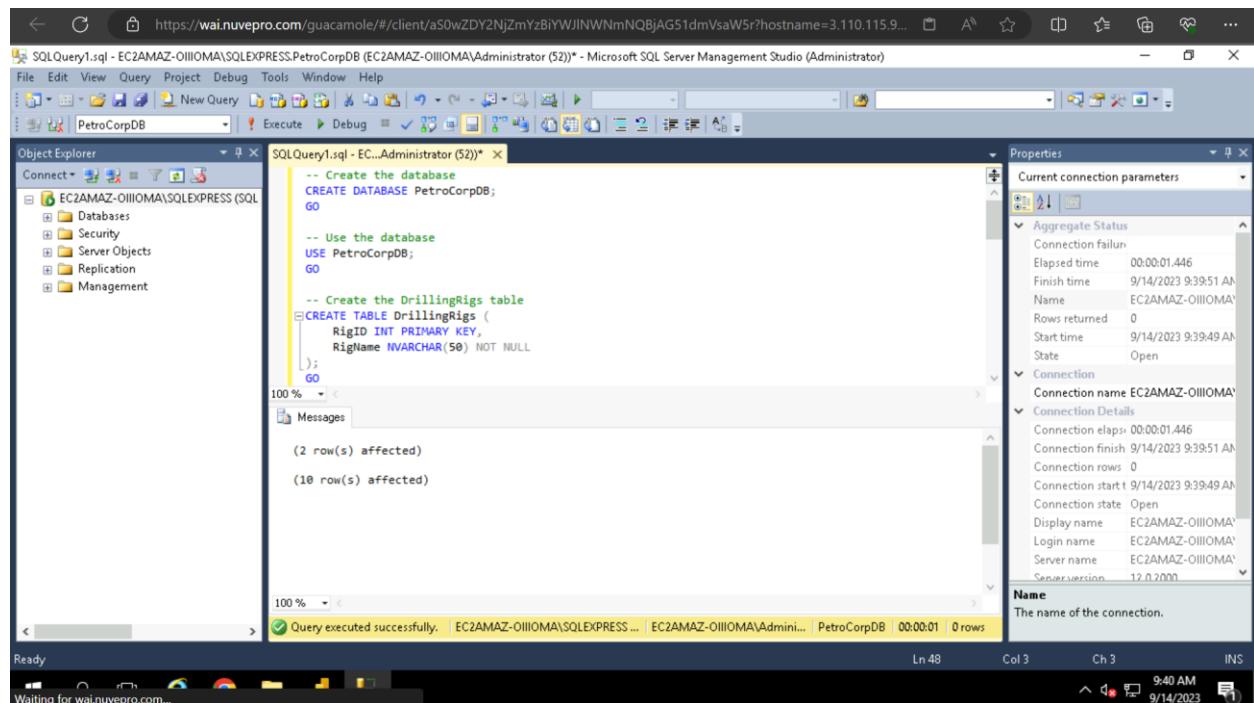


POWER BI

PetroCorp Business Requirement for Power BI

Scenario: You work for an oil and gas company called "PetroCorp" that operates multiple drilling rigs across different regions. PetroCorp is interested in optimizing its drilling operations and monitoring the performance of its drilling rigs. To achieve this, they have collected data from various sensors and equipment on the drilling rigs and stored it in a SQL Server database. Your task is to create a T-SQL database script and provide business reporting solutions to help PetroCorp make data-driven decisions.

Problem Statement: PetroCorp wants to analyze drilling rig performance data to identify trends and anomalies, track the progress of ongoing drilling operations, and generate daily reports summarizing key metrics for each drilling rig.



