



# Building Interactive Dashboards with Power BI

*From Data to Decisions*

Day - 1

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# Agenda

## Day 1: Power BI Foundations & First Report

- Introduction to Business Intelligence & Power BI
- Power BI ecosystem and workflow
- Power BI Desktop interface overview
- Connecting to data (Excel / CSV)
- Data cleaning using Power Query
- Basics of data modeling and relationships
- Creating basic visuals:
  - Tables, Charts, Cards
- Applying filters and basic interactions

## Learning Outcomes

- Load and clean data
- Build a basic data model
- Create a functional Power BI report

# What Is Business Intelligence?

BI = Process of analyzing data to support decisions



Image source: <https://www.edureka.co/blog/power-bi-tutorial/>

# Why Business Intelligence (BI)?

- Organizations generate huge amounts of data
- Without a Business Intelligence tool, an organisation may have to handle:
  1. Multiple Excel files
  2. Manual reports
  3. Time-consuming analysis
  4. Inconsistent numbers
  5. No real-time view
- Raw data ≠ Insights
- Decision-makers need:
  1. Fast insights
  2. Accurate numbers
  3. Visual storytelling

# What is Power BI and where it fits?

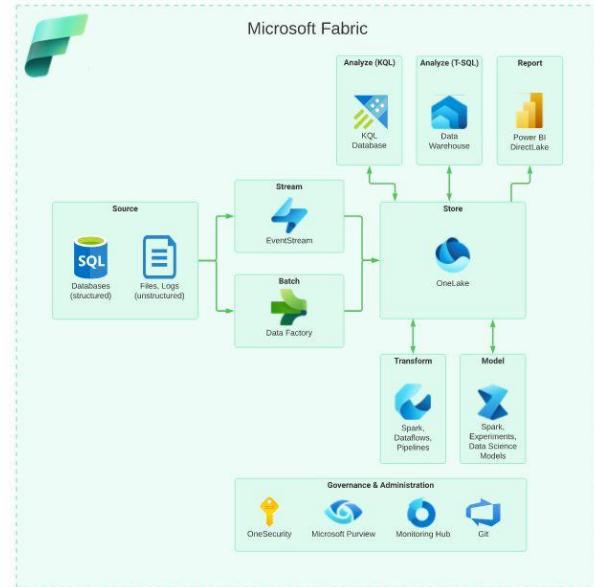
Power BI is a **Business Intelligence & Data Visualization** tool developed by Microsoft

Used to:

1. Connect to data
2. Analyze data
3. Create interactive dashboards
4. Share insights

Part of Microsoft Analytics Platform

1. Excel
2. Power BI
3. Azure Synapse Analytics
4. Azure Data Factory
5. Azure Analysis Services
6. SQL Server



source:<https://www.softwebsolutions.com/resources/predictive-analysis-microsoft-fabric/>

