Kunal Jha
Course: GATE
Computer Science Engineering(CS)

DATABASES-1: (GATE - 2021) - REPORTS

OVERALL ANALYSIS | COMPARISON REPORT | SOLUTION REPORT

ALL(17) | CORRECT(0) | INCORRECT(0) | SKIPPED(17)

Q. 1 FAQ | Solution Video | Have any Doubt ?

Consider a relation $R(A, B, C, D, E)$ with functional dependencies:
$F = \{AB \rightarrow C, CD \rightarrow E, C \rightarrow A, C \rightarrow D, D \rightarrow B\}$
How many candidates key in the above relation?

A 1

B 2

C 3 — Correct Option

Solution :
(c)

$$(AB)^+ = \{A, B, C, D, E\}$$
$$(AD)^+ = \{A, B, C, D, E\}$$
$$C+ = \{A, B, C, D, E\}$$

Total 3 candidate key for the relation.

D 4

QUESTION ANALYTICS +

Q. 2 FAQ | Solution Video | Have any Doubt ?

Consider a schema $R(A, B, C, D, E, F)$ and functional dependencies.
$AD \rightarrow E, AB \rightarrow C, B \rightarrow D, AC \rightarrow B, BC \rightarrow A, E \rightarrow F$
The decomposition of R into $R_1(ABDE)$, $R_2(ABC)$ and $R_3(EF)$ is

A Lossless join and dependency preserving — Correct Option

Solution :
(a)

- $R(A, B, C, D, E, F)$

$R_1(ABDE)$	$R_2(ABC)$	$R_3(EF)$
$B \rightarrow D$	$AB \rightarrow C$	$E \rightarrow F$
$AD \rightarrow E$	$BC \rightarrow A$	
	$AC \rightarrow B$	

So, it is Dependency Preserving.

- It is lossless join because in every relation there is common attribute and candidate key.

B Lossless join but not dependency preserving

C Lossy join but dependency preserving

D Neither lossless join nor dependency preserving

QUESTION ANALYTICS +

Q. 3 FAQ | Solution Video | Have any Doubt ?

Which of the following statement is true?

A For queries of the form $\sigma_{A > a}(R)$ hashing is usually better than a B^+ tree.

B For queries of the form $\sigma_{A = a}(R)$ hashing is usually better than a B^+ tree. — Correct Option

Solution :
(b)
• Option (a) is incorrect. Hashing does not support range queries.
• Option (b) is correct.
• Option (c) is incorrect, as index should be dense.
• Option (d) is incorrect, as index at second level and further level is always sparse.

C A secondary index should be sparse.

D A second level index should be dense.

QUESTION ANALYTICS +

Q. 4 FAQ | Solution Video | Have any Doubt ?

Which of the following statement is false?

A Relation with every attribute is prime, always in BCNF. Correct Option

Solution :
(a)
• Option (a) is incorrect.
• All other options (b), (c) and (d) are correct.

B Relation with every attribute is prime, always in 3NF.

C Relation *R* which satisfies 3NF and atmost one compound candidate key is also in BCNF.

D Relation with every candidate key is simple, always in 2NF.

QUESTION ANALYTICS +

Q. 5 FAQ | Solution Video | Have any Doubt ?

Consider a relation $R(A, B, C, D, E)$ with functional dependencies $F = \{A \rightarrow B, BC \rightarrow E, ED \rightarrow A\}$.
How many additional relations required to convert it into 3NF with lossless and dependency preserving?

A 0 Correct Option

Solution :
(a)
$R(A, B, C, D, E)$

$$F = \{A \rightarrow B, BC \rightarrow E, ED \rightarrow A\}$$
$$(CDE)^+ = \{A, B, C, D, E\}$$
$$(ACD)^+ = \{A, B, C, D, E\}$$
$$(BCD)^+ = \{A, B, C, D, E\}$$

Now, A, B, C, D, E are prime attribute. So, surely the relation will be in 3NF.
Since, the relation is already in 3NF thus no more breaking (on additional relations) are required.

B 1

C 2

D 3

QUESTION ANALYTICS +

Q. 6 FAQ | Solution Video | Have any Doubt ?

Consider a relation $R(A, B, C, D, E, F)$ with the following functional dependencies:
$A \rightarrow BC$
$B \rightarrow E$
$D \rightarrow AF$
$F \rightarrow C$
$B \rightarrow AD$
The number of super keys present in the relation are _____.

56 Correct Option

Solution :
56

$$A^+ = \{A\ B\ C\ D\ E\ F\}$$
$$B^+ = \{A\ B\ C\ D\ E\ F\}$$
$$D^+ = \{A\ B\ C\ D\ E\ F\}$$

Clearly, there are three candidate keys.
Thus, $N(A \cup B \cup D) = N(A) + N(B) + N(D) - \{N(A \cap B) + N(B \cap D) + N(A \cap D) + N(A \cap B \cap D)\}$
Where, $N(A \cap B \cap D)$ represents number of super keys where A or B or D is candidate keys.

$$\Rightarrow \quad N(A \cup B \cup D) = 3 \times 2^5 - 3 \times 2^4 + 2^3$$
$$= 96 - 48 + 8 = 56$$

QUESTION ANALYTICS +

Q. 7 FAQ | Solution Video | Have any Doubt ?

Consider the below table:

Employee	Dependent

E_{id}	E_{name}	E_{age}
1	A	20
2	B	21
3	C	25
4	D	20

D_{id}	D_{eid}	D_{name}	D_{age}
D_1	2	AB	15
D_2	1	AC	21
D_3	2	M	23
D_2	3	N	28

π_{Eid} (Employer) – π_{Eid} (Employee $\rhd\lhd_{(Eid=Deid)}$ $\wedge_{(Dage \leq Eage)}$ (Dependent))

The numbers of tuples after the above RA execution is _____.

3 — Correct Option

Solution :
3
I. π_{Eid}(Employee) = {1, 2, 3, 4}
II. π_{Eid}(Employee $\infty_{(Eid=Deid)\wedge(Dage\in Eage)}$(Dependent) = {2}
So, I – II = {1, 3, 4}
So, total 3 tuples.

QUESTION ANALYTICS +

Q. 8 ? FAQ ▶ Solution Video Have any Doubt ?

For two relations $R(A, B, C)$ and $S(D, E)$, relation S maintain a foreign key for D on attribute A of relation R. Consider the following statements:
(a) Each record of R is related to 0 or more record of S.
(b) Each record of S is related to 0 or more record of R.
(c) Each record of S is related to 0 or 1 record of R.
(d) Each record of R is related to 0 or 1 record of S.
Which of the following is/are true?

A a — Correct Option
B b
C c — Correct Option
D d

YOUR ANSWER - NA | CORRECT ANSWER - a,c | STATUS - SKIPPED

Solution :
(a, c)
Option (a) is correct because relation S is allowed to take only those value which are part of relation R. Hence, R is related to 0 or more record of S. Option (c) is correct, since relation S is going to have only those values which are part of R. Hence, it is related to only 1 value of R. But the field with NULL is related to 0 value of R.
Hence, option (b) and (d) are false.

QUESTION ANALYTICS +

Q. 9 ? FAQ ▶ Solution Video Have any Doubt ?

Which of the following statement(s) is/are true?

