

## 1. What is Power BI, and what are its three main components?

Power BI is a business analytics tool developed by Microsoft that enables users to visualize and analyze data from various sources. It provides interactive dashboards and reports to help organizations and business owners make data-driven decisions.

This tool consists of 3 components:

- 1) **Power BI Desktop** – an application that allows users to create detailed reports and dashboards on the local machine. It offers robust tools for data transformation and visualization.  
Key activities carried out by the Desktop app:
  - Connecting with data
  - Data cleansing and transformation
  - Creating data models
  - Creating reports
- 2) **Power BI Service (Power BI Online):** Power BI Service is a cloud-based platform that enables non-profit organizations to share and collaborate on reports and dashboards. It allows you to publish your Power BI reports securely and share them with stakeholders such as board members, donors, and volunteers. Power BI Service also provides the ability to schedule data refresh, ensuring that your reports are always up to date. Additionally, you can use features like Q&A to allow stakeholders to ask natural language questions about your data and receive instant answers.
- 3) **Power BI Mobile:** Power BI Mobile allows non-profit professionals to access their reports and dashboards on mobile devices while on the go. This can be particularly useful for staff members who are working in the field, attending events, or visiting project sites. With Power BI Mobile, you can monitor real-time data, track progress, and make informed decisions based on the latest insights, ensuring that you stay connected to your organization's data no matter where you are.

## 2. Name two business use cases for Power BI dashboards.

1<sup>st</sup> case. Sales performance tracking.

Using Power BI dashboards, we can visualize real-time sales data, such as revenue, regional performance, units sold, and other essential data. This will enable businesses to monitor targets and identify trends, as well as make data-driven decisions to optimize sales strategies.

2<sup>nd</sup> case. Financial performance monitoring.

Dashboards can display key financial metrics like cash flow, profit margins, and budget vacancies in real time. This allows us to identify cost-saving opportunities and goals.

### 3. How do you download and install Power BI Desktop?

There are more than 2 ways to download Power BI desktop. I downloaded from the official website of Microsoft Office Power BI. It is also possible to get this app on the Microsoft Store.

### 4. What is the difference between Power BI Desktop and Power BI Service?

## 1. Definition and Purpose

- **Power BI Desktop:**
  - A free, Windows-based application installed on a local computer.
  - Used for creating, designing, and building reports and dashboards with a rich set of data modeling and visualization tools.
  - Primarily for data analysts and report developers to connect to data sources, transform data, and design interactive reports.
- **Power BI Service:**
  - A cloud-based platform (SaaS) accessed via a web browser at [app.powerbi.com](https://app.powerbi.com).
  - Used for sharing, publishing, collaborating, and consuming reports and dashboards created in Power BI Desktop or elsewhere.
  - Focuses on report distribution, collaboration, and centralized management for teams and organizations.

## 2. Functionality

- **Power BI Desktop:**
  - **Data Connectivity:** Connects to a wide range of data sources (databases, Excel, APIs, etc.) for data import and transformation using Power Query.
  - **Data Modeling:** Allows creation of data models, relationships, calculated columns, and DAX measures.
  - **Report Creation:** Offers a full-featured design interface for building interactive reports and dashboards with drag-and-drop visuals.
  - **Offline Work:** Operates locally, so no internet connection is required for designing reports.
  - **Publishing:** Reports can be published to Power BI Service for sharing.
- **Power BI Service:**

- **Sharing and Collaboration:** Enables publishing reports for team access, with features like sharing dashboards, commenting, and setting access permissions.
- **Data Refresh:** Supports scheduled or manual data refreshes from connected data sources (requires a gateway for on-premises data).
- **Dashboards:** Allows creation of dashboards by pinning visuals from multiple reports, which is exclusive to the Service.
- **Apps and Workspaces:** Organizes reports and dashboards into workspaces or apps for team or organization-wide distribution.
- **Limited Editing:** Offers basic report editing in the browser, but lacks the full design capabilities of Desktop.
- **Analytics Features:** Includes AI-driven insights, Q&A natural language queries, and usage metrics for tracking report engagement.

### 3. Accessibility

- **Power BI Desktop:**
  - Available only on Windows operating systems (not supported on macOS or mobile devices).
  - Downloaded and installed locally, with all processing done on the user's machine.
- **Power BI Service:**
  - Platform-agnostic, accessible on any device with a web browser (Windows, macOS, iOS, Android).
  - Cloud-based, requiring an internet connection and a Power BI account (free or Pro/Premium license, depending on features).

