

LOW LEVEL DESIGN

ANALYZING AMAZON SALES DATA

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Chaitanya Nilkanthanawar

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1. Introduction

1.1 What is Low-Level design document?

The goal of the LDD or Low-level design document (LLDD) is to give the internal logic design of the actual program code for the House Price Prediction dashboard. LDD describes the class diagrams with the methods and relations between classes and programs specs. It describes the modules so that the programmer can directly code the program from the document.

1.2 Scope

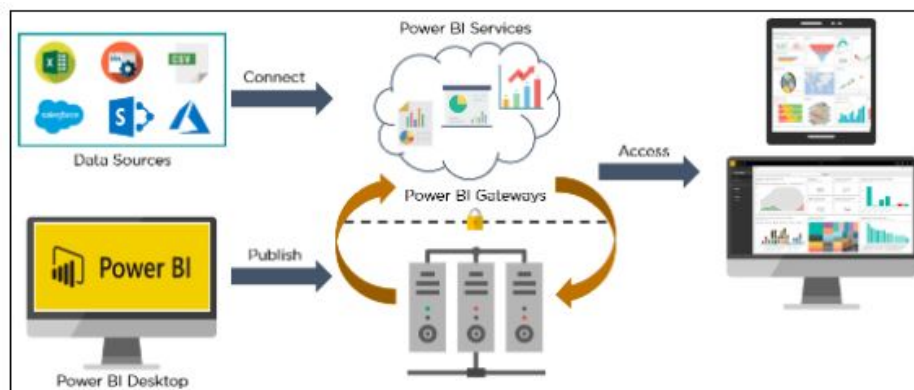
Low-level design (LLD) is a component-level design process that follows a step-by-step refinement process. The process can be used for designing data structures, required software architecture, source code and ultimately, performance algorithms. Overall, the data organization may be defined during requirement analysis and then refined during data design work.

2. Architecture

Power BI is a comprehensive business suite encompassing a synergistic ensemble of technologies, meticulously orchestrated to deliver exemplary business intelligence solutions. At its core, the Microsoft Power BI technology amalgam comprises an array of integral components, each playing a pivotal role in the data journey. These components include:

- POWER QUERY (For Data Mash-Up And Transformation)
- POWER BI DESKTOP (A Companion Development Tool)
- POWER BI MOBILE (For Android, IOS, Windows Phones)
- POWER PIVOT (For In-Memory Tabular Data Modeling)
- POWER VIEW (For Viewing Data Visualizations)
- POWER MAP (For Visualizing 3D Geo-Spatial Data)
- Power Q&A (For Natural Language Q&A)

In essence, Microsoft Power BI orchestrates this symphony of components, harmonizing their capabilities to compose a holistic business intelligence solution. Each element contributes a distinct melody, culminating in a harmonious and potent composition that empowers businesses to unravel the symphony of their data-driven endeavours.



2.1 Data Sources

An integral facet of Power BI lies within its extensive array of data sources. This platform empowers you to seamlessly import data from various origins, including files residing within your local system, data sources hosted on cloud-based platforms, or establish direct connections to real-time data streams. When engaging in data imports, whether from on-premise repositories or online services, it's important to note that there exists a data size threshold of 1 GB. A selection of frequently utilized data sources within Power BI encompasses:

- Excel
- Text/CSV
- XML
- JSON
- Oracle Database
- IBM DB2 Database
- MySQL Database
- PostgreSQL Database
- Sybase Database
- Teradata Database
- SAP HANA Database
- SAP Business Warehouse server
- Amazon Redshift
- Impala
- Google Big Query (Beta)
- Azure SQL Database
- Salesforce Reports
- Google Analytics
- Facebook
- GitHub

2.2 Power BI Desktop

Power BI Desktop stands as a client-side companion development and authoring tool renowned for its comprehensive capabilities. Functioning on the desktop environment, this software is equipped with an extensive array of tools and functionalities, enabling seamless interaction with diverse data sources. Its capabilities span data connectivity, data transformation, robust data modeling, and the creation of insightful reports.

