Transaction Support in SQL

65

- A transaction is initiated implicitly when an SQL statement is executed.
  - Each DBMS provides either a commit or a rollback (abort) option
- Isolation level: controls the extent to which a transaction is exposed to actions of other transactions executing concurrently
- Four possible isolation levels
  - Increase concurrency → increasing Xact exposure to uncommitted changes from other Xacts

65

Isolation Levels (cont'd)

66

- SQL-92 provides different isolation levels that control the degree of concurrency

Isolation Level	In DB2	Dirty Read	Unrepeatable Read	
Read Uncommitted	Uncommitted Read	Maybe	Maybe	Phantoms possible
Read Committed	Cursor Stability (default)	No	Maybe	Phantoms possible
Repeatable Reads	Repeatable Reads	No	No	Phantoms possible
Serializable	Read Stability	No	No	

66

Degrees of Isolation in SQL

67

- **Four levels of isolation**
  - READ UNCOMMITTED: no read locks
  - READ COMMITTED: short duration read locks
  - REPEATABLE READ:
    - Long duration read locks on individual items
  - SERIALIZABLE:
    - All locks long duration
- **Trade-off: consistency vs concurrency**
- Commercial systems give choice of level

67

Isolation Levels in SQL

68

1. "Dirty reads"
   SET TRANSACTION ISOLATION LEVEL READ UNCOMMITTED

2. "Committed reads"
   SET TRANSACTION ISOLATION LEVEL READ COMMITTED

3. "Repeatable reads"
   SET TRANSACTION ISOLATION LEVEL REPEATABLE READ

4. Serializable transactions
   SET TRANSACTION ISOLATION LEVEL SERIALIZABLE   ACID

68

Choosing Isolation Level

69

- Trade-off: efficiency vs correctness

- DBMSs give user choice of level

Beware!!
- Default level is often NOT serializable
- Default level differs between DBMSs
- Serializable may not be exactly ACID

Always read docs!

69