# Power BI Ecosystem



Power BI Desktop



Power BI Service



Power BI Mobile



Power BI Gateway



Report Server

Windows application used to **connect, clean, model data and build reports**

Cloud platform to **publish, share, and collaborate** on reports

Mobile app (Android / iOS) to **view and interact with reports & dashboards**

Bridge between **on-premises data sources** and Power BI Service

On-premises server to **host Power BI reports internally**

# Power BI Workflow



Image source: <https://www.edureka.co/blog/power-bi-tutorial/>

# Power BI Desktop Workflow

Get Data → Transform Data → Model Data → Create Visuals → Share Insights

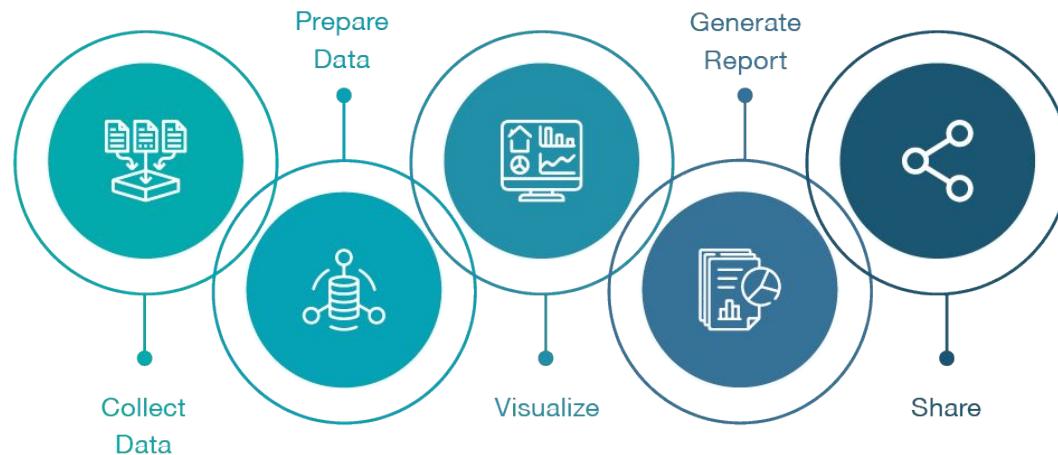


Image source: <https://www.hitechbpo.com/data-visualization-services.php>

# Power BI vs Excel



Vs.



Excel:

1. Good for analysis
2. Limited interactivity

Power BI:

1. Handles large data
2. Interactive dashboards
3. Centralized reporting

# What you will learn vs what you will not

- |                              |                         |
|------------------------------|-------------------------|
| 1. Load and clean data       | 1. Advanced DAX         |
| 2. Create relationships      | 2. Administration       |
| 3. Build interactive visuals | 3. Security (RLS)       |
| 4. Use basic DAX             | 4. Gateways (deep dive) |
| 5. Publish reports           |                         |

# Power BI Desktop

## Deep Dive

# Power BI Desktop Interface

The screenshot displays the Power BI Desktop application window. The title bar reads "Untitled - Power BI Desktop". The ribbon menu is visible with tabs: File, Home (selected), Insert, Modeling, View, Optimize, and Help. The Home tab contains several groups of icons: Clipboard (Paste, Cut, Copy, Format painter), Data (Get data from Excel, workbook hub, Data, SQL Server, Enter, Dataverse, Recent sources), Queries (Transform, Refresh data, New visual, Text box, More visuals, Insert), Calculations (New, Quick measure, measure, Sensitivity, Publish, Share).

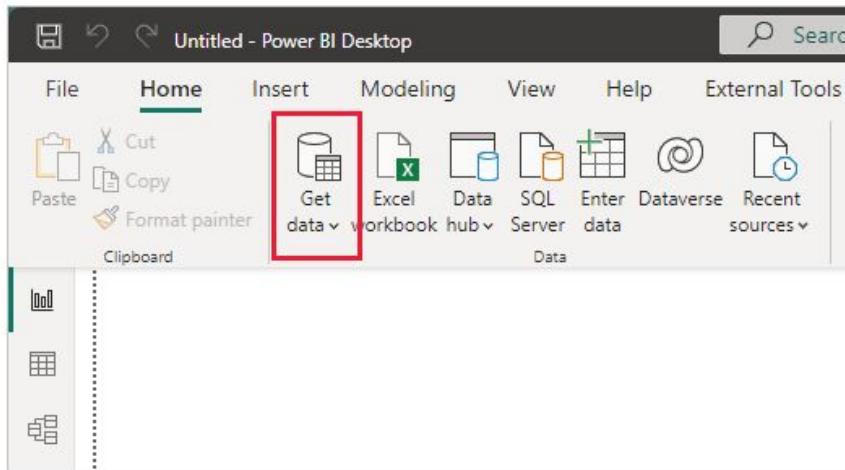
The main workspace shows a message: "Add data to your report. Once loaded, your data will appear in the Fields pane." Below this are four buttons: "Import data from Excel", "Import data from SQL Server", "Paste data into a blank table", and "Try a sample dataset". A link "Get data from another source →" is also present.

