

① Master-Slave ✓

② Indexing ✓

# Database Partitioning

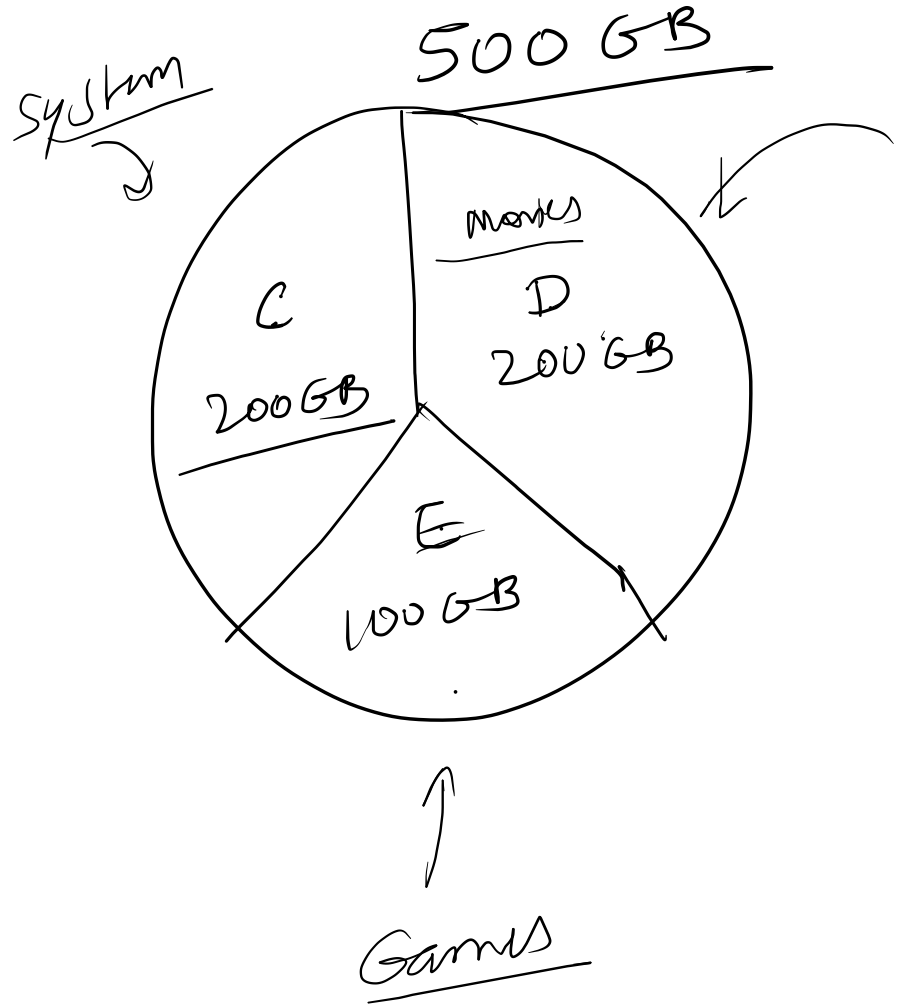
→ splitting data

Splitting a subset of data  
within the same instance

Drive C

Drive D

Drive E



Customers → 3 million

1 → 1 million

2 → 2 million

3 → 3 million

1 mil

1 mil

1 mil

0 to 1

1 to 2

2 to 3

