Architecture Design

Air BNB Data Analysis

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1.Introduction

1.1 What is Architecture design document?

Any software needs the architectural design to represents the design of software. IEEE defines architectural design as “the process of defining a collection of hardware and software components and their interfaces to establish the framework for the development of a computer system.” The software that is built for computer-based systems can exhibit one of these many architectures. Each style will describe a system category that consists of:

A set of components (e.g.: a database, computational modules) that will perform a function required by the system. The set of connectors will help in coordination, communication, and cooperation between the components. Conditions that how components can be integrated to form the system. Semantic models that help the designer to understand the overall properties of the system.

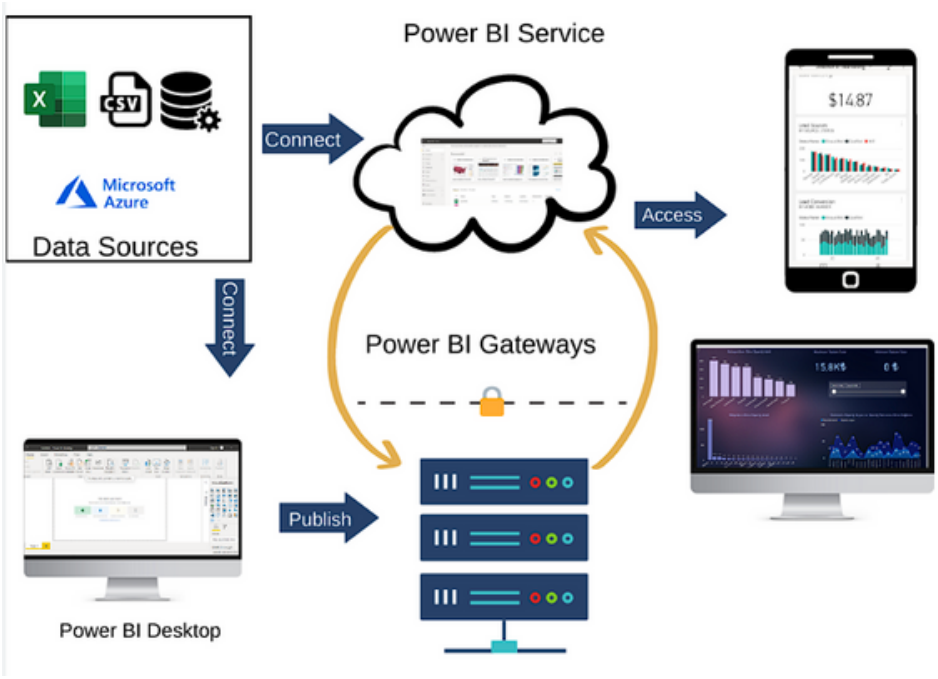
1.2 Scope

Architecture Design Document (ADD) is an architecture 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 design principles may be defined during requirement analysis and then refined during architectural design work.

2.Architecture of Power BI

Power BI is a business suite that includes several technologies that work together. To deliver outstanding business intelligence solutions, Microsoft Power BI technology consists of a group of components such as:

- **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)**



1. Data Sources

An important component of Power BI is its vast range of data sources. You can import data from 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 authoring tool. This desktop-based software is loaded with tools and functionalities to connect to data sources, transform data, data modeling and creating 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

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.

5.Power BI Gateway

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

6.Power BI Mobile

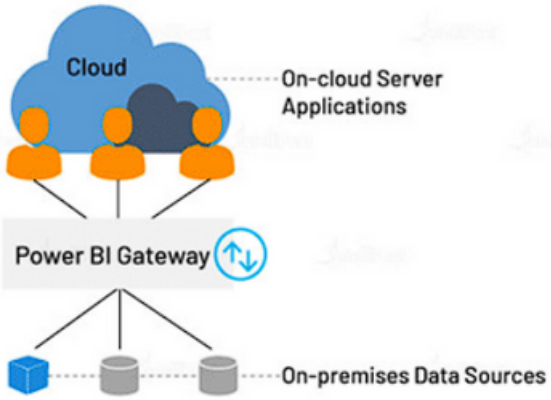
Power BI Mobile is a native Power BI application that runs on iOS, Android, and Windows mobile devices. For viewing reports and dashboards, these applications are used.

7.Power BI Embedded

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

3.Working of the Architecture

Divided into two parts Power BI works on, On-Cloud and On-Premises services. From the diagram we can understand the flow of data from On-premises to On-cloud server applications.



On-premises

Here, all kinds of reports published in the Power BI Report Server are distributed to the end-user. Power Publisher enables the user to publish Excel workbooks to Power BI Report Server. Report Server and Publisher tools help you create datasets, paginated reports, mobile reports, and more.

On-cloud

In the Power BI Gateway architecture, the BI gateway acts as a bridge in transferring data from on-premises data sources to on-cloud servers or applications. The cloud consists of various components such as dashboards, datasets, reports, Power BI Embedded, etc. These on-cloud data sources are connected with the Power BI tools.

4. Power BI Service

The Power BI Service is a cloud-based platform provided by Microsoft that allows users to share, collaborate, and distribute interactive reports, dashboards, and data visualizations. It is based on two clusters.

The Front-end Cluster

The front-end cluster acts as a medium between the client and the on-cloud servers in the Power BI data flow diagram. After the initial connection and authentication using Azure Active Directory, the client can interact with the datasets located across the globe.

The Back-end Cluster

The back-end cluster manages datasets, storage, reports, visualizations, data connections, data refreshing, and other services in Power BI. At the cluster, web clients have only two points to interact with the information, i.e., Azure API Management and Gateway Role. These components are responsible for authorizing, routing, authentication, load balancing, etc.

There are a small number of areas where the Desktop and Service overlap. However, most implementations use the Power BI Desktop to create the reports and then use the Service to distribute the reports with others.

Power BI can extract data from multiple sources and provide custom visualization. It also provides real-time analytics on both structured and unstructured data for different devices.
The point to note here is that the Power BI solution architecture has made the process of creating reports fairly easy for non-technical users so that companies can save time, effort, and resources. Small businesses can use Power BI Desktop to create the reports and dashboards of datasets without much hassle.