

# What are ACID Properties in DBMS?

✔ Definition:

ACID properties are a set of **four key rules** that ensure **reliable and consistent transactions** in a database.They are essential to maintain **data integrity**, especially when multiple users or systems access the database.

ACID stands for:

- **A** – Atomicity
- **C** – Consistency
- **I** – Isolation
- **D** – Durability

✔ ACID Properties Explained:

1. ✎ Atomicity – “All or nothing”
- A transaction should either **complete fully** or **not happen at all**.
  - If any part of the transaction fails, the entire transaction is **rolled back** (undone).

✔ Example:

If you’re transferring ₹100 from Account A to Account B:

- Debit ₹100 from A ✔

- Credit ₹100 to B ✖ (fails)

→ Whole transaction is cancelled (₹100 remains in A)

2. ✔ Consistency – “Data must always be valid”
- The database must move from **one valid state to another**.
  - Rules like **foreign keys, constraints, triggers** must always be satisfied.

✔ Example:

A bank account balance can’t be negative if rules say so.

If a transaction causes a negative balance → it's rejected.

3. 🔒 Isolation – “No interference between transactions”
- Each transaction runs **as if it's the only one** in the system.
  - It prevents **dirty reads, lost updates**, etc.

✔ Example:

Two people trying to buy the **\*\*last ticket\*\*** at the same time:

→ Isolation ensures only one transaction completes.

4. 💾 Durability – “Once done, always saved”
- After a transaction is committed, **changes are permanent** — even in case of power failure or crash.

✔ Example:

You transfer money via UPI and get a confirmation ✔

→ Even if your app crashes, money is not lost.

✔ Summary Table (Copy-Paste Ready):

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Property	Meaning	
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Atomicity	All steps of a transaction succeed or none	
Consistency	Data remains valid before and after the transaction	
Isolation	Transactions do not affect each other	
Durability	Once committed, data stays saved permanently	
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Let me know if you want a **diagram**, **real-world analogy**, or the **ACID vs BASE** comparison next!