The screenshot shows the Microsoft SQL Server Management Studio (SSMS) interface. The title bar reads "SQLQuery1.sql - EC2AMAZ-OIIIOAMA\SQLEXPRESS.PetroCorpDB (EC2AMAZ-OIIIOAMA\Administrator (52))* - Microsoft SQL Server Management Studio (Administrator)". The main area displays the following T-SQL script:

```
-- Create the database
CREATE DATABASE PetroCorpDB;
GO

-- Use the database
USE PetroCorpDB;
GO

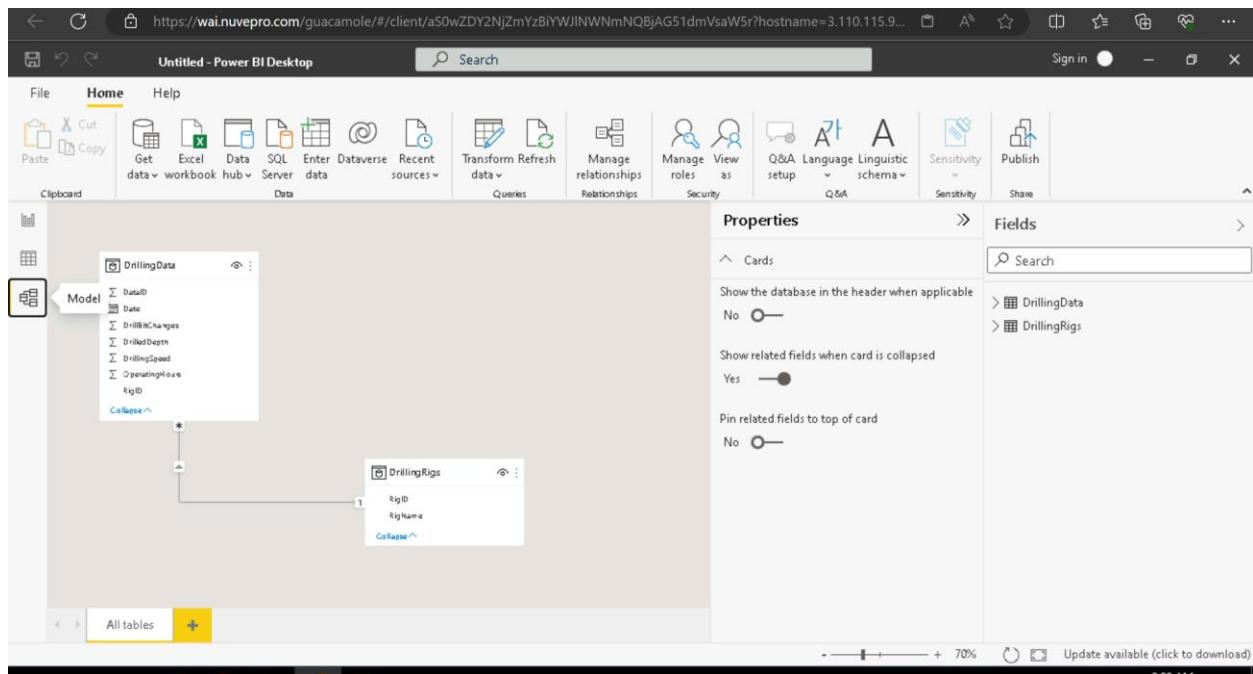
-- Create the DrillingRigs table
CREATE TABLE DrillingRigs (
    RigID INT PRIMARY KEY,
    RigName NVARCHAR(50) NOT NULL
);
GO
```

The "Messages" pane shows the execution results:

```
(2 row(s) affected)
(10 row(s) affected)
```

The "Properties" pane on the right shows connection details:

| Current connection parameters |
|--|
| Connection name: EC2AMAZ-OIIIOAMA\SQLEXPRESS |
| Connection status: Open |
| Elapsed time: 00:00:01.446 |
| Finish time: 9/14/2023 9:39:51 AM |
| Name: EC2AMAZ-OIIIOAMA\SQLEXPRESS |
| Rows returned: 0 |
| Start time: 9/14/2023 9:39:49 AM |
| State: Open |



Business Reporting Requirements:

- Daily Summary Report:** PetroCorp needs a daily summary report for each drilling rig, including the following information:
 - Rig Name
 - Date
 - Total Drilled Depth (in meters) for the day
 - Average Drilling Speed (in meters per hour) for the day
 - Total Operating Hours for the day

| RigName | Year | Quarter | Month | Day | Sum of DrilledDepth | Average of DrillingSpeed | Sum of OperatingHours | Count of DrillBitChanges |
|---------|------|---------|-----------|-------|---------------------|--------------------------|-----------------------|--------------------------|
| Rig A | 2023 | Q3 | September | 1 | 100.00 | 20.00 | 10.00 | 1 |
| Rig A | 2023 | Q3 | September | 2 | 200.00 | 18.00 | 12.00 | 1 |
| Rig A | 2023 | Q3 | September | 3 | 300.00 | 22.00 | 9.00 | 1 |
| Rig A | 2023 | Q3 | September | 4 | 400.00 | 18.00 | 10.00 | 1 |
| Rig A | 2023 | Q3 | September | 5 | 500.00 | 21.00 | 8.00 | 1 |
| Rig B | 2023 | Q3 | September | 1 | 150.00 | 25.00 | 9.00 | 1 |
| Rig B | 2023 | Q3 | September | 2 | 250.00 | 24.00 | 10.00 | 1 |
| Rig B | 2023 | Q3 | September | 3 | 350.00 | 26.00 | 8.00 | 1 |
| Rig B | 2023 | Q3 | September | 4 | 450.00 | 23.00 | 11.00 | 1 |
| Rig B | 2023 | Q3 | September | 5 | 550.00 | 27.00 | 7.00 | 1 |
| | | | | Total | 3,250.00 | 22.50 | 95.00 | 10 |

- 2. Anomaly Detection:** PetroCorp wants to identify drilling rigs that have experienced an unusually high number of drill bit changes in the last week. They need a report listing the rig names and the number of drill bit changes for each rig over the last seven days.

