

1. Power BI

Overview: Power BI is a powerful business analytics tool developed by Microsoft. It allows users to transform raw data into meaningful insights through interactive reports and dashboards.

OR

Power BI is a data visualization tool and business intelligence tool that converts data from difference sources to interactive dashboards and BI reports.

Key Components of Power BI:

1. Power BI Desktop:

- The main development tool where users can import data, transform it, and build visualizations. It's a free application that runs on a local computer.

2. Power BI Service (PowerBI.com):

- A cloud-based platform where users can publish, share, and collaborate on Power BI reports and dashboards. It allows access to real-time data and collaboration with other users.

3. Power BI Mobile:

- A mobile app version of Power BI that provides on-the-go access to dashboards and reports.

4. Power BI Report Server:

- An on-premises server that allows users to publish reports internally without needing to upload them to the cloud.

5. Power Query:

- A data connection technology that allows users to transform and prepare data by removing errors, changing formats, and consolidating multiple data sources into one clean dataset.

6. Power Pivot:

- A data modeling component that enables complex calculations, creating relationships, and building data models using DAX (Data Analysis Expressions).

7. Power View:

- A data visualization tool that lets users create interactive charts, graphs, and other visual elements to represent data meaningfully.

Features of Power BI:

- **Data Transformation and ETL:**
 - Extracts, transforms, and loads (ETL) data from various sources such as Excel, SQL databases, cloud services, and web pages.
- **Customizable Dashboards:**
 - Enables users to design and customize dashboards that display KPIs (Key Performance Indicators) and critical metrics in real time.
- **Natural Language Querying:**
 - Allows users to type queries in plain English (e.g., "Total sales by month"), and Power BI translates this into data results and visualizations.
- **Integration with Microsoft Tools:**
 - Seamlessly integrates with other Microsoft products like Excel, Azure, and Dynamics 365, providing a unified experience.
- **Security and Data Governance:**
 - Features robust security through Microsoft's Azure Active Directory and data governance capabilities that let users control access and permissions.

Applications of Power BI:

- **Financial Analysis:**
 - Building interactive financial reports to track revenue, expenses, and profitability.
- **Sales and Marketing Analytics:**
 - Tracking sales performance, customer demographics, campaign ROI, and lead generation metrics.
- **Operations Monitoring:**
 - Monitoring production efficiency, quality control, and supply chain performance.

2. Data Visualization

Overview: A Visual representation of data is called visualization. It enables stakeholders to understand complex data sets by displaying them in visual formats like charts, graphs, and maps.

Importance of Data Visualization:

- **Easier Interpretation:**
 - Converts large data sets into digestible visual formats, making it easier to interpret trends, patterns, and outliers.
- **Improves Decision-Making:**
 - Quick insights through visuals allow leaders to make faster, data-driven decisions.
- **Enhances Communication:**
 - Visuals convey information efficiently and can be understood by non-technical stakeholders.

Types of Data Visualizations:

1. Charts:

- **Bar Chart:** Used to compare values across categories (e.g., sales by region).
- **Line Chart:** Displays trends over time, useful for tracking changes or growth.
- **Pie Chart:** Shows proportions of a whole, often used to display market share or distribution.

2. Tables:

- Useful for showing exact data values and is best for data that requires specific comparisons across many categories.

3. Maps:

- **Heat Maps:** Show data density in a specific area (e.g., sales volume by region).
- **Geographical Maps:** Used for data with location elements, like showing customer locations or logistics data.

4. Scatter Plots:

- Shows relationships between two variables, helping to identify correlations and trends.

5. Infographics:

- Combines text and visuals to provide a comprehensive and engaging summary of data.

Key Principles of Data Visualization:

- **Clarity:**
 - Visuals should be straightforward, easy to interpret, and free of unnecessary elements.
- **Consistency:**

- Use consistent colors, labels, and scales for easier comparison and interpretation.
- **Color Theory:**
 - Colors should enhance the visualization, with contrasting colors to highlight important data points.
- **Interactivity:**
 - Interactive elements (like filtering, drilling down) help users engage with data to explore insights.

