CE0317-Database Management System

ASSIGNMENT-2

INSTRUCTIONS:

- a. Neat presentation.
- b. Include well labelled diagrams.c. Write down differences in tabular format.d. Mention and Highlight important text.
- e. Use only blue and black ink for presentation

-: QUESTION/ANSWERS:-

| 0-1). (Onsider the relation Treatment with the schema |
|--|
| Treatment (doctor ID, doctor Name, Patient ID, diagnosis) and functional dependencies: doctor ID -> doctor Name and (doctor ID, putient ID) -> diagnosis. Describe different types of anomaly that can arise for this table with example records. |
| Ans |
| In a velational schema like the one described for the Treatment table: |
| Treatment (doctorID, doctorName, patientID, diagnosis) with the following functional dependencies: · doctorID -> doctorName · (doctorID, patientID) -> diagnosis |
| Several types of anomalies can arise if the table is not properly normalized. These anomalies include update anomalies, insert anomalies and delete anomalies. Let's understand each anomalies with an example based on this schema: |
| is. Update Anomaly: |
| · An update anomaly occurs when the same data has to be updated in multiple rows, leading to data inconsistency if not all instances are updated correctly. |
| · Let's understand it with an example: |

Consider the following occords in the Treatment Table : diagnosis doctor ID ; doctor Name PatientID Dr. Smith 1001 (old Dr. Smith 1002 101 Headache Dr. 5mith 1003 Here the doctor Name ("Dr Smith") is repeated for every patient. If Dr Smith changes their name ("Dr. John Smith") this change needs to be made in multiple rows. If the update is not applied consisently across all records, there should be inconsistency, where some rows have "Dr. Smith" and others have "Dr. John Smith" 11). Insert Ammaly :-· An insert anomaly occurs when certain duta cannot be added to the table without having other data that may not yet be available or applicable. · Let's understand it with an example: In the treatment table, Suppose a new doctor joins the hospital, and you want to add their details to the table. However, since there is no patient yet assigned to the doctor, you don't have a valid patientID or diagnosis to enter. Due to the table's design, you can't insert a row for the new doctor without also including a patient, which creates an insert anomaly. doctorID | doctorName | putientID | diagnosis Dr. Johnson : NOLL

· This row may not be allowed because patient to and diagnosis fields might be required.

iii). Delete Anomaly :-

- · A delete anomaly occurs when deleting a record unintentionally removes other useful information.
- · Let's understand it with an example:

| doctorio | doctorName | patientIO | diagnosis |
|----------|------------|-----------|-----------|
| 101 | Dr. Smith | 1001 | Flu |
| 101 | Do. Smith | 1002 | Cold |
| 101 | Dr. Smith | 1003 | Headache |

Suppose the last patient of Dr. Smith (patient 20 = 1003) is discharged, and you want to delete their treatment record. Deleting the row with patient 20 = 1003 would remove the association between doctor 10 = 101 and doctor Name = Dr. Smith entirely if there are no other patients linked to Dr. Smith. This would cause a loss of information about Dr. Smith even though they are still employed and available for new patients.

iw. Redundancy (Duplication) :-

- · Redundancy is when the same piece of information is stored multiple times in different rows, leading to increased storage requirements and potentional inconsistencies.
- · Let's understand it with an example:

| doctoo ID | _doctorName_ | Putient 10 | diagnosis |
|-----------|--------------|------------|-----------|
| 101 | Do. Smith | 1001 | Flu |
| 101 | Dr. Smith | 1002 | ! (old |