DAX = CALCULATE(SUM(DrillingData[DrillBitChanges]),FILTER(DrillingData,DrillingData[Date]>=TODAY()-6 && DrillingData[Date]<=TODAY()))

The screenshot shows the Power BI Desktop interface with the 'Measure tools' ribbon tab selected. A new measure named 'DAX' is being created, using the following DAX formula:

```
DAX = CALCULATE(SUM(DrillingData[DrillBitChanges]),FILTER(DrillingData,DrillingData[Date]>=TODAY()-6 && DrillingData[Date]<=TODAY()))
```

The Fields pane on the right lists the 'DrillingData' table with several measures selected, including:

- Σ DrillBitChanges
- Σ DrilledDepth
- Σ DrillingSpeed
- Σ OperatingHours
- RigID
- RigName

Untitled - Power BI Desktop

Home

Filters

- DAX is (All)
- RigName is (All)

Visualizations

Fields

DrillingData

- DataID
- Date
- DAX
- DAX1
- DrillBitChanges
- DrilledDepth
- DrillingSpeed
- OperatingHours
- RigID

DrillingRigs

- RigID
- RigName

DAX1 =

```
CALCULATE(SUM(DrillingData[DrillBitChanges]), FILTER(DrillingData, DrillingData[Date] >= TODAY() - 10 && DrillingData[Date] <= TODAY()))
```

Untitled - Power BI Desktop

Home

Filters

- DAX1 is (All)
- RigName is (All)

Visualizations

Fields

DrillingData

- DataID
- Date
- DAX
- DAX1
- DrillBitChanges
- DrilledDepth
- DrillingSpeed
- OperatingHours
- RigID

