

Data Sharding

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Nabrass Gull

Anas Inam

Scaling of Database

Scaling of Database

Roll No	Name	Age	Class	DoB	Address	Region	Domicile	CGPA	Blood	Gender	Session		
1	Ahmed	18	M2	11/11/2001	Farid Town	Multan	Multan	3.1	A+	Male	2020-24		
2	Alisha	19	M2	01/01/2001	Shadman	Sahiwal	Sahiwal	3.4	B+	Female	2020-24		
3	Babar	25	Umer	20	Captain M25/10/1994	11/11/2001	Farid PCB Town	Multan	Multahore	3.1 Fail A+	Male	2020-24	
4	Noor	6	Aftab	19	M2	01/01/2001	Shadm Pak	Sahiwal	Sahiwal	3.4	B+	Female	
		20	M2	10/12/2002	Captai	15/10/1994	Avenue PCB	Sahiwal	Sahiwal	3.5	O-	AB+ Female	
		27	Usman	27	n	94	Lahore	Lahore	Fail	Male	3	2019-2	
							Pak Avenue	Sahiwal	Sahiwal	3.5	AB+	Female	2020-24
8	Noor	20	M2	10/12/2002	Pak Avenue	Sahiwal	Sahiwal	3.5	AB+	Female	2020-24		