A Non repeatable read occurs when a second transaction is trying to access the same row several times and different data each time. — Correct Option
B Uncommitted dependency issues occur when the second transaction selects a row which is updated by the another transaction. (Dirty read) — Correct Option
C Atomicity of transaction refers to the requirement that when one transaction executes, all other transactions should be made to wait.
D Under rigorous 2PL, transactions should release all its locks after it commits. — Correct Option

YOUR ANSWER - NA | CORRECT ANSWER - a,b,d | STATUS - SKIPPED

Solution :
(a, b, d)
• Option (a), (b) and (d) are standard definitions.
• Option (c) is false because atomicity means either executes all operations or none.

QUESTION ANALYTICS +

Q. 10 ? FAQ ▶ Solution Video Have any Doubt ?

Consider a relational database about hotels, customers and their bookings database is given below:
Hotel (HID, hname, haddress, hcity)
Guest (GID, gname, gaddress, gcity)
Room (HID, room no, type, price)
Booking (GID, HID, roomno, fromDate, year, no. of days)
Which of the following TRC query represent "finds the ids and names of the hotels for which every one of our guests had made a booking during 2020"?

A $\{t \mid \exists x \in \text{Hotel}\ (t.\text{HID} = x.\text{HID} \wedge t.\text{hname} = x.\text{hname} \wedge \forall m \in \text{Guest}\ \exists b \in \text{Booking}(x.\text{HID} = b.\text{HID} \wedge m.\text{GID} = b.\text{GID} \wedge b.\text{year} = 2020))\}$

Correct Option

Solution :
(a)
• Option (a) is correct.
• Option (b) did not compare m.GID = *b*.GID which results unwanted tuple.

B $\{t \mid \exists x \in \text{Hotel}\ (t.\text{HID} = x.\text{HID} \wedge t.\text{hname} = x.\text{hname} \wedge \forall m \in \text{Guest}\ \exists b \in \text{Booking}(x.\text{HID} = b.\text{HID} \wedge b.\text{year} = 2020))\}$

C Both (a) and (b)

D None of these

QUESTION ANALYTICS +

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ALL(17) | CORRECT(0) | INCORRECT(0) | SKIPPED(17)

Q. 11 FAQ | Solution Video | Have any Doubt ?

Consider relation schema $R(A, B, C, D)$ and the two sets of functional dependency:
$S_1 = \{A \rightarrow B, AB \rightarrow C, AC \rightarrow D, B \rightarrow C, B \rightarrow A\}$
$S_2 = \{AB \rightarrow D, AC \rightarrow B, B \rightarrow D, BD \rightarrow C\}$
Which of the following is true?

A S_1 covers S_2 — Correct Option

Solution :
(a)
S_1 covers S_2:
S_2 : $AB \rightarrow D$ can be derived from S_1.
$AC \rightarrow B$ can be derived from S_1.
$B \rightarrow D$ can be derived from S_1.
$BD \rightarrow C$ can be derived from S_1.
S_2 not covers S_1:
S_1 : $A \rightarrow B$ can not be derived from S_2.

B S_2 covers S_1

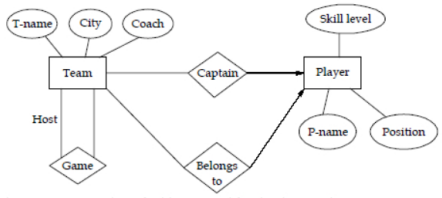
C S_1 and S_2 are equivalent

D None of these

QUESTION ANALYTICS +

Q. 12 FAQ | Solution Video | Have any Doubt ?

Consider the following ER-diagram for simple database for the National Hockey League given below:



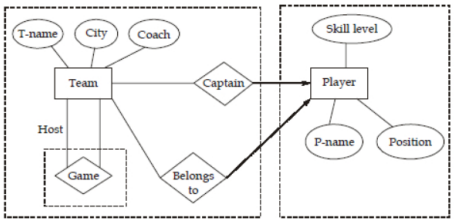
The minimum number of table required for database to be in 2NF is

A 1

B 2

C 3 — Correct Option

Solution :
(c)



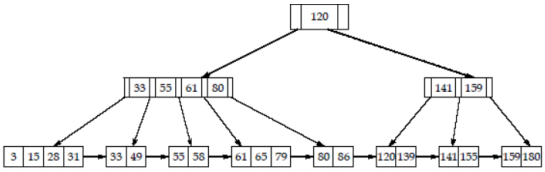
Total 3 tables are required.

D 4

QUESTION ANALYTICS +

Q. 13 FAQ | Solution Video | Have any Doubt ?

Consider the following B^+ tree with order 5 (order means maximum number of child pointers a node can have)



How many addition records could be added in the above B+ tree without altering the height?

A 100

B 75

C 13

D 81 Correct Option

Solution :
(d)

- Root node can point 5 internal nodes.
- Total maximum number of records this B^+ tree can have = $5 \times 5 \times 4 = 100$
- Total additional records can be added
  = 100 – 19 (available) = 81

QUESTION ANALYTICS +

Q. 14 ? FAQ ▶ Solution Video Have any Doubt ?

Consider a B^+ tree in which search key 20 bytes long, block size is 1500 bytes, record pointer is 10 bytes long and block pointer is 8 bytes long. The maximum number of keys that can be accommodated in each leaf node of the tree is _____.

49 Correct Option

Solution :
49
Assume order of leaf node is P.
In B^+ tree,

$$P * \text{Key Size} + P * \text{Record Pointer} + \text{Block Pointer} \le \text{Block Size}$$
$$P * 20 + P * 10 + 8 \le 1500$$
$$30P \le 1492$$
$$P \le \left[\frac{1492}{30}\right]$$
$$P \le 49$$

QUESTION ANALYTICS +

Q. 15 ? FAQ ▶ Solution Video Have any Doubt ?

Consider the following statements given below:
S_1 : In a relation $R(A, B, C)$, $C \rightarrow$ A holds is true then $BC \rightarrow A$ also holds.
S_2 : The join is a basic operation in a relational algebra.
S_3 : If a relation is in 4NF surely it will be in a BCNF as well.
The number of the correct statements is/are _____.

2 Correct Option

Solution :
2

- Statement S_1 and S_3 are correct.
- S_2 is incorrect. In relational algebra the basic operations are (σ, π, $\cup$, –, X, P). Join is not a basic operation because it can be derived from basic operations.

QUESTION ANALYTICS +

Q. 16 ? FAQ ▶ Solution Video Have any Doubt ?

Which of the following statement(s) is/are true from the following statements about Normal Forms:

A Lossless join and dependency preserving decomposition into 3NF is always possible. Correct Option

B Lossless join and dependency preserving decomposition into BCNF is always possible.

C Any Relation with two attributes is in BCNF. Correct Option

D BCNF is stronger than 3NF. Correct Option

YOUR ANSWER - NA | CORRECT ANSWER - a,c,d | STATUS - SKIPPED

Solution :

(a, c, d)
- Lossless join and dependency preserving decomposition into 3NF is always possible. True
- Lossless join and dependency preserving decomposition into BCNF is always possible False Not always possible.
- Any Relation with two attributes is in BCNF. True
- BCNF is stronger than 3NF. True

QUESTION ANALYTICS +

Q. 17

FAQ | Solution Video | Have any Doubt ?

