

* Explain Functional Dependencies.

There are Five type of Functional Dependencies.

- 1) Trivial Dependency
- 2) Non-Trivial Dependency
- 3) Transitive Dependency
- 4) Full-Functionally Dependency
- 5) Partial Dependency.

1 Trivial Dependency:

In Trivial Dependency, A Function dependent is always a subset of the determinant.

Ex. $X \rightarrow Y$ is Trivial Function Dependency then Y is subset of X .

Ex. $\{e_id, e_name\} \rightarrow e_id$

then e_id is proper subset of e_id and e_name .

2 Non-Trivial Dependency:

In Non-Trivial Dependency, the Function dependent is strictly not subset of the F determinant.

Ex. $\{e_id, e_name\} \rightarrow e_age$

then e_age is not sub set
of e_id and e_name .

3. Transitive Dependency:

In transitive Dependency, Function
Dependency is causes the indirect

Ex.

$e_id \rightarrow e_name$

$e_name \rightarrow e_Job$

$\therefore e_id \rightarrow e_Job$

Using e_id we can get e_Job .

4 Full-Functionally Dependency:

In Full-Functionally Dependency,
Function A is dependent on aB
but not any proper subset of
A.

Ex.

$e_id \rightarrow e_name$

$\{e_Job, e_MN, e_Name\} \rightarrow e_id$

$e_name \rightarrow e_address$

Using e-addresses we can not get full detail of Employee, We get only e-name.

5 Partial Dependency:

In Partial Dependency, Function A is dependent & dependent on B but with not proper subset of A.

EX.

$\{s_enrolln., s_branch\} \rightarrow e_s_SIP$

Using s-enrolln we can get s-SIP without using s-branch Attribute.

* Explain Armstrong's Axioms with its operations.

Ans

Armstrong's Axioms are set of rules when we applied Functional Dependency.

It can be apply to a set of Functional Dependency to derive other Functional Dependency.

There are seven Armstrong's Axioms Operations.

1 Reflexivity:

In reflexivity, if Y is proper sub set of X , then X is determine Y .

$$\therefore X \supset Y \rightarrow X \rightarrow Y \rightarrow X \supset Y$$

2 Augmentation:

In Augmentation, if X determine Y , then XZ determine YZ for any value of Z .

$$\therefore X \rightarrow Y$$

$$\therefore XZ \rightarrow YZ$$

3 Transitivity:

In Transitivity, if X determine Y and Y determine Z then X is also determine Z .

$$\therefore X \rightarrow Y, Y \rightarrow Z$$

$$\therefore X \rightarrow Z$$

4 Union:

In Union, if x determine y and x determine z then x is also determine yz

$$\begin{aligned} \therefore x \rightarrow y, x \rightarrow z \\ \therefore x \rightarrow yz \end{aligned}$$

5 Decomposition:

In Decomposition, if x determine yz then, x is also determine y and z respectively.

$$\begin{aligned} \therefore x \rightarrow yz \\ \therefore x \rightarrow y, x \rightarrow z \end{aligned}$$

6 Composition:

In Composition, if x determine y and a determine b then xa determine by .

$$\begin{aligned} \therefore x \rightarrow y, a \rightarrow b \\ \therefore xa \rightarrow yb \end{aligned}$$

7 Pseudo Transitivity:

In Pseudo Transitivity, if x determine y and xa determine b then

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ya determine b .

$$\therefore x \rightarrow y, xa \rightarrow b$$
$$\therefore ya \rightarrow b$$

* Explain Normalization with its type.

Normalization is the process of organizing data in database.

This includes creating tables and establishing relationships between the table.

Normalization divides the larger table into smaller and links using relationship.

There are six types of Normalization.

- 1) 1st Normal Form
- 2) 2nd Normal Form
- 3) 3rd Normal Form
- 4) Boyce-Codd Normal Form
- 5) 5th Normal Form
- 6) 6th Normal Form

1 1st Normal Form:

Condition: Each tuple of the table should contain a single value.

In this form attributes contain only single value not contain multivalued.

EX.

S_id	S_MN
1	(25, 26)
2	27
3	28
4	29

In 1st Normal Form:

S_id	S_MN
1	25
1	26
2	27
3	28
4	29

In First table S_MN attribute 1st id contain two value so, we convert the table into 1st Normal Form.

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2 2nd Normal Form:

Condition: It should be follow 1st Normal Form and It is based on full functional dependency.