Scaling of Database

Drawbacks

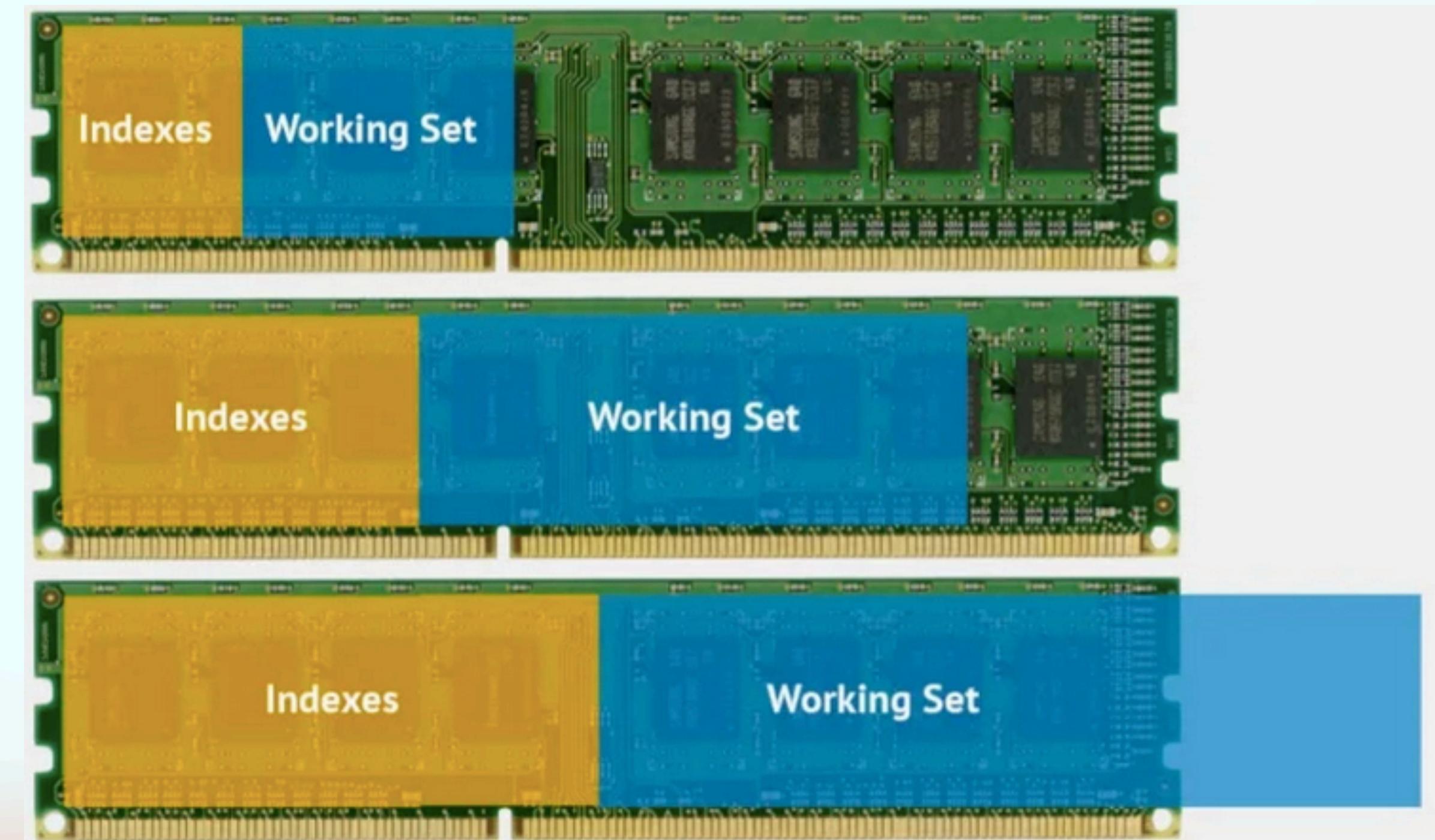
**Read/Write Throughput
Exceeds I/O**



Scaling of Database

Drawbacks

RAM usage
increases



Scaling of Database Drawbacks

High CPU usage

Database server runs out of storage

Network is overloaded

Increase in Response time

Chances of data loss

Database Sharding

Database Sharding

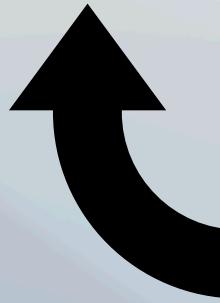
Roll No	Name	Age	Class	DoB	Address	Region	Domicile	CGPA	Blood	Gender	Session
1	Ahmed	18	M2	11/11/2001	Farid Town	Multan	Multan	3.1	A+	Male	2020-24
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3	Babar	27	Captain	15/10/1994	PCB	Lahore	Lahore	Fail	O-	Male	2019-23
4	Noor	20	M2	10/12/2002	Pak Avenue	Sahiwal	Sahiwal	3.5	AB+	Female	2020-24

Vertical Partitions

Database Sharding

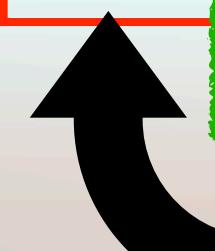
Chunk

Roll No	Name	Age	Class
1	Ahmed	18	M2
2	Alisha	19	M2
3	Babar	27	Captain
4	Noor	20	M2



