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# TOPICWISE : DATABASES-2 (GATE - 2019) - REPORTS

OVERALL ANALYSIS | COMPARISON REPORT | SOLUTION REPORT

ALL(17) | CORRECT(9) | INCORRECT(4) | SKIPPED(4)

## Q. 1

Consider the following transaction involving two bank accounts $x$ and $y$.

read $(x)$;
$x = x - 50$;
write $(x)$;
read $(y)$;
$y = y + 50$;
write $(y)$;

Which of the following constraints fail if transaction is fail just after write $(x)$; operation?

Solution Video | Have any Doubt ?

A
Atomicity

Correct Option

**Solution :**
(a)
According to Atomicity either all operations of transaction are reflected properly in database, or none are. So, here transaction fails in middle so, Atomicity is fail.

B
Durability

C
Isolation

D
None of these

Your answer is **Wrong**

QUESTION ANALYTICS

## Q. 2

Which of the following is true?

FAQ | Solution Video | Have any Doubt ?

A
Secondary index over key must be dense

Correct Option

**Solution :**
(a)
• Secondary index over key build based on unordered field so that it is dense.
• Clustering index based on non key may be sparse also so, clustering index may be dense if each cluster one record.
• Primary index on key with ordering may be dense or sparse.

B
Clustering index must be dense

C
Primary index must be sparse

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QUESTION ANALYTICS

**Q. 3**

Consider a relation Employees and assertion A be declared by the following:

```
CREATE TABLE Employees (
name CHAR (50) PRIMARY KEY,
dept CHAR (20),
salary INT
);
CREATE ASSERTION A CHECK ('Toy' IN (
                                    SELECT dept
                                    FROM Employees
                                    GROUP BY dept
                                    HAVING AVG (salary) ≥ 50000)
);
```

Which of the following best describes the constraints enforce by this assertion?

FAQ | Solution Video | Have any Doubt ?

A
Every employee making atleast $ 50000 must be in the Toy department.

B
Only the Toy department may have an average salary of $ 50000 or more.

C
The average salary of employees in the Toy department is atleast $ 50000.

Correct Option

**Solution :**
(c)
Assertion check in "Toy department", average salary of employees should be greater than or equal to 50000 or not.
• Output is valid if condition is true.
• Output is invalid if condition is false.

D
The average salary in each department other than the Toy department is less than $50000.

QUESTION ANALYTICS

**Q. 4**

R

| A | B | C |
|---|---|---|
| 4 | 5 | 6 |
| 7 | 2 | 4 |
| 3 | 5 | 6 |

S

| D | E | F |
|---|---|---|
| 4 | 2 | 5 |
| 6 | 4 | 5 |
| 3 | 5 | 6 |

How many records in result of SQL query?

```
Select *
FROM R
Where EXISTS (Select count (*) FROM S Where R.C > S.D and S.F > 10)
```

FAQ | Solution Video | Have any Doubt ?

A
0

Your answer is **Wrong**

B
1

C
2

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Correct Option

**Solution :**
(d)
Result of inner query is non empty because even no record satisfy where condition of inner query count (*) produces one record.
So every record of R where condition true.

QUESTION ANALYTICS

**Q. 5**

Consider the following relation schema:

employee (emp-name, street, city)
works (emp-name, company-name, salary)
company (company-name, city)
manages (emp-name, manager-name)

What does the following query return?

```
Select a.emp-name
From employee a, employee b, manages m
Where a.emp-name = m.emp-name and m.manager-name = b.emp-name
      and a.street = b street and a.city = b.city;
```

FAQ | Solution Video | Have any Doubt ?

A
Find name of employees who lives in same city as the companies for which they work.

B
Find name of employees who lives in same cities and on same streets as do their colleagues.

C
Find name of all employees who lives in same cities and on the same streets as do their managers.

Your answer is **Correct**

**Solution :**
(c)
• a.emp-name = m.emp-name will ensure employee works under some manager.
• m.manager-name = b.emp-name will ensure manager is one of the employee of company.
• a.street = b.street will ensure both employee and their manager lives in same street.
• a.city = b.city will ensure both employee and their manager lives in same city.
So, output of query is name of all employees who lives in same city and on same streets as do their managers.

