L18 : Normalization

1-Tut : MCQ - 1

Send Feedback

What is trivial functional dependency?

Options :

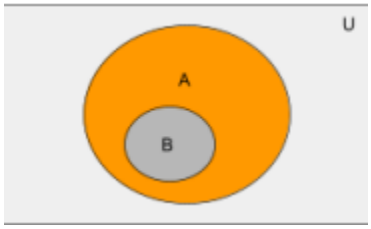
This problem has only one correct answer

If A→B holds where B is not a subset of A.
If A→B holds where B is a subset of A.
If A→B holds where B is not an intersection of A.
If A→B holds where B is an intersection of A.

Correct Answer : B

Solution Description

Let there be a set of attributes A which determines a set of attributes B (i.e. A→ B). Now if the dependent (i.e. B) is a subset of the determinant (i.e. A). i.e. If A→ B and B⊆A. Hence, we call this a trivial functional dependency
Here is a Venn diagram below for this trivial dependency:



2-Tut : MCQ - 2

Send Feedback

The rule which states that addition of same attributes to the right side and left side will results in other valid dependency is classified as

Options

This problem has only one correct answer

reflexive rule
augmentation rule
transitivity Rule
Sigma Rule

Correct Answer : B

Solution Description

The augmentation rule states that the addition of the same attributes to the right side and the left side will result in another valid dependency. If B can be determined from A, then adding an attribute to this functional dependency won't change anything. i.e. If A→ B holds, then AM→ BM holds too. 'M' being a set of attributes.

3-Tut : MCQ - 3

Send Feedback

A relation R has the following tuples:

A	B	C
1	2	3
4	2	3
5	3	3
2	4	4

Which of the following dependencies do not hold over the relation R?

Options

This problem has only one correct answer

A -> B
AB -> C
C -> B
B -> C

Correct Answer : C

Solution Description

Explanation: Here , if we observe carefully for C->B, we would notice that for attribute 'C', value 3 is appearing multiples times and it is pointing to different values of attribute 'B'. So, if we consider value 3 of attribute 'C' , then it can point to value 2 as well as value 3 of attribute 'B'. Hence, 'C' cannot determine 'B' uniquely.
Hence ,C->B dost NOT hold.

4-Tut : MCQ - 4

Send Feedback

R={A, B, C, D, E} is the given schema, the FD's for the same are as follows:

A→B

A→C

CD→E

B→D

E→A

Identify the illegal relation from the following.

Options

This problem has only one correct answer

BC→ CD
AC→ BC
EC→ AC
BD→ CD

Correct Answer : D

Solution Description

Using Armstrong's axiom of Augmentation, which states that,If Y can be determined from X, then adding an attribute to this functional dependency won't change anything.
i.e. If X→ Y holds, then XM→ YM holds too. 'M' being a set of attributes.

Therefore, here all the relation stated holds but not BD→ CD. As there is no FD stating B→ D.

5-Tut : MCQ - 5

Send Feedback

R={A, B, C, D, E} is the given schema, the FD's for the same are as follows:

A→B

A→C

CD→E

B→D

E→A

Is the relation CD→ AC legal one?

Options

This problem has only one correct answer

Yes
No
Cannot say

Correct Answer : A

Solution Description

We know CD→ E and E→ A . Therefore, CD→ A (using transitive rule)
Also it is evident that C⊆CD therefore, CD→ C.

Hence, Combining CD→ A and CD→ C , we can state, CD→ AC.

6-Tut : MCQ - 6

Send Feedback

A functional dependency of the form A→B is trivial if:

Options

This problem has only one correct answer

A⊆A
A⊆B
B⊆A
A⊆B and B⊆A

Correct Answer : C

Solution Description

Let there be a set of attributes A which determines a set of attributes B (i.e. A→ B). The functional dependency will be trivial if the dependent (i.e. B) is a subset of the determinant (i.e. A). i.e. If A→ B and B⊆A.

7-Tut : MCQ - 7

Send Feedback

Which of the following anomalies can a relation have if it contains data redundancies.

Options

This problem has only one correct answer

Insertion
Deletion
Update
All of them

Correct Answer : D

Solution Description

Data Redundancy means having the same copies of data in a database. This mostly happens in the database when the data is not normalized. Anomalies that can be caused due to Data Redundancy are mostly on the WRITE anomalies that are insertion anomaly, deletion anomaly, update anomaly, etc.