### 4. Cost

- **Power BI Desktop:**
  - Completely free to download and use for report creation and local analysis.
  - No licensing is required for individual use unless publishing to Power BI Service.
- **Power BI Service:**
  - Offers a free tier with limited features (e.g., basic report viewing and personal workspaces).
  - Requires a **Power BI Pro** license (\$10/user/month, as of last known pricing) for sharing, collaboration, and advanced features like scheduled data refresh.
  - **Power BI Premium** (per user or capacity-based) unlocks additional features like larger datasets, AI capabilities, and dedicated cloud resources.

### 5. Data Storage and Processing

- **Power BI Desktop:**
  - Stores data locally in the .pbix file (Power BI project file) on the user's device.
  - Processing depends on the local machine's hardware capabilities.
- **Power BI Service:**
  - Stores reports, datasets, and dashboards in the cloud.
  - Processing is handled by Microsoft's cloud infrastructure, with scalability for large datasets (especially in Premium tiers).

## 6. Use Case Examples

- **Power BI Desktop:**
  - A data analyst builds a sales performance report by connecting to an SQL database, transforming data, and creating visuals for a board meeting.
  - An individual user creates a personal budget dashboard using Excel data for local analysis.
- **Power BI Service:**
  - A team shares a marketing campaign dashboard with stakeholders, allowing real-time updates and comments.
  - An organization sets up a workspace for department heads to access financial KPIs, with data refreshed daily from a cloud data warehouse.

## 7. Integration and Dependencies

- **Power BI Desktop:**
  - Works independently for report creation but requires Power BI Service to share reports with others.
  - Can export reports as static files (e.g., PDF) or save as templates (.pbit).
- **Power BI Service:**
  - Relies on reports created in Power BI Desktop or imported from other sources (e.g., Excel).
  - Integrates with other Microsoft tools like Teams, SharePoint, and Azure services for enhanced collaboration and automation

5. What file extension does a Power BI project use?

.pbix is used for Power BI projects

6. Explain the role of Power Query in Power BI.

Power Query is a powerful data transformation and preparation tool integrated into Power BI (available in both Power BI Desktop and Power BI Service to a limited extent). It plays a critical role in the data analytics workflow by enabling users to connect to various data sources, clean, transform, and shape data before it is loaded into Power BI's data model for visualization and analysis.

## 7. Why would a business prefer Power BI over Excel for reporting?

### **Superior Visualization and Interactivity:**

- Power BI offers dynamic, interactive dashboards with a wide range of visuals (charts, maps, KPIs) and features like slicers, drill-downs, and cross-filtering.
- Excel provides static charts and basic PivotTable interactivity, less engaging for stakeholders.
- Why Power BI: Delivers visually appealing, user-friendly reports for faster insights.

### **Scalability for Large Data:**

- Power BI handles millions of rows with in-memory compression and supports real-time data via DirectQuery.
- Excel is limited to ~1 million rows per sheet and struggles with large datasets, slowing performance.
- Why Power BI: Scales to enterprise-level data needs without performance issues.

### **Automated Data Refresh:**

- Power BI enables scheduled data refreshes (up to 8 times/day with Pro) for cloud and on-premises data via gateways.
- Excel requires manual data updates or complex scripting for automation.
- Why Power BI: Keeps reports current with minimal effort, ideal for real-time decision-making.

### **Collaboration and Sharing:**

- Power BI Service allows cloud-based sharing, workspaces, and role-based access for secure team collaboration.
- Excel relies on file sharing (email, OneDrive), risking version control and security issues.
- Why Power BI: Streamlines secure, centralized report distribution across teams.

### **Robust Data Integration:**

- Power BI's Power Query connects to hundreds of sources (databases, APIs, cloud services) with reusable transformations.
- Excel's Power Query is less powerful, with fewer connectors and manual reuse.
- Why Power BI: Simplifies combining and transforming diverse data sources.

#### **Enterprise Governance and Security:**

- Power BI offers row-level security (RLS), audit logs, and centralized admin controls, ensuring compliance.
- Excel lacks native RLS and relies on file-level security, less robust for sensitive data.
- Why Power BI: Protects data and meets regulatory needs in large organizations.

#### **8. Describe one limitation of the free version of Power BI.**

One limitation of the free version of Power BI (Power BI Desktop and the free tier of Power BI Service) is the inability to share reports or dashboards with others. While you can create and analyze reports in Power BI Desktop, publishing them to Power BI Service for sharing with colleagues or stakeholders requires a Power BI Pro license (\$10/user/month, as of last known pricing). In the free tier of Power BI Service, you are restricted to personal use in "My Workspace," with no option to collaborate, share links, or distribute reports, limiting its utility for team-based or organizational reporting.

