ACID properties

1. Atomicity:

* All or nothing

The entire transaction takes place at once or doesn’t happen at all. If any part of the transaction fails, the whole things get rolled back like it never happened.

**Ex:**

Commit all or nothing

**Database**

Transaction 2

Transaction 3

Transaction 1

**Transactions**

1. Consistency:

* Measurement of correctness

It should follow all the rules & leave the database in a good state. The database system itself enforces consistency by automatically checking for constraint violations during transactions.

**Ex:   
50 rupees Transaction from A to B**

1. **Initially A having 100 rupees & it transacts 50 rupees to B**

**A = 100**

**B = 200**

**Total = 300**

1. **After transaction**

**A = 50**

**B = 250**

**Total = 300**

1. **Isolation:**

**🡪** Alone

It is all about how concurrent transition interact with each other. Even if many transaction is running at the same time, isolation makes it seems like each transaction has the database all to itself. This property ensures that the execution of transactions concurrently will result in a state that is equivalent to a state achieved these were executed serially in some order.

**Ex:**

Let X = 500, Y = 500.

Consider two transactions T and T”.

Suppose T has been executed till Read (Y) and then T’’ starts. As a result, interleaving of operations takes place due to which T’’ reads the correct value of X but the incorrect value of Y and sum computed by

T’’: (X+Y = 50, 000+500=50, 500)

is thus not consistent with the sum at end of the transaction:

T: (X+Y = 50, 000 + 450 = 50, 450).

This results in database inconsistency, due to a loss of 50 units. Hence, transactions must take place in isolation and changes should be visible only after they have been made to the main memory.

1. **Durability :**

**🡪**Permanent update in the database

This property ensures that once the transaction has completed execution, the updates and modifications to the database are stored in and written to disk and they persist even if a system failure occurs. These updates now become permanent and are stored in non-volatile memory. The effects of the transaction, thus, are never lost