| The doctor Name ("D leading to redunda updated, it would where doctor ID = 10 | have to | be don | e in ev | ery | som be | 7 (1) |
|--|---|--|--|----------|-------------------|--|
| inconsistencies and | unnecess | iary dup | plication | 10 | data. | |
| | | | | | | |
| | | | | | | THE REAL PROPERTY. |
| | | | | 100 | | |
| | | | | | | |
| | | | | TO THE | a Syn | |
| | | | | | 2011 | N. III |
| | A S. R. L. L. | AND THE RESERVE | | | 10 B B T | 7377 |
| | | at a land | The spine of | | WAR E.F | Kinn . |
| | The state of the state of | DESCRIPTION OF | | | | Inth |
| | 191811919 | | | | 186 | |
| | | | | | | |
| | Philadella | | | Via III | WELL ! | HIERON |
| | | | and the late of | | | 11/1/35 |
| | | 18 P. S. W. 18 B. | The state of the s | | Alle To | A Dall |
| | | La Maria | 162 | | Mary Shirt | |
| Marie Company of the Party of t | | Jan - | | alli la | 1994 191 | Baller |
| | 2 of There's | and the same | | 15 15 11 | the little | |
| | A State of | AP PRINTER | | | | 13840 |
| | | P. H. CALLED S. L. | | | 19 19 | Contract of the Contract of th |
| | - | | 12 5 1 1 1 | | art. | 41103 |
| | | The state of the s | delphi linec | Page 10 | asterio I | 1/10 |
| | | | 100000 | | | MAL |
| | matter de la constitución de la | | | - 1000 | 1500000 | LAR |
| | | | Service Co | mad Iv. | | 11/1/2 |
| | | | | Z Page | | |
| | | | | | | |
| | Service . | port de la come | 192 194 | | | |
| | | | | | | |
| | | Warming Tolland | W. Francisco | | | |
| | Andrew . | | | 100 | | 11/2 |
| | | The state of the s | THE PERSON | | | 151 |
| | | | | | The second second | - |

| 2. Normali: | e the | below | table | User_ | Personal | upto | 3NF. |
|-------------|-------|-------|-------|-------|----------|------|------|
|-------------|-------|-------|-------|-------|----------|------|------|

| UserID | U_email | Frame | Lname | City | State |
|--------|----------------------|----------|--------|----------|--------------|
| A12 | mani@ymail.com | Manish | Jain | Bilaspur | (hatisquah |
| P045 | , pooja, gagmail.com | Pooja | Maga | Kacch | (Cujazat |
| LA33 | , , , , , | Lauleen | Dhalla | Raipur | (hattisgardh |
| CH99 | ! chekiq; aih.com | (himal i | Bedi | Torchy | Tomilnadu |
| DA74 | Danu 5800g. com | Dany ! | James | Toichy | Tamilnady ! |

| ZiP |
|--------|
| 458991 |
| 853578 |
| 645018 |

Ans

· To normalize the given User_Personal table upto 3NF (Third normal form), we'll go through the following normalization steps: INF, 2NF and 3NF.

Step-1: INF (First Normal Form):

· INF requires that all values in the table be atomic. In the given table, the data is already in atomic form, meaning each field contains a single value. Therefore, it is already in INF.

Step-2: 2NF (Second Noomal Form):

· 2NF requires that the table be in INF and that all non-key attributes are fully functionally dependent on

the poimary key. In this case, the conditate key is UserID. However, we can see that (ity, State, and Zip are dependent on each other rather than directly on the UserID. This violates 2NF, as these columns (City, State, Zip) depend on each other.

· Decompose the table into two tables to sutisfy 2NF:

is. User Table :-

· Attaibutes that are dependent on UserID

| UserID | U-email | Fname | Lname | City | 1 |
|-------------------------------------|--|--|---|---|---|
| A12 P045 LA33 CH99 DA74 | maniaymail.com pooja.gagmail.com laule98@jj.com chexi9j@in.com danu 58@g.com | Manish Pooja Lauleen Chimal Dany | Jain Magg Dhalla Bedi James | Bilaspus Kachh Raipus Toichy Toichy | |

ii). Location Table :-

· Attoibutes that are location-specific ((ity, State, Zip) which are related to geographical location.

| City | State | ZiP | |
|----------|----------------|--------|--|
| Bilaspur | (hattisgardh | 458991 | The second secon |
| Kacch | trujabat | 832212 | |
| Raipur | ! Chattisgardh | 853578 | |
| Toichy | ! Tamil nadu | 632011 | |
| Toichy | Tamilnadu | 645018 | the factor of the same |

· Now, the User table has no partial dependency, and all non-key attributes depend fully on the primary key UserID. The Location table stores location - specific details and avoids redundancy.

Step-3: 3NF (Third Normal Form):

- · 3NF requires that the table be in 2NF, and all attributes should be functionally dependent only on the primary key. In other words, there should be no transitive dependencies.
- · In this Location table, there is a dependency between (ity and the combination of State and Zip. Therefore, to achieve 3NF, we need to further decompose the Location table.