2.3 Power BI Service

The Power BI Service serves as a web-based platform that facilitates seamless sharing of reports crafted using Power BI Desktop, fosters collaborative endeavors among users, and provides tools for dashboard creation. This dynamic platform is accessible through three distinct versions:

- The Free version
- The Pro version
- The Premium version

Recognized under various names such as "Power BI.com," "Power BI Workspace," "Power BI Site," and "Power BI Web Portal," this component extends beyond its basic functions. It encompasses advanced capabilities such as natural language Q&A and alert mechanisms, thereby enhancing its utility and user experience.

2.4 Power BI Report Server

The Power BI Report Server closely parallels the Power BI Service, with the primary distinction lying in its on-premise nature. Unlike the cloud-based Power BI Service, the Power BI Report Server caters to organizations seeking to maintain their reports within their own infrastructure, driven by data security considerations. This localized platform empowers users to develop dashboards and share reports while upholding rigorous security protocols. To leverage the capabilities of the Power BI Report Server, a requisite Power BI Premium license is essential.

2.5 Power BI Gateway

This integral element serves the purpose of establishing connections and accessing on-premise data within highly secure networks. Power BI Gateways find their primary application in organizations that prioritize stringent data security measures. These gateways play a crucial role in extracting such securely held data through protected channels, facilitating its seamless integration into the Power BI platform for comprehensive analysis and reporting functionalities.

2.6 Power BI Mobile

Power BI Mobile represents a native application designed specifically for iOS, Android, and Windows mobile devices. Its core functionality revolves around the convenient access and visualization of reports and dashboards. This suite of applications serves as the preferred medium for interacting with and gaining insights from Power BI content on the go.

2.7 Power BI Embedded

Power BI Embedded provides a set of Application Programming Interfaces (APIs) that serve the purpose of seamlessly integrating visuals into bespoke and custom applications. This capability empowers developers to incorporate Power BI's interactive data visualizations directly within their own software solutions, enhancing user experiences and enriching applications with data-driven insights.

3. Architecture Description

3.1 Data Description

The dataset comprises two main tables: Customer and Sales data from Amazon, spanning the years 2017, 2018, and 2019.

Amazon Sales Data Features

1. Custkey: This is a unique identifier assigned to each customer.
2. Datekey: The specific date on which a transaction occurred.
3. Discount amount: The variance between the sales amount based on the list price and the actual sales amount.
4. Invoice Date: The date of order delivery and invoice creation.
5. Invoice Number: A distinct system-generated number for each invoice.
6. Item Class: The category classification of the item.
7. Item Number: An exclusive identifier for each item.
8. Item: The name of the item involved in the transaction.
9. Line Number: The line number associated with the order.
10. List Price: The manufacturer's quoted price for the item.
11. Order Number: A unique identifier for individual orders.
12. Promised delivery date: The estimated delivery date provided.
13. Sales Amount: The product of the sales price and quantity sold.
14. Sales amount based on List Price: The result of multiplying the list price by the quantity.
15. Sales Cost amount: The cost incurred for making the item's sale.
16. Sales Margin amount: The difference between the sales amount and the sales cost amount.
17. Sales Price: The price at which the item is sold.
18. Sales Quantity: The quantity of the item ordered.
19. Sales Rep.: A unique identifier for the sales representative.
20. U/M: The unit of measurement for a specific item.

Customer Details Data Features

1. Custkey: A distinct identifier for each customer.
2. Region Name: The geographical region, e.g., central, southern, etc.
3. Division Name: The categorization of the division as domestic or international.
4. City: The name of the city associated with the customer.
5. Country: The name of the country where the customer is located.
6. Zip Code: The postal code for the city.
7. Customer Name: The name of the customer.

Please note that this data structure provides a comprehensive overview of customer and sales-related attributes within the Amazon dataset for the specified years.