Tools for Data Visualization:

- **Power BI:** Offers advanced, customizable visualizations and real-time data integration.
 - **Tableau:** Known for flexibility in creating detailed, interactive visual dashboards.
 - **Google Data Studio:** Free tool with Google Analytics integration, great for small businesses.
 - **Excel:** Basic data visualization capabilities with charts and conditional formatting.
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3. Business Intelligence (BI)

Overview: Business Intelligence (BI) refers to technologies, applications, and practices for collecting, integrating, analyzing, and presenting business information. The main goal of BI is to support better decision-making.

Key Elements of BI:

1. Data Collection:

- The process of gathering data from various sources, including databases, spreadsheets, and APIs, to build a comprehensive dataset.

2. Data Storage:

- BI solutions store data in data warehouses or data lakes where it's cleaned, transformed, and prepared for analysis.

3. Data Analysis:

- Analyzing data to identify patterns, trends, and anomalies. Tools like SQL, Python, and R are often used in the analysis phase.

4. Reporting:

- BI provides insights through reports, charts, dashboards, and visual analytics tools that present key performance indicators and metrics.

5. Data Visualization:

- As a subset of BI, it presents data in visual formats (discussed above) to make data easily interpretable.

6. Data Governance and Security:

- BI ensures that data is managed securely, complies with regulatory standards, and maintains high data integrity.

Benefits of Business Intelligence:

- **Improved Decision-Making:**
 - BI allows leaders to base decisions on data rather than intuition, leading to more accurate and reliable decisions.
- **Enhanced Efficiency:**
 - Automated data collection and reporting streamline business processes and free up resources for strategic activities.
- **Better Customer Insights:**
 - BI helps organizations understand customer behavior and preferences, leading to more targeted marketing efforts.
- **Cost Savings:**
 - BI helps identify inefficiencies and waste within the organization, reducing costs over time.

Types of Business Intelligence Tools:

1. **Data Warehousing Tools:**
 - For storing large volumes of data (e.g., Amazon Redshift, Snowflake).
2. **Data Integration Tools:**
 - For connecting data sources and systems (e.g., Informatica, Alteryx).
3. **Data Visualization Tools:**
 - For creating interactive dashboards (e.g., Power BI, Tableau).
4. **Reporting Tools:**
 - For generating structured reports and analytics (e.g., SAP BusinessObjects).

