Architecture Design

BUDGET SALES ANALYSIS

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1.   Introduction

1.1 What is Architecture design document?

An Architecture Design Document (ADD) outlines the architectural design of software. According to IEEE, architectural design involves defining the hardware and software components, along with their interfaces, to create a framework for a computer system. The software can take on various architectural styles, each characterized by:
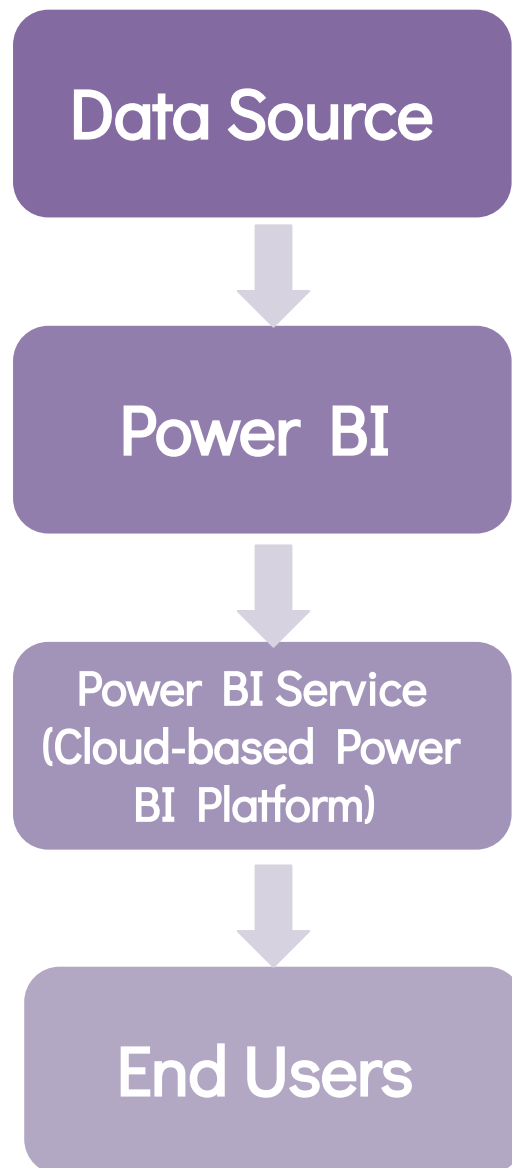
- **Components:** Such as databases or computational modules that perform specific functions.
- **Connectors:**   Mechanisms for communication and coordination among components.
- **Integration Conditions:**   Guidelines for how components fit together to form the system.
- **Semantic Models:**   Frameworks to help designers understand the overall system properties.

1.2 Scope.

The ADD describes a step-by-step process for refining software architecture, data structures, source code, and performance algorithms. Design principles are initially defined during requirement analysis and are further refined in the architectural design phase.