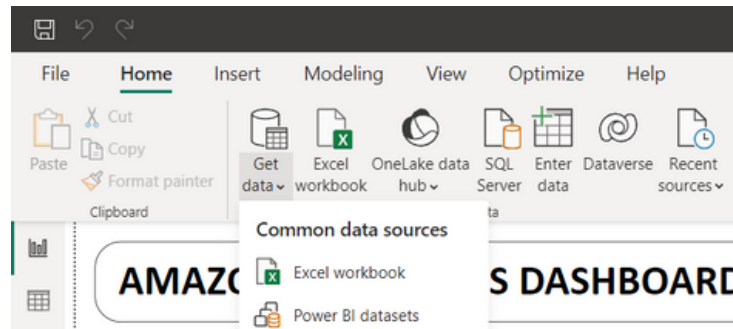
3.2 Data Loading

STEP 1: Launch the Power BI Desktop application.

STEP 2: Navigate to the "Get Data" option and then select "Excel."

STEP 3: Locate the data file within your system and choose it.

STEP 4: After the data is loaded, select "Transform Data" at the bottom to initiate additional data transformations.



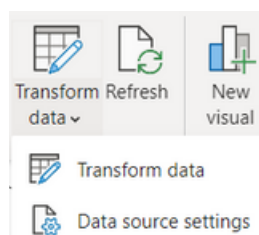
3.3 Data Transformation

During the transformation phase, our initial datasets will undergo a series of modifications using the Power Query tool within the Power BI ETL framework. This conversion process involves reformatting attributes and altering features in alignment with the specific requirements outlined in the problem statement. As the source data is provided in Excel format, Power Query will be employed for these adjustments.

One significant enhancement involves the creation of a new "Dim_date" table. This dedicated table is strategically designed to facilitate seamless time intelligence analysis. The table incorporates essential temporal attributes, including:

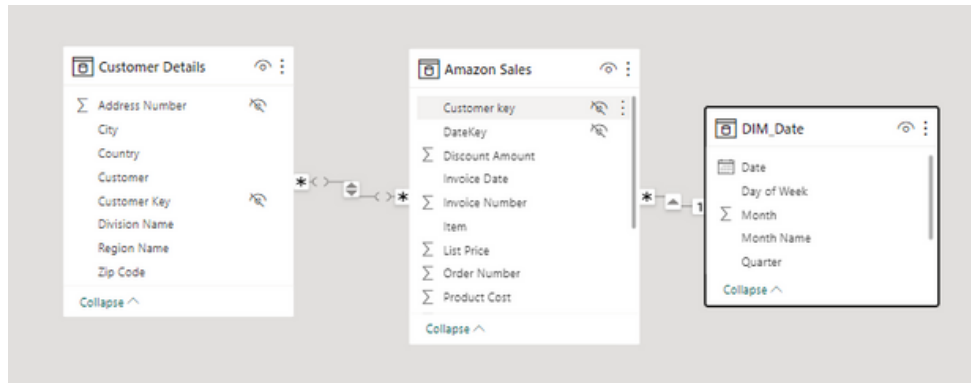
- 1) Day of Week: This attribute captures the specific day of the week for each date entry.
- 2) Month Name: It signifies the name of the month corresponding to each date.
- 3) Year: This feature represents the calendar year associated with the respective date.
- 4) Year Quarter: It categorizes dates into distinct quarters within a calendar year.
- 5) Month: This attribute denotes the numerical representation of the month for each date.
- 6) Date: The date itself is included as an integral part of this new table.

By integrating these attributes into the "Dim_date" table, we enable streamlined and effective time-based analysis within the Power BI environment.



3.3 Data Modelling

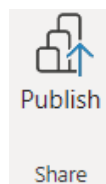
Once the data has undergone the transformation process, it is then structured and modeled to facilitate visualization and analysis.



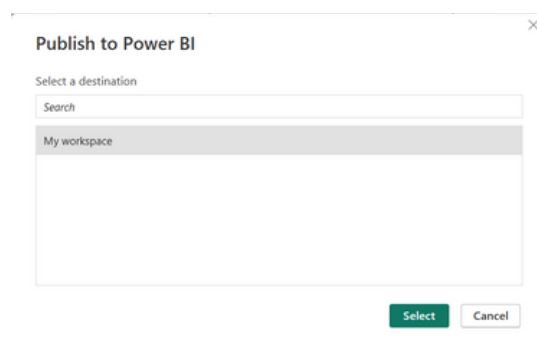
3.4 Deployment

Upon finalizing the dashboard, proceed with the following STEPs to successfully deploy the report:

