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

1. 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)

1. 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)

1. 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)

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

* Symbol, Date ⟶ Company, HQ, ClosePrice
* Symbol ⟶ Company, HQ
* Symbol ⟶ HQ

1. 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)

1. 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)

1. 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.

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

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

1. 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)

1. 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)

1. 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.

1. **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

1. 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)

1. 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)

1. 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.