CS4.301 : Data and Applications

(Monsoon 2022)

Project Phase-3

SuperMarket

DataBase Designed to Manage the Operations in a Supermarket

Team Details

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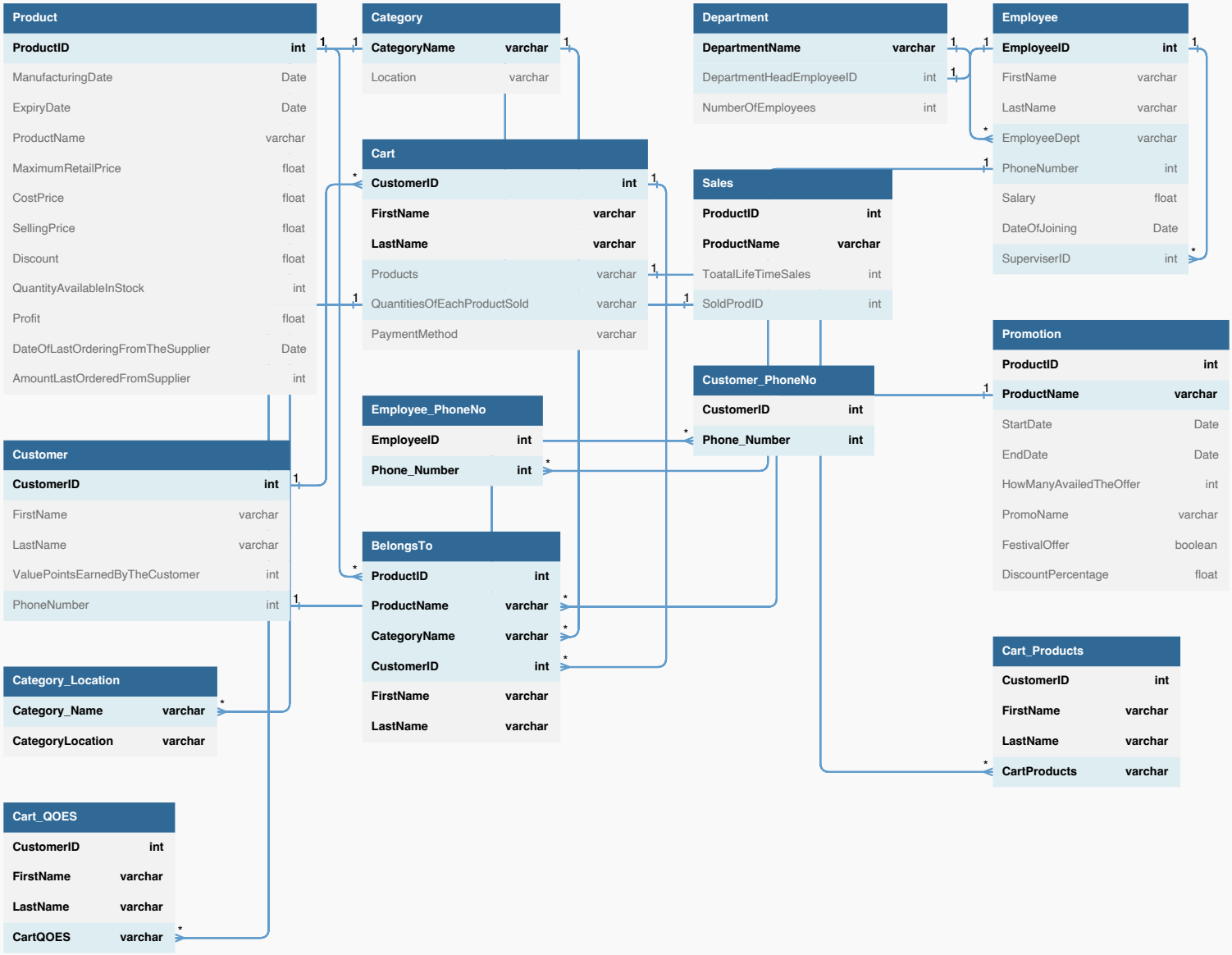
E-R To Relational Model



Changes Made for Conversion to Relational Model

- Customer Name and Employee Name changed from Composite Attribute i.e. First Name and Last Name to Two Separate Attributes.
- Added Supervisor ID as an Attribute to the Employee Entity Type.
- Phone Numbers being Multivalued Attributes, Separate Relational Tables for Employee and Customer Phone Number were Added.

