16 – Concurrency Control Theory

1. Transaction

   A. Sequence of operations

   B. Should executed all or nothing

   C. During executing transaction, there might be temporary inconsistency in DB, but, after executing transaction, there are no inconsistency.

   D. COMMIT and ABORT

      i. commit means DBMS save it's result or abort it.

      ii. abort means undo all of changes that is made by txn.

2. ACID property

   A. Atomicity : transactions should be executed all or nothing

      i. Save log to trace changes mady by transaction,
         if abort, use log to rollback it

      ii. Copy pages and make changes to it,
          if commit, make these copies visible.

   B. Consistency : before and after transaction, DB should be logically correct

   C. Isolation : each transactions should be executed as if it was running alone.

      i. Pessimistic way : don't allow problems arise.

      ii. Optimistic way : if problem arises, handle it.

   D. Durability :

3. Conflicts

   A. Types of Conflicts

      i. Read-write
          If T1 read A twice, and T2 write A between T1's read operation,
          it can be a problem – T1 and T2 are not isolated

      ii. Write-read
          If T1 write A and abort, and T2 read A before T1 abort
          it can be a problem – dirty read

      iii. Write-write
          If T1 and T2 modify A, one change is overwrited and it can't be
          commited to DB

   B. Conflict Serializable
      schedule is conflict serializable
      if schedule can be serial schedule by swapping some operation without
      harm of order

4. Introduced Papers

   A. Google's Globally-Distributed Database