Customers → 3 million

1 → 1 million

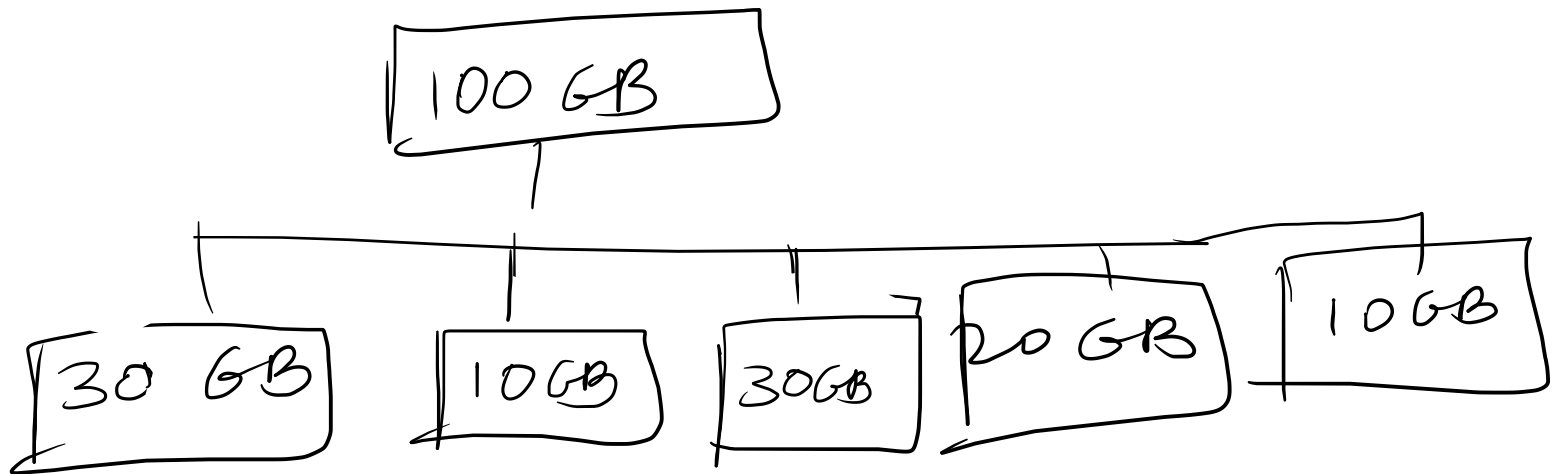
2 → 2 million

3 → 3 million

# Database Sharding

method of distributing data  
across multiple machines.

Partihon 100 GB

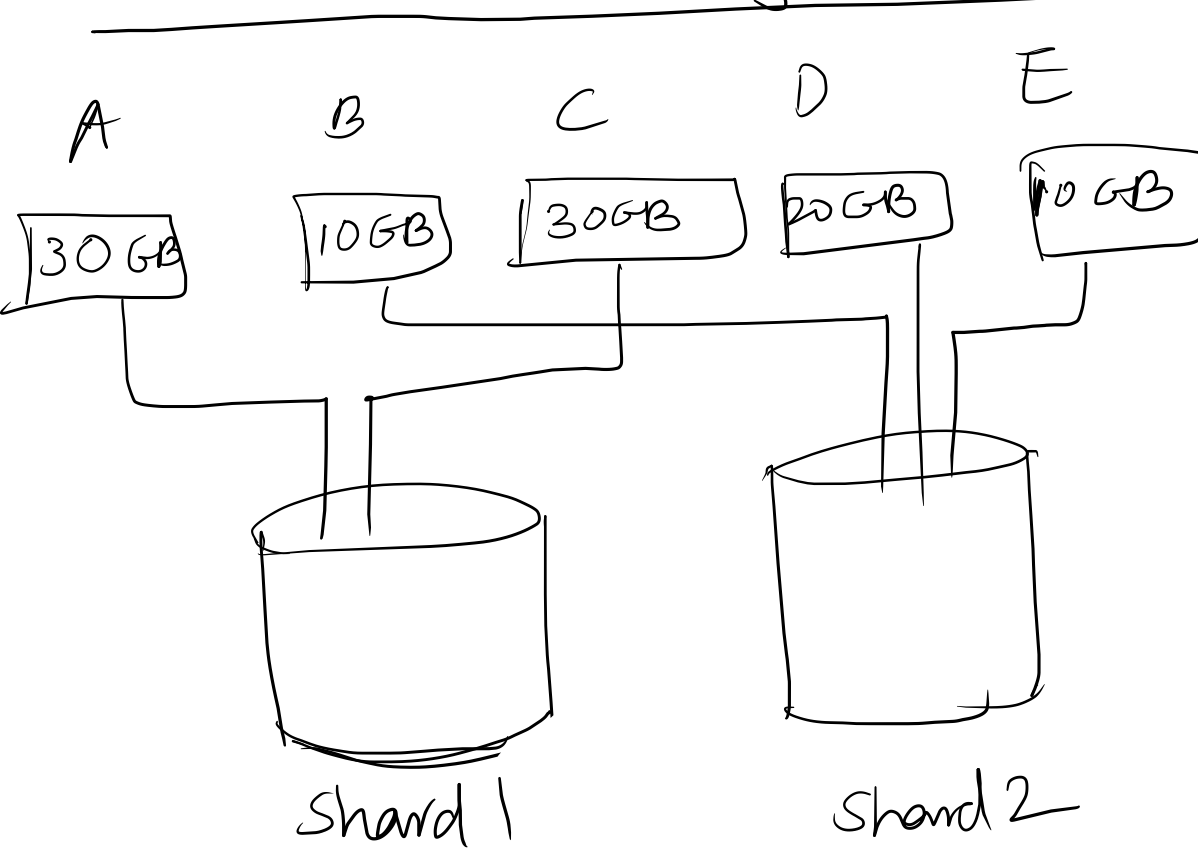


\* Each of the partitions can either live on one database server or on multiple servers.