D
None of the above

QUESTION ANALYTICS

**Q. 6**

Consider a block of size such that it can hold:
• either 5 records of a relation R, or
• be used as a $B^+$ tree internal node with degree 11, or
• $B^+$ tree leaf node with degree 10.
If R has 1000 records, then the smallest number of blocks that could be used to store R and a sparse $B^+$ tree index on key of R is _____.

Solution Video | Have any Doubt ?

223

Correct Option

**Solution :**
223

1000R

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$$\text{Number of block at internal nodes} = \left\lceil \frac{20}{11} \right\rceil = 2$$

$$\text{Number of block at last level} = \left\lceil \frac{2}{11} \right\rceil = 1$$

$$\text{Total number of blocks} = 200 + 20 + 2 + 1 = 223$$

QUESTION ANALYTICS

**Q. 7**

A database table T1 has 4000 records and occupies 50 disk blocks. Another table T2 has 300 records and occupies 20 disk blocks. These two tables have to be joined as per a specified join condition that needs to be evaluated for every pair of records from these two tables. The memory buffer space available can hold exactly one block of records for T1 and one block of records for T2 simultaneously at any point in time. No index is available on either table. If Nested-loop join algorithm is employed to perform the join, with the most appropriate choice of table to be used in outer loop, the number of block accesses required for reading the data are _____.

Solution Video | Have any Doubt ?

15020

Your answer is **Correct**15020

**Solution :**
15020

Nested Loop algorithm will involve $n_r \times b_s + b_r$ block transfers.
$n_r$ = # records in relation $r$, $b_r$ = # blocks in relation $r$
$n_s$ = # records in relation $s$, $b_s$ = # blocks in relation $s$
Either T1 can be R or T2.
If R is T1 then total number of block access is $4000 \times 20 + 50 = 80050$
If R is T2 then total number of block access is $300 \times 50 + 20 = 15020$
Better one is the second case, total number of block accesses = (15020).

QUESTION ANALYTICS

**Q. 8**

S : $r_1(A)$, $r_2(A)$, $r_3(A)$, $r_4(A)$, $w_1(B)$, $w_2(B)$, $w_3(B)$, $w_4(B)$

The number of serial schedules equal to schedule(S) but not conflict equal to schedule(S) _____.

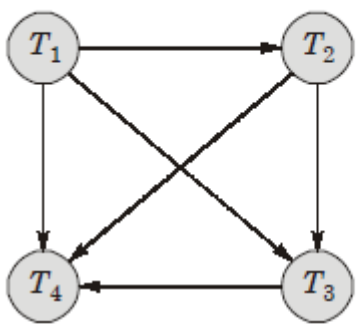
Solution Video | Have any Doubt ?

5

**Correct Option**

**Solution :**
5

Number of conflict equal serial schedule.




1 topological order $T_1 : T_2 : T_3 : T_4$
[1 serial schedule equal to conflict equal to S]
Number of view equal serial schedule

$[T_1T_2T_3] \rightarrow T_4$

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Your Answer is 24

QUESTION ANALYTICS

## Q. 9

Consider a database that has the relation schema EMP (ID, Name, Dept_name, Salary). An instance of the schema EMP is as given below:

| ID | Name | Dept_name | Salary |
|---|---|---|---|
| 101 | Suresh | CS | 37000 |
| 102 | Ramesh | EE | 45000 |
| 103 | Gaurav | EC | 54000 |
| 104 | Vamsi | EE | 74000 |
| 105 | Gaurav | CS | 45000 |
| 106 | Kunal | CS | 54000 |
| 107 | Suresh | CS | 42000 |
| 108 | Gangesh | CS | 74000 |

The following query is made on the database:

$\{t \mid \exists\, s \in EMP\ (t[ID] = s[ID] \wedge s[salary] > 40000 \wedge s[Dept\_name] = CS)\}$

The number of tupples in '*t*' is _____.

Solution Video | Have any Doubt ?

4

Your answer is **Correct**4

**Solution :**

4

Query: $\{t \mid \exists\, s \in EMP\ (t[ID] = s[ID] \wedge s[salary] > 40000 \wedge s[Dept\_name] = CS)\}$ result those empl who works in 'CS' department and whose salary is more than 40000.