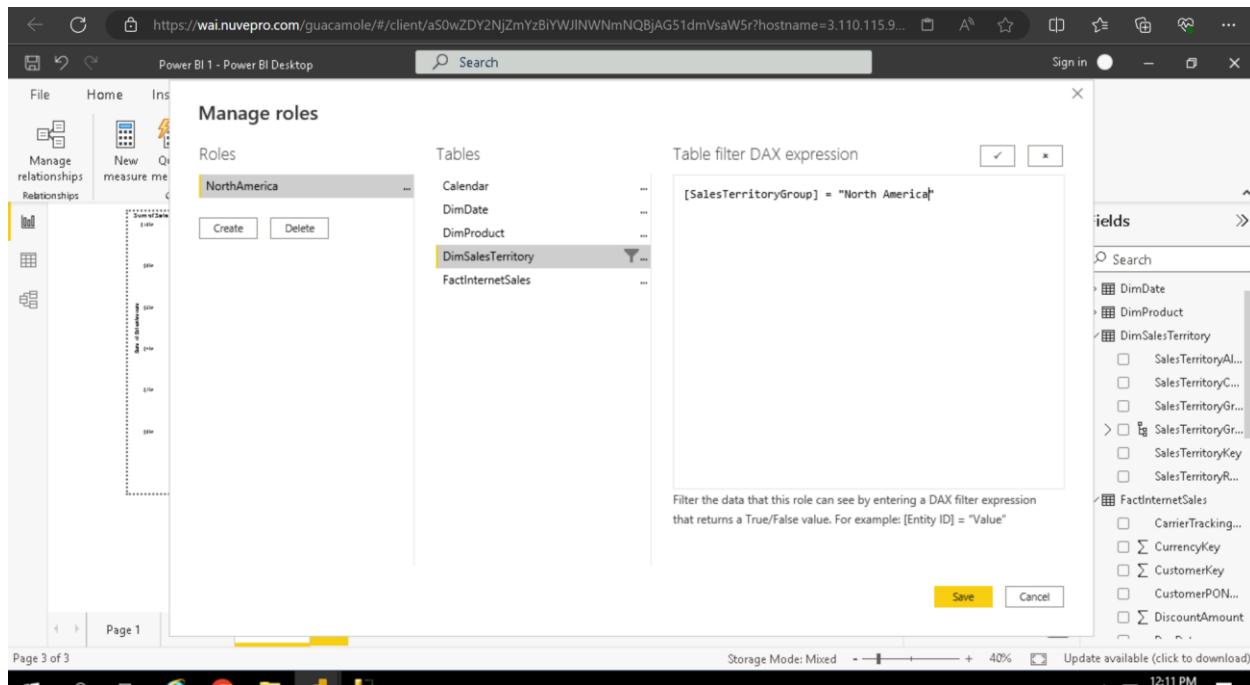
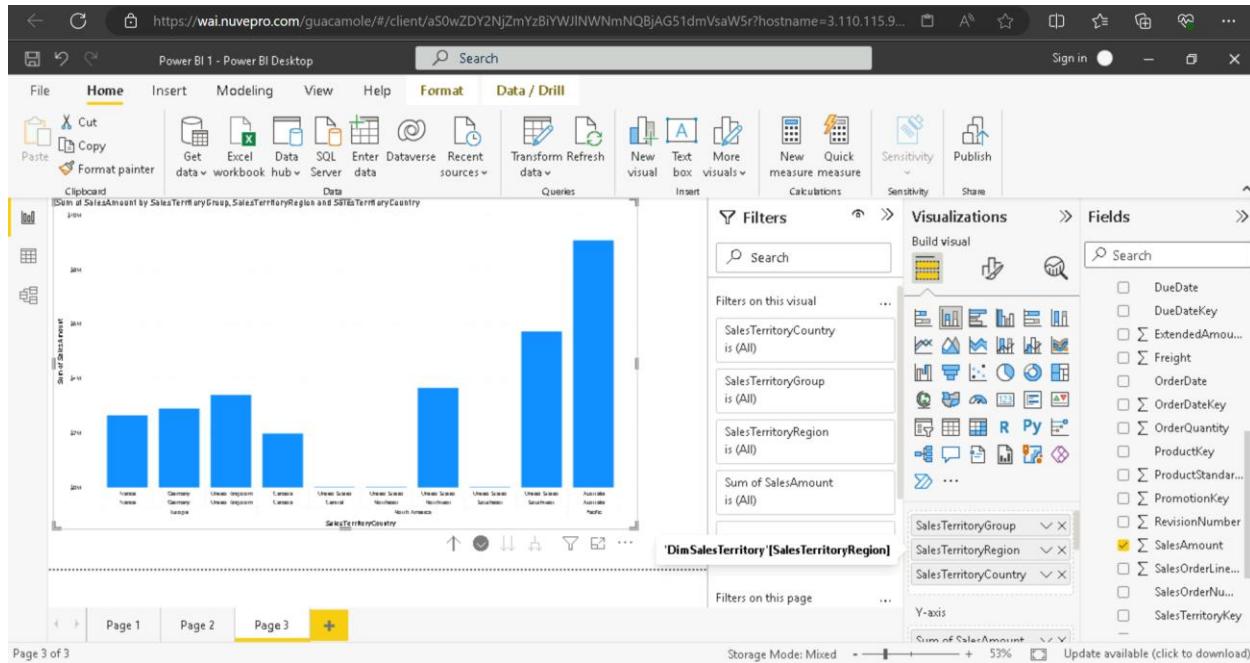
DrillingRigs

- RigID
- RigName

Hierarchy:

The screenshot shows the 'Manage relationships' dialog in Power BI Desktop. The 'From: Table (Column)' section lists several columns from the 'FactInternetSales' table, including 'DueDateKey', 'OrderDate', 'OrderDateKey', 'ProductKey', 'SalesTerritoryKey', 'ShipDate', and 'ShipDateKey'. The 'To: Table (Column)' section lists various dimensions such as 'Calendar (Date)', 'DimDate (DateKey)', 'DimProduct (ProductKey)', 'DimSalesTerritory (SalesTerritoryKey)', and 'DimDate (DateKey)'. A search bar at the top right is set to 'Fields'. On the right side, there is a sidebar with navigation links like 'Publish', 'Share', and a tree view of the data model, including 'SalesTerritoryGroup Hierarchy' and 'FactInternetSales'.

The screenshot shows the 'Properties' pane for a 'SalesTerritoryGroup Hierarchy' object. The 'General' tab is selected, displaying the name 'SalesTerritoryGroup Hierarchy', a description field ('Enter a description'), and a 'Synonyms' field ('Enter a comma-separated list of synonyms for Q&A'). The 'Fields' pane on the right lists various dimensions and fact tables, including 'Calendar', 'DimDate', 'DimProduct', 'DimSalesTerritory', 'SalesTerritoryAlternateKey', 'SalesTerritoryCountry', 'SalesTerritoryGroup', 'SalesTerritoryKey', 'SalesTerritoryRegion', and 'FactInternetSales'. The 'Properties' pane also includes tabs for 'View as', 'Q&A', 'Language setup', 'Linguistic schema', 'Sensitivity', and 'Publish'.



