

Amazon Sales Analysis Architecture Design

Version: 1.0

Revision Date: 21-11-24

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DOCUMENT CONTROL

Change Record:

Version	Date	Changes
1.0	27-11-2024	Formatting

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1. Introduction

1.1 What is an Architecture design document?

An Architecture Design Document describes the overall structure and framework of the system or application, providing insights into its components, functionalities, and data flow. It serves as a blueprint to understand the system's design and implementation strategy.

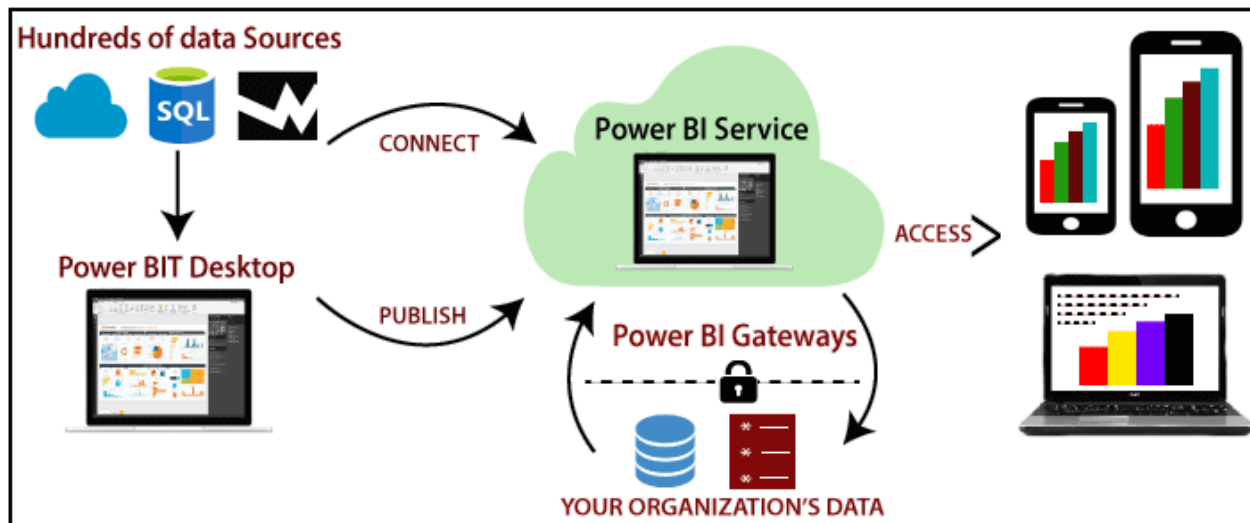
1.2 Scope

The scope of this project is to analyze Amazon sales data using Power BI and create a comprehensive dashboard that offers insights into:

1. Monthly, yearly, and month-wise yearly sales trends.
2. Key metrics such as total revenue, total cost, and total profit.
3. Relationships between attributes like region, item type, and sales channel.

The dashboard aims to support better decision-making, cost reduction, and profit maximization for Amazon's e-commerce business.

2. Architecture



2.1 Power BI Implementation Architecture

Power BI's architecture includes two primary clusters: the **Web Front End (WFE) cluster** and the **Back-End cluster**.

- **Web Front End Cluster (WFE):**
 - Manages initial connections between the back-end cluster and the clients.
 - Utilizes **Azure Active Directory (AAD)** to authenticate clients and provide access tokens.
 - Distributes content efficiently through the **Azure Content Delivery Network (CDN)**.
 - **Azure Traffic Manager (ATM)** is used for content distribution based on the user's geographical location.
- **Back-End Cluster (BEC):**
 - Maintains data storage, reports, datasets, and other services within Power BI.
 - The user interacts with two primary components: **Gateway Role** and **Azure API Management**.
 - These components manage load balancing, authentication, and routing.

2.2 Power BI Architecture Overview

Power BI is a business analytics service provided by Microsoft that offers tools for data analysis, reporting, and sharing insights. The architecture of Power BI involves the following components:

1. **Power BI Desktop** - Used for data cleaning, modeling, and visualization.
2. **Power BI Service** - A cloud-based service for publishing and sharing reports.
3. **Power BI Mobile** - Allows accessing reports on mobile devices.
4. **Power BI Gateway** - Enables secure data transfer between on-premises data sources and the Power BI Service.
5. **Power BI Embedded** - Used to integrate Power BI reports into custom applications.

Power BI components

Power BI architecture includes several components that work together. These components are an important part of Power BI that delivers its capabilities. Now, we will discuss in detail the various components of Power BI architecture.

a) Data Sources

There are many data sources that Power BI uses to extract data and transform it into meaningful insight. The data sources that support Power BI are databases, file types, Azure, online services, other services (HDFS, ODBC, Spark, R Script), etc.

b) Power BI Desktop

This is free software that allows users to connect, transform, and visualize information or data on the desktop. Besides, the user can connect to different sources of data using Power Desktop and combine all the data into a data model. This enables the user to create a variety of graphical images to share with other people within the organization for records. Moreover, most users working on various BI projects use this feature to generate reports. Later, they also use Power BI to share these reports with others.

c) Power BI Mobile

Using these mobile applications the user can connect with the information anywhere and anytime. It supports various platforms such as iOS, Windows, Android, etc. Moreover, these applications are useful for visualizing various dashboards and reports easily.

