

Low Level Design

House Price Prediction

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1. Introduction

The Low-Level Design (LLD) document acts as a guide for the organization's technical Power BI deployment. Using analytics effectively is essential for organisations to obtain a competitive edge and promote well-informed decision-making in today's data-driven environment. With the complete toolkit for data visualisation, analysis, and reporting provided by Power BI, users can extract valuable insights from a variety of heterogeneous data sources.

Despite a focus on on-premises, cloud, and hybrid implementation situations, this article attempts to offer comprehensive information on Power BI configuration, implementation, and usage. To fully use Power BI's capabilities, it will go into the technical architecture, data integration procedures, security concerns, and implementation methods. Organisations may guarantee a smooth integration of Power BI into their current technological infrastructure, optimise system performance, and expedite the deployment process by adhering to the guidelines provided in this document. IT managers, developers, and other stakeholders engaged in the organization's Power BI adoption will find great value in the LLD document.

1.1 What is Low-Level design document?

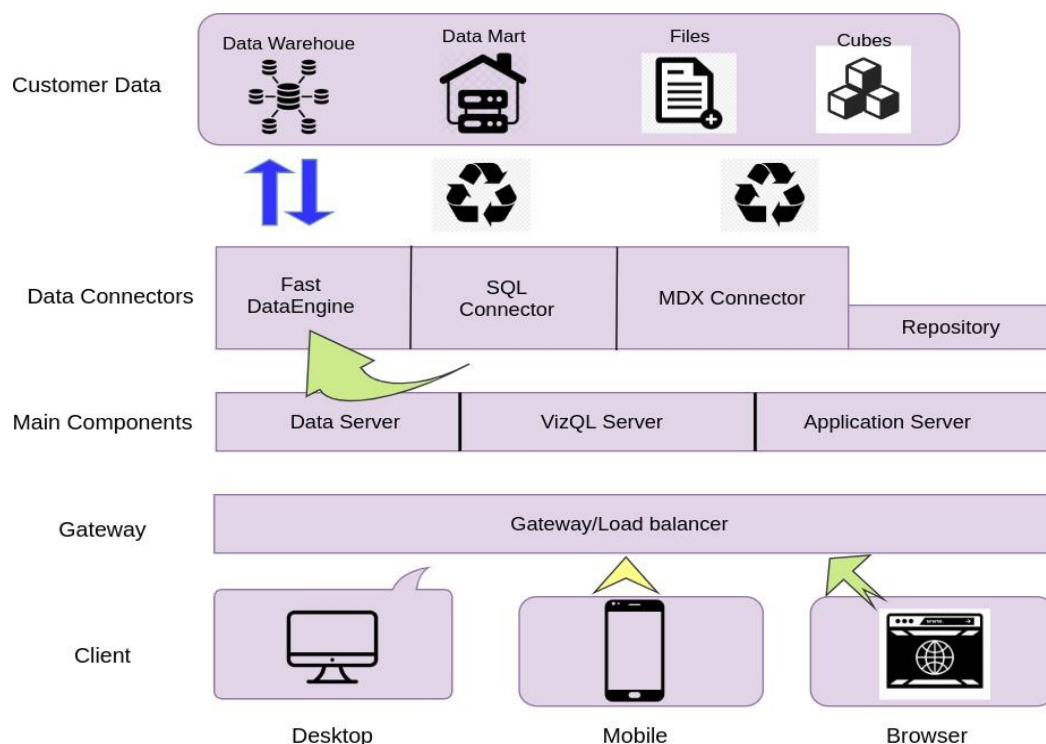
A software or system's Low-Level Design (LLD) document contains comprehensive technical specifications and implementation guidance. It provides a detailed description of the architecture, data structures, algorithms, interfaces, and modules so that developers may convert high-level specifications into tasks that can be completed for implementation.

1.2 Scope

The organization's Power BI installation will include a detailed description of the technical architecture and implementation details in the Low-Level Design (LLD) document. It will address topics including placing tactics, security protocols, data integration procedures, and system design. To meet on-premises, cloud, and hybrid deployment situations, the paper will detail the setup requirements for Power BI Desktop, Power BI Service, and Power BI Report Server. It will also offer direction on dashboard building, data modelling, user authorization, and connection with current technological infrastructure. IT professionals and other stakeholders engaged in the adoption and execution of Power BI inside the company will find the LLD to be an extensive guide.

2. Architecture

The Microsoft Power BI deployment architecture consists of several components, including data sources, data transformation processes, data models, visualisation layers, and deployment choices. This section will offer an overview of the architecture and how the components work together to provide insights to end users.



