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Assignment -16

16.7) Consider the log records generated with the modified recovery algorithm.

1. $\langle T_1, \text{start} \rangle$
2. $\langle T_1, A, 1000, 900 \rangle$
3. $\langle T_2, \text{start} \rangle$
4. $\langle T_2, A, 1000, 2000 \rangle$
5. $\langle T_2, \text{commit} \rangle$

A rollback happened between step 2 & 3.
At the end of the redo-phase T_1 would get added to the undo-list, and the value of A would be 2000. During the undo-phase since T_1 is present in the undo list the recovery algorithm does an undo of statement 2 and A takes the value of 100.

1. $\langle T_1, \text{start} \rangle$
2. $\langle T_1, A, 1000, 900 \rangle$
3. $\langle T_1, A, 1000 \rangle$
4. $\langle T_1, \text{Abort} \rangle$
5. $\langle T_2, \text{start} \rangle$
6. $\langle T_2, A, 1000, 2000 \rangle$
7. $\langle T_2, \text{commit} \rangle$

16.14)

Consider a banking schema with a transaction that transfers \$50 from account A to account B

1. read (A, a_1)
2. $a_1 := a_1 - 50$
3. write (A, a_1)
4. read (B, b_1)
5. $b_1 := b_1 + 50$
6. write (B, b_1)

Suppose the system crashes after the transaction commits, but before the log records are flushed to stable storage. Let us assume that at the time of the crash the update of A in 3rd step had alone been propagated to the disk whereas the buffer page containing B was not yet written to disk.

When the system comes up it is in an inconsistent state but recovery is not possible because there are no records corresponding to transaction in stable storage.

16.18) Redo-phase :-

1. undo list $\langle T_0, T_1 \rangle$
2. Start from the checkpoint entry and perform the redo operation
3. $c = 600$
4. T_1 is removed from undo-list as there is commit record.
5. T_2 is added to the undo list on encountering $\langle T_2, \text{start} \rangle$ record
6. $A = 400$.
7. $B = 2000$

Undo-phase :-

1. Undo list $\langle T_0, T_2 \rangle$
2. Scan the log backward from end
3. $A = 500$; output the redo only record $\langle T_2, A, 500 \rangle$
4. output $\langle T_2, \text{abort} \rangle$
5. $B = 2000$, output the redo-only record $\langle T_0, B, 2000 \rangle$
6. output $\langle T_0, \text{abort} \rangle$

At the end of recovery process

$A = 500$, $B = 2000$, $c = 600$.

log records added during recovery are -

$\langle T_2, A, 500 \rangle$

$\langle T_2, \text{abort} \rangle$

$\langle T_0, B, 2000 \rangle$

$\langle T_0, \text{abort} \rangle$