Shared Key

Roll No	DoB	Address	Region	Domicile
1	11/11/2001	Farid Town	Multan	Multan
2	01/01/2001	Shadman	Sahiwal	Sahiwal
3	15/10/1994	PCB	Lahore	Lahore
4	10/12/2002	Pak Avenue	Sahiwal	Sahiwal



Shared Key Partition

Vertical Partitions

Shard

Roll No	CGPA	Blood	Gender	Session
1	3.1	A+	Male	2020-24
2	3.4	B+	Female	2020-24
3	Fail	O-	Male	2019-23
4	3.5	AB+	Female	2020-24



Shared Key

Database Sharding

Roll No	Name	Age	Class	DoB	Address	Region	Domicile	CGPA	Blood	Gender	Session
1	Ahmed	18	M2	11/11/2001	Farid Town	Multan	Multan	3.1	A+	Male	2020-24
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4	Noor	20	M2	10/12/2002	Pak Avenue	Sahiwal	Sahiwal	3.5	AB+	Female	2020-24

Horizontal Partitions

Range Based Sharding

0- 499

500-999

1000+

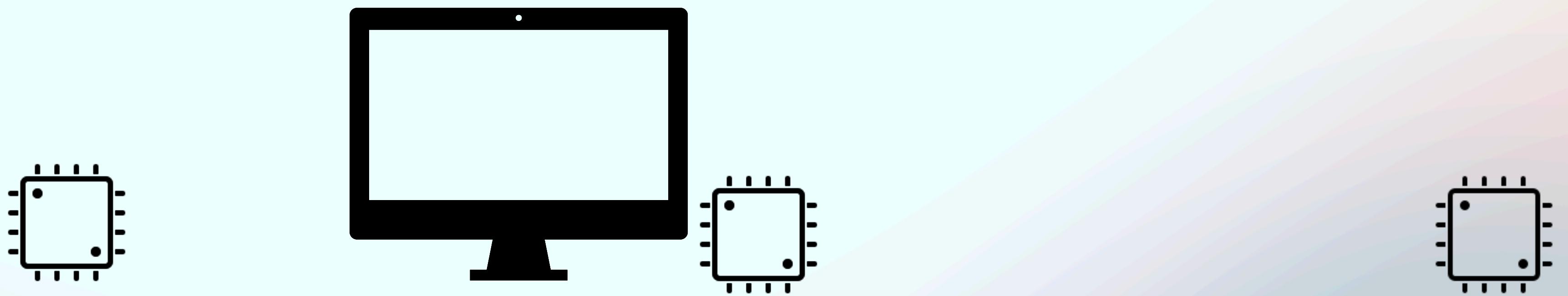
Product	Price
Dairy Milk	570
Ramen	660
Water	120
Dairy Milk	1520
Coke	150
Foot Ball	1660
Shampoo	1200
Foot Ball	1400