So output will be:

| ID |
|---|
| 105 |
| 106 |
| 107 |
| 108 |

i.e. 4 records tupples.

QUESTION ANALYTICS

## Q. 10

Consider the following schedule S of transactions $T_1$, $T_2$, $T_3$ and $T_4$:

| $T_1$ | $T_2$ | $T_3$ | $T_4$ |
|---|---|---|---|
| | Write(x) | Write(x) | |
| | Commit | | Read(x) |
| Write(x) | | Read(x) | |
| Commit | | Commit | |
| | | | Commit |

Which one of the following statement is correct?

FAQ | Solution Video | Have any Doubt ?

A

Recoverable but not conflict serializable.

Your answer is **Correct**

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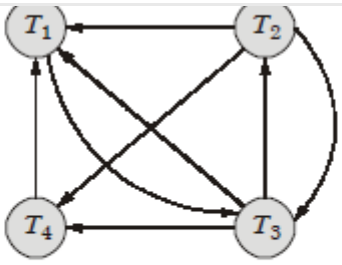



Since cycle exist in graph, so not conflict serializable.

- Checking recoverability:
  Since in given schedule, no write-read pair exist where commit of read(x), comes b
  commit after write(x). Hence recoverable.

B
Irrecoverable but conflict serializable.

C
Irrecoverable and not conflict serializable.

D
Both recoverable and conflict serializable.

QUESTION ANALYTICS

**Q. 11**

Consider the following statements:
$S_1$ : All strict schedules are serial.
$S_2$ : All recoverable schedules are conflict serializable.
$S_3$ : All strict schedules are conflict serializable.
$S_4$ : All conflict serializable schedules are free from cascading rollbacks.
Which of the following is true?

FAQ | Solution Video | Have any Doubt ?

A
Only $S_1$ and $S_4$

B
Only $S_2$ and $S_4$

C
Only $S_2$, $S_3$ and $S_4$

D
None of these

Your answer is **Correct**

**Solution :**
(d)
$S_1$ : All strict schedule may or may not serial i.e.

| $T_1$ | $T_2$ |
|---|---|
| W(A) | |
| | W(B) |
| W(C) | |
| | W(D) |
| $C_1$ | $C_2$ |

Schedule is strict schedule but not serial.
$S_2$ : All recoverable schedule need not be conflict serializable.

| $T_1$ | $T_2$ |
|---|---|
| R(A) | |
| | W(A) |



$S_3$ : All strict schedule need not be conflict serializable.

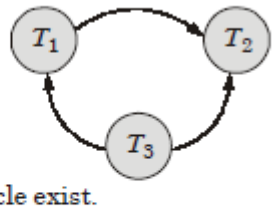
| $T_1$ | $T_2$ |
|---|---|
| R(A) | |
| | W(A) |
| | W(B) |
| | $C_2$ |
| R(B) | |
| $C_1$ | |

Schedule is strict schedule but not conflict serializable.

$S_4$ : All conflict serializable schedules may not free from cascading rollbacks i.e.

| $T_1$ | $T_2$ | $T_3$ |
|---|---|---|
| | | W(A) |
| R(A) | | |
| W(A) | | |
| | R(A) | |
| | W(A) | |
| $C_1$ | | |
| | $C_2$ | |
| | | $C_3$ |

- Schedule is conflict serializable i.e.




no cycle exist.

- Schedule have cascading abort.

So, none of these statement is true.

QUESTION ANALYTICS

**Q. 12**

Consider a simple check pointing protocol and the following set of operations in the log.
(Start, $T_4$); (Start, $T_1$); (Write, $T_1$, a, 2, 3); (Write, $T_4$, b, 1, 2) (commit, $T_1$); (Start, $T_3$) (check point); (Write, $T_3$, C, 4, 7) (commit, $T_4$)
If crash happens now and the system tries to recover using both undo and redo operations, what are the contents of the undo list and redo list

Solution Video | Have any Doubt ?