Decomposition for 3NF:

· We will break the Location table into two seperate tables: one for (ity-state and another for State-Zip.

Final 3NF Tables:

i). User :-

| UseoID | U-email | Fname | Lname | City |
|--------|--------------------|---------|--------|----------|
| A12 | mani Qymail. com | Manish | Jain | Bilaspur |
| P045 | pooja g @gmail.com | Poora | Magg | Kuchh |
| LA33 | laulearaji.com | Lauleen | Dhaila | ! Raipur |
| CH99 | chekiajaih.com | Chimal | Bedi | Toichy |
| DA74 | donu 580g. com | Dany | James | Torchy |

ii). (ity_ State :-

| City | State | |
|----------|------------------------------------|--|
| Bilaspur | Chattisgazh Chattisgazh Tamil nady | |
| Karch | (Tujara) | |
| Raipur | Chattisgarh | |
| laichy | lamil nady | |

iii). State_Zip :-

| State | Zip |
|-------------|----------|
| Chattisgarh | 458991 |
| brujarat | 832212 |
| Chattisquah | 853578 |
| Tamilnadu | 1 632011 |
| Tamilnada | 645018 |

is Suppose, a relational schema R(A, B, (, D, E) and set of functional dependencies: F{A->BC, CD>E, B>D, E>A?. Compute CD+, E+ (Closure of attribute set CD, attribute E

despectively). ii). Suppose, a relational schema R(A, B, C, D, F, F) and set of tunctional dependencies: F {A -> BC, BC -> AD, D -> E, CF -> B}

(ompute BCF+, CD+, D+

iii). Suppose, a relational schema R(A, B, C, D, F, F, G, H) and set of functional dependencies: f { A > BC, E > C, AH > D, CD>E, D>AEH, DH> BC} (ompute AE+. Is BCD +1 valid or not ?

Ans

a). Compute CD+ (Closure of the attribute set CD)

- · We are given the following functional dependencies on relation R(A, B, C, D, E) R(A, B, C, D, E) R(A, B, C, D, E):
 - i). A BCA 1 to BCA BC ii). (D -> ECD 1 to ECD -> E iii). B > DB 1 to DB > D ivo. E - AE 1 +0 AE - A
- · To compute the closure CD+, we need to iteratively apply the functional dependencies that are applicable based on the attributes we already know.

i). Start with CDCDCD

ii). From CD>ECD 1 to ECD> F, we can add EFF to the closure. Now, CD += {CD, E} += 1 {C, D, E1} CD+= {C, D, E}.

iii). From E - AE 1 to AE - A, we can add AAA to the closure. Now, (D+= {(,D,E,A)+= (c, D,E,A) (D+= {(,D,E,A).

b). Compute E+ (closure of the attribute set E)

- · Start with EEE.
- is. From E = AE 1+0 AE > A, we can add AAA to the closure. Now, Ft= {F, A} += \ {E, A} E+ = {E, A}.
- ii). From A + B(A) to B(A + B(, we can add BBB and ecc to the closure.
- iii). From D + BD 1 to DB + D, we can add DDD to the closure.
- · 50, E+= {A, B, C, D, E} += \{A, B, C, D, E\} E+= {A, B, C, D, E}

ii)

