Chapter 7.7 Tree Protocol

*Introduction:*

In this Chapter, mainly related with *Data of Tree Module*. However, the Tree Node has not formed the Level that contains Relation. *To some extant, Database Element are non - intersect Data Segment and the only way to reach the node is through its Parent Node.* *B - Tree* is one of the important example of this kind of Data.

Chapter 7.7.1 Lock Motive Based on Tree (Need to Re - read)

*Introduction:*

B - Tree Index treats single node (block) as the lockable Database Element. Tree Node is a correct Lock Granularity, since there has not any benefits to treat the whole Database Tree as one Database Element, also it prevents the development from happening through using the Lock Infrastructure which has been introduced before.

Since if we use the standard Shared Lock, Exclusive Lock, and Update Lock, such Locking Collection, and using the Two - Phase Lock, then it is impossible to use B - Tree structure concurrently. The reason is that each Transaction that used Index must start from Locking B - Tree Root Node. If Transaction is 2PL, then it can not release Root, till the Transaction releases B - Tree Root Node.

*In principle, any insertion or deletion transaction may need to rewrite the Root node of B - Tree, actually each transaction needs one Update Lock of the Root Node, or when the Update Node can not be reached, then it should get one Exclusive Lock. So, every time, there should only one non - read Transaction can access the B - Tree.*

*In the most of situations, we can conclude that B - Tree Node would not be rewritten, even we insert or delete the Tree Node.*

Normally, we can not release the Lock of the root since release the lock early would violate 2PL and we can not make sure whether schedule of several Transactions is Serializable. The Solution is to use the specialized protocol. This protocol violates the 2PL, but the fact that the access of Database Element must from top to the end is used to guarantee Serializable Transactions.

Chapter 7.7.2 Rule that Access to Tree Structure Data

Chapter 7.7.3 Reason why Tree Protocol Takes Effect