Test Project Session 7

IT Software Solution for Business

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Introduction

In this session, you will become a business intelligence (BI) analyst for Belle Croissant Lyonnais. Your task is to create an interactive dashboard using Power BI to visualize and analyze various aspects of the bakery's business, including customer feedback, social media engagement, website traffic, and loyalty program data.

This session will assess your skills in:

- **Data Preparation and Modeling:** Connecting to a database, cleaning and transforming data, and creating missing relationships between tables.
- **Dashboard Design and Visualization:** Creating visually appealing and informative dashboards using Power BI's wide range of charts, graphs, and other visual elements.
- **Interactive Features:** Implementing filters, slicers, and drill-down capabilities to enable interactive data exploration.
- **Business Intelligence:** Applying your analytical skills to derive insights from the data and present them in a clear and actionable way.

Contents

This session package includes the following materials:

1. **Session Instructions (PDF):** Detailed instructions outlining the tasks to be completed and deliverables expected for this session.
2. **Common Folder:** This folder contains additional resources such as the Belle Croissant Lyonnais logo, icons, style guide, and other design assets that can be used throughout the development of the application.
3. **Database Schema (SQL):** A SQL script containing the structure for the tables Promotions and LoyaltyProgram, which you will use in this session.
4. **Data Files (CSV):**
    - customers_data.csv
    - customer_feedback.csv
    - social_media_engagement.csv
    - website_analytics.csv
    - loyalty_program_history.csv

Description of Project and Tasks

In this session, you will create an interactive dashboard for Belle Croissant Lyonnais using Power BI to analyze business data from various sources.

Guidelines:

1. **Easy to Use:** Make the dashboard simple and intuitive for staff to understand.

2. **Looks Good:** Follow the Belle Croissant Lyonnais Style Guide for all visualizations.
3. **Works Well:** Ensure all data connections and visualizations function correctly without errors.
4. **Secure:** Protect customer data and adhere to data privacy regulations.
5. **On Time:** Complete all tasks within the specified time limit.

Technical Considerations:

1. **Data Integrity:** Ensure all data imports and transformations maintain the original data structure and relationships. Verify row counts match the source files.
2. **Naming Conventions:** Use consistent and clear naming for all measures, calculated columns, and visualizations. Follow a standardized format (e.g., "Metric_Name [Unit]").
3. **Performance Metrics:** Implement DAX measures for key performance indicators (KPIs) that can be easily validated against source data.
4. **Visualization Standards:** Utilize a predefined set of chart types and color schemes across all dashboard pages for consistency.
5. **Interactivity:** Implement cross-filtering and drill-through capabilities that work uniformly across all dashboard elements.
6. **Error Handling:** Incorporate error checking in DAX measures to handle potential null values or division by zero scenarios.

Additional Considerations:

- The dashboard should update automatically when the underlying data changes.
- Use clear labels and instructions for all dashboard elements.
- Organize information logically across different pages of the dashboard.
- Consider potential data quality issues and handle them appropriately.
- Implement interactivity features like filters to enhance user experience.

General Guidelines:

1. **Data Integrity:** Ensure accuracy and consistency in data cleaning, transformation, and analysis.
2. **Clarity and Conciseness:** Communicate your findings clearly and concisely, focusing on actionable insights.
3. **Time Management:** Efficiently manage your time to complete all tasks within the allocated timeframe.

Specific Requirements for Belle Croissant Lyonnais:

1. **Data Confidentiality:** Treat all data as confidential and adhere to data privacy regulations.
2. **Style Guide:** Refer to the Belle Croissant Lyonnais Style Guide for formatting and styling visualizations and reports.
3. **Prerequisites:** Ensure you have a strong understanding of data analysis concepts and proficiency in using the tools available in your production environment.

General Software Development Best Practices:

Please note that while this project focuses on data analysis and reporting, general software development best practices should still be followed where applicable. This includes:

- **Code Modularity:** Organize your code into reusable functions or modules.
- **Commenting:** Add clear and concise comments to explain your code.
- **Error Handling:** Implement appropriate error handling mechanisms to manage unexpected situations.

