

End Term Examination.

- 1) For an XYZ Company instead of storing their employees tuples in a heap file, with a clustered index on the empname field, they can also choose to store it with an index on the empid field. 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. Instead, they can use empid as a clustered index. This is definitely possible, considering everyone already has a unique id assigned to them which is empid. Then the tuples will be organized according to their empid.
- But using both fields (empname and empid) as indexes may not be possible. This operation may fail. But it is possible to have one clustered index and one non clustered index. Thus XYZ company can store their employees data.

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2) DDL is important in representing information

in DBMS because it is used to describe
external and logical schemas.

DDL is used to access and update data;
it is not important for representing data.

3) True. DBMS interleave the actions of different transactions instead of executing transactions one after the other. To improve the execution time of users queries, transactions from these users are interleaved. A DBMS is typically shared among many users. 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 A begins a transaction that will take 10 seconds to complete, and user B wants to begin a transaction, user B have to wait an additional 10 seconds for user A's transaction to complete before the database would begin processing user B's request. To avoid this waiting time and to improve execution time, transactions are interleaved.

4) a) A user should be sincere, law abiding, submitting transactions with their own or system assigned credentials, not borrowing from or lending those credentials to others, and taking responsibility for their actions. 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 withdrawal transaction accurately models the amount a person removes from his or her account.

b) Consistency in database systems refers to the requirement that any given database transaction must change affected data only in allowed ways. 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 fully, or will be aborted and the database returned to its initial state. This ensures that the database remains consistent.

5) Yes, we can determine the key of relation with the help of instance. For example, in a one to many relation we can consider the column / attribute with unique values as a primary key.

7) Let the two suppliers be $R_1, R_2 \in D$.
 $P(R_1, \text{catalog})$
 $P(R_2, \text{catalog})$

$$\Pi_{R_1, P, d} \sigma_{R_1, P, d = R_2, P, d \wedge R_1, S, d} = R_2, S, d \wedge R_1, S, d \wedge R_1, S, d \wedge R_2, S, d \wedge R_1, S, d \wedge R_2, S, d$$

using the following:

SID	PID	COST
1	1	1000
2	1	2000
2	3	3000
3	1	4000

$R_1 \times R_2$ gives us :

SID	PID	cost	SID	PID	cost
1	1	1000	1	1	1000
1	1	1000	2	1	2000
1	1	1000	2	3	3000
1	1	1000	3	1	4000
2	1	2000	1	1	1000
2	1	2000	2	1	2000
2	1	2000	2	3	3000
2	1	2000	3	1	4000
2	3	3000	1	1	1000
2	3	3000	2	1	2000
2	3	3000	2	3	3000
2	3	3000	3	1	4000
3	1	4000	1	1	1000
3	1	4000	2	1	2000
3	1	4000	2	3	3000
3	1	4000	3	1	4000
3	1	4000	3	1	4000

$R_1 \cdot \text{pid} = R_2 \cdot \text{pid}$ gives :

SID	PID	cost	SID	PID	cost
1	1	1000	1	1	1000
1	1	1000	2	1	2000
1	1	1000	3	1	4000
2	1	2000	1	1	1000
2	1	2000	2	1	2000
2	1	2000	3	1	4000
2	3	3000	2	3	3000
3	1	4000	1	1	1000
3	1	4000	2	1	2000
3	1	4000	3	1	4000

Relational algebra query:

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

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

$\pi_{R_1.PID \in R_1.PID \neq R_2.PID \wedge R_1.SID \neq R_2.SID}(R_1 \times R_2)$

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)

8) Invalid query.

Because, 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) The following view query on emp can be updated automatically by updating emp;

```
CREATE VIEW seniorEmp (eid, ename, age,  
AS SELECT E.eid, E.ename, E.age, (E.salary)  
FROM emp E where E.age > 50 .
```