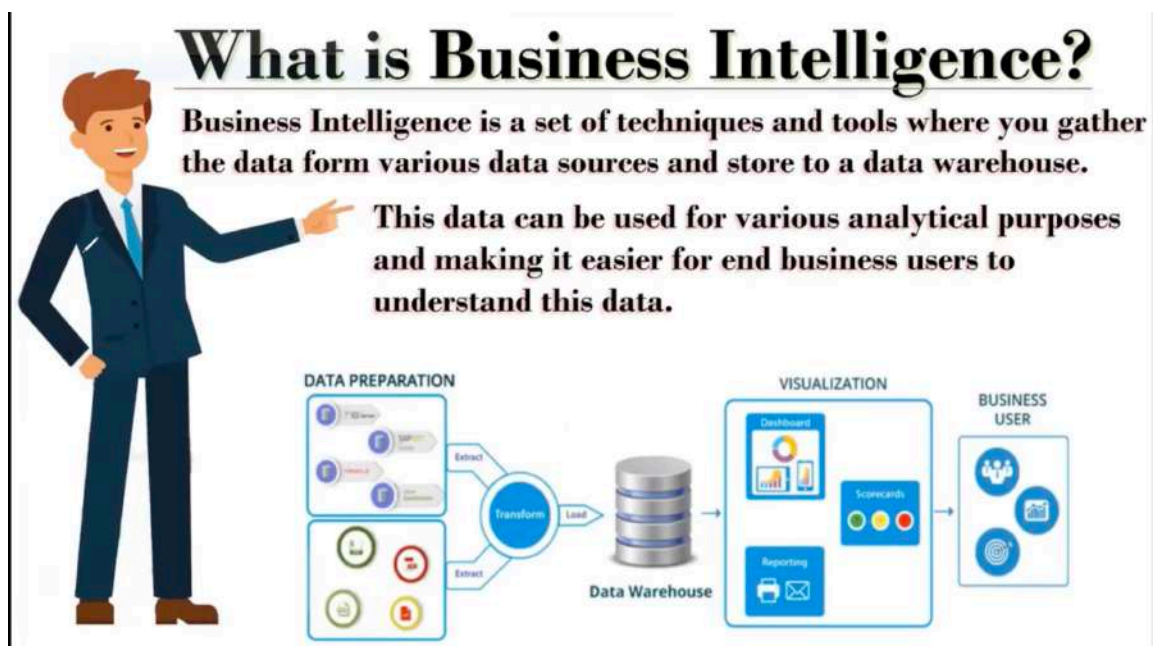
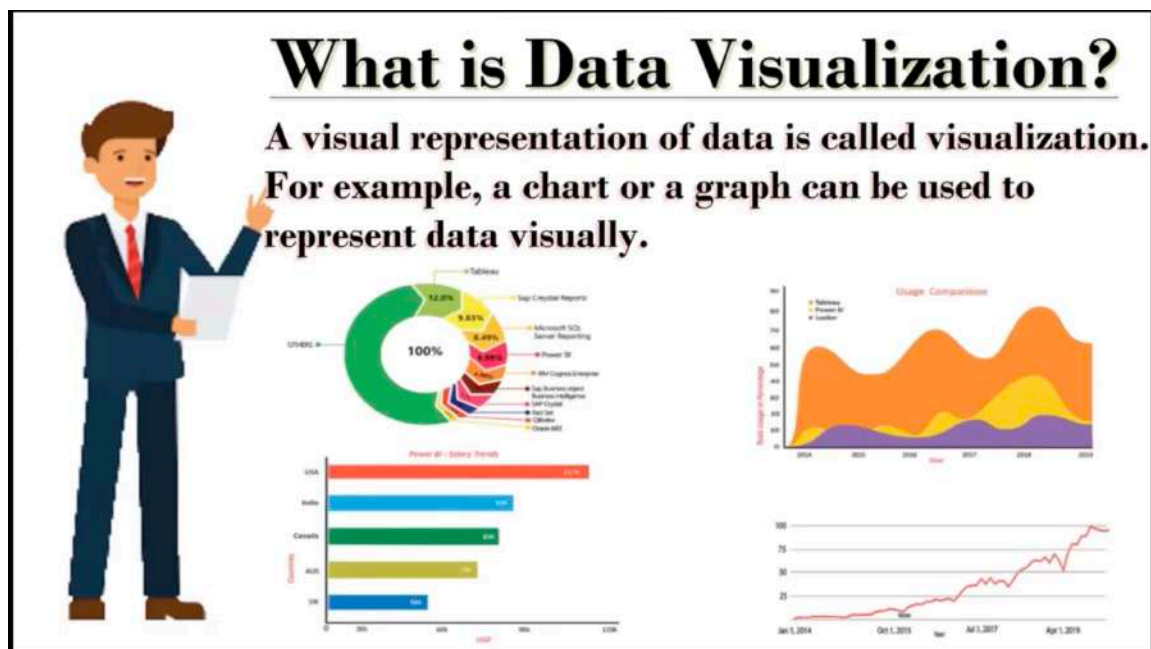
BI Process:

1. **Data Sourcing:** Collecting data from internal and external sources.
2. **Data Preparation:** Cleaning and transforming data for consistency.
3. **Data Mining:** Analyzing data for patterns and predictive insights.
4. **Data Presentation:** Displaying insights through dashboards and reports.

Applications of BI:

- **Finance:** Budgeting, forecasting, and financial performance analysis.
 - **Marketing:** Campaign performance, customer segmentation, and trend analysis.
 - **Operations:** Inventory management, logistics optimization, and supply chain analysis.
 - **HR:** Employee performance tracking, talent acquisition, and retention analysis.
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These notes should provide a solid foundation for understanding Power BI, Data Visualization, and Business Intelligence, including their components, applications, and significance in data-driven decision-making.



Business Intelligence (BI) tools help organizations collect, process, and analyze data to make more informed decisions. These tools allow users to visualize data, generate reports, and discover trends, empowering them to draw actionable insights from complex datasets. Here's a detailed overview of popular BI tools, their features, and specific use cases.

1. Power BI

Description: Developed by Microsoft, Power BI is a comprehensive BI tool that enables data visualization, report generation, and interactive dashboard creation.

Feature	Description	Example Use Case
Data Integration	Connects to various data sources, including cloud services, on-premises databases, and Excel files.	Integrating sales and CRM data from multiple platforms to create a unified sales performance report.
Visualizations	Provides a wide variety of customizable charts, graphs, maps, and tables.	Creating interactive dashboards for real-time monitoring of key performance indicators (KPIs).
Natural Language Query	Allows users to ask questions in plain English and receive visualized answers.	Typing "sales by region" and getting a quick chart of regional sales data.