- a). Compute BCF + (closure of the attribute set BCF)
- · We are given the following functional dependencies on relation R(A,B,C,D,E,F) R(A,B,C,D,E,F) B(A,B,C,D,E,F):
- i). A BCA 1 to BCA BC
- ii). BC -> ADBC >+O ADBC -> AD
- iii). D→ ED 1to ED → E
- IN. CF -> BCF 1+0 BCF -> B
- · Start with BCF+
- 1). From CF BCF, we add BBB, so no change.
- 11). from BC ADBC, we can add AAA and DDD.
- iii). From Ar BCA, we add BBB and ccc, so no change. iv). From D > ED, we add EEE.
- · 50, BCF += {A,B,C,D,E,F} += \ {A,B,C,D,E,F} BCF +=
 - b). Compute CD+ (closure of the attribute set CD) {A, B, C, D, E, F).
 - · Start with CD+
 - i). From BC ADBC, we need both BBB and ccc to add AAA and DDD, but we only have ccc, so this dependency

```
ii). From DAED, we can add EFE.
  · 50, CD+= {C,D,E} += \{C,D,E}, CD+= {C,D,E}.
 C). (ompute D+ (closure of the attribute set D).
  · Start with DDD
 is from DAED, we can add EFF
 · 50, D+ = {D, E} + - \{D, E} > D+ = {D, E}.
Siii.
   a). Compute AE+ (closure of the attribute set AE)
  · Stast with AFAFAF.
  is. From A > BCA 1 to BCA > BC, we can add BBB and ccc
  ii). From E > CE 1+0 CE>C, we can add ccc calready in
                            the set), so no change.
 1172. From DARHD 40 ARHD -> ARH, we need DDD, but
     we don't have it yet.
  ivs. From CD-> ECD ItO ECD-> E, we need DDD, but we
     don't have it yet.
  · No further functional dependencies are applicable.
    Therefore:
   AE += {A,B,C,E} += \{A,B,C,E\} AE += {A,B,C,E}
  b). Is BODH valid?
  · To check if BCDH is valid:
  1). Start with BCDH
 ii). From DH > BCDH > to BCDH > BC, we can add BBB
     and ccc, so no change.
 iii). From Da AEHD No AEHD a AEH, we can add A, E, HA, E,
    HA, E, H.
 iv). From ADBIA I to BIAD BC, we can add BBB and
```

acc, so no change.

| | COLLAPIPI | BCDH utes, is not | BCD+1 | is | not | 9 50 | the uper Me | suppe | set this | of | (+ ` 101 |
|---|------------|-------------------------|---|--------|--------------|-------------|-------------|-------------|--------------|--------|-----------------|
| | | | | | -16.6 | | | Diso. | | | 111/4 |
| | | | | | 400) | I Island | | | | | |
| - | | | | 1.00 | | - more | | 1000 | 1152 | . (B) | 1 10 |
| - | | | | | | 1 11 6 | | A. 1460 | 2151 | | |
| | | 7-17-17 | | | Mary Control | | | - 1 | | | |
| | | | | | | | | | | | - |
| | | | | 10000 | | | | N. M. M. | | 7 40 | |
| | | | | | | | | | | | |
| | | 7 7 7 7 7 7 | 18-2 | | | | | My vale a | 259.043. | | 1,000 |
| | | | | | | | | 11 1 13 | 1 | | - |
| | | | | | | | | | | - 120 | 57/17 |
| | | | | | | | | | | | |
| | | | | | | | | | A CONTRACTOR | 5/0/20 | -1000 |
| | | | | | HUA | HE BY | | | | | |
| | | | Fig. 1 | | | | | | | | To the |
| | Twitted. | | | | A Prince | HEALT ! | | San le | 1 11 1 | M | 100 |
| | | | | | | H. H. | | | | | 7 |
| | | | | | | | | | | | |
| | | | | BA : | - | 6 2 2 | A. M. Hay | | | 11 30 | 14 |
| | | | | | Miles | | | | | | |
| | | | | | | | 1 1951 | 23 Packer 1 | Nama | DE | 1 1000 |
| | | | | 10.115 | | | 1.35001 | | | | |
| | | | | | - | Survey or | | 10000 | 19 - | 21/8 | |
| | | - 23 126 3 | | | | | | | | | |
| | | | | - | 2131 | | | 1071500 | All and | 1100 | in i |
| | BAT! | tober to the | - | 1-1-3 | 10 1 | 4000 | -00/60 | 110 317 | a steel | 10000 | |
| - | | | | - | | | 1000 | 100 100 | 100 | 1 | 9500 |
| | 414 51 | | A SHIP | - | 100 | TE SO | 990 | 2/ 0162 | 12.300 | 14100 | 1 1/2 |
| | | | VI III | | | 21.11 | William . | Lake L | - 10 6 | | |
| | Charles 13 | West of | CONTRACTOR OF THE PARTY OF THE | | | C. of Cong. | | 2 / El 1 | We an | - | AL. |
| | | 1-11-11 | | | | | The House | 15 110 | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

等。在1965年,1965年,1966年,1966年,1966年,1966年,1966年,1966年,1966年,1966年,1966年,1966年,1966年,1966年,1966年,1966年,1966年,1966年