Low-Level Design

Travel (Airbnb) Data Analysis

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DOCUMENT CONTROL

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0.2	1-Feb-2023	Karishma Grover	Architecture & Architecture description appended and updated.

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0.2	3- April - 2023	Karishma Grover	Unit test cases to be added

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Contents

1. Introduction

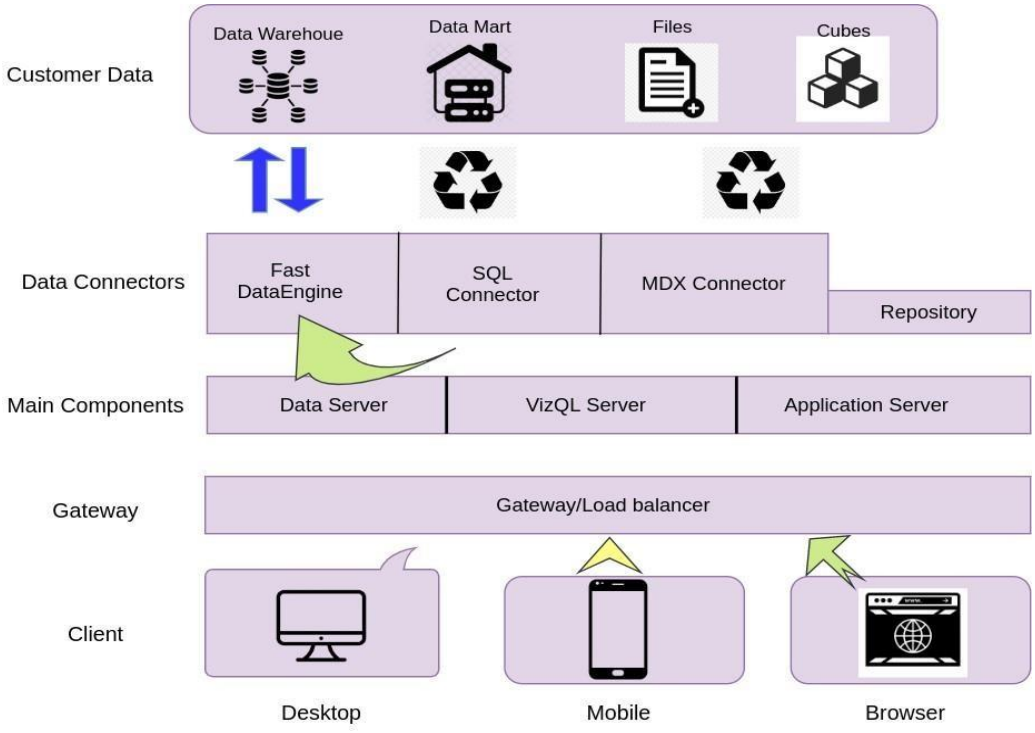
1.1 What is a Low-Level design document?

The goal of the LDD or Low-level design document (LLDD) is to give the internal logic design ofthe actual program code for the Airport Data Analysis dashboard. LDD describes the class diagrams with the methods and relations between classes and program specs. It describes themodules 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 softwarearchitecture, source code, and ultimately, performance algorithms. Overall, the data organization may be defined during requirement analysis and then refined during data designwork.

2. Architecture



Power BI Architecture

What is Power BI?

Power BI is a suite of business analytics tools that are used to analyze data and share insights. The dashboardthe users so that they do not miss out on any useful insight. To deliver outstanding business intelligence solution components such as:

