Database Normalization Analysis

Relation CUSTOMER

Attributes: CusID FirstName LastName Address Username Password UserType
FDs{
CusID —> FirstName,
CusID —> LastName,
CusID —> Address,
CusID —> Username,
CusID —> Password,
CusID —> UserType
}
In relation CUSTOMER, the PK is CusID. CusID can functionally dependence other attributes such like FirstName, LastName, Address, Username, Password and UserType. So we can say the relation CUSTOMER is in 3NF, since every trivial FDs X —> A satisfied the test (a) X is a superkey of CUSTOMER.

Relation CONTRACT

Attributes: ContID CusID MID Invoice Timstamp
FDs{
ContID —> CusID,
ContID —> MID,
ContID —> Invoice,
ContID —> Timstamp
}
In relation CONTRACT, firstly we tried to add attribute “PID” (department ID) so we could track which department built current ship in our contracts. However, if we add PID into relation CONTRACT, there would be one FD that MID —> PID, since actually department are directly connected to model, not contract, which could not pass 3NF test. So we delete attribute PID in relation CONTRACT, now every FDs in CONTRACT satisfied the test (a) X is a superkey of CUSTOMER, so it is in 3NF.

Relation PART

Attributes: PID Name Price
FDs{
PID —> Name,
PID —> Price
}
In relation PART, every trivial FDs that PID —> Name, PID —> Price are satisfied the 3NF test (a) X is a superkey of CUSTOMER, so relation PART is in 3NF.

Relation DEPARTMENT

Attributes: DID MID Name
FDs{
DID —> Name,
DID —> MID
}
In relation DEPARTMENT, every trivial FDs that DID —> Name, DID —> MID are satisfied the 3NF test (a) X is a superkey of DEPARTMENT, since the name is the name of part, and MID is to let us know parts are used in which model, so relation PART is in 3NF.

Relation MODEL

Attributes: MID DID Name Labor Markup
FDs{
MID —> DID,
MID —> Name,
MID —> Labor,
MID —> Markup
}
In relation MODEL, the PK is MID (model ID). And we can track all other attributes only by MID. That is every trivial FDs that MID —> DID, MID —> Name, MID —> Labor, MID —> Markup are satisfied the 3NF test (a) X is a superkey of MODEL, so relation PART is in 3NF.

Weak Entity Relation CONT_PART

Attributes: ContID PID Status

This weak entity relation is to help us make connection between relation CONTRACT and PART so we can track part info in contract. No FDs. No normalization.

Weak Entity Relation MODEL_PART

Attributes: MID PID

This weak entity relation is to help us make connection between relation MODEL and PART so we can track part info in model. No FDs. No normalization.