

Ans 1. 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 to empname alphabetically.

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 index may not be possible but it is possible to have one clustered index and one non-clustered index.

Ans 2. DDL is important in representing information in DBMS because it is used to describe external and logical schemas.

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

Ans 3. True, A DBMS is typically shared among many users. Transactions from these users can be interleaved to improve the execution time of user's 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 second for user A's transaction to complete before the database would begin processing user B's request.

- Ans 4. ~~A user~~
- a) A user must guarantee that his or her transaction does not corrupt data or insert nonsense in the 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~~ 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 fully, or will be aborted and the database returned to its initial state. This ensures that the database remains.

Ans 5. Yes, we can determine the key of relation with the help of instance. eg. In a one to many relation we can consider the column/attribute with unique value as a primary key.

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Ans 7. $P(R_1, \text{Catalog}), P(R_2, \text{Catalog})$

$$R_1.\text{pid} \cap R_1.\text{pid} = R_2.\text{pid} \wedge R_1.\text{sid} \neq R_2.\text{sid} (R_1 \times R_2)$$

Using following

SID	PID	Cost
1	1	\$10
2	1	\$9
2	3	\$34
3	1	\$11

$R_1 \times R_2$

SID	PID	Cost	SID	PID	Cost
1	1	\$10	1	1	\$10
1	1	\$10	2	1	\$9
1	1	\$10	2	3	\$34
1	1	\$10	3	1	\$11
2	1	\$9	1	1	\$10
2	1	\$9	2	1	\$9
2	1	\$9	2	3	\$34
2	1	\$9	3	1	\$11
2	3	\$34	1	1	\$10
2	3	\$34	2	1	\$9
2	3	\$34	2	3	\$34
2	3	\$34	3	1	\$11
3	1	\$11	1	1	\$10
3	1	\$11	2	1	\$9
3	1	\$11	2	3	\$34
3	1	\$11	3	1	\$11

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$\delta R_1.pid = R_2.pid$ gives us.

SID	PID	Cost	SID	PID	Cost
1	1	\$10	1	1	\$10
1	1	\$10	2	1	\$9
1	1	\$10	3	1	\$11
2	1	\$9	1	1	\$10
2	1	\$9	2	1	\$9
2	1	\$9	3	1	\$11
2	3	\$34	2	3	\$34
3	1	\$11	1	1	\$10
3	1	\$11	2	1	\$9
3	1	\$11	3	1	\$11

$\delta R_1.pid = R_2.pid \wedge R_1.sid \neq R_2.sid$ gives us

SID	PID	Cost	SID	PID	Cost
1	1	\$10	2	1	\$9
1	1	\$10	3	1	\$11
2	1	\$9	1	1	\$10
2	1	\$9	3	1	\$11
3	1	\$11	1	1	\$10
3	1	\$11	2	1	\$9

SQL query.

```
SELECT C.sid
FROM Catalog C
WHERE EXISTS (SELECT C1.sid
               FROM Catalog C1
              WHERE C1.pid = C.pid AND C1.sid != C.sid)
```

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Ques 9. The following view on Emp can be updated automatically by updating Emp:

```
CREATE VIEW SeniorEmp(eid, name, age, salary)
AS SELECT E.eid, E.ename, E.age, E.salary
FROM EMP E
WHERE E.age > 50
```

Ans 8. 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 same will not return anything.