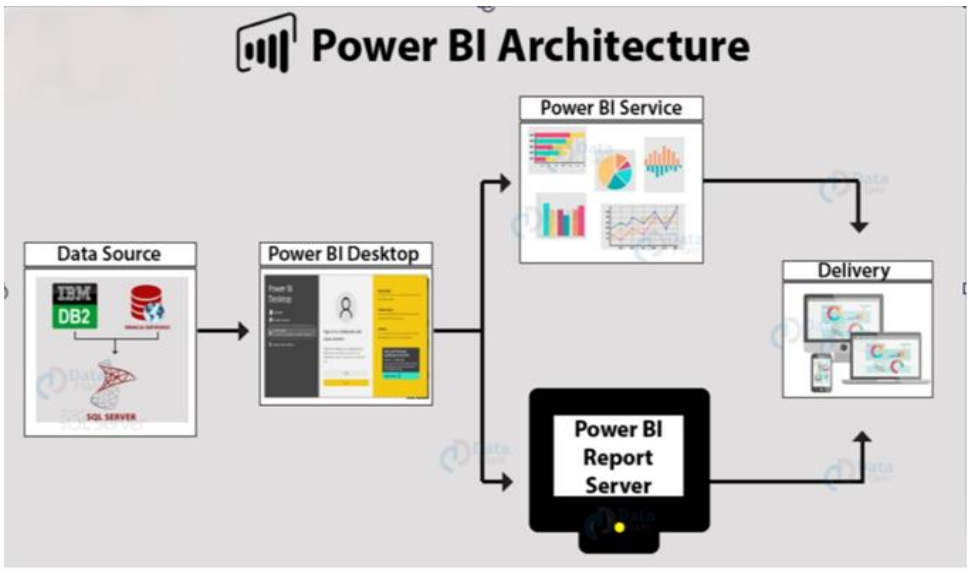
- Power Query (for data mash-up and transformation)
- Power BI Desktop (a companion development tool)
- Power BI Mobile (for Android, iOS, and Windows phones)
- Power Pivot (for in-memory tabular data modeling)
- Power View (for viewing data visualizations)
- Power Map (for visualizing 3D geo-spatial data)
- Power Q&A (for natural language Q&A)

A Power BI user takes data from various data sources such as **files, Azure sources, online services, and DirectQ** client development tools such as Power BI Desktop*.* The imported data is cleaned and transformed according to the data.

Once the data is transformed and formatted, it is ready to use in making visualizations in a report. A report is *slicers.* Moving on to the chain of processes, you can publish the reports created on the Power BI desktop in two kind Power BI Service is a cloud-based public platform whereas Power BI Report Server is an on-premise platform

You can create dashboards on these platforms by pinning visualizations from your published reports. Now it's other users from your organization or outside, using delivery options like a web browser, and Power BI on iPad.

The following diagram shows Power BI architecture:



Components of Power BI Architecture

1. Data Sources

An important component of Power BI is its vast range of data sources. You can import datafrom files in your system, cloud-based online data sources or connect directly to live connections. If you import from data on-premise or online services there is a limit of 1 GB.Some commonly used data sources in Power BI are:

- 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 BigQuery (Beta)
- Azure SQL Database
- Salesforce Reports
- Google Analytics
- Facebook
- GitHub

2. Power BI Desktop

Power BI Desktop is a client-side tool known as a companion development and authoringtool.

This desktop-based software is loaded with tools and functionalities to *connect to datasources, transform data, data modelling, and create reports.*

You can download and install Power BI Desktop in your system for free. Using Power BI Desktop features, one can do *data cleansing, create business metrics and data models, definethe relationship between data, define hierarchies, create visuals, and publish reports.*

3. Power BI Service

Power BI Service is a web-based platform from where you can *share reports made on Power BI Desktop, collaborate with other users, and create dashboards.*

It is available in three versions:

- Free version
- Pro version
- Premium version

Power BI Service is also known as, “Power BI.com”**,** “Power BI Workspace”, “Power BI Site” **and** “Power BI Web Portal”**.** This component also offers advanced features like *natural language Q&A* and *alerts*.

4. Power BI Report Server

The Power BI Report Server is similar to the Power BI Service. The only difference between these two is that Power BI Report Server is an on-premise platform. It is used by organizations who do not want to publish their reports on the cloud and are concerned about the security of their data.

Power BI Report Server enables you to create dashboards and share your reports with otherusers following proper security protocols. To use this service, you need to have a Power BI Premium license.

5. Power BI Gateway

This component is used to connect and access on-premise data in secured networks. Power BIGateways are generally used in organizations where data is kept in security and watch. Gateways help to extract such data through secure channels to Power BI platforms foranalysis and reporting.