2. Tableau

Description: Tableau is a powerful and widely-used BI tool known for its intuitive drag-and-drop interface, extensive visualization options, and strong analytics capabilities.

Feature	Description	Example Use Case
Data Blending	Allows combining data from different sources without extensive data preparation.	Blending marketing campaign data from different sources to see a comprehensive view.
Live and In-Memory Data	Enables live data connections as well as data extraction for fast in-memory analysis.	Analyzing live website traffic data alongside historical data to monitor trends.
Mapping Capabilities	Offers built-in geographic visualizations and mapping features.	Creating sales territory maps to understand geographic performance.

3. Qlik Sense

Description: Qlik Sense, developed by Qlik, is known for its associative model, which lets users explore data freely without being constrained by predetermined query structures.

Feature	Description	Example Use Case
Associative Model	Unique model that enables users to explore relationships across datasets by highlighting associations.	Discovering unexpected connections between product sales and customer demographics.
Self-Service BI	Empowers users to create their own reports and visualizations without requiring technical expertise.	Sales teams can independently generate reports on their regional sales performance.
Smart Search	Provides a global search feature that suggests relevant data insights based on user input.	Typing "2023" to quickly pull up all related reports, charts, and tables with 2023 data.

4. Looker

Description: Acquired by Google, Looker is a cloud-based BI platform that's designed for modern, big data environments. Looker uses LookML, a unique modeling language, to define and manage data relationships.

Feature	Description	Example Use Case
LookML Modeling Language	Allows data analysts to define complex data models that can be reused across the organization.	Building reusable data models for sales data to standardize reporting metrics.
Embedded Analytics	Embeds analytics directly into applications, allowing end-users to interact with data within familiar tools.	Integrating customer analytics directly into a CRM platform.
BigQuery Integration	Optimized for Google BigQuery, providing a high-performance solution for big data analytics.	Analyzing large datasets in Google BigQuery for real-time insights.

5. Domo

Description: Domo is a cloud-based BI tool that emphasizes collaboration, enabling organizations to bring data together and make decisions as a team.

Feature	Description	Example Use Case
Collaborative BI	Facilitates sharing and commenting on data insights within the platform.	Marketing teams collaborate on campaign performance data and share insights across teams.
Data Apps	Provides a platform to build custom data applications tailored to specific business needs.	Creating a customer feedback app to analyze survey results and customer sentiment.
Real-Time Dashboards	Supports real-time data streaming, ideal for monitoring live metrics.	Tracking real-time performance metrics for e-commerce orders and inventory levels.

6. SAP BusinessObjects

Description: SAP BusinessObjects is an enterprise-level BI solution tailored for organizations using SAP ERP systems. It focuses on reporting, analysis, and sharing data within large organizations.

Feature	Description	Example Use Case
Enterprise Reporting	Generates complex reports for large organizations, especially those using SAP ERP.	Creating detailed financial reports that integrate with SAP Financials.
Integration with SAP	Seamless integration with other SAP products, enabling end-to-end data management and analysis.	Analyzing supply chain data in real-time, integrated with SAP ERP and SCM systems.
Role-Based Security	Provides security and access control features for managing large teams.	Setting access levels for different departments for compliance and data security.

7. IBM Cognos Analytics

Description: IBM Cognos Analytics is a BI tool with strong AI-powered features, making it ideal for large organizations with complex data requirements.

Feature	Description	Example Use Case
AI-Powered Insights	Utilizes AI to generate data insights and suggest visualizations.	Automatically generating sales insights based on seasonal trends in retail data.
Data Governance	Robust data governance tools for managing data access, security, and compliance.	Ensuring compliance with data security standards in financial and healthcare industries.
Interactive Dashboards	Provides customizable dashboards that can be shared across teams.	Creating interactive dashboards for department heads to monitor KPIs in real-time.

8. Sisense

Description: Sisense is a BI tool focused on embedding analytics into applications, making it highly customizable and ideal for software companies that want to offer built-in analytics to users.