Which of the following statements is/are TRUE about weak entity set?

A. Weak entities can be deleted automatically when their strong entity is deleted. — Correct Option

B. Weak entity set avoids the data duplication and consequent possible inconsistencies caused by duplicating the key of the strong entity. — Correct Option

C. A weak entity set has no primary keys unless attributes of the strong entity set on which it depends are included — Correct Option

D. Tuples in a weak entity set are not partitioned according to their relationship with tuples in a strong entity set.

YOUR ANSWER - NA | CORRECT ANSWER - a,b,c | STATUS - SKIPPED

Solution :

(a, b, c)
Weak entities can be deleted automatically when their strong entity is deleted. Correct Weak entity set avoids the data duplication and consequent possible inconsistencies caused by duplicating the key of the strong entity. Correct
A weak entity set has no primary keys unless attributes of the strong entity set on which it depends are included. Correct
Tuples in a weak entity set are not partitioned according to their relationship with tuples in a strong entity set. This is Incorrect, because tuples in a weak entity set are partitioned according to their relationship with tuples in a strong entity set.

QUESTION ANALYTICS +

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DATABASES-2 : (GATE - 2021) - REPORTS

OVERALL ANALYSIS | COMPARISON REPORT | SOLUTION REPORT

ALL(17) | CORRECT(0) | INCORRECT(0) | SKIPPED(17)

Q. 1 FAQ | Solution Video | Have any Doubt ?

Consider the following relation:
Flights (ID, Name, Type)
Booking (BID, ID, Travellers)
SQL : Select DISTINCT Name from Flights where Not Exists (Select * from Booking where Booking.ID = Flights.ID);
Which of the following the above SQL returns?

A. Distinct flight names who have maximum travellers.

B. Distinct flight names who does not have any travellers. — Correct Option

Solution :
(b)
The SQL returns the distinct flight names who does not have any travellers.

C. Distinct flight name who have travellers.

D. None of these

QUESTION ANALYTICS +

Q. 2 FAQ | Solution Video | Have any Doubt ?

Consider the following schema:
P(Pid, Pname)
Q(Qid, Qname, Color)
R(Pid, Qid)
Which of the given options is correct to "find the pid's of producer who produces every green"?

A. Select R.Pid from R where NOT EXISTS (Select Qid from Q where Q.color = 'green')

B. $(\pi_{Pid,Qid}R)/\pi_{Qid}\ \sigma_{color='green'}(Q)$ — Correct Option

Solution :
(b)
The correct SQL to "find the Pids of producer who produces every green Q will be:
Select R.Pid from R where
NOT EXISTS (Select Q.Qid from Q
where Q.Color = 'green' AND
(NOT EXISTS (Select RPid from R_1 where R_1.Pid = R.Pid and R_1.Pid = Q.Qid)))
Option correctly finds the required Pids.

C. Both (a) and (b)

D. None of these

QUESTION ANALYTICS +

Q. 3 FAQ | Solution Video | Have any Doubt ?

Consider the following schedules with 3 transactions:
I. $R_3(z), R_3(y), W_2(y), R_3(z), W_1(x), R_3(x), W_2(x), R_1(x)$
II. $R_2(z), R_2(x), W_2(y), R_3(z), W_1(x), R_1(x), R_3(x), R_3(z), R_3(y), W_1(x)$
Which of the following schedules are conflict serializable?

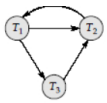
A. Only I

B. Only II

C. Both I and II

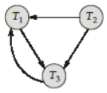
D. None of these — Correct Option

Solution :
(d)
Let's draw precedence graph:
I. Precedence Graph



There is cycle present. Hence, it cannot be conflict serializable.

II. Precedence Graph



It contain cycle. Hence, it cannot be conflict serializable.

QUESTION ANALYTICS +

Q. 4 ? FAQ ▶ Solution Video Have any Doubt ?

Consider the given boolean expression:
Exp. : a ≥ 98 AND NOT (b ≤ 30)
For what values of a and b including NULL the Exp have truth value UNKNOWN in SQL. Consider these statements regarding above conditions:
I. b is NULL and a ≥ 98
II. a is NULL and b > 30
Which of the above statements is/are correct?

A Only I

B Only II

C Both I and II — Correct Option

Solution :
(c)

- The AND evaluates to UNKNOWN (x_1 AND x_2) when atleast one of the x_1 or x_2 is NULL and neither x_1 nor x_2 is FALSE.
- So, both the statement results in UNKNOWN.

D None of these

QUESTION ANALYTICS +

Q. 5 ? FAQ ▶ Solution Video Have any Doubt ?

Consider the following statements:
S_1 : All recoverable schedules are conflict serializable.
S_2 : All conflict serializable schedules are free from cascading roll backs.
Which of the above statements is/are true?

A Only S_1

B Only S_2

C Both S_1 and S_2

D None of these — Correct Option

Solution :
(d)

- S_1 is in incorrect because every recoverable schedule need not to be conflict serializable. See the example below:

T_1	T_2
$r(A)$	
	$w(A)$
	$r(B)$
$w(B)$	
c_1	
	c_2

- S_2 is also incorrect. Every conflict serializable are not free from cascading rollbacks.

QUESTION ANALYTICS +

Q. 6 ? FAQ ▶ Solution Video Have any Doubt ?

Consider the following statements:
Statement I: A 2PL guarantee schedule is surely be conflict serializable schedule.
Statement II: Wound wait and wait die algorithms are deadlock prevention algorithms and can cause more transactions aborts.
The number of the above statements correct is/are _____.

2 — Correct Option

Solution :
2
• Statement I is correct but reverse is not true.
• Statement II is the correct explanation about wound wait and wait die systems.

QUESTION ANALYTICS +

Q. 7 Solution Video Have any Doubt ?

Consider the following relation table (where keys are underlined) and SQL.

Student

S_{num}	S_{name}
1	Q
2	Y
8	A
10	X
18	M
20	N
24	F
14	T
23	P

Enroll

S_{num}	S_{name}
20	LM
8	BC
2	CC
18	MN
8	CD
24	TS
10	XY

Select S_{num} from student S where S.S_{num} NOT IN (Select E.S_{num} from enroll *E*)
The number of tuples returned by the SQL query is _____.

3 Correct Option

Solution :
3
The query returns the S_{num} of all those students who are not enrolled in enroll table.
So, S_{num} = {1, 14, 23} not enrolled. Total 3 tuples are returned.

QUESTION ANALYTICS +

Q. 8 FAQ Solution Video Have any Doubt ?

Which of the following statements is/are False about an SQL query?

A An SQL query can contain a HAVING clause even if it does not have a GROUP BY clause. Correct Option

B An SQL query can contain a HAVING clause only if it has a GROUP BY clause

C All attributes used in the GROUP BY clause must appear in the SELECT clause

D Not all attributes used in the GROUP BY clause need to appear in the SELECT clause. Correct Option

YOUR ANSWER - NA | CORRECT ANSWER - a,d | STATUS - SKIPPED

Solution :
(a, d)

QUESTION ANALYTICS +

Q. 9 Solution Video Have any Doubt ?

Consider the following four schedules due to three transactions (indicated by the subscript) using read and write on a data item x, denoted by $r(x)$ and $w(x)$ respectively. Which of them is/are conflict serializable.