Power BI Desktop - Manage roles

Roles

- Europe
- NorthAmerica**
- Pacific

Tables

- Calendar
- DimDate
- DimProduct
- DimSalesTerritory
- FactInternetSales

Table filter DAX expression

Filter the data that this role can see by entering a DAX filter expression that returns a True/False value. For example: [Entity ID] = "Value"

Save Cancel

Storage Mode: Mixed 40% Update available (click to download)

Waiting for wai.nuvepro.com... 12:13 PM 9/14/2023

Power BI Desktop - Modeling

File Home Insert **Modeling** View Help

Manage relationships Relationships

Now viewing as: Pacific

View as roles

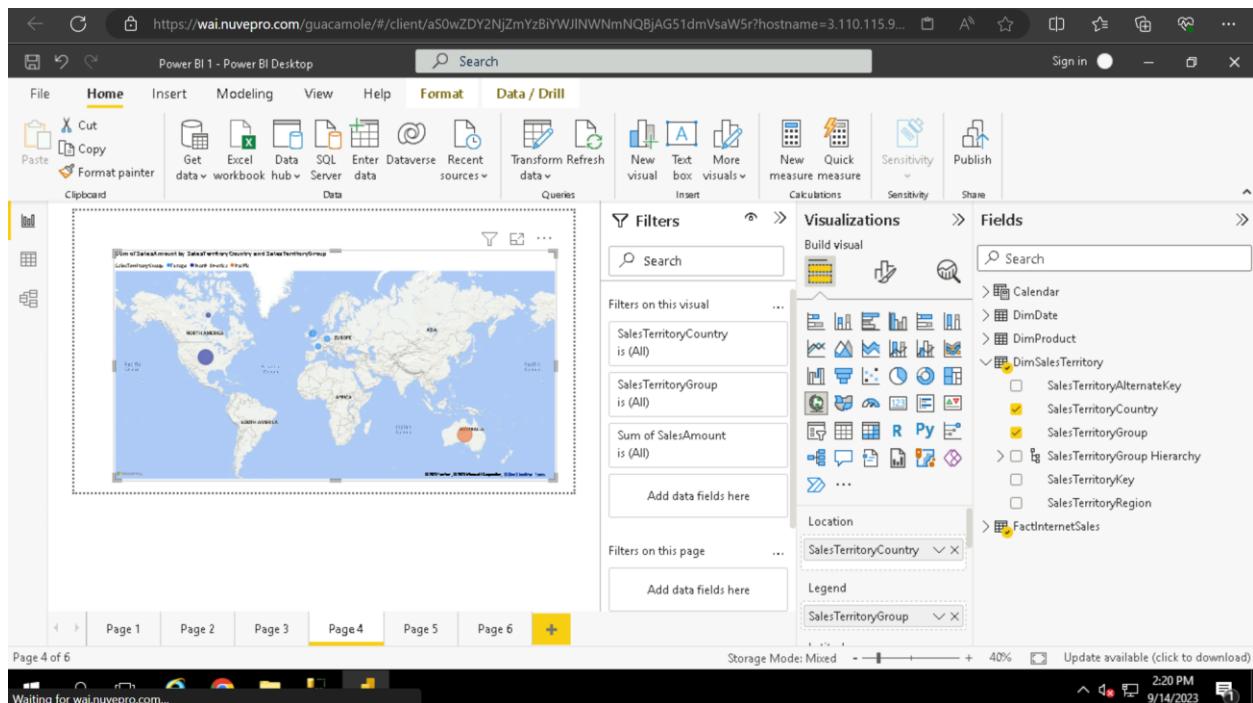
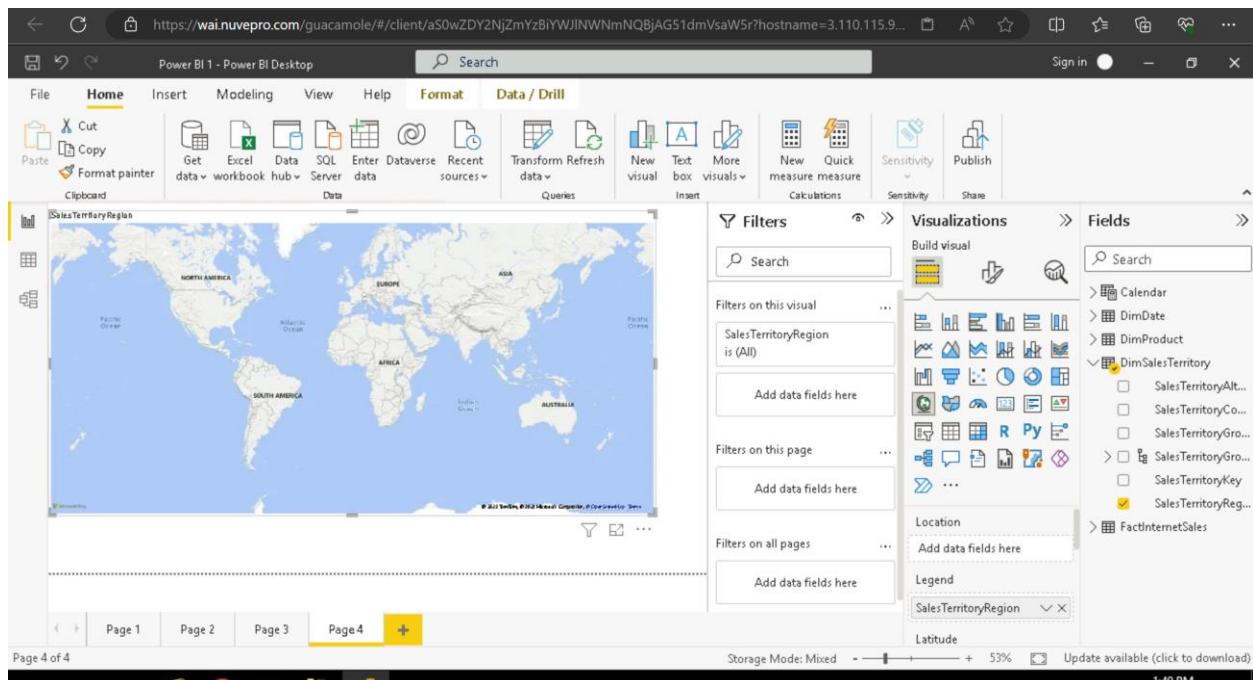
- None
- Other user
- Europe
- NorthAmerica
- Pacific