On the right side, there are three panes:

- Filters**: Contains a search bar and sections for "Filters on this page" and "Filters on all pages", each with a "Add data fields here" button.
- Visualizations**: Shows a grid of visualization icons (e.g., bar charts, line graphs, pie charts) with a "Build visual" button above them.
- Fields**: Contains a search bar and a message: "You haven't loaded any data yet. Get data".

At the bottom, there are navigation icons for back, forward, and search, followed by "Page 1" and a green "+" button.

# Connect to Data



The screenshot shows the Power BI Desktop interface with the 'Home' tab selected. In the 'Data' section of the ribbon, the 'Get data' button is highlighted with a red box. A dropdown menu titled 'Get data' is open, listing various data sources.

**Get Data**

- All
- All
- File
- Database
- Power Platform
- Azure
- Online Services
- Other
- Excel Workbook
- Text/CSV
- XML
- JSON
- Folder
- PDF
- Parquet
- SharePoint folder
- SQL Server database
- Access database
- SQL Server Analysis Services database
- Oracle database
- IBM Db2 database
- IBM Informix database (Beta)
- IBM Netezza
- MySQL database

Certified Connectors | Template Apps      **Connect**      **Cancel**

# Navigator and Data view in fields pane

**Navigator**

Display Options ▾

Financial Sample.xlsx [2]

- ✓ financials
- ✓ Sheet1

**Sheet1**

Segment	Country	Product	Discount Band	Unit
Government	Canada	Carretera	None	
Government	Germany	Carretera	None	
Midmarket	France	Carretera	None	
Midmarket	Germany	Carretera	None	
Midmarket	Mexico	Carretera	None	
Government	Germany	Carretera	None	
Midmarket	Germany	Montana	None	
Channel Partners	Canada	Montana	None	
Government	France	Montana	None	
Channel Partners	Germany	Montana	None	
Midmarket	Mexico	Montana	None	
Enterprise	Canada	Montana	None	
Small Business	Mexico	Montana	None	
Government	Germany	Montana	None	
Enterprise	Canada	Montana	None	
Midmarket	United States of America	Montana	None	
Government	Canada	Paseo	None	
Midmarket	Mexico	Paseo	None	
Channel Partners	Canada	Paseo	None	
Government	Germany	Paseo	None	
Channel Partners	Germany	Paseo	None	
Government	Mexico	Paseo	None	
Midmarket	France	Paseo	None	

Load Transform Data Cancel

New measure Quick measure Sensitivity Publish

Calculations Visualizations Fields

Build visual

Filters

Search financials

Sales COGS Country Date Discount Band Discounts Gross Sales Manufacturing P... Month Name Month Number Product Profit Sale Price Segment Units Sold

Values Add data fields here

Drill through Cross-report Keep all filters

# Power Query Editor

## Deep Dive

# What is Power Query?

Power Query is a **data preparation** and **transformation** tool used in Microsoft Excel and Power BI.

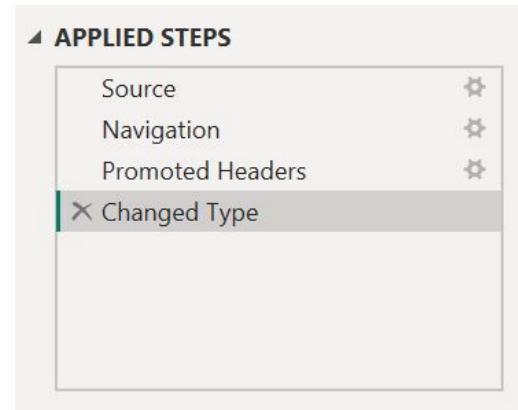
- Used to connect, clean, and transform data
- Works with data from:
  1. Excel files
  2. Databases (SQL, Access)
  3. Text/CSV files
  4. Web pages
  5. APIs and cloud sources
- Uses a no-code / low-code interface
- Automates repetitive data-cleaning tasks
- Based on the M language behind the scenes



# What Are Applied Steps?

Applied Steps show every transformation applied to the data in Power Query.

