DATABASE
Project Report

On

ELECTRONIC (BESTBUY) STORE DATABASE MANAGEMENT AND DATA ANALYSIS

By

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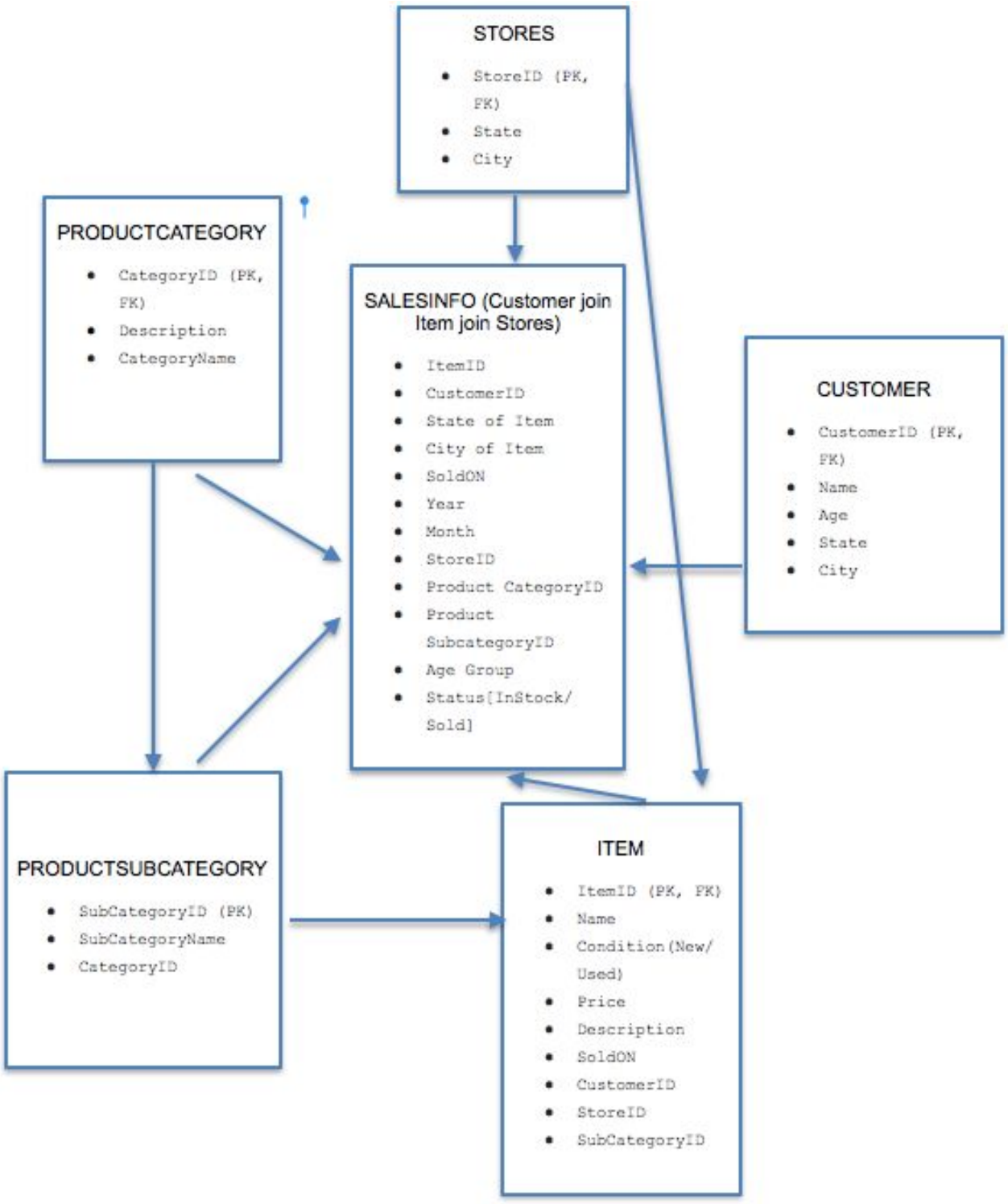
Introduction: Problem Description