6. Power BI Mobile

Power BI Mobile is a native Power BI application that runs on iOS, Android, and Windows mobile devices. For viewing reports and dashboards, these applications are used.

7. Power BI Embedded

Power BI Embedded offers APIs that are used to embed visuals into custom applications.

3. Architecture Description

3.1. Data Description

The Dataset describes the listing activities and metrics of Airbnb Amsterdam which shares information on the room types and locations that are available for rent, it shared the pricing and even the reviews to check the popularity of different neighborhoods. The Dataset had latitude, longitude, hosts that were listed, and the count that they were listed. It also had a list of amenities.

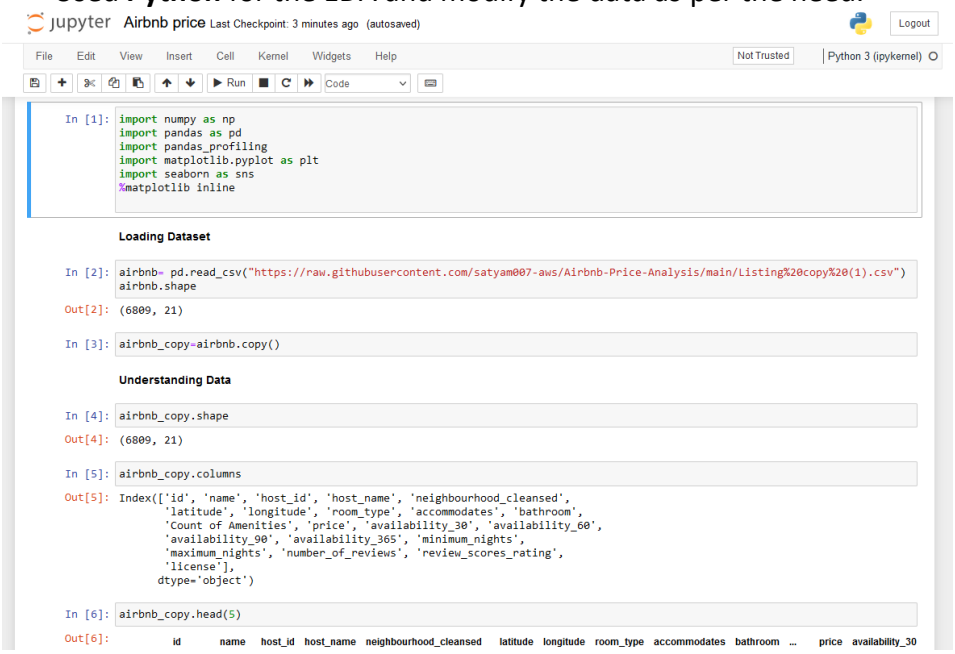
By using these parameters, we evaluated the following options

1. Average Price of the Neighborhood: This help to give us the average range of different locations in the data.
2. Top Earners: This gives the top 10 Earner details and the amount that they have earned.
3. Booking by Location: It helps to evaluate the most booked location in the entire set.
4. Average pricing by Year and Month: This help in evaluating the average price in a particular month of that year.
5. Average Price by Room type: Give us an average of which areas were mostly preferred by clients.
6. Review VS Price: This option gives us review counts of particular areas (Entire room, Hotel Room, Private space, Share areas)
7. Amenities effect on pricing: This help in evaluating the average pricing and amenities that the host has to offer.
8. Maps: Microsoft help in showcasing the locations through maps

3.2. Data Transformation

In the Transformation Process, we have converted our original dataset and added more datasets of calendars with other necessary attributes format. And merge it usingPower BI modeling, and manage relationships between the datasets.

