18K-0208

(4)

Date

QUESTION # 1:

(a):

- INSERTION:-
  For example a new house is to be added (team) then a must be associated with it otherwise all other fields must be NULL. Similar case is if a player is added with no team assigned this cannot be done.

- DELETION:-
  For example only one player belongs to a team then on deletion of that player, team will also be deleted .e.g: if Hammad of Demons is deleted then Demons will also be deleted.

- UPDATE:
  For example: multiple players can be associated with a single team, if any information of team is to be updated then it must be done across all player records. Since multiple players belong to teams then if its color is to change then it must be done in all records

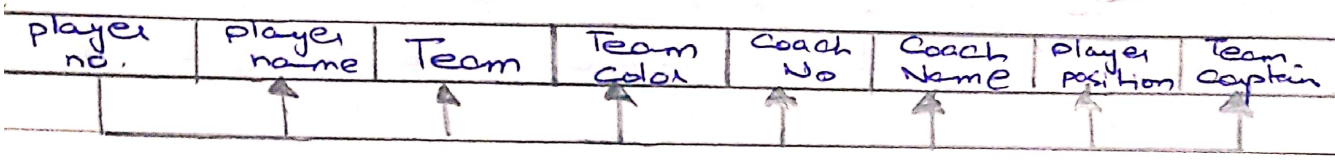
Date

(b):

- 1NF:

Since no composite attributes exist alongside any multi valued attributes therefore table is in 1NF.

- 2NF:



Since player no. ↑ alone can uniquely identify tuples in the table and all non-prime attributes can be determined by it, therefore it is in 2NF

- 3NF:

{player no.} → player name, player position, Team, Team color, Team captain, Coach No., Coach Name

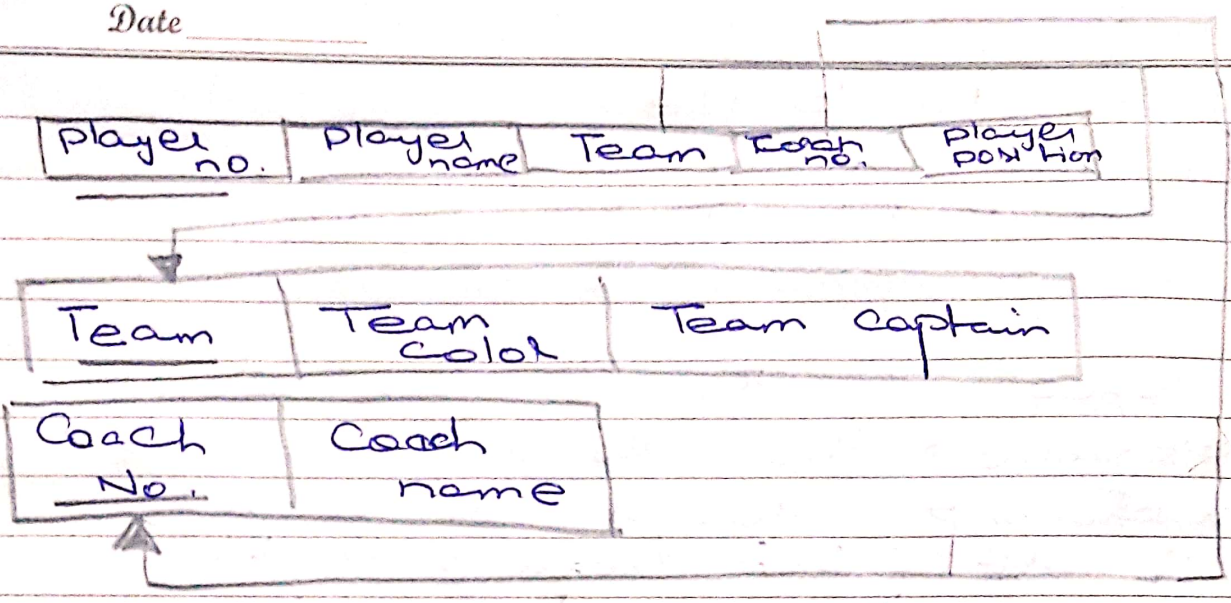
Since ↑ transitive dependencies exist i

{player no.} → player name, player position Team, Coach No.