Visualizations

Fields

Storage Mode: Mixed 40% Update available (click to download)

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Power BI 1 - Power BI Desktop

Home Insert Modeling View Help Format Data / Drill

Cut Copy Format painter Paste Clipboard

Get data workbook hub Data SQL Enter Dataverse Recent sources Data Transform Refresh data New visual Text box More visual Insert Calculations Sensitivity Publish

SALESTERRITORYCOUNTRY AND SALESTERRITORYGROUP

Filters

- SalesTerritoryCountry is (All)
- SalesTerritoryGroup is (All)
- Add data fields here

Visualizations

Fields

Build visual

Storage Mode: Mixed 40% Update available (click to download) 2:21 PM 9/14/2023

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Power BI 1 - Power BI Desktop

Home Insert Modeling View Help Format Data / Drill

Cut Copy Format painter Paste Clipboard

Get data workbook hub Data SQL Enter Dataverse Recent sources Data Transform Refresh data New visual Text box More visual Insert Calculations Sensitivity Publish

Sum of SalesAmount by SalesTerritoryCountry

Filters

- SalesTerritoryCountry is (All)
- Sum of SalesAmount is (All)
- Sum of TotalProductCost is (All)
- Add data fields here

Visualizations

Fields

Build visual

X-axis

Y-axis

Storage Mode: Mixed 40% Update available (click to download) 2:22 PM 9/14/2023

Power BI 1 - Power BI Desktop

File Home Insert Modeling View Help Format Data / Drill

Pages Visuals AI visuals Elements

Sum of SalesAmount by Year, Quarter, Month and Day

Sum of TotalProductCost by SalesTerritoryRegion

SalesTerritoryRegion is (All)

Sum of TotalProductCost is (All)

Add data fields here

Filters on this visual

Filters on this page

Filters on all pages

Visualizations Fields

Build visual

tot

FactInternetSales

Σ TotalProductCost

Legend

SalesTerritoryRegion

Values

Sum of TotalProductCost

Page 1 Page 2 Page 3 Page 4 Page 5 Page 6 Page 7 +

Storage Mode: Mixed 53% Update available (click to download)

Waiting for wai.nuvepro.com... 2:48 PM 9/14/2023

Power BI 1 - Power BI Desktop

File Home Insert Modeling View Help Format Data / Drill

Themes

Page view Mobile layout Show panes

Gridlines Snap to grid Lock objects

Filters Selection Bookmarks Format Fields

Layer order Tab order Add View

PieChart LineChart ONBK OFFBK

Bookmark 1 Bookmark 2

Type Bookmark

Bookmark 1 Destination None

Web URL

Tooltip

Learn how to create and edit bookmarks

Reset to default

Page 1 Page 2 Page 3 Page 4 Page 5 Page 6 Page 7 +

Storage Mode: Mixed 49% Update available (click to download)

