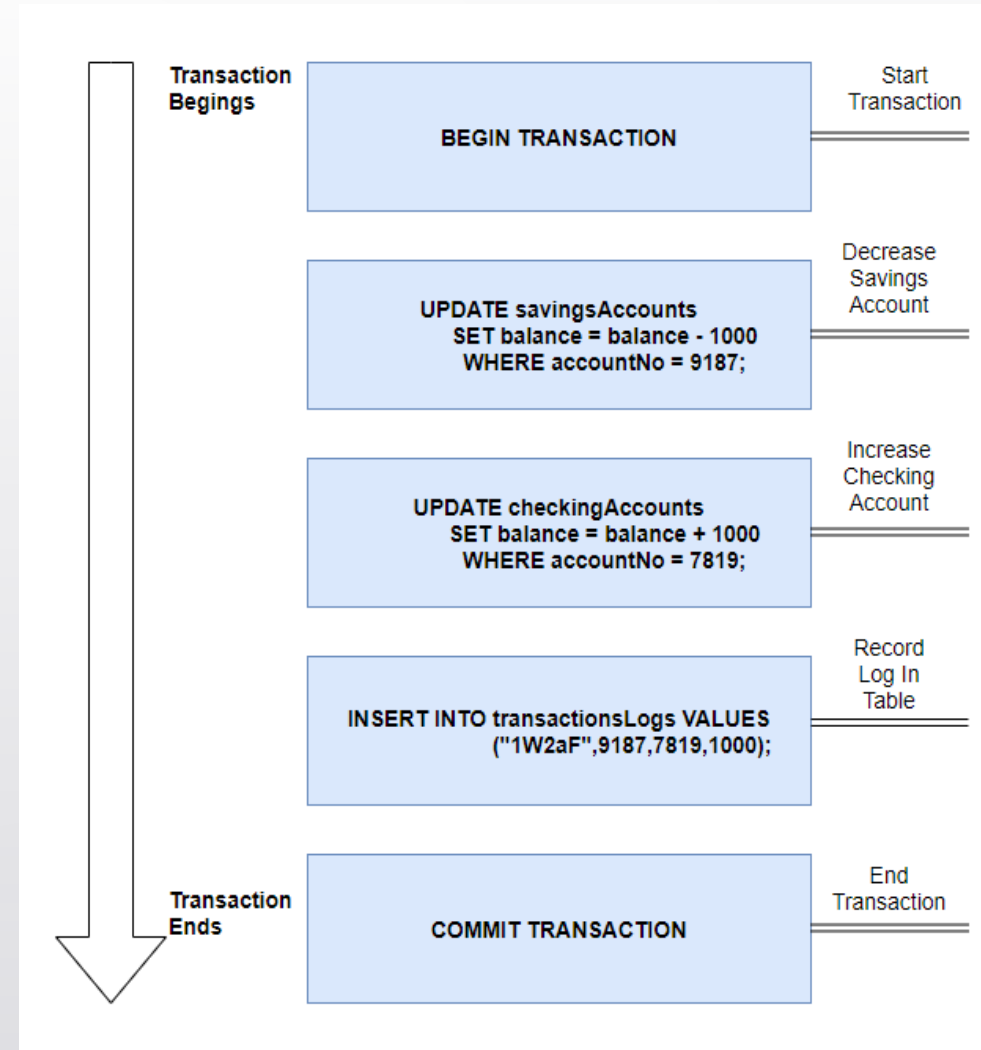




**What is a Transaction and what are
ACID properties?**

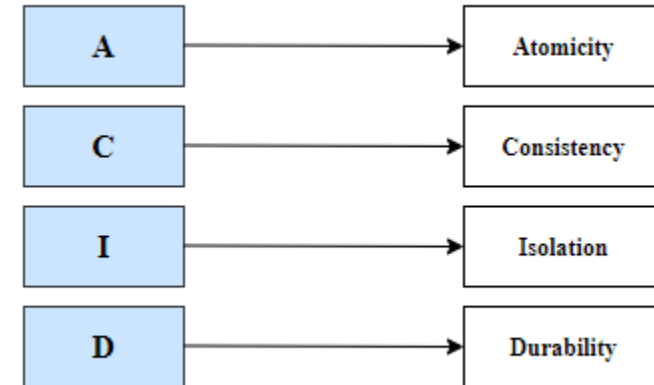
What is a Transaction...

