



Relational Database Concepts

Transaction Processing

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Objectives

- Understand transaction processing.
- Examples of transactions.



Transaction Processing

- Transaction management, is very important to organization such as banks with automatic tellers, airlines with online reservations systems, universities with online registrations, retail stores with online shopping and payment processing
- These organizations could not function without reliable and efficient transactions processing.
- A database transaction involves a collection of operations that must be reliably processed is one unit of work. Transactions are all or nothing meaning that all operations of a transaction must either succeed or the entire transaction is cancelled.
- Transactions should be processed reliably so that there's no loss of data due to interference among concurrent users, users operating at the same time, and failures such as operating system crashes.



Airline Transaction Example

START TRANSACTION

Display greeting

Get reservation preferences from user

SELECT departure and return flight records

If reservation is acceptable then

 UPDATE seats remaining of departure flight record

 UPDATE seats remaining of return flight record

 INSERT reservation record

 Email receipt if requested

End if

On Error:ROLLBACK

COMMIT



Airline Transaction Example

- The data request from a user, such as flight preferences, in the interaction with the database such as updating a flight record.
- Making an airline reservation typically involve reservations for the departure and return.
- To a traveler, the combination of the departure and the return is a transaction, not the departure and the return separately.
- If a departure and return were considered separately, a traveler may make a departure without obtaining a desired return flight.
- In this example note that the multiple database operations are necessary. Two update operations for the departure and return records and one INSERT operation for the reservation record are necessary.



Airline Transaction Example

- You should also note the exception handling indicated by the line with On Error. If any kind of error occurs, such as loss of connection, any partial actions are removed with a ROLLBACK statement.
- After the COMMIT executes, all actions are recorded in a database without interference from multiple users and loss of data from failures.

ATM Transaction Example

START TRANSACTION

Display greeting

Get account number, pin, type, and amount

SELECT account number, type, and balance

If balance is sufficient then

UPDATE account by posting debit

UPDATE account by posting credit

INSERT history record

Display message and dispense cash

Print receipt if requested

End if

On Error:ROLLBACK

COMMIT



ATM Transaction Example

- The ATM transaction example shows data requested from the user such as account number and transaction type.
- Multiple database actions occur such as posted to debit and corresponding credit to the bank's accounts.
- If failure occurs before the transaction terminates all actions are removed or undone with the on error and rollback line.



Transaction Management

- Database management systems provide two services to ensure reliable transaction processing.
- DBMS's ensure that concurrent users, that is users operating at the same time, do not overwrite each other or cancel each others actions. Without proper control, work can be lost as one concurrent user overrides another concurrent user.
- DBMS's also ensure that a failure after a transaction finishes will not result in loss of data.



Transaction Management

- Two internal features of a DBMS provide these services, concurrency for controlling actions of concurrent users and the recovery manager for dealing with failures, such as communication errors and software crashes.
- It is important to note that these services are internal and transparent to the database users.
- For databases, transparency means that the inner details of transaction services are invisible.