# Restanță SGBD IE Sabina S. 11.07.2019

I

1. Describe Wait-Die prevention technique. Give an example.
2. Describe semijoin technique for distributed query processing. Give example.

II

1.

| T1 | T2 | T3 | T4 |
|---|---|---|---|
| | R(A) | | |
| | W(A) | | |
| | | | R(A) |
| | | | W(A) |
| | | | W(E) |
| | | | R(E) |
| | | ~~R~~(E) | |
| | | W(E) | |
| | R(B) | | |
| | R(C) | | |
| | | R(A) | |
| | | W(A) | |
| | W(D) | | |
| R(A) | | | |

Let S be this schedule → Compute its conflict relation. Is S conflict serializable? Justify.
Find a serial schedule equivalent to S.

2.

| LSN | prevLSN | transId | type | pageId |
|---|---|---|---|---|
| 1 | • | T10 | update | P1 |
| 2 | • | T12 | update | P1 |
| 3 | 1 | T10 | update | P1 |
| 4 | 3 | T10 | update | P2 |
| 5 | 4 | T10 | update | P3 |
| 6 | • | T11 | update | P1 |
| 7 | 2 | T12 | update | P2 |
| 8 | 6 | T11 | update | P3 |

Write Transaction Table and Dirty Page Table for the table above.

3. Let $R1, R2$ be two relations. $R1 \rightarrow 200000$ records, a page holds 50 R1 records. $R2 \rightarrow 10000$ records, a page holds 200 R2 records.

a) 102 buffer pages available. R1, R2 not sorted

- Compute the cost of $R2 \otimes_{R2.ID = R1.ID} R1$ using block nested loops join and sort_merge join; R2 is the outer relation (the dominant part in the family). Assume each partition is scanned once during merging phase of sort_merge join.
- What is the minimum number of pages in Buffer Pool that keeps the cost unchanged for both blocked nested loops join and sort merge join? Justify.

b) 102 buffer pages available. Compute the cost of $\hat{\Pi}_{ID,A,B,C}(R1)$ using projection based on sorting (basic version, without improvement). The size of a tuple in the result of $\hat{\Pi}_{ID,A,B,C}(R1)$ is 1/8 times the size of a tuple in R1.

c) R1 is stored at Resita, R2 at Galati. Compute the cost of $R2 \otimes_{R2.ID} = R1_{ID R2} R1$ using page oriented nested loops join in Galati without caching. R2 is the outer relation, the query site is Baia Mare and the result $R2 \otimes_{R2.ID} = {}_{R1.ID R2} R1$ has 5000 pages.

III [1] Under READ COMMITTED layer:

a) You can't aquire X locks

b) You can aquire X locks

c) You can aquire S locks

d) You can't aquire S locks

e) none

[2] In ARIES, the redo phase:

a) starts at the most recent checkpoint

b) starts at the smallest recLSN in Dirty Page Table

c) determines the starting point for undo phase

d) determines the starting point for analysis phase

e) none

[3] The reduction factor for ~~if~~ the condition Age > 0 assuming data is uniformly distributed and there is an index J on Age, can be estimated by:

a) $(20 - JHigh(J)) / (JLow(J) - JHigh(J))$

b) $(JHigh(J) - 20) / (JLow(J) - JHigh(J))$

c) $(20 - JHigh(J)) / (JHigh(J) - JLow(J))$

d) ~~$(20 - JHigh(J))$~~ $(JHigh(J) - 20) / (JHigh(J) - JLow(J))$

e) none

III

4 Let R be a relation and $c_1, \ldots, c_m$ selection conditions

GO $\sigma$ - sigma (selection ~~op~~ query operator)

a) $\sigma_{c_1}(\sigma_{c_2}(\sigma_{c_3}(R))) \equiv$ ~~$\sigma_{c_1 \wedge c_2 \wedge c_3}(R)$~~ $\sigma_{c_1}(\sigma_{c_3}(\sigma_{c_2}(R)))$

b) $\sigma_{c_1 \wedge c_2 \wedge c_3}(R) \equiv \sigma_{c_1}(\sigma_{c_2}(\sigma_{c_3}(R)))$

c) $\sigma_{c_1 \vee c_2 \vee c_3}$ ~~$\neq$~~ $\equiv \sigma_{c_1}(\sigma_{c_2}(\sigma_{c_3}(R)))$

d) $\sigma_{c_1 \wedge c_2 \wedge c_3}(R) \equiv \sigma_{c_2}(\sigma_{c_3}(\sigma_{c_1}(R)))$

e) none

5 Choose access paths that can be used for a query with ~~an~~ relation in the FROM clause:

a) single index access path
b) multiple index access path
c) sorted index access path
d) index only access path

6 The transactions T1, T2 execute serially on a consistent database state.

a) The database is in a consistent state after execution
b) The database is in an inconsistent state after execution
c) T2 cannot write operations
d) T2 cannot read operations
e) none

7 *A log fragment was given*. T2 update described by log with LSN 5 is undone. The undoNextLSN field of the corresponding CLR has a value of

a) 5 b) 4 c) 3 d) 2 e) none

8 RSA uses: a) a public key and a secret key
b) only a public key c) only a secret key
d) $\log_2 1000$ secret keys e) none

[9] Concurrent transactions T1, T2 can lock same object in the following manner:

a) T1 has X lock, T2 S lock

b) -11- X lock -11- X lock

c) S lock S lock

d) nu mai stiu

e) none

[10]

[11] Relation R is sorted with external merge sort algorithm. R has N pages. There are B buffer pages. The first phase pass of the algorithm produces:

a) $\left\lceil \frac{B}{N} \right\rceil$ sorted runs of N pages each

b) $\left\lceil \frac{N}{B} \right\rceil$ sorted runs of B pages each

c) $\left\lceil \frac{N}{N} \right\rceil$ sorted runs of $B^3$ pages each

d) $\left\lceil \frac{B}{N-1} \right\rceil$ sorted runs of $N^3$ pages each

[12] Join implementation techniques:

a) block-nested loops join based on iteration technique

b) block-nested loops join based on partitioning technique

c) hash join based on iteration

d) hash join based on partitioning

e) none

III

13 ACID stands for:

a) ?

b) acid..

c) atomicity consistency, isolation, durability

d) ?

e) none

14 The following hold:

a) Dirty reads can occur under READ UNCOMMITTED

b) Dirty reads cannot occur under REPEATABLE

c) Unrepeatable reads cannot occur under SERIALIZABLE

d) Unrepeatable reads can occur under READ COMMITTED

e) none

15 Encrypt the following "din ceas, dedus adancul acestei calme creste" using the key "hermione"

| 00 | 01 | 02 | ... | 27 |
|---|---|---|---|---|
| - | a | b | ... | , |