8-Tut : MCQ - 8

Send Feedback

Consider the following table:

Employee_ID	Name	Department	Clubs
1	Navdeep	Content	Fitness Freaks
2	Shubhangi	Marketing	Marketing Club
3	Shubhangi	Marketing	Management Club
4	Gaurav	CIS	Technology Org.
5	Gaurav	CIS	Fitness Freaks

Answer the following question with the help of above data. Keep in mind that an employee may be added to various clubs, but only one department.

While creating the database, the column “Clubs” was defined so that null values are not allowed. A new intern is hired by the company. No departments or clubs are assigned to him beforehand. What kind of anomaly might occur due to this restriction?

Options

This problem has only one correct answer

Updation Anomaly
Deletion Anomaly
Insertion Anomaly
None of the above

Correct Answer : C

Solution Description

A new employee without a club affiliation cannot be added into the database.

9-Tut : MCQ - 9

Send Feedback

Consider the following table:

Employee_ID	Name	Department	Clubs
1	Navdeep	Content	Fitness Freaks
2	Shubhangi	Marketing	Marketing Club
3	Shubhangi	Marketing	Management Club
4	Gaurav	CIS	Technology Org.
5	Gaurav	CIS	Fitness Freaks

Answer the following question with the help of above data. Keep in mind that an employee may be added to various clubs, but only one department.

If the club Fitness Freak is disbanded and the data is not handled properly, what anomaly might occur?

Options

This problem has only one correct answer

Updation Anomaly
Deletion Anomaly
Insertion Anomaly
None of the above

Correct Answer : B

Solution Description

Deletion of instances of the club Fitness Freak will lead to the complete loss of employee information having Employee_ID as 1.

10-Tut : MCQ - 10

Send Feedback

Consider the following table:

Employee_ID	Name	Department	Clubs
1	Navdeep	Content	Fitness Freaks
2	Shubhangi	Marketing	Marketing Club
3	Shubhangi	Marketing	Management Club
4	Gaurav	CIS	Technology Org.
5	Gaurav	CIS	Fitness Freaks

Answer the following question with the help of above data. Keep in mind that an employee may be added to various clubs, but only one department.

Gaurav has recently decided to switch to the Tech Team and has put in an official request for department change. What anomaly might occur in the above database if the database manager doesn't realize the one to many relation between employee and clubs?

Options

This problem has only one correct answer

Updation Anomaly
Deletion Anomaly
Insertion Anomaly
None of the above

Correct Answer : A

Solution Description

Updating the department may lead to the data inconsistency and partial update as multiple entries are present for Gaurav . All rows should be updated with a new department for Gaurav.

11-Tut : MCQ - 11

Send Feedback

Katherine was the assistant to the DBMS professor at her college. She was given a simple task of converting composite attributes into individual attributes for a table. What normalization is she performing?

Options

This problem has only one correct answer

First
Second
Third
None of the above

Correct Answer : A

Solution Description

First Normal Form (1NF) is the first step of the normalization process. For a relation to justifying 1NF, it needs to satisfy 4 basic conditions:
1. Each attribute should contain atomic values. (i.e. no multivalued attributes)
2. Each Value stored in an attribute should be of the same type.
3. All the attributes in a table should have unique names.
4. The order of the data stored in the table doesn't matter.

In the given question Katherine was given the task of converting composite attributes to individual attributes for a table. So it is in the First normal form.

12-Tut : MCQ - 12

Send Feedback

Which of the following is not required for a table to be in 1NF?

Options

This problem has only one correct answer

Attributes to have unique names
Free from Transitive dependencies
Single valued attribute
Each value in an attribute is of a similar type.

Correct Answer : B

Solution Description

For a relation to justifying 1NF, it needs to satisfy 4 basic conditions:
1. Each attribute should contain atomic values.
2. Each Value stored in an attribute should be of the same type.
3. All the attributes in a table should have unique names.
4. The order of the data stored in the table doesn't matter.

13-Tut : MCQ - 13 (First Normal Form)

Send Feedback

We are given a table products:

cust_Id	products_ordered	price
20	Mobile cover	499
27	Bag, Earphones	1399
33	Laptop	35000
35	camera	5490

Identify the Normal form it doesn't satisfy and make changes to it to be accepted.

Answer

Type here : 1 NF

Solution Description

It doesn't satisfy 1 NF, as product_ordered attribute has multiple values in a single record.
A way to fix this is, Split the table into two tables one containing the cust_id with the price paid and other one containing the cust_id and the products_ordered.

Here, splitting the table is a better option as the customer buying the products have certain number of products in the cart and we only know the final price. We are not aware of the price of individual product_ordered like Bag or earphones, so we would not be able to insert them as separate rows (one for Bag and another for Earphone) inside the Product table.