A
Undo: $T_1$ $T_3$; redo : $T_4$

B
Undo: $T_3$; redo : $T_4$

Your answer is **Correct**

**Solution :**
(b)
In data base until check point not come data is not saved permanently, when checkpoint is cc
all data till checkpoint get stored permanently.
After checkpoint process which are committed are redo and which are not committed are u
So, undo is to be transaction $T_3$ redo is to be transaction $T_4$.

C
Undo: $T_2$; redo : $T_2$ ;

D
Undo: $T_4$; redo : $T_1$

QUESTION ANALYTICS

**Q. 13**

Consider the following queries on the relational schema R(A B), S(C D)

$Q_1$ : Select A
From R
Where NOT EXISTS (Select *

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From R
Where A ≥ all (Select C
From S)

$Q_3$ : $\pi_A(R) - \pi_A(R \bowtie_{A \leq C} S)$

Which of the following statement true?

FAQ | Solution Video | Have any Doubt ?

A
$Q_1$ $Q_2$ results same but not $Q_3$

B
$Q_1$ $Q_3$ results same but not $Q_2$

Your answer is **Correct**

**Solution :**
(b)
$Q_1$ : Results set of A values which are more than every value of S.
$Q_2$ : Results set of A values which are more than or equal to all values of S.
$Q_3$ : Results set of A values which are more than every values of S.

C
$Q_2$ $Q_3$ results same but not $Q_1$

D
$Q_1$ $Q_2$ $Q_3$ all result same

QUESTION ANALYTICS

## Q. 14

Consider the following schedules involving two transactions.

$S_1 : R_1(x), W_2(y), R_2(x), W_1(y), \text{commit}_1, \text{commit}_2.$

$S_2 : R_1(x), R_2(y), W_1(z), \text{commit}_1, R_3(y), R_3(z), W_2(y), W_3(x), \text{commit}_2, \text{commit}_3.$

Which of the following statements is true?

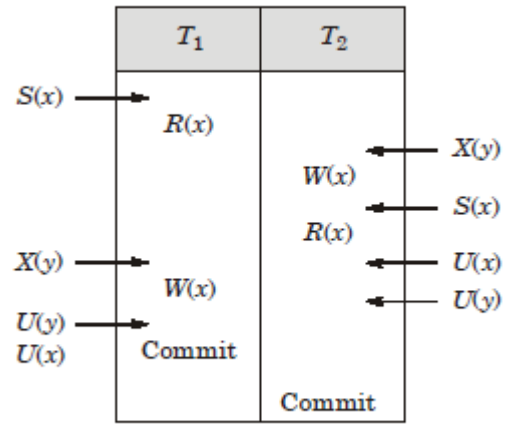
FAQ | Solution Video | Have any Doubt ?

A
Both $S_1$ and $S_2$ are allowed under 2PL.

Correct Option

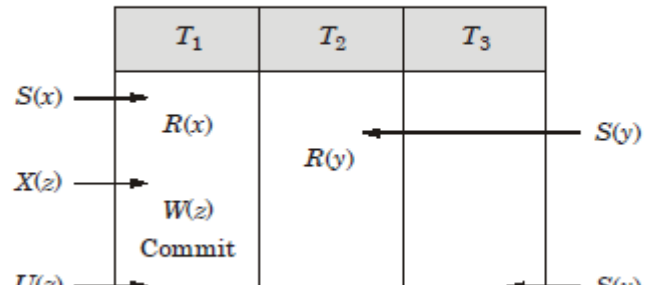
**Solution :**
(a)

- **Check $S_1$:**

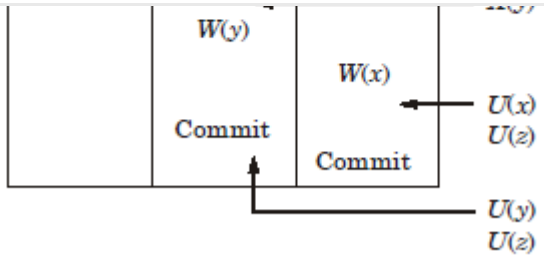



Schedule $S_1$ is allowed under 2PL.

- **Check $S_2$:**








Schedule $S_2$ is allowed under 2PL.

B

Only $S_2$ is allowed under 2PL.

