# CS310 - DBMS

## End Term Examination

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(1) Ans

Using empname as a clustered index is possible only when every employee will have a unique name. If this is ensured, the tuples will be organized according empname alphabatically.

Using empid as a clustered index is definitely possible Considering everyone already has a unique id assigned to them. The tuples will be organized according to empid.

Using both empname & empid as a clustered indexes may not be possible but it is possible two name one clustered index and one non-clustered index.

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2) Ans:

a) DDL is important in representing information in DBMS because it is used to describe external and logical schemes.

b) DML is used to access and update data, it is not important for representing the data.

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(3) Ans: True, Because A DBMs is typically shared among many users. Transactions from these users can be interleaved to improve the execution time of users' queries. By interleaving queries, users do not have to wait for other user's transactions to complete fully before their own transaction begins. Without interleaving, if user A begins a transaction that will take 10 seconds to complete, and user B wants to begin a transaction, user B would have to wait an additional 10 seconds for user A's transaction to complete before the database would begin processing user B's request.

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(4) Ans:

a) A user must guarantee that his or her transaction does not corrupt data or insert nonsense in the for example, in a banking database, a User must guarantee that a cash withdraw transaction accurately models the amount a person removes from his or her account. A database application would be worthless if a person removed 20 dollars from an ATM but the transaction set their balance to zero!

(b) A DBMS must guarantee that transactions are executed fully and independently of other transactions. An essential property of a DBMS is that a transaction should execute atomically, or as if it is the only transaction running. Also, transactions will either complete

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fully, or will be aborted and the database returned to it's initial state: This ensures that the database remains consistent.

(7) Ans:

$\rho(R_1, \text{catalog})$

$\rho(R_2, \text{catalog})$

$\pi_{R_1.pid}(\sigma_{R_1.pid = R_2.pid \wedge R_1.sid != R_2.sid}(R_1 \times R_2))$

Using:

| SID | PID | cost |
|---|---|---|
| 1 | 1 | ₹ 10.00 |
| 1 | 1 | ₹ 9.00 |
| 2 | 1 | ₹ 34.00 |
| 2 | 3 | ₹ 11.00 |
| 3 | 1 | |

$R_1 \times R_2$ gives:

| SID | PID | cost(₹) | SID | PID | cost(₹) |
|---|---|---|---|---|---|
| 1 | 1 | 10.00 | 1 | 1 | 10.00 |
| 1 | 1 | 10.00 | 2 | 1 | 9.00 |
| 1 | 1 | 10.00 | 2 | 3 | 34.00 |
| 1 | 1 | 10.00 | 2 | 1 | 11.00 |
| 1 | 1 | | | | |

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| SID | PID | cost (R) |
|---|---|---|
| 2 | 1 | 9.00 |
| 2 | 1 | 9.00 |
| 2 | 1 | 9.00 |
| 2 | 3 | 34.00 |
| 2 | 3 | 34.00 |
| 2 | 3 | 34.00 |
| 3 | 1 | 11.00 |
| 3 | 1 | 11.00 |
| 3 | 1 | 11.00 |
| 3 | 1 | 11.00 |

| SID | PID | cost (E) |
|---|---|---|
| 1 | 1 | 10.00 |
| 2 | 1 | 9.00 |
| 2 | 1 | 34.00 |
| 2 | 3 | 11.00 |
| 3 | 1 | 10.00 |
| 1 | 1 | 10.00 |
| 1 | 1 | 34.00 |
| 2 | 3 | 11.00 |
| 3 | 1 | 10.00 |
| 1 | 1 | 9.00 |
| 2 | 1 | 34.00 |
| 2 | 3 | 11.00 |

$R_1.pid = R_2.pid$ gives:

| SID | PID | cost |
|---|---|---|
| 1 | 1 | 10.00 |
| 1 | 1 | 10.00 |
| 1 | 1 | 10.00 |
| 2 | 1 | 9.00 |
| 2 | 1 | 9.00 |
| 2 | 1 | 9.00 |
| 2 | 3 | 34.00 |
| 3 | 1 | 11.00 |
| 3 | 1 | 11.00 |
| 3 | 1 | 11.00 |

| SID | PID | cost |
|---|---|---|
| 1 | 1 | 10.00 |
| 2 | 1 | 9.00 |
| 3 | 1 | 11.00 |
| 1 | 1 | 10.00 |
| 2 | 1 | 9.00 |
| 3 | 1 | 11.00 |
| 2 | 3 | 34.00 |
| 1 | 1 | 10.00 |
| 2 | 1 | 9.00 |
| 3 | 1 | 11.00 |

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$\Gamma_{R_1.pid = R_2.pid \wedge R_1.sid != R_2.sid}$ gives

| sid | pid | cost |
|---|---|---|
| 1 | 1 | 10.00 |
| 1 | 1 | 10.00 |
| 1 | 1 | 9.00 |
| 2 | 1 | 9.00 |
| 2 | 1 | 11.00 |
| 3 | 1 | 11.00 |
| 3 | 1 | 11.00 |

| sid | pid | cost |
|---|---|---|
| 2 | 1 | 9.00 |
| 3 | 1 | 11.00 |
| 1 | 1 | 10.00 |
| 3 | 1 | 11.00 |
| 3 | 1 | 10.00 |
| 1 | 1 | 9.00 |
| 2 | 1 | 9.00 |

projecting on PID gives us a single part number = 1 (ultimating the duplicates)

SQL Query:

```
SELECT c.sid
FROM CATALOG c
WHERE EXISTS (SELECT c1.sid FROM
CATALOG c1
WHERE c1.pid and c1.sid = c.sid).
```

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(8) Ans:

Invalid query.

Explanation :-

This relational algebra statement does not return anything because of the sequence of projection operators. Once the sid is projected, it is the only field in the set. Therefore, projecting on some will not return anything

(5) Ans: Yes, we can determine the key of relation with the help of instance

Eg: In a one to ~~one~~ many relation we can consider the column/attribute with unique values as a primary key.

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(9)

Ans: The query on Emp schema that could be automatically updated by updating Emp is

CREATE VIEW seniorEmp (eid, ename, age, salary)

As SELECT E.eid, E.ename, E.age, E.salary.

from Emp E

WHERE E.age > 50.