Instructions to the Competitor

7.1 Database Setup and Data Import

Objective:

Set up the database for Belle Croissant Lyonnais' business intelligence (BI) dashboard and import the provided data, ensuring accuracy and completeness.

Tasks:

1. **Database Creation:**
    - Create a database named BelleCroissantLyonnaisBI. You can use Microsoft SQL Server Management Studio (SSMS) to do this.
2. **Schema Execution:**
    - Execute the SQL script Session7_Database_Schema.sql to create the following tables:
        - Customers
        - CustomerFeedback
        - SocialMediaEngagement
        - WebsiteAnalytics
        - LoyaltyProgramHistory
3. **Establish Relationships:** Within Power BI, create relationships between tables based on common fields. This will allow for integrated analysis across the datasets.
4. **Data Import:**
    - Import the provided CSV data into their corresponding tables:
        - customers_data.csv -> Customers
        - customer_feedback.csv -> CustomerFeedback
        - social_media_engagement.csv -> SocialMediaEngagement
        - website_analytics.csv -> WebsiteAnalytics
        - loyalty_program_history.csv -> LoyaltyProgramHistory
    - You can use SSMS or any other SQL tool to import the data.

Deliverables:

- **Database Credentials:** Provide the connection details (server name, database name, username, password) in a text file named Session7_DatabaseCredentials.txt.
- **Verification Script:** Create a SQL script named Session7_DatabaseVerification.sql that performs the following checks:
    - Confirms the existence and correct structure of all tables.
    - Counts the number of rows in each table and compares them to the expected counts based on the CSV files.
    - Verifies the presence of data in each table by selecting a few sample rows.

7.2 Dashboard Creation

Objective:

Create an interactive dashboard in Power BI to show important information about Belle Croissant Lyonnais's business.

Tasks:

1. **Dashboard Setup:**
    - Make a new dashboard in Power BI.
    - Name the pages:
        - "Customer Feedback"
        - "Social Media"
        - "Website Traffic"
        - "Loyalty Program"
2. **Show the Data (Make these charts/graphs):**
    - **Customer Feedback Page:**
        - **Line Chart:** Show how customer ratings change over time (use the 'Date' and 'Rating' columns).
        - **Pie Chart:** Show the percentage of each rating (1 to 5 stars).
    - **Social Media Page:**
        - **Line Chart:** Show how many likes, shares, and comments each post gets over time (use 'Date', 'Likes', 'Shares', 'Comments').
        - **Bar Chart:** Show the total likes, shares, and comments for each platform (use 'Platform', 'Likes', 'Shares', 'Comments').
    - **Website Traffic Page:**
        - **Line Chart:** Show how many people visit the website each day (use 'Date' and 'Pageviews').
        - **Bar Chart:** Show the top 5 most visited pages (use 'Page' and 'Pageviews').
    - **Loyalty Program Page:**

- **Line Chart:** Show how many points are earned and used each month (use 'TransactionDate', 'PointsEarned', 'PointsRedeemed').
- **Card Visual:** Show the total number of loyalty program members.

3. **Make it Interactive:**
    - Add filters to the dashboard:
        - **Date Filter:** Let users choose a time period to see the data.
        - **Platform Filter (Social Media Page):** Let users choose which platform to see.

Deliverables:

- Power BI file named "BelleCroissantLyonnais_Dashboard.pbix" with all the pages and charts/graphs.

Additional Notes:

- Use the exact column names from the CSV files.
- Make sure the charts/graphs are easy to read and understand.
- The dashboard should work even if the data in the CSV files changes.

7.3 Sentiment Analysis and Visualization

Objective:

Analyze customer feedback to see if people are happy or not.