The problem set was divided into three parts:-

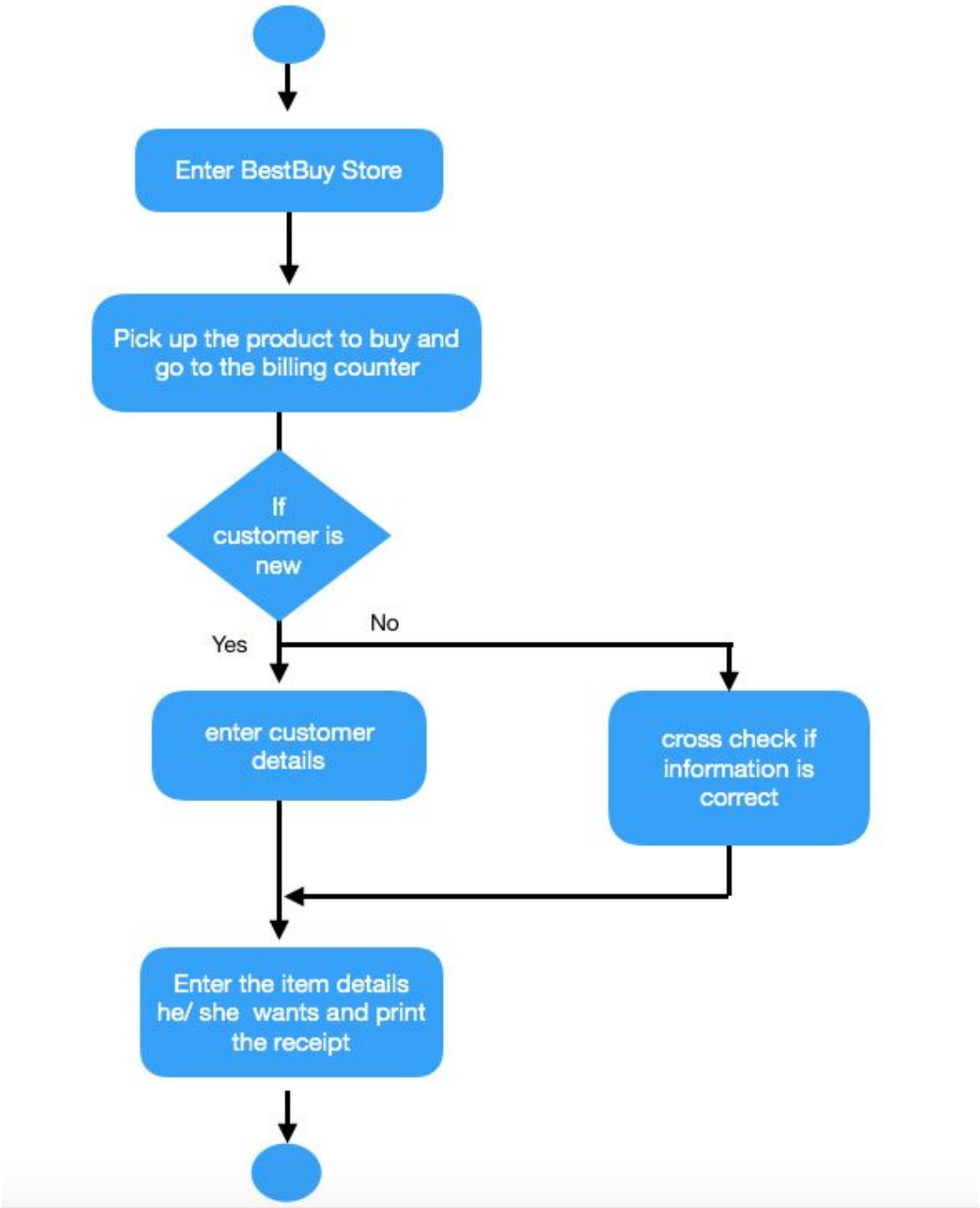
1. **Create a BestBuy database that contains store information, product categories, product sub categories, item information, customer information and sales information tables.**
2. **Create procedures to add an item, delete an item, sell an item, return an item, move an item from one store location to another and add a customer.**
3. **Create procedures to find out popular product by state, popular product by city, popular product by month, popular product by year, popular product category by state, popular product category by age group.**