- A transaction is a sequential group of database manipulation operations, which is performed as if it were one single work unit.
- Transactions access data using read and write operations.
- A transaction groups SQL statements so that they are either all committed, which means they are applied to the database, or all rolled back, which means they are undone from the database.
- If any operation within the transaction fails, the entire transaction will fail.
- Transfer \$1000.00 from my Savings Account 9187 to Checking Account 7819.



ACID Properties

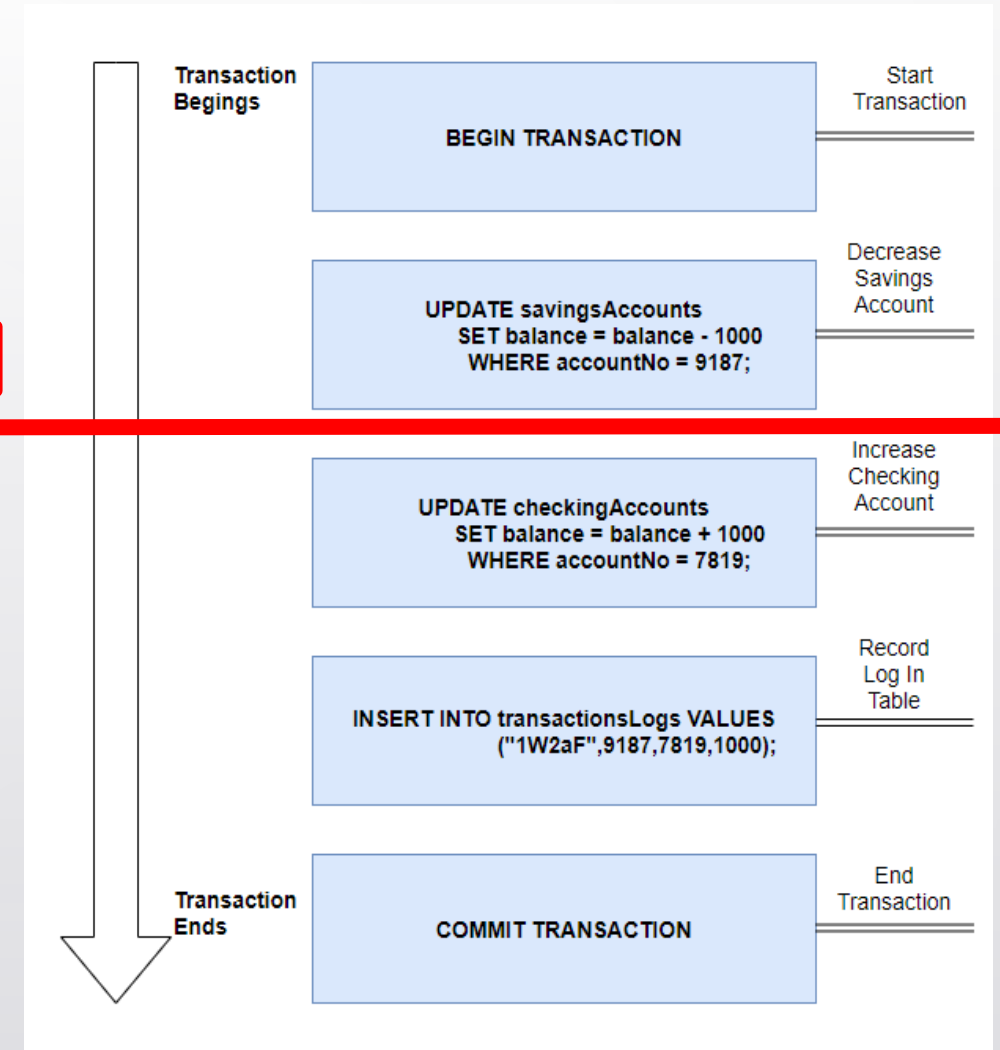
- ACID is a concept (and an acronym) that refers to the four properties of a transaction in a database system, which are: **Atomicity, Consistency, Isolation and Durability.**
- These properties ensure the accuracy and integrity of the data in the database.
- Ensuring that the data does not become corrupt as a result of some failure.
- Because of the ACID properties, we can focus on the application logic instead of failures, recovery and sync of the data.



