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Camlin Page
Date / /

Soln (1) (1) If crash happens and the last log record on the disk is <START U>, T is uncommitted, therefore we undo its actions, from the end moving backwards.

A → 10

(2) If the crash happens after <COMMIT U> we have a committed transaction (U) and an uncommitted trans (T). we redo the actions of U in the order earliest first:-

B → 21, D → 41.

We undo the actions of T from the end moving backwards:

C → 30, A → 10.

(3) If the crash follows <T, E, 50, 51>. U has been committed, so we redo its actions starting earliest first.

B → 21, D → 41.

T is uncommitted, so undo its actions, from the end backwards.

E → 50, C → 30, A → 10

(4) If the crash follows commit T, both transitions are committed hence actions of both T and U undergo redo, earliest first.

A → 11, B → 21, C → 31, D → 41.
E → 51

Sol^n (2) (1) Disk reads from A and B :-
$r_1(A)$, $r_1(B)$

(2) Disk write on B : $w_1(B)$

(3) Disk read followed by disk write for C :-
$r_1(C)$; $w_1(C)$

(4) Disk read followed by disk write for D :-
$r_1(D)$, $w_1(D)$

(5) Disk read followed by disk write for E :-
$r_1(E)$, $w_1(E)$:

Tasks: $r_1(A)$; $r_1(B)$; $w_1(B)$; $r_1(C)$; $w_1(C)$; $r_1(D)$;
$w_1(D)$; $r_1(E)$; $w_1(E)$.

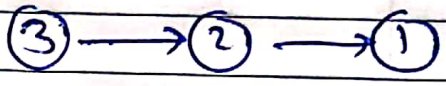
Camlin Page
Date / /

Soln (3) :- (1) $r_1(A)$; $r_2(A)$, $r_3(B)$, $w_1(A)$, $r_2(C)$, $r_2(B)$, $w_2(B)$, $w_1(C)$

Comparing $r_3(B)$ and $w_2(B)$ $\Rightarrow$ $3 \rightarrow 2$.

Comparing $r_2(C)$ and $w_1(C)$ $\Rightarrow$ $2 \rightarrow 1$

Therefore, precedence graph :

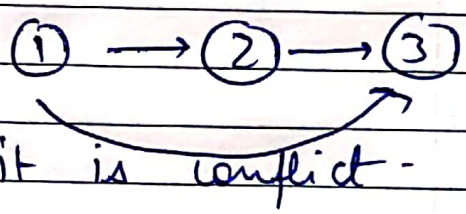


∴ this is acyclic hence the schedule is conflict - serializable.

(2) $r_1(A)$, $w_1(B)$, $r_2(B)$, $w_2(C)$, $r_3(C)$, $w_3(A)$

Comparing $r_1(A)$ and $w_3(A)$ $\Rightarrow$ $1 \rightarrow 3$.
Comparing $w_1(B)$ and $r_2(B)$ $\Rightarrow$ $1 \rightarrow 2$
Comparing $w_2(C)$ and $r_3(C)$ $\Rightarrow$ $2 \rightarrow 3$.

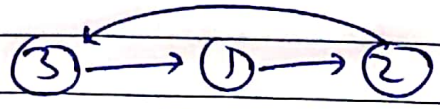
Precedence graph :-



∴ the graph is acyclic, it is conflict - serializable.

(3) $w_3(A)$, $r_1(A)$, $w_1(B)$, $r_2(B)$, $w_2(C)$, $r_3(C)$

Comparing $w_3(A)$ and $r_1(A)$: $\Rightarrow$ $3 \rightarrow 1$
Comparing $w_1(B)$ and $r_2(B)$ $\Rightarrow$ $1 \rightarrow 2$
Comparing $w_2(C)$ and $r_3(C)$ $\Rightarrow$ $2 \rightarrow 3$.



∴ graph is cyclic Hence, it isn't conflict serializable.