- Located in the Query Settings pane
- Each action creates a new step
- Steps are applied in sequence
- Can be:
  1. Renamed
  2. Deleted
  3. Reordered
- Helps track and understand data changes



# Common Transformations in Power Query

Power Query provides many built-in transformations such as;

- Filtering rows
- Removing duplicates
- Sorting data
- Renaming columns
- Changing data types
- Splitting and merging columns
- Handling errors and null values
- Pivot and unpivot columns
- Grouping and aggregating data
- Merging queries (joins)

# Power Query Editor Interface - Blank

The screenshot displays the Microsoft Power Query Editor interface. At the top, there is a ribbon bar with the following tabs: File, Home, Transform, Add Column, View, Tools, and Help. The File tab is currently selected. Below the ribbon is a toolbar with various icons for file operations like Close & Apply, New Source, Refresh, Manage Parameters, Properties, Advanced Editor, and others. The main workspace below the toolbar is currently empty, showing the text "Queries [0]".

# Power Query Editor Interface - with Data connected

In the ribbon, many buttons are now active to interact with the data in the query.

In the left pane, queries are listed and available for selection, viewing, and shaping.

In the center pane, data from the selected query is displayed and available for shaping.

The Query Settings pane appears, listing the query's properties and applied steps.

Row ID	Order Priority	Discount
1	20847	High
2	20228	Not Specified
3	21776	Critical
4	24844	Medium
5	24846	Medium
6	24847	Medium
7	24848	Medium
8	18181	Critical
9	20925	Medium
10	26267	High
11	26268	High
12	23890	High
13	24063	Not Specified
14	5890	High

# Power Modeling

## Deep Dive

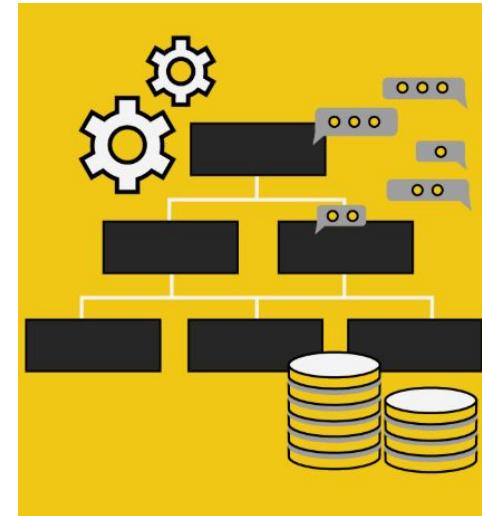
# What Is Data Modeling?

Data Modeling is the process of organizing data into related tables to support analysis.

- Defines how tables connect to each other
- Improves performance and accuracy
- Enables meaningful calculations
- Separates raw data from analytical logic

## Why Data Modeling Matters

- Simplifies complex datasets
- Reduces data duplication
- Improves report performance



# Fact Tables

**Fact Tables** store measurable, numerical data.

- Contains business metrics (sales, quantity, revenue)
- Usually large in size
- Includes foreign keys to dimensions
- Example:
  - Sales Amount
  - Quantity Sold
  - Order Date Key

Orders	...
Customers.Customer ID	
$\Sigma$ Discount	
Order Date	
$\Sigma$ Order ID	
Order Priority	
$\Sigma$ Order Quantity	
Products.Product ID	
$\Sigma$ Profit	
Region	
<a href="#">Collapse ^</a>	

# Dimension Tables

**Dimension Tables** provide descriptive context.

- Contains attributes used for filtering and grouping
- Usually smaller than fact tables
- Connected to fact tables
- Examples:
  - Date
  - Product
  - Customer
  - Region

The image shows two side-by-side dimension tables. The left table is titled 'Customers' and lists attributes: Customer ID, Customer Name, Customer Segment, and Region. It includes a 'Collapse ^' button at the bottom. The right table is titled 'Products' and lists attributes: Product Base Margin, Product Category, Product Container, Product ID, Product Name, and Product Sub-Category. It also includes a 'Collapse ^' button at the bottom. Both tables have an ellipsis (...) icon in the top right corner.