Benefits of Data Sharding

Benefits of Data Sharding

Increased Read/Write Throughput

Increased Read/Write Throughput

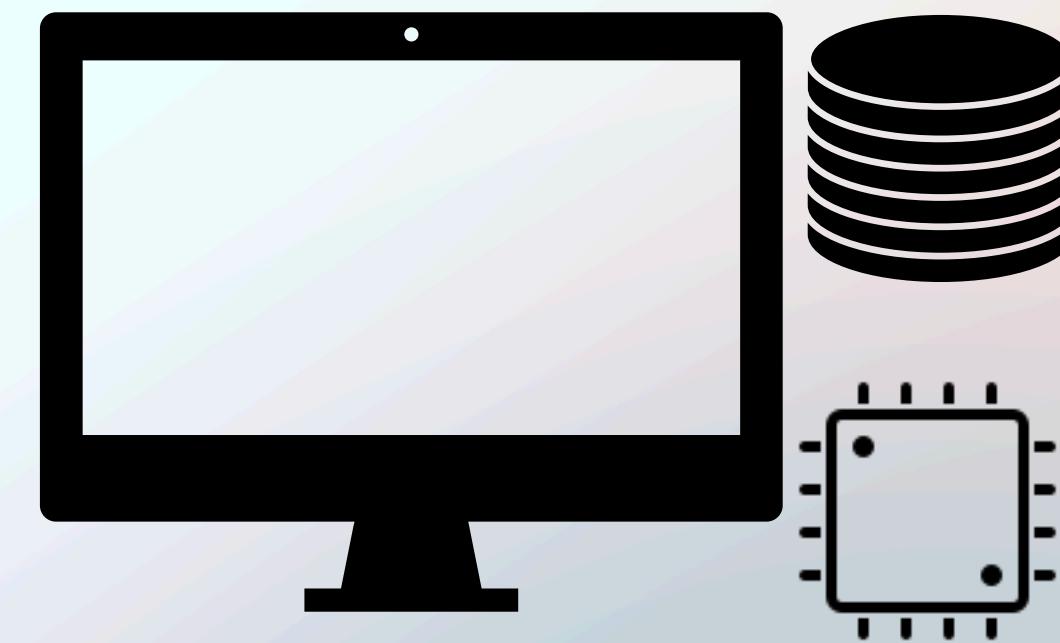
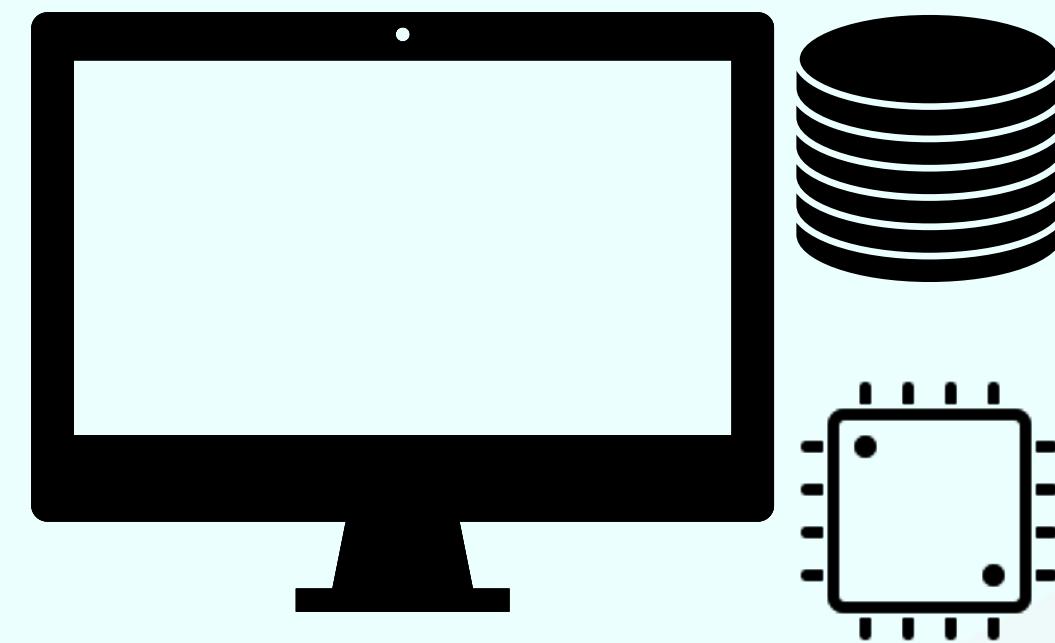
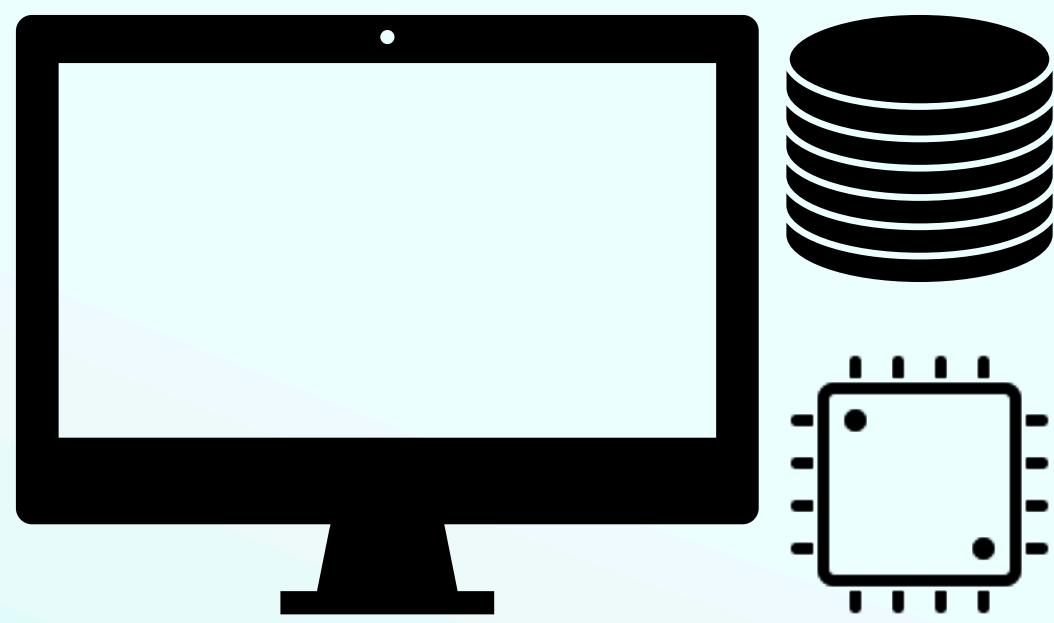