A $r_1(x); r_2(x); w_1(x); r_3(x); w_2(x)$

B $r_2(x); r_1(x); w_2(x); r_3(x); w_1(x)$

C $r_3(x); r_2(x); r_1(x); w_2(x); w_1(x)$

D $r_2(x); w_2(x); r_3(x); r_1(x); w_1(x)$ Correct Option

YOUR ANSWER - NA | CORRECT ANSWER - d | STATUS - SKIPPED

Solution :
(d)
In option (d), there is no interleaving of operations. The option (d) has first all operations of transaction 2, then 3 and finally 1.
There can not be any conflict as it is a serial schedule with sequence 2 → 3 → 1.

QUESTION ANALYTICS +

Q. 10

FAQ | Solution Video | Have any Doubt ?

Consider the following relations given below:

Parts (Pid, Pname, Color)

Supply (Sid, Sname)

Catalog (Sid, Pid)

SQL : Select C.pid from Catalog C where NOT EXISTS (Select C1.Sid from Catalog C1 where C1.Pid = C.Pid AND (C1.Sid ≠ C.Sid)
Which of the following is correct regarding the above SQL? (Assume Sid means Supplier ID)

A It returns the Pids of part supplied by two suppliers.

B It returns the Pids of part supplied by atleast two different suppliers.

C It returns the Pids of part supplied by atmost two different suppliers.

D It returns the pids of part supplied by at most 1 supplier. Correct Option

Solution :
(d)
NOT (The inner query returns parts supplied by atleast 2 supplier).
So, it returns Pids by atmost 1 supplier.
So, option (d) is correct.

QUESTION ANALYTICS +

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OVERALL ANALYSIS | COMPARISON REPORT | SOLUTION REPORT

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Q. 11 ? FAQ | Solution Video | Have any Doubt ?

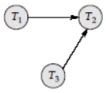
Consider the following schedules involving three transaction:
$S : r_1(x), r_2(z), r_1(z), r_3(z), r_3(y), w_1(x), r_2(x), c_1, w_3(y), c_3, r_2(y), w_2(y), c_2$
Which of the following is correct about the above schedule S?

A. *S* is not recoverable and has dirty read operation.

B. *S* is conflict serializable and has blind write.

C. *S* contain dirty read but does not have blind write. — Correct Option

Solution :
(c)
Precedence graph:



- *S* is conflict serializable.
- *S* contain dirty read problem i.e. $[w_1(x) \rightarrow r_2(x)]$.
- *S* does not contain blind write.
- *S* is recoverable because transaction 1 is committing first.

So, option (c) is correct.

D. None of these

QUESTION ANALYTICS +

Q. 12 ? FAQ | Solution Video | Have any Doubt ?

Assume S is a schedule that has both read and write operation with different transaction with different data variable. Also assume all the operations are atomic in nature. Which of the following is true?

A. *S* with no dirty read then *S* is cascadeless rollback but may not be strict recoverable. — Correct Option

Solution :
(a)
If *S* does not have dirty read then *S* is cascadeless rollback but may not be strict recoverable.

B. *S* with no dirty read then *S* is recoverable but may not be cascadeless roll back.

C. *S* with no dirty read then *S* is conflict serializable schedule.

D. *S* with no dirty read then *S* is strict recoverable.

QUESTION ANALYTICS +

Q. 13 ? FAQ | Solution Video | Have any Doubt ?

Assume the relations *X*(*A*, *B*, *C*) and *Y*(*A*, *B*, *C*) and consider the following query.
I. Select * from *X* where (*A*, *B*, *C*)
NOT IN ((Select * from X where (*A*, *B*, *C*) NOT IN (Select * from *Y*));
II. Select * from *X* where EXISTS
(Select * from *Y* where *X.A* = *Y.A* and *X.B* = *Y.B* and *X.C* = *Y.C*);
Which of the above query results in $X \cap Y$?

A. I only

B. II only

C. Both I and II — Correct Option

Solution :
(c)
Both query I and II results in $X \cap Y$.

D. None of these

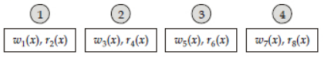
QUESTION ANALYTICS +

Q. 14 ? FAQ | Solution Video | Have any Doubt ?

Consider the following schedule S:
$S : w_1(x), r_2(x), w_3(x), r_4(x), w_5(x), r_6(x), w_7(x), r_8(x), w_9(x), r_{10}(x)$
The number of serial schedules which are view equal to schedule to S but not conflict equal to S are _____.

23 Correct Option

Solution :
23



it can execute in any order.

Total 4! = 24 view equal serial schedule for S and only one conflict equal serial schedule for S.
Total 24 – 1 = 23 which are view equal but not conflict equal.

QUESTION ANALYTICS +

Q. 15 ? FAQ | Solution Video | Have any Doubt ?

Consider the following statements:
I. Primary index may or may not be sparse.
II. Secondary index may or may not be dense.
III. Unspanned strategy is suitable for fixed length records.
The number of the correct statements is/are _____.

3 Correct Option

Solution :
3
• Primary index may or may not be sparse. It depends on the attribute used for indexing same case with statement II.
• Unspanned strategy is suitable for fixed length records and spanned strategy suitable for variable length records.

QUESTION ANALYTICS +

Q. 16 ? FAQ | Solution Video | Have any Doubt ?

Which of the following is/are incorrect?

A. B-trees are for storing data on disk and B+ trees are for main memory. Correct Option
B. Range queries are faster on B+ trees.
C. B-trees are for primary indexes and B+ trees are for secondary indexes. Correct Option
D. The height of a B+ tree is independent of the number of records. Correct Option

YOUR ANSWER - NA | CORRECT ANSWER - a,c,d | STATUS - SKIPPED

Solution :
(a, c, d)

QUESTION ANALYTICS +

Q. 17 ? FAQ | Solution Video | Have any Doubt ?

Which of the following is/are integrity constraint?

A. Not null Correct Option
B. Unique Correct Option
C. Identical
D. Check Correct Option

YOUR ANSWER - NA | CORRECT ANSWER - a,b,d | STATUS - SKIPPED

Solution :
(a, b, d)

identical is not an allowed integrity constraint in SQL. Not null prevents null values and unique only allows unique values to be entered. Check checks for a given condition.

QUESTION ANALYTICS +

Kunal Jha
Course: GATE
Computer Science Engineering(CS)

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DATABASE (GATE - 2021) - REPORTS

OVERALL ANALYSIS | COMPARISON REPORT | SOLUTION REPORT

ALL(33) | CORRECT(0) | INCORRECT(0) | SKIPPED(33)

Q. 1 Solution Video | Have any Doubt ?

Consider R = (A, B, C, D, E, F) be a relation schema with the following dependencies:
$A \rightarrow B$, $A \rightarrow C$, $CD \rightarrow E$, $CD \rightarrow F$, $B \rightarrow E$
Which of the following is candidate key of R?

A AD — Correct Option

Solution :
(a)
Closure of $(AD)^+ = \{A, B, C, D, E, F\}$
Since AD is already a candidate key. Hence superset of AD i.e. ADE can not be candidate key.