Data Model


STORES
StoreID (PK, PK)
State
City
PRODUCTCATEGORY
CategoryID (PK, PK)
Description
CategoryName
SALESINFO (Customer join Item join Stores)
ItemID
CustomerID
State of Item
City of Item
SoldON
Year
Month
StoreID
Product CategoryID
Product SubcategoryID
Age Group
Status[InStock/ Sold]
CUSTOMER
CustomerID (PK, PK)
Name
Age
State
City
PRODUCTSUBCATEGORY
SubCategoryID (PK)
SubCategoryName
CategoryID
ITEM
ItemID (PK, PK)
Name
Condition(New/ Used)
Price
Description
SoldON
CustomerID
StoreID
SubCategoryID

State chart Diagram:

The state diagram shows the states of an object and represents activities as arrows connecting the states. The Activity Diagram highlights the activities. Each activity is represented by a rounded rectangle-narrower and more oval-shaped than the state icon. An arrow represents the transition from the one activity to the next. The activity diagram has a starting point represented by filled-in circle, and an end point represented by bulls eye.



Implementation :

Testing :

Test Cases:

- **Check if new item added has subcategory id and store id which is not in the list**
- **Check if item id or condition(new/used) of the new item entered is already there in the list**

```
-- Create procedure to add an item
-- raise error if subcategory id and store id entered is not in given list
-- raise error if item id is already there in the list
-- raise error if condition entered is other than new or used
CREATE PROC sp_Add_Item @ItemID int, @Condition NVARCHAR(5), @Price money, @StoreID
int, @SubCategoryID int
As
   if @SubCategoryID not in (Select SubCategoryID from dbo.ProductSubCategory)
       RAISERROR('Invalid SubCategory ID', 16, 1)
   If @StoreID not in (Select StoreID from dbo.Stores)
       RAISERROR('Invalid Store ID', 16, 1)
   If @ItemID in (Select ItemID from dbo.Item)
       RAISERROR('Item ID already in Item', 16, 1)
   If @Condition not in ('New', 'Used')
       RAISERROR('Enter the given condition : Used or New', 16, 1)

   Insert into dbo.Item VALUES (@ItemID, 'Item' + CAST(@ItemID as NVARCHAR(15)),
@Condition, @Price, 'described as-' + CAST(@ItemID as NVARCHAR(20)), NULL, NULL,
@StoreID, @SubCategoryID)

Go
```

- **Check if item id of the item to be deleted entered is not there in the list**

```
-- create procedure to delete an item
```

```
-- raise error if item id is not in the list
Create PROC sp_delete_item @ItemID INT
AS
   If @ItemID not in (Select ItemID from dbo.Item)
       RAISERROR('Item ID not in Item', 16, 1)

   Delete dbo.Item
   where ItemID = @ItemID

Go
```

- **Check if item id of the item to be updated entered is not there in the list**

```
-- create procedure to update the status of the item to sold and update the 'sold on'
date and enter the customer id of the customer who bought it
-- raise error if item id is not in the given list
Create PROC sp_Sell_item @ItemID INT, @CustomerID int
AS
   If @ItemID not in (Select ItemID from dbo.Item)
       RAISERROR('Item ID not in Item', 16, 1)

   Update dbo.Item
   set SoldOn = GETDATE(), CustomerID = @CustomerID
   where ItemID = @ItemID

Go

-- create procedure to update the status of the item to returned and update the 'sold
on' date
-- raise error if item id is not in the given list
Create PROC sp_Return_item @ItemID INT
AS
   If @ItemID not in (Select ItemID from dbo.Item)
       RAISERROR('Item ID not in Item', 16, 1)

   Update dbo.Item
   set SoldOn = NULL
```

```
   where ItemID = @ItemID

Go
```

- **Check if item id or store id of the item to be updated is already there in the list**

```
-- create procedure to update the store id of the item, if the item is moved to
another store
-- raise error if item id or store id is not in the given list
Create PROC sp_Move_item_to_other_store @ItemID INT, @StoreID INT
AS
   If @ItemID not in (Select ItemID from dbo.Item)
       RAISERROR('Item ID not in Item', 16, 1)
   If @StoreID not in (Select StoreID from dbo.Stores)
       RAISERROR('Invalid Store ID', 16, 1)

   Update dbo.Item
   set StoreID = @StoreID
   where ItemID = @ItemID
Go
```