**Benefits of
Data Sharding**

Benefits of Data Sharding

Increased storage Capacity

Increased storage Capacity



**Benefits of
Data Sharding**

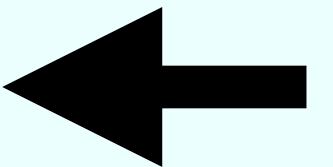
Benefits of Data Sharding

High Availability

Benefits of Data Sharding

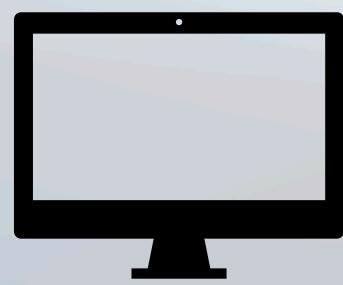
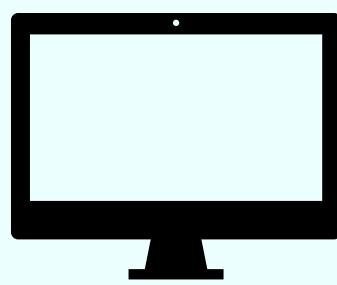


Product	Price
Dairy Milk	570
Ramen	660
Water	120
Coke	150
Shampoo	1200
Foot Ball	1400

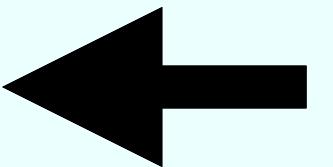


High Availability

Benefits of Data Sharding



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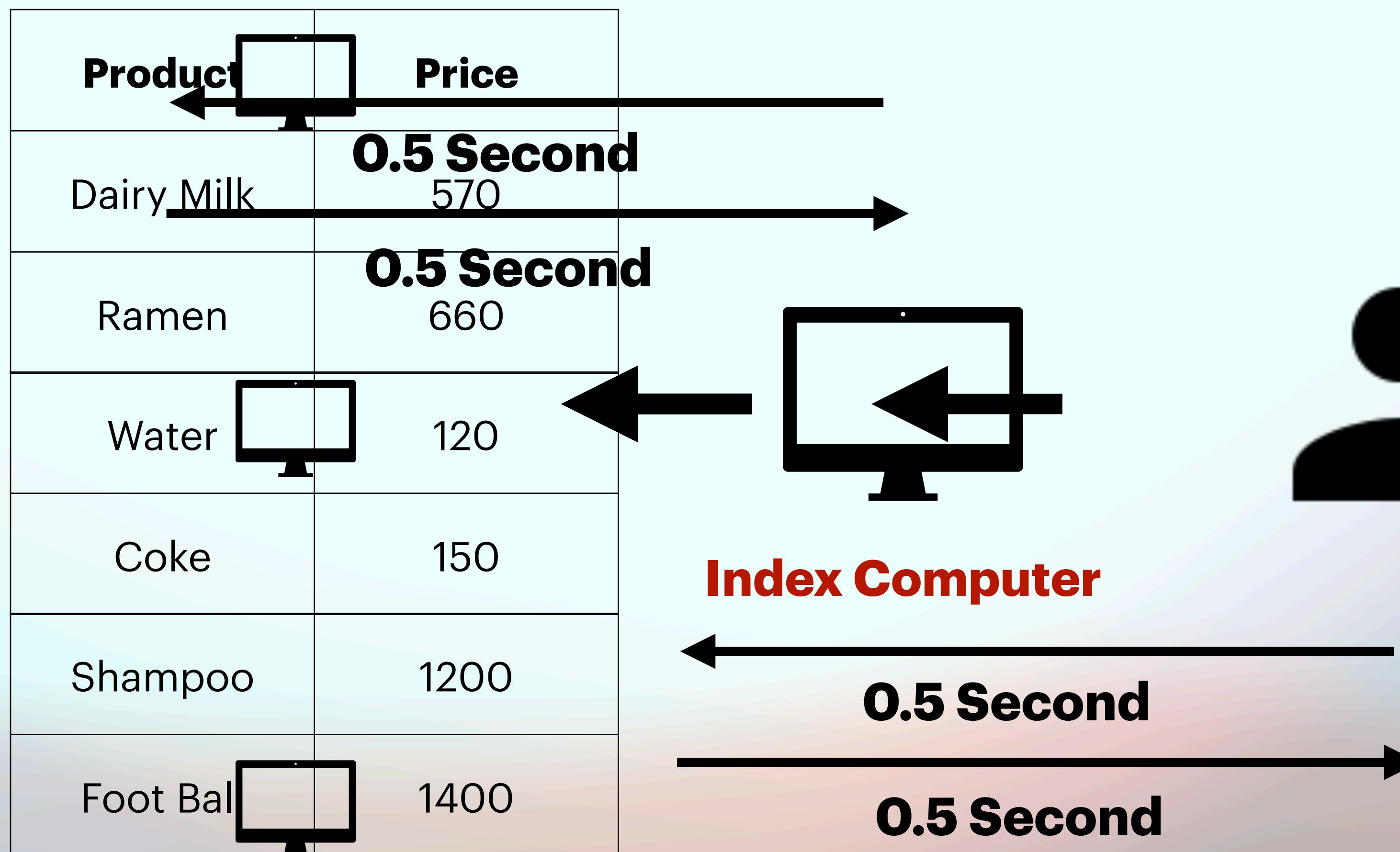
High Availability