Customers	...
Customer ID	
Customer Name	
Customer Segment	
Region	
<a href="#">Collapse ^</a>	

Products	...
Product Base Margin	
Product Category	
Product Container	
Product ID	
Product Name	
Product Sub-Category	
<a href="#">Collapse ^</a>	

# Creating Relationships and Cardinality (One-to-Many)

Relationships connect tables using common columns.

- Typically between **Fact and Dimension tables**
- Based on **primary key ↔ foreign key**
- Enables filtering across tables
- Created automatically or manually

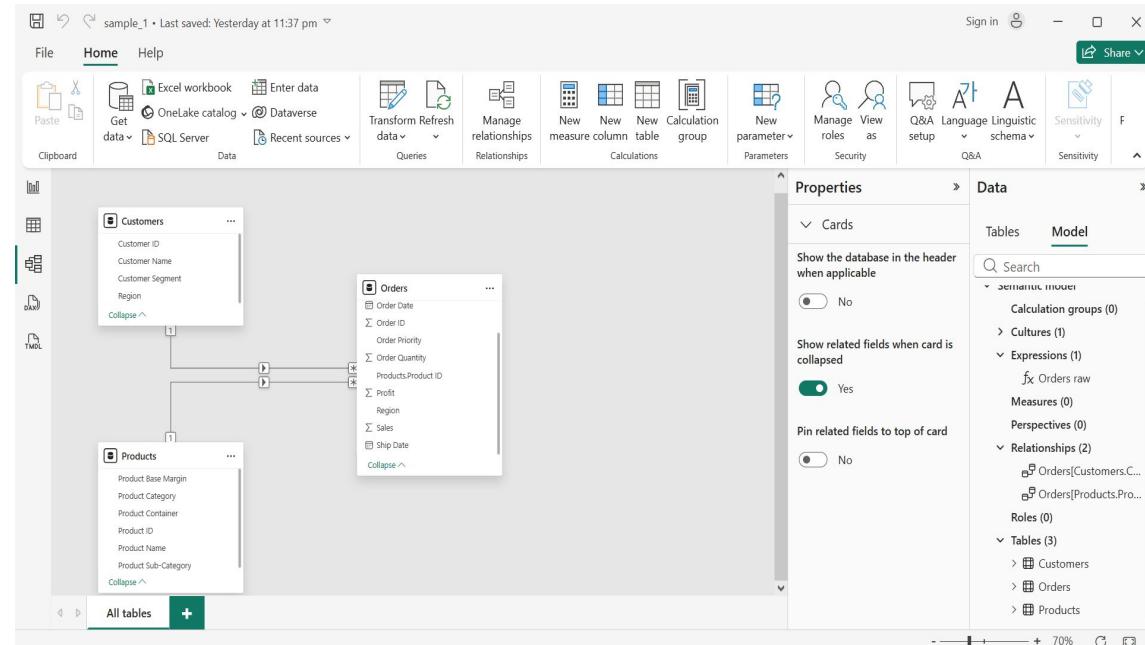
**Cardinality** defines how rows relate between tables.

- **One-to-Many (1:\*)** is the most common
- One dimension row relates to many fact rows
- Example:
  - One Product → Many Sales
  - One Customer → Many Orders
- Ensures accurate aggregations
- Prevents double counting
- Improves query performance
- Forms the basis of the **Star Schema**

# Model View Overview

**Model View** provides a visual representation of the data model shown in a **star schema**

- one central fact table is connected to multiple dimension tables.
- Displays tables and relationships
- Allows easy relationship editing
- Helps identify model issues
- Improves understanding of data flow