- Cart QOES and Cart Products were Added to the Relational Model as they were Multivalued Attributes inside the Cart Entity Type.
- Category Location was Also Added to the Relational Model as it was Multivalued Attribute in the ER diagram.
- **Note :** Department Head can be A Head for Multiple Departments.

Conversion to 1-NF

- Relational Model After Conversion to 1-NF
    - A Relation will be 1NF if it contains an Atomic Value.
    - It States that an Attribute of a Table cannot hold Multiple Values. It must hold only Single-Valued Attributes.
    - The First Normal Form does not allow Multi-Valued Attributes, Composite Attributes and their Combinations.

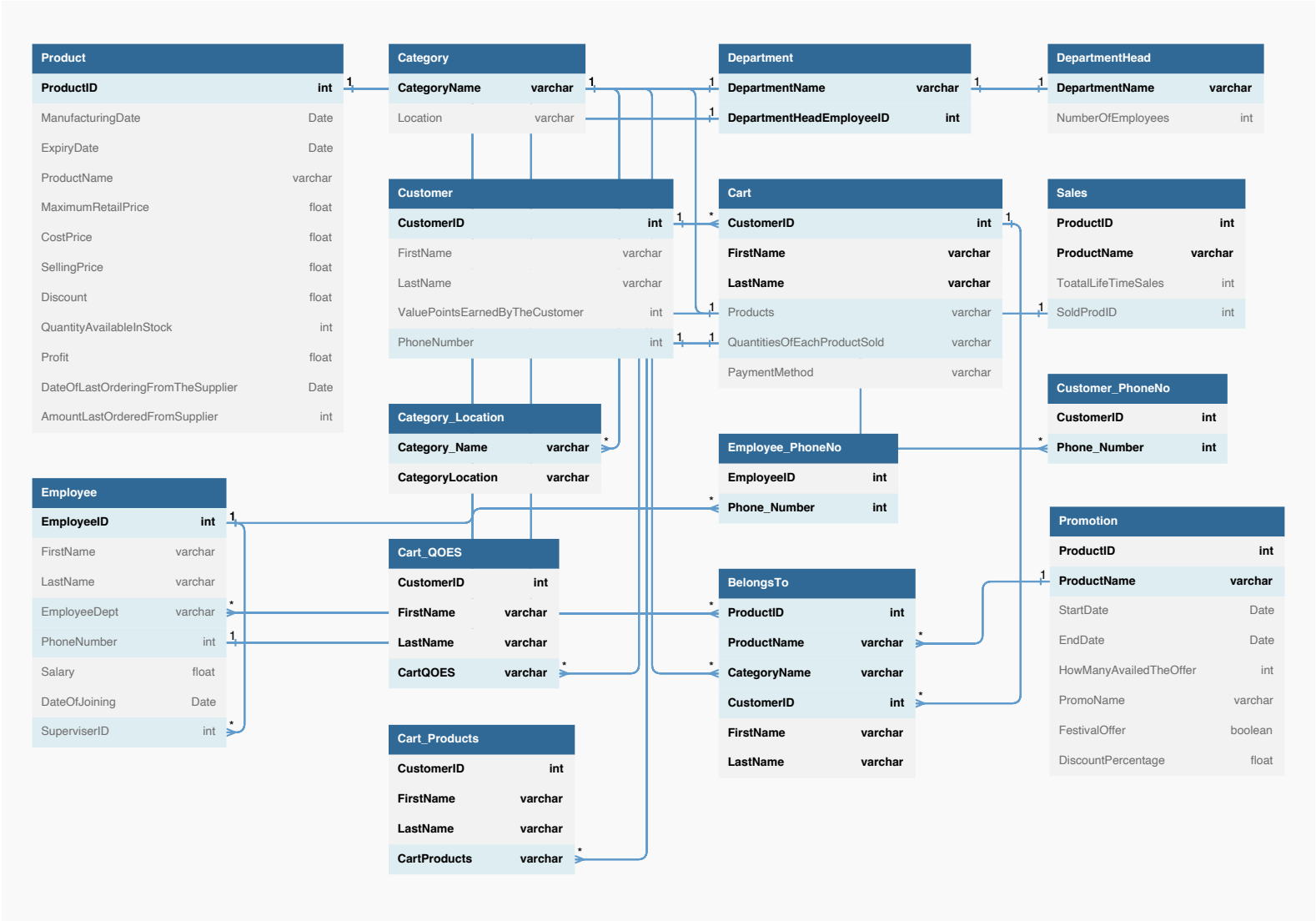
As it can be Clearly Seen from the Data Types in the preceding Relational Diagram , every given Attribute can only take Atomic Values. This means that the Criterions for the First Normal Form are already Met. Hence, the Relational Schema is already in the First Normal Form.

