

# Hands-on Assessment

## Power BI

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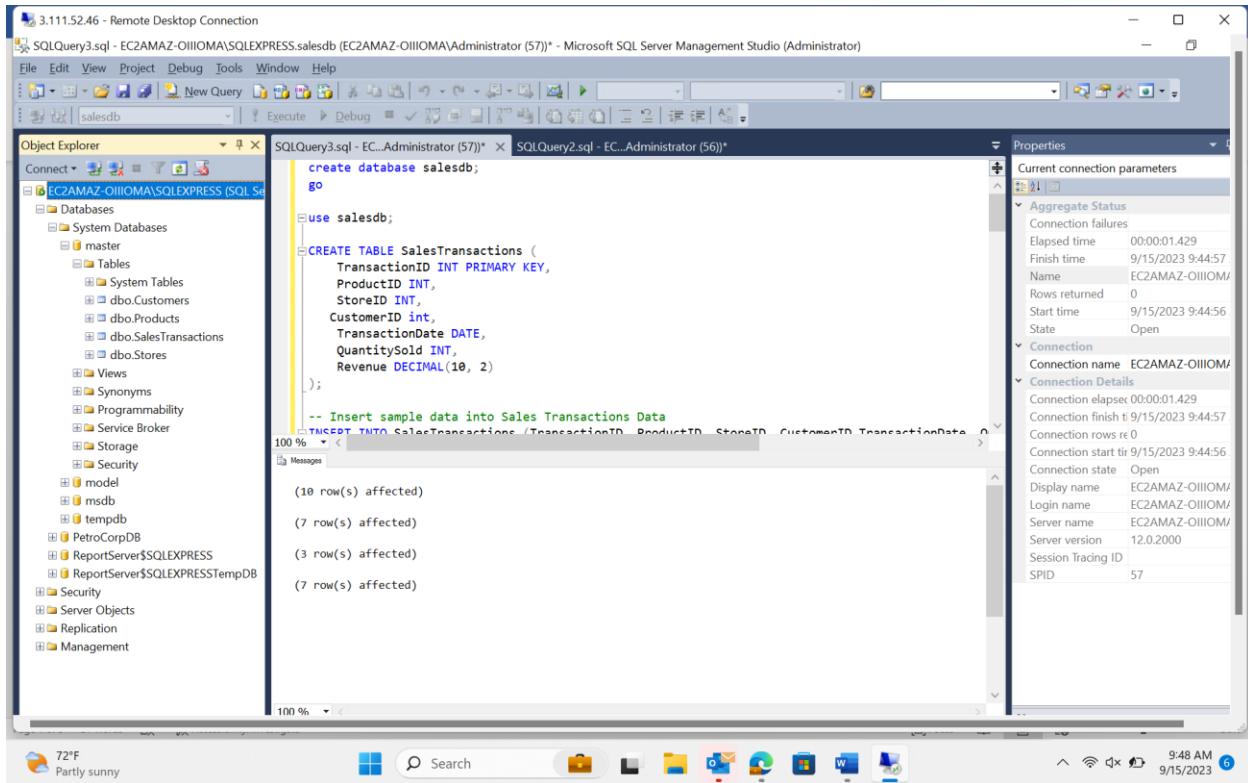
### **Scenario:** Sales Performance Analysis with Power BI

In this scenario, let's imagine you work for a retail company, and you've been tasked with analyzing the sales performance of your products and stores using Power BI. You have multiple data sources and tables to work with, and your goal is to provide actionable insights to improve sales strategies.

#### **Data Sources:**

1. Sales Transactions Data: Contains information about each sale, including product ID, store ID, date, quantity sold, and revenue generated.
2. Product Data: Includes details about each product, such as product ID, name, category, and price.
3. Store Data: Provides information about the stores, including store ID, location, and store manager.

# 1. Data Loading



Object Explorer

File Edit View Project Debug Tools Window Help

SQLQuery3.sql - EC2AMAZ-OIIOMA\SQLEXPRESS.salesdb (EC2AMAZ-OIIOMA\Administrator (57))\* - Microsoft SQL Server Management Studio (Administrator)

salesdb

Properties

```
CREATE DATABASE salesdb;
GO

USE salesdb;

CREATE TABLE SalesTransactions (
    TransactionID INT PRIMARY KEY,
    ProductID INT,
    StoreID INT,
    CustomerID int,
    TransactionDate DATE,
    QuantitySold INT,
    Revenue DECIMAL(10, 2)
);

-- Insert sample data into Sales Transactions Data
INSERT INTO SalesTransactions (TransactionID, ProductID, StoreID, CustomerID, TransactionDate, QuantitySold, Revenue)
VALUES
    (1, 101, 1, 1, '2023-01-01', 1, 10.0),
    (2, 102, 2, 2, '2023-01-01', 2, 20.0),
    (3, 103, 1, 3, '2023-01-01', 3, 30.0),
    (4, 104, 3, 4, '2023-01-01', 4, 40.0),
    (5, 105, 2, 5, '2023-01-01', 5, 50.0),
    (6, 106, 1, 6, '2023-01-01', 6, 60.0),
    (7, 107, 3, 7, '2023-01-01', 7, 70.0)
;
```

Messages

(10 row(s) affected)

(7 row(s) affected)

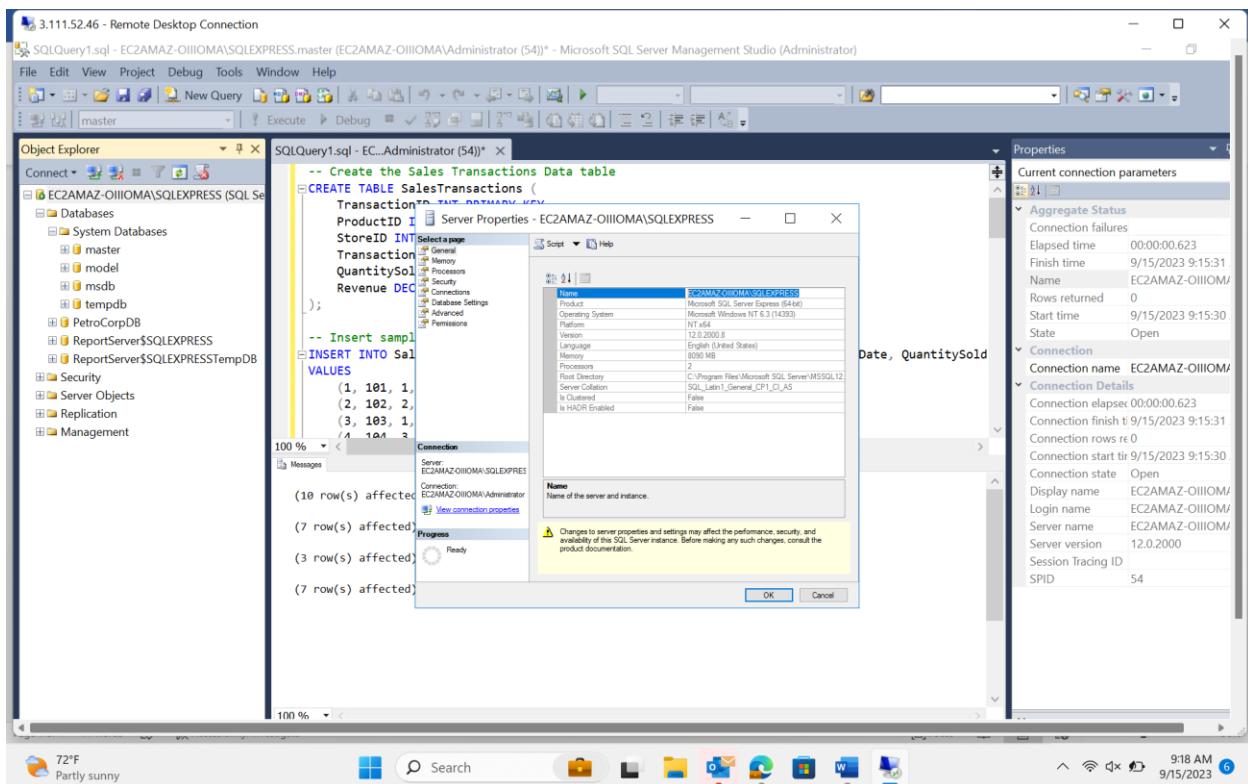
(3 row(s) affected)