Drawbacks of Data Sharding

Drawbacks of Data Sharding

Query Overhead

Query Overhead



Drawbacks of
Data Sharding

Drawbacks of Data Sharding

Complexity of Administration

Complexity of Administration

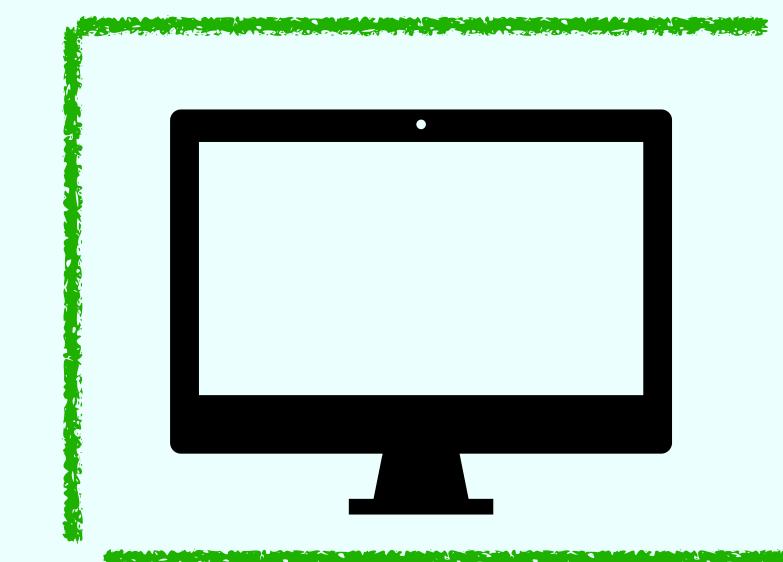
Product	Price
Dairy Milk	570
Ramen	660



Water	120
Coke	150



Shampoo	1200
Foot Ball	1400



Index Computer



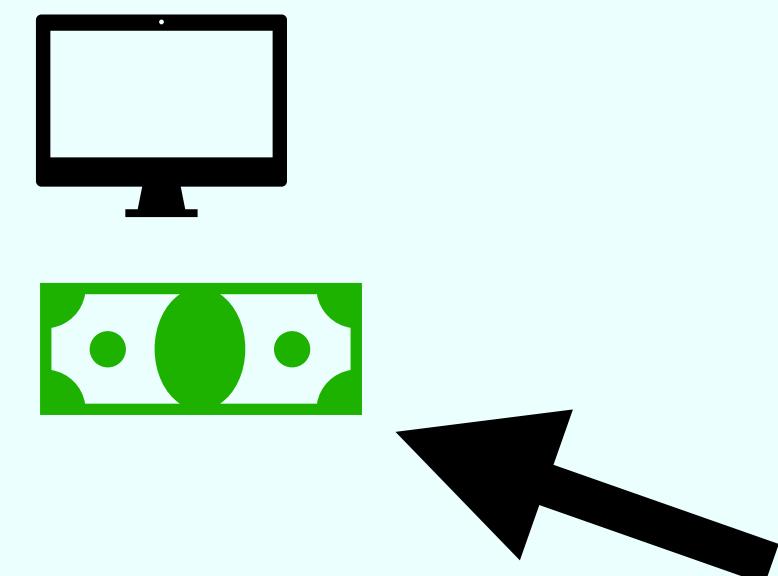
**Drawbacks of
Data Sharding**

Drawbacks of Data Sharding

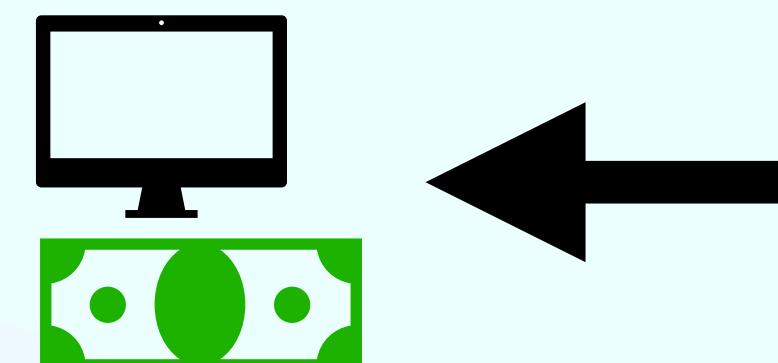
Increased infrastructure costs

Increased infrastructure costs

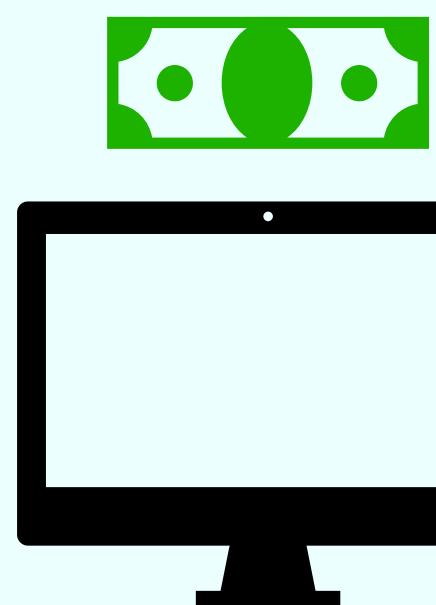
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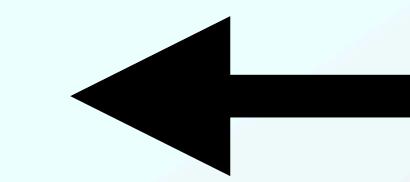
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Coke	150



