

ASSIGNMENT: 5

"DATABASE SYSTEMS"

(Q) Q.1 Sol.: Anomalies:-

A database anomaly is an inconsistency in data resulting from an operation like insertion, deletion or updation. There can be inconsistencies when a record is held in multiple places and not all of copies are updated.

⇒ They are present in relations when the data has too much redundancy and data is organized in unorganized way.

2) TYPES:-

⇒ Insertion Anomaly.

It occurs when extra data beyond the desired data is added to database e.g. To insert a course it is necessary to know a student (Std-ID) and name because their combination is primary key. A row cannot exist as NULL for part of its primary key - So, it must be known.

⇒ Updation Anomaly.

It occurs when updating data in tables which results in inconsistencies or errors. If we change StdClass of student in two rows Row 1 and Row 2 must be changed updating the grade of one record would update other records, resulting in inconsistency.

⇒ Deletion Anomaly.

It occurs while deleting data causes data to be deleted. e.g. if we delete course of S2 03, we lose the information about offering 03 even that the course has been offered at any point. Because we don't have any record in table as 03 is primary key.

⇒ Staff Branch:-

Insertion Anomalies.

Insertion anomaly occurs in this table because we have duplicate branch no and addresses. e.g. If we insert details of a new member of staff at Branch B001, we must ensure that we enter correct details of branch so that branch details are consistent with values for branchB001 in other records of staff Branch table. These tables don't have redundant data and don't suffer from inconsistency because for each staff member we only enter appropriate branch no into staff table.

To insert details of a new branch that currently has no members of staff Branch table. However as seen from table StaffNo is primary key for table. So, if we enter data into branch no B001 it will insert accordingly to table. The table becomes more redundant and inconsistent. So, it causes insertion anomaly.

Deletion Anomalies

If we delete a record from StaffBranch that represents the last member of staff located at a Branch, the details about branch also lost from database. e.g. if we delete record for staff Peter from Staff Branch table, the details relating to B003 are lost from database which means if we delete any staff member it respects branch associated with it also changes. By designing the table of branch and staff separately we can avoid this problem. So, if we delete any record from staff it will not affect the other table.

⇒ Updation Anomaly

If we want to update the value of one column of a particular branch in the StaffBranch table. e.g. the telephone-no for branch B002 we must update records of all staff located at that Branch. If modification is not carried out, the database will become inconsistent. Branch B002 would have some telephone no. in different staff records.

Q.2: Staff table:-

StaffNo	Name	Position	Salary	BranchNo
S1500	Tom Daniels	Manager	46000	Boo1
8003	Sally Adams	Assistant	30000	Boo3
80010	Mary Martinez	Manager	50000	Boo2
S 2250	Sally Stern	Manager	48000	Boo4
8 0415	Art Peters	Manager	41000	Boo3
S 3250	Robert Chin	Supervisor	32000	Boo2

Branch Table,-

BranchNo	Branch Address	Telephone No.
Boo1	8 Jefferson Way Portland	503-555-3618
Boo2	City Centre Plaza, Seattle	206-555-6756
Boo3	14th - 8th Avenue	212-371-3000
Boo4	16-14 th Avenue, Seattle	206-555-3131

(b) (i)

In this table, branch No is Primary key. TelNo have more than one value so from here we can say that the table is not in 1NF. Converting it to 1NF and check it needs 2NF or normalizes before 3NF.

Branch No	Tel No	Branch No	Branch Address
B001	503-555-3618	B001	8 Jefferson Way, Portland
B001	503-555-2727	B002	City Center Plaza, Seattle
B001	206-555-6534	B003	14-8 th Avenue, New York
B002	206-555-6786	B004	16-14 th Avenue, Seattle
B002	206-555-8836		Alternate ↑
B003	212-371-3000		↓ Foreign Key
B004	206-555-3131		
B004	206-555-4112		
Foreign Key		Primary Key ↑	

(iii) \Rightarrow In table 1 branch No becomes Primary key and Branch Address becomes Alternate key.

\Rightarrow In table 2 Branch No becomes Foreign Key and Tel No becomes Primary Key.