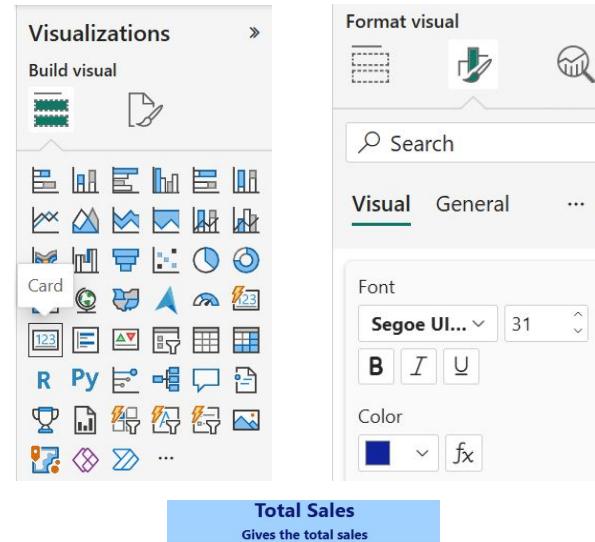
# Creating our first visual

## Deep Dive

# Visual 1: KPI Card – Total Sales

1. Chart Name KPI Card – Total Sales
2. Parameters Used
  - a. Visual Type: Card
  - b. Field Used: Values: Total Sales (Measure)
3. What Does It Signify
  - a. Displays the overall sales value for the selected data
  - b. Provides a quick, high-level business KPI
  - c. Acts as a summary metric that stakeholders look at first

Steps: Report View → Card → Total Sales → Format Pane → Title  
(ON) → “Total Sales”



418.03

Sum of Sales

# Visual 2: Column Chart – Sales by Product Category

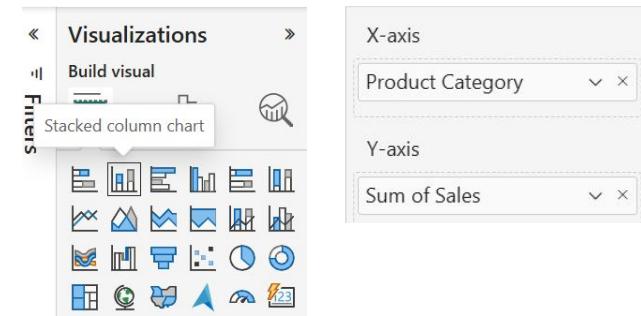
1. Chart Name: Column Chart – Sales by Product Category

2. Parameters Used

- Visual Type: Clustered Column Chart
- Fields Used:
  - Axis: Product Category
  - Values: Total Sales

3. What Does It Signify

- Compares sales performance across product categories
- Identifies:
  - Top-performing categories
  - Underperforming categories



Steps: Visualization Pane → Column Chart → Axis(Product cat) → Values (Total Sales) → Format Pane → Title (ON) → "Sales by Product Category"

# Visual 3: Line Chart – Sales Trend Over Time

1. Chart Name: Line Chart – Sales Trend Over Time

2. Parameters Used

a. Visual Type: Line Chart

b. Fields Used:

i. Axis: Order Date (Year → Month hierarchy)

ii. Values: Total Sales

3. What Does It Signify

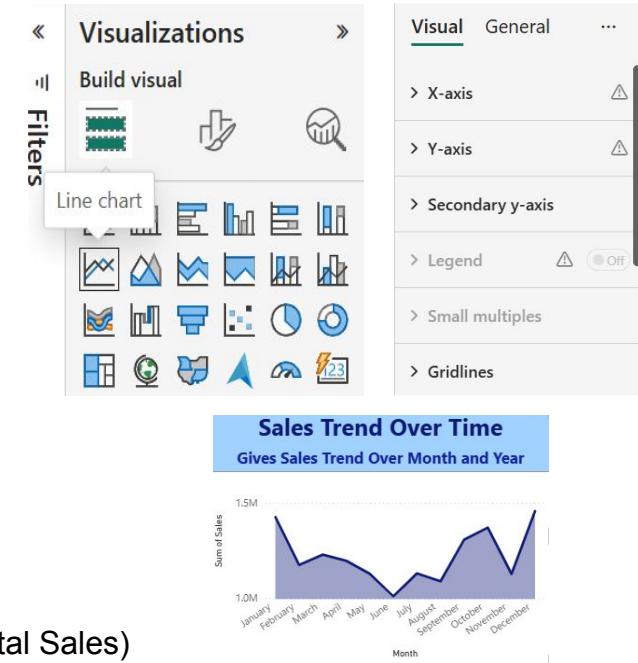
a. Shows how sales change over time

b. Helps identify:

