ChatGPT

Technical Specification Document: Sales Performance Dashboard

1. Overview

This document outlines the technical details for developing the Sales Performance Dashboard using Power BI. The dashboard will leverage the AdventureWorks2022 database as its data source and include advanced DAX calculations, an optimized data model, and high-performance visualizations.

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2. Data Source Details

- **Database:** AdventureWorks2022
- **Connection Type:** DirectQuery and Import (hybrid model for optimized performance)
- **Tables Used:**
- SalesOrderHeader
- SalesOrderDetail
- Product
- Customer
- Territory

- Date

- **Data Transformation Requirements:**

- Merge SalesOrderHeader with SalesOrderDetail for complete transactional data.
- Join Customer, Product, and Territory tables to enhance dimension attributes.
- Create a Date table for time intelligence measures.
- Handle null values and duplicates to ensure data quality.

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3. Data Model

- **Schema Design:** Star Schema
- **Fact Table:** Merged Sales Data
- **Dimension Tables:** Product, Customer, Territory, Date
- **Relationships:**
- SalesOrderHeader (Fact) to Product (Dimension): Many-to-One
- SalesOrderHeader (Fact) to Customer (Dimension): Many-to-One
- SalesOrderHeader (Fact) to Territory (Dimension): Many-to-One

- SalesOrderHeader (Fact) to Date (Dimension): Many-to-One

- **Performance Enhancements:**

- Use aggregations for frequently accessed metrics.

- Apply bi-directional relationships only when necessary.

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4. Key DAX Calculations

1. **Measures:**
2. Total Revenue = SUM(SalesOrderDetail[LineTotal])
3. Units Sold = SUM(SalesOrderDetail[OrderQty])
4. Gross Margin = [Total Revenue] - SUM(SalesOrderDetail[Cost])
5. Year-over-Year Growth =

```
DIVIDE([
  Total Revenue]-CALCULATE([
  Total Revenue],
  SAMEPERIODLASTYEAR(Date[Date])
),
CALCULATE([
  Total Revenue],
  SAMEPERIODLASTYEAR(Date[Date])
))
```

6. **Calculated Columns:**
7. Customer Segmentation =

```
IF(SUM(SalesOrderDetail[LineTotal]) > 10000, "High",
  IF(SUM(SalesOrderDetail[LineTotal]) > 5000, "Mid", "Low"))
```

8. Ranking =

```
RANKX(ALL(Product), SUM(SalesOrderDetail[LineTotal]), , DESC)
```

9. **Calculation Groups:**
10. Time Intelligence (YTD, MTD, QTD, YoY Growth) defined using Tabular Editor for reusability.

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5. Visualizations

- **KPIs:** Card visuals for key metrics.
- **Trend Analysis:** Line and area charts for revenue and growth trends.

- **Performance Comparison:** Bar/column charts for Top N analysis.
- **Customer Segmentation:** Donut and pie charts.
- **Advanced Insights:** Decomposition tree for anomaly detection.
- **Interactive Elements:** Slicers for product, region, and customer filters.

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6. Performance Optimization

- **Data Model:**
- Use summarization and pre-aggregated tables for high-cardinality data.

- Replace calculated columns with measures where possible.

- **DAX Optimization:**

- Leverage variables to simplify complex calculations.

- Avoid iteration functions (e.g., `SUMX`) for large datasets.

- **Visualization Optimization:**

- Limit the number of visuals per page.
- Use bookmarks and drillthroughs to reduce rendering overhead.

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7. Security Implementation

- **Row-Level Security (RLS):**
- Roles created based on regions (e.g., North America, Europe).
- DAX filter: `[Territory] = USERPRINCIPALNAME()`

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8. Development Tools

- **Primary Tool:** Microsoft Power BI Desktop
- **Supporting Tools:**
- SQL Server Management Studio (SSMS) for data extraction.
- Tabular Editor for calculation groups.
- DAX Studio for performance analysis.

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9. Testing and Validation

- **Unit Testing:** Validate individual measures and calculated columns.
- **Performance Testing:** Use DAX Studio to check query performance.
- **User Acceptance Testing (UAT):** Gather feedback from end-users to ensure the dashboard meets business requirements.

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10. Deployment

- **Environment:** Power BI Service
- **Workspace:** Sales Analytics
- **Access Levels:**
- Viewers: Sales team and management.
- Contributors: BI development team.
- Admins: IT support team.

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11. Maintenance

- **Monthly Review:** Ensure metrics are aligned with business needs.
- **Updates:** Add new features or metrics based on stakeholder feedback.
- **Data Refresh:** Automate daily refresh through Power BI Service.

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12. Appendix

- **Data Dictionary:** Details of tables, columns, and their descriptions.
- **Key DAX Samples:** Frequently used measures and their formulas.
- **Calculation Group Definitions:** List of reusable time intelligence calculations.