C

Only $S_1$ is allowed under 2PL.

D

Neither $S_1$ nor $S_2$ allowed under 2PL.

QUESTION ANALYTICS

**Q. 15**

Consider the following relation schema Instructor (ID, Name, Dept_name, Salary) with table:

| ID | Name | Dept_name | Salary |
|---|---|---|---|
| 101 | Crick | IN | 72000 |
| 102 | Katz | CS | 75000 |
| 103 | Srinivas | CS | 32000 |
| 104 | Brandt | CS | 25000 |
| 105 | Kim | EE | 42000 |
| 106 | Singh | EC | 48000 |
| 107 | Gold | EC | 34000 |
| 108 | Mozart | CE | 70000 |
| 109 | Gaurav | CE | 20000 |
| 110 | Kunal | CE | 50000 |

Consider the following SQL query:

```
SELECT Dept_name, avg_salary
FROM  (SELECT Dept_name, avg (Salary) as avg_salary
       FROM Instructor
       GROUP by Dept_name)
WHERE avg_salary > 42000;
```

The number of tupple returned by above SQL query is _____.

Solution Video | Have any Doubt ?

3

Your answer is **Correct**3

**Solution :**
3

1. Query: (SELECT Dept_name, avg (Salary) as avg_salary
   FROM Instructor
   GROUP by Dept_name)
   will return department name with their average salary.
2. Outside query return department name with average salary whose average salary more 42000.
   i,e. IN, CS, CE.

QUESTION ANALYTICS

**Q. 16**

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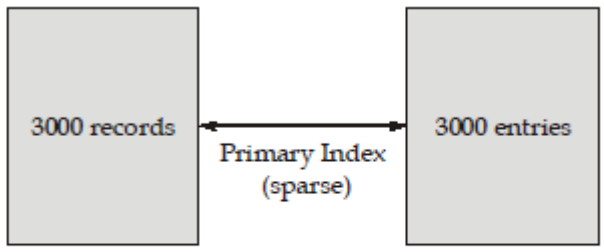
SSN value using primary index are _____.

Solution Video | Have any Doubt ?

7

Your answer is **Correct**7

**Solution :**
7




$$\text{Block factor} = \left\lfloor \frac{1024}{100} \right\rfloor = 10 \text{ Record/block}$$

$$\text{Number of blocks} = 3000$$

$$\text{Block factor} = \left\lfloor \frac{1024}{6+9} \right\rfloor = 68$$

$$\text{Number of blocks} = \left\lceil \frac{3000}{68} \right\rceil = 45$$

$$\text{Number of block access needed} = \lceil \log_2 45 \rceil + 1 = 7 \text{ blocks}$$

QUESTION ANALYTICS

**Q. 17**

Consider the following schedule:
$S : r_1(A); w_1(B); r_2(A); w_2(B); r_3(A); w_3(B);$
Here $r_i(X)$ denotes read on data item X and $w_i(X)$ denotes write operation on data item X. The total number of schedules that are view equivalent to S are _____.

Solution Video | Have any Doubt ?

30

Correct Option

**Solution :**
30

- **Final write:**

  On B: $T_3$
  On A: No one
  So, $(T_1 \to T_2 \to T_3)$, $(T_2 \to T_1 \to T_3)$

- No write read pair present
- Initial read

  On A: $T_1$, $T_2$, $T_3$
  On B: No one

So, number of schedule possible: $T_2 \to T_1 \to T_3$ and $T_1 \to T_2 \to T_3$
**Now check view equivalent to S:**

1. $T_1 \to T_2 \to T_3$

(i) $w_1(B)$ — $r_2(A)$ $w_2(B)$ $r_3(A)$ $w_3(B)$ = Here $r_1(A)$ will come in 3 ways

(ii) $w_1$ — $r_2(A)$ $r_3(A)$ $w_2(B)$ $w_3(B)$ = Here $r_1(A)$ will come in 6 ways

(iii) $w_1(B)$ — $r_3(A)$ $r_2(A)$ $w_2(B)$ $w_3(B)$ = Here $r_1(A)$ will come in 6 ways

$$\text{Total ways} = 3 + 6 + 6$$

QUESTION ANALYTICS

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