



UNIT IV

TRANSACTIONS

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Definition



A transaction can be defined as a group of tasks. A single task is the minimum processing unit which cannot be divided further.



Transaction Property



- Atomicity
- Consistency
- Isolation
- Durability



Automicity



It states that all operations of the transaction take place at once if not, the transaction is aborted.

Operations:

Abort: If a transaction aborts then all the changes made are not visible.

Commit: If a transaction commits then all the changes made are visible.



Example



T consisting of T1 and T2. A consists of Rs 600 and B consists of Rs 300. Transfer Rs 100 from account A to account B.

T1	T2
Read(A) A:= A-100 Write(A)	Read(B) Y:= Y+100 Write(B)



Consistency



- The integrity constraints are maintained so that the database is consistent before and after the transaction.
- The transaction is used to transform the database from one consistent state to another consistent state.



Example



Total before T occurs = $600+300=900$

Total after T occurs = $500+400=900$

In the case when T1 is completed but T2 fails, then inconsistency will occur.



Isolation



This property ensures that multiple transactions can occur concurrently without leading to the inconsistency of the database state.

Transactions occur independently without interference.



Example



Let $X = 500$, $Y = 500$.

Consider two transactions T and T'' .

T	T''
Read (X) $X := X * 100$ Write (X) Read (Y) $Y := Y - 50$ Write (Y)	Read (X) Read (Y) $Z := X + Y$ Write (Z)

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

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

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



Durability



This property ensures that once the transaction has completed execution, the updates and modifications to the database are stored in and written to disk.

These updates now become permanent and are stored in non-volatile memory. The effects of the transaction, thus, are never lost.



Points



Property

Atomicity

Consistency

Isolation

Durability

Responsibility for maintaining properties

Transaction Manager

Application programmer

Concurrency Control Manager

Recovery Manager