DEPARTMENTAL SALES DASHBOARD INFORMATION

## Dashboard and analysis by Hammad Noor Ahmed

Contents

Data:

The data presented by Store Manager consists of the following:

1. An Excel file containing department information. Departments are numbered as per their primary keys.
2. A CSV file containing information about stores and their respective managers. The information store contains the store number as the primary key assigned to them.
3. Lastly, a data folder containing all the weekly sales data from stores. The data is from last year and also of the current year which is 2012 in the case.

Schema:

The data is linked through star schema in which the department table and store table are linked to the table containing information about weekly sales.
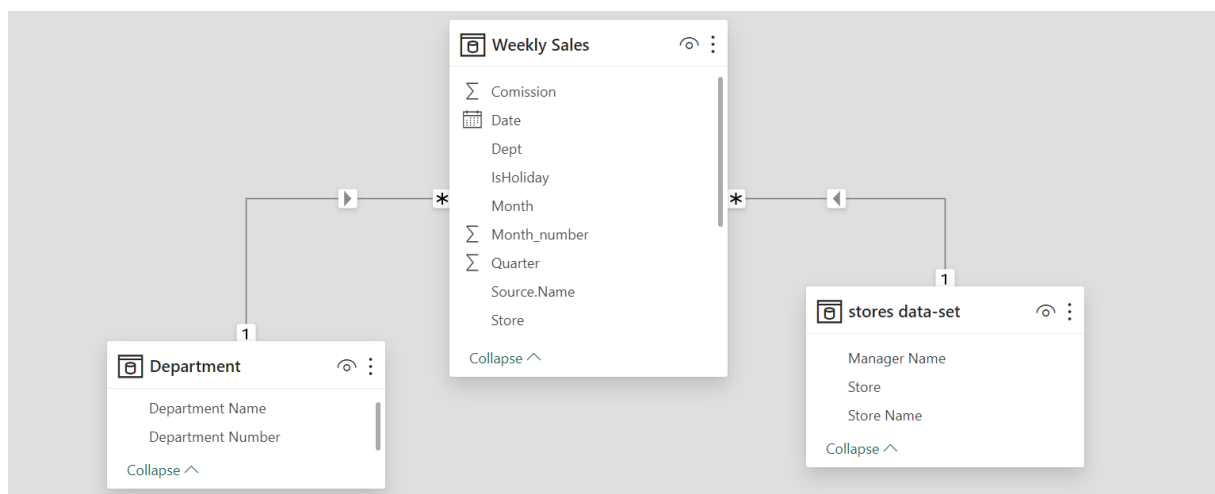
Tool Analysis:

For the requirement of the CEO, a Power BI dashboard is generated to provide live information about weekly sales. There were other tools such as streamlit in consideration as well. However, based on the following analysis of merits and demerits, Power BI was preferred.

PowerBI Analysis:

Benefits of Power BI
1. **Data Integration:** Easily integrates with various data sources.
2. **Real-time Analytics:** Offers real-time data analysis and reporting.
3. **Customizable Dashboards:** Highly customizable dashboards and reports.
4. **AI Support:** Incorporates AI tools for predictive analytics.
5. **Collaboration Tools:** Facilitates sharing and collaboration on reports.
6. **Accessibility:** Accessible from multiple devices, enhancing mobility.
7. **Security Features:** Provides strong data security and governance.
8. **Scalability:** Scales to accommodate growth in data and users.
9. **Cost-Effective:** Offers a competitive pricing model, especially for small to medium businesses.

10. **User-Friendly:** Intuitive interface for non-technical users to create reports and dashboards.

Demerits of Power BI
1. **Learning Curve:** It can be steep for beginners or non-technical users.
2. **Data Capacity Limits:** Free and Pro versions have data capacity limits.
3. **Performance Issues**: Can experience slowdowns with large datasets or complex reports.
4. Dependency on Microsoft Ecosystem: Best integrated within the Microsoft ecosystem, which might limit some users.
5. **Limited Customization:** While flexible, there are limits to visual customization compared to specialized tools.
6. **Cost for Premium Features:** Premium features can be expensive for small businesses or individual users.
7. **Complexity in Sharing:** Sharing reports outside of Power BI service requires additional licensing or export to other formats.
8. **Data Refresh Rates:** The frequency of data refreshes can be limited, affecting real-time decision-making.
9. **Limited Advanced Analytics:** While it has AI capabilities, it might not suffice for very advanced analytics needs.
10. **Access Control Limitations:** Granular access control can be complex and challenging to manage effectively.