Conversion to 2-NF

- Relational Model After Conversion to 2-NF
    - In order for a Relation to be in 2-NF it already Must be in 1-NF.
    - In the Second Normal Form , all Non Key Attributes are Fully Functional Dependent on the Primary Key.

Changes Made for Conversion to 2-NF

- Relation Department was Changed to From What it was in 1-NF. It does not Include Number of Employees.
- A New Table Department Head was Created because a Head can lead Multiple Departments.
- The New Relation Department Head contains Department Name and Number of Employees which are in a Relational Integrity Constraint with the Department Head Employee ID in the Department Relation.

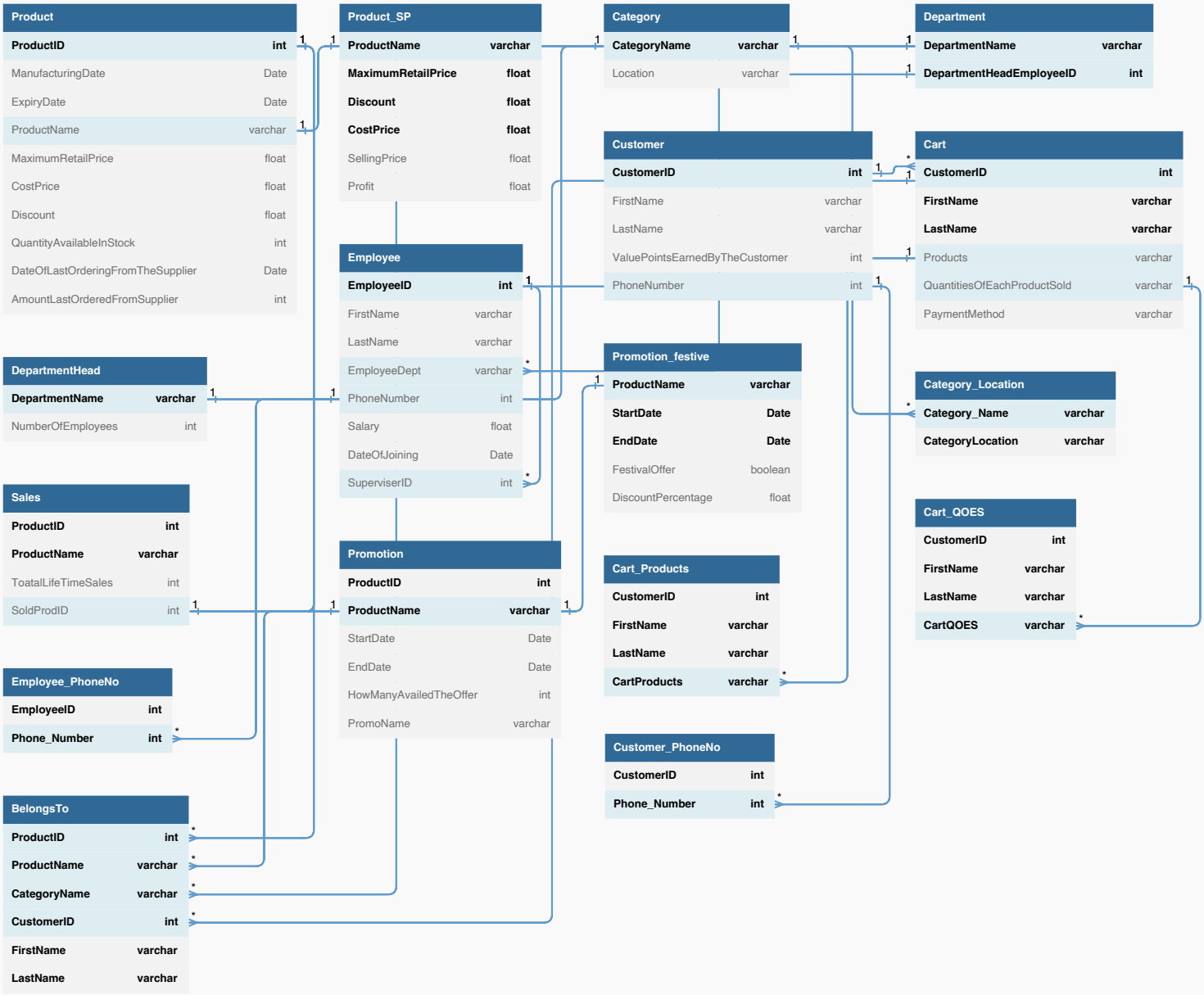


Conversion to 3-NF

- Relational Model After Conversion to 3-NF
  - A Relation will be in 3-NF if it is 2-NF and does not contain any Transitive Partial Dependency.
  - A Relation is in 3-NF if at least any one of the following conditions holds in every non-trivial Functional Dependency X -> Y :
    1. X is a Super Key.
    2. Y is a Prime Attribute I.e. Each Element of Y is part of some Candidate Key.

Changes Made for Conversion to 3-NF

- Two new Relations Product_SP denoting the Selling Price of the Product and Promotion_Festive denoting the Festive Promotion Details were added in 3-NF.
- Product_SP contains the Product Name , MRP , Discount , Cost Price and the Selling Price along with the Profit. It is in a Relational Integrity Constraint with the Product Relational Table.
- Promotion_Festive contains the Product Name , Start Date of the Promotion , End Date of the Promotion , Festive Offer (Boolean) and the Discount Percentage for the Promotion.