- **Check if new customer added is not in the list.**
- **Check if item id of the item bought by the customer is already there in the list**

```
-- Customer insert
SELECT * from dbo.Customer

-- create procedure to add new customer and its information in the database
-- raise error if customer id for the new customer generated is already in the list
CREATE PROC sp_Add_Customer @CustomerID int, @CustomerName NVARCHAR(15), @Age int,
@State NVARCHAR(15), @City NVARCHAR(15)
As
   If @CustomerID in (Select CustomerID from dbo.Customer)
       RAISERROR('CustomerID already exists', 16, 1)
```

```
   Insert into dbo.Customer VALUES (@CustomerID, @CustomerName, @Age, @State, @City)

Go
```

Analysis :

- ## Calculate popular product city wise

```
-- create procedure to calculate popular product city wise
CREATE PROC sp_Items_By_City
AS
   select  COUNT(ItemID) as [Number of Items sold], CIty
   from view_Sales_Info
   GROUP by City
   order by 1 desc

Go
```

- ## Calculate popular product state wise

```
-- create procedure to calculate popular product state wise
CREATE PROC sp_Items_By_State
AS
   select  COUNT(ItemID) as [Number of Items sold], [State]
   from view_Sales_Info
   GROUP by [State]
   order by 1 desc

Go
```

- ## Calculate popular product year wise

```
-- create procedure to calculate popular product year wise
CREATE PROC sp_Items_By_Year
AS
   select  COUNT(ItemID) as [Number of Items sold], YearSoldOn
   from view_Sales_Info
   GROUP by YearSoldOn
   order by 1 desc
```

```
Go
```

- **Calculate popular product month wise**

```
-- create procedure to calculate popular product month wise
CREATE PROC sp_Items_By_Month
AS
   select  COUNT(ItemID) as [Number of Items sold], MonthSoldOn
   from view_Sales_Info
   GROUP by MonthSoldOn
   order by 1 desc

GO
```

- **Calculate popular product category state wise**

```
-- create procedure to calculate popular items Category state wise
CREATE PROC sp_ItemsCategory_By_State
AS
   select  COUNT(CategoryID) as [Number of Items Sold by Category], State
   from view_Sales_Info
   GROUP by [State]
   order by 1 desc
Go
```

- **Calculate popular product category age-group wise**

```
-- create procedure to calculate popular item category age-group wise
CREATE PROC sp_ItemsCategory_By_AgeGroup
AS
   select  COUNT(CategoryID) as [Number of Items Sold by Age Group], [Age Group]
   from view_Sales_Info
   GROUP by [Age Group]
   order by 1 desc

Go
```