In this form relations with a primary key composed of two or more attributes.

Ex.

*T-id	T-sub	T-age
1	A	25
1	B	25
2	C	26
3	D	27

In 2nd Normal Form:

T-id	T-sub	T-id	T-age
1	A	1	25
1	B	1	25
2	C	2	26
3	D	3	27

In above Table-1 T-id is containt Primary key and it is relation with two attribute.

In last table, in 2nd normal form
T-id has a relation with only
One attribute.

3 3rd Normal form:

Condition: It should be follow 1st and
2nd normal form and it does not
have transitive dependency.

In this form one attribute relate
with only one attribute.

EX

e-id	e-name	e-zip	e-city	e-state
1	A	111	D	H
2	B	222	F	J
3	C	333	G	I

In this table $\{e_id, e_name\} \rightarrow e_zip$
 $e_zip \rightarrow \{e_city, e_state\}$

then
 $\{e_id, e_name\} \rightarrow \{e_city\}$

So, this is not condition in
3rd Normal form.

In Normal form:

e-id	e-name	e-zip	e-zip	e-city	e-state
1	A	111	111	D	H
2	B	222	222	F	J
3	C	333	333	G	I

In above table, both table are not contain transitive dependency.

4. Boyce-Codd Normal Form:

Condition: It should be follow 1st, 2nd and 3rd normal form and It has trivial functional dependency.

BCNF is a Advance version of 3rd Normal Form.

Ex.

e-id	e-contry	e-dep.	dep-type
1	A	C	1
2	B	D	2

In this table every attributes are not contain determinant.

In Boyce-Codd Normal Form:

c.id	c.category	c.dep	dep.type	c.id	c.dep
1	A	C	1	1	C
2	B	D	2	2	D

In this table: Every Element have determinat.

5 4th Normalform:

Condition: It should be follow 1st, 2nd, 3rd and BCNF Normalform and not contain more than one multivalued dependency.

In this form, there are non-trivial multivalued dependency.

Ex.

S id	Course	Hobby
1	A	Sing
1	B	Dance
2	C	Study
3	D	Dance

In this table s-id have more than One multivalue dependency.

In 4th Normalform,

S_id	Course	S_id	Hobby
1	A	1	Sing
1	B	1	Dance
2	C	2	Study
3	D	3	Dance

In both table, S_id have only one multivalued dependency.

6 5th Normal Form:

Condition: It should be follow 1st, 2nd, 3rd, 4th and BCNF normal form and it cannot be non loss decomposed.

In this normal form, relation decomposed into two relation must have loss-less property.

EX

e_id	e_name	e_Course
1	A	D
2	B	E
3	C	F

In this table every have more than two relation.

In 5th normal form:

e-id	e-name	e-id	e-course	e-name	e-course
1	A	1	D	A	D
2	B	2	E	B	E
3	C	3	F	C	F

In this table, Every Attribute has only one relation.

* Explain Relational Decomposition with its type.

When a relation in the relation model is not in normal form then the relational decomposition is required.

Relational Decomposition breaks the table into multiple tables.

There are two type of Relational Decomposition.

- 1) Lossless Decomposition
- 2) Dependency Preserving

1 Lossless Decomposition :

In Lossless Decomposition, It will give ~~gura~~ guarantees that the join of relations will result is the same relation as it was decomposed.

In this Decomposition, information is not lost from the relation that is so decomposed.

In lossless Decomposition, when we use natural join then decomposition give the original relation.

EX. Student \bowtie Employee

S-id	S-name	e-id	e-name
1	A	3	C
2	B	4	D

lossless
Decomposition

Student Employee

S-id	S-name	e-id	e-name
1	A	3	C
2	B	4	D

In this both table, we use natural join and result is same that original result.

2. Dependency Preserving:

Dependency Preserving is a very important constraint in database.

In this Dependency, One decomposed table must satisfy every table dependency.

If a relation R is decomposed into two relation R_1 and R_2 then, at least R_1 or R_2 contain all the dependency.

Ex

e-id	e-name	e-name	e-age	e-age	e-dep
1	A	A	21	21	D
2	B	B	22	22	E
3	C	C	23	23	F

Dependency Preserving

e-id	e-name	e-age	e-age	e-dep
1	A	21	21	D
2	B	22	22	E
3	C	23	23	F

(E_1)

(E_2)