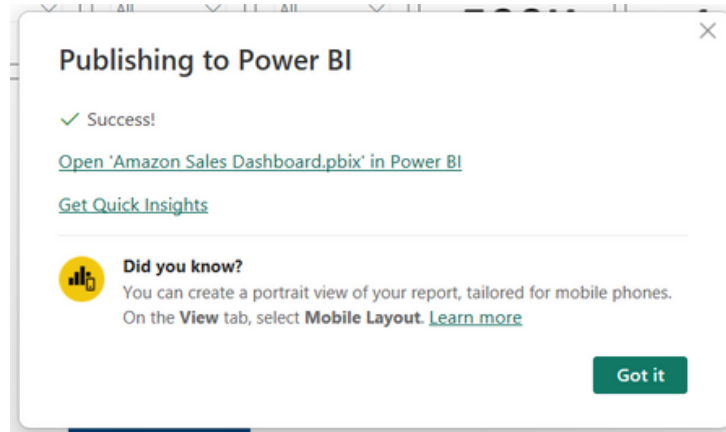
STEP 1: Access the "Publish" option located on the ribbon.



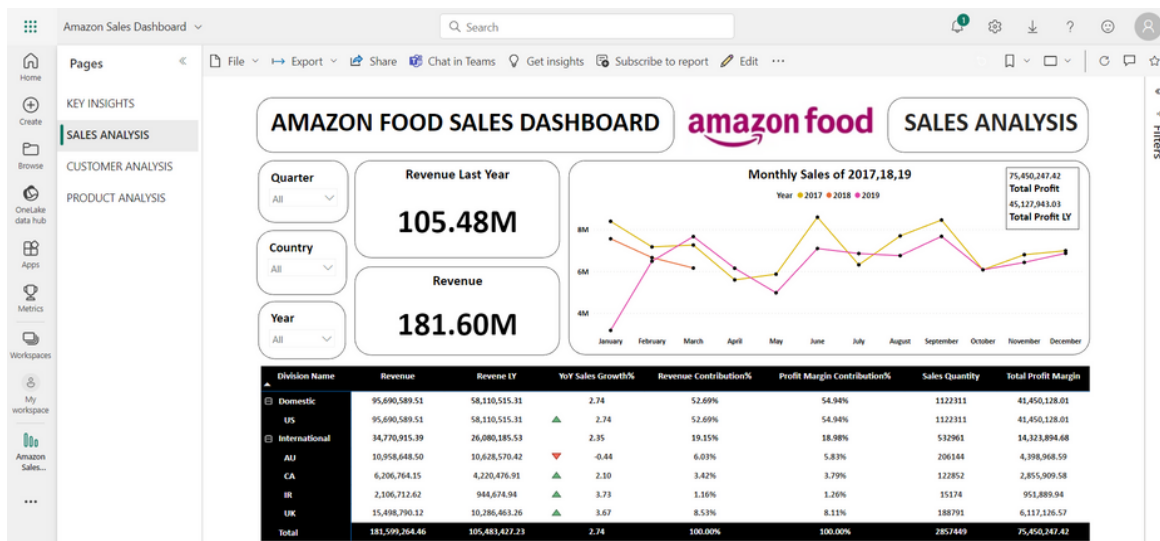
STEP 2: A dialogue box will appear; simply choose "My Workplace" and make your selection.



STEP 3: Your report is now published. To review the published report, simply click on "Open."



STEP 4: With the report successfully published, take the opportunity to explore and delve into its contents.



These STEPS ensure a seamless deployment of your report, allowing for thorough examination and interaction with the published content.

4. Unit Test Cases

TEST CASE	DESCRIPTION
Slicers for Year, Country, and Quarter	A user-friendly drop-down interface enables selections within the Year, Country, and Quarter slicers.
Top 20 product slicer	The Top 20 Product slicer effortlessly displays the top products, facilitating seamless selection.
Charts	Each chart flawlessly presents data without any display errors or discrepancies, providing accurate insights.
Tooltips	Tooltips across different pages are effectively functioning, enhancing the user experience by delivering relevant information.
Page buttons	The page buttons are fully operational, ensuring smooth navigation between different sections of the report.