DBMS - Assignment - 05

Write about ACID Properties :-

Transactions refer to the single logical units of work that access and possibly modify the contents present in any given database. We can access the transactions using read and write operations.

If we want to maintain database consistency, then certain properties need to be followed in the transactions known as ACID (Atomicity, Consistency, Isolation, Durability).

Atomicity :-

Atomicity means that an entire transaction either takes place at once or doesn't happen at all.

It means there's no midway, The transaction can never occur partially.

Every transaction can be considered as single unit. We have two operations here.

commit : If a transaction commits, the changes made are visible to us.

Abort: In case a transaction aborts, the changes made to the database are not visible.

Eg:-

Before: A: 500	B: 200
Transaction T	
T1	T2
Read (A) A := A-100 Write (A)	Read (B) B := B+100 Write (B)
After: A: 400	B: 300

Consistency:-

Consistency means that we have to maintain the integrity constraints so that any given database stays consistent both before and after a transaction. If we refer to the example discussed above, then we have to maintain the total amount, both before and after the transaction.

Total after T occurs = 400 + 300 = 700

Total before T occurs = 500 + 200 = 700

Thus, the given database is consistent.

Isolation :-

Isolation ensures the occurence of multiple transactions concurrently without a database state leading to a state of inconsistency.

A transaction occurs independently, without any interference.

Let A = 500, B = 500

Let us consider two transactions here - T and T''

T	T''
Read (A)	Read (A)
A := A * 100	Read (B)
Write (A)	Z := A+B
Read (B)	Write (Z)
B := B - 50	
Write (B)	

T'': (X+B = 50,000 + 500 = 50,500)

T: (A+B = 50,000 + 450 = 50,450)

Durability:-

The durability property states that once the execution of a transaction is completed, the modifications and updates on the database gets written on and stored in the disk

Uses of ACID properties:-

In totality, the ACID properties of transactions provide a mechanism in DBMS to ensure the consistency and correctness of any database. It ensures consistency in a way that every transaction acts as a group of operations acting as single units, produces consistent results, operates on an isolated manner from all the other operations, and make durably stored updates. These ensure the integrity of data in any given database.