Streamlit analysis:

Benefits of streamlit
1. **Ease of Use:** Simplifies the process of building interactive web apps for data science projects.
2. **Rapid Development:** Enables fast prototyping and deployment of data applications.
3. No Front-End Experience Required: Designed for data scientists without deep knowledge of web development.
4. **Interactive Widgets:** Easily integrates widgets like sliders, buttons, and checkboxes without a backend.
5. **Customizable and Flexible:** Supports custom HTML, CSS, and JavaScript for more complex applications.
6. **Python-Based:** Utilizes Python, making it accessible for a wide range of users familiar with the language.
7. Integration with Data Science Libraries: Seamlessly works with popular libraries like NumPy, Pandas, Matplotlib, and more.
8. **Open Source:** Free to use and has a supportive community for troubleshooting and sharing resources.
9. **Automatic App Updates:** Automatically updates the app's interface with code changes.
10. Deployment: Offers straightforward methods for deploying apps, making them accessible to a wider audience.

| **Demerits of streamlit** |
|---|
| 1. **Performance Issues**: Can be slow with large datasets or complex computations. |

2. **Limited Scalability:** Might not be the best choice for very large-scale applications with high concurrency demands.
3. **Simplistic UI Components:** While easy to use, the UI components might not be as advanced or customizable as those in dedicated front-end frameworks.
4. **State Management:** Managing state across sessions and callbacks can be challenging without additional coding or workarounds.
5. **Deployment Complexity:** While deployment is straightforward, managing dependencies and ensuring environment consistency can be tricky.
6. **Security Features:** Basic security features might require additional setup for production environments.
7. **Limited Control Over Layout:** Offers less control over app layout compared to traditional web development frameworks.
8. **Dependency on Python:** Being Python-based limits the use of other programming languages or technologies.
9. **Integration with Third-Party Services:** May require additional effort to integrate with certain third-party services and APIs.
10. **Documentation and Support**: Although growing, the community and resources might not be as extensive as more established frameworks.

Recommendation on the tool:

A thorough analysis was presented to stakeholders for making informed decisions. Based on the following arguments PBI was preferred:

1. **Comprehensive Data Integration:** Power BI provides extensive data connectivity options, including direct links to various databases, cloud services, and other sources, which is crucial for retail analytics.
2. **Advanced Data Visualization and Reporting:** Power BI offers a wide range of visualization options and the ability to create complex reports and dashboards, which are essential for analyzing sales, inventory, customer data, and other key metrics.
3. **Scalability and Security:** Power BI, being a Microsoft product, offers robust security features and scalability. It can handle large volumes of data and support a growing business better than Streamlit, which is more suited for individual projects or smaller-scale applications.
4. **Collaboration and Sharing:** Power BI's integration with Microsoft 365 facilitates seamless sharing and collaboration on reports and dashboards within an organization. This is particularly beneficial for stores with multiple departments or locations.1
5. **Support and Community:** Power BI benefits from Microsoft's extensive support network and a large community of users. This can be invaluable for stores needing reliable support and resources to manage their data analytics and reporting needs.

PBI Dashboard:
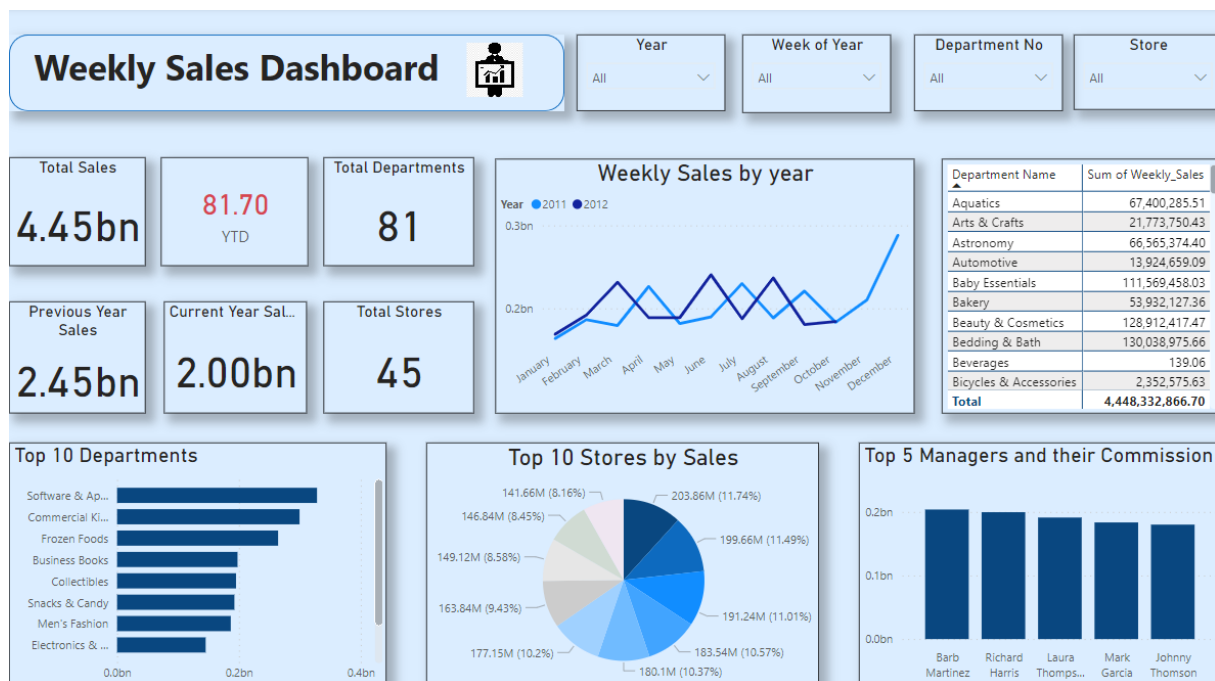
DAX Functions Performed:
1. To calculate total sales: Total Sales = sum('Weekly Sales'[Weekly_Sales])
2. To calculate sales of current year = YTD New Year = Calculate(sum('Weekly Sales'[Weekly_Sales]), FILTER('Weekly Sales','Weekly Sales'[Year] = 2012))
3. To calculate sales of previous year = YTD Previous year = Calculate(sum('Weekly Sales'[Weekly_Sales]), FILTER('Weekly Sales','Weekly Sales'[Year] = 2011))
4. Sales increase percentage = YTD = ([YTD New Year]/[YTD Previous year])*100