Atomicity...

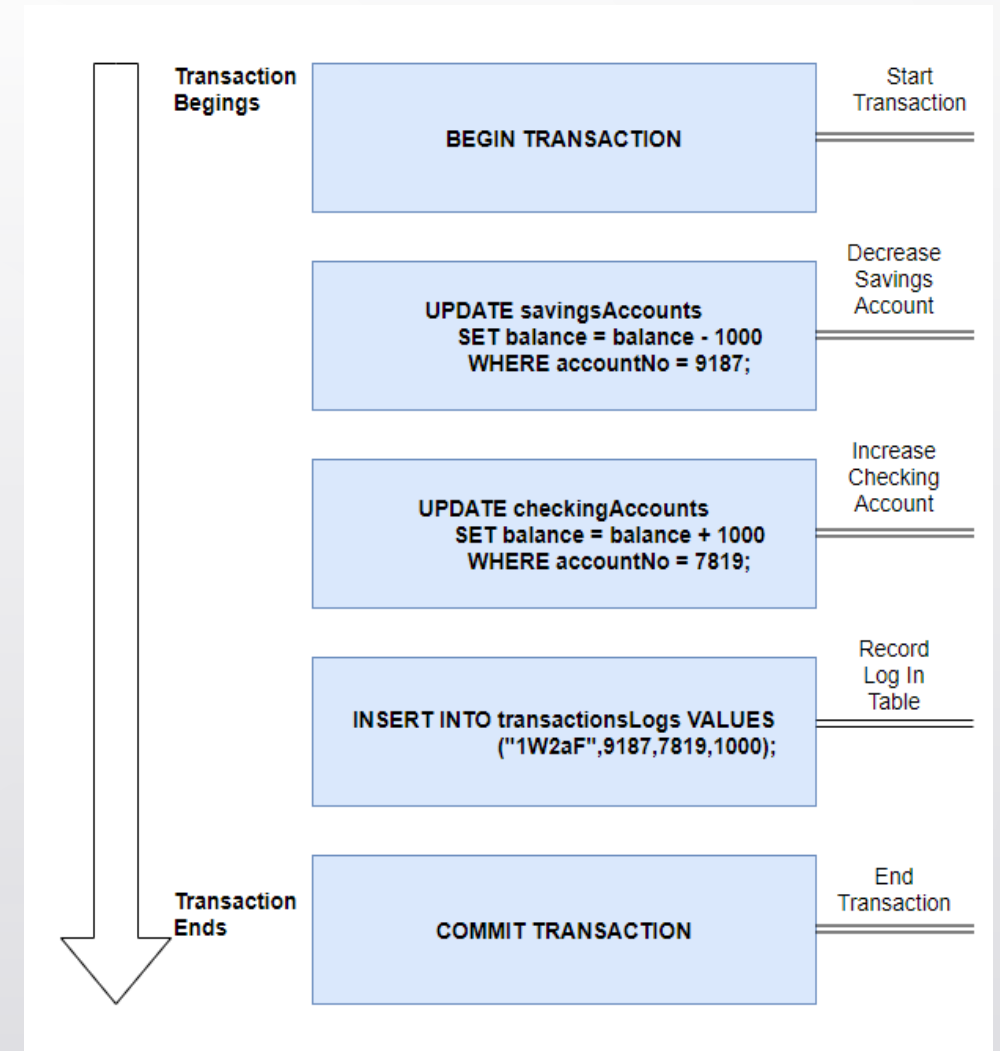
- A transaction must be an atomic unit of work.
- that is, either all of its operations are executed or none.
- The transaction should be completely executed or fails completely, if one part of the transaction fails, all the transaction will fail.
- This provides reliability because if there is a failure in the middle of a transaction, none of the changes in that transaction will be committed.

