Quadrant II – Transcript and Related Materials

Programme: Bachelor of Science (Second Year)
Subject: Computer Science
Course Code: CSC103
Course Title: Database Management systems
Unit: 09
Module Name: Transaction Management: Lock Based Concurrency control- II

Notes:

1. Graph Based Protocol

- Graph-based protocol is an alternative to two-phase locking.
- Impose a partial ordering on the set D = {d1, d2,..., dh} of all data items.
- If di, dj are data items then any transaction accessing both di and dj must access di before accessing dj.
- Implies that the set D may be viewed as a directed acyclic graph, called a database graph.
- The tree-protocol is a simple kind of graph protocol.

2. Tree Based Protocol

- Partial Order on Database items determines a tree like structure.
- In this protocol, Only Exclusive Locks are allowed.
- The first lock by Ti may be on any data item. Subsequently, a data Q can be locked by Ti only if the parent of Q is currently locked by Ti
- Data items may be unlocked at any time.
- Tree based Protocol ensures Conflict Serializability and Deadlock Free Schedule.
- In this protocol there is no need to wait for unlocking a Data item as done in 2-PL protocol, thus increasing the concurrency.

Tree Based Protocol Example:-

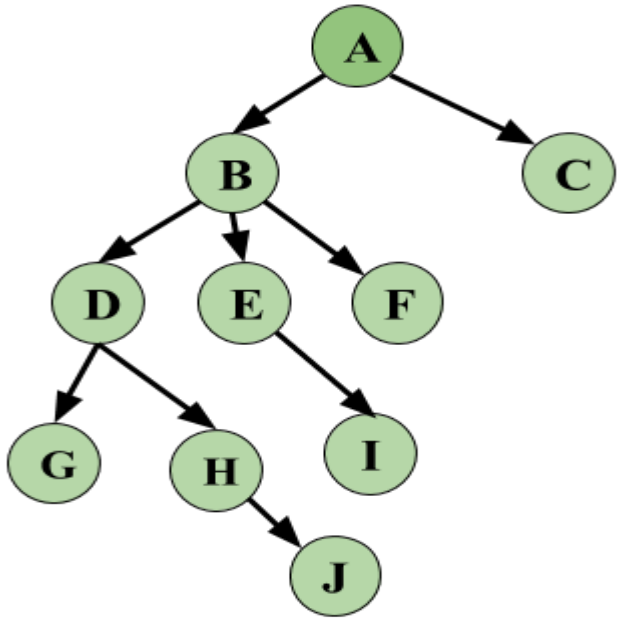

Fig1: Database Graph

T1	T2	T3
Lock-X(A) Lock-X(B)		
	Lock-X(D) Lock-X(H) Unlock-X(D)	
Lock-X(E) Lock-X(D) Unlock-X(B) Unlock-X(E)		
		Lock-X(B) Lock-X(E)
	Unlock-X(H)	
Lock-X(B) Lock-X(G) Unlock-X(D)		
		Unlock-X(E) Unlock-X(B)
Unlock-X(G)		

Advantages & Disadvantages of Graph Based Protocol

Advantages: -

- Ensures conflict Serializable Schedule.
- Ensures Deadlock Free Schedule.
- Unlocking can be done at any time.

Disadvantages: -

- Unnecessary locking overheads may happen sometimes.
- Cascading Rollbacks is a problem.

Summary:

- Graph-based protocol is an alternative to two-phase locking.
- Partial Order on Database items determines a tree like structure.
- In Tree Based protocol, Only Exclusive Locks are allowed.
- Tree based Protocol ensures Conflict Serializability and Deadlock Free Schedule.
- In this protocol there is no need to wait for unlocking a Data item as done in 2-PL protocol, thus increasing the concurrency.