Leonard Wassenaar
25948083

ITRW 321

SU 1: Summary

Transaction Management and Concurrency control

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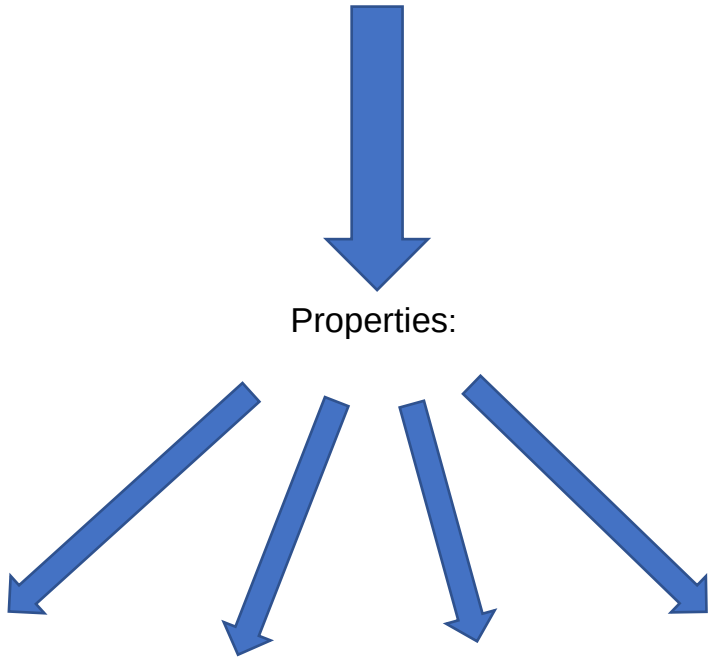
Transaction Management and Concurrency control

Transactions:

A transaction involves accessing a database with an arrangement of database requests.



Every part of a transaction is treated as single logical unit

Database must be in a consistent state.

Data of a Transaction can't be used until the first one is finished.

When changes is made and committed, it can't be undone or go missing.

Concurrency Control:

A feature of the database management system coordinating the simultaneous transaction execution in multiuser database systems.

Concurrency Control Problems:

Lost Update

Transaction accesing data before and after other transactions are finshed working with the data.

Uncomitted Data

A transaction accessing data that is uncomitted from a different transaction.

Inconsistent Retrievals

Is a problem where a transaction accesses data before and after other transactions are done working with the data.

Concurrency Control with Locking methods:

Lock:

A device that provides exclusive use of data to a current transaction.

Lock granularity:

Database-level lock	Database access is restricted to the owner of the lock and allows only one user at a time.
Table-level lock	Allows one transaction at a time to access the table.
Page-level lock	The DBMS lock the entire diskpage.
Row-level lock	Enables concurrent transactions to access separate rows of the same table.
Field-level lock	Access the same row as long as they have different fields.

Two-Phase Locking:
Principles that rules how a transaction acquires and relinquish locks.

Phases:

Growing phase:	Transaction gets locked without unlocking data
Shrinking phase:	Releases locks and cannot aquire a new lock
Rules: • Transactions cannot have locks that have conflicts. • Unlock operations cannot precede a lock operation with similar transactions. • Locks must be obtained first before data will be effected.	

Deadlock:

More than one transaction wait for others to release the lock from a previously locked item.

Concurrency Control with Time Stamping Methods:

Methods in time stamping is used to control concurrent transaction execution.

Wait/die:
Transactions that are older must wait for the newer transaction to finish, then release locks before it can request the lock.

Wound/wait:
Older transactions can request the lock, then preempt the newer transaction and reschedule it.

Concurrency Control with Optimistic Methods:

Optimistic approach:

Assuming that most database operations do not battle.

Transaction moves though 2 or 3 Phases:

Read phase	Database is read, needed computations is executed and updates are made.
Validation phase	Validate transactions to see if the changes effects consistency and integrity.
Write phase	Permanent changes are applied to the database

Database Recovery Management:

Database Recovery:

Involves restoring the database to a consistent previous state.

Critical events that can cause the database to be less functional and compromise data integrity:

- Hardware failures
- Software failures
- Human- caused incidents
- Natural disasters

Transactional Recovery:

4 concepts that influences the recovery process;

- Write-ahead-log protocol
- Redundant transaction logs
- Buffers
- Database checkpoints