\* Depends on the # shards you have



# Database Partitioning & Sharding

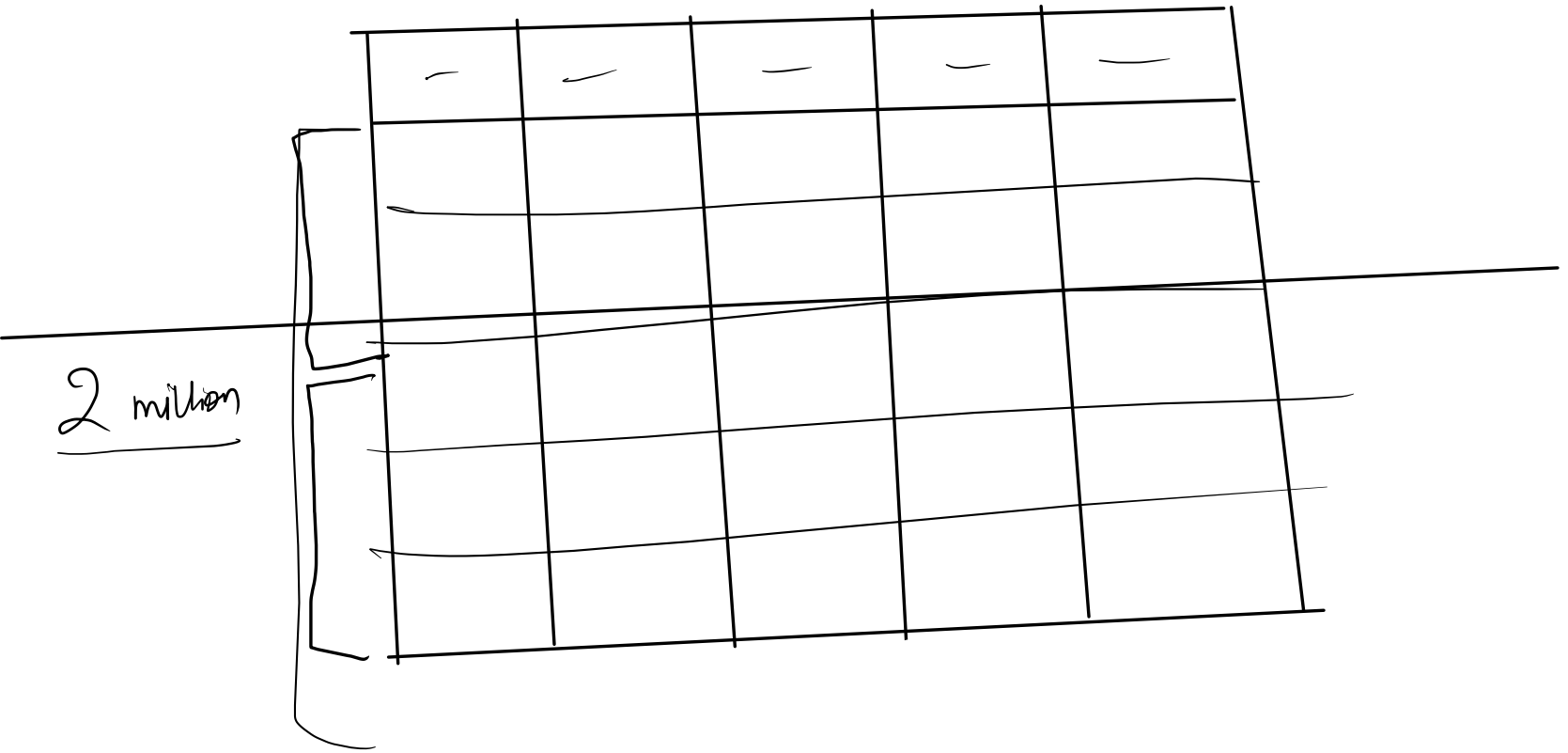


Partitions → 5  
Shards → 2

# How to partition data?

- 1.) Horizontal Partitioning
- 2.) Vertical Partitioning

① partitioning by rows (Horizontal)