There are many arrangements by Power BI for mobile apps for different gadgets. It offers different models and services for different types of devices and their usage. All services are compatible with every device and also update regularly. These apps can be configured with

custom solutions that provide better engagement and service. Furthermore, there many apps designed for these gadgets like iOS, Android, Tablets, etc.

d) Power BI Report Server

Under Power BI architecture, the Report Server component is an on-premise platform similar to Power BI Service. Moreover, the Report Server allows users to create various dashboards and reports to share with others following proper security protocols.

e) Power BI Gateway

The Power BI gateway is useful to maintain information freshly by creating a link to on-site data sources without moving the information. Moreover, by linking to on-site information sources, the user can maintain information afresh using the on-site gateways. Here, the user can transfer his precious data securely between the cloud services as well as on-premise.

f) Power View

The Power BI View in the Power BI architecture components offers interactive visualization. It allows the user to use drag and drop facilities to create visualizations quickly and attractively.

g) Power Pivot

The element Power Pivot helps to store the information within memory and enables users to store highly compressed data. It also allows for faster aggregation of data and computation. Moreover, Power Pivot is also useful within an Excel workbook that helps to build data models. The advantage of this component is that it can load data itself or power query helps to load data into it. Furthermore, it is similar to the SSAS model like a server-based version of the Power Pivot.

Power Pivot has no limit on the number of lines alike in MS Excel. Some features make it a unique tool for users to do some tasks. Such as loading limitless tables, data compression for the data model, fully supported database engine, faster data transformation, etc.

h) Power Q&A

The Power Q&A is the Power BI architecture feature that allows users to explore data in their own specific words. Here, the users can use natural language to ask a query and get the answer for the same. Moreover, this is the fastest way to get any query answered within a limited time. It's an interactive path with query solution and visualization of the answer to the user. There are many ways to use Q&A within Power BI.

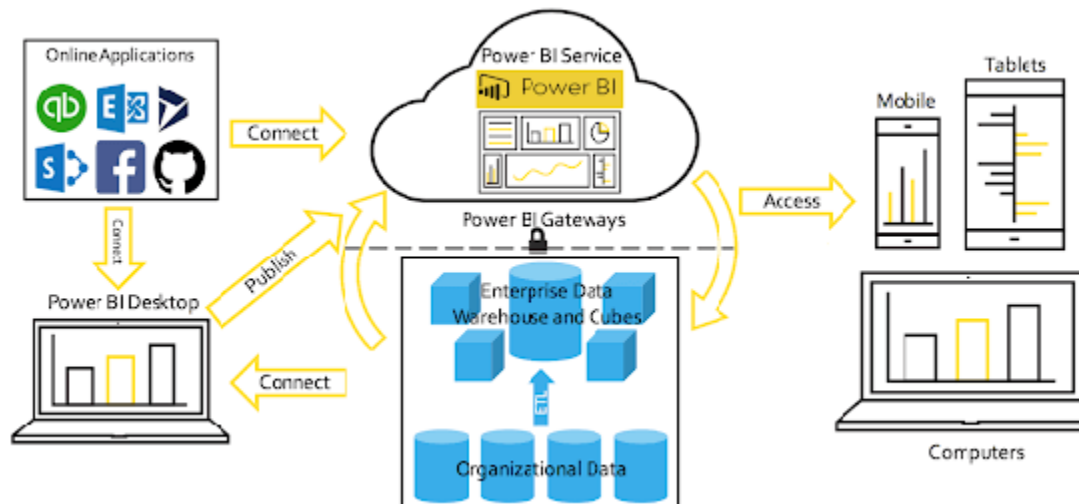
The Power Q&A within the Power BI architecture is useful in the Power BI Service dashboards, reports in the Desktop model, etc. Moreover, in mobile apps also this service is useful.

i) Power Map

The Power Map component within the Power BI architecture is useful to visualize data in the simplest way. It is mostly useful in the Power BI Desktop model where users can build and develop various models of data. They can build shape map visuals to define data from different sources. To represent different locations, Power Map is the best way to define.

g) Power Query

Power BI Query is the platform that allows various users to connect & access the data stored in different sources. Moreover, it allows them to design it for their various business requirements.



2.3 Power BI Data Flow

1. **Data Collection:** Extract data from multiple sources like Excel files, databases, and web APIs.
2. **Data Preparation:** Clean and transform the data using Power Query in Power BI Desktop.
3. **Data Modeling:** Establish relationships between datasets and create a DataTable for time-based analysis.
4. **Visualization:** Create interactive reports and dashboards in Power BI Desktop.
5. **Publishing:** Publish the reports to Power BI Service for sharing and collaboration.
6. **Sharing:** Enable access to stakeholders via links, apps, or embedding.

