

# **HIGH LEVEL DESIGN DOCUMENT**

## **(BANK MARKETING ANALYTICS – BI PROJECT)**

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## Document Version Control:

### Bank Marketing Analytics - Business Intelligence Project

Version	Date	Author	Change
1.0	07/09/21	Madhav Khurana	First version of complete HLD
1.1	09/11/21	Madhav Khurana	Added Tableau functionalities and dashboard

## **Abstract:**

The data is related to direct marketing campaigns (phone calls) of a Portuguese banking institution. The classification goal is to predict if the client will subscribe to a term deposit. The data is related to direct marketing campaigns of a Portuguese banking institution. The marketing campaigns were based on phone calls. Often, more than one contact to the same client was required, in order to access if the product (bank term deposit) would be subscribed or not.

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# 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.

## 1.3. Definitions

- EDA – Exploratory Data Analysis
- Csv file – Comma separated values file, opened in MS Excel

- Fair Share – An administratively set data rate per time frame that is considered fair.
- Postgres SQL Server – A database management system.
- Python – A programming language used for performing data analytics
- ER – Entity Relation Diagram
- Jupyter Notebook – An IDE which supports data science and scientific computing across all programming languages.
- Tableau -An interactive data visualization software company focused on business intelligence.

## 2. General Description:

### 2.1. Product Perspective & Problem Statement

Marketing Campaigns are important function in the banking industry. The Portuguese bank offers the service of Term deposits to its customers. In this project, I have analysed the data of marketing campaign to generate insights about the users who have either subscribed the term deposit or not.

The objective of the project is to get insights and perform data visualization techniques to understand in detail about the customers. This project aims to apply various Python libraries to get insights and also get a visual understanding of the data.

### 2.2. Tools used

#### 2.2.1 Python language:

- Pandas: This library is used to process the marketing data and analyze it.
- NumPy: This library is used for data manipulation and to perform calculations.
- Matplotlib: This library is used for performing basic data visualization such as charts like bar chart, pie chart, line chart, histogram etc.
- Seaborn: This library is used to perform complex data visualization such as heat map, box plot, scatter plot etc.

#### 2.2.2 MS Excel:

Microsoft excel is used for loading the data in csv format, basic data cleaning and filter operations to execute the program, MS excel file was loaded into pandas dataframe.

#### 2.2.3 Jupyter Notebook:

Jupyter Notebook is a client-based interactive web application that allows users to create and share codes, equations, visualizations as well as text.

#### 2.2.4 Anaconda Navigator:

Anaconda Navigator is a desktop graphical user interface (GUI) included in Anaconda distribution that allows you to launch applications and easily manage conda packages, environments, and channels without using command-line commands.

#### 2.2.5 Tableau Public:

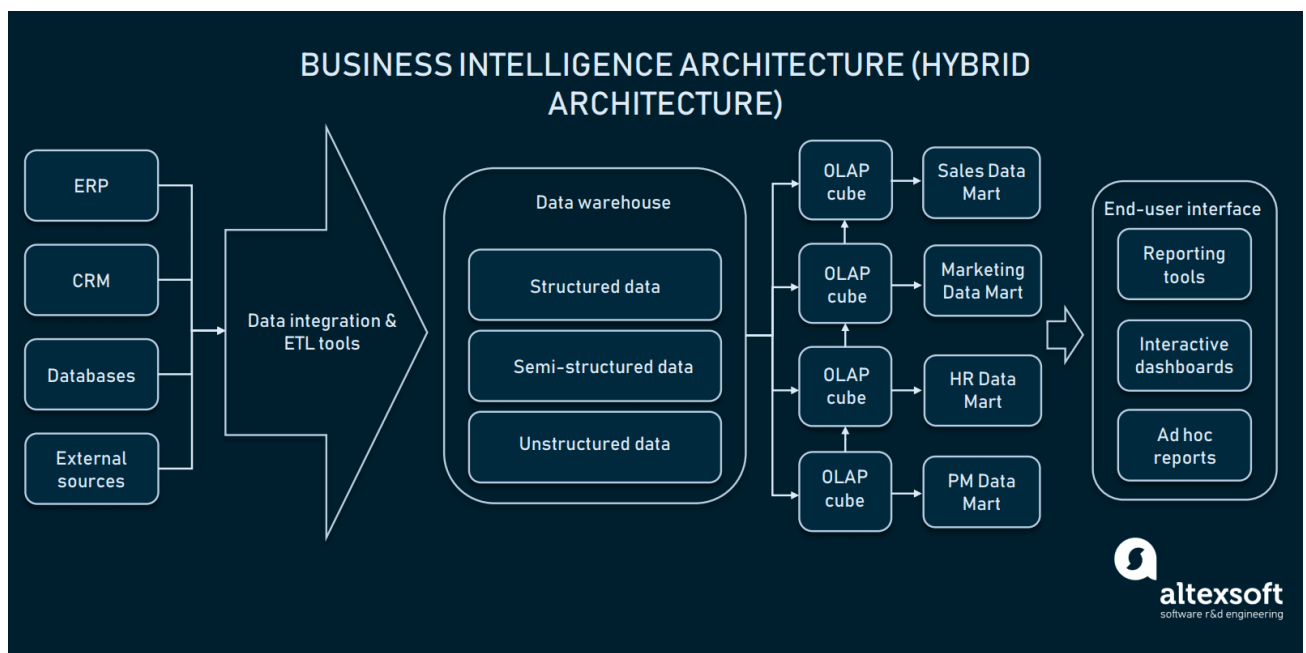
Business intelligence and analytics use Tableau as a visualized platform for the intentions of helping people watch, observe, understand, and make decisions with a variety of data. Any type of graphs, plots, and charts can be made easily in it without the need for any programming.





