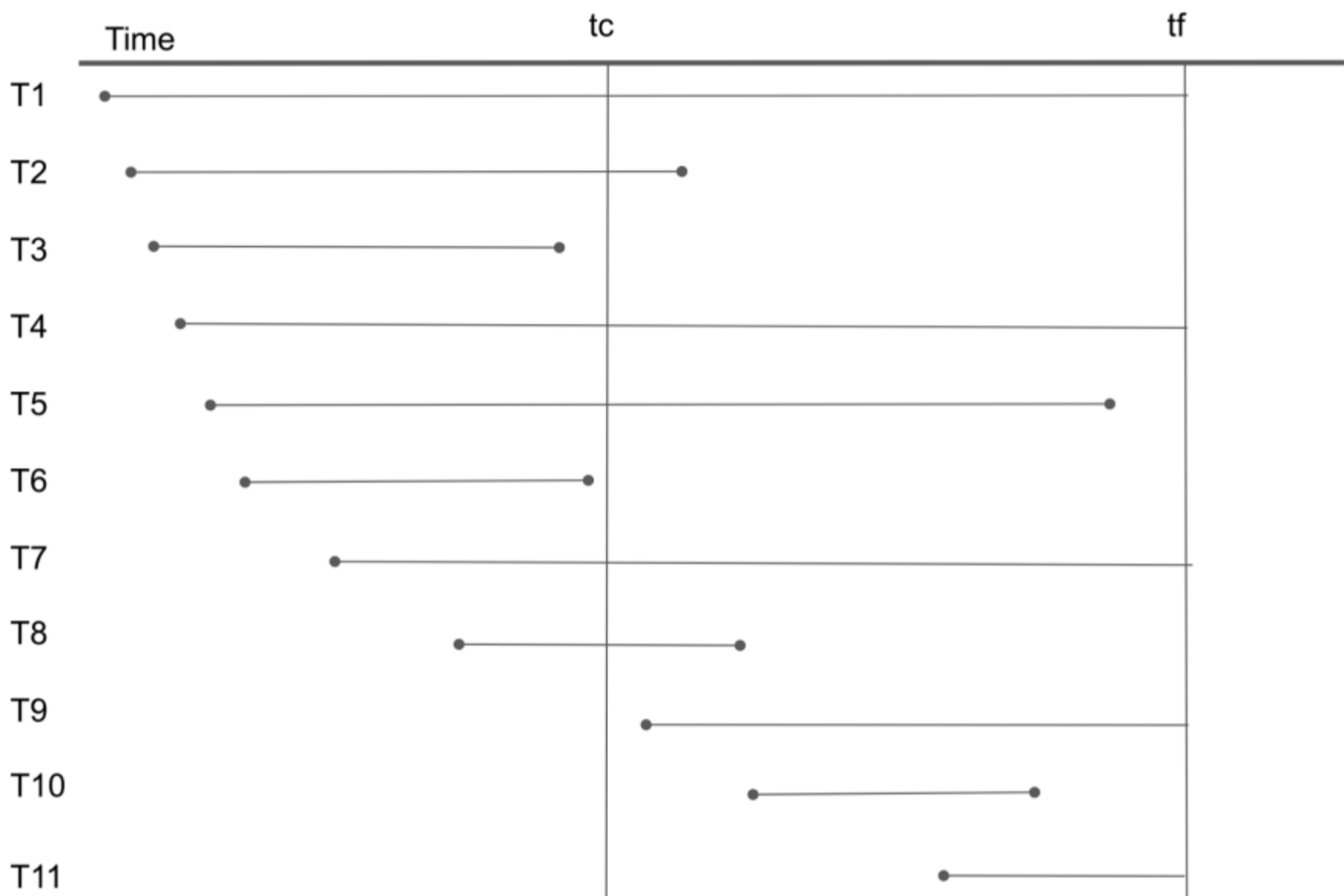# ASSIGNMENT(2A) - TASK 5

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Applied Class: 01

a)

From the above diagram we can notice that :

T1 - Successfully completed the transaction that commenced at the time of failure.

T2 - Achieved completion but requires redoing or rolling forward.

T3 - Has not reached the checkpoint time and can be safely ignored at the checkpoint, as the system has already ensured data was written to the disk.

T4 - Successfully completed the transaction that started at the time of failure.

T5 - Completed the checkpoint but is still progressing towards the time of failure.

T6 - Hasn't reached the checkpoint time and can be safely ignored at the checkpoint, as the system has already guaranteed data was written to the disk.

T7 - Must undergo a rollback as it was still running at the point of failure.