Appendix

Please refer to the following pages

Code :

```
Create DATABASE BestBuyUS

GO

-- Create table stores to store the bestbuy store info (storeID, state and city)
CREATE TABLE Stores (
   StoreID int NOT NULL PRIMARY KEY,
   State NVARCHAR(20),
   City NVARCHAR(20)
)

-- Create table to store product categories
CREATE TABLE ProductCategory (
   CategoryID int NOT NULL PRIMARY KEY,
   Description NVARCHAR(20),
   CategoryName NVARCHAR(15)
)

-- Create table to store product subcategories
CREATE TABLE ProductSubCategory(
   SubCategoryID int NOT NULL PRIMARY KEY,
   SubCategoryName NVARCHAR(15),
   CategoryID int
)

-- create table to store product information
CREATE table Item (
   ItemID int NOT NULL PRIMARY KEY,
   Name NVARCHAR(15),
   [Condition(New/Used)] NVARCHAR(5),
   Price money,
   Description NVARCHAR(20),
   SoldOn DATETIME2,
   CustomerID int,
   StoreID int,
   SubCategoryID int
```

```
)

-- create table customer to store customer information
CREATE table Customer (
   CustomerID int NOT NULL PRIMARY KEY,
   Name NVARCHAR(15),
   Age int,
   State NVARCHAR(20),
   City NVARCHAR(20)
)

-- create sequences to populate the data in store table
CREATE SEQUENCE Sq_Store_StoreID
START WITH 1
INCREMENT BY 1
MINVALUE 1
MAXVALUE 15000
CYCLE


CREATE SEQUENCE Sq_Store_State
START WITH 1
INCREMENT BY 1
MINVALUE 1
MAXVALUE 100
CYCLE

CREATE SEQUENCE Sq_Store_City
START WITH 1
INCREMENT BY 1
MINVALUE 1
MAXVALUE 10000
CYCLE

-- use while loop to fill stores table with 15000 records
Declare @Id int
set @Id = 1

While @Id <= 15000
```

```
Begin
  Insert Into dbo.Stores values (@Id, 'S'+ CAST(Next Value for Sq_Store_State as
NVARCHAR(10)),
  'C'+ CAST(Next value for Sq_Store_City as NVARCHAR(10)))

  Set @Id = @Id + 1
End

SELECT * FROM dbo.Stores

-- use while loop to fill ProductCategory table with 1000 records
Declare @Id int
set @Id = 1

While @Id <= 1000
Begin
  Insert Into dbo.ProductCategory values (@Id, 'in category-'+ CAST(@Id as
NVARCHAR(20)),
  'Category'+ CAST(@Id as NVARCHAR(15)))

  Set @Id = @Id + 1
End

select * from dbo.ProductCategory

-- create sequences to populate the data in ProductSubCategory table
CREATE SEQUENCE Sq_ProductSubCategory_CategoryID
START WITH 1
INCREMENT BY 1
MINVALUE 1
MAXVALUE 1000
CYCLE

-- use while loop to fill ProductSubCategory table with 15000 records
Declare @Id int
set @Id = 1

While @Id <= 15000
Begin
```

```
  Insert Into dbo.ProductSubCategory values (@Id, 'SubCategory' + CAST(@Id as
NVARCHAR(15)),
  NEXT VALUE for Sq_ProductSubCategory_CategoryID)

  Set @Id = @Id + 1
End

Select * from dbo.ProductSubCategory

-- create sequences to populate the data in Item table
CREATE SEQUENCE Sq_ProductItem_Price
START WITH 10
INCREMENT BY 5
MINVALUE 10
MAXVALUE 2000
CYCLE

CREATE SEQUENCE Sq_ProductItem_SubCategoryID
START WITH 1
INCREMENT BY 1
MINVALUE 1
MAXVALUE 15000
CYCLE

CREATE SEQUENCE Sq_ProductItem_CustomerID
START WITH 1
INCREMENT BY 1
MINVALUE 1
MAXVALUE 150000
CYCLE

-- use while loop to fill Item table with 500,000 records
Declare @Id int
set @Id = 1

While @Id <= 400000
Begin
  Insert Into dbo.Item values (@Id, 'Item' + CAST(@Id as NVARCHAR(15)), 'New',
CAST(NEXT VALUE for Sq_ProductItem_Price as money),
```

```
  'described as-' + CAST(@Id as NVARCHAR(15)), DATEADD(day,-(NEXT VALUE for
Sq_ProductItem_SubCategoryID),GETDATE()), NEXT VALUE for Sq_ProductItem_CustomerID,
  NEXT VALUE for Sq_Store_StoreID, NEXT VALUE for Sq_ProductItem_SubCategoryID)

  Print @Id
  Set @Id = @Id + 1
End

-- Set condition as 'Used' for few items and for rest set as 'New'
Declare @Id int
set @Id = 400001

While @Id <= 500000
Begin
