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Write a short essay talking about your understanding of transactions, locks and isolation levels.

TRANSACTION in SQL is the process of executing a group of SQL statements. These statements are executed sequentially and independently. A Transaction is executed successfully when all statements are successful, then all data changes made in the Transaction are saved to the database. However, if only one of them fails, the whole process will fail, which means that the data has to be rolled back to its original state (data is restored to the state before the transaction was performed).

ACID Principle

1. Atomicity : the 'all or nothing' principle, which ensures that all statements in the command group are executed successfully. Otherwise, the Transaction is aborted at the time of failure and all previous operations are restored to their previous state meaning nothing has changed in terms of data.

2. Consistency: ensures that the database correctly changes states when a transaction is successfully executed.

3. Isolation: allows Transactions to operate independently and transparently with each other.

4. Durability: ensures that the result of a transaction is determined, no matter that Transaction's data after execution can revert to the data state before execution.

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LOCKS:

Each transaction requires different types of locks on the resource such as: row lock, page lock or table lock, ... depending on what the transaction depends on. Lock prevents other transactions from changing data. Transactions release the Lock when it is no longer dependent on the locked resources. Only then can other transactions access these resources.

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ISOLATION

Isolation levels are data isolation levels. Each transaction is assigned an isolation level to specify the degree to which it must be isolated from data modifications made by other transactions.

The Isolation levels control :

-Lock is used when data is read and the type of Lock is used.

A low level of data isolation increases concurrency and performance, but it increases the risk of the bad effects discussed in the previous section. Depending on the circumstances, the environment and the requirements of the application, we choose the most appropriate data isolation levels. SQL provides the following isolation levels in ascending order of data isolation: Read Uncommitted, Read Committed, Repeatable Read, Serializable, Snapshot.