T8 - Completed the checkpoint and is still running as it approaches the point of failure.

T9 - Requires a rollback as it is still running at the point of failure.

T10 - No rollback necessary, it reached completion and only requires redoing or rolling forward.

T11 - Requires a rollback as it was still in progress at the time of failure.

Step 1: Using the log, compile REDO and UNDO lists

(note: green – completed, blue – redo/rollforward, red – undo/rollback)

Transactions at Last Checkpoint before crash : T1, T2, T3, T4, T5, T6, T7, T8, T9, T10, T11

- [To Redo]:

T2, T5, T8, T10

- [To Undo]:

T1, T4, T7, T9, T11

Step 2: UNDO incomplete or rolled back transactions starting from newest.

T11, T9, T7, T4, T1

Step 3: REDO committed transactions starting from oldest.

T2, T5, T8, T10

b)

TIME	TRANS	ACTION	A	B	C	D	E	F	G	H
0	T1	READ A	S(T1)							
1	T2	READ B		S(T2)						
2	T1	READ C			S(T1)					
3	T4	READ D				S(T4)				
4	T5	READ A	S(T5)							
5	T2	READ E					S(T2)			
6	T2	UPDATE E					X(T2)			
7	T3	READ F						S(T3)		
8	T2	READ F						S(T2)		
9	T5	UPDATE A	T5 wait T1							
10	T1	COMMIT	X(T5)							
11	T6	READ A	T6 wait T5							
12	T5	ROLLBACK	S(T6)							
13	T6	READ C			S(T6)					
14	T6	UPDATE C			X(T6)					
15	T7	READ G							S(T7)	
16	T8	READ H								S(T8)
17	T9	READ G							S(T9)	
18	T9	UPDATE G							T9 wait T7	
19	T8	READ E					S(T8)			
20	T7	COMMIT							X(T9)	
21	T9	READ H								S(T9)
22	T3	READ G							S(T3)	
23	T10	READ A	S(T10)							
24	T9	UPDATE H								T9 wait T8
25	T6	COMMIT			X(T6)					
26	T11	READ C			S(T11)					
27	T12	READ D				S(T12)				
28	T12	READ C			S(T12)					
29	T2	UPDATE F						T2 wait T3		
30	T11	UPDATE C			X(T11)					
31	T12	READ A	S(T12)							
32	T10	UPDATE A	X(T10)							
33	T12	UPDATE D				T12 wait T4				
34	T4	READ G							S(T4)	

(i)   **wait states are present at time 34:**
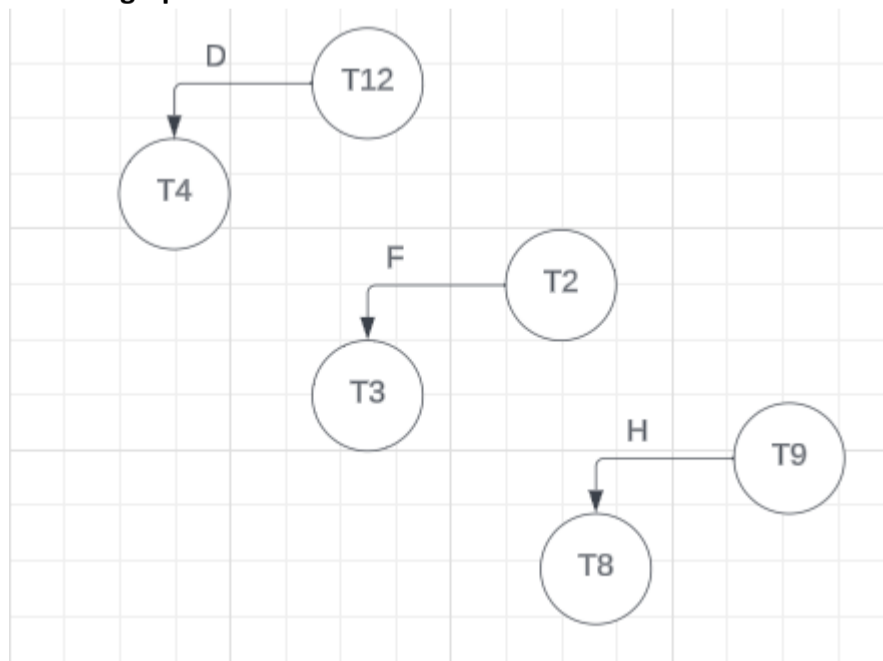   **Item D:** T12 wait T4
   Item F: T2 wait T3
   Item H: T9 wait T8

(ii)   **wait for graph:**

(iii)   **No deadlock exists.**