  Insert Into dbo.Item values (@Id, 'Item' + CAST(@Id as NVARCHAR(15)), 'Used',
CAST(NEXT VALUE for Sq_ProductItem_Price as money),
  'described as-' + CAST(@Id as NVARCHAR(15)), DATEADD(day,-(NEXT VALUE for
Sq_ProductItem_SubCategoryID),GETDATE()), NEXT VALUE for Sq_ProductItem_CustomerID,
  NEXT VALUE for Sq_Store_StoreID, NEXT VALUE for Sq_ProductItem_SubCategoryID)

  Print @Id
  Set @Id = @Id + 1
End

-- set sold on date and customerID as NULL for few items as they are still in stock
and not sold to any customer
Declare @Id int
set @Id = 1

While @Id <= 165000
Begin
  Update dbo.Item
  set CustomerID = Null
  where ItemID = @Id * 3

  Print @Id
  Set @Id = @Id + 1
End
```

```
Declare @Id int
set @Id = 1

While @Id <= 165000
Begin
  Update dbo.Item
  set SoldOn = Null
  where ItemID = @Id * 3

  Print @Id
  Set @Id = @Id + 1
End

select * from dbo.Item

-- create sequences to populate the data in Customer table
CREATE SEQUENCE Sq_Customer_Age
START WITH 20
INCREMENT BY 1
MINVALUE 20
MAXVALUE 60
CYCLE

-- use while loop to fill Customer table with 200000 records
Declare @Id int
set @Id = 1

While @Id <= 150000
Begin
  Insert Into dbo.Customer values (@Id, 'Customer' + CAST(@Id as NVARCHAR(15)),
  NEXT VALUE For Sq_Customer_Age, 'S' + CAST(Next value for Sq_Store_State as
NVARCHAR(20)), 'C' + CAST(Next Value for Sq_Store_City as NVARCHAR(20)))

  Set @Id = @Id + 1
End


SELECT * from dbo.Customer
```

```sql
-- create a view to get customer and item information
select * from dbo.Item

Declare @Id int
set @Id = 1

Create view view_Sales_Info
as
   SELECT i.ItemID, i.CustomerID, s.[State], s.City, i.SoldOn, YEAR(i.SoldOn) as
[YearSoldOn], MONTH(i.SoldOn) as [MonthSoldOn],
   s.StoreID, pc.CategoryID, ps.SubCategoryID, [Status(InStock/ Sold)] =
   CASE
       WHEN i.SoldOn is NULL THEN 'Item in stock'
       WHEN i.SoldOn is not NULL THEN 'Item Sold'
   END,
   [Age Group] =
       CASE
           WHEN c.Age <= 25 THEN '25 and lower'
           WHEN c.Age <= 30 AND c.Age >=26 THEN '26-30'
           WHEN c.Age <= 35 AND c.Age >=31 THEN '31-35'
           WHEN c.Age <= 40 AND c.Age >=36 THEN '36-40'
           WHEN c.Age <= 45 AND c.Age >=41 THEN '41-45'
           WHEN c.Age <= 50 AND c.Age >=46 THEN '46-50'
           WHEN c.Age >=51 THEN '51 and higher'
       End
   from dbo.Item i, dbo.Customer c, dbo.Stores s, dbo.ProductCategory pc,
dbo.ProductSubCategory ps
   where c.CustomerID = i.CustomerID
   and i.StoreID = s.StoreID
   and i.SubCategoryID = ps.SubCategoryID
   and ps.CategoryID = pc.CategoryID

Go

Select * from view_Sales_Info

-- Create procedure to add an item
-- raise error if subcategory id and store id entered is not in given list
```

```
-- raise error if item id is already there in the list
-- raise error if condition entered is other than new or used
CREATE PROC sp_Add_Item @ItemID int, @Condition NVARCHAR(5), @Price money, @StoreID
int, @SubCategoryID int
As
   if @SubCategoryID not in (Select SubCategoryID from dbo.ProductSubCategory)
       RAISERROR('Invalid SubCategory ID', 16, 1)
   If @StoreID not in (Select StoreID from dbo.Stores)
       RAISERROR('Invalid Store ID', 16, 1)
   If @ItemID in (Select ItemID from dbo.Item)
       RAISERROR('Item ID already in Item', 16, 1)
   If @Condition not in ('New', 'Used')
       RAISERROR('Enter the given condition : Used or New', 16, 1)

   Insert into dbo.Item VALUES (@ItemID, 'Item' + CAST(@ItemID as NVARCHAR(15)),
@Condition, @Price, 'described as-' + CAST(@ItemID as NVARCHAR(20)), NULL, NULL,
@StoreID, @SubCategoryID)

Go

-- create procedure to delete an item
-- raise error if item id is not in the list
