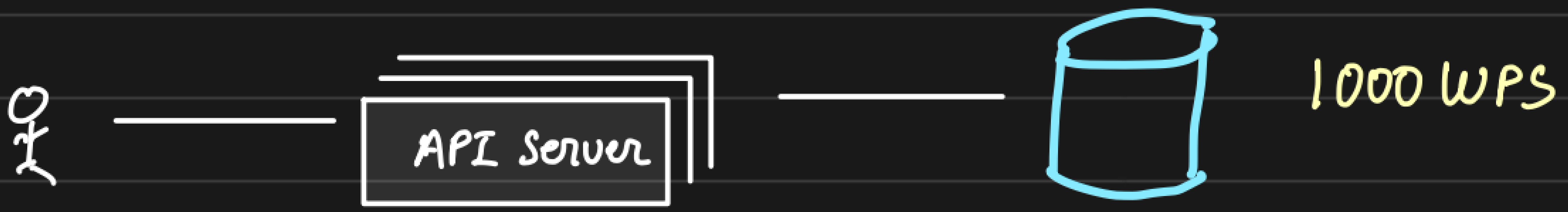
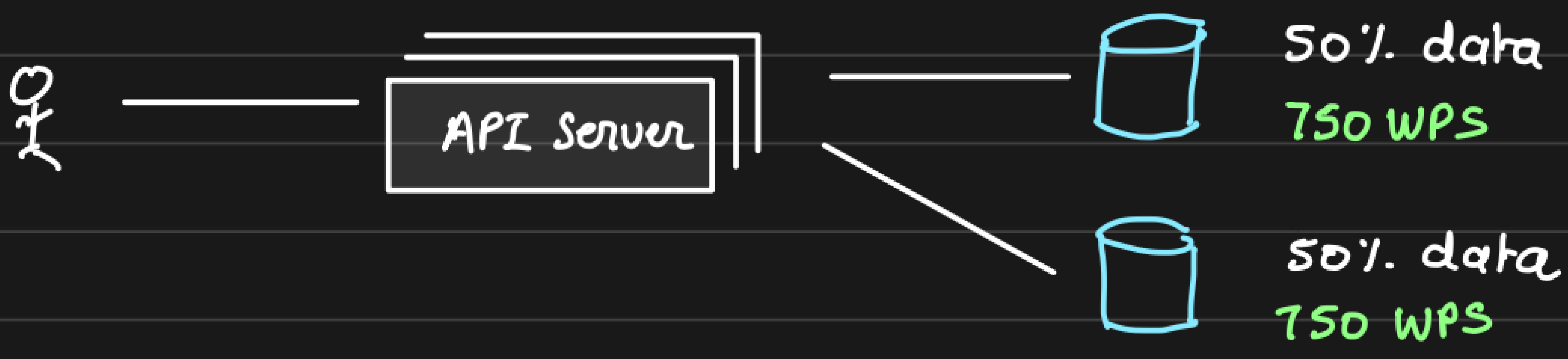
Your product went viral and your bulky database is unable to handle the load, so you scale up again



But, after a certain stage you know you would not be able to scale "up" your DB because Vertical scaling has limit

So, you will have to resort to Horizontal Scaling

Say, one DB server was handling 1000 WPS and we cannot scale up beyond that but we are getting 1500 WPS, we scale horizontally and split the data



By adding one more database server, we reduced the load to 750 WPS on each node and thus handled higher throughput