Table Price:

cust_Id	price
20	499
27	1399
33	35000
35	5490

Table Orders:

cust_Id	price
20	Mobile cover
27	Bag
27	Earphone
33	Laptop
35	Camera

14-Tut : MCQ - 14

Send Feedback

For a relation to be in 2NF it has to:

Options

This problem has only one correct answer

a. Be in 1 NF
b. Shouldn't have transitive dependencies
c. Shouldn't have partial dependencies
Both c and a
Both a and b

Correct Answer : D

Solution Description

For a relation to justifying 2NF, it needs to satisfy two important rules:
1. It should be in the First Normal Form.

2. It should not have any partial dependencies i.e. when a nonprime attribute is derivable from only a part of a candidate key.

15-Tut : MCQ - 15 (Second Normal Form)

Send Feedback

For a given table employee, assume an employee can work for multiple teams.

Emp_id	Team	Emp_age
34324	Design	22
34324	Content	22
54355	Content	21
77445	Technical	25
77445	Design	25

Identify the prime and non-prime attributes.

Answer

Type here :

Solution Description

Non-prime: Emp_age (it is dependent on Emp_id)

Prime attributes: {Emp_id, Team}

16-Tut : MCQ - 16 (Second Normal Form)

Send Feedback

For a given table employee, assume an employee can work for multiple teams.What normal form does this table violates?

Emp_id	Team	Emp_age
34324	Design	22
34324	Content	22
54355	Content	21
77445	Technical	25
77445	Design	25

Answer

Type here

Solution Description

Here ({Emp_id, Team}) is the key for the table. We can see that Emp_age is dependent on Emp_id and Emp_id is a subset of the Prime attributes ({Emp_id, Team}). Hence, it is a case of Partial dependency. Therefore, it is a violation of 2NF.

17-Tut : MCQ - 17 (Second Normal Form)

Send Feedback

For a given table employee, assume an employee can work for multiple teams.

Emp_id	Team	Emp_age
34324	Design	22
34324	Content	22
54355	Content	21
77445	Technical	25
77445	Design	25

Fix the violation.

Answer

Type here

Solution Description

To fix this we should split the above table into two:

Table Emp_detail:

```
 Emp_id  |   Emp_age
 --------------------
   34324 | 22
   54355 | 21
   77445 | 25
```

Table Team_data:

```
 Emp_id  |  Team
 --------------------
   34324 | Design
   34324 | Content
   54355 | Content
   77445 | Technical
   77445 | Design
```

18-Tut : MCQ - 18

Send Feedback

Which of the following dependencies leads to violation of 3NF.

Options

This problem has only one correct answer

Transitive Dependency
Partial Dependency
Both a and b
None of them

Correct Answer : C

Solution Description

For a table to be in third normal form, first it should be in 2NF and second no transitive dependencies.

19-Tut : MCQ - 19 (Third Normal Form)

Send Feedback

Given a table subjects as shown below:

Sub	Department	Instructor
S1	Dep1	Ins1
S3	Dep1	Ins2
S2	Dep1	Ins1
S4	Dep2	Ins3
S5	Dep2	Ins4

Try and identify the normal form it violates. Try and fix it.

Answer

Type here

Solution Description

Here, on observing we can say,
Sub--> Instructor (A subject is taught by instructor)
And Instructor--> Department (an instructor belongs to certain department)

So we can say Sub --> Department (using transitive rule.)

Hence, transitive dependency from the primary key.
Hence Violating 3NF.

Let's fix this by splitting the above table into two as below:

Table Ins_dep:

Instructor	Department
Ins1	Dep1
Ins2	Dep1
Ins3	Dep2
Ins4	Dep3

Table Sub_Ins:

Sub	Instructor
S1	Ins1
S2	Ins1
S3	Ins2
S4	Ins3
S5	Ins4

20-Tut : **MCQ - 20**

Send Feedback

Which of the following is true about BCNF:

Options

This problem has only one correct answer

lossless join and dependency preserving
lossless join but not dependency preserving
not lossless join but dependency preserving
none of these

Correct Answer : B

Solution Description

Lossless Join:

A decomposition of the Relation is said to be lossless when it is decomposed into two new relation whose FD satisfy following condition:
1. Union of attributes of two relation is equal to that of the original relation.
2. Intersection of Attributes of two decomposed relations must not be NULL.
3. Common attribute between the relations must be a key for at least one of them.

Dependency Preserving:

On decomposing a relation into two, All dependencies of the original relation either must be a part of both the decomposed relation or must be derivable from combination of dependencies of both the relation.

21-Tut :