#### **9. What is a "published report" in Power BI Service?**

A published report in Power BI Service is a report created in Power BI Desktop (or sometimes within the Service) that has been uploaded to the cloud-based Power BI Service (app.powerbi.com) for sharing, collaboration, or consumption by others. Once published, the report becomes accessible via a web browser or mobile app, allowing authorized users to view, interact with, and analyze the report's visualizations, dashboards, or data.

#### **10. How does Power BI Mobile enhance accessibility?**

Power BI Mobile enhances accessibility by providing a seamless, on-the-go experience for users to access, interact with, and analyze Power BI reports and dashboards from mobile devices (iOS and Android). It extends the functionality of Power BI Service to mobile platforms, ensuring users can stay connected to business insights anytime, anywhere.

## 11. Compare Power BI with Tableau—pros and cons.

### Power BI: Pros and Cons

#### Pros

1. **Cost-Effective:** Free **Power BI Desktop; Pro** (~\$10/user/month) is budget-friendly for teams; scalable with **Premium**.
2. **User-Friendly:** Drag-and-drop interface and **Power Query** make it accessible for non-technical users.
3. **Microsoft Integration:** Tight integration with Excel, Azure, Teams, and Single Sign-On (SSO) via Azure AD.
4. **Automation:** Scheduled refreshes (8/day with Pro) and real-time data with DirectQuery.

#### Cons

1. **Less Flexible Visuals:** Limited customization compared to Tableau's pixel-perfect designs.
2. **Windows-Centric:** Power BI Desktop is Windows-only (Service is browser-based).

### Tableau: Pros and Cons

#### Pros

1. **Advanced Visualizations:** Highly customizable, publication-quality visuals for complex dashboards.
2. **Robust Data Analysis:** Excels in blending diverse, large-scale datasets; supports advanced analytics (e.g., clustering).
3. **Flexible Deployment:** Cloud (Tableau Online), on-premises (Tableau Server), or hybrid options.

#### Cons

1. **High Cost:** **Creator** (~\$70/user/month) and server licenses are costly for small teams.
2. **Steeper Learning Curve:** Requires technical skills for complex visualizations and calculations.

**Power BI:** Ideal for small/medium businesses, Microsoft-centric environments, or cost-conscious teams needing quick, user-friendly reporting.

**Tableau:** Best for large enterprises or advanced analysts requiring complex visualizations and deep data analysis.

## 12.Explain how Power BI integrates with Azure services.

Power BI integrates seamlessly with Azure services, Microsoft's cloud platform, to enhance data connectivity, processing, storage, analytics, and security for business intelligence (BI) workflows. This integration leverages Azure's scalable infrastructure to support Power BI's data preparation, visualization, and reporting capabilities, making it ideal for enterprises with complex data needs. Below is a concise explanation of how Power BI integrates with key Azure services, focusing on essential aspects.

## 13.What are "gateways" in Power BI, and when are they needed?

### What Are Gateways?

- **Gateways** in Power BI are software components that enable **Power BI Service** (cloud) to securely connect to **on-premises data sources** or **cloud data with private endpoints**, facilitating data refreshes and real-time queries.
- They act as a bridge between Power BI Service and data sources behind firewalls or in restricted networks.

### Types of Gateways

1. **On-premises Data Gateway:**
  - Connects to on-premises sources (e.g., SQL Server, Excel, Oracle).
  - **Personal Mode:** For individual use, tied to one user, limited to personal workspace.
  - **Standard Mode:** Enterprise-grade, supports multiple users and workspaces.
2. **Virtual Network (VNet) Data Gateway:**
  - Managed by Microsoft for cloud-based Azure data sources in Virtual Networks (e.g., Azure SQL with private endpoints).
  - No local installation needed.

### When Are Gateways Needed?

- **On-Premises Data:** For accessing databases, files, or apps (e.g., SQL Server, SharePoint) behind a firewall.
- **Scheduled Refreshes:** To automatically update imported datasets in Power BI Service from on-premises sources.
- **DirectQuery/Live Connections:** For real-time queries to on-premises databases or Analysis Services.
- **Cloud Data with Private Endpoints:** For Azure sources in VNets (e.g., Azure Synapse Analytics).
- **Hybrid Scenarios:** Combining on-premises and cloud data in reports.



## When Gateways Are NOT Needed

- Publicly accessible cloud data (e.g., Salesforce, Google Analytics).
- Manual data uploads to Power BI Service.
- Local report creation in **Power BI Desktop**.

## Key Features

- **Security:** Encrypted data transfer (AES-256, TLS); credentials stored in Azure.
- **Automation:** Supports scheduled refreshes (up to 8/day with Pro, 48 with Premium).
- **Scalability:** Standard mode handles multiple sources; clustering for high availability.
- **Management:** Configured via Power BI Admin Portal with usage logs.