Power BI Architecture

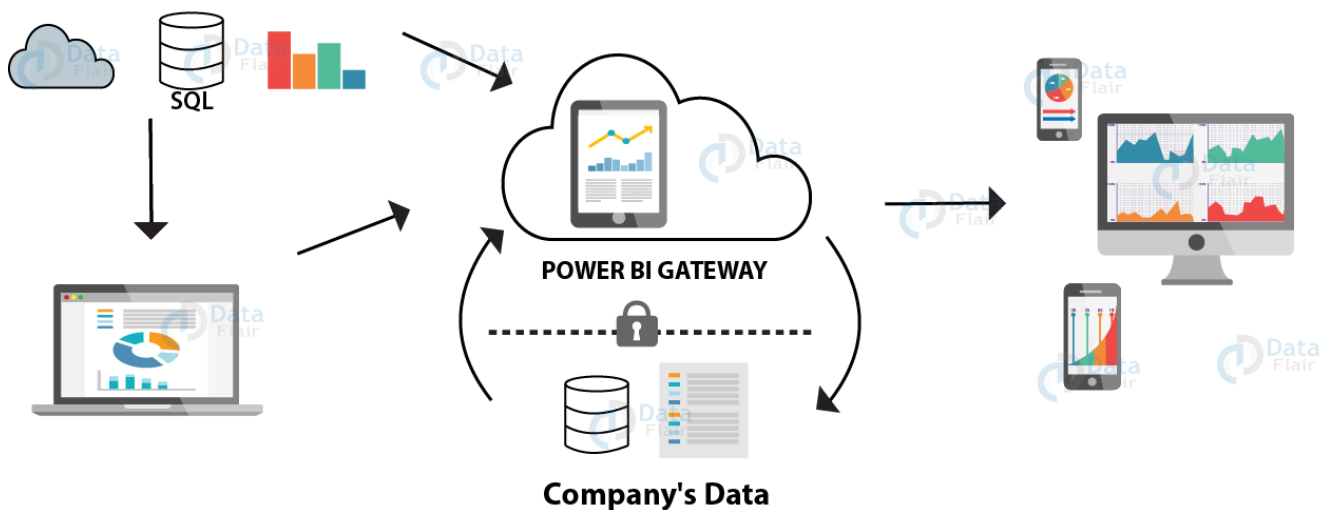
Power BI is an adaptable architecture that works well for desktop, online, and mobile customers. Its adaptable deployment choices guarantee quick setup in a variety of settings, facilitating easy access to and analysis of data.

POWER BI ARCHITECTURE



Process Flow of Power BI

Collection of data sources



- **Data Sources**
CRM systems, Excel spreadsheets, SQL databases, and cloud platforms are among the sources of data.
- **Data Integration**
Power BI links to data sources via connectors and APIs, allowing for data extraction, transformation, and loading (ETL) operations to prepare data for analysis.

- **Power BI Desktop**
Using a drag-and-drop interface, analysts and developers can create data models, generate reports, and construct visualizations using Power BI Desktop.
- **Power BI Service**
Reports and dashboards developed in Power BI Desktop are published to the Power BI Service, a cloud platform. Users can obtain these reports using web browsers or mobile applications.
- **Data Refresh**
To guarantee that reports include the most recent information, Power BI Service automatically refreshes data on a scheduled basis from linked sources.
- **Sharing and Collaboration**
Users may share reports and dashboards with colleagues, stakeholders, and clients to facilitate collaboration and decision-making based on real-time data.
- **Consumption**
End-users can engage with reports and dashboards via web browsers, mobile apps, or embedded analytics in other apps.
- **Feedback Loop**
Users can offer comments on reports and dashboards, urging producers to make any required changes or upgrades to increase usability and effectiveness.
- **Administration**
To maintain compliance and governance, administrators oversee user access, permissions, data connectivity, and security settings in the Power BI Service.
- **Continuous Improvement.**
Creators improve and iterate on reports and dashboards based on user input and data research to ensure their long-term relevance and effectiveness.

3. Architecture Description

3.1. Data Description

The Dataset contains amazon Customer data with the agencies by the Commendation or Complaint for the issue details fall under the categories of Subject Detail & Subject matter.

1.Agency:

Description: The agency or department within Amazon that handles the customer interaction.

Data Type: Categorical (e.g., Customer Service, Shipping, Sales)

2.Commendation or Complaint:

Description: Indicates whether the customer interaction was a commendation or a complaint.

Data Type: Categorical (e.g., Commendation, Complaint)

3.Subject Matter:

Description: The general subject or topic of the customer's inquiry or feedback.

Data Type: Text (e.g., Product Quality, Delivery Delay, Billing Issue)

4.Subject Detail:

Description: Specific details related to the subject matter of the customer's inquiry.

Data Type: Text (e.g., Defective Item Received, Late Delivery Notification)

5.Issue Detail:

Description: Detailed description of the specific issue or problem reported by the customer.

Data Type: Text (e.g., Item arrived broken, Package lost in transit)

6.Year:

Description: The year in which the customer interaction took place.

Data Type: Numeric (e.g., 2021, 2022)

7.Quarter:

Description: The quarter (three-month period) within the year when the interaction occurred.

Data Type: Categorical (e.g., Q1, Q2, Q3, Q4)

8.Branch/Line/Route:

Description: Specific branch, product line, or service route associated with the customer interaction.