(7 row(s) affected)

Elapsed time 00:00:01.429  
Finish time 9/15/2023 9:44:57  
Name EC2AMAZ-OIIOMA/  
Rows returned 0  
Start time 9/15/2023 9:44:56  
State Open

Connection name EC2AMAZ-OIIOMA/  
Connection elapse 00:00:01.429  
Connection finish 9/15/2023 9:44:57  
Connection rows re 0  
Connection start 9/15/2023 9:44:56  
Connection state Open  
Display name EC2AMAZ-OIIOMA/  
Login name EC2AMAZ-OIIOMA/  
Server name EC2AMAZ-OIIOMA/  
Server version 12.0.2000  
Session Tracing ID SPID 57

72°F Partly sunny 9:48 AM 9/15/2023



Object Explorer

File Edit View Project Debug Tools Window Help

SQLQuery1.sql - EC2AMAZ-OIIOMA\SQLEXPRESS.master (EC2AMAZ-OIIOMA\Administrator (54))\* - Microsoft SQL Server Management Studio (Administrator)

master

Properties

```
-- Create the Sales Transactions Data table
CREATE TABLE SalesTransactions (
    TransactionID INT PRIMARY KEY,
    ProductID INT,
    StoreID INT,
    TransactionDate DATE,
    QuantitySold INT,
    Revenue DECIMAL(10, 2)
);

-- Insert sample data into Sales Transactions Data
INSERT INTO SalesTransactions (TransactionID, ProductID, StoreID, TransactionDate, QuantitySold, Revenue)
VALUES
    (1, 101, 1, '2023-01-01', 1, 10.0),
    (2, 102, 2, '2023-01-01', 2, 20.0),
    (3, 103, 1, '2023-01-01', 3, 30.0),
    (4, 104, 3, '2023-01-01', 4, 40.0),
    (5, 105, 2, '2023-01-01', 5, 50.0),
    (6, 106, 1, '2023-01-01', 6, 60.0),
    (7, 107, 3, '2023-01-01', 7, 70.0)
;
```

Messages

(10 row(s) affected)

(7 row(s) affected)

(3 row(s) affected)

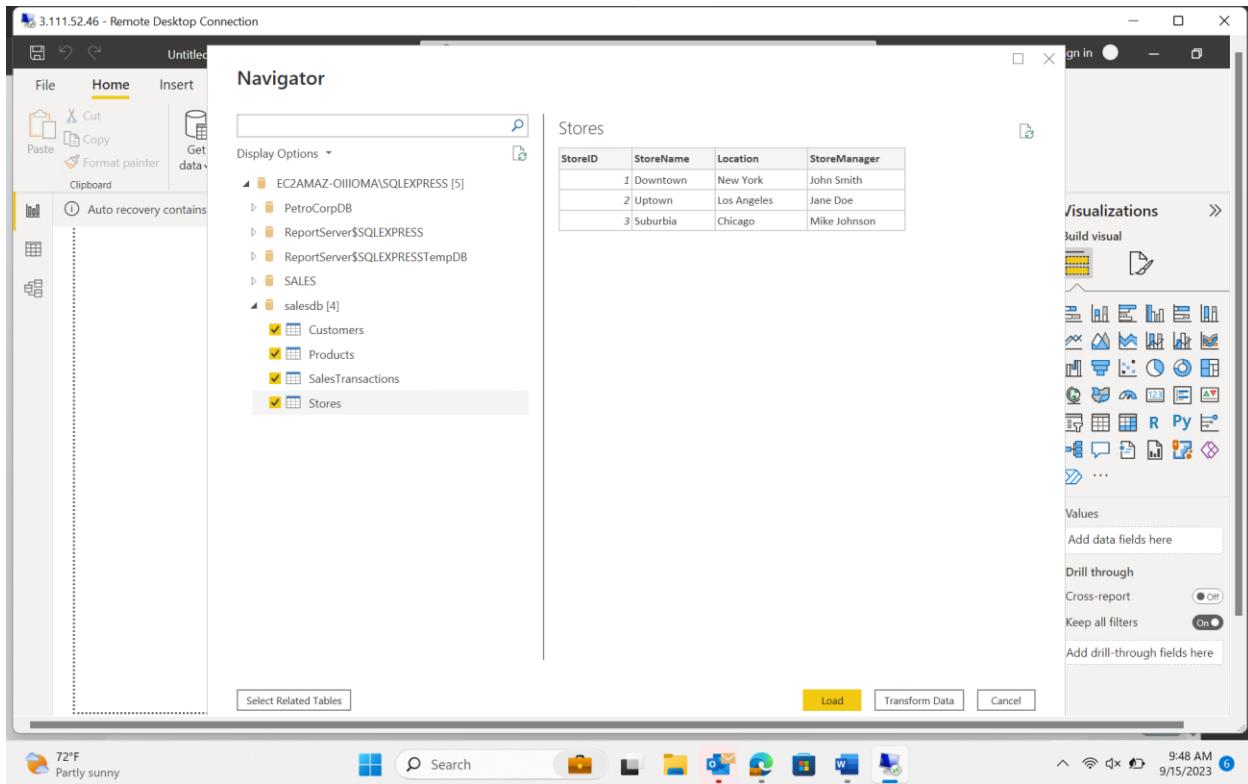
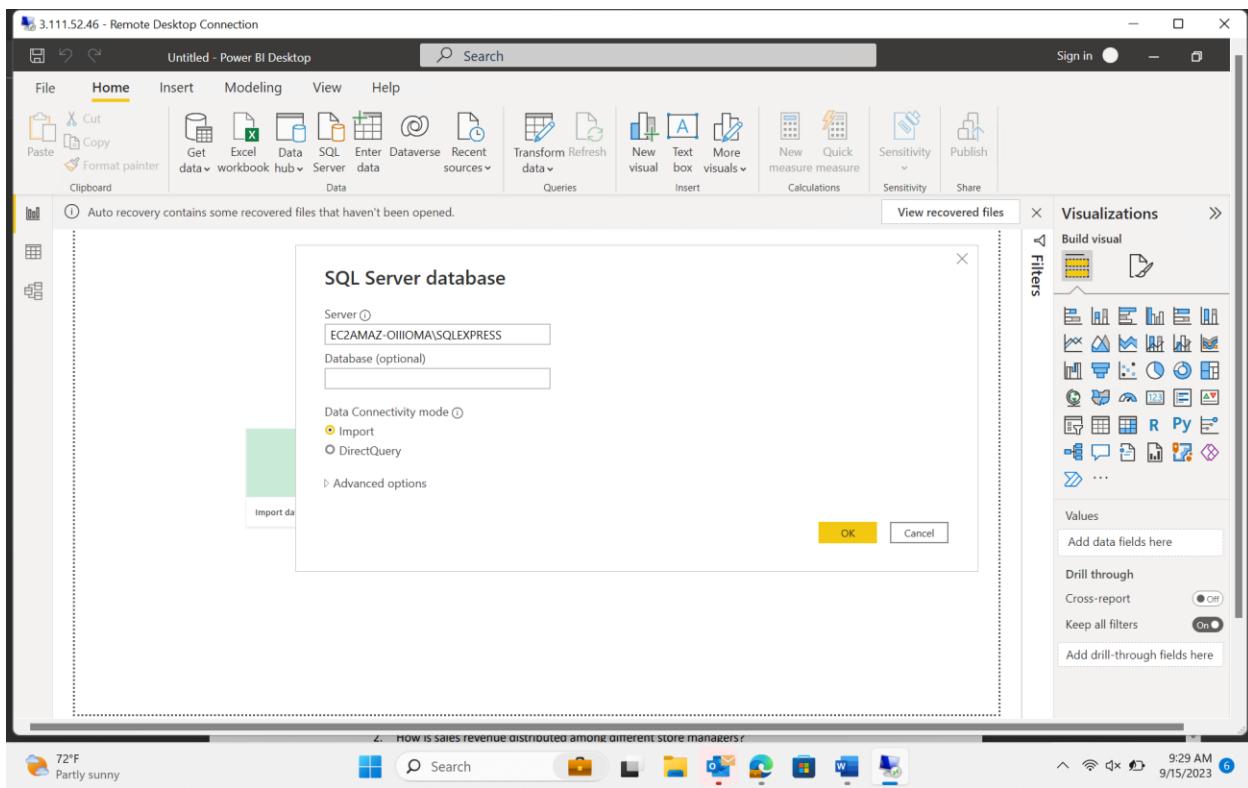
(7 row(s) affected)

