

Normalization Exercise 5

Normalization Exercise 5 - Design Document

Database Purpose: Track equipment check-out

Exercise Description:

- Refine the design to conform to the 3rd normal form
- Meet the following business rules and design requirement

Business Rules:

- Track all equipment check-out
- Need to store only the current addresses for a customer
- Need to keep only the primary phone customer for a customer

Design Requirements:

- Use Crow's Foot Notation

Current Database Design (UNF)

Customer

*CustomerID
CustomerName
Address
Phone
AgentID1
AgentName1
EquipmentID1
EquipmentName1
EquipmentDetails1
DailyRate1
Deposit1
CheckOutDate1
ReturnDate1
AgentID2
AgentName2
EquipmentID2
EquipmentName2
EquipmentDetails2
DailyRate2
Deposit2
CheckOutDate2
ReturnDate2

Unnormalized Form (UNF)

Take to 1st NF

Current Database Design (UNF)

Customer

*CustomerID
CustomerName
Address
Phone
AgentID1
AgentName1
EquipmentID1
EquipmentName1
EquipmentDetails1
DailyRate1
Deposit1
CheckOutDate1
ReturnDate1
AgentID2
AgentName2
EquipmentID2
EquipmentName2
EquipmentDetails2
DailyRate2
Deposit2
CheckOutDate2
ReturnDate2

*Composite Attribute,
Multi-value Attribute,
Repeating Groups,
Many-to-many relationship?*

Unnormalized Form (UNF)

Take to 1st NF

Current Database Design (UNF)

Customer

Composite

Repeating
Groups

*CustomerID
CustomerName
Address
Phone
AgentID1
AgentName1
EquipmentID1
EquipmentName1
EquipmentDetails1
DailyRate1
Deposit1
CheckOutDate1
ReturnDate1
AgentID2
AgentName2
EquipmentID2
EquipmentName2
EquipmentDetails2
DailyRate2
Deposit2
CheckOutDate2
ReturnDate2

Corrected Composite Attributes and Repeating Groups Conform to 1st NF

Customer

*CustomerID
CustomerLastName
CustomerFirstName
StreetNumber
City
State
ZipCode
Phone

CheckOut

*CheckOutID
CustomerID
AgentID
AgentLastName
AgentFirstName
EquipmentID
EquipmentName
EquipmentDetails
DailyRate
Deposit
CheckOutDate
ReturnDate

First Normal Form (1st NF)

Take to 2nd NF Next

Partial Dependency?

Customer

*CustomerID
CustomerLastName
CustomerFirstName
StreetNumber
City
State
ZipCode
Phone

CheckOut

*CheckOutID
CustomerID
AgentID
AgentLastName
AgentFirstName
EquipmentID
EquipmentName
EquipmentDetails
DailyRate
Deposit
CheckOutDate
ReturnDate

No Partial Dependency

Conform to 2nd NF

Customer

*CustomerID
CustomerLastName
CustomerFirstName
StreetNumber
City
State
ZipCode
Phone

CheckOut

*CheckOutID
CustomerID
AgentID
AgentLastName
AgentFirstName
EquipmentID
EquipmentName
EquipmentDetails
DailyRate
Deposit
CheckOutDate
ReturnDate

Second Normal Form (2nd NF)

Take to 3rd NF Next

Transitive Dependency?

Customer

*CustomerID
CustomerLastName
CustomerFirstName
StreetNumber
City
State
ZipCode
Phone

CheckOut

*CheckOutID
CustomerID
AgentID
AgentLastName
AgentFirstName
EquipmentID
EquipmentName
EquipmentDetails
DailyRate
Deposit
CheckOutDate
ReturnDate

Second Normal Form (2nd NF)

Take to 3rd NF Next

Customer

*CustomerID
CustomerLastName
CustomerFirstName
StreetNumber
City
State
ZipCode
Phone

Move out to create
a new address entity
if more than one address
may be stored or an
address may be shared

CheckOut

*CheckOutID
CustomerID
AgentID
AgentLastName
AgentFirstName
EquipmentID
EquipmentName
EquipmentDetails
DailyRate
Deposit
CheckOutDate
ReturnDate

Transitive Dependency

Corrected Transitive Dependency and Conform to 3rd NF

Customer

*CustomerID
CustomerLastName
CustomerFirstName
StreetNumber
City
State
ZipCode
Phone

CheckOut

*CheckOutID
CustomerID
AgentID
EquipmentID
DailyRate
Deposit
CheckOutDate
ReturnDate

Agent

*AgentID
AgentLastName
AgentFirstName

Equipment

*EquipmentID
EquipmentName
EquipmentDetails

What To Do Next?

- Create entities in Design Tool
- Don't add any additional entity or attribute
- Establish relationships between entities
- Pay attention to Multiplicity
- Pay attention to type of relationship
 - Identifying vs Non-Identifying
- Label PKs and FKs