Feature	Description	Example Use Case
In-Chip Analytics	Uses advanced algorithms that optimize performance, especially for big data analytics.	Analyzing millions of customer interactions in a high-traffic application with minimal latency.
Embedded BI	Allows embedding analytics into custom applications, enabling clients to interact with data within their workflows.	Embedding analytics into an ERP system to provide insights within user workflows.
Extensibility	Offers robust APIs and SDKs for customization, making it highly adaptable to various use cases.	Building custom data visualizations tailored to specific business needs.

9. MicroStrategy

Description: MicroStrategy is a BI platform geared towards enterprise-level data analytics, providing high-performance solutions and tools for large-scale deployments.

Feature	Description	Example Use Case
HyperIntelligence	Uses AI-driven insights, delivering contextually relevant information directly to users.	Sales representatives receive real-time insights about customer accounts when viewing emails.
Scalability	Scales easily for large data volumes, making it suitable for global enterprises.	Handling large datasets for a multinational corporation's financial reporting.
Mobile BI	Provides mobile-optimized dashboards and insights for on-the-go analysis.	Executives monitor operational metrics on mobile devices while traveling.

10. Zoho Analytics

Description: Zoho Analytics is a self-service BI tool with an easy-to-use interface, targeting small and medium businesses that need to analyze and report on their data without complex integrations.

Feature	Description	Example Use Case
Ease of Use	User-friendly drag-and-drop interface, suitable for non-technical users.	Small businesses analyze sales data without needing extensive technical knowledge.
Pre-Built Connectors	Connects with popular platforms such as CRM, marketing, and finance applications.	Integrating data from Zoho CRM to track customer engagement and sales performance.
Affordable Pricing	Cost-effective, making it ideal for smaller businesses.	Accessing BI tools without the high cost of enterprise-level solutions.

Summary of BI Tools

BI Tool	Best For	Unique Feature(s)	Examples of Usage
Power BI	Small to large organizations	Real-time dashboards, natural language query	Visualizing KPIs, exploring data relationships
Tableau	Data-driven organizations, data scientists	Extensive visualizations, mapping	Creating complex and interactive visual analytics
Qlik Sense	Organizations needing exploratory data analysis	Associative model	Discovering hidden patterns and associations
Looker	Google Cloud users, data-driven decision making		

LookML modeling | Building data models for marketing analytics | | **Domo** | Team collaboration and real-time insights | Collaborative BI, data apps | Monitoring cross-departmental data in real time | | **SAP BusinessObjects** | Large SAP-based enterprises | SAP integration, enterprise reporting | Financial and supply chain analysis | | **IBM Cognos** | Enterprises needing AI-driven insights | AI-powered insights, data governance | Compliance and operational insights | | **Sisense** | Embedded BI for custom applications | In-chip analytics, embedded BI | Providing customer analytics in custom applications | | **MicroStrategy** | Global enterprises needing scale and performance | HyperIntelligence, mobile BI | Sales and financial reporting across regions | | **Zoho Analytics** | Small businesses seeking easy-to-use BI | Pre-built connectors, affordability | Customer analytics for small businesses |

These BI tools each serve unique needs and industries, and their versatility makes them critical for organizations of all sizes seeking to leverage data for competitive advantage. Choosing the right BI tool depends on factors such as data sources, company size, technical requirements, and budget.

Different Data source & Location



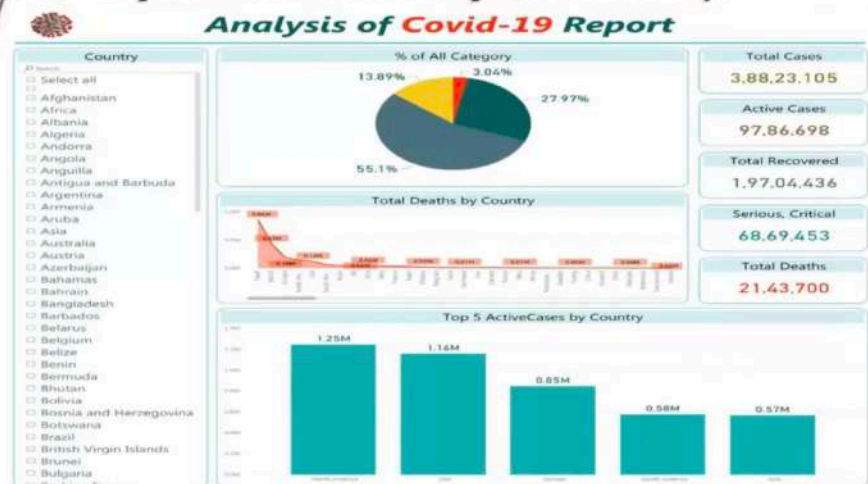
Data is stored in different type of databases, applications and files has to be refined and transformed in usable format.