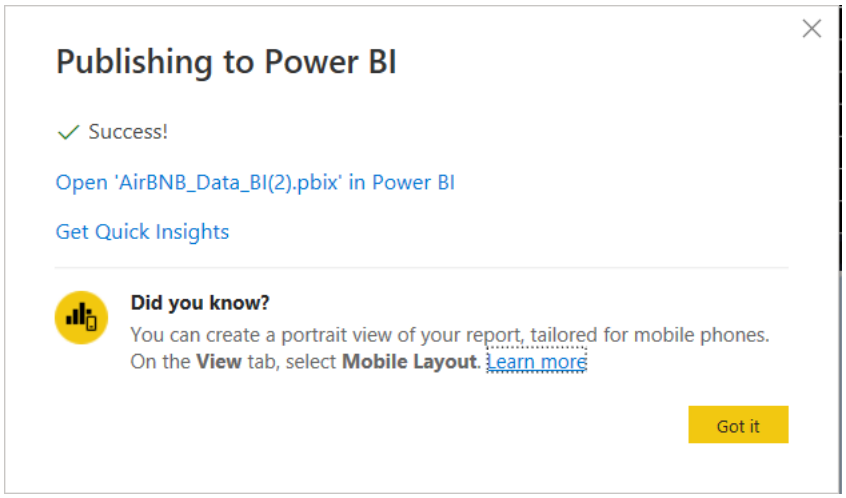
Used **Python** for the EDA and modify the data as per the need.



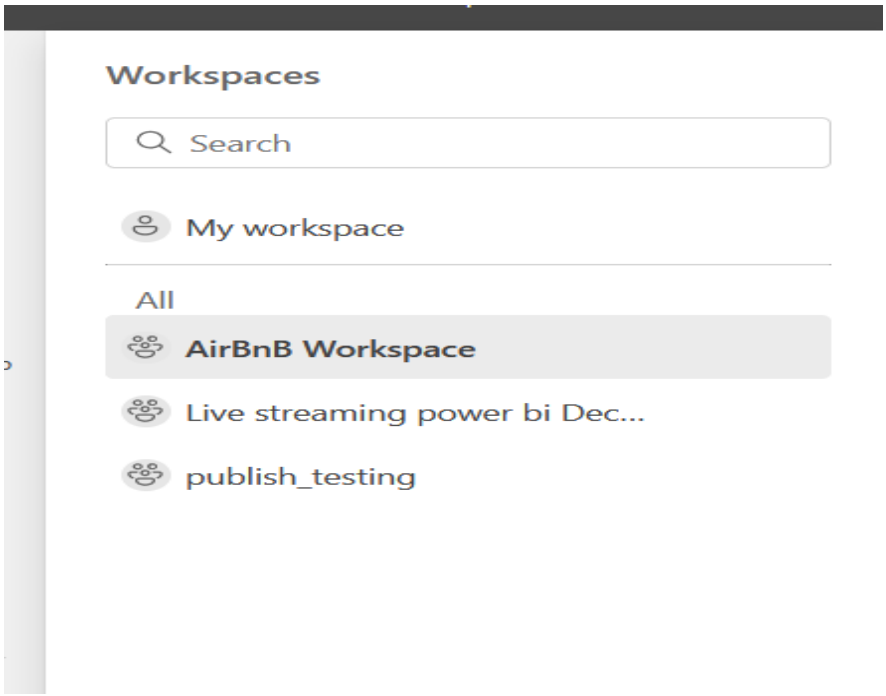
3.3 Deployment.