B ADE

C BC

D AC

QUESTION ANALYTICS +

Q. 2 FAQ | Solution Video | Have any Doubt ?

Consider R(A, B, C, D, E) be a relation schema with the following functional dependencies:
$F = \{A \rightarrow BC, CD \rightarrow E, B \rightarrow D, E \rightarrow A\}$
Which of the following is true for decomposition of R into (A, B, C) and (C, D, E)?

A Neither lossless join nor dependency preserving. — Correct Option

Solution :
(a)

$R_1 = \{A, B, C\}$ and $R_2 = \{C, D, E\}$
$R_1 \cap R_2 = \{C\}$ and C is not a key for either R_1 or R_2.
Hence decomposition is not lossless join.
$E \rightarrow A$ and $B \rightarrow D$ are not preserved in decomposition.
Hence it is not dependency preserving.

B Lossless join but not dependency preserving.

C Not lossless join but dependency preserving.

D Lossless join and dependency preserving.

QUESTION ANALYTICS +

Q. 3 FAQ | Solution Video | Have any Doubt ?

Consider the relation R(A, B) in which (AB) is the primary key and the relations S(A, C) where A is the primary key. Assume there are no null values and no foreign keys or integrity constraints.
Q_1 : Select A from R where A in (Select A from S).
Q_2 : Select A from S where A in (Select A from R).
Which of the following option is correct related to the above queries?

A Both Q_1 and Q_2 gives same result.

B Both Q_1 and Q_2 gives different result.

C Both Q_1 and Q_2 may give same result. — Correct Option

Solution :
(c)
For the same values unique for the column A in tables R and S. Q_1 and Q_2 will give the same output.

D None of these

QUESTION ANALYTICS +

Q. 4 FAQ | Solution Video | Have any Doubt ?

Consider relation schema R(A, B, C, D) and the two sets of functional dependencies:
H = {A → B, B → A, AB → C, AC → D, B → C}
G = {CA → B, BA → D, B → D, DB → C}
Which of the following is true?

A. G covers H

B. H covers G — Correct Option

Solution :
(b)
Check G covers H:
1. A → B cannot be derived from G which is present in H, So G not covers H.
Check H covers G:
1. CA → B can be derived from H i.e. A → B then CA → CB.
2. BA → D can be derived from H i.e. A → B, B → AC, AC → D then B → D and AB
3. B → D can be derived from H i.e. A → B, B → AC, AC → D then B → D.
4. DB → C can be derived from H i.e. B → C then DB → DC.
Hence H covers G.

C. H and G are equivalent

D. Neither H covers G not vice-versa

QUESTION ANALYTICS +

Q. 5 FAQ | Solution Video | Have any Doubt ?

Which of the following is true?

A. Wound wait and wait die algorithms are pessimistic deadlock prevention algorithm and can cause more transaction aborts than needed. — Correct Option

Solution :
(a)
• Option (a) is correct.
• 2PL guarantee schedule will be conflict schedule will be conflict serializable but reverse is false.
• Strict 2PL schedule guarantee to prevent cascading aborts but not basic 2PL. So it is correct.

B. Schedules that are conflict serializable have to be produced by two phase locking.

C. Schedules produced by two phase locking are guaranteed to prevent cascading aborts.

D. None of these

QUESTION ANALYTICS +

Q. 6 FAQ | Solution Video | Have any Doubt ?

Which of the following statement is true?

A. For queries of the from $\sigma_{A>x}$ (s) hashing is usually better than B^+ tree.

B. For queries of the from $\sigma_{A=x}$ (s) hashing is usually better than a B^+ tree. — Correct Option

Solution :
(b)
A secondary index has to be dense since the file is not organized according to a secondary index. Otherwise the index structure does not allow to find all values directly.

C. Secondary index should be sparse.

D. None of these

QUESTION ANALYTICS +

Q. 7 FAQ | Solution Video | Have any Doubt ?

Consider the relation and functional dependencies given below:
R(SSN, Name, ID, Phone)
FD: SSN → Name
SSN, ID → Phone
SSN, ID → Name
Phone → SSN, Name, ID

What is the canonical cover of FD?

A. SSN → Name
SSN, ID → Phone

Phone → Name, ID

B SSN → Name
SSN, ID → Phone
Phone → SSN, ID

Correct Option

Solution :
(b)

C SSN → Name
SSN, ID → Phone
SSN, ID → Name
Phone → SSN, ID

D SSN → Name
SSN, ID → Phone
Phone → SSN, Name

QUESTION ANALYTICS +

Q. 8 ? FAQ ▶ Solution Video Have any Doubt ?

Consider the following statements:
S_1 : The full outer join operation can be written as
$(A \bowtie B) \cup (A - \pi_x(A \bowtie B)) \times \{(null, ... null)\}$, where {null, ... null)} is the constant relation is on the schema B-A.
S_2 : For range queries every B^+ tree index requires less I/O than a full table scan.
Which of the above statements are correct?

A Only S_1

B Only S_2

C Both S_1 and S_2

D None of these

Correct Option

Solution :
(d)
S_1 : Left outer join can be written as mentioned in S_1 not full outer join. So S_1 is false.
S_2 : It is not true if the range includes the entire table. So S_2 is false.

QUESTION ANALYTICS +

Q. 9 ▶ Solution Video Have any Doubt ?

Consider the following relation R(T, U, V, W, X, Y, Z) and functional dependencies:
F = {TU → VW, TY → W, WX → Y, V → Z, Y → X, Z → T}
The number of candidate keys in relation R is _____.

6

Correct Option

Solution :
6
Total {TUX, ZUY, TUY, VUX, ZUX, VUY}
Hence 6 candidate keys.

QUESTION ANALYTICS +

Q. 10 ? FAQ ▶ Solution Video Have any Doubt ?

A relation $R(x_1, x_2, ... x_n)$ and the maximum number of candidate key possible when $n = 15$ is _____.

6435

Correct Option

Solution :
6435
$R(x_1, x_2, ... x_n)$ if we assume all the attribute to relation is a candidate key then we get n but this is not the maximum value.
In general maximum candidate key possible with n attribute is ${}^nC_{\lfloor \frac{n}{2} \rfloor}$.
Here, $n = 15$ so ${}^{15}C_7 = 6435$

QUESTION ANALYTICS +

Kunal Jha
Course: GATE
Computer Science Engineering(CS)

DATABASE (GATE - 2021) - REPORTS

OVERALL ANALYSIS | COMPARISON REPORT | SOLUTION REPORT

ALL(33) | CORRECT(0) | INCORRECT(0) | SKIPPED(33)

Q. 11 FAQ | Solution Video | Have any Doubt ?

Consider the database with the block size of 3 KB, data record pointer is 10 byte long, the value field is 20 bytes long and a block pointer is 9 bytes long. If the order of a leaf node in a B^+ tree is defined as the maximum number of (value, data record pointer) pairs it can hold, then the order of the leaf node is _____.

102 — Correct Option

Solution :
102

$$P(\text{keys} + \text{record pointer}) + \text{Block pointer} \le \text{block size}$$
$$P(20 + 10) + 9 \le 3072$$
$$30P + 9 \le 3072$$
$$30P \le 3072 - 9$$
$$P \le \left\lfloor \frac{3063}{30} \right\rfloor$$
$$P = 102$$

QUESTION ANALYTICS +

Q. 12 FAQ | Solution Video | Have any Doubt ?

In a B^+ tree in which maximum 60 keys a block can have. Let the B^+ tree index be dense over 30000 records. Assume the order of internal and leaf node is same. Then the number of nodes in the tree that we have to examine when searching for a record is _____.