Q:3 (ii) Yes, the relation is in 1NF because there is no column where multivalued values are found. So, the reason it is in 1NF we don't have more than 1 value.

(iii) Table 1:-

Branch No	Branch Address	Alternate Key
B002	City Centre Plaza, Seattle Wa, 98122	
B004	16-18th Avenue, Seattle Wa, 98128	

Primary key

Table 2:-

→ Primary key

Staff No	Name	Position
SU555	Ellen Laymen	Assistant
S4612	Dave Sinclair	Assistant

Table 3:-

FK

Staff No	Branch No	Hours
SU555	B002	16
SU555	B004	9
S4612	B002	14
S4612	B004	10

Composite Key

(iv) Now, this table is in 3NF because it doesn't need to be normalized.

In table 1, Branch No becomes Primary Key. Branch Address becomes alternate key.

In table 2, Staff No becomes Primary Key.

In table 3, Staff No and Branch No act as P.K and both as composite key.

Q:4 (i) No, the table is not in 3NF because according to dependency diagram mgr.StaffNo is non-Prime attribute determines name the non-prime attribute. So, it is not in 3NF but it is in 2NF because No data inconsistency.

(ii) Table 1:-

Branch No	Branch Address	Tel No	Mgr Staff No
B001	8 Jefferson Way, Portland	503-555-3618	S1500
B002	City Center Plaza, Seattle	206-555-6786	S0010
B003	14.18th Avenue, N.Y	212-371-2000	S0415
B004	16-14th Avenue, Seattle	206-555-3311	S2250

P.K

Mgr Staff No	Name
S1500	Tom Daniels
S0010	Mary Martinez
S0415	Art Peters
S2250	Sally Sterns

Table 2:-

P.K \leftarrow S0010

S0415

S2250

(ii)

- ⇒ In table 1, BranchNo is Primary key and mgrStaffNo is F.K
- ⇒ In table 2, mgrStaffNo becomes P.K

Q:5

Emp.Id	Emp.Name	Emp.Bld	Emp.Id	Emp.Mobile
101	Herschel	New Delhi	101	8912312390
102	Jon	Karapur	102	8812121212
103	Ron	Chennai	102	9900012222
104	Lester	Banglore	103	7778881212
			104	9990000123
			104	8123450987

⇒ The table drawn is now in
3NF

PK

→ 1st slot (ii)

Q:6 (ii) Events Table contains update Anomaly as if records of
events coordinate are update there are multiple records of
Mr. hotel so while updating inconsistent date may occur
and update anomaly can be caused
It can be solved by ~~splitting~~ splitting entry of event
coordinate in another table and linking events table by
it while using P.K event coordinator as F.K in Events

Change the type of P affiliation to suggest
There will be no effect to anomalies because it is not a
P.K or Identifier in Participants table.

(3) Deletion Anomaly would occur in Events table because when event coordinator leaves or is deleted event date will also be deleted from table. To resolve separate event coordinator entity in another table and make it's P.K/F.K of Events

(4) Insertion Anomaly would occur in Event organizer table because when we only have to add an organizer office which is available but there is no organizer attached to this office would create insertion anomaly as organizer id can't be null. It's solution is to create separate table for organizers office.

(5) Timeline table is not in INF because it contains multivalued attributes.

Time Id	Time	Day	Time Id	Location
1	8- 9:45	Day 1	1	Front Ground
2	5- 6:30	Day 2	2	101
3	4- 5:53	Day 3	3	Cricket Ground
4	3:45- 9	Day 4	3	Futsal Ground
			4	102
			4	Main Lobby
				101

→ Participants table also not in 1NF as P-k not primary

Participants (P_id, P-name, P-affiliation, Event name)

(7) Table Event organized is not in 3NF making it in 3NF

→ After 3NF All Tables :-

Events (Events id, Event name, Event type)

Event coordinator (Event id, Organizer id, Event coordinator)

Event organizer (Organizer id, organizer name, Organizer dept)

Event office (Organizer id, Office id, organizer office)

Timeline (Time id, Day)

Time location (Time id, location)

Society (Society id, Society name, organizer id)

Media (Sponsor id, Sponsor name, Sponsored amount)

Participants (P_id, P-name, P-affiliation, Event name)