Modeling with Power BI

1) Project Context & Scope

To support better commercial decision-making, *Summit Edge Distributors* (a B2B electronics wholesaler) requested a Power BI sales model that centralizes all sales activity across products, regions, and sales teams.

The goal of the project is to create a clean, analysis-ready data model that enables the company to:

- Track revenue, cost, margin, and quantity trends
- Compare performance across **products**, **territories**, and **salespeople**
- Conduct time-based analysis using a proper calendar table
- Build a foundation for interactive dashboards and future forecasting

The scope includes importing the sales dataset, optimizing and modeling the tables, and preparing the analytical layer (DAX) to answer business questions.

2) Dataset Overview & Data Modeling Process

Dataset

The model includes the following tables:

- **Sales** (fact table): order date, product, reseller, territory, employee, quantity, unit price, cost
- **Products**: product name, category, subcategory, color, standard cost
- **Region**: territory, country, region, group
- **Salesperson**: employee details and sales roles
- **Date**: calendar table with date, month, month number, and year

Sales
- Cost
- EmployeeKey
- OrderDate
- ProductKey
- Quantity
- ResellerKey
- SalesOrderNumber
- SalesTerritoryKey
- Unit Price

Products
- Background Color Format
- Category
- Category ID

- Color
- Font Color Format
- Product
- ProductKey
- Standard Cost
- Subcategory
- Subcategory ID

🌍 Region
- Country
- Group
- Region
- SalesTerritoryKey

👔 Salesperson
- EmployeeID
- EmployeeKey
- Salesperson
- Title
- UPN

📅 Date
- Date
- Month
- MonthNum
- Year

Data Preparation
- Imported all tables into Power BI
- Inspected data quality and validated primary keys
- Assigned the correct data types (date → Date, price/cost → Decimal, IDs → Whole number, etc.)
- Cleaned and simplified field names where necessary

Data Modeling
- Designed a **star schema** with **Sales** as the central fact table
- Created one-to-many relationships from each dimension to the Sales fact table
- Established proper filtering direction (single direction for performance and clarity)
- Disabled Auto Date/Time and used the explicit Date table for all time intelligence
- Configured sorting (e.g., *Month* sorted by *MonthNum*) to ensure correct ordering in visuals

This model forms the foundation for accurate, scalable analytical reporting.

After establishing a clean and reliable data foundation, the next step is to apply analytical measures to answer the business questions that matter most to the organization

Question 1: **Which products in our catalog have never been sold, representing dead inventory and a potential opportunity for clearance or promotional focus?**

```
Products Never Sold :=
COUNTROWS (
    FILTER (
        ALL ( Products ),
        COUNTROWS ( RELATEDTABLE ( Sales ) ) = 0
    )
)
```

RELATEDTABLE(Sales): For each product, this function looks up the related rows in the Sales table. This is the core of the relationship-based logic.

Question 2: **What is our sales growth rate compared to the same period last year, helping us identify growth trends and seasonality?**

```
Sales YoY Growth % :=
DIVIDE (
    [Sales Amount] - CALCULATE ( [Sales Amount], PARALLELPERIOD ( 'Date'[Date], -12, MONTH ) ),
    CALCULATE ( [Sales Amount], PARALLELPERIOD ( 'Date'[Date], -12, MONTH ) )
)
```

```
Sales YoY Growth (VAR) :=
VAR SalesPriorYear =
    CALCULATE ( [Sales Amount], PARALLELPERIOD ( 'Date'[Date], -12, MONTH ) )
RETURN
```
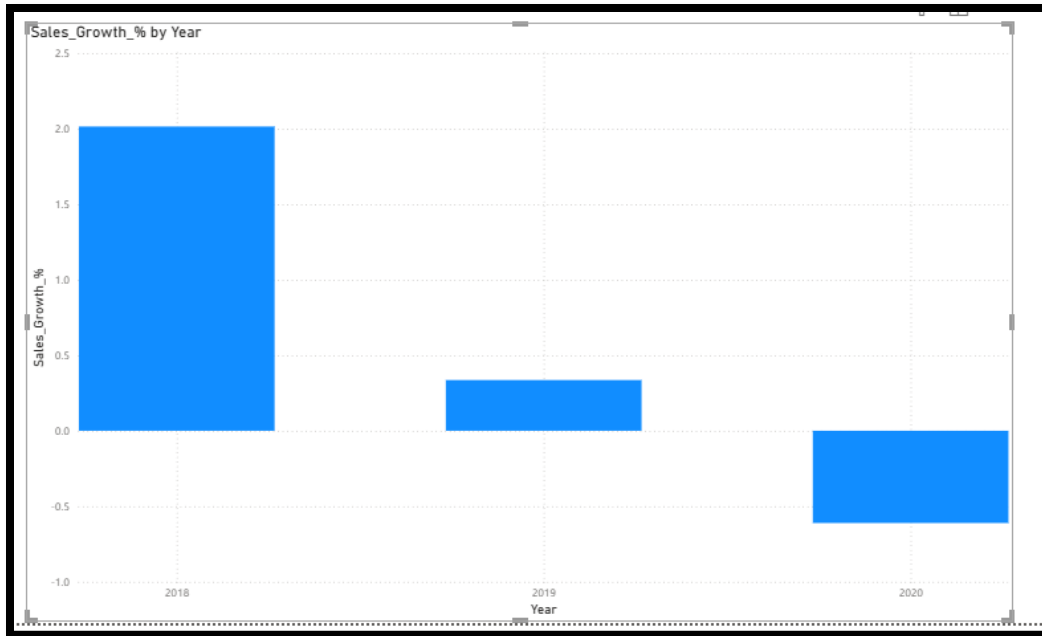
DIVIDE ([Sales Amount] - SalesPriorYear, SalesPriorYear)