- Promotion_Festive is in a Relational Integrity Constraint with the Promotion Relational Table.


Product
ProductID int
ManufacturingDate Date
ExpiryDate Date
ProductName varchar
MaximumRetailPrice float
CostPrice float
Discount float
QuantityAvailableInStock int
DateOfLastOrderingFromTheSupplier Date
AmountLastOrderedFromSupplier int
Product_SP
ProductName varchar
MaximumRetailPrice float
Discount float
CostPrice float
SellingPrice float
Profit float
Category
CategoryName varchar
Location varchar
Department
DepartmentName varchar
DepartmentHeadEmployeeID int
Customer
CustomerID int
FirstName varchar
LastName varchar
ValuePointsEarnedByTheCustomer int
PhoneNumber int
Cart
CustomerID int
FirstName varchar
LastName varchar
Products varchar
QuantitiesOfEachProductSold varchar
PaymentMethod varchar
Employee
EmployeeID int
FirstName varchar
LastName varchar
EmployeeDept varchar
PhoneNumber int
Salary float
DateOfJoining Date
SuperviserID int
DepartmentHead
DepartmentName varchar
NumberOfEmployees int
Promotion_festive
ProductName varchar
StartDate Date
EndDate Date
FestivalOffer boolean
DiscountPercentage float
Category_Location
Category_Name varchar
CategoryLocation varchar
Sales
ProductID int
ProductName varchar
ToatalLifeTimeSales int
SoldProdID int
Promotion
ProductID int
ProductName varchar
StartDate Date
EndDate Date
HowManyAvailedTheOffer int
PromoName varchar
Cart_QOES
CustomerID int
FirstName varchar
LastName varchar
CartQOES varchar
Cart_Products
CustomerID int
FirstName varchar
LastName varchar
CartProducts varchar
Employee_PhoneNo
EmployeeID int
Phone_Number int
Customer_PhoneNo
CustomerID int
Phone_Number int
BelongsTo
ProductID int
ProductName varchar
CategoryName varchar
CustomerID int
FirstName varchar
LastName varchar