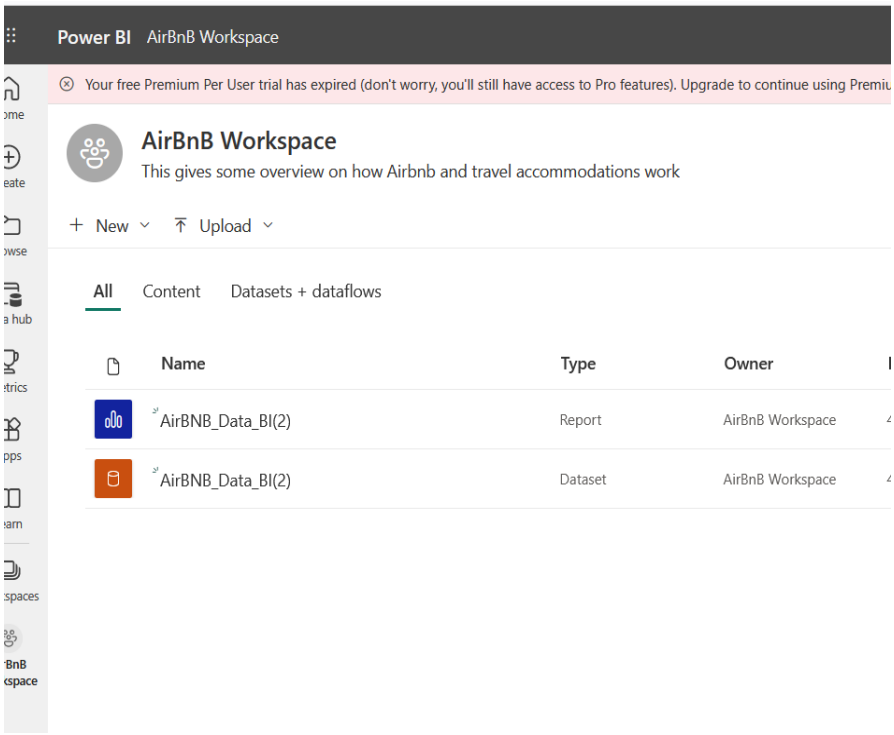
Once you've completed your dashboard, follow these steps **- Power BI Desktop, Publish toPower BI service.**

A screen will prompt with the successful upload of the dashboard in the Power BI service if it's already linked to the Power BI Desktop



Next, Login to the Power BI Service and check the workspace in which the Dashboard is published.

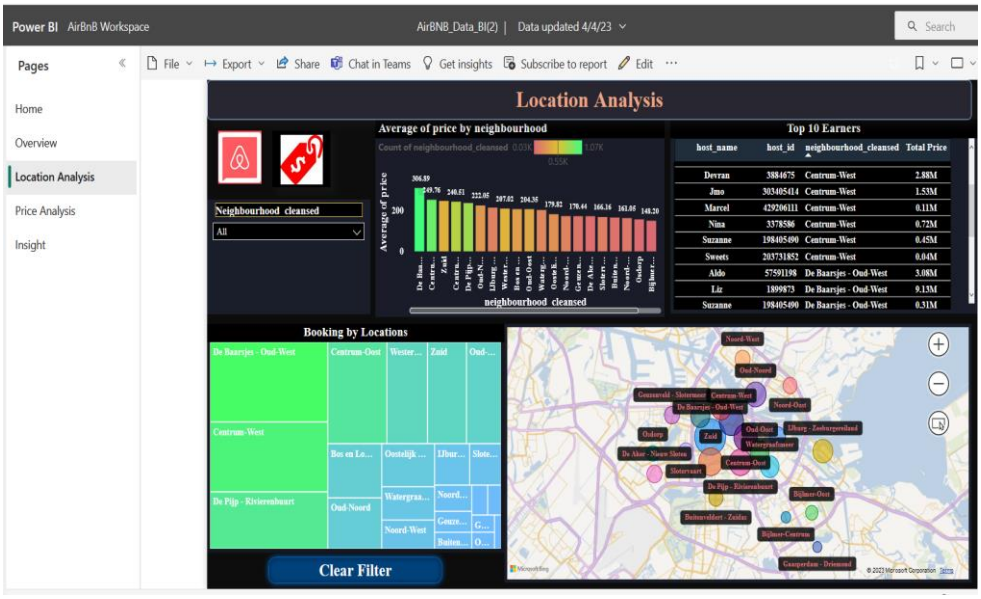




This shows that Report has been published in the workspace and now who so ever will have anID and the access to check the dashboard will be able to check from anywhere.

Here in the below screenshot, of visualization on the Power BI service.

Airbnb Data Analysis



Airbnb Data Analysis

4. Unit Test Cases

TEST CASE DESCRIPTION	EXPECTED RESULTS
Average Price of the Neighborhood	This helps to give us the average range of different locations in the data.
Top Earners	This gives the top 10 Earner details and the amount that they have earned.
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Average Price by Room Type	Give us an average of which areas were mostly preferred by clients.
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