4 — Correct Option

Solution :
4

QUESTION ANALYTICS +

Q. 13 FAQ | Solution Video | Have any Doubt ?

Consider the following relations given below:

X

A	B
4	3
5	1
6	2

Y

C	D
5	3
2	6
2	7

$\pi_{AD}(X * Y) - \rho_{A \leftarrow B}(\pi_{BD}(X \bowtie_{B=C} Y))$

The number of tuples return by the above query when it is executed on the above instances of relation X and Y is _____.

9 — Correct Option

Solution :
9

$X * Y =$

A	B	C	D
4	3	5	3
4	3	2	6
4	3	2	7
5	1	5	3
5	1	2	6
5	1	2	7
6	2	5	3
6	2	2	6
6	2	2	7

Now,

$\pi_{AD}(X * Y) - \rho_{A \leftarrow B}(\pi_{BD}(X \bowtie_{B=C} Y))$

A	D
4	3
4	6
4	7
5	3
5	6
5	7
6	3
6	6
6	7

−

B	A	D
	2	6
	2	7

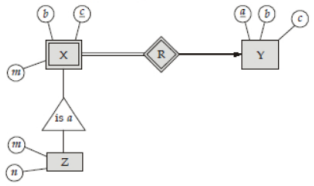
Hence, 9 tuples will be returned as none of tuples is removed.

QUESTION ANALYTICS +

Q. 14

? FAQ | Solution Video | Have any Doubt ?

Consider the following ER diagram:



If the above diagram is converted into RDBMS. Which of the following is/are correct?

A Minimum 4 tables are required to convert above ER diagram into RDBMS table.

B Minimum 3 tables are required to convert above ER diagram into RDBMS table. Correct Option

C Total 2 foreign keys when converted into minimum RDBMS table. Correct Option

D Total 3 foreign keys when converted into minimum RDBMS table.

YOUR ANSWER - NA | CORRECT ANSWER - b,c | STATUS - SKIPPED

Solution :

(b, c)

- Entity X is weak entity and dependent on Y. Hence the key of X needs to include the key of Y. Z includes the key of X.

  $Y(\underline{a}, b, c) \rightarrow 3$ attributes

  $X(\underline{c,a}, b, m) \rightarrow 4$ attributes [1 foreign key]

  $Z(\underline{c,a}, m, n) \rightarrow 4$ attributes [1 foreign key]
- 3 tables are required.
- 2 foreign keys.

QUESTION ANALYTICS +

Q. 15

? FAQ | Solution Video | Have any Doubt ?

Which of the following statements is/are true about "HAVING" and "WHERE" clause in SQL?

A "WHERE" is always used after "GROUP BY" and "HAVING" before "GROUP BY".

B "WHERE" is always used before "GROUP BY" and "HAVING" after "GROUP BY". Correct Option

C "WHERE" is used to filter rows but "HAVING" is used to filter groups. Correct Option

D None of these

YOUR ANSWER - NA | CORRECT ANSWER - b,c | STATUS - SKIPPED

Solution :

(b, c)

QUESTION ANALYTICS +

Q. 16

? FAQ | Solution Video | Have any Doubt ?

Consider the following database tables named "EMP_REC".

EMP_ID	Name	DEPT_ID	Point
5	John	4	15
5	Smith	5	25
9	Keile	4	23
9	Ted	5	16
21	Phillp	6	23
21	Max	5	9
23	Prince	4	8
23	Lynn	5	12
29	Matt	6	26

Consider the below query:

```
Select DEPT_ID, Count(Distinct
EMP_ID) From EMP-REC
        GROUP BY DEPT_ID;
```

Which of the following is/are correct?

A The above query returns "Dept which has more employees".

B The above query returns "Number of employee assigned in each dept". Correct Option

C The query returns (4, 3), (5, 4) and (6, 2) as output. Correct Option

D The query returns (4, 4), (6, 5), (3, 5) and (4, 3) as output.

YOUR ANSWER - NA | CORRECT ANSWER - b,c | STATUS - SKIPPED

Solution :
(b, c)
The query returns "How many employee assigned each Dept" i.e. (4, 3) (5, 4) and (6, 2).

QUESTION ANALYTICS +

Q. 17 FAQ | Solution Video | Have any Doubt ?

Consider the following schedule involved in transactions:
$S_1 : r_1(A); w_1(A); w_2(B); w_3(C); r_1(D); w_2(D)$
$S_2 : r_3(A); w_4(B); r_1(C); r_3(D); w_3(B); w_2(D); r_3(A); w_1(D); r_3(B); r_2(C); r_1(A)$
Which of the following is true?

A Both S_1 and S_2 allowed under 2PL. Correct Option

Solution :
(a)

S_1 :

T_1	T_2	T_3
$x(A)$ $r(A)$ $w(A)$		
	$x(B)$ $w(B)$	
		$x(C)$ $w(C)$ $u(C)$
$s(D)$ $r(D)$ $u(D)$ $u(A)$		
	$x(D)$ $w(D)$ $u(D)$ $u(B)$	

So S_1 is allowed under 2PL.
similarly S_2 is also allowed under 2PL.

B Only S_1 allowed under 2PL.

C Only S_2 allowed under 2PL.

D None of S_1 and S_2 allowed under 2PL.

QUESTION ANALYTICS +

Q. 18 FAQ | Solution Video | Have any Doubt ?

Consider the following relational schema:
Student (Sid : integers, Sname : string, address : string)
Course (Cid : integer, Cname : string, branch: string)
Enroll (Sid : integer, Cid : integer, employee : integer)
Which of the following queries are equivalent to this query in English?
"Find the Sid of students who enrolled in some courses of 'AI' branch and some courses of 'ML' branch".

S_1 : Select Sid from course P, Enroll E where P.branch = "AI" and P.cid = E.cid and EXISTS (select Sid from course P_1, enroll E_1 where P_1.branch = "ML" and E_1.Sid = E.Sid and P_1.Cid = E_1.Cid);

S_2 : $\rho(T_1, \pi_{sid}(\pi_{cid}(\sigma_{branch = 'AI'}(course)) \bowtie Enroll))$
$\rho(T_2, \pi_{sid}(\pi_{cid}(\sigma_{branch = 'ML'}(course)) \bowtie Enroll))$
$T_1 \cap T_2$

A Only S_1

B Only S_2

C Both S_1 and S_2 Correct Option

Solution :
(c)
Both S_1 and S_2 are equivalent and finds "The sid of students who enrolled in some courses of 'AI' and 'ML' branch".

D None of these

QUESTION ANALYTICS +

Q. 19 FAQ | Solution Video | Have any Doubt ?

Consider two relations P and Q have x and y tuples respectively. Match the following expression with maximum and minimum number of tuples:

Expression	Tuples
A. $\sigma_A(P) \times Q$	1. max = $x * y$, min = 0
B. $\pi_A(P) - Q$	2. max = $y * x$, min = 0
C. $P \cup Q$	3. max = x, min = 0
D. $P \bowtie Q$	4. max = $x + y$, min = max (x, y)

	A	B	C	D
(a)	3	2	4	1
(b)	1	2	3	4
(c)	3	2	1	4
(d)	2	3	4	1

A a

B b

C c

D d — Correct Option

Solution :
(d)
A → 2, B → 3, C → 4, D → 1

QUESTION ANALYTICS +

Q. 20 — Solution Video — Have any Doubt ?

Which of the following relation schema with given functional dependency follows 3NF but not BCNF?