Failure



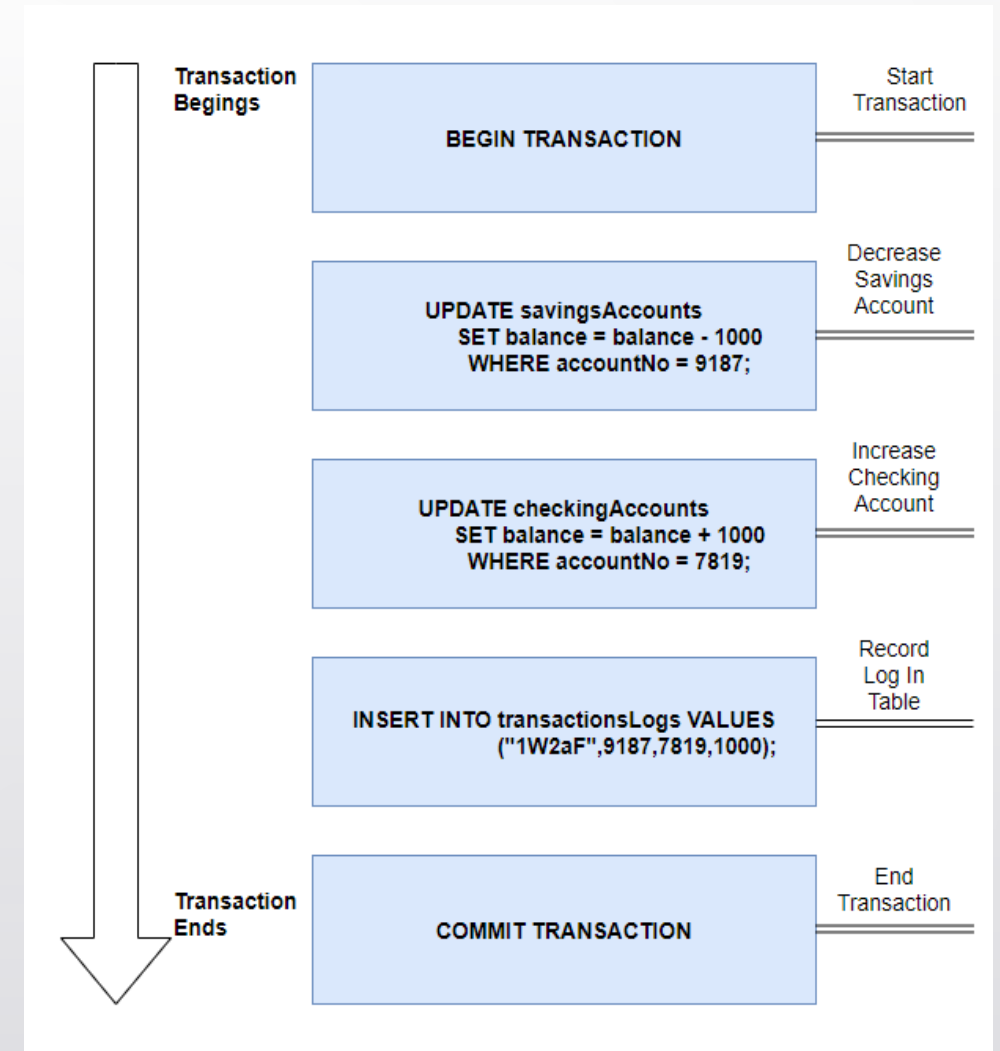
Consistency...

- The database must remain in a consistent state after any transaction.
- ensures that the transaction **maintains data integrity constraints, leaving the data consistent.**
- It also refers to the correctness of a database.
- The data that is saved in the database must always be valid.
- The data will be valid according to defined rules, including any constraints.
- If you have a column that does not allow negative numbers, and try to add or modify a record, using a value lower than zero on this column, the transaction will fail.



Isolation...

- All the transactions will be carried out and executed as if it is the only transaction in the system. No transaction will affect the existence of any other transaction.
- Ensuring that the transaction will not be changed by any other concurrent transaction.
- For example, if two clients are trying to buy at the same time the last available product on the web site, when the first user finishes the shopping, it will make the transaction of the other user be interrupted.



Durability...

- Once a transaction is completed and committed, its **changes are persisted permanently in the database**.
- Ensures that the information that is saved in the database is immutable until another update or deletion transaction affects it.
- For this purpose, the completed transactions are recorded on permanent memory devices (non-volatile) such as hard drives, so the data will be always available, even if the DB instance is restarted.

**Changes
Saved to
DISK**

