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Introduction to Transactions in SQL

Mastering SQL Transactions for Reliable Data Management

DEFINITION

> Transactions in SQL are sequences of operations performed as a single unit. They ensure data integrity and consistency in databases.

KEY CONCEPTS

ACID Properties

Transactions follow ACID principles: Atomicity, Consistency, Isolation, and Durability to maintain data integrity.

BEGIN, COMMIT, ROLLBACK

BEGIN starts a transaction, COMMIT saves changes, and ROLLBACK undoes changes if needed.

Isolation Levels

Isolation levels define how transaction integrity is visible to other transactions, affecting concurrency.

Concurrent Transactions

Multiple transactions can occur simultaneously, requiring careful management to avoid conflicts.

Error Handling

Proper error handling ensures transactions can be rolled back to maintain data consistency.

EXAMPLES

→ BEGIN; UPDATE accounts SET balance = balance - 100 WHERE id = 1; COMMIT;

→ BEGIN; DELETE FROM orders WHERE order_id = 5; ROLLBACK;

→ BEGIN; INSERT INTO logs (action) VALUES ('User logged in'); COMMIT;

MEMORY TIPS

★ Remember ACID: Atomicity, Consistency, Isolation, Durability.

★ Think of transactions like a bank: you either complete the deposit or cancel it.

★ Use 'C' for Commit and 'R' for Rollback to differentiate saving and undoing.

COMMON MISTAKES

✗ Forgetting to use COMMIT after making changes.

✗ Neglecting to handle errors, leading to incomplete transactions.

✗ Not understanding isolation levels, causing data conflicts.

QUICK RECAP

SQL transactions ensure that a series of operations are completed successfully or not at all. Understanding ACID properties and transaction commands like BEGIN, COMMIT, and ROLLBACK is crucial for maintaining data integrity.