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EECS 341 Databases

Homework 5

1 i

I would treat inserting into the database as inserting into an array at a given index. The data on my machine is stored in a similarly to an array, which would allow us to enforce the uniqueness constraint of key eid using the clustered index. Inserting data into the table using a key that is not unique is the same as inserting into an occupied array position. The database management system needs to ensure the data at the given index is empty before enacting the INSERT query to protect against overriding data and to make sure both keys aren't kept.

1 ii

`UPDATE Emp SET sal=10000 WHERE eid=7`

The database management system efficiently locates the entry where the value on "eid" is equal to 7 because of the clustered index. Changing the value on "sal" will not be slowed or sped up because the attribute is not clustered or unclustered.

1 iii

`UPDATE Emp SET eid=7 WHERE sal=10000`

This query will locate all of the entries where the value on "sal" is equal to 10,000. From here, the database management system will need to change the value on "eid" at each of the matching rows. Because the "eid" attribute is clustered, the database management system will need to physically move the employee's data on the disk to enforce the clustered index rule.

1 iv

`UPDATE Emp SET sal=100 WHERE did=1`

`UPDATE Emp SET eid=1 WHERE eid=2`

The first query does not reference clustered or unclustered attributes. Therefore, performance is neither optimized nor worsened by the indexes.

The second query will efficiently use "eid" to locate the matching rows, but will then be slowed by needing to change the value on an attribute that has a clustered index.

***The question is ambiguous, so I included both of my interpretations.

2 i

$R1 = \{ A B \}$

$R2 = \{ B C \}$

$R3 = \{ A B D E \}$

$R4 = \{ E G \}$

Functional Dependencies

$AB \rightarrow C$

$AC \rightarrow B$

$AD \rightarrow E$

$B \rightarrow D$

$BC \rightarrow A$

$E \rightarrow G$

(A)

Dependency Preserving?

Includes: $AD \rightarrow E$ $B \rightarrow D$ $E \rightarrow G$

Excludes: $AB \rightarrow C$ $AC \rightarrow B$ $BC \rightarrow A$

No, three of the six functional dependencies are not preserved.

(B)

Lossless join?

	A	B	C	D	E	G
AB	X	X	X	X		
BC	X	X	X	X		
ABDE	X	X	X	X	X	X
EG					X	X

Yes, a row has been filled with distinguished variables signifying ability to join losslessly.

2 ii

$R1 = \{ A B C \}$

$R2 = \{ A C D E \}$

$R3 = \{ A D G \}$

Functional Dependencies

$AB \rightarrow C$

$AC \rightarrow B$

$AD \rightarrow E$

$B \rightarrow D$

$BC \rightarrow A$

$E \rightarrow G$

(A)

Dependency Preserving?

Includes: $AB \rightarrow C$ $AC \rightarrow B$ $AD \rightarrow E$ $BC \rightarrow A$

Excludes: $B \rightarrow D$ $E \rightarrow G$

No, two of the six functional dependencies are not preserved.

(B)

Lossless join?

	A	B	C	D	E	G
ABC	X	X	X	X		
ACDE	X	X	X	X	X	X
ADG	X			X	X	X

Yes, a row has been filled with distinguished variables signifying ability to join losslessly.