Shampoo	1200
Foot Ball	1400



Index Computer

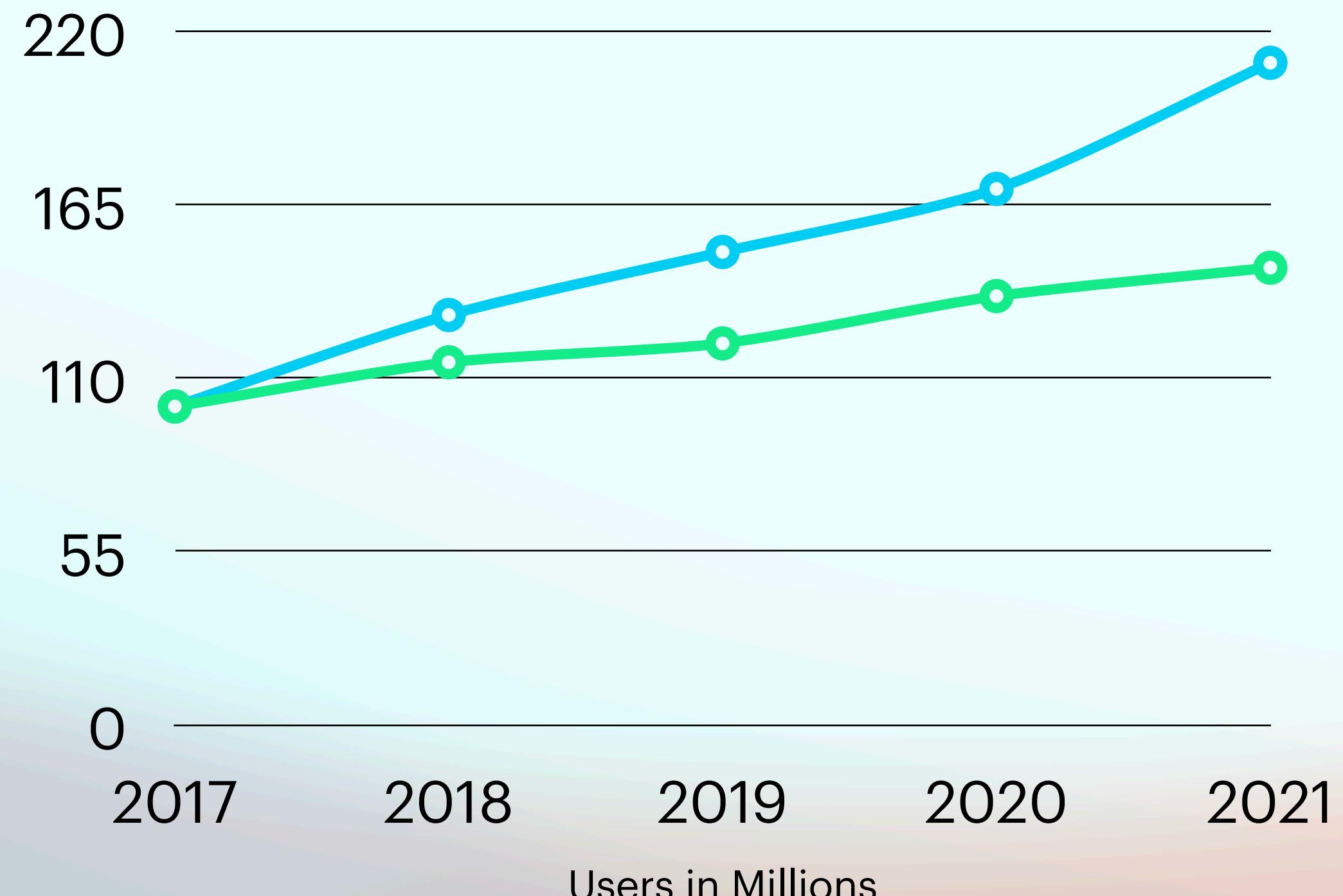


**Drawbacks of
Data Sharding**

Adoption