Dashboard Information:
The dashboard presents the following information:

1. Sales information and comparison with previous years.
2. Yearly trend analysis of weekly sales.
3. Departmental sales as per current updated data.
4. Top 10 Departments by sales.
5. To 10 Stores by sales
6. Information about managers who are topping sales chart, and their commission is also present.
7. There are filters for year, week, department and store to get the relevant KPIs for management.

Data Refresh Information:

Microsoft Excel Power Query:
Power Query in Microsoft Excel is a powerful data processing tool that can import, merge, and automate data from various sources, including CSV files.

- **Step 1:** Use the "Get Data" feature to import CSV files.

- **Step 2:** Use the "Append Queries" option to merge multiple CSV files into a single dataset.

- **Step 3:** Load the merged dataset into a new Excel worksheet.

- **Step 4:** To automate, we can refresh the query whenever new files are added to a folder, assuming the file structure remains consistent.

Microsoft Power Automate (formerly Flow):

Power Automate is a service that helps you create automated workflows between your favorite apps and services to synchronize files, get notifications, collect data, and more.

- **Create a Flow:** Design a flow that triggers on the addition of new files in a specific folder (e.g., in OneDrive, SharePoint).

- **Action to Combine Files:** Add actions to read the CSV files and then use the Excel Online (Business) connector to create or update an Excel file with the data from the CSV files.

Google Sheets and Google Apps Script:

If we prefer Google's ecosystem, Google Sheets combined with Google Apps Script can automate the merging of CSV files into a single spreadsheet.

- **Google Sheets:** Use Google Sheets to open or import CSV files.

- **Google Apps Script:** Write a script to automatically import CSV files into a Google Sheet. You can trigger this script to run whenever a new file is added to Google Drive.

Automate File Updates

For Cloud Storage (OneDrive, SharePoint): If CSV files are stored in OneDrive or SharePoint, Power BI can automatically detect changes to these files. Just make sure the new files have the same structure and are saved in the same folder.

For Local or Network Storage: Ensure the Power BI Data Gateway is configured to refresh the dataset. New files added to the monitored folder (with the same structure) will be included in the refresh.

Batch or Shell Scripting:

For more system-level automation, you can write a batch script (Windows) or a shell script (Linux/Mac) to concatenate CSV files.

- **Batch/Shell Script:** Write a script that monitors a folder for new CSV files and concatenates them into a single file. This file can then be opened with Excel.

- **Task Scheduler/Cron Jobs:** Use Windows Task Scheduler or Cron jobs (Linux/Mac) to schedule your script to run at regular intervals.

Third-party Tools:

There are various third-party tools and software that can automate the merging of CSV files without programming, such as Alteryx, Tableau Prep, or even simpler file merge utilities that can be scheduled to run at regular intervals.

CSV files contain data on weekly sales for every store. Using any of the above based on the needs and requirements of the CEO, an automatic process can be established. The process can enable the processing speed at run time. PBI can also be automated to cover the daily sales once their data is available, however this would require further usage of ETL tools and data management.