Waiting for wai.nuvepro.com... 2:55 PM 9/14/2023

The screenshots show the Power BI Desktop interface with two visualizations: a line chart and a pie chart. The top screenshot has the ribbon set to 'Insert', while the bottom one has it set to 'View'. Both screenshots show the 'Fields' pane on the right, which includes a 'Bookmarks' section with two entries: 'Bookmark 1' and 'Bookmark 2'. The 'Format' section is also visible, showing settings for a bookmark type, including 'Type: Bookmark', 'Destination: None', and a 'Web URL' field. The status bar at the bottom of both screenshots shows the date and time as 9/14/2023 and 2:48 PM for the top one, and 2:55 PM for the bottom one.

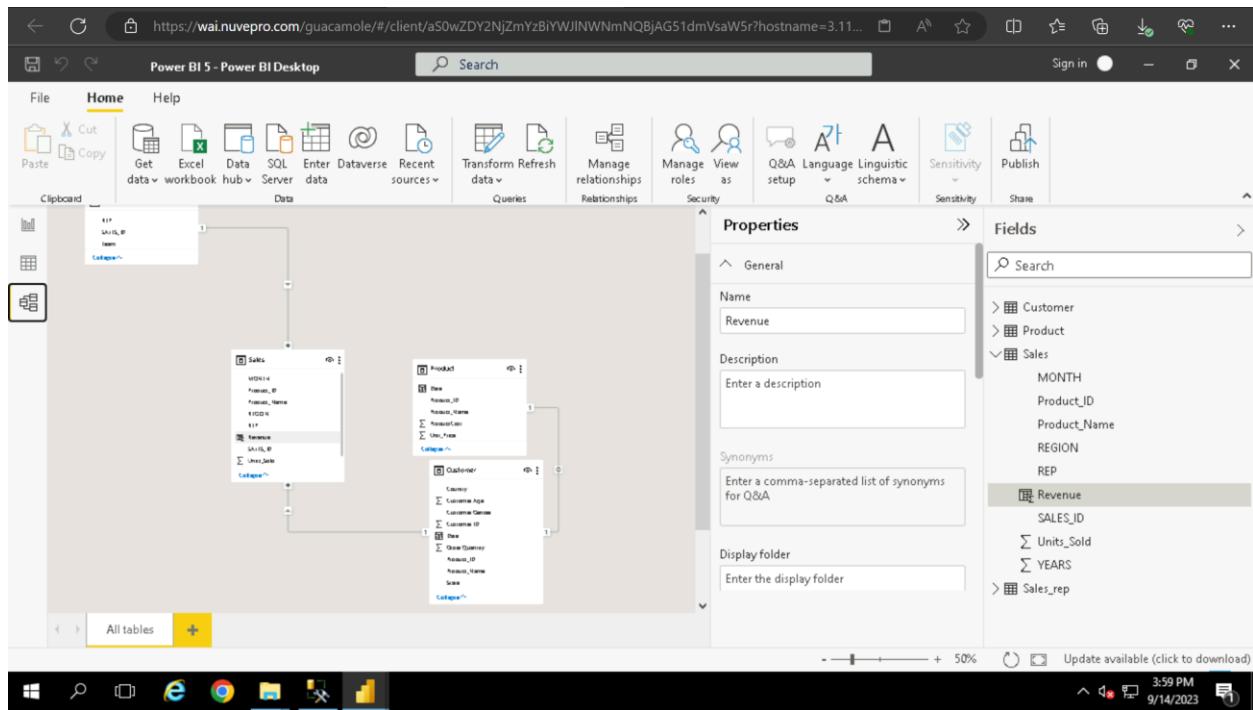
Case study:

Overview

1. Total quantity sold card visual, Revenue card visual, country slicer visual
2. Revenue by country and state
3. Revenue by Region

Deep Dive

1. Customer Gender, Customer Age and Revenue
2. Revenue by REP and team
3. Revenue by Month



Power BI 5 - Power BI Desktop

Table tools

Name: Revenue | Format: Currency | Summarization: Sum | Data category: Uncategorized | Sort by column: Sort | Data groups: Groups | Manage relationships: Relationships | New column: Calculations

Fields

Search: Customer, Product, Sales

MONTH, Product_ID, Product_Name, REGION, REP, Revenue, SALES_ID, Units_Sold, YEARS

Table: Sales (1,048,575 rows, 293 filtered rows) Column: Revenue (286 distinct values, 285 distinct values)

Update available (click to download)