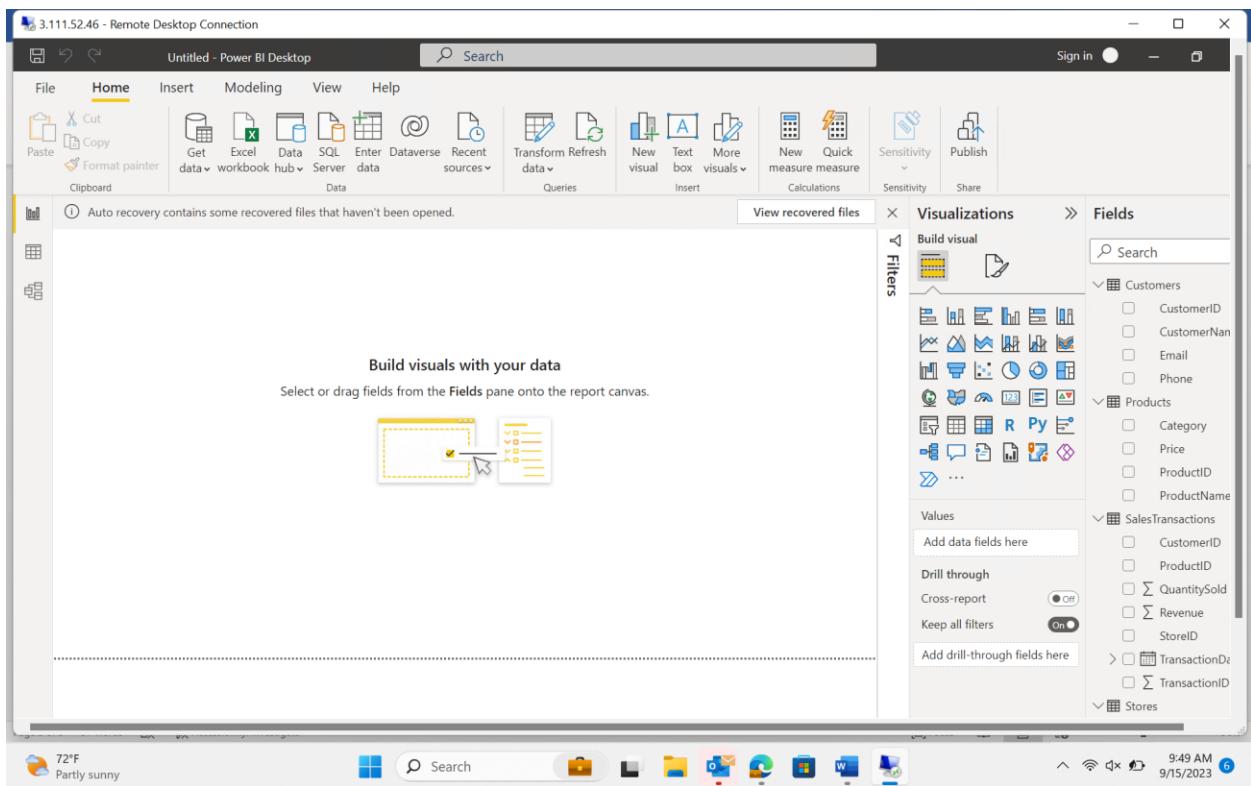
Name EC2AMAZ-OIIOMA\SQLEXPRESS
Product Microsoft SQL Server Express (64-bit)
Operating System Microsoft Windows NT 6.3 (14393)
Platform NT x64
Version 12.0.2000.8
Engine (United States)
Memory 8000 MB
Processors 2
Root Directory C:\Program Files\Microsoft SQL Server\MYSQL12
Service Configuration S0L1\_General\_CPL\_1\_AS
Is Quorum False
Is HADR Enabled False

OK Cancel

Changes to server properties and settings may affect the performance, security, and availability of the SQL Server instance. Before making any such changes, consult the product documentation.

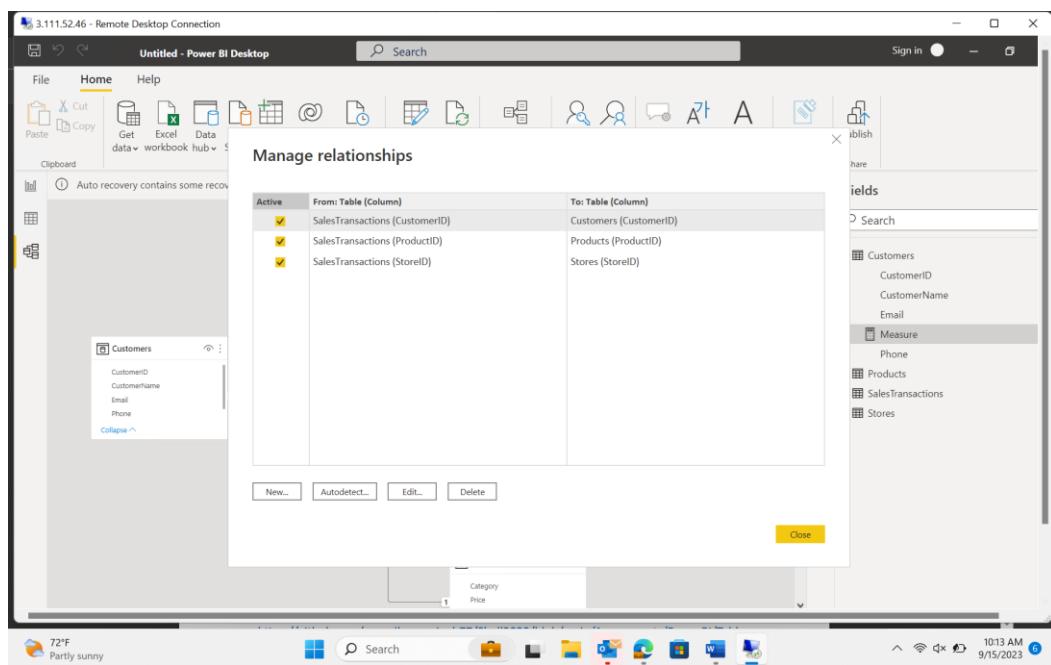
72°F Partly sunny 9:18 AM 9/15/2023

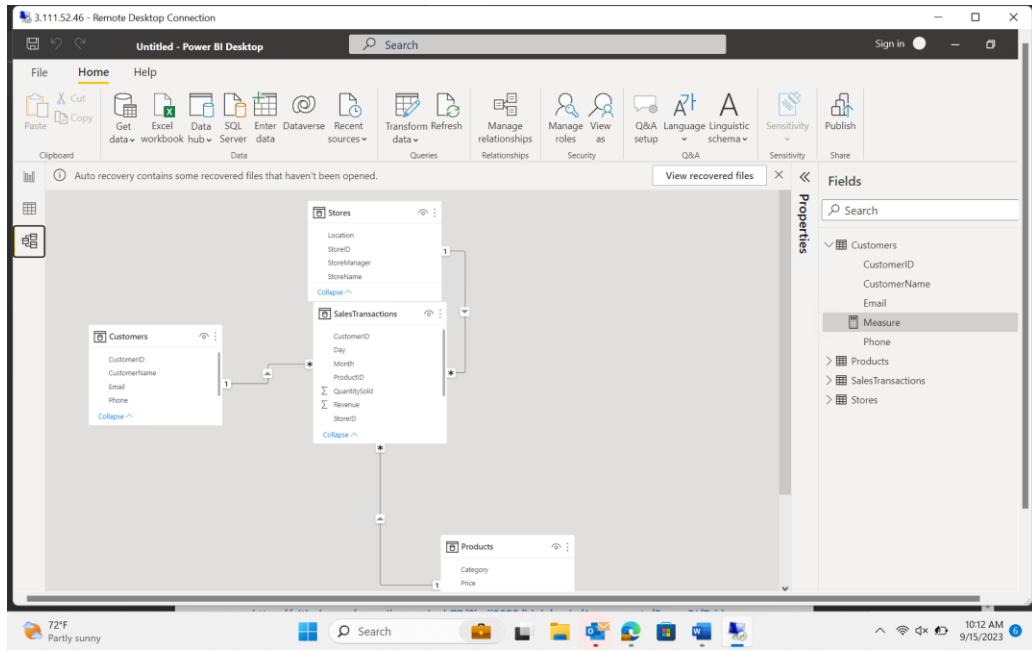




## 2. Data Transformation

### Manage Relationships





## Clean Data: Transform Data Can Remove Duplicates

The screenshot shows the Power Query Editor window with the 'Customers' query selected. A context menu is open over the 'Email' column, with 'Remove Duplicates' highlighted. The main ribbon bar includes File, Home, Transform, Add Column, View, Tools, and Help. The 'Transform' tab is active. The 'Applied Steps' pane on the right shows a single step named 'Navigation'. The status bar at the bottom indicates it's 9:38 AM on 9/15/2023.

