Anushka Verma (Z1911937)
CSCI 466 Section 1
Today's Date: 01/25/2021
Due Date: 01/29/2021
Assignment 2

Normalization

1. **Company**(EmpID, EmpName, EmpAddr, (ProjID, ProjName, MgrID, MgrName, HoursWorked)) **Functional Dependencies :**

    - EmpID → EmpName, EmpAddr
    - ProjID → ProjName, MgrID, MgrName
    - EmpID, ProjID → HoursWorked
    - MgrID → MgrName

    a) Is this relation in 1NF? If not, explain why not, then make the necessary changes to fix it.

    No, this is not a relation in 1NF. The reason being the groups are being repeated.

    First Normal Form:
    Company(EmpID, EmpName, EmpAddr, ProjID, ProjName, MgrID, MgrName, HoursWorked)

    b) Is this relation in 2NF? If not, explain why not, then make the necessary changes to fix it.

    No, this is not a relation in 2NF. This is because the elements should fully depend on the entire primary key which in our case, they don't.

    Second Normal Form:
    Employee (EmpID, EmpName, EmpAddr)
    Projects (ProjID, ProjName, MgrName, MgrID)
    Time (EmpID, ProjID, HoursWorked)
    Supervisor (MgrID, MgrName)

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c) Is this relation in 3NF? If not, explain why not, then make the necessary changes to fix it.

Since there is a **Transitive Dependency.**

Third Normal Form:
Employee (EmpID, EmpName, EmpAddr)
Projects (ProjID, ProjName, MgrName, MgrID)
Employee Project (EmpID, ProjID)
Supervisor (MgrID, MgrName)
Employee Hours (EmpID, Hours Worked)

2. **StockExchange**(Company, Symbol, HQ, Date, ClosePrice) **Functional Dependencies:**

- Symbol, Date ⟶ Company, HQ, ClosePrice
- Symbol ⟶ Company, HQ
- Symbol ⟶ HQ

a) Is this relation in 1NF? If not, explain why not, then make the necessary changes to fix it.

Yes, this is a relation in 1NF. The reason being the groups are not being repeated.

First Normal Form:
Stock Exchange (Company, Symbol, HQ, Date, ClosePrice)

b) Is this relation in 2NF? If not, explain why not, then make the necessary changes to fix it.

No, this is not a relation in 2NF. This is because the elements should fully depend on the entire primary key and not just part of the primary key.

Second Normal Form:
Stock Exchange (Company, Symbol, HQ, Date, ClosePrice)
Information (Symbol, Date, Company, HQ, ClosePrice)
Logo (Company, Symbol)
Main Office (Company, HQ, Symbol)

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c) Is this relation in 3NF? If not, explain why not, then make the necessary changes to fix it.

Since there is **no Transitive Dependency**, forming the second normal was more than enough.

3. **Property**(id, county, lotNum, lotArea, price, taxRate, (datePaid, amount)) **Functional Dependencies:**

   - id ⟶ county, lotNum, lotArea, price, taxRate
   - lotArea ⟶ price
   - county ⟶ taxRate
   - id, datePaid ⟶ amount

a) Is this relation in 1NF? If not, explain why not, then make the necessary changes to fix it.

No, this is not a relation in 1NF. The reason being the groups are being repeated.

First Normal Form:
Property (ID, county, lotNum, lotArea, price, taxRate, datePaid, amount)

b) Is this relation in 2NF? If not, explain why not, then make the necessary changes to fix it.

No, this is not a relation in 2NF. This is because the elements should fully depend on the entire primary key and not just part of the primary key.

Second Normal Form:
Property (ID, county, lotNum)
Lot Information (lotNum, lotArea, price)
Tax (County, taxRate)
Amount (ID, datePaid, amount)

c) Is this relation in 3NF? If not, explain why not, then make the necessary changes to fix it.

Since there is **no Transitive Dependency**, forming the second normal was more than enough.

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4. **Pharmacy**(patient_id, patient_name, address, (Rx_num, trademark_name, generic_name, (filldate, num_refills_left), num_refills)) **Functional Dependencies:**

    - patient_id → patient_name, address
    - patient_id, Rx_num → trademark_name, generic_name
    - Rx_num → num_refills
    - Rx_num, filldate → num_refills_left

a) Is this relation in 1NF? If not, explain why not, then make the necessary changes to fix it.

No, this is not a relation in 1NF. The reason being the groups are being repeated.

First Normal Form:
Pharmacy (patient_id, patient_name, address, Rx_num, trademark_name, generic_name, filldate, num_refills)

b) Is this relation in 2NF? If not, explain why not, then make the necessary changes to fix it.

No, this is not a relation in 2NF. This is because the elements should fully depend on the entire primary key which in our case, they don't.

Second Normal Form:
Patient (patient_id, patient_name, address)
Medicine (patient_id, Rx_num, trademark_name, generic_name)
Refill (Rx_num, num_refills)
Refill Date (Rx_num, filldate)

c) Is this relation in 3NF? If not, explain why not, then make the necessary changes to fix it.

Since there is **no Transitive Dependency**, forming the second normal was more than enough.