Tasks:

1. **Make Word Lists:**
    - **Good Words:** happy, satisfied, delicious, amazing, love, excellent, great, enjoyed, recommend, best
    - **Bad Words:** disappointed, bad, terrible, awful, hate, worst, horrible, disgusting, not good, dislike
2. **Check Each Comment:**
    - Look at each comment in the feedback dataset.
    - Count how many good words and bad words are in the comment.
    - If there are more good words, mark the comment as "Positive."
    - If there are more bad words, mark the comment as "Negative."
    - If the number of good and bad words is the same, or if there are no good or bad words, mark the comment as "Neutral."
3. **Show on Dashboard:**
    - On the "Customer Feedback" page in your Power BI dashboard, add these:
        - **Pie Chart:** Show the percentage of positive, negative, and neutral comments.
        - **Line Chart:** Show how many positive and negative comments there are each week.

- **Bar Chart:** Show the top 5 most used good words and the top 5 most used bad words.
- **Table:** Show how many times each of the top 5 good and bad words are used.

4. **Add Filters:**
    - Let users choose a time period to see how the positive and negative comments change over that time.

Deliverables:

- Update the file BelleCroissantLyonnais_Dashboard.pbix.

7.4 Loyalty Program Performance Analysis

Objective:

Analyze and visualize the performance of Belle Croissant Lyonnais' loyalty program using the loyalty_program_history.csv table in Power BI.

Tasks:

1. **Points Accumulation and Redemption:**
    - **Points Over Time:** Create a line chart visualizing the total points earned and redeemed over time (by week or month).
    - **Average Points per Transaction:** Calculate and display the average points earned per transaction using a Card visual.
    - **Top Customers:** Identify and showcase the top 5 customers with the highest total points earned using a bar chart.
    - **Time to Redeem:** Calculate the average time (in days) between points earned and redeemed. Display this metric using a Card visual.
2. **Tier Distribution and Progression:**
    - **Tier Distribution (Simplified):** Visualize the distribution of customers across simplified loyalty tiers (Basic, Silver, Gold, Platinum) using a donut chart.
    - **Tier Distribution (Detailed):** Visualize the distribution of customers across all 16 loyalty tiers using a bar chart.
    - **Tier Upgrade Funnel:** Create two funnel charts to visualize the progression of customers through loyalty tiers (one for the simplified, and one for the detailed tier structure).
    - **Time to Upgrade:** Calculate the average time it takes for customers to upgrade from one tier to the next. Display this information in a table.
3. **Median Activity Frequency:**
    - **Activity by Tier:** Analyze and visualize the median frequency of points-earning activities for each loyalty tier. Use a bar chart to compare the median activity frequency per customer across simplified and detailed tiers.

Deliverables:

- Update BelleCroissantLyonnais_Dashboard.pbix with the charts and tables on the "Loyalty Program" page.

Additional Notes:

- **Tier Structure:** The loyalty program has multiple tiers, with customers starting at the 'Basic 1' tier. Each time a customer performs a "Tier Upgrade" action, they move up to the next tier.
- **Tier Names (Detailed):**
    - Tiers 1-4: Basic 1, Basic 2, Basic 3, Basic 4
    - Tiers 5-8: Silver 1, Silver 2, Silver 3, Silver 4
    - Tiers 9-12: Gold 1, Gold 2, Gold 3, Gold 4
    - Tiers 13-16: Platinum 1, Platinum 2, Platinum 3, Platinum 4
- **Tier Names (Simplified):**
    - Tiers 1-4: Basic
    - Tiers 5-8: Silver
    - Tiers 9-12: Gold
    - Tiers 13-16: Platinum
- **Data Interpretation:** The number of "Tier Upgrade" actions for a customer indicates how many times they have moved up from the 'Basic 1' tier. For example, a customer with seven "Tier Upgrade" actions would be in 'Silver 3'.
- **Funnel Chart:** A funnel chart is a visual representation that shows the progression of a process. In the context of the loyalty program, it shows how many customers are in each tier, starting with the largest number at the top ('Basic 1') and decreasing as you move down to higher tiers. It helps visualize the drop-off in customer numbers as they progress through the loyalty program.