A R(A, B, C, D, E) and FD's are C → D, D → B, D → E and AB → C

B R(A, B, C, D) and FD's are B → D and B → C

C R(A, B, C, D) and FD's are C → D, D → A and AB → C — Correct Option

Solution :
(c)
• Option (a) has partial dependency i.e. D → E hence not in 2NF.
• Option (b) also has partial dependency. Hence not in 2NF.
• Option (b), candidate keys = {AB, DB, CB} and all RHS of FD is prime attribute. Hence it is in 3NF and L.H.S. are not key so not in BCNF.
• Option (d) is BCNF.

D R(A, B, C, D) and FD's are A → B, B → C, C → D and D → A

QUESTION ANALYTICS +

Kunal Jha
Course: GATE
Computer Science Engineering(CS)

DATABASE (GATE - 2021) - REPORTS

OVERALL ANALYSIS | COMPARISON REPORT | SOLUTION REPORT

ALL(33) | CORRECT(0) | INCORRECT(0) | SKIPPED(33)

Q. 21 FAQ | Solution Video | Have any Doubt ?

Consider a database that has a relation schema:
student (rollNo, name, degree, year, sex, deptNo, advisor)
course (courseId, cname, credits, deptNo)
enrollment (rollNo, courseId, sem, year, grade)
Assume that every student is enrolled in at least one course, then which of the following query
"Retrieve the names of students who have scored 'A' in all subjects they have enrolled"?

A {s.name|student(s) ∧ (∀e) ((enrollment(e) ∨ e.rollNo = s.rollNo) → e.grade = 'A')}

B {s.name|student(s) ∧ (∀e) ((enrollment(e) ∧ e.rollNo = s.rollNo) → e.grade = 'A') Correct Option

Solution :
(b)
In option (b)
When Student e with all A grade, for enrollment tuples not having her roll number, LHS is false. For enrollment tuples having his/her roll number, LHS is true, RHS also true so the implication is true for all e tuples.
When Student e with some non-S grades, for enrollment tuples not having her roll number, LHS is false.
For enrollment tuples having his/her roll number, LHS is true, but RHS is false for at least one tuple.

C {s.name|student(s) ∧ (∃e) ((enrollment(e) ∧ e.rollNo = s.rollNo) → e.grade = 'A')}

D {s.name|student(s) ∧ (∃e) ((enrollment(e) ∨ e.rollNo = s.rollNo) → e.grade = 'A'))

QUESTION ANALYTICS +

Q. 22 Solution Video | Have any Doubt ?

Consider a relational database about hotels, customers (guests) and their bookings that is maintained by an online hotel booking company. The database consisting of the following tables
(Primary Keys are underlined).
Hotel(hId, hName, hAddress, hCity)
Guest(gId, gName, gAddress, gCity)
Room(hId, roomNo, type, price)
Booking(gId, hId, roomNo, fromdate, year, no of days)
Which of the following TRC query represent "Find the ids and names of the hotels for which every one of our guests had made a booking during the year 2021"?

A $\{x \mid \exists h \in \text{Hotel}\ (x.\text{hId} = h.\text{hId} \wedge x.\text{hname} = h.\text{hName} \wedge \forall g \in \text{Guest}\ \exists b \in \text{Booking}\ (h.\text{hId} = b.\text{hId} \wedge g.\text{gId} = b.\text{gId} \wedge b.\text{year} = 2021))\}$ Correct Option

Solution :
(a)
• Query (a) results the id's and names of the hotels for which every one of our guests had made a booking during the year 2021.
• Query (b) did not compare g.gId = b.gId which results unwanted tuple.

B $\{x \mid \exists h \in \text{Hotel}\ (x.\text{hId} = h.\text{hId} \wedge x.\text{hname} = h.\text{hName} \wedge \forall g \in \text{Guest}\ \exists b \in \text{Booking}\ (h.\text{hId} = b.\text{hId} \wedge b.\text{year} = 2021))\}$

C Both (a) and (b)

D None of the above

QUESTION ANALYTICS +

Q. 23 FAQ | Have any Doubt ?

Consider the following relations and query given below:
Emp(Id, Name, Sex, Salary)
Proj(No, Name, Dno) and
Works_on(No, IDs) contains atleast one tuples. Consider the following query:

```
Select Name
From Emp
Where NOT Exists ((Select No
          From Proj where Dno = 106)
        EXCEPT (select No from
          works_on where Id = IDs));
```

Which of the following is true about above query?

A Find the name of each employee who works on all the projects controlled by department number 106. Correct Option

Solution :
(a)
The first subquery select all projects controlled by department 106 and the second subquery selects all projects that the particular employee being considered works on.
If the set difference of the first subquery results and the second subquery result is empty, it means that the employee works on all the projects and is therefore selected.

B Find the name of each employee who does not works on all the projects controlled by department number 106.

C Find the name of each employee who work on some projects controlled by department number 106.

D None of the above

QUESTION ANALYTICS +

Q. 24 FAQ Have any Doubt ?

Consider the following schedule:
$S : r_1(x), r_2(x), w_2(x), w_3(y), w_3(x), r_1(z), w_1(x)$
Which of the following is true about the above schedule?

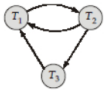
A Conflict serializable

B View serializable

C Both (a) and (b)

D None of these — Correct Option

Solution :
(d)



- Precedence graph of S contain cycle. Hence not conflict serializable.
- S has write-read conflict i.e., $(T_2, T_3) \rightarrow T_1$ and $T_1 \rightarrow T_2$, T_3 which is not possible same time. Hence not view serializable.

QUESTION ANALYTICS +

Q. 25 Have any Doubt ?

Consider the following relations:

Eno	Sname
2	Andy
3	John
5	Vin
8	John
9	Andy

Eno	Course	Grade
2	OS	80
3	CN	55
2	DBMS	65
5	CO	85
8	OS	70
5	DBMS	68
8	OS	52
9	CO	65

Select S.Sname, sum (E.grade)
From student S, Enroll E where
S.Eno = E.Eno Group By
S.Sname;
The number of tuples returned by the above SQL query is _____.

3 — Correct Option

Solution :
3
Relation returned by the SQL query:

Sname	Grade
Andy	210
John	177
Vin	153

QUESTION ANALYTICS +

Q. 26 FAQ Have any Doubt ?

Consider the relation R has 1000 tuples and relation S has 5000 tuples. The block size is 200 tuples/ block. These 2 relations have to be joined as per a specified join condition that needs to be evaluated for every pair of records from these 2 relations. The memory buffer space available can hold exactly one block of records for R and one block of records of S simultaneously at any point of time. No index is available on either relation. The optimal number of block transfer required in case of Nested loop join is _____.