### 3. Design Detail

#### 3.1. Functional Architecture



The current business environment is constantly evolving. The global economic scenario is providing opportunities as well as challenges. The factors affecting business environment are consumer needs, globalization, and government policies, etc.

In such a business environment, organization basically has four action steps. The organization can be reactive, anticipative, adaptive, or/and proactive. For this, organization can develop a new strategy, get into partnership, etc.

Today most of the businesses are having a computerized business support. This support is in form of decision support system, business analysis, etc.

The main objective of business intelligence is to bridge the gap between organization current status and its desired position. Business intelligence helps organization achieve commercial success along with sound financial management.

**Business intelligence is framework designed to support decision-making process.** This framework combines architecture, database, analytical tools and applications. Business analytics forms an integral part of business intelligence.

#### Framework of Business Intelligence

More and more businesses are moving towards business intelligence. The reason for this movement is the business environment. Organizations are forced to capture, store and interpret data. This data is at the core of business success. Organizations require correct information for any decision-making process.

**Business intelligence combines data warehousing, business analytics, performance, strategy and user interface.** Business receives data from various sources. This data is capture in the data warehouse where it is stored, organized and summarized as per further utilization. Authorized users can access this data and work on it to get desired results. This result than are shared to executives for decision-making process. These data results can be published through dashboards or share points.

#### Business Intelligence Architecture and Components

The main components of business intelligence are data warehouse, business analytics and business performance management and user interface.

Data warehouse holds data obtained from internal sources as well as external sources. The internal sources include various operational systems.

Business analytics creates a report as and when required through queries and rules. Data mining is also another important aspect of business analytics.

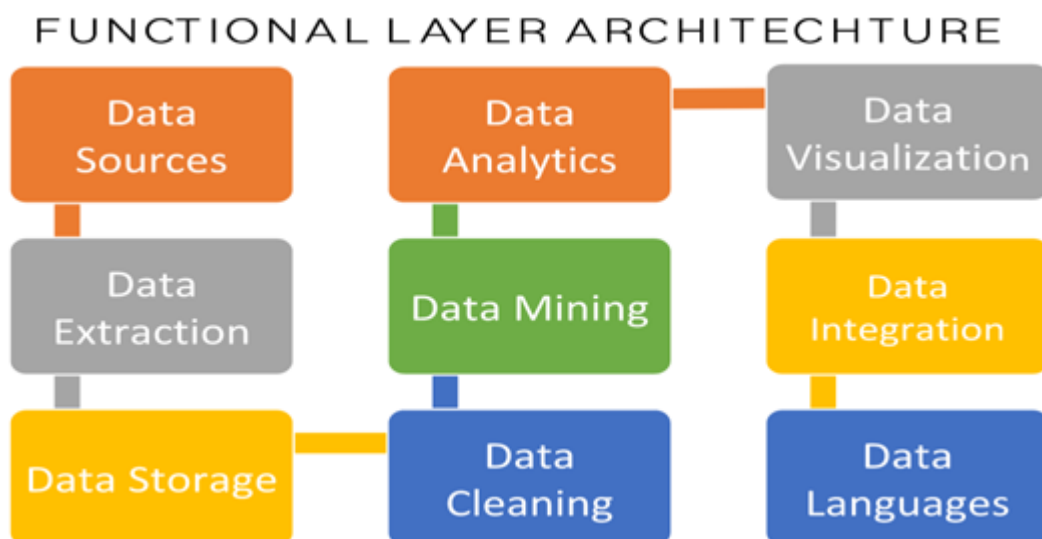
Business performance management is a linkage of data with business objectives for efficient tracking. This business performance is then broadcasted to an executive decision-making body through dashboards and share-point.