{Team} → Team Color, Team Captain

{Coach No} → Coach name.

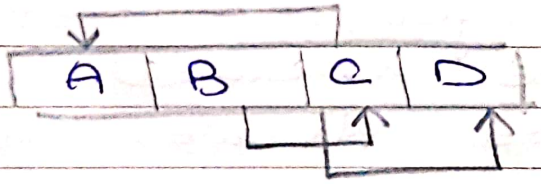
Date



Above table is in 3NF.

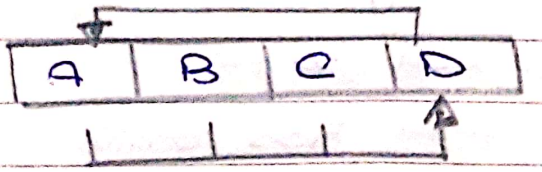
QUESTION # 2:

a) $B \rightarrow C$, $C \rightarrow A$, $C \rightarrow D$



B is prime attribute determining, A, C, D but C is determining D being a non prime attribute hence it is not in 3NF.

b) $ABC \rightarrow D$, $D \rightarrow A$.



{ABC} together determine D and D does not determine any non-prime attributes hence relation is in 3NF.

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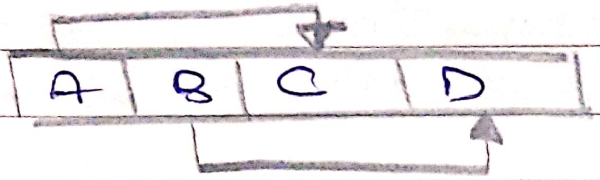
c) $A \rightarrow C$, $B \rightarrow D$



Since no attribute can alone determine all the attributes in the relationship therefore it is not in 3NF (3NF requires relation to be in 2NF which it is not).

QUESTION #3

(a):

- INSERTION:-

In order to add a flat, or a place, a student must be associated with it otherwise all related attributes should be set to NULL hence insert anamoly exist.

- DELETION:- If single lease only, place of a flat is done by a student, upon deleting that student record, flat deleted from the relation, e.g. F79 has only a single record, therefore this information will also be situation can occur.

Date _____

(B):

- UPDATE :-

For example: multiple places of flats can be leased by multiple students in multiple instances, in that case if any flat info. has to be updated, it must be done in multiple records. e.g. in our relation place 88 and 89 of F-78 is leased by multiple students, hence this situation can occur.

(b):

1NF:

No multivalued attributes exist however composite attributes exist in flat Address which can be broken into street number, street name and city name

lease No.	banner ID	place No	tName	lname	Start Date	finish Date
	Hot No.	street No.	street Name	City name		

Date

2NF :-

Since lease No alone can uniquely determine all tuples in the table therefore it is already in 2NF.

{leaseNo} → bannerID, placeNo, fname, lname, startDate, finishDate, HotNo, ~~Ho~~ street No, street name, city.

Date

3NF:

{leaseNo} → startDate, & finishDate
bannerID, fname, lname, placeNo,

flatNo, streetNo, streetName, city.

Since transitive dependencies exist ∴ relations must be broken down.

{leaseNo} → startDate, finishDate
bannerID, placeNo.

