

ACID vs BASE

◆ ACID কী?

👉 **Traditional Relational Database** (MySQL, PostgreSQL, Oracle) follow করে

ACID = 4টা strong guarantee

A → Atomicity

C → Consistency

I → Isolation

D → Durability

1. Atomicity – সব হবে, না হলে কিছুই না

মানে:

একটা transaction-এর সব operation একসাথে সফল হবে
একটা fail হলে → সব rollback ❌

Example:

A account → 500 taka

B account → 200 taka

Transfer 300 taka from A to B

- A থেকে 300 কাটা হলো ✅
- B তে 300 যোগ হলো ❌ (crash)

👉 Rollback → A = 500, B = 200

2. Consistency – DB rules কখনো ভাঙবে না

মানে:

- Primary key
- Foreign key
- Balance never negative

সব constraint **always valid**

👉 Transaction শেষে DB **valid state** এ থাকবে

3. Isolation – concurrent transaction একে অপরকে disturb করবে না

Example:

দুইজন একই সময় withdraw করছে

Isolation level অনুযায়ী:

- Read Uncommitted ❌
- Read Committed
- Repeatable Read
- Serializable ✅ (strongest)

👉 User বুঝতেই পারবে না parallel কাজ চলছে

4. Durability – commit হলে শেষ কথা

মানে:

Transaction commit হলে

👉 **Power off হলেও data থাকবে**

- Disk write
- WAL (Write Ahead Log)
- Replication

◆ **BASE কী?**

👉 **NoSQL / Distributed Database** follow করে

B → Basically Available

A → Soft state

E → Eventual consistency

1. Basically Available

- System সবসময় response দেবে
- Network fail হলেও

👉 Availability > Consistency

2. Soft State

- Data temporary inconsistent হতে পারে
- Cache / replica different হতে পারে

👉 State change হতে পারে even without user input

3. Eventual Consistency

👉 কিছু সময় পরে

👉 সব node এ same data হয়ে যাবে

Example:

Instagram Like count:

Node 1 → 101 likes

Node 2 → 98 likes

কিছু সময় পরে:

Node 1 → 101

Node 2 → 101 ✅

🔥 ACID vs BASE (Side-by-Side)

Topic	ACID	BASE
Consistency	Strong	Eventual
Availability	Lower	High
Scalability	Hard	Easy
Performance	Slower	Faster
Transactions	Strict	Relaxed
Use case	Banking	Social media
DB Type	SQL	NoSQL

CAP theorem relation

System	CAP Choice	Model
SQL DB	CA	ACID
MongoDB	CP	ACID + tweaks
Cassandra	AP	BASE
DynamoDB	AP	BASE

Real-world Example

Bank Transfer

Wrong balance ❌

Slow but correct ✅

ACID

Facebook Likes

Fast response ✅

Exact count later 😊

BASE

Interview Killer Lines ⭐

“ACID prioritizes data correctness, while BASE prioritizes availability and scalability.”

“In large-scale distributed systems, BASE is often preferred due to CAP theorem constraints.”

 **মনে রাখার Trick**

Money → ACID

Social → BASE

Correctness → ACID

Scale → BASE