2. Architecture

2.1 Power BI Architecture.

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┌─────────────────────┐
│    Data Source      │
└─────────────────────┘
          │
          ▼
┌─────────────────────┐
│     Power  BI       │
└─────────────────────┘
          │
          ▼
┌─────────────────────┐
│  Power  BI Service  │
│ (Cloud-based  Power │
│    BI  Platform)    │
└─────────────────────┘
          │
          ▼
┌─────────────────────┐
│     End Users       │
└─────────────────────┘
```

In this diagram, the data sources provide the data that is consumed by Power BI. Power BI is the application used for data visualization, analytics, and reporting. Power BI Service is the cloud-based platform where the dashboards and reports are published and shared. End users access the dashboards and interact with the data through the Power BI Service.

2.2 Power BI Communication Flow
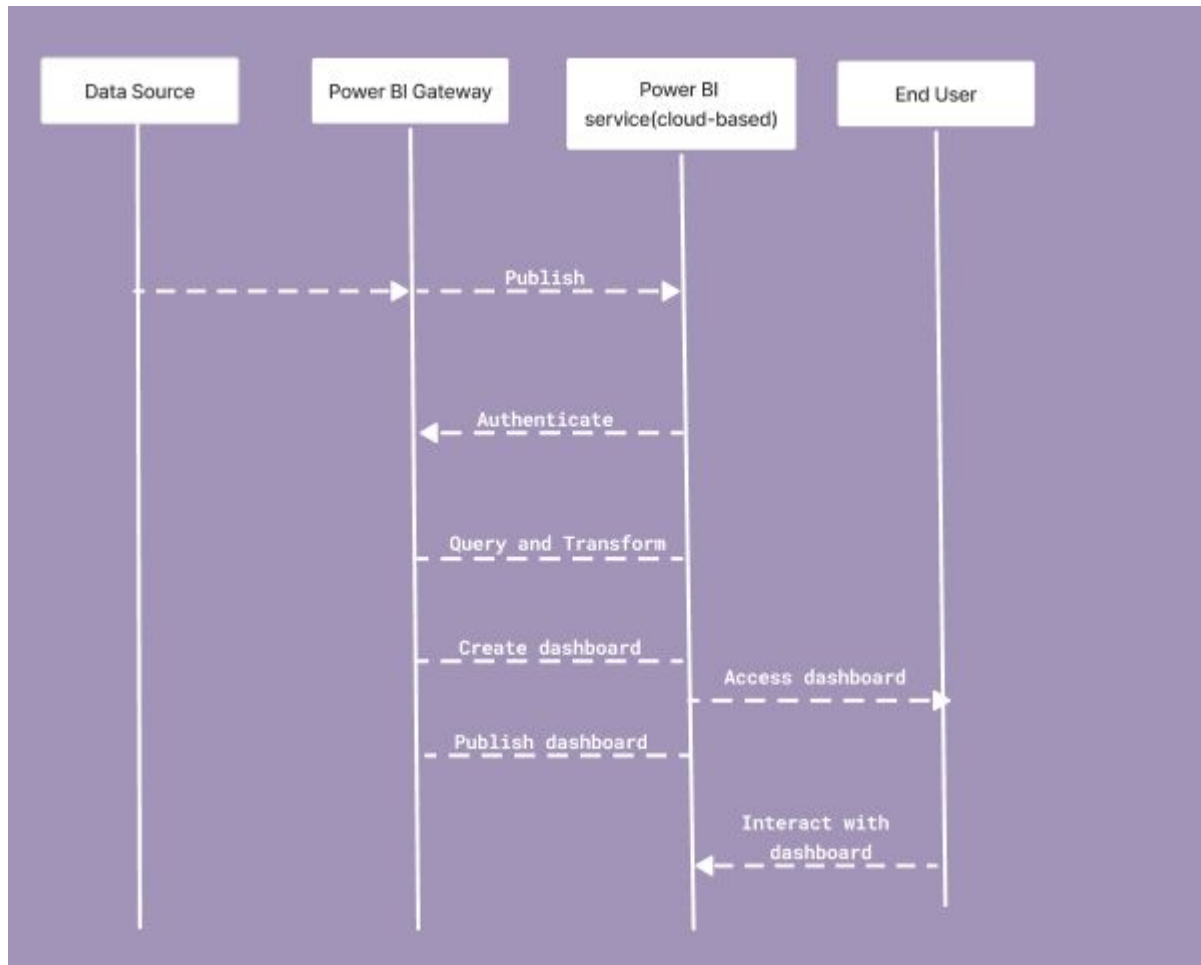
1. Data Sources: This represents the various data sources you are connecting to in Power BI. These can include Excel files, databases, web services, or other data repositories.

2. Power BI Gateway: The Power BI Gateway is used when you need to access on-premises data sources from Power BI Service. It acts as a bridge between the cloud-based Power BI Service and your local data sources, enabling secure data connectivity.

3. Power BI: Power BI refers to the Power BI Desktop application where you design and create your dashboard. This is where you connect to your data sources, query and transform the data, and create visualizations and reports.

4. Power BI Service: Power BI Service is the cloud-based platform where you publish and share your Power BI dashboard. It provides a centralized location for hosting and managing your dashboard, allowing you to control access, collaborate with others, and schedule data refresh.

5. End Users: The end users represent the individuals who access and interact with your published dashboard in Power BI Service. They can view and explore the data visualizations, apply filters, drill down into details, and interact with the dashboard to gain insights.

The flow of actions in the architecture is as follows:

1. Data Retrieval: Power BI retrieves data from the connected data sources, either through direct connections or using the Power BI Gateway for on-premises sources.

2 . Query and Transform: Power BI allows you to query and transform the data from your data sources. You can apply data transformations, merge or append tables, filter data, and perform other data preparation tasks.

3. Create Dashboard: I n Power BI Desktop, you design and create your dashboard by selecting visualizations, arranging them on the canvas, and configuring their properties. You can also create interactive elements like slicers, filters, and drill-through actions to enhance user experience.

4. Publish Dashboard: Once your dashboard is ready, you publish it to Power BI Service. This process uploads the dashboard file (PBIX) to the cloud and makes it available for sharing and consumption.

5. Authentication: When end users access the published dashboard in Power BI Service, they go through an authentication process to ensure authorized access to the data and dashboard.

6. Access Dashboard: After authentication, end users can access the published dashboard in Power BI Service. They can view the visualizations, interact with the data, and explore different aspects of the dashboard.

7. Interact with Dashboard: End users can interact with the dashboard by applying filters, selecting data points, drilling down into details, or interacting with other dashboard elements. This allows them to analyze the data, gain insights, and make data-driven decisions.

2.3 Data Engine.

1. Power Query: Power Query is a data connectivity and transformation tool in Power BI. It allows you to connect to various data sources, retrieve data, and apply transformations to prepare the data for analysis. With Power Query, you can perform tasks such as filtering, sorting, merging, shaping, and cleaning data. It provides a user-friendly interface to visually build queries and apply steps to transform data.