## ② Partitioning by column

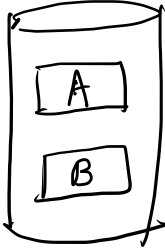
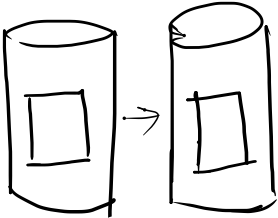
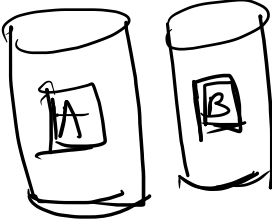
(vertical partitioning)

A	B	C	D	E

A	B

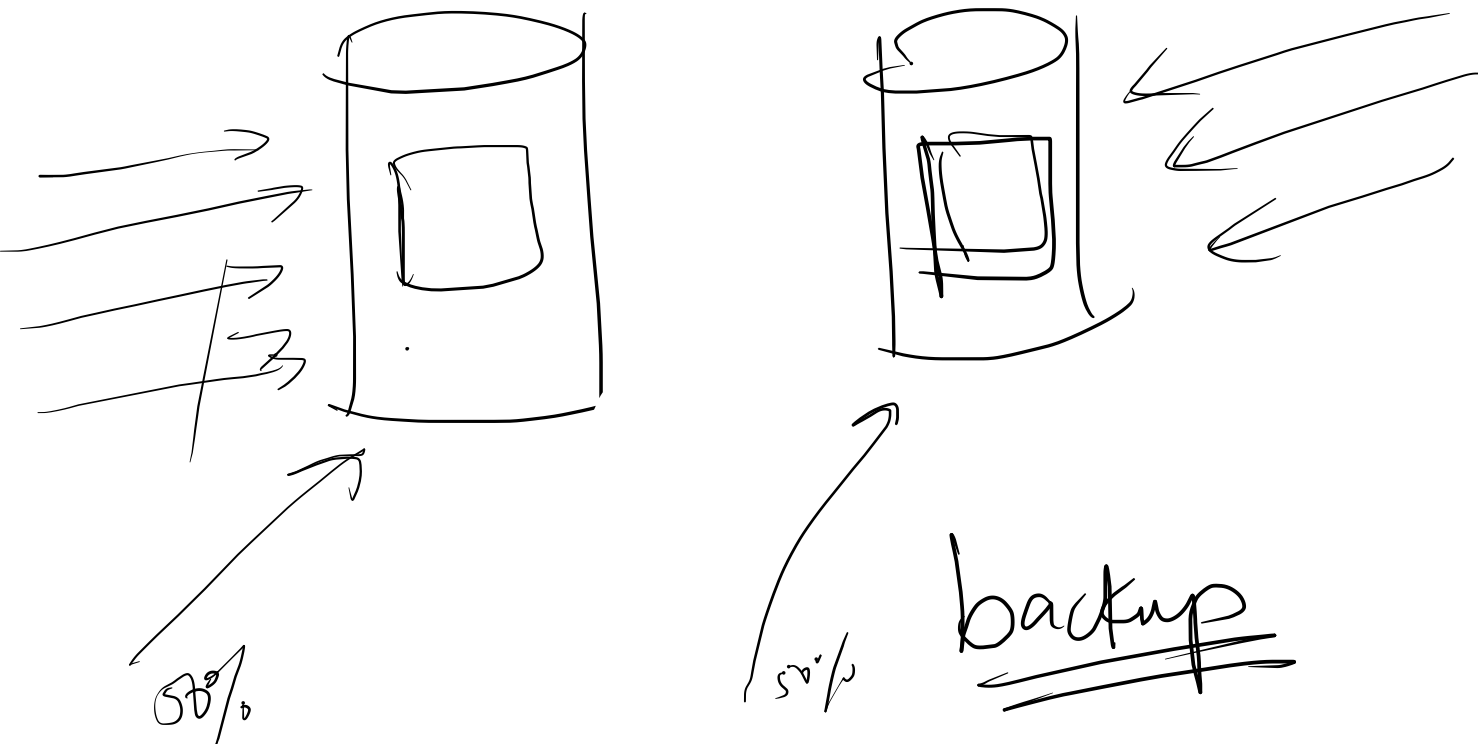
C	D	E

# Partitioning

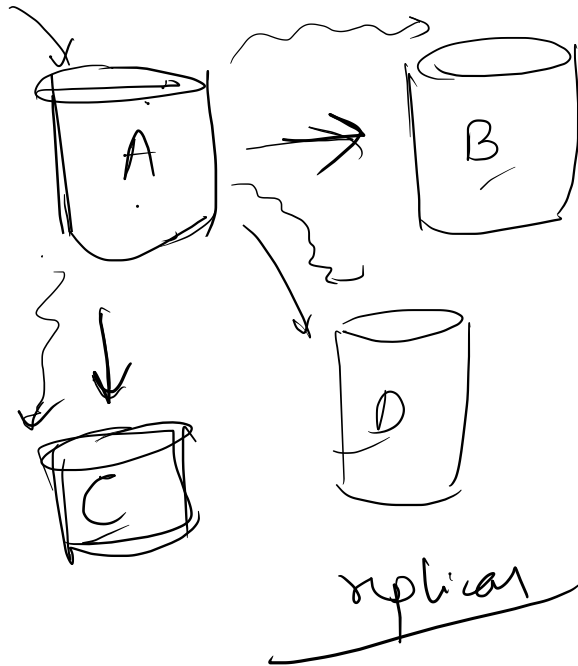
	No	Yes
No		
Yes	 (read replicas)	

# Sharding

(read replicas)



# Database Replication



consistency

→ eventual consistency

# SQL vs NO-SQL

SQL → Structured Query Language

NO-SQL → Not only SQL / not SQL



rows

column	
RollNo	Name
1	Rahul
2	Rishi
3	Rohan
4	Rajesh

Students

Rohan
Rajesh

→ Select Name from Students where RollNo > 2;

SQL query

No-SQL

Mongo DB

SQL

↓  
MySQL

SQL → table based

→ Relational database

No-SQL - document,  
key value

SQL

relational

vertical scaling

Structured