Data Type: Categorical (e.g., Customer Support Branch A, Product Line XYZ)

3.2. Web Scrapping

Web scraping for Amazon customer data involves programmatically retrieving specific information from Amazon's website, such as customer reviews, product ratings, or sales data. Python libraries like BeautifulSoup and Selenium can be used to automate this process. For example, BeautifulSoup parses HTML content to extract desired elements like customer reviews or product details. Selenium, on the other hand, can simulate user interactions with the website, allowing for more complex scraping tasks such as navigating through pages or interacting with dynamic elements. By leveraging these tools, developers can efficiently gather and analyze Amazon customer data for various purposes like sentiment analysis or market research.

3.3. Data Transformation

In the data transformation process for Amazon customer data, we'll convert the original dataset into a standardized format with necessary attributes. This may involve cleaning, reformatting, and enriching the data. Subsequently, we'll merge this transformed dataset with additional data obtained from web scraping, enhancing the dataset for analysis and insights.

3.4. Data Insertion into Database

- a. Prepare transformed Amazon customer data for insertion into a database.
- b. Establish a connection to the target database (e.g., PostgreSQL, MySQL).
- c. Define database schema and tables to accommodate the data structure.
- d. Use database-specific libraries or tools (e.g., psycopg2 for PostgreSQL) to insert data efficiently.
- e. Execute SQL queries to insert transformed data into the database tables.
- f. Validate and ensure data integrity post-insertion.
- g. Handle any potential errors or exceptions during the insertion process.

3.5 Make the SQL connection and set up the data source

Step 1: Configuring Power bi

- Launch Power BI Desktop on your computer.
- Click on "Get Data" from the Home tab in the ribbon.
- Choose the desired data source option (e.g., SQL Server, Excel, Web, etc.).
- Provide the connection details such as server name, database name, and authentication method.
- If required, specify advanced options like port number and SSL settings.
- Click "Connect" to establish the connection to the data source.

Step 2: Configuring Data Source

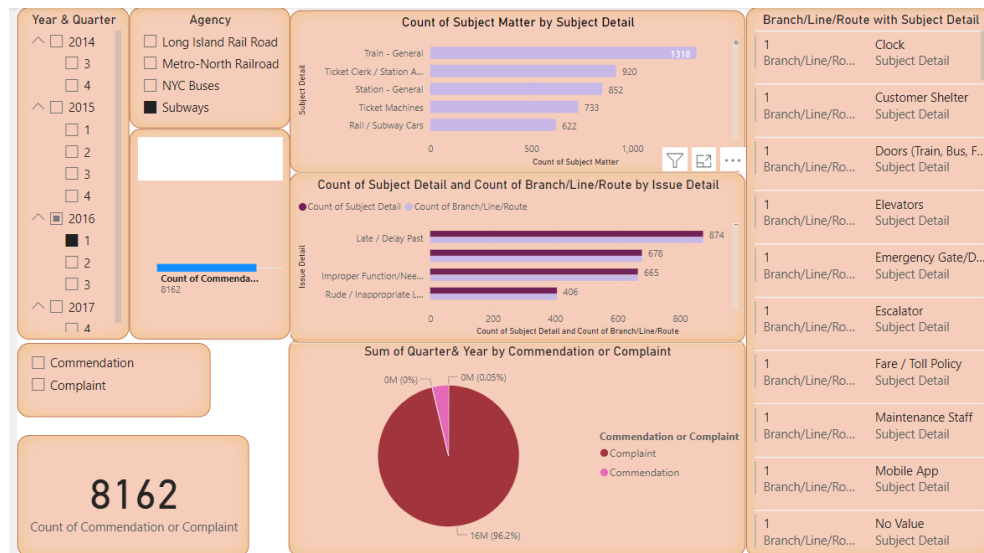
1. After connecting to the data source, select the specific tables or views you want to import into Power BI.
2. Use the Navigator pane to preview and select the data objects (tables, views) you need.
3. Click on "Load" or "Transform Data" based on whether you want to load the data directly into Power BI or perform data transformations first.
4. If transformations are needed, use Power Query Editor to clean, transform, or reshape the data.
5. Apply necessary data modeling techniques like creating relationships between tables or adding calculated columns.
6. Save the changes and data model within Power BI Desktop.

3.5. Export Data from Database

Exporting data from a database to use in Power BI involves querying the database directly within Power BI or using external tools like SQL Server Management Studio. Once the desired data is retrieved, it can be exported as CSV files for further preprocessing or analysis outside of Power BI.

3.6 Deployment.

Deployment of Power BI involves publishing reports and dashboards to Power BI Service or Power BI Report Server. This allows users to access and interact with the visualizations via web browsers or mobile apps. Administrators manage access permissions and schedule data refreshes for live data sources.



3. Unit Test Cases

TEST CASE DESCRIPTION	EXPECTED RESULTS
Agency slicer	When clicked on the slicer, a dropdown should occur which has various Agencies in the list.
Year & Month Parameter	When clicked on the slicer, a dropdown should occur which describes the parameters of the Years & Months.
Decomposition Tree	Here a time series graph is shown of all the agencies to the total no of branches/lines/routes.
Card for commendation & Compliant	which shows the total no of the commendations & complaints.
Pie Chart	The visual should show a pie diagram of the relation between the number of years and the commendations & complaints.
Clustered bar chart	This is an important visual in the bar graph which shows the count of subject matter by the subject detail.