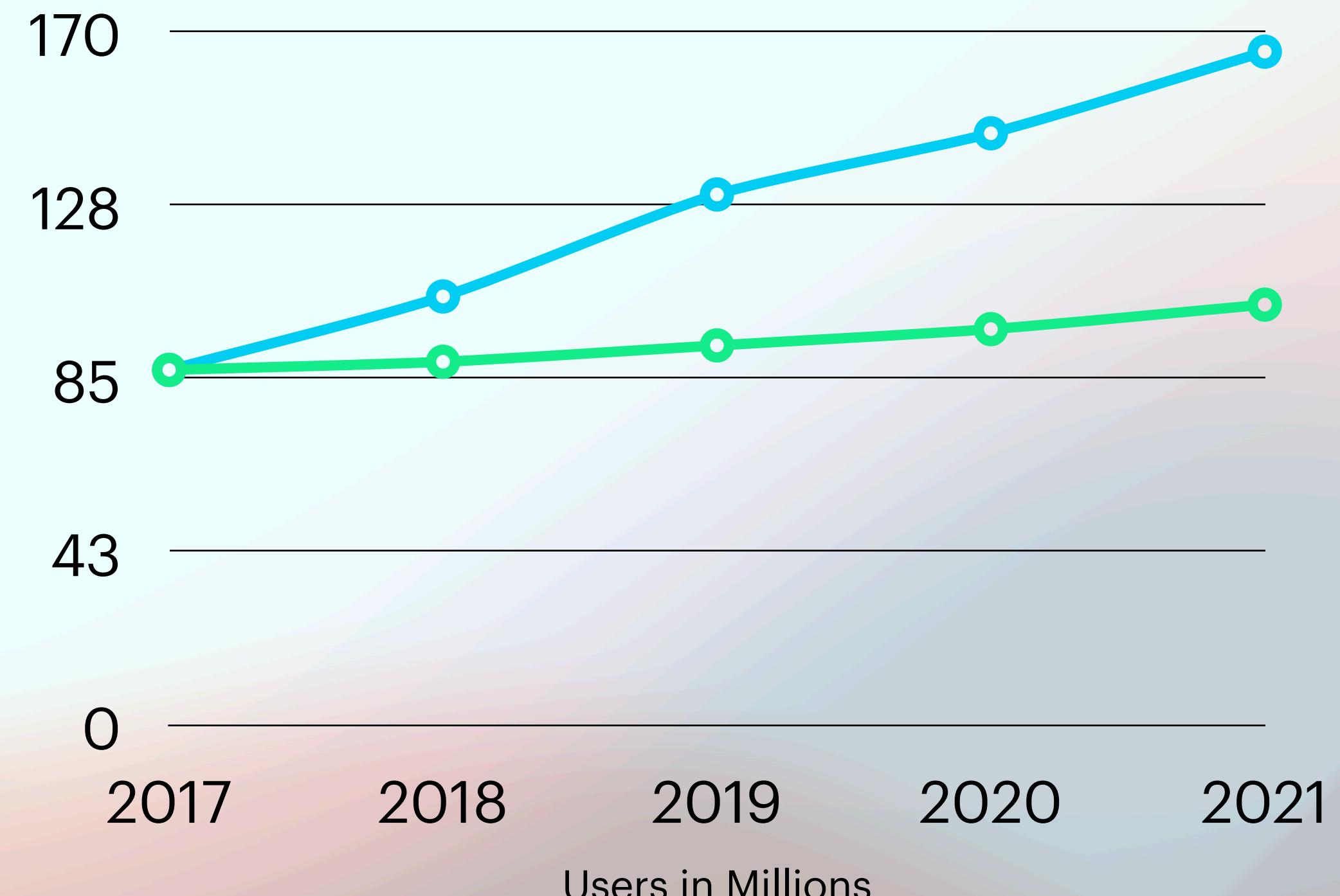
Adoption

Not Sharded Sharded



Google

Not Sharded Sharded



Facebook

thank You