Email	Phone
customerA@email.com	(123) 456-7890
customerB@email.com	(234) 567-8901
customerC@email.com	(345) 678-9012
customerD@email.com	(456) 789-0123
customerE@email.com	(567) 890-1234
customerF@email.com	(678) 901-2345
customerG@email.com	(789) 012-3456

## Change Datatype

The screenshot shows the Power Query Editor interface. A context menu is open over the 'Phone' column, which contains numeric values. The menu path 'Customer[Phone]' is highlighted. The 'Change Type' submenu is open, showing various data types: Decimal Number, Fixed decimal number, Whole Number (which is selected), Percentage, Date/Time, Date, Time, Date/Time/Timezone, Duration, Text, True/False, Binary, and Using Locale... .

Properties pane:

- Name: Customers
- All Properties

Applied Steps pane:

- Source
- Navigation

CustomerID	CustomerName	Email	Phone
101	Customer A	customerA@email.com	(123) 456-7890
102	Customer B	customerB@email.com	(234) 567-8901
103	Customer C	customerC@email.com	(345) 678-9012

Suppose you want to keep only top 3 customers.

The screenshot shows the Power Query Editor after applying the 'Kept First Rows' step. The 'Applied Steps' pane now includes 'Kept First Rows'. The data table now only contains the first three rows of data.

Properties pane:

- Name: Customers
- All Properties

Applied Steps pane:

- Source
- Navigation
- Kept First Rows

CustomerID	CustomerName	Email	Phone
101	Customer A	customerA@email.com	(123) 456-7890
102	Customer B	customerB@email.com	(234) 567-8901
103	Customer C	customerC@email.com	(345) 678-9012

## Create Calculated Columns

Created day/month/year from transaction date.

The screenshot shows the Microsoft Power Query Editor interface. In the center, there is a table with four columns: 'QuantitySold', 'Revenue', 'Day', and 'Month'. A fifth column, 'Year', is being created using the formula `= Table.RenameColumns#"Inserted Last Characters", {"Last Characters", "Year"}()`. The 'Year' column contains the value 2023 for all rows. On the right side of the screen, the 'APPLIED STEPS' pane is open, showing the history of operations: Source, Navigation, Inserted First Characters, Renamed Columns, Inserted Text Between Delimit..., Renamed Columns1, Inserted Last Characters, and Renamed Columns2. The 'Renamed Columns2' step is highlighted.

The screenshot shows the Microsoft Power BI Desktop interface. The 'Table tools' tab is selected. In the center, there is a table with columns 'CustomerID', 'CustomerName', 'Email', and 'Phone'. A new column is being created with the DAX expression `CustomerID & CustomerName`. On the right side, the 'Fields' pane is open, showing the structure of the data model. The 'Customers' table is expanded, showing its columns: CustomerID, CustomerName, Email, and Phone. Other tables in the model are listed: Products, SalesTransactions, and Stores. The status bar at the bottom indicates it's 9:56 AM on 9/15/2023.

## Calculated day of week

The screenshot shows the Power Query Editor interface. In the Queries list, 'SalesTransactions' is selected. The main area displays a table with columns: Revenue, Day, Month, Year, and Day of Week. A context menu is open over the 'Day of Week' column, with 'Calculated Day of Week' highlighted.

	Revenue	Day	Month	Year	Day of Week
1	500	1	5	2023	
2	600	1	10	2023	
3	300	2	15	2023	
4	900	3	20	2023	
5	700	4	25	2023	
6	675	5	30	2023	
7	550	6	5	2023	
8	570	7	10	2023	
9	630	8	15	2023	
10	680	9	20	2023	

## Filter Data

The screenshot shows the Power Query Editor interface. In the Queries list, 'Customers' is selected. The main area displays a table with columns: CustomerID, CustomerName, Email, and Phone. A filter dialog is open over the 'CustomerName' column, showing a list of customers: Customer A, Customer B, Customer C, Customer D, Customer E, Customer F, and Customer G. 'Customer A' is selected.

CustomerID	CustomerName	Email	Phone
1	customerA@email.com	(123) 456-7890	
2	customerB@email.com	(234) 567-8901	
3	customerC@email.com	(345) 678-9012	
4	customerD@email.com	(456) 789-0123	
5	customerE@email.com	(567) 890-1234	
6	customerF@email.com	(678) 901-2345	
7	customerG@email.com	(89) 012-3456	

3.111.52.46 - Remote Desktop Connection

Untitled - Power Query Editor

File Home Transform Add Column View Tools Help

Close & Apply New Source Recent Enter Data Data source settings Parameters Refresh Preview Advanced Editor Properties Choose Columns Remove Columns Keep Rows Remove Rows Split Column Group By Data Type: Text Use First Row as Headers Manage Columns Manage Rows Sort Transform

Queries [4]

Customers

Products

SalesTransactions

Stores

= salesdb{[Schema="dbo",Item="customers"]}{Data}

	CustomerID	CustomerName	Email	Phone
1	1001	Customer A	customerA@email.com	(123) 456-7890
2	1002	Customer B	customerB@email.com	(234) 567-8901
3	1003	Customer C	customerC@email.com	(345) 678-9012
4	1004	Customer D	customerD@email.com	(456) 789-0123
5	1005	Customer E	customerE@email.com	(567) 890-1234
6	1006	Customer F	customerF@email.com	(678) 901-2345
7	1007	Customer G	customerG@email.com	(789) 012-3456

Filter Rows

Apply one or more filter conditions to the rows in this table.

Basic  Advanced

Keep rows where 'CustomerName'

equals

And  Or

OK Cancel

72°F Partly sunny Search 9:54 AM 9/15/2023

3.111.52.46 - Remote Desktop Connection

Untitled - Power Query Editor

File Home Transform Add Column View Tools Help

Close & Apply New Source Recent Enter Data Data source settings Parameters Refresh Preview Advanced Editor Properties Choose Columns Remove Columns Keep Rows Remove Rows Split Column Group By Data Type: Text Use First Row as Headers Manage Columns Manage Rows Sort Transform

Queries [4]

Customers

Products

SalesTransactions

Stores

= Table.SelectRows(dbo\_Customers, each [CustomerName] = "Customer A")

	CustomerID	CustomerName	Email	Phone
1	1001	Customer A	customerA@email.com	(123) 456-7890

Query Settings

PROPERTIES

Name: Customers

All Properties

APPLIED STEPS

Source Navigation Filtered Rows

72°F Partly sunny Search 9:54 AM 9/15/2023

### 3. Data Modelling

#### Create Relationships

The screenshot shows the 'Create relationship' dialog box in Power BI. The 'Customers' table is selected, showing three rows with columns: CustomerID, CustomerName, Email, and Phone. The 'Products' table is also shown with three rows and columns: ProductID, ProductName, Category, and Price. In the 'Cardinality' section, 'One to many (1:\*)' is selected for the relationship direction, and 'Both' is chosen for the cross-filter direction. There are checkboxes for 'Make this relationship active', 'Apply security filter in both directions', and 'Assume referential integrity'. The dialog has 'OK' and 'Cancel' buttons at the bottom.