### Benefit of Business Intelligence

The benefits of Business intelligence are as follows:

- Business intelligence is faster more accurate process of reporting critical information.
- Business intelligence facilitates better and efficient decision-making process.
- Business intelligence provides timely information for better customer relationship management.
- Business intelligence improves profitability of the company.
- Business intelligence provides a facility of assessing organization's readiness in meeting new business challenges.
- Business intelligence supports usage of best practices and identifies every hidden cost.

Business intelligence usage can be optimized by identifying key projects on which company would like to focus. This process of highlighting key projects is called business intelligence governance.



## 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.
  - o LODs - Look at the number of unique dimension members in the calculation.

o 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.

## 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 Bank marketing Campaign's results and subscribers' information based on various parameters

1. No of Subscribers based on age range.
2. Subscriber's demographics such as age, job, education and marital status.
3. Leads conversion rate based on various parameters
4. Credit default information and analytics
5. Employment variation rate - quarterly indicator
6. Consumer price index - monthly indicator (numeric)
7. Consumer confidence index - monthly indicator (numeric)
8. Euribor 3-month rate - daily indicator (numeric)
9. Number of employees - quarterly indicator (numeric)

## 5. Deployment

Prioritizing data and analytics couldn't come at a better time. Your company, no matter what size, is already collecting data and most likely analysing just a portion of it to solve business problems, gain competitive advantages, and drive enterprise transformation. With the explosive growth of enterprise data,

database technologies, and the high demand for analytical skills, today's most effective IT organizations have shifted their focus to enabling self-service by deploying and operating Python Data Visualization at scale, as well as organizing, orchestrating, and unifying disparate sources of data for business users and experts alike to author and consume content.

- **Patterns in business operations:** Data visualization techniques help us to determine the patterns of business operations. By understanding the problem statement and identifying the solutions in terms of patterning and applied to eliminate one or more of the inherent problems.
- **Identify business trends and relate to data:** These techniques help us identify market trends by collecting the data on Day-To-Day business activities and preparing trend reports, which helps track the business how influences the market. So that we could understand the competitors and customers. Certainly, this helps to long-term perspective.
- **Storytelling and Decision making:** Knowledge of storytelling from available data is one of the niche skills for business communication, specifically for the Data Science domain which is playing a vital role. Using best visualization this role can be enhanced much better way and reaching the objectives of business problems.
- **Understand the current business insights and setting the goals:** Businesses can understand the insight of the business KPIs, finding tangible goals and business strategy planning, therefore they could optimize the data for business strategy plans for ongoing activities.
- **Operational and Performance analysis:** Increase the productivity With the help of visualization techniques the clarity of KPIs depicting the trends of the productivity of the manufacturing unit, and guiding were to improve the productivity of the plant.

TYPE PROS CONS

### Tableau Server - On Premises

- Full control of hardware and software
- Infrastructure and data remain behind your firewall
- Need dedicated administrators to manage hardware and software
- Additional infrastructure needed to access off-network (mobile, external)

**Tableau Server - Public Cloud (IaaS)**

- Full control of software on managed hardware
- Puts infrastructure in same place as data (for migration to cloud)
- Flexibility to spin up/down hardware as needed
- Need dedicated administrators to manage software
- Additional infrastructure needed to access off-network (mobile, external)

**Tableau Online (SaaS)**

- Fully hosted solution (hardware, software upgrades)
- Fast to deploy
- Easy for external audience to access
- Single-site in multi-tenant environment
- Cubes are not supported
- No guest account access

Depending on your organizational roles and responsibilities, Tableau Server should be installed by a systems administrator and the designated Tableau Server Administrator in coordination with the appropriate IT roles. For Tableau Online, you will integrate with your existing technology and configure the site settings. The Data & Analytics Survey, completed by business teams, identifies and prioritizes data use cases, audience size, and users. You will use the information collected in both surveys to plan your deployment strategy, including sizing, installation, and configuration of your Tableau Server or integration and configuration of Tableau Online. In addition to installing Tableau Server or configuring Tableau Online, administrators will also need to plan for the client software installation of Tableau Prep Builder, Tableau Desktop, Tableau Mobile, and Tableau Bridge for Tableau Online where applicable.