CSE 444 Homework 5

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TOTAL POINTS

57 / 60

QUESTION 1

1 15 pts

1.1 a **5 / 5**

✓ **- 0 pts Correct**

- 1.5 pts (a) incorrect

- 1.5 pts (b) incorrect

- 1.5 pts (c) incorrect

1.2 b **5 / 5**

✓ **- 0 pts Correct**

- 1.5 pts X4 incorrect or missing

- 1.5 pts X5 incorrect or missing

- 1 pts Minor error

1.3 c **5 / 5**

✓ **- 0 pts Correct**

- 2 pts Partially Incorrect

- 5 pts No submission

QUESTION 2

2 15 pts

2.1 a **5 / 5**

✓ **- 0 pts Correct**

- 2.5 pts First checkpoint incorrect

- 2.5 pts Second checkpoint incorrect

2.2 b **5 / 5**

✓ **- 0 pts Correct. From <START T1> to the end.**

- 3 pts Read from <START CKPT T1>

- 1 pts Didn't read (or mention) the last lines. You need this information to finally decide to read from <START T1>

- 5 pts Wrong answer

2.3 c **5 / 5**

✓ **+ 2 pts A, D (T1) , E (T4) are recovered**

✓ **+ 1 pts A = 15**

✓ **+ 1 pts D = 5**

✓ **+ 1 pts E = 10**

+ 0 pts Wrong answer.

QUESTION 3

3 30 pts

3.1 a **9 / 10**

- 0 pts Correct

- 1 pts Incorrect Entry in Transaction Table

- 2 pts Incorrect Transaction Table

- 1 pts Incorrect Entry in Dirty Page Table

- 1 pts Missing Entry in Dirty Page Table

- 2 pts Incorrect Dirty Page Table

- 1 pts Incorrect T1 in Log Table

✓ **- 1 pts Incorrect T2 in Log Table**

- 1 pts Incorrect T3 in Log Table

- 4 pts Incorrect Log Table

- 1 pts Incorrect Page Content in Memory

- 1 pts Missing Page Content in Memory

- 1 pts Incorrect PageLSN in Memory

- 1 pts Missing PageLSN in Memory

- 2 pts Incorrect Buffer Pool

- 2 pts Missing Memory Part

- 10 pts Incorrect

LSN 7 will not have a prevLSN

3.2 b **5 / 5**

✓ **- 0 pts Correct**

- 2.5 pts Incorrect Transaction Table

- 2.5 pts Incorrect Dirty Page Table

- 5 pts Incorrect

3.3 c **4 / 5**

- **0 pts** Correct
- **5 pts** Incorrect

- 1 Point adjustment

LSN 11 and 12 were not in the Log table so why are they in the REDO phase?

3.4 d **9 / 10**

- **0 pts** Correct
- **1 pts** Shouldn't undo T1
- **1 pts** Shouldn't undo T2
- **2 pts** Undo T3
- **1 pts** Wrong/missing memory pageLSN
- **2 pts** Wrong/missing memory pages info
- **2 pts** Wrong log content

✓ **- 1 pts Missing END after UNDO**

- **10 pts** Missing 3d

(a) (5 points) What are the correct values of the three <START CKPT ????> records? You have to provide three correct values for the three ????s.

First START CKPT: T_1

Second START CKPT: T_2, T_3

Third START CKPT: T_4, T_5

1.1 a **5 / 5**

✓ **- 0 pts Correct**

- 1.5 pts (a) incorrect

- 1.5 pts (b) incorrect

- 1.5 pts (c) incorrect

(b) (5 points) Assuming that the three <START CKPT ???> records are correctly stored in the log, according to your answer in a., show which elements are recovered by the undo recovery manager and compute their values after recovery.

- The last CheckPoint's Transactions need to be undo, because first two checkPoints has already ended, which means, we don't need to worry about them anymore.

- T_4 & T_5 are two transactions that has commited yet.

- by following the undo algorith, we start at most recent and go backwards:

1. $\langle T_4, X_4, 8\rangle$ → write $X_4 = 8$ to disk.

2. $\langle$START CKPT $T_4, T_5\rangle$ → do nothing.

3. $\langle T_5, X_5, 7\rangle$ → write $X_5 = 7$ to disk.

4. $\langle$START $T_5\rangle$ → do nothing

⋮ ⋮

- . $\langle T_4, X_4, 6\rangle$ → write $X_4 = 6$ to disk

end. $\langle$START $T_4\rangle$;

1.2 b **5 / 5**

✓ **- 0 pts** **Correct**

- 1.5 pts X4 incorrect or missing

- 1.5 pts X5 incorrect or missing

- 1 pts Minor error

(c) (5 points) Indicate what fragment of the log the recovery manager needs to read.

- Based on the Steps I have done in (b), I found the recovery manager knows the other Transact. had been completed when it reads <START CKPT T_4, T_5> so it only needs to read after the line of <START T_4>.
- which is becacese the recovery manager only needs to recover transaction T_4 & T_5. So once it reads and find all the <START> of these two transaction, it can recover them.

1.3 C **5 / 5**

✓ **- 0 pts** **Correct**

- 2 pts Partially Incorrect

- 5 pts No submission

(a) (5 points) What are the correct values of the two <START CKPT ????> records? You have to provide two correct values for the two ????s.

First START CKPT: T1

Second START CKPT: T5

2.1 a **5 / 5**

✓ **- 0 pts** **Correct**

- 2.5 pts First checkpoint incorrect

- 2.5 pts Second checkpoint incorrect

(b) (5 points) Indicate what fragment of the log the recovery manager needs to read.