**Customers**

CustomerID	CustomerName	Email	Phone
1001	Customer A	customerA@email.com	(123) 456-7890
1002	Customer B	customerB@email.com	(234) 567-8901
1003	Customer C	customerC@email.com	(345) 678-9012

**Products**

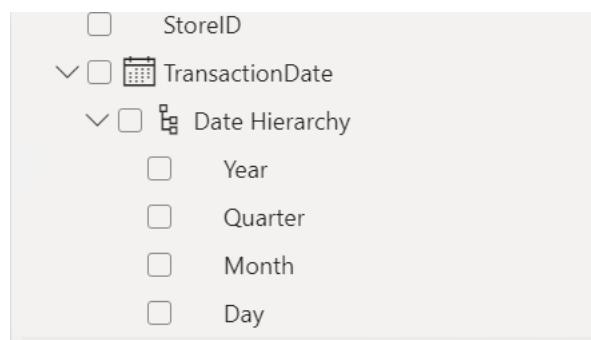
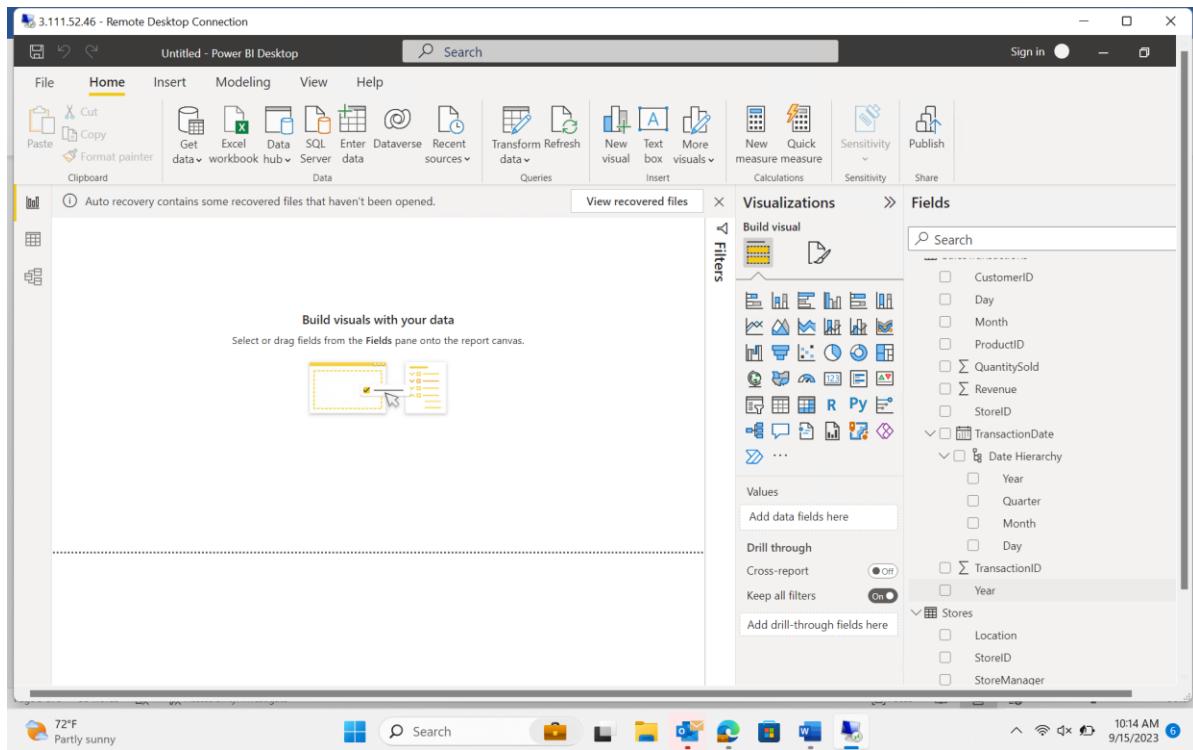
ProductID	ProductName	Category	Price
101	Laptop XYZ	Electronics	800
102	T-Shirt Blue	Clothing	15
103	Smartphone ABC	Electronics	400

**Cardinality**  
One to many (1:\*)      Cross filter direction: Both  
 Make this relationship active       Apply security filter in both directions  
 Assume referential integrity

**OK**      **Cancel**

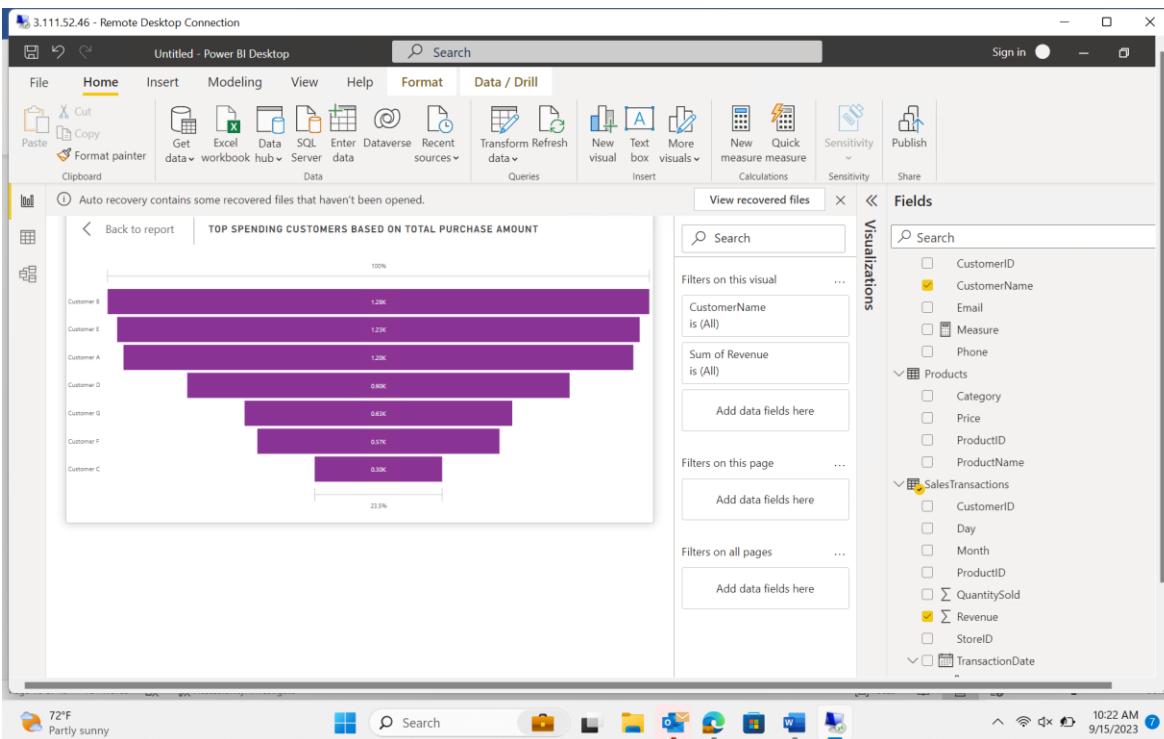
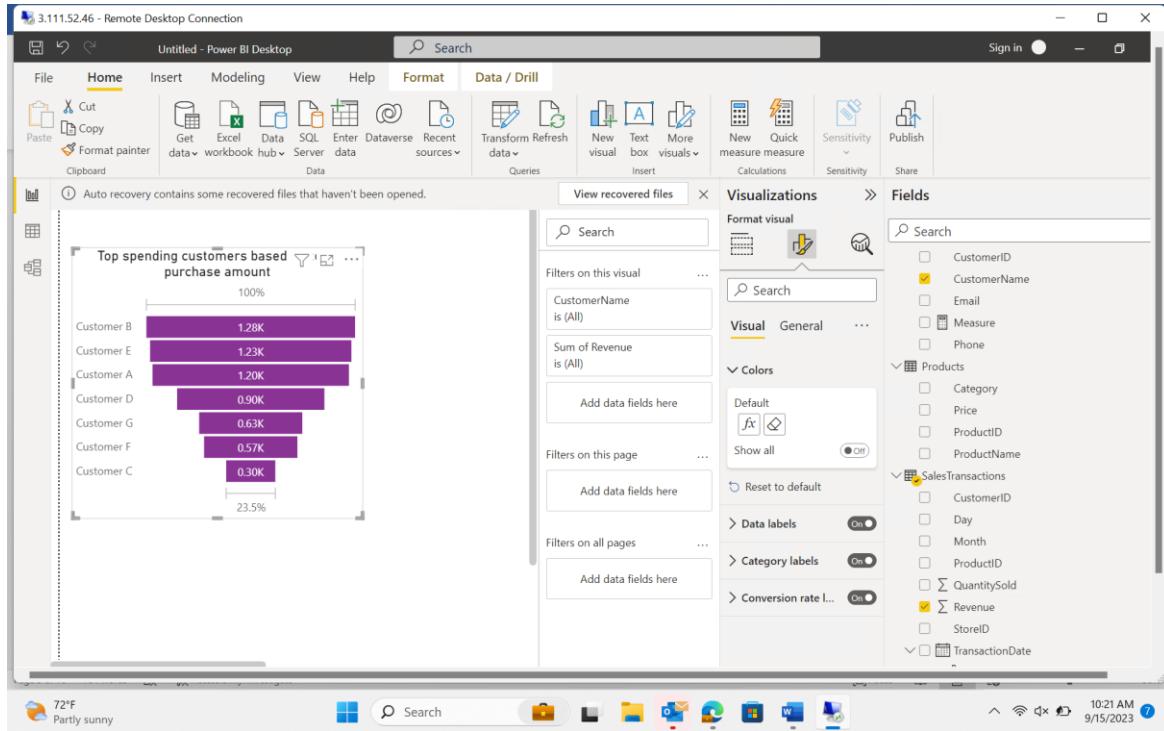
11:05 AM 9/15/2023