2. Data Modelling: Once the data is retrieved and transformed using Power Query, you can create a data model in Power BI. The data model defines the relationships between different tables, defines calculations and measures, and organizes the data for efficient analysis. Power BI's data modelling capabilities allow you to create hierarchies, define calculated columns and measures, and implement advanced modelling techniques like role□playing dimensions and many-to-many relationships.

3. VertiPaq Engine: Power BI utilizes the VertiPaq engine for in-memory data storage and analysis. VertiPaq compresses and stores the data in a highly optimized columnar format, which enables fast query performance and efficient memory utilization. This columnar storage format allows for quick aggregation, filtering, and retrieval of data, making it ideal for interactive analysis and visualization in Power BI.The combination of Power Query for data transformation and VertiPaq for data storage and analysis forms the backbone of the data engine in Power BI. This engine ensures that your Entertainer Data Analysis Dashboard can efficiently process and analyze large volumes of data, provide fast and responsive visualizations, and deliver a seamless user experience.

2.4 Data Server

1. Cloud-based Storage: Power BI provides a cloud-based data storage solution where you can upload and store your data. This storage infrastructure is managed by Power BI Service, which is the online platform for publishing, sharing, and accessing Power BI content. When you publish your dashboard to Power BI Service, the data is stored securely in the cloud, and you can access it from anywhere with an internet connection.

2. Data Gateway: I f your data resides on-premises or in other external data sources that are not directly accessible by Power BI Service, you can use a Data Gateway. A Data Gateway is a bridge that establishes a secure connection between Power BI Service and your on□premises or external data sources. It enables Power BI to query and retrieve data from these sources in real-time or on a scheduled basis. The Data Gateway ensures that your data remains secure and up-to-date within Power BI.

3. Data Refresh: Power BI provides the capability to schedule automatic data refreshes for your dataset. This means that your data can be periodically refreshed from the data server, ensuring that your dashboard reflects the most current information. You can configure the data refresh settings based on your data source availability and update frequency. With scheduled data refresh, your dashboard stays up-to-date with the latest data without manual intervention.

3. Deployment

1. Power BI Service: Power BI Service is a cloud-based platform where you can publish, share, and collaborate on your dashboards. With Power BI Service, you can deploy your Entertainer Data Analysis dashboard to a secure cloud environment, making it accessible to users with appropriate permissions. Users can access the dashboard through a web browser or the Power BI mobile app.

2. Power BI Embedded: If you want to integrate your Entertainer Data Analysis dashboard into a custom application or website, you can use Power BI Embedded. Power BI Embedded allows you to embed Power BI reports and dashboards directly into your application, providing a seamless user experience. This deployment option is ideal if you want to deliver your dashboard within your existing application ecosystem.

3. Power BI Report Server: Power BI Report Server is an on-premises reporting solution that allows you to deploy your dashboards within your organization's infrastructure. With Power BI Report Server, you have full control over data security and can keep your data on premises. This option is suitable for organizations that have strict data governance and compliance requirements.

4. Publish to SharePoint: If your organization uses SharePoint as its collaboration platform, you can publish your Entertainer Data Analysis dashboard to SharePoint. This allows users to access and interact with the dashboard directly within SharePoint, leveraging the capabilities of both Power BI and SharePoint.