It actually needs to read from the 1st row of the log, to the end of the log. - All log after <START T_1>

The reason is because there is only one <End CKPT> in the log which indicates the T_2 & T_3 have been flushed to disk. However, T_1 hasn not been flushed to disk.

2.2 b **5 / 5**

✓ **- 0 pts Correct. From <START T1> to the end.**

- 3 pts Read from <START CKPT T1>

- 1 pts Didn't read (or mention) the last lines. You need this information to finally decide to read from <START T1>

- 5 pts Wrong answer

(c) (5 points) Assuming that the two < START CKPT ??? > records are correctly stored in the log, according to your answer above, show which elements are recovered by the redo recovery manager and compute their values after recovery.

1) T_1 needs to do redo on A element.

rows → redo

<T1, A, 15> write A → 15 on disk

<T1, D, 5> write D → 5 on disk

<T4, E, 10> write E → 10 on disk

The T5 has not Commit, so we don't need to do the redo process.

2.3 C **5 / 5**

✓ **+ 2 pts** **A, D (T1) , E (T4) are recovered**

✓ **+ 1 pts** **A = 15**

✓ **+ 1 pts** **D = 5**

✓ **+ 1 pts** **E = 10**

+ 0 pts Wrong answer.

Log

LSN	prevLSN	tID	pID	Log entry	Type	undoNextLSN	
1	-	T1	P1	<T1, P1, A0, A1>	Update	-	flushed log, and P1
2	-	T2	P1	<T2, P1, B0, B1>	Update	-	
3	2	T2	P2	<T2, P2, C0, C1>	Update	-	
4	3	T2	-	<ABORT T2>	Abort	-	
5	-	T2	p2	<UNDO T2 LSN 3>	CLR	2	
6	-	T2	p1	<UNDO T2 LSN 2>	CLR	-	
7	6	T2	-	<END>	End	-	
8	-	T3	P2	<T3, P3, D0, D1>	Update	-	
9	1	T1	-	<Commit T1>	Commit	-	
10	9	T1	-	<END>	End	-	flushed Log

Dirty Page Table

pageID	recLSN
P1	2
p2	3

Transaction Table

transID	lastLSN	status
T3	8	Running

Buffer Pool

P1, PageLSN = 6, (A1, B0)	P2, PageLSN = 8, (C0, D1)

3.1 a **9 / 10**

- **0 pts** Correct
- **1 pts** Incorrect Entry in Transaction Table
- **2 pts** Incorrect Transaction Table
- **1 pts** Incorrect Entry in Dirty Page Table
- **1 pts** Missing Entry in Dirty Page Table
- **2 pts** Incorrect Dirty Page Table
- **1 pts** Incorrect T1 in Log Table
- ✓ **- 1 pts Incorrect T2 in Log Table**
- **1 pts** Incorrect T3 in Log Table
- **4 pts** Incorrect Log Table
- **1 pts** Incorrect Page Content in Memory
- **1 pts** Missing Page Content in Memory
- **1 pts** Incorrect PageLSN in Memory
- **1 pts** Missing PageLSN in Memory
- **2 pts** Incorrect Buffer Pool
- **2 pts** Missing Memory Part
- **10 pts** Incorrect

LSN 7 will not have a prevLSN

Dirty Page Table		Transaction Table		
pageID	recLSN	transID	lastLSN	status
p1	1	T3	8	U = Unkown
P2	3			

3.2 b **5 / 5**

✓ **- 0 pts** **Correct**

- 2.5 pts Incorrect Transaction Table

- 2.5 pts Incorrect Dirty Page Table

- 5 pts Incorrect

LSN	operation
1	skipped
2	redone
3	redone
4	skipped
5	redone
6	redone
7	skipped
8	redone
9	skipped
10	skipped
11	skipped
12	skipped

3.3 C **4 / 5**

- **0 pts** Correct
- **5 pts** Incorrect

- 1 Point adjustment

LSN 11 and 12 were not in the Log table so why are they in the REDO phase?

Log LSN	prevLSN	tID	pID	Log entry	Type	undoNextLSN	
1	-	T1	P1	<T1, P1, A0, A1>	Update	-	flushed log, and P1
2	-	T2	P1	<T2, P1, B0, B1>	Update	-	
3	2	T2	P2	<T2, P2, C0, C1>	Update	-	
4	3	T2	-	<ABORT T2>	Abort	-	
5	-	T2	P2	<UNDO T2 LSN 3>	CLR	2	
6	-	T2	P1	<UNDO T2 LSN 2>	CLR	-	
7	6	T2	-	<END>	End	-	
8	-	T3	P2	<T3, P3, D0, D1>	Update	-	
9	1	T1	-	<COMMIT T1>	Commit	-	
10	9	T1	-	<END>	End	-	flushed Log
11	8	T3	P2	<UNDO T3 LSN 8>	CLR	-	

Buffer Pool	
P1, PageLSN = 6, (A1, B0)	P2, PageLSN = 11, (C0, D0)

3.4 d **9 / 10**

- **0 pts** Correct
- **1 pts** Shouldn't undo T1
- **1 pts** Shouldn't undo T2
- **2 pts** Undo T3
- **1 pts** Wrong/missing memory pageLSN
- **2 pts** Wrong/missing memory pages info
- **2 pts** Wrong log content

✓ - **1 pts** **Missing END after UNDO**

- **10 pts** Missing 3d