## Example

A retailer uses an **On-premises Data Gateway** to connect Power BI Service to an on-premises SQL Server, enabling a daily-refreshed inventory dashboard and real-time sales queries via DirectQuery.

## Limitations

- **Setup:** On-premises gateways need local server installation and maintenance.
- **Network:** Requires stable connectivity; firewall issues can disrupt access.
- **Resources:** Consumes local server resources for on-premises gateways.

14. How would you convince a company to adopt Power BI? (ROI argument)

To convince a company to adopt **Power BI**, focus on its **Return on Investment (ROI)** through cost savings, efficiency, and better decision-making.

### 1. Low Cost, High Value

- **Affordable Pricing:** Free **Power BI Desktop**; **Pro** at ~\$10/user/month vs. Tableau's ~\$70/user/month.
  - **ROI:** Saves ~\$12,000/year for 20 users compared to Tableau.
- **Cloud-Based:** Runs on Azure, eliminating server costs.
  - **ROI:** Cuts ~\$5,000-\$10,000/year in infrastructure expenses.

### 2. Time and Productivity Savings

- **User-Friendly:** Drag-and-drop interface and **Power Query** enable non-technical users to build reports.

- **ROI:** Saves ~500-1,000 hours/year (~\$20,000-\$40,000 at \$40/hour) by halving report creation time.
- **Automation:** Scheduled data refreshes and **Power Automate** integration reduce manual work.
  - **ROI:** Saves ~\$10,000/year for a small team on data prep.

### 3. Better Decisions, Higher Revenue

- **Real-Time Insights:** **DirectQuery** and **Azure Stream Analytics** enable live data for timely decisions.
  - **ROI:** Prevents ~\$50,000/year in losses (e.g., stockouts) for a mid-sized business.
- **AI Analytics:** Built-in AI (e.g., forecasting) and **Azure Machine Learning** drive predictive insights.
  - **ROI:** Boosts revenue by 5-10% (~\$50,000-\$100,000 for a \$1M business).

### 4. Scalability and Integration

- **Microsoft Ecosystem:** Integrates with Excel, Teams, Azure, reducing setup costs.
  - **ROI:** Saves ~\$5,000 in integration vs. non-Microsoft tools.
- **Scalable:** Handles large datasets; **Premium** supports enterprises.
  - **ROI:** Avoids ~\$20,000 in future migration costs.

### 5. Secure Collaboration

- **Power BI Service:** Secure sharing with **row-level security** and **Azure AD**.
  - **ROI:** Saves ~\$5,000/year by avoiding errors and ~\$10,000 in compliance fines.

### Total ROI

- **Benefits:** ~\$100,000-\$200,000/year (revenue growth + savings) for a \$1M company.
- **Costs:** ~\$2,400/year for 20 Pro licenses.
- **ROI:** 20x-40x return within a year.

15. What security features does Power BI offer for sensitive data?

Power BI provides robust security features to protect sensitive data, ensuring compliance and secure access:

1. **Data Encryption:**
  - **At Rest:** AES-256 encryption for data stored in Power BI Service (Azure cloud).

- **In Transit:** TLS encryption for data transferred between Power BI and users/sources.
  - **Benefit:** Prevents unauthorized access to sensitive data.
2. **Row-Level Security (RLS):**
- Restricts data access based on user roles (e.g., a manager sees only their region's data).
  - Configured in Power BI Desktop and enforced in Power BI Service.
  - **Benefit:** Ensures users only see authorized data, critical for sensitive reports.
3. **Azure Active Directory (Azure AD):**
- Enables **Single Sign-On (SSO)** with corporate credentials for secure authentication.
  - Supports **Multi-Factor Authentication (MFA)** and role-based access control.
  - **Benefit:** Simplifies and secures user access management.
4. **Access Controls and Permissions:**
- Granular permissions for workspaces, reports, and datasets (e.g., view, edit, share).
  - Managed via Power BI Admin Portal with audit logs to track activity.
  - **Benefit:** Prevents unauthorized sharing or modifications.
5. **Data Gateway Security:**
- **On-premises Data Gateway** uses encrypted connections for secure data refreshes from local sources.
  - Credentials stored in Azure, not locally.
  - **Benefit:** Safely connects to sensitive on-premises data.
6. **Compliance Certifications:**
- Adheres to standards like GDPR, ISO 27001, SOC 1/2/3, and HIPAA.
  - **Benefit:** Meets regulatory requirements for industries like finance and healthcare.