INDIAN INSTITUTE OF INFORMATION TECHNOLOGY, DESIGN & MANUFACTURING, JABALPUR

DBMS

Assignment 13

1. Consider the simple relation EMPLOYEE(ID, SALARY) storing employee IDs and salaries, where ID is a key. Consider the following sequence of execution of two transactions:

```
--T1
UPDATE EMPLOYEE
SET SALARY = SALARY + 500
WHERE ID = 125
--T2
UPDATE EMPLOYEE
SET SALARY = 5000 WHERE SALARY > 5000
COMMIT
```

```
--T1
UPDATE EMPLOYEE
SET SALARY = SALARY + 500
WHERE ID = 125
COMMIT
```

   Before either transaction starts, there is a tuple (125, 4700) in EMPLOYEE. Suppose transaction T1 executes with isolation level READ COMMITTED, transaction T2 executes with isolation level READ UNCOMMITTED. Tell the final salary of employee 125.

2. Following questions are based on a simple relation TA (SID, CID, STIPEND) storing TA assignments and stipends. TA's are identified by their student ID's (SID's). Consider the following two transactions, executed by two different clients at approximately the same time:

-----T1-----	------T2-----
UPDATE TA	UPDATE TA
SET STIPEND = STIPEND + 200	SET STIPEND = 2000
WHERE CID = 'CS145'	WHERE STIPEND > 2000
UPDATE TA	COMMIT
SET STIPEND = STIPEND + 200	
WHERE CID = 'CS145'	
COMMIT	

   Before either transaction starts, there is a tuple (987, 'CS145', 1900) in TA

   Suppose T1 executes with isolation level READ COMMITTED and T2 executes with isolation level READ UNCOMMITED. Which one of the following figures cannot be a possible final STIPEND value for TA 987?

   (a). 2000
   (b). 2200
   (c). 2300
   (d). None of the above (i.e. all of them are possible)

Now suppose instead that T1 executes with isolation level REPEATABLE READ and T2 executes with isolation level READ COMMITED. Which one of the following figures cannot be a possible final STIPEND value for TA 987?

(a). 2000
(b). 2200
(c). 2300
(d). None of the above (i.e. all of them are possible)

3. Consider two transactions T1 and T2 shown here, whose execution is interleaved as follows:

T1	T2
	RA
RA	
RB	
	WB
WB	
	WC
COMMIT	
	COMMIT

where RA: Read item A and WA: Write item A

Is this interleaving serializable? If yes, show the equivalent serial order. If not, state why not.

Can this interleaving be generated by a database that uses strict two-phase locking for concurrency control? If not, state why not?

4 Consider the following log sequence corresponding to a particular schedule at the point of a system crash for four transactions T1, T2, T3, and T4. Describe the recovery process from the system crash.

[start transaction, T1]
[read item, T1, A]
[read item, T1, D]
[write item, T1, D, 20, 25]
[commit, T1]
[checkpoint]
[start transaction, T2]
[read item, T2, B]
[write item, T2, B, 12, 18]
[start transaction, T4]
[read item, T4, D]
[write item, T4, D, 25, 15]
[read item, T4, A]
[write item, T4, A, 30, 20]
[commit, T4]
[read item, T2, D]
[write item, T2, D, 15, 25] ← system crash