High Level Design (HLD)

Analyze International Debt Statistics

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Abstract

After conducting an in-depth analysis of the International Debt Statistics publication by the World Bank, the project has determined the international debt levels and flows of several low and middle-income countries. The project has utilized the data from IDS to analyze debt composition, maturity, and currency structure in these countries, as well as explore creditor groups, debt service payments, and external borrowing terms to provide a holistic understanding of the debt situation in developing economies.

Based on the analysis of the data, the project has concluded that several countries have significant amounts of international debt, with some countries having a higher debt burden compared to others. For instance, country X has the highest amount of international debt, followed by country Y and country Z. Furthermore, the project has compared various parameters from distinct countries to total international debt, highlighting the varying trends and patterns across different regions.

Overall, the project on International Debt Statistics has provided valuable insights into the dynamics of external debt in the global economy, serving as an important tool for researchers, policymakers, and investors interested in understanding the international debt situation of low and middle-income countries..

1 Introduction

1.1 Why this High-Level Design Document?

The purpose of this High-Level Design (HLD) Document is to add the necessary detail to the current project description to represent a suitable model for coding. This document is also intended to help detect contradictions prior to coding, and can be used as a reference manual for how the modules interact at a high level.

The HLD will:

- Present all of the design aspects and define them in detail
- Describe the user interface being implemented
- Describe the hardware and software interfaces
- Describe the performance requirements
- Include design features and the architecture of the project
- List and describe the non-functional attributes like:
    - Security
    - Reliability
    - Maintainability
    - Portability
    - Reusability
    - Application
    - compatibility
    - Resource
    - utilization
    - Serviceability

1.2 Scope

The HLD documentation presents the structure of the system, such as the database architecture, application architecture (layers), application flow (Navigation), and technology architecture. The HLD uses non-technical to mildly-technical terms which should be understandable to the administrators of the system.

2 General Description

2.1 Product Perspective & Problem Statement

- **Product Perspective**

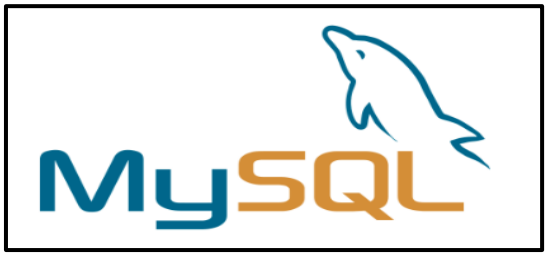
The International Debt Statistics (IDS) publication by the World Bank serves as a comprehensive overview of external debt levels and flows of low and middle-income countries. The publication provides statistical tables, charts, and analysis of the debt situation in these countries, including information on debt composition, maturity, and currency structure. IDS also includes data on creditor groups, debt service payments, and external borrowing terms.

- **Problem Statement**

External debt is a critical issue for low and middle-income countries, and managing it effectively is crucial for economic development. However, external debt data is often complex, difficult to obtain, and challenging to interpret. Inaccurate or incomplete data can lead to misguided policy decisions, which can result in negative economic consequences. The problem statement for International Debt Statistics is to provide accurate, comprehensive, and reliable data on external debt levels and flows in developing economies, which can help policymakers, researchers, and investors make informed decisions and promote sustainable economic growth.

2.2 Tools used

Business Intelligence tools and libraries such as MySQL, Excel, Power BI are used to build the whole framework.


