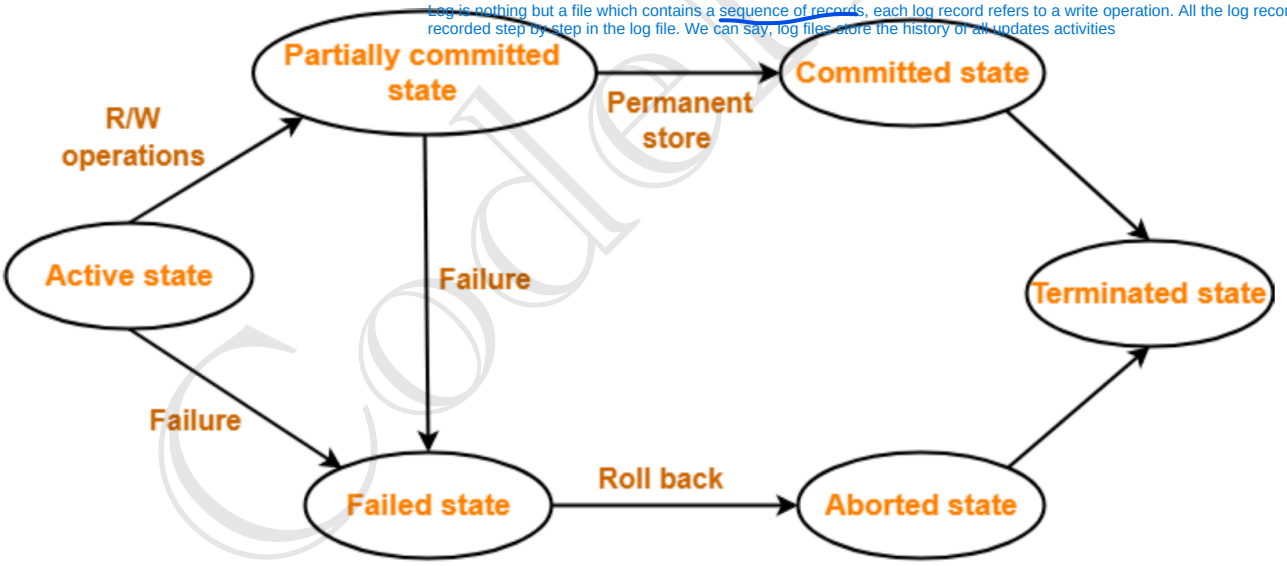
for doing transaction there are sequence of operations in single transaction eg. tansfer of money from A to B;
first at A'b side read(A's money), do A=A-x, write(A) then on B's side read(B) do B=B+x , write(B) means total 6 sql operations are occuring in transaction.

LEC-12: Transaction

1. **Transaction**
    1. A unit of work done against the DB in a logical sequence.
    2. Sequence is very important in transaction.
    3. It is a logical unit of work that contains one or more SQL statements. The result of all these statements in a transaction either gets completed successfully (all the changes made to the database are permanent) or if at any point any failure happens it gets rollbacked (all the changes being done are undone.)
2. **ACID Properties** consistency is maintained during transaction.
    1. To ensure integrity of the data, we require that the DB system maintain the following properties of the transaction.
    2. **Atomicity**
        1. Either all operations of transaction are reflected properly in the DB, or none are.
    3. **Consistency** integrity constraints means restrictions on the type of info to be entered in certain column.
        1. Integrity constraints must be maintained before and after transaction.
        2. DB must be consistent after transaction happens.
    4. **Isolation**
        1. Even though multiple transactions may execute concurrently, the system guarantees that, for every pair of transactions Ti and Tj, it appears to Ti that either Tj finished execution before Ti started, or Tj started execution after Ti finished. Thus, each transaction is unaware of other transactions executing concurrently in the system.
        2. Multiple transactions can happen in the system in isolation, without interfering each other.
    5. **Durability** means all oper'n in transactions done successfully in buffer now while writing in actual db if failure occur then dbms should have capability of recover transaction and again execute automatically and write to database.
        1. After transaction completes successfully, the changes it has made to the database persist, even if there are system failures. recovery management unit handles maintaining durability. he should maintain some mechanism like writing logs while doing operations so that on failure he can recover current state.
3. **Transaction states**

two methods of recovery management unit- shadow copy scheme and logged Based Recovery.

Log is nothing but a file which contains a sequence of records, each log record refers to a write operation. All the log records are recorded step by step in the log file. We can say, log files store the history of all updates activities



Transaction States in DBMS

1. **Active state**
    1. The very first state of the life cycle of the transaction, all the read and write operations are being performed. If they execute without any error the T comes to Partially committed state. Although if any error occurs then it leads to a Failed state.
2. **Partially committed state**
    1. After transaction is executed the changes are saved in the buffer in the main memory. If the changes made are permanent on the DB then the state will transfer to the committed state and if there is any failure, the T will go to Failed state.
3. **Committed state**

    1. When updates are made permanent on the DB. Then the T is said to be in the committed state. Rollback can't be done from the committed states. New consistent state is achieved at this stage.
4. **Failed state**
    1. When T is being executed and some failure occurs. Due to this it is impossible to continue the execution of the T.
5. **Aborted state**
    1. When T reaches the failed state, all the changes made in the buffer are reversed. After that the T rollback completely. T reaches abort state after rollback. DB's state prior to the T is achieved.
6. **Terminated state**
    1. A transaction is said to have terminated if has either committed or aborted.