Assignment No. 3

Que-1 What is the Normalization? Explain its types.

Ans-

NORMALIZATION

Normalization is a process of organizing the data in database to avoid data redundancy, insertion anomaly, update anomaly and deletion anomaly.

The purpose of normalization is to produce a stable set of relations that is a faithfull model of the operations of the enterprise. By following the principles of normalization, we can achieve a design of highly flexibility, allowing the model to be extended.

TYPES OF NORMALIZATION

i) First Normal form
ii) Second Normal form (2NF)
iii) Third Normal form (3NF)
iv) Boyce - Codd Normal form (BCNF)
v) fourth Normal form (4NF)
vi) fifth Normal form (5NF)

i) First Normal form:

A relation is, in first normal form if and only if all underlying domains contain atomic values only.

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First Normal form -

SID	ACTIVITY	FEE
100	SKING	200
150	SWIMMING	150
175	SQUASH	50

ii) Second Normal form:

A relation is in second normal form (2NF) and every non-key attribute is fully dependent on the key. If the key is a single attribute, then the relation is automatically in the 2NF.

SC (S#, CITY) and CS (CITY, STATUS)

S#	CITY
S1	Delhi
S2	Karnal
S3	Rohtak
S4	Delhi

CITY	STATUS
Delhi	30
Karnal	10
Rohtak	40

iii) Third Normal form:

A relation R is in third normal form (3NF) if and only if it is 2NF and every nonkey attribute is nontransitively dependent on the primary key.

3NF was designed to improve the database processing while minimizing the storage costs. It is very beneficial for online transactions processing applications with the need of heavy order entry.

SP

S#	P#	QTY.
S1	P1	100
S1	P2	125
S1	P3	130
S1	P4	115
S2	P1	200
S2	P2	215
S3	P1	200
S4	P4	200
S4	P5	300

iv) Boyce - Codd Normal form (BCNF):

Unfortunately, even relations in third normal form can have anomalies. Consider the ADVISOR (SID, Major, fname) relation. Since students can have several majors, SID does not determine Major. Further, since students can have several advisors, SID does not determine fname. Thus SID cannot be a key.

Key (primary) : (SID, Major)
Key (candidate): (SID, Fname)
Functional dependencies : Fname → Major

ADVISOR

SID	Major	Fname
100	MATH	CAUCHY
150	PHYSICS	JUNG
200	MATH	RIEMANN
250	MATH	CAUCHY
200	PHYSICS	CHETAN

v) fourth Normal form (4NF) :

STUDENT

SID	Major	Activity
200	MUSIC	SWIMMING
200	ACCOUNTING	SWIMMING
200	MUSIC	TENNIS
200	ACCOUNTING	TENNIS
250	MATH	JOGGING

SID →→ Major
SID →→ Activity

The relation is in BCNF (2NF ~~becomes~~ because it is all key, 3NF because it has no non-key determinants). However, as we have seen, it has anomalies.
We can eliminate these anomalies by decomposing STUDENT relation into two relations.

STU-MAJOR (SID, Major) and STU-ACT (SID, Activity)

Key : (SID, Major)

SID	fname
200	MUSIC
200	ACCOUNTING
250	MATH

Key : (SID, Activity)

SID	fname
200	SKING
200	SWIMMING
200	TENNIS
250	JOGGING

This observation leads to the definition of 4NF: A relation is in 4NF if it is in BCNF and has no multivalued dependencies.

vi) Fifth Normal form (5NF) :

Consider relation SPJ shown below this relation is "all key" and involves no FDs or MVDs and so in 4NF.
It shows
a) the three projections SP, PJ & JS of SPJ and
b) the effect of joining SP & PJ over P# & then joining the result & JS over (J#, S#).

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SPJ

S#	P#	J#
S1	P1	J2
S1	P2	J1
S2	P1	J1
S1	P1	J1

SP

S#	P#
S1	P1
S1	P2
S2	P1

PJ

P#	J#
P1	J2
P1	J1
P2	J1

JS

J#	S#
J2	S1
J1	S1
J1	S2

Join over P#

Join over (J#, S#)

S#	P#	J#
S1	P1	J2
S1	P1	J1
S1	P2	J1
S2	P1	J2
S2	P1	J1

Spurious

S#	P#	J#
S1	P1	J2
S1	P2	J1
S2	P1	J1
S1	P1	J1

if the pair $\langle s_1, p_1 \rangle$ appears in SP and the pair $\langle p_1, j_1 \rangle$ appears in PJ and the pair $\langle j_1, s_1 \rangle$ appears in JS

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Que-2 What is meant by functional dependency? Give example of functional dependency.

Ans -

FUNCTIONAL DEPENDENCY

A functional dependency is a constraint between the two sets of attributes in a relation from a database. It describes a relationship between attributes in a relation.

A dependency (Example)

FD : $x \rightarrow y$

means that the value of y are determined by the values of x. Two rows of tuples having the same value of x will necessarily have the same value of y.

⇒ Types of functional dependencies are :

- Trivial dependency
- Non trivial dependency
- Transitive dependency

Que-3 What is trigger ? Explain.

Ans -

TRIGGER :

A trigger is a statement that a system executes as a side effect of a modification to the database. A trigger can also be interpreted as a special kind of stored

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procedure that is executed whenever an action, such as data modification, takes place. A trigger is always defined on a table, and is said to have fired whenever the data in the underlying table is affected by any of the Data Manipulation Language (DML) statements. - INSERT, UPDATE or DELETE.

To design a trigger, we must:

i) Specify the condition under which trigger is to be executed. This is broken up into an event that causes the trigger to be checked and a condition that must be satisfied for trigger executions to proceed.

ii) Specify the actions to be taken when the trigger executes.