Experiment No. 09

Aim: - Study and Implementation of Normalization

Prerequisites: - Functional dependency, data normalization and types of NF

Theory: -

- Normalization is the process of minimizing redundancy from a relation or set of relations,
- Redundancy in a relation may has insertion, deletion and anomalies.
- Need of Normalization

  To handle the following anomalies

  1. Insertion
  2. Deletion
  3. Update

Basic Terms Related to Normalization -

Attribute Closure

It is a set of attributes defined as set of attributes which can be functionally determine

Denoted by [A+]

Super key

If attribute closure of an attribute set contains all attribute of relation then the attribute set will be super key of relation

Candidate key

If no subset of this attribute set can functionally determine, all of the relation the set will be candidate key as well

Prime and Non-Prime Attribute

Types of Normalization

1) **1NF (First Normal Form)**

Single valued attribute (multivalued attribute) or atomic value

Patient

Pat_no	Pat_name	Age	Gender	M_no	Address
12	Nilesh	21	male	97621205 98343619	Ashoknager
13	Ujair	20	male	87654201	Cidco
14	Tejas	21	male	45012035	TV center

The attribute m_no is containing 2 value so this relation is not in the form of 1NF

To convert it into 1NF we should have to remove multivalued dependency

After 1NF

Patient

Pat_no	Pat_name	Age	Gender	M_no	Address
12	Nilesh	21	male	97621205	Ashoknager
12	Nilesh	21	male	98343619	Ashoknager
13	Ujair	20	male	87654201	Cidco
14	Tejas	21	male	45012035	TV center

2) **2NF (Second Normal Form)**

Rules

1. Relation should be in 1NF
2. No partial dependency (no non-prime attribute is dependent on any proper subset of candidate key

Patient

Pat_no	Pat_name	Age	Gender	M_no	Address
201	Nilesh	21	Male	9834	N7
202	Ujair	20	Male	8196	N3

Bill

Bill_no	Pat_no	ot_no	R_Type	R_charge	Other_ser	Doc_name	Total
101	201	1	Deluxe	20000	15000	Dr.Manoj	35000
102	202	2	Super Deluxe	80000	10000	Dr.Pradip	90000

There are three relations patient, operation and Bill

In relation bill pat_no and bill_no is work as candidate key

Doc->Pat_no but Doc is not depending on Bill_no so there is partial dependency is present

After 2NF

Patient

Pat_no	Pat_name	Age	Gender	M_no	Doc_name	Address
201	Nilesh	21	Male	9834	Dr.Manoj	N7
202	Ujair	20	Male	8196	Dr.Pradip	N3

Bill

Bill_no	Pat_no	ot_no	R_Type	R_charge	Other_ser	Total
101	201	1	Deluxe	20000	15000	35000
102	202	2	Super Deluxe	80000	10000	90000

3) 3NF (Third Normal Form)

Rules

1. Table should be in 2NF
2. No Transitive dependency (A->B and B->C therefore A->C)

Transitive dependency - non prime -> non-prime

Bill

Bill_no	Pat_no	ot_no	R_Type	R_charge	Other_ser	Total
101	201	1	deluxe	20000	15000	35000
102	201	2	Super deluxe	80000	10000	90000
103	202	1	deluxe	20000	5000	25000

In relation bill room charge is deepened on room type because both are non-prime attribute, we can say that non-prime –> non-prime

R_charge -> R_type

R_type -> op_no, pat_no

so, there is **transitive dependency** is present

After 3NF

Bill

Bill_no	Pat_no	ot_no	Room_no	Other_ser	Total
101	201	1	16	15000	35000
102	201	2	69	10000	90000
103	202	1	19	5000	25000

Rooms

Room_no	Room_type	R_charge
16	deluxe	20000
69	Super deluxe	80000
19	deluxe	20000

4) BCNF (Boyce Codd Normal form)

Rules

a. Table should be in 2NF
b. No Transitive dependency (A->B and B->C therefore A->C)

Transitive dependency - non prime -> non-prime

Conclusion: -

Date of Performance by Student	Date of Assessment by Staff	Staff Signature	Remark