25005 — Correct Option

Solution :
25005
Number of tuples in R $(N_r) = 1000$
Number of tuples in S $(N_s) = 5000$
Block size = 200 tuples/block

$$\text{Number of block in R } (B_r) = \left\lceil \frac{1000}{200} \right\rceil = 5$$

$$\text{Number of block in S } (B_s) = \left\lceil \frac{5000}{200} \right\rceil = 25$$

Number of block transfer in nested join = $1000 \times 25 + 5 = 25005$

QUESTION ANALYTICS +

Q. 27 FAQ Have any Doubt ?

Consider a disk with block size 1 KB, pointer size P = 9 bytes long. A file has 15000 employee records of fixed length. Each record has the following fields:

Fields	Size (in bytes)
NAME	20
ID	12
DEPTT	30
SALARY	15

Assume the file is ordered by the key field ID and primary index is based on ID. The number of levels needed to make it into a multi-level index is _____.

2 Correct Option

Solution :
2

$$\text{Record length} = 20 + 12 + 30 + 15 = 77 \text{ bytes}$$

$$\text{Blocking factor } (B_f) = \left\lfloor \frac{1024}{77} \right\rfloor = 13$$

$$\text{Number of blocks needed for file} = \left\lceil \frac{15000}{13} \right\rceil = 1154$$

$$\text{Index entry size} = (\text{ID} + \text{P}) = (12 + 9) = 21 \text{ bytes}$$

$$\text{Index blocking factor} = \left\lfloor \frac{1024}{21} \right\rfloor = 48$$

$$\text{Number of } 1^{st} \text{ level index blocks} = \left\lceil \frac{1154}{48} \right\rceil = 25$$

$$\text{Number of } 2^{nd} \text{ level index blocks} = \left\lceil \frac{25}{48} \right\rceil = 1$$

Since the 2^{nd} level has only one block it is the top index level.
So only 2 levels are required.

QUESTION ANALYTICS +

Q. 28 FAQ Have any Doubt ?

Consider the following schedule S with data item x:
S : $w_1(x), r_2(x), w_3(x), r_4(x), w_5(x), r_6(x), w_7(x), r_8(x), w_9(x), r_{10}(x)$
The number of serial schedules which are view equal schedule(S) but not conflict equal to schedule(S) are _____.

23 Correct Option

Solution :
23

① $w_1(x), r_2(x)$ ② $w_3(x), r_4(x)$ ③ $w_5(x), r_6(x)$ ④ $w_7(x), r_8(x)$ it can execute in any order.

Total 4! = 24 view equal serial schedule for S and only one conflict equal serial schedule for S.
Total 24 - 1 = 23 which are view equal but not conflict equal.

QUESTION ANALYTICS +

Q. 29 FAQ Have any Doubt ?

Consider the transaction T_1 and T_2 given below:
T_1 : r(A), w(A), r(B), w(B)
T_2 : r(A), w(A), r(B), w(B)
r(A) means reads operation by A and w(A) means write operation by A.
The total number of possible conflict equivalent to $T_1 \rightarrow T_2$ is _____.

6 Correct Option

Solution :
6
Conflict equivalent to $T_1 \rightarrow T_2$:

	T_1	T_2
	r(A) w(A)	
Remaining 4 transactions		
Can be arranged in any possible order		r(B) w(B)

$$\text{Number of possibilities} = \frac{4!}{2!\,2!} = 6$$

QUESTION ANALYTICS +

Q. 30

FAQ | Have any Doubt ?

Consider a relation R(P, Q, R, S, T, U) with set of functional dependencies:
FD = {PQ → R, QR → P, PR → Q, Q → S, R → T}
If the relation R is decomposed into lossless join and dependency preserving BCNF then the minimum number of relation required in this decomposition is _____.

4 — Correct Option

Solution :
4

Candidate key of the relation R(P, Q, R, S, T, U) = {PQU, QRU, PRU}. The given FD does not satisfy BCNF property so we have to decompose relation R.

I. R_1(PQR) satisfy function dependency PQ → R, QR → P, PR → Q

II. Q → S does not satisfy BCNF property so R_2(QS) separate relation.

III. R → T then R_3(RT) three relation R_1(PQR), R_2(QS), R_3(RT). But the decomposed relation is not lossless join. To make it lossless one more relation needs to add i.e. R_4(PQU).

So, total 4 relations are required to decomposed with FD preserving and lossless join.

QUESTION ANALYTICS +

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Computer Science Engineering(CS)

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ALL(33) | CORRECT(0) | INCORRECT(0) | SKIPPED(33)

Q. 31 FAQ | Have any Doubt ?

Consider a database with the following relation:
Ship(Name, Type, ID, Date, Port, Material)
Name → Type
ID → Name, Material
Name, Date → ID, Port
The database is broken with the following schemas:
S_1 (Name, Type)
S_2 (ID, Name, Material)
S_3 (Name, Date, ID, Port)
Which of the following is/are correct?

A. S_1 satisfies BCNF — Correct Option
B. S_2 satisfies BCNF — Correct Option
C. S_3 satisfies BCNF
D. S_3 satisfies 3NF but not BCNF — Correct Option

YOUR ANSWER - NA | CORRECT ANSWER - a,b,d | STATUS - SKIPPED

Solution :
(a, b, d)

QUESTION ANALYTICS +

Q. 32 FAQ | Have any Doubt ?

Consider the given query on the relation $P(r, s)$ and $R(s,t)$:
$Q_1 : \pi_r(P \rhd\lhd R)$
$Q_2 : \pi_r((P \times \pi_t(R)) \cap (\pi_r(P) \times R))$
$Q_3 : \pi_r(P \cap (\pi_r(P) \times \pi_t(R)))$
Which of the above produces the same result?

A. Q_1 and Q_2 — Correct Option
B. Q_2 and Q_3 — Correct Option
C. Q_1 and Q_3 — Correct Option
D. Q_1, Q_2 and Q_3 — Correct Option

YOUR ANSWER - NA | CORRECT ANSWER - a,b,c,d | STATUS - SKIPPED

Solution :
(a, b, c, d)
All Q_1, Q_2 and Q_3 produces same result.

QUESTION ANALYTICS +

Q. 33 FAQ | Have any Doubt ?

Consider the schedules S_1 and S_2 given below and the statements given:
$S_1 : r_1(x), r_2(z), r_1(z), r_3(x), r_3(y), w_1(x), w_3(y), r_2(y), w_2(z), w_2(y), C_1 C_2 C_3$
$S_2 : r_1(x), r_2(z), r_3(x), r_1(z), r_2(y), r_3(y), w_1(x), C_1 w_2(z), w_3(y), w_2(y), C_3 C_2$
Which of the following options is/are correct?

A. S_1 is cascadeless
B. S_2 is cascadeless — Correct Option
C. S_1 is recoverable
D. S_2 is recoverable — Correct Option

YOUR ANSWER - NA | CORRECT ANSWER - b,d | STATUS - SKIPPED

Solution :

(b, d)

- In S_1, T_2 reads item Y from T_3 but T_2 commits before T_3 commits. So S_1 is non-recoverable, cascade problem and not strict recoverable.
- S_2 is not strict because T_2 writes before T_3 commits but S_2 is cascadeless because there is no transaction reads item that were written by an uncommitted transaction.
- Option (b) and (d) are correct.

QUESTION ANALYTICS +