

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 organised 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 organised according to empid.

Using both empname & empid as a clustered index may not be possible but it is possible to have one clustered index & one non-clustered index.

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Q.

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

\* DML is used to access and update data. It is not important for representing the data.



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3. True,

Because in General many users Can Access a database and 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 users 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.

4. a) 1

A user must guarantee that his or her transaction does not corrupt data or insert nonsense in the database. 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 automatically 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 consistent.



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5. Yes, we can determine the key of relation with the help of instance. E.g, In a one to many relation we can consider the Column/Attribute with unique values as a primary key.

6).

a) Create clustered index IX-empname index ON STUDENT Table (StudentName DESC)

"Select Email from STUDENT Table"

→ This Query displays all emails in descending order of student Name. First the table gets sorted based on student Name in DESC order then the select query displays the emails in that order.

b) Student ID      Student Name      Email      Age

1005      Krishna      Krishna@xyz.com      22

1030      John      Null      23

1020      John      Jh@xyz.com      22

## 7. Query in Relational Algebra:

 $\rho(R_1, \text{Catalog})$ 
 $\rho(R_2, \text{Catalog})$ 
 $\pi_{R_1.pid \mid R_1.pid = R_2.pid \wedge R_1.sid \neq R_2.sid}(R_1 \times R_2)$ 

### SQL Query:

Select distinct  $R_1.pid$  from catalog  $R_1$ ,  
Catalog  $R_2$  where  $R_1.pid = R_2.pid$  and  
 $R_1.sid \neq R_2.sid$

Sid	Pid	Cost
1	1	10
2	1	9
2	3	34
3	1	11



$R_1 \times R_2$  gives us:

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



$\sqrt{R_1 \cdot \text{pid}} = R_2 \cdot \text{pid}$  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

$\sqrt{R_1 \cdot \text{pid}} = R_2 \cdot \text{pid} \wedge R_1 \cdot \text{sid} = R_2 \cdot \text{sid}$  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

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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.

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9. A view query on Emp Schema that could be automatically updated by updating Emp:

```
CREATE VIEW Snr-Employee (eid, name, age,  
salary) AS
```

```
SELECT E.eid, E.ename, E.age, E.salary FROM  
Emp E Where E.age > 50.
```