MySQL, Oracle DB,  
ms SQL server

Non-SQL

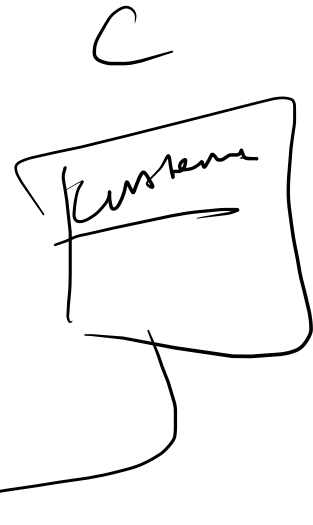
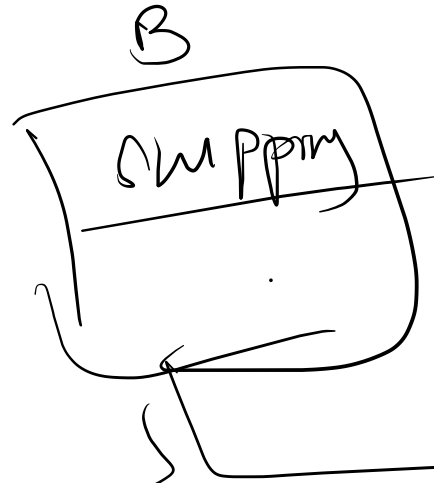
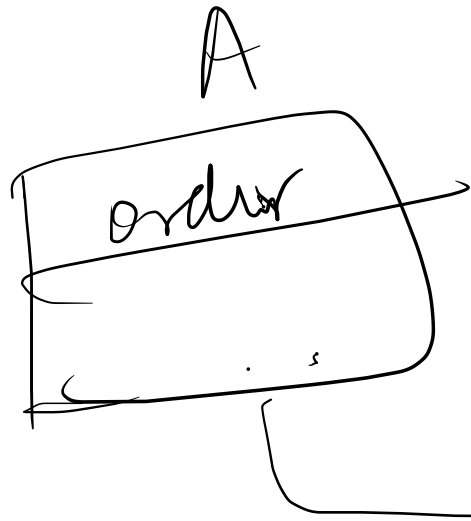
Not-relational

Horizontal scaling

Non-structured

MongoDB,

Cassandra,  
Redis



# Strengths of SQL

- ① Easy querying on relationships  
b/w multiple tables
- ② Data is structured
- ③ SQL is ACID compliant

- ① Atomicity → Execute all or none
- ② Consistency → Data is valid before & after
- ③ Isolation → multiple transacts at same time
- ④ Durability → committed data is never lost



Weaknesses :

SQL  $\begin{cases} \times \text{ structured (format)} \\ \times \text{ relational} \\ \times \text{ tables} \end{cases}$

- 1.) Structure must be created in advance.  
(tables, columns, need to be create before hand)
- 2.) Difficult to scale horizontally