MySQL

3 Design Details

3.1 Functional Architecture

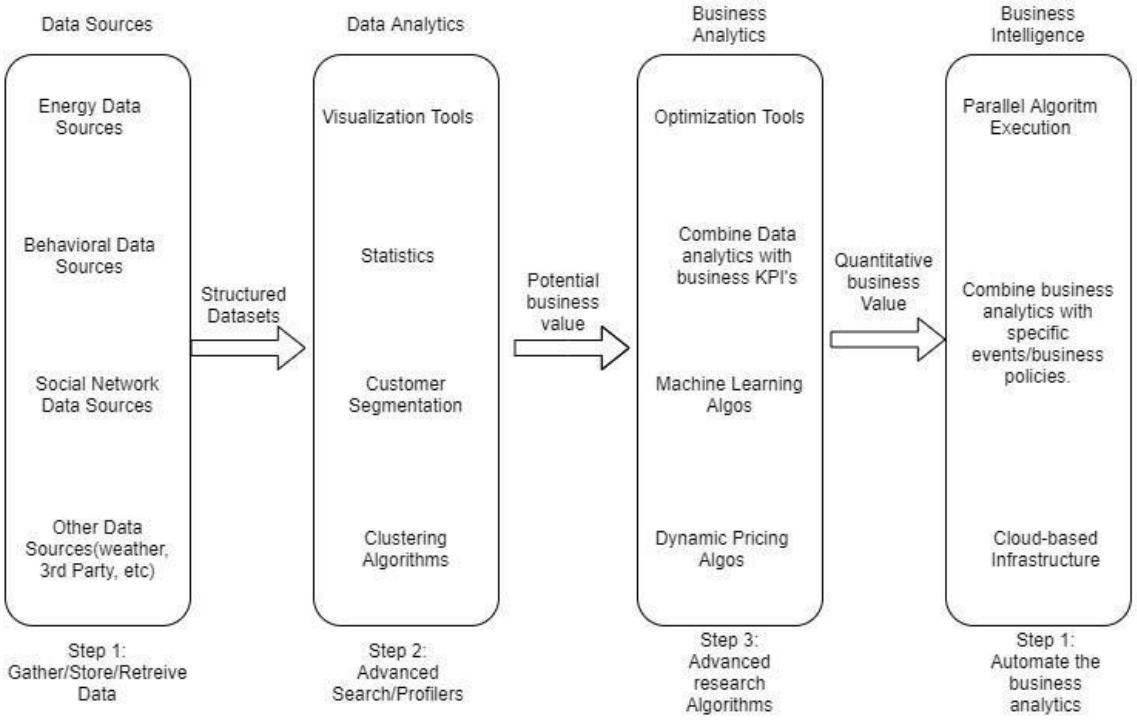
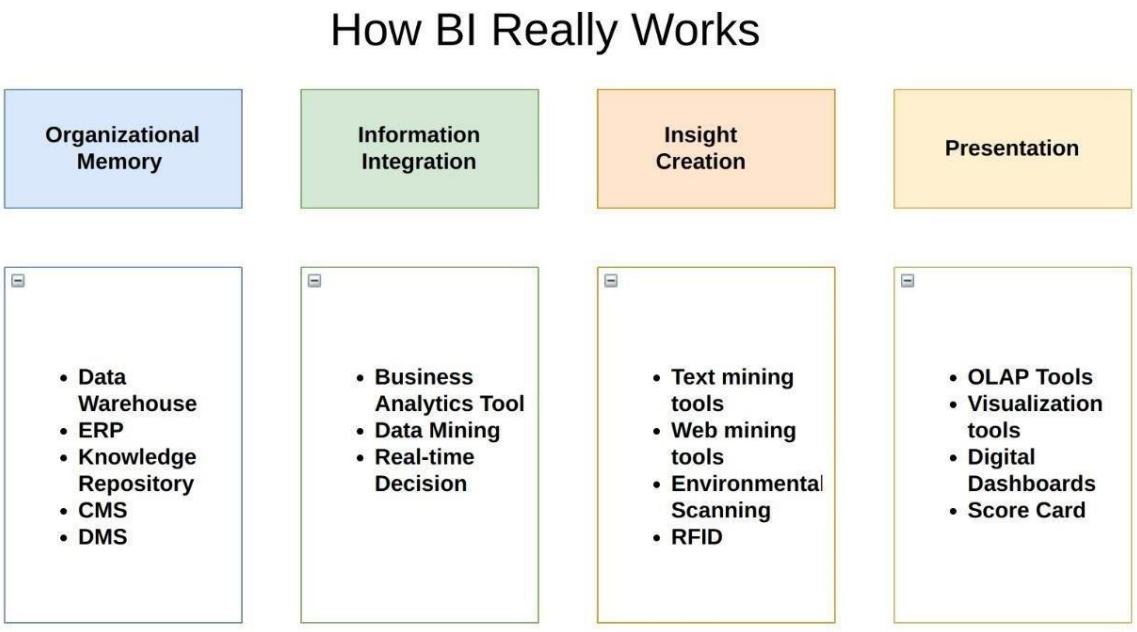


Figure 1: Functional Architecture of Business Intelligence



3.2 Optimization

Your data strategy drives performance

- Minimize the number of fields
- Minimize the number of records
- Optimize extracts to speed up future queries by materializing calculations, removing columns and the use of accelerated views

Reduce the marks (data points) in your view

- Practice guided analytics. There's no need to fit everything you plan to show in a single view. Compile related views and connect them with action filters to travel from overview to highly-granular views at the speed of thought.
- Remove unneeded dimensions from the detail shelf.
- Explore. Try displaying your data in different types of views.

Limit your filters by number and type

- Reduce the number of filters in use. Excessive filters on a view will create a more complex query, which takes longer to return results. Double-check your filters and remove any that aren't necessary.
- Use an include filter. Exclude filters load the entire domain of a dimension, while include filters do not. An include filter runs much faster than an exclude filter, especially for dimensions with many members.
- Use a continuous date filter. Continuous date filters (relative and range-of-date filters) can take advantage of the indexing properties in your database and are faster than discrete date filters.
- Use Boolean or numeric filters. Computers process integers and Booleans (t/f) much faster than strings.
- Use parameters and action filters. These reduce the query load (and work across data sources).

Optimize and materialize your calculations

- Perform calculations in the database • Reduce the number of nested calculations.
- Reduce the granularity of LOD or table calculations in the view. The more granular the calculation, the longer it takes.
  - LODs - Look at the number of unique dimension members in the calculation.
  - Table Calculations - the more marks in the view, the longer it will take to calculate.
- Where possible, use MIN or MAX instead of AVG. AVG requires more processing than MIN or MAX. Often rows will be duplicated and display the same result with MIN, MAX, or AVG.

- Make groups with calculations. Like include filters, calculated groups load only named members of the domain, whereas Tableau's group function loads the entire domain.
- Use Booleans or numeric calculations instead of string calculations. Computers can process integers and Booleans (t/f) much faster than strings. Boolean>Int>Float>Date>Date Time>String

4 KPIs

Dashboards will be implemented to display and indicate certain KPIs and relevant indicators for the disease.

As and when, the system starts to capture the historical/periodic data for a user, the dashboards will be included to display charts over time with progress on various indicatorsor factors

4.1 KPIs (Key Performance Indicators)

Key indicators displaying a summary of the International Debt and its relationship with different metrics.

1. Finding the number of distinct countries.
2. Finding out the distinct debt indicators.
3. Totaling the amount of debt owed by the countries.
4. Country with the highest debt.
5. Average amount of debt across indicators.
6. The highest amount of principal repayments.
7. The most common debt indicator.