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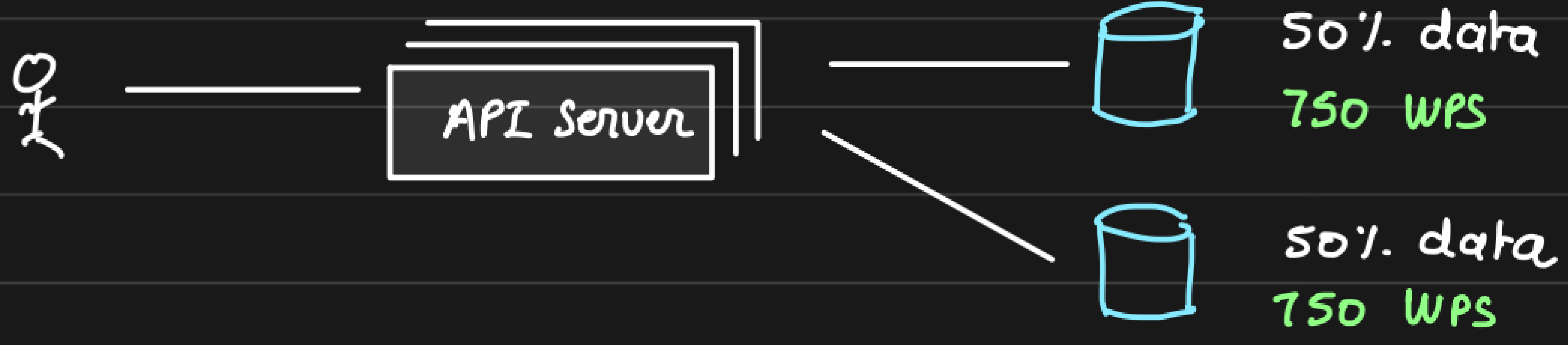
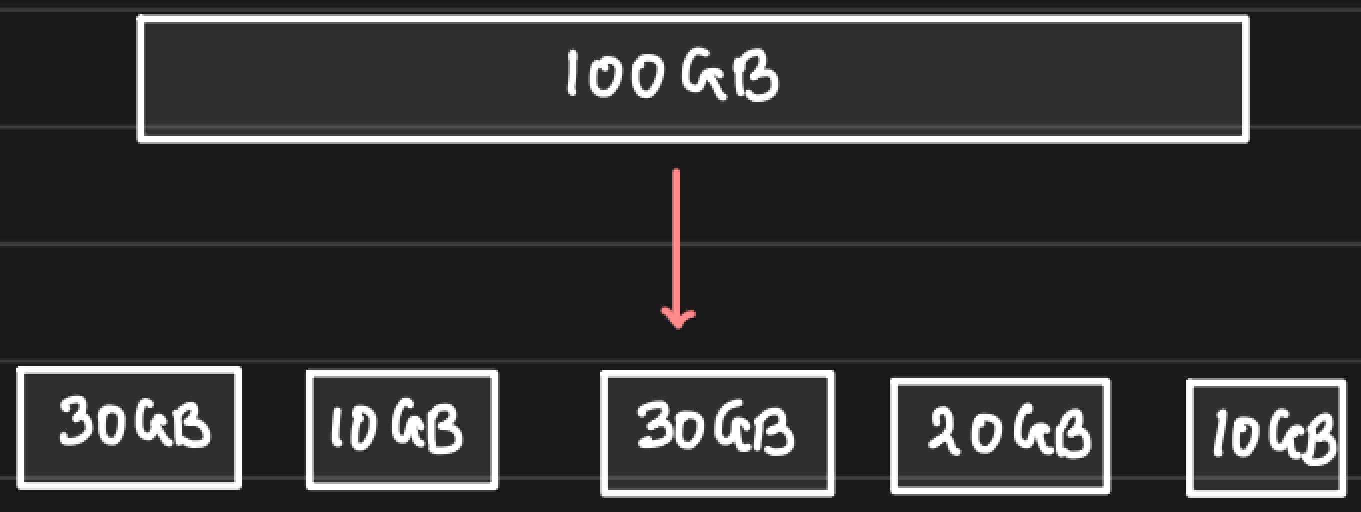