Power BI 5 - Power BI Desktop

Home

Cut, Copy, Paste, Format painter, Get data, Excel workbook hub, Data, SQL Server data, Enter Dataverse, Recent sources, Transform Refresh data, New visual, Text box, More visuals, Insert, Quick measure, Calculations, Sensitivity, Publish

Filters

Customer Gender: F, M

Visualizations

Sum of Revenue by Customer Gender and Customer Age

Fields

GEN, Customer, Customer Gender

Page 1, Page 2

Page 2 of 2

Update available (click to download)

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Power BI 5 - Power Query Editor

File Home Transform Add Column View Tools Help

General

Column From Examples **Custom Column** **Invoke Custom Function** **Conditional Column** **Index Column** **Duplicate Column**

From Text **From Number** **From Date & Time** **From Date & Time**

Trigonometry **Statistics** **Standard** **Scientific** **Rounding** **Information**

Date **Time** **Duration** **Text Analytics** **Vision** **Azure Machine Learning**

AI Insights

Queries [4]

Sales (selected)

Customer **Product** **Sales_rep**

REP **Product_Name** **Units_Sold** **Product_ID** **MONTHNUMBER**

| line | Product | Units_Sold | Product_ID | MONTHNUMBER |
|------|-------------|------------|------------|-------------|
| 1 | Product 101 | 15 | 101 | 1 |
| 2 | Product 102 | 22 | 102 | 2 |
| 3 | Product 103 | 38 | 103 | 3 |
| 4 | Product 104 | 41 | 104 | 4 |
| 5 | Product 105 | 25 | 105 | 5 |
| 6 | Product 106 | 32 | 106 | 6 |
| 7 | Product 107 | 48 | 107 | 7 |
| 8 | Product 108 | 13 | 108 | 8 |
| 9 | Product 109 | 47 | 109 | 9 |
| 10 | Product 110 | 15 | 110 | 10 |
| 11 | Product 111 | 12 | 111 | 11 |
| 12 | Product 112 | 12 | 112 | 12 |
| 13 | Product 113 | 50 | 113 | 1 |
| 14 | Product 114 | 42 | 114 | 2 |
| 15 | Product 115 | 13 | 115 | 3 |
| 16 | Product 116 | 42 | 116 | 4 |
| 17 | Product 117 | 40 | 117 | 5 |
| 18 | Product 118 | 47 | 118 | 6 |
| 19 | Product 119 | 47 | 119 | 7 |

9 COLUMNS, 999+ ROWS Column profiling based on top 1000 rows

Query Settings

PROPERTIES

Name: Sales

All Properties

APPLIED STEPS

Source * Navigation * Promoted Headers * Changed Type **Added Conditional Column**

PREVIEW DOWNLOADED AT 3:25 PM 4:36 PM 9/14/2023

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Power BI 5 - Power BI Desktop

File Home Insert Modeling View Help Format Data / Drill

Cut Copy Format painter

Data

Clipboard Sum of Revenue by Customer Gender and Customer Age

Customer Gender ● Female ● Male

Customer Age

Sum of Revenue by REP and Team

Team ● Retail ● Wholesale

REP

Sum of Revenue

Sum of Revenue by Month

Month

Filters

Search

Filters on this visual

MONTH is (All)

Sum of Revenue is (All)

Add data fields here

Filters on this page

Add data fields here

Filters on all pages

Visualizations

Build visual

REV

Fields

Sales

Revenue

X-axis MONTH

Y-axis Sum of Revenue

Page 1 Page 2 +

Page 2 of 2

57% Update available (click to download) 4:43 PM 9/14/2023

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Power BI 5 - Power BI Desktop

File Home Insert Modeling View Help

Cut Copy Format painter Paste Get data Excel workbook hub Data SQL Server Enter Dataverse Recent sources Transform Refresh data New visual Text box More visual Insert Quick measure measure Calculations Sensitivity Share

Clipboard

Sum of Order Quantity: 1149

Sum of Revenue: \$2.64M

Sum of Revenue by Country and State:

| State | California | Kentucky | Oregon | Washington |
|----------------|------------|----------|--------|------------|
| Sum of Revenue | \$2.64M | \$0.00 | \$0.00 | \$0.00 |

Sum of Revenue by Country:

Sum of Revenue by REBIDN:

Country:

| United States | France | Australia | Germany | Canada | United Kingdom |
|----------------|---------|-----------|---------|--------|----------------|
| Sum of Revenue | \$2.64M | \$0.00 | \$0.00 | \$0.00 | \$0.00 |

Filters

Visualizations

Fields

REV

Sales

Revenue

Sum of Revenue

Page 1 Page 2

Page 1 of 2

4:44 PM 9/14/2023