## Create Hierarchy

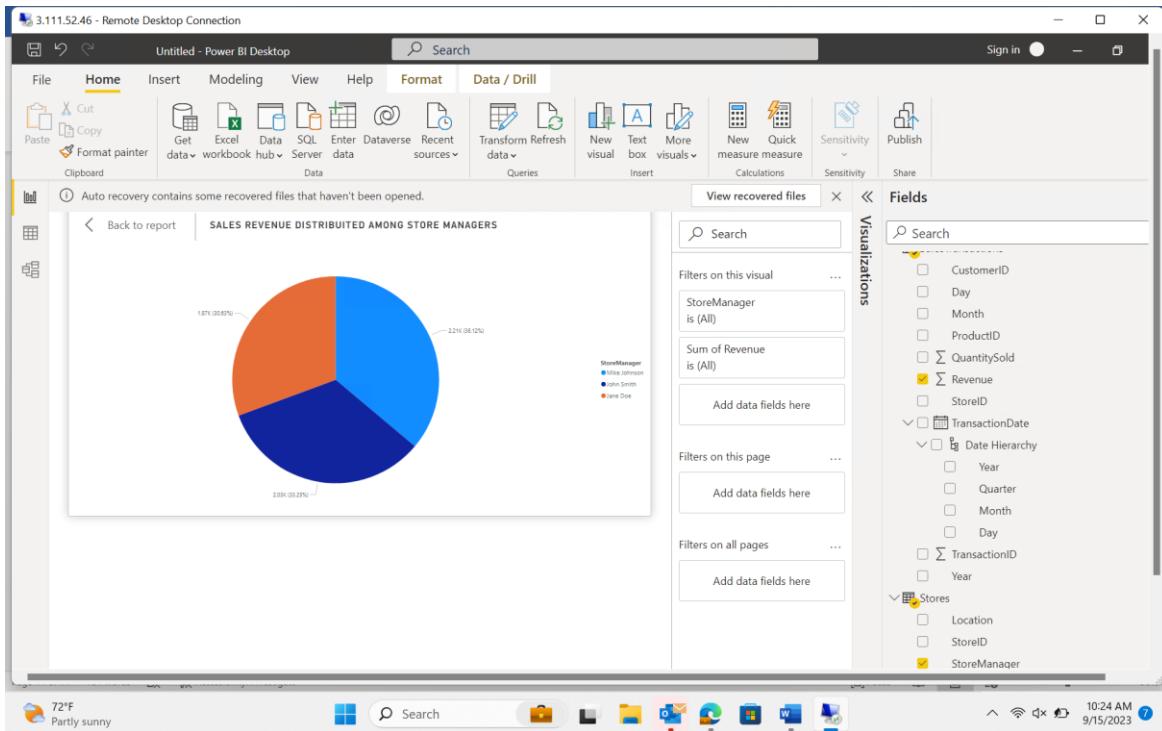


## 4: Business Queries and Analysis

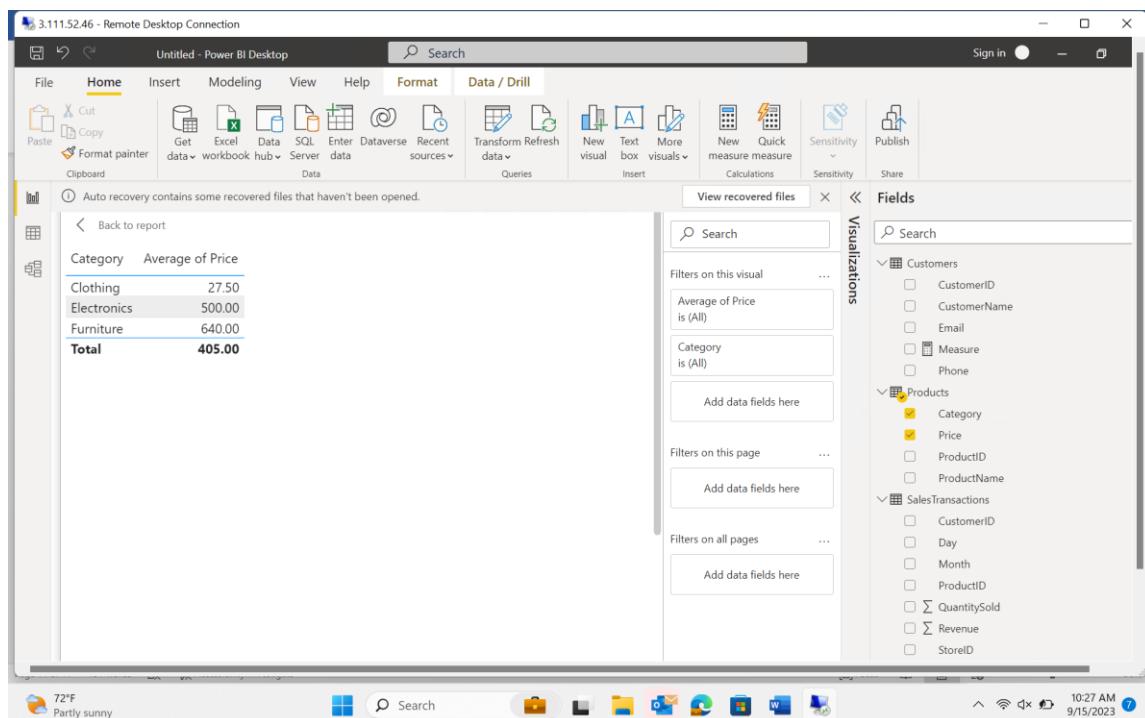
1. Who are the top-spending customers based on their total purchase amount?