Each database server is thus a shard and we say that the data is partitioned

Overall, a database is sharded while the data is partitioned

Oversimplification, most people use the terms interchangably

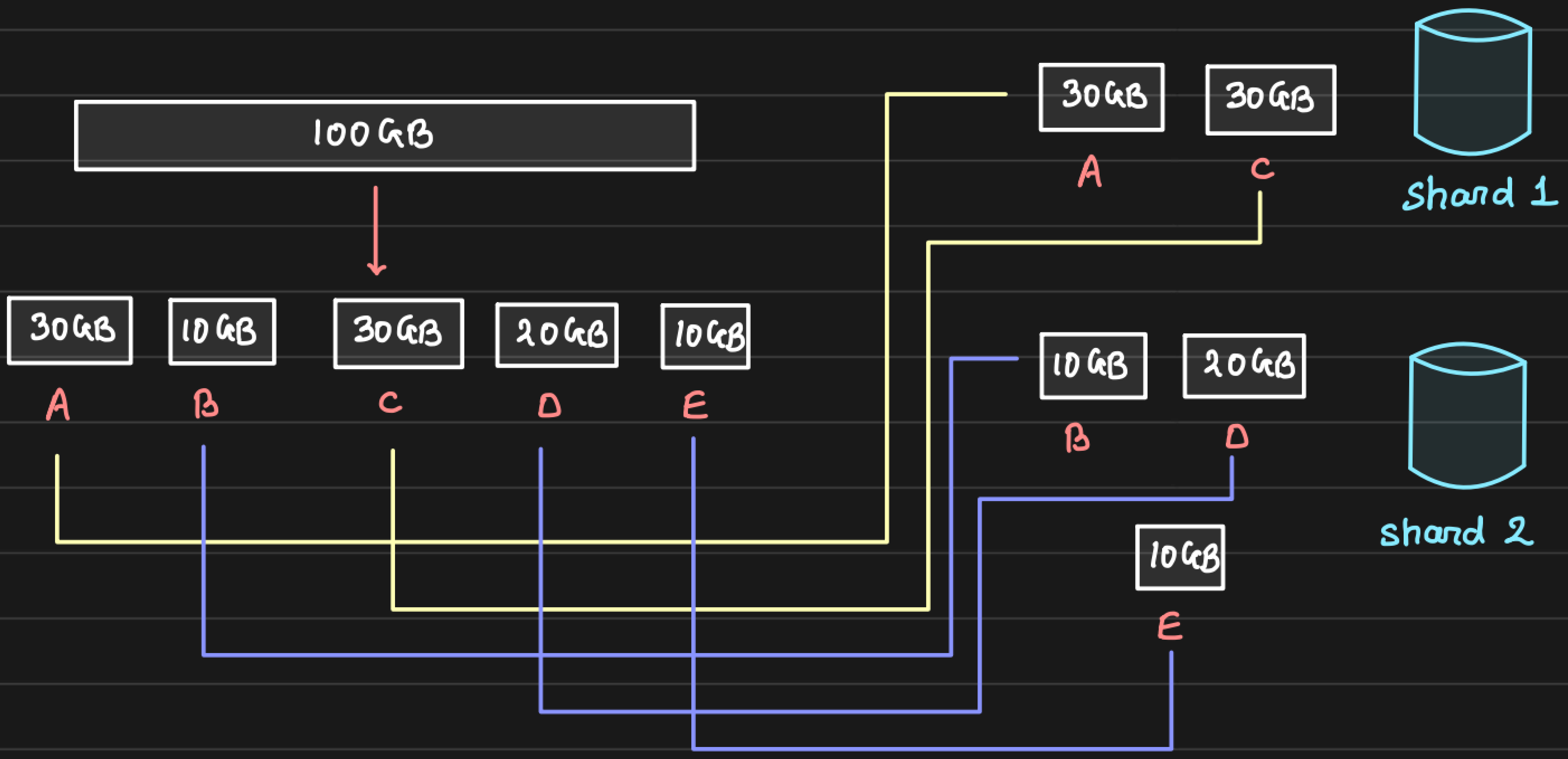
split across



You partitioned the 100 GB of total data into 5 mutually exclusive partitions.

Each of these partitions can either live on one database server or a couple of them can share one server.

And this depends on the # shards you have

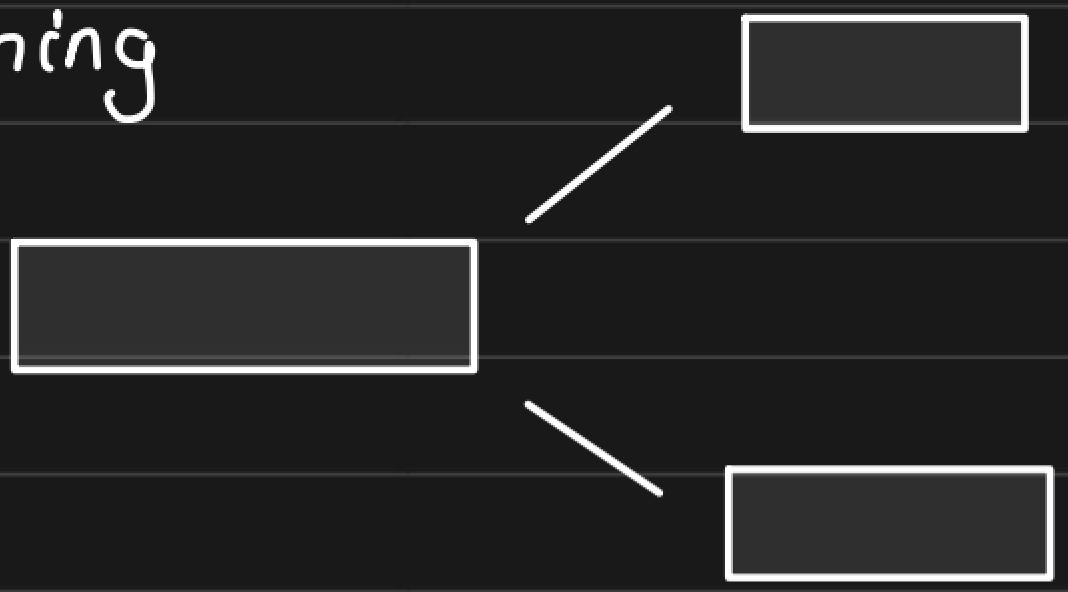


5 partitions of our 100GB dataset is distributed across 2 shards

How to partition the data?