3. Deployment Description

3.1 Deployment Options in Power BI

1. Single User Development: Power BI Desktop is used locally for development and testing.
2. Collaboration Environment: Publish reports to Power BI Service for team collaboration.
3. Enterprise Deployment: Use Power BI Premium for large-scale data analysis and distribution.

3.2 Single Node Architecture

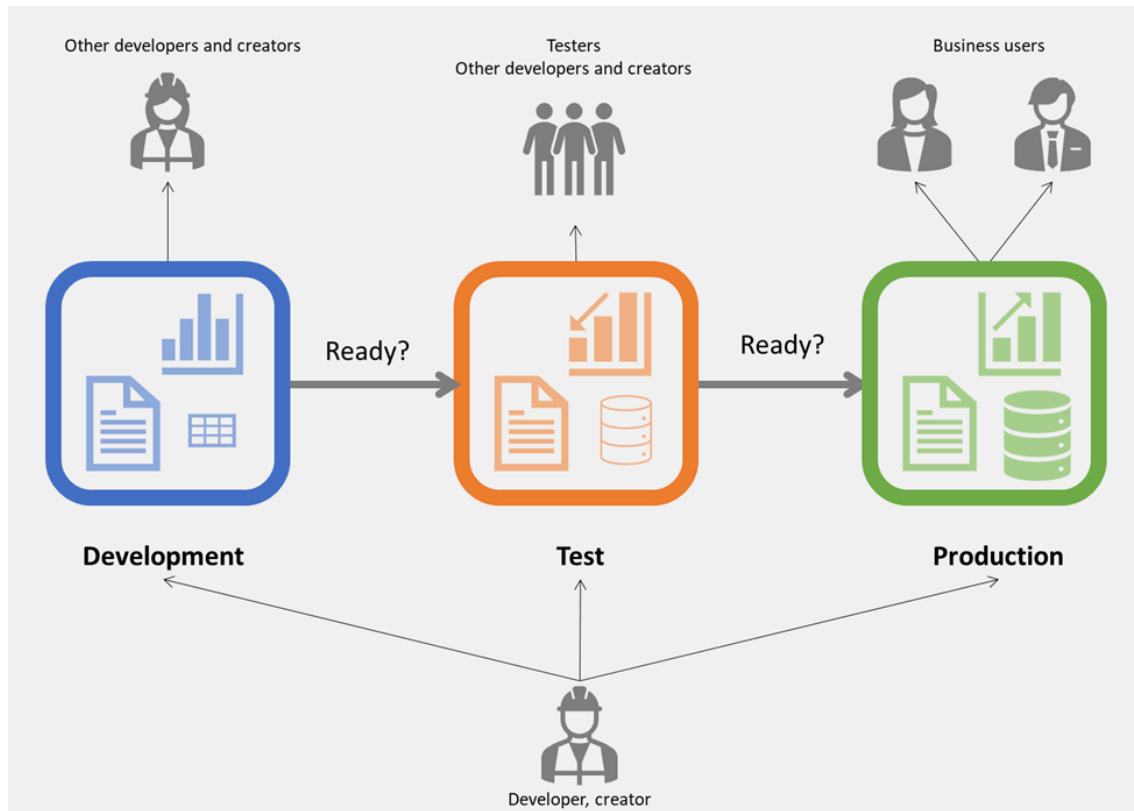
In a single-user environment, all data processing, modeling, and visualization are done using Power BI Desktop. Reports are shared locally or via email.

3.3 Collaborative Architecture

For team projects, the reports are published to Power BI Service. Team members can access and collaborate on dashboards securely via the cloud.

3.4 Enterprise-Scale Deployment

Power BI Premium supports large organizations by offering enhanced performance, scalability, and the ability to handle large datasets.



4. Power BI Components Overview

1. Power BI Desktop

- Used for creating the Amazon Sales Analysis dashboard.
- Tools like Power Query and DAX were employed for data transformation and analysis.

2. Power BI Service

- Reports were published and shared with stakeholders through Power BI Service.
- Role-based access was implemented to secure the data.

3. Power BI Gateway

- A gateway was set up to refresh data from on-premises sources periodically.

4. Power BI Mobile

- Dashboards were optimized for mobile viewing for accessibility.

Power BI Communication Flow

1. Data is extracted and transformed in Power BI Desktop.
2. Processed data is uploaded to the Power BI Service for collaboration and sharing.
3. Real-time dashboards are accessed by users through web browsers or mobile apps.
- 4.

Conclusion

This document outlines the architecture of the Amazon Sales Analysis project in Power BI, showcasing its capabilities to process, analyze, and visualize e-commerce data efficiently. The project leverages Power BI's robust tools to deliver actionable insights that drive informed decision-making.