Low-Level Design Report

Profit and Loss Dashboard for Physics Wallah

Jaideep Jaiswal and Kushagra Taneja

October 31, 2024

1 Introduction

The Low-Level Design (LLD) report aims to provide an in-depth description of the specific components, functionalities, and interactions of the Profit and Loss Dashboard project. This document outlines the design considerations, data structures, algorithms, and user interface elements that form the foundation of the dashboard. It serves as a detailed guide for developers and stakeholders involved in the implementation of the system.

2 System Components

The dashboard comprises the following main components:

- Data Source
- ETL Process
- Tableau Dashboard
- User Interface
- Security Measures
- Error Handling Mechanisms
- Future Enhancements

Each component plays a critical role in ensuring the functionality and performance of the dashboard.

3 Component Design

3.1 Data Source

Description: A sample dataset in CSV format containing financial data, organized by regions, countries, and time periods. This dataset is crucial for generating meaningful insights and visualizations.

Data Structure:

- **Columns:**
  - `Date`: Date of the financial transaction (Format: YYYY-MM-DD).
  - `Region`: Geographical area of the transaction (e.g., Asia, Europe).
  - `Country`: Country where the transaction occurred (e.g., India, Germany).
  - `Revenue`: Total revenue earned from sales (Currency: INR).
  - `Expenses`: Total expenses categorized into various categories (e.g., marketing, administration).
  - `Profit`: Calculated profit from the transactions (Revenue - Expenses).
- **Data Types:**
  - `Date`: Date
  - `Region`: String
  - `Country`: String
  - `Revenue`: Float
  - `Expenses`: Float
  - `Profit`: Float

Example Row:

```
2024-01-01, Asia, India, 100000, 70000, 30000
```

Data Sample Size: The dataset consists of 10,000 rows representing transactions over multiple years, providing a robust base for analysis.

3.2 ETL Process

Overview: The ETL (Extract, Transform, Load) process is vital for preparing data for analysis. It ensures that the data is cleaned, structured, and loaded into Tableau for visualization.

Data Transformation Steps:

1. **Extract:**
   - Read the CSV file using libraries such as `pandas` in Python to create a DataFrame.
2. **Transform:**
   - **Data Cleaning:**
     - Remove duplicates and null values from the dataset.
     - Standardize date formats to ensure consistency.
   - **Aggregation:**
     - Aggregate expenses by category (e.g., total marketing expenses).
   - **Calculation of Metrics:**
     - Calculate Gross Profit as `Revenue - Cost of Sales`.

- Calculate EBITDA (Earnings Before Interest, Taxes, Depreciation, and Amortization) by adding back non-operating expenses to the operating profit.
- Calculate profit margins and ratios to analyze profitability.

3. **Load:**

   - Upload the cleaned and transformed data into Tableau for visualization using the Tableau Data Extract (TDE) format for performance optimization.

3.3 Tableau Dashboard

Overview: The Tableau dashboard integrates multiple visualizations to present financial metrics interactively. It is designed to facilitate easy navigation and analysis for stakeholders.

Visual Components:

- **Filters:**
  - **Region Filter:** Dropdown menu for selecting specific regions.
  - **Country Filter:** Dropdown menu for selecting specific countries.
  - **Quarterly Filter:** Dropdown menu for selecting quarters (Q1, Q2, etc.).
- **Graphs:**
  - **Sales — GP Margin — NP Margin Chart:** A line chart displaying sales trends, gross profit margins, and net profit margins over time.
  - **Sales — Marketing Expense Chart:** A dual-axis bar and line chart comparing sales with marketing expenses, providing insights into marketing efficiency.
  - **Gross Profit — EBITDA — Operating Profit Chart:** A stacked area chart showing trends in gross profit, EBITDA, and operating profit over time, highlighting the overall financial health of the company.
- **Summary Table:**
  - **Profit & Loss Statement Table:**
    - **Trading Account:** Summarizes sales, sales returns, cost of sales, and trading profit.
    - **Operating Account:** Breaks down various expense categories, like administration, marketing, and professional services.
    - **Non-Operating Income:** Displays non-operating financial activities, such as dividends and exchange gains or losses.
  - **Financial Metrics Summary:**
    - Displays a high-level summary of Gross Profit, EBITDA, Operating Profit, and Net Profit across multiple years, facilitating quick assessments of financial performance.

3.4 User Interface

Design:

- **Layout:**
  - **Header:** Project title and logo prominently displayed at the top of the dashboard.
  - **Sidebar:** Contains filter options for Region, Country, and Quarter for easy access.
  - **Main Area:** Dynamically displays graphs, charts, and tables based on user-selected filters, allowing for seamless interaction.

User Interaction:

- Users can select filters from the sidebar, which will update all dashboard visuals in real-time, ensuring that users can derive insights quickly and efficiently.
- Users can hover over charts to see detailed tooltips with exact values and additional context.
- A help section is included to guide users on how to navigate the dashboard and interpret the data.

3.5 Security Measures

Data Access:

- Implement user authentication mechanisms to restrict access to financial data, ensuring that only authorized personnel can view sensitive information.

Data Protection:

- Use secure storage solutions, such as AWS S3 or Azure Blob Storage, for sensitive financial data.
- Implement data encryption during transit and at rest to safeguard against unauthorized access.

4 Data Flow and Interaction

1. **User Interaction:** The user interacts with the dashboard by selecting filters from the sidebar.
2. **Data Retrieval:** Upon filter selection, the dashboard triggers queries to the ETL process to retrieve the relevant data based on user selections.
3. **Data Visualization:** The Tableau dashboard dynamically updates all visualizations to reflect the filtered data, providing real-time insights.
4. **Data Export:** Users can export visualizations and data summaries in various formats (e.g., PDF, Excel) for reporting and presentation purposes.

5 Error Handling

Data Validation:

- Implement validation checks during the ETL process to ensure data integrity and prevent errors in visualizations.
- Log errors and exceptions during data processing to enable debugging and prompt resolution.

User Feedback:

- Provide clear feedback messages to users in case of errors or issues while interacting with the dashboard (e.g., "No data available for selected filters").

6 Future Enhancements

- Implement predictive analytics features to forecast revenue and expenses based on historical data.
- Integrate additional data sources, such as real-time financial data feeds, to enhance the dashboard's accuracy and timeliness.
- Explore mobile compatibility options to allow users to access the dashboard on mobile devices.
- Add machine learning capabilities for automated anomaly detection in financial transactions.

7 Conclusion

The Profit and Loss Dashboard for Physics Wallah provides a comprehensive view of the company's financial health. Through its intuitive user interface and robust data visualizations, stakeholders can derive valuable insights from the dashboard. The proposed design not only fulfills current requirements but also allows for scalability and enhancements in the future.