Create PROC sp_delete_item @ItemID INT
AS
   If @ItemID not in (Select ItemID from dbo.Item)
       RAISERROR('Item ID not in Item', 16, 1)

   Delete dbo.Item
   where ItemID = @ItemID

Go

-- create procedure to update the status of the item to sold and update the 'sold on'
date and enter the customer id of the customer who bought it
-- raise error if item id is not in the given list
Create PROC sp_Sell_item @ItemID INT, @CustomerID int
AS
   If @ItemID not in (Select ItemID from dbo.Item)
       RAISERROR('Item ID not in Item', 16, 1)
```

```
   Update dbo.Item
   set SoldOn = GETDATE(), CustomerID = @CustomerID
   where ItemID = @ItemID

Go

-- create procedure to update the status of the item to returned and update the 'sold
on' date
-- raise error if item id is not in the given list
Create PROC sp_Return_item @ItemID INT
AS
   If @ItemID not in (Select ItemID from dbo.Item)
       RAISERROR('Item ID not in Item', 16, 1)

   Update dbo.Item
   set SoldOn = NULL
   where ItemID = @ItemID

Go

-- create procedure to update the store id of the item, if the item is moved to
another store
-- raise error if item id or store id is not in the given list
Create PROC sp_Move_item_to_other_store @ItemID INT, @StoreID INT
AS
   If @ItemID not in (Select ItemID from dbo.Item)
       RAISERROR('Item ID not in Item', 16, 1)
   If @StoreID not in (Select StoreID from dbo.Stores)
       RAISERROR('Invalid Store ID', 16, 1)

   Update dbo.Item
   set StoreID = @StoreID
   where ItemID = @ItemID
Go

-- Customer insert
SELECT * from dbo.Customer
```

```sql
-- create procedure to add new customer and its information in the database
-- raise error if customer id for the new customer generated is already in the list
CREATE PROC sp_Add_Customer @CustomerID int, @CustomerName NVARCHAR(15), @Age int,
@State NVARCHAR(15), @City NVARCHAR(15)
As
   If @CustomerID in (Select CustomerID from dbo.Customer)
       RAISERROR('CustomerID already exists', 16, 1)

   Insert into dbo.Customer VALUES (@CustomerID, @CustomerName, @Age, @State, @City)

Go

-- create procedure to calculate popular product city wise
CREATE PROC sp_Items_By_City
AS
   select  COUNT(ItemID) as [Number of Items sold], CIty
   from view_Sales_Info
   GROUP by City
   order by 1 desc

Go

-- create procedure to calculate popular product state wise
CREATE PROC sp_Items_By_State
AS
   select  COUNT(ItemID) as [Number of Items sold], [State]
   from view_Sales_Info
   GROUP by [State]
   order by 1 desc

Go

-- create procedure to calculate popular product year wise
CREATE PROC sp_Items_By_Year
AS
   select  COUNT(ItemID) as [Number of Items sold], YearSoldOn
   from view_Sales_Info
   GROUP by YearSoldOn
   order by 1 desc
```

```
Go

-- create procedure to calculate popular product month wise
CREATE PROC sp_Items_By_Month
AS
   select  COUNT(ItemID) as [Number of Items sold], MonthSoldOn
   from view_Sales_Info
   GROUP by MonthSoldOn
   order by 1 desc

GO

-- create procedure to calculate popular items Category state wise
CREATE PROC sp_ItemsCategory_By_State
AS
   select  COUNT(CategoryID) as [Number of Items Sold by Category], State
   from view_Sales_Info
   GROUP by [State]
   order by 1 desc
Go

-- create procedure to calculate popular item category age-group wise
CREATE PROC sp_ItemsCategory_By_AgeGroup
AS
   select  COUNT(CategoryID) as [Number of Items Sold by Age Group], [Age Group]
   from view_Sales_Info
   GROUP by [Age Group]
   order by 1 desc

Go

Select * from view_Sales_Info
SELECT * from dbo.Stores
SELECT * FROM dbo.ProductSubCategory
SELECT * from dbo.ProductCategory
SELECT * FROM dbo.Item
SELECT * FROM dbo.Customer
```