ST. XAVIER’S COLLEGE

**(Affiliated to Tribhuvan University)**

**Maitighar, Kathmandu**

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**Database Management System**

**Theory Assignment**

**SUBMITTED BY:**

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**Database Concurrency Control**

**Introduction**

Process of managing simultaneous operation of transactions in a shared database, to ensure the serializability of transactions is known as concurrency control. Concurrency Control protocols are mechanisms to control concurrency of transactions to ensure isolation of transactions.

**Need of Concurrency Control**

1. **Lost updates:** This problem occurs when two transactions that access the same database items have their operations interleaved in a way that makes the value of some database item incorrect. Successfully completed update is overridden by another user.
2. **The dirty read problem:** Transactions read a value written by a transaction that has been later aborted. This value disappears from the database upon abort, and should not have been read by any transaction. The reading transaction end with incorrect results.
3. **The incorrect summary problem:** While one transaction takes the summary over the values of all the instances of a repeated data item, a second transaction updates some instances of that data item. The resulting summary does not reflect a correct result for any precedence order between the two transactions.

**Two Phase Locking**

In databases and transaction processing, two phase locking (2PL) is a concurrency control method that guarantees serializability. It is also the name of the resulting set of database transaction schedules. The protocol utilizes locks, applied by a transaction to data, which may block other transactions from accessing the same data during the transaction’s life.

By the 2PL protocol locks are applied and removed in two phases:

* **Expanding Phase:** locks are acquired and no locks are released.
* **Shrinking Phase:** locks are released and no locks are acquired.

Two types of locks are utilized by the basic protocol: Shared and Exclusive locks. Refinements of the basic protocol may utilize more lock types. Using locks that block processes, 2PL may be subject to deadlocks that result from the mutual blocking of two or more transactions.

**Limitation of CCM**

Concurrency Control is a type of management style where employers or supervisors constantly monitor how employees are working while the work is still in progress. This kind of management makes employees feel like slaves and lowers their morale to work, which lowers production. It also creates a sense of mistrust between the employers and the employees.

**Timestamp based Protocols**

* Each transaction is issued a timestamp when it enters the system. If an old transaction Ti has time stamp TS (Ti), a new transaction Tj is assigned time stamp TS (Tj) such that TS (Ti) < TS (Tj).
* The protocol manages concurrent execution such that the time stamps determine the serializability order.
* In order to assure such behavior, the protocol maintains for each data Q two timestamp values:
  + W-timestamp (Q) is the largest time stamp of any transaction that executed write (Q) successfully.
  + R-timestamp (Q) is the largest time stamp of any transaction that executed read (Q) successfully.
* The timestamp ordering protocol ensures that any conflicting read and write operations are executed in timestamp order.