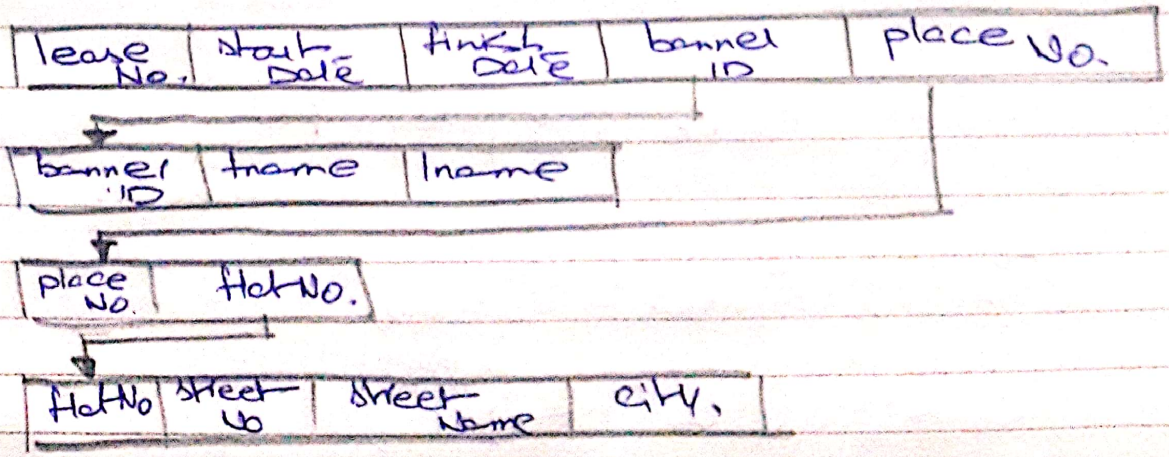
{bannerID} → fname, lname

{placeNo} → flatNo, streetNo, streetName
city.

Further breaking because of transitive dependencies.

{placeNo} → flatNo

{flatNo} → streetNo, streetName
city.



Date

QUESTION #4:

(a):

$R_1 \leftarrow \sigma_{\text{category} = \text{'Laptop'}} (\text{Computer} \bowtie_{\text{maker} = \text{name}} \text{Maker})$

$R_2 \leftarrow \Pi_{\text{name}} (R_1)$

(b): $R_1 \leftarrow \sigma_{\text{category} = \text{'Desktop'}} (\text{Computer})$

$R_2 \leftarrow {}^{\text{maker}}\mathcal{F}_{\text{COUNT(maker)}} (R_1)$

$R_3 \leftarrow \sigma_{\text{COUNT(maker)} \geq 3} (R_2)$

$R_4 \leftarrow (R_3 \bowtie_{\text{maker} = \text{name}} \text{Maker})$

$R_5 \leftarrow \Pi_{\text{name}} (R_4)$

(c): $R_1 \leftarrow \sigma_{\text{category} = \text{'Desktop'} \text{ AND } \text{speed} = 3.2} (\text{Computer} \bowtie_{\text{model} = \text{number}} \text{Model})$

$R_2 \leftarrow \Pi_{\text{phone}} (R_1 \bowtie_{\text{maker} = \text{name}} \text{Maker})$

(d): $R_1 \leftarrow \Pi_{\text{maker}} (\text{Computer}) - \Pi_{\text{maker}} (\sigma_{\text{category} = \text{'Desktop'}} (\text{Computer}))$

$R_2 \leftarrow \Pi_{\text{maker}} (\sigma_{\text{category} = \text{'Laptop'}} (\text{Computer}))$

$R_3 \leftarrow (R_2 \cap R_1)$

$R_4 \leftarrow \Pi_{\text{name}} (R_3 \bowtie_{\text{maker} = \text{name}} \text{Maker})$.

Date

(e) $R_1 \leftarrow \sigma_{speed > 3.2}(Model \bowtie)$

(e) $R_1 \leftarrow \sigma_{speed > 3.2}(Computer \bowtie_{\substack{model \\ = \\ number}} Model)$

$R_2 \leftarrow \Pi_{name}(R_1 \bowtie_{\substack{maker \\ = \\ name}} Maker)$

QUESTION #5:

(a) $R_1 \leftarrow \sigma_{\substack{rent \\ > \\ 350}}(PropertyForRent)$

$R_2 \leftarrow \mathcal{F}_{count(propertyNo)}(R_1)$

(b)

(c) $R_1 \leftarrow \Pi_{clientNo, comment}(Viewing)$

$R_2 \leftarrow (R_1 \bowtie_{R_1.clientNo = Client.clientNo} Client)$

$R_3 \leftarrow \Pi_{fname, lname, comment}(R_2)$

(d) $R_1 \leftarrow \Pi_{city}(Branch)$

$R_2 \leftarrow \Pi_{city}(PropertyForRent)$

$R_3 \leftarrow (R_1 \cup R_2)$

(e)

$R_1 \leftarrow \Pi_{city}(Branch)$

$R_2 \leftarrow \Pi_{city}(PropertyForRent)$

$R_3 \leftarrow (R_1 - R_2)$