PARALLELPERIOD('Date'[Date], -12, MONTH): This shifts the current date context back by exactly 12 months to retrieve last year's sales for the same period.

Blue 2018 Revenue :=
CALCULATE (
* [Sales Amount],*
* FILTER (Products, Products[Color] = "Blue"),*
* FILTER ('Date', 'Date'[Year] = 2018)*
)

Question 3: **What was the total revenue generated specifically from Red Road Bikes in the years 2019 and 2021, allowing us to analyze the performance of this specific product segment across non-consecutive years?**

Red_RoadBike_Revenue_2019_2021 =
CALCULATE (
* [Sales Amount],*
* Products[Color] = "Red",*
* Products[Subcategory] = "Road Bikes",*
* 'Date'[Year] IN {2019, 2021}*
)

CALCULATE + filters: CALCULATE applies filters for product color ("Red"), subcategory ("Road Bikes"), and the selected years (2019, 2021) to return the total sales amount only for those conditions

Question 4: **How many unique products are sold each year, helping us understand our product portfolio's market activity and turnover rate?**

Products_Sold_Per_Year :=
CALCULATE (
 DISTINCTCOUNT (Products[ProductKey]),
 CROSSFILTER (Sales[ProductKey], Products[ProductKey], BOTH)
)
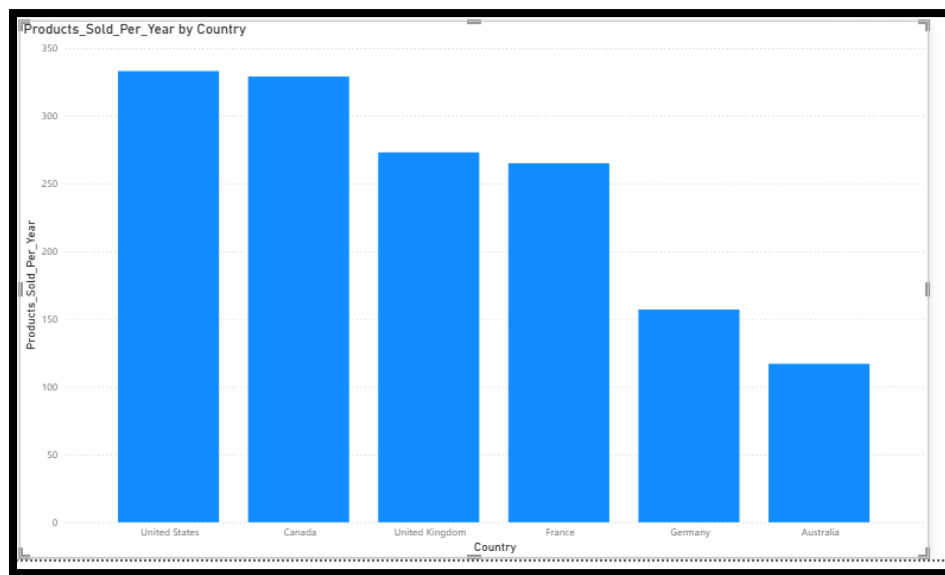
CROSSFILTER(..., BOTH)**:** This is the key. It temporarily changes the filter direction between the Sales and Product tables to **BOTH** for this calculation. This allows the Year filter from the Date table (via Sales) to correctly filter the list of distinct products in the Product table, ensuring we only count products that were actually sold in a given year.

Non_US_Sales :=
CALCULATE (
 [Sales Amount],
 FILTER (Region, Region[Country] <> "United States")
)

Question 5: **What is the total sales revenue attributed specifically to Black Road Bikes, enabling us to assess the performance of this popular aesthetic and category combination?**

Black_RoadBikes_Sales :=
CALCULATE (
   [Sales Amount],
   Products[Subcategory] = "Road Bikes",
   Products[Color] = "Black"
)