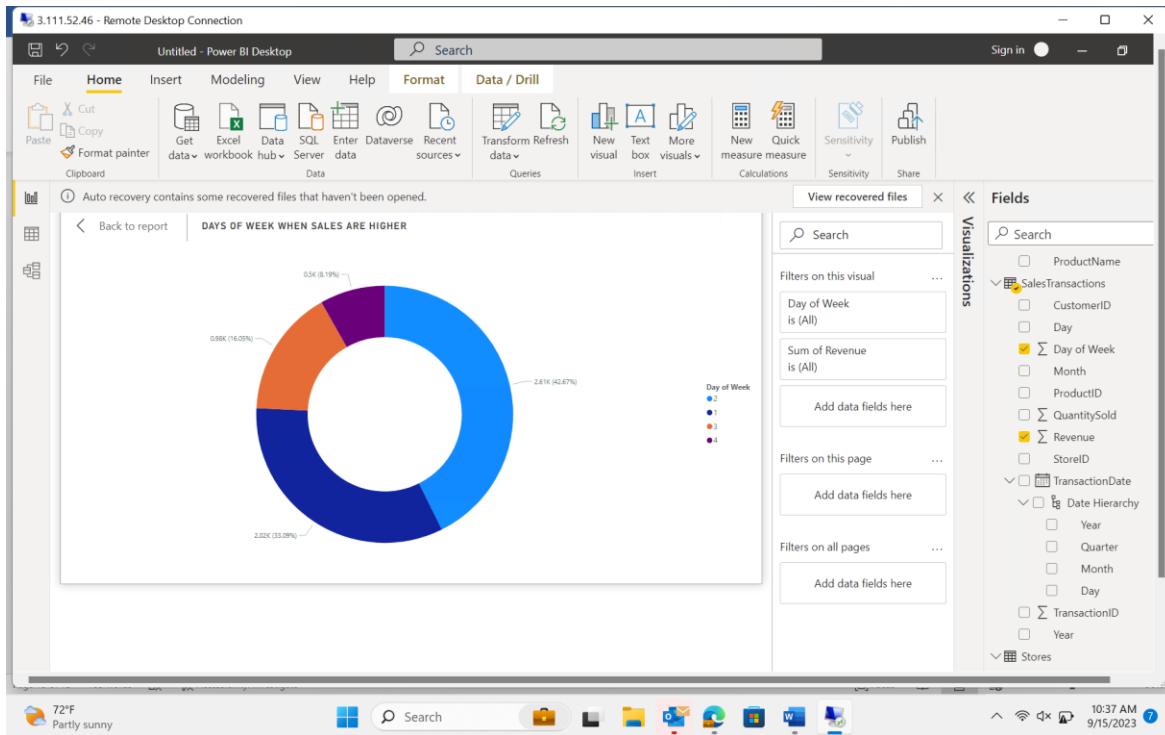
## 2. How is sales revenue distributed among different store managers?



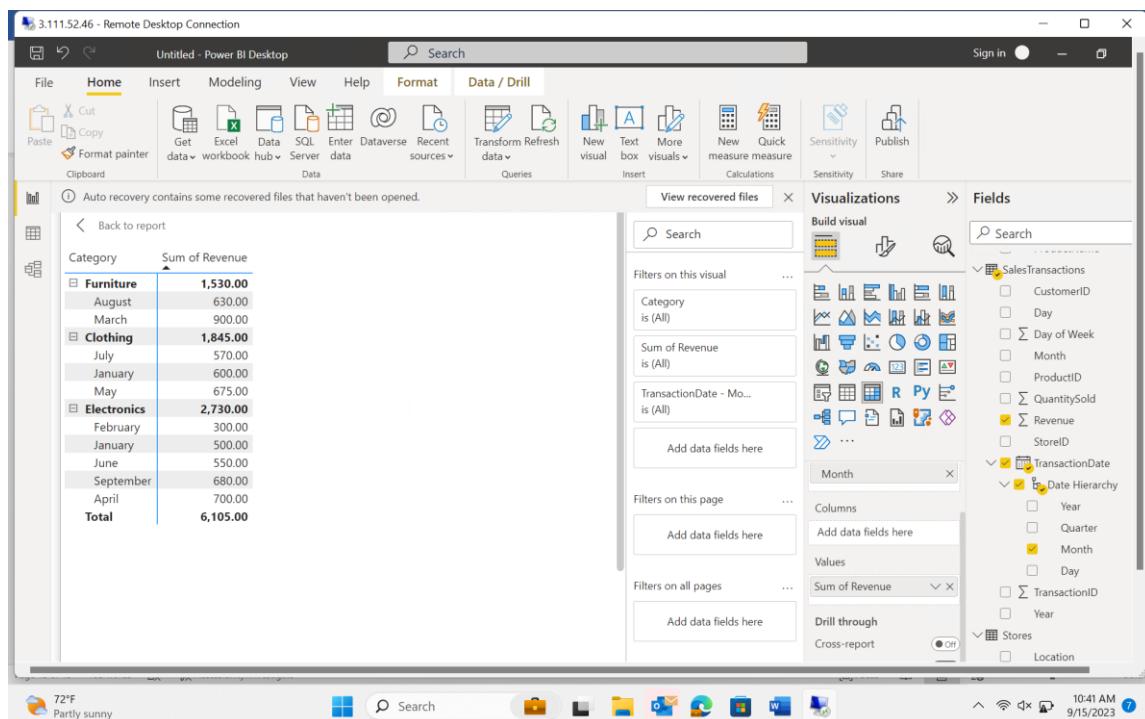
## 3. What is the average price of products in each category?



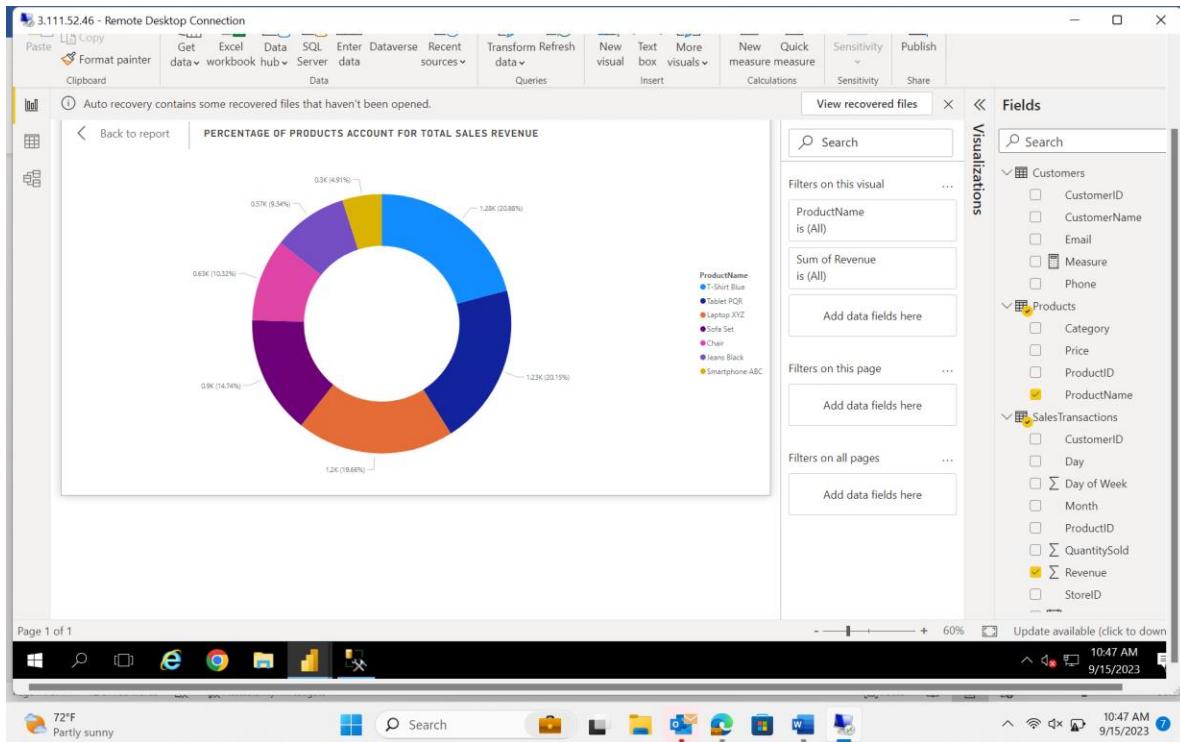
4. Are there specific days of the week when sales are higher?