i. Growth or decline

ii. Seasonal patterns

iii. Trends across months and years



Steps: Visualization pane → Line chart → Axis(Order Date) → Values(Total Sales)

→ Format Pane → Title (ON) → “Sales Trend Over Time”

# Visual 4: Table – Customer Sales Breakdown

1. Chart Name: Table – Customer Sales

2. Parameters Used

a. Visual Type: Table

b. Fields Used:

i. Customer Name

ii. Total Sales

3. What Does It Signify

a. Displays detailed customer-level sales

b. Identifies top customers

c. Provides exact numbers (not aggregated visually)

Steps: Visualization Pane → Table → Select column → Sort

Column(Optional)

The screenshot shows the Power BI visualization pane. At the top, there is a grid of icons representing different chart types, with the 'Table' icon highlighted. Below this is a list of parameters used in the visual:

- Customer Name
- Sum of Sales
- Ship Date
- Year
- Quarter
- Month

On the left, a sidebar titled 'Visual' contains the following sections:

- > Style presets
- > Grid
- > Values
- > Column headers
- > Totals

At the bottom, a table titled 'Current Sales Data' is displayed, showing sales data for Adam Hart across four quarters of 2011.

Customer Name	Sum of Sales	Year	Quarter
Adam Hart	547.00	2010	Qtr 1
Adam Hart	2,086.68	2010	Qtr 4
Adam Hart	7,640.23	2011	Qtr 1
Adam Hart	51.90	2011	Qtr 2
Adam Hart	1,463.42	2011	Qtr 2
Adam Hart	391.90	2011	Qtr 3
Adam Hart	1,451.59	2011	Qtr 3
Adam Hart	330.21	2011	Qtr 3
Adam Hart	418.03	2011	Qtr 4
Adam Hart	336.86	2011	Qtr 4
Adam Hart	211.97	2011	Qtr 4
Total	1,4647.187.90		

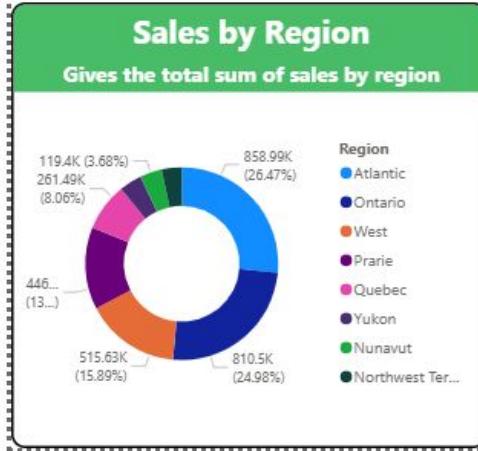
# Complete Dashboard at a glance



### Current Sales Data

Gives the data wrt customer, time, region and segment

Customer Name	Sum of Sales	Year	Quarter	Month	Day	Region	Customer Segment
Adrian Shami	322.82	2012	Qtr 1	March	3	West	Consumer
Alan Haines	1,764.97	2010	Qtr 4	October	25	Quebec	Consumer
Alan Haines	238.34	2010	Qtr 4	October	27	Quebec	Consumer
Alan Haines	136.61	2012	Qtr 2	April	10	Quebec	Consumer
Alan Haines	2,907.63	2012	Qtr 2	April	14	Quebec	Consumer
Alan Haines	3,883.47	2012	Qtr 4	December	29	Quebec	Consumer
Alan Haines	15,337.58	2012	Qtr 4	December	30	Quebec	Consumer
Total	32,44,778.99						



End of Presentation  
Thank You