High Level Design (HLD)

Airport Data Analysis

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Contents

Abstract

The purpose of data analytics in aviation is to examine the vast amount of data generated daily and provide useful information to airlines, airports, and other aviation stakeholders so that they can improve their operational planning and execution, as well as any related products and services.

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:

- o Security
- o Reliability
- o Maintainability
- o Portability
- o Reusability
- o Application compatibility
- o Resource utilization
- o 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

The purpose of data analytics in aviation is to examine the vast amount of data generated daily and provide useful information to airlines, airports, and other aviation stakeholders so that they can improve their operational planning and execution, as well as any related products and services.

The objective of the project is to perform data visualization techniques to understand the insight of the data. This project aims to apply various Business Intelligence tools such as Tableau or Power BI to get a visual understanding of the data.

2.2 Tools used

Business Intelligence tool (Tableau) is used to build the whole Project.
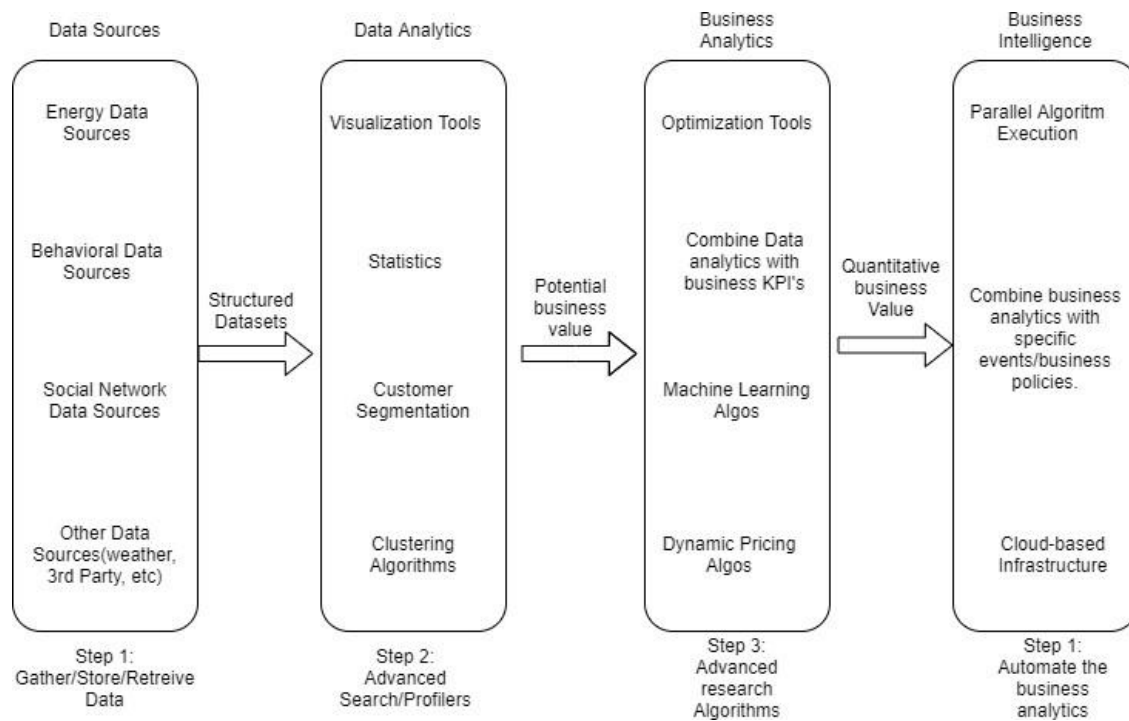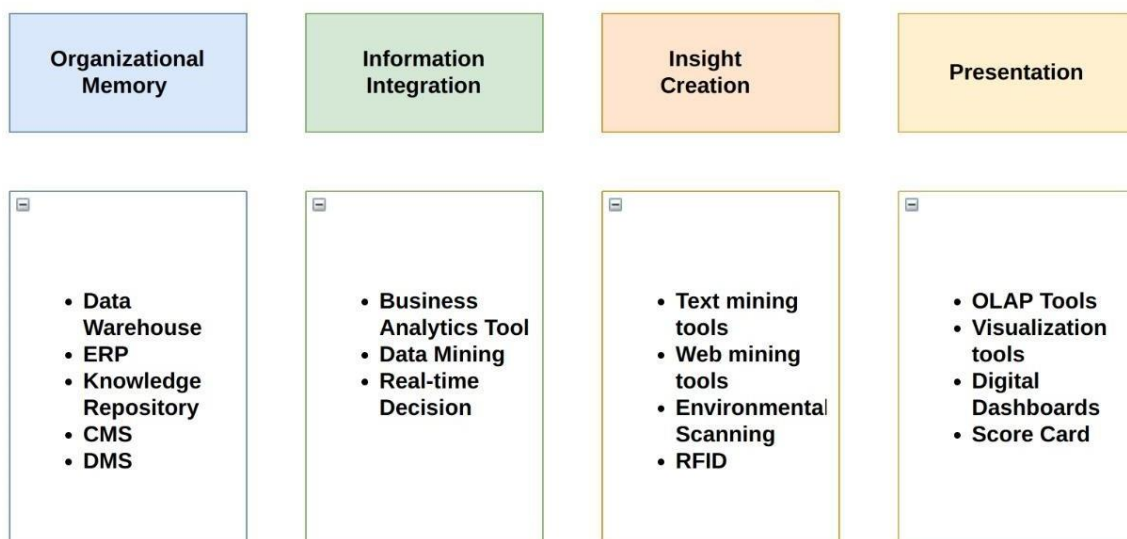
3 Design Details

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>DateTime>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 indicators or factors.

4.1 KPIs (Key Performance Indicators)

Key indicators displaying a summary of the Airport data and its relationship with different metrics

1   Total No. of Flights
2   No. of Flights by Day
3   Most Popular Day
4   Top 5 Routes
5   Top 5 Average Distance
6   Map

5 Deployment

Tableau's analytics platform offers three different deployment options depending on your environment and needs. The below graphic shows each option at a glance:

1. Tableau Online Get up and running quickly with no hardware required. Tableau Online is fully hosted by Tableau so all upgrades and maintenance are automatically managed for you.
2. Tableau Server deployed on public cloud: Leverage the flexibility and scalability of cloud infrastructure without giving up control. Deploy to Amazon Web Services, Google Cloud Platform or Microsoft Azure infrastructure to quickly get started with Tableau Server (on your choice of Windows or Linux). Bring your own license or purchase on your preferred marketplace.
3. Tableau Server deployed on-premises: Manage and scale your own hardware and software (whether Windows or Linux) as needed. Customize your deployment as you see fit.