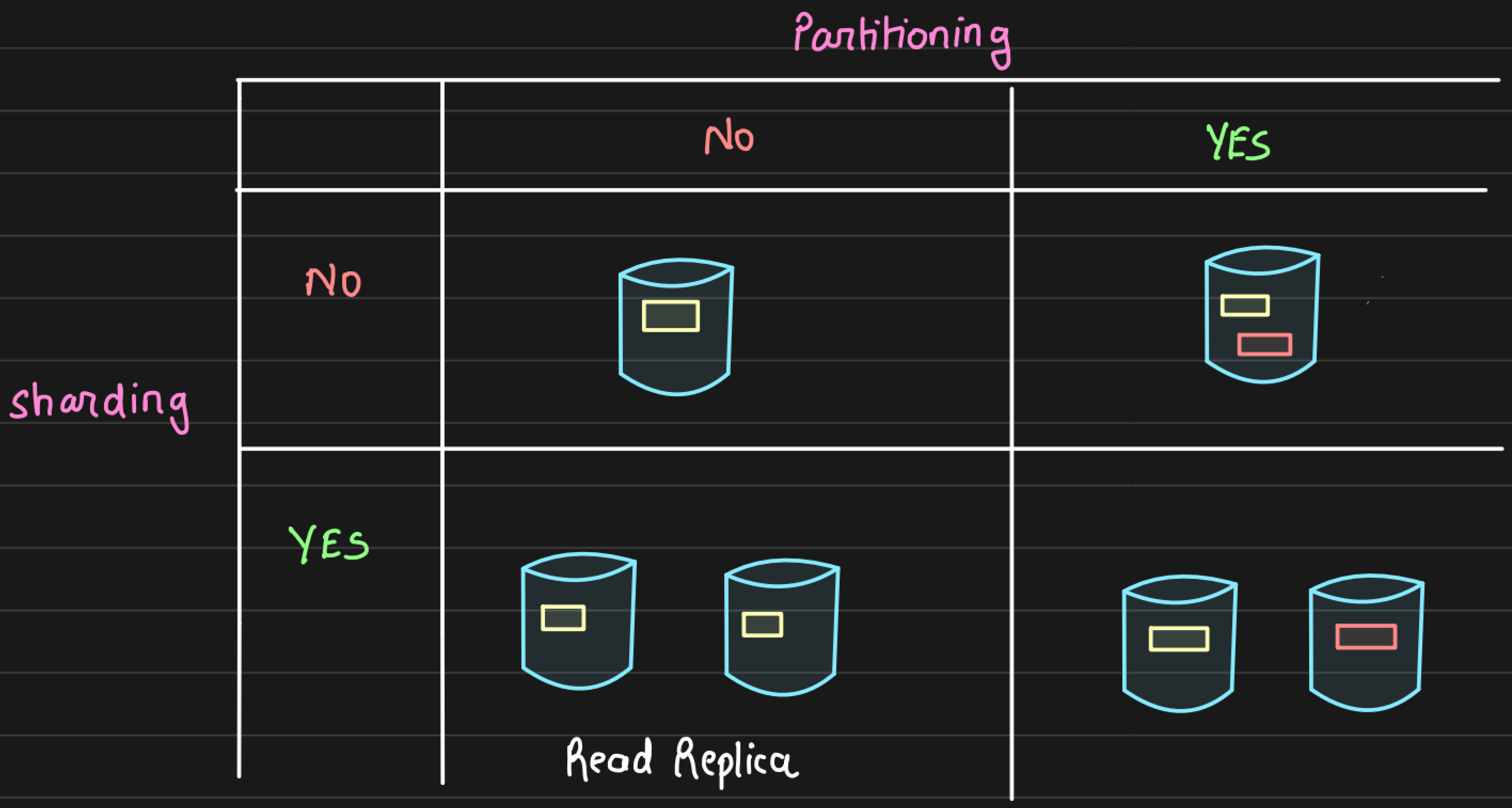
There are two categories of partitioning

1. Horizontal Partitioning
2. Vertical Partitioning



When we "split" the 100 GB data, we could have used either of the ways but deciding which one to pick depends on load, usecase, and access pattern.

Sharding and Partitioning



Advantages of sharding

- Handle large Reads and Writes
- Increase overall storage capacity
- Higher availability

Disadvantages of sharding

- operationally complex
- cross-shard queries expensive