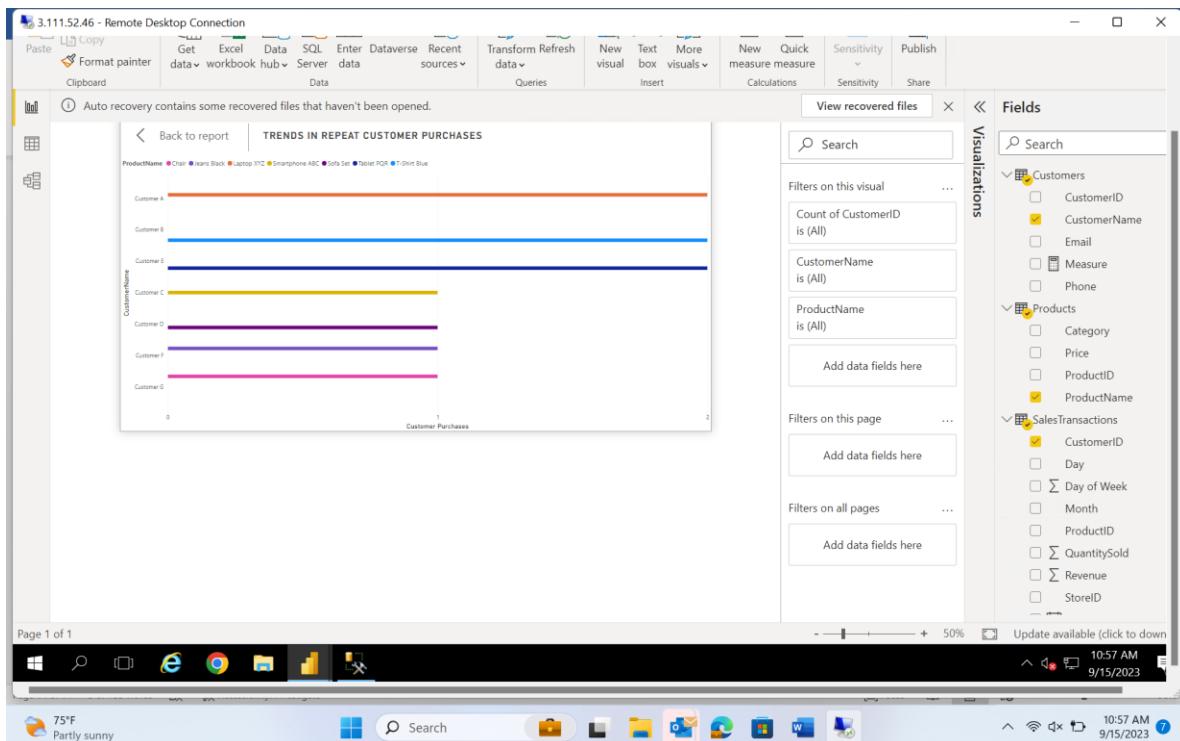
5. How do sales trends vary by product category on a monthly basis?



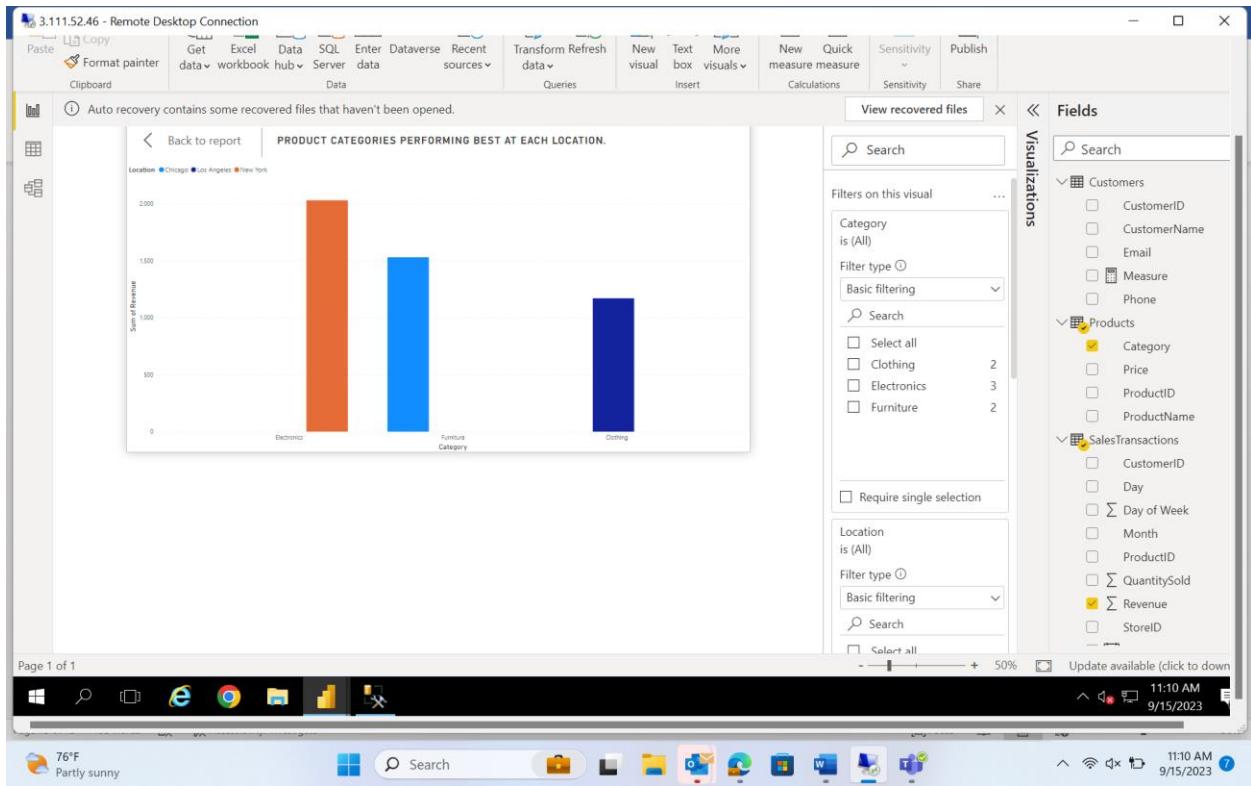
## 6. What percentage of products account for 80% of total sales revenue?



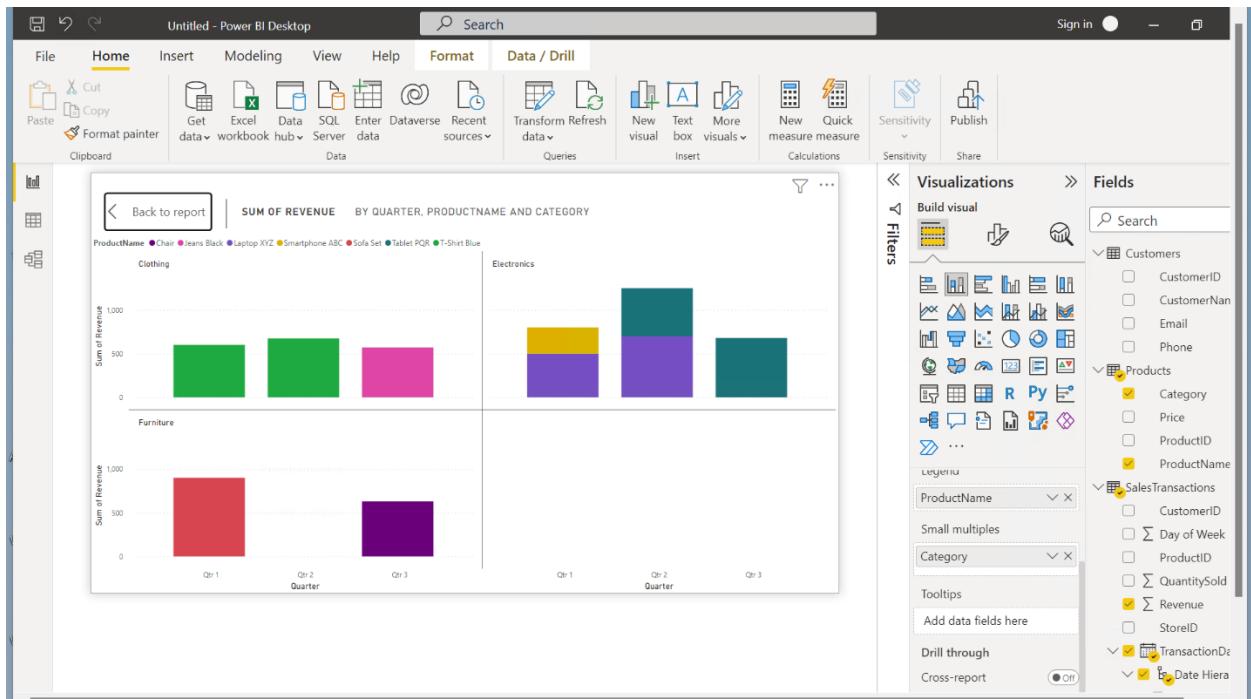
## 7. Are there any trends in repeat customer purchases?



8. Which product categories perform best at each store location?



9. Are there any seasonal patterns or trends in sales for specific products or categories?



10. Can customers be segmented into high, medium, and low-value segments based on their purchase history?