Business related data is scattered across different locations and data needs to be extracted from different applications and databases.

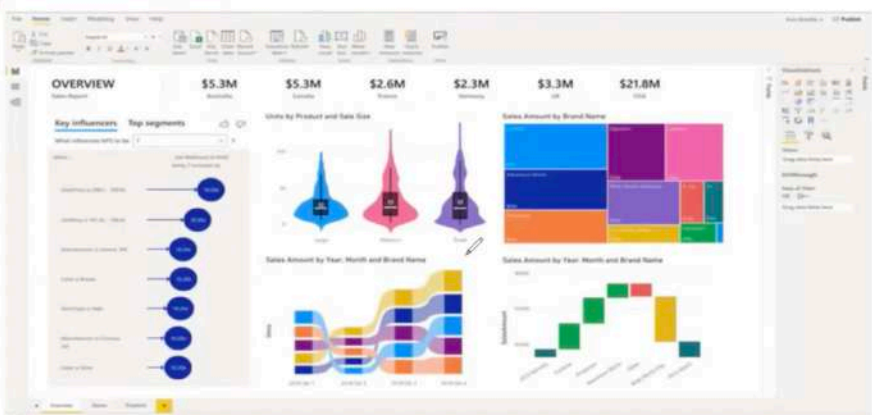
What is Dashboard?

A Power BI dashboard is a single page interface that uses the most- important elements of a report to tell a story.



What is BI Report?

A collection of visualizations that appear together on one or more pages is report in Power BI. It is a collection of items that have common motive.



Building Block of Power BI

01

Visualizations

02

Datasets

03

Reports

04

Dashboards

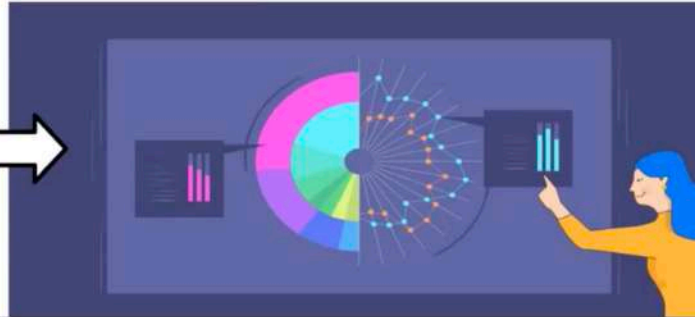
05

Tiles

A visual representation of data is called **visualization**.
For example, chart or graph

01

Visualizations



02

Datasets

The data-set is nothing but a collection of data or information.



	A	B	C	D	E	F	G	H	I	J	K
	Order ID	Order Date	Customer Name	City	Country	Region	Segment	Ship Date	Ship Mode	State	Lat
2	BN-2011-7407039	01/01/2011	Ruby Patel	Stockholm	Sweden	North	Home Office	05/01/2011	Economy Plus	Stockholm	18.0685
3	AZ-2011-9050313	03/01/2011	Summer Hayward	Southport	United King	North	Consumer	07/01/2011	Economy	England	-3.0101
4	AZ-2011-6674300	04/01/2011	Devin Huddleston	Valence	France	Central	Consumer	08/01/2011	Economy	Auvergne-Rhône-Alpes	4.8923
5	BN-2011-2819714	04/01/2011	Mary Parker	Birmingham	United King	North	Corporate	09/01/2011	Economy	England	-1.8930
6	AZ-2011-617423	05/01/2011	Daniel Burke	Echirolles	France	Central	Home Office	07/01/2011	Priority	Auvergne-Rhône-Alpes	5.71803
7	AZ-2011-2918397	07/01/2011	Fredrick Beveridge	La Seyne-sur-Mer	France	Central	Corporate	08/01/2011	Priority	Provence-Alpes-Côte d	5.87821
8	BN-2011-3248724	08/01/2011	Archer Hort	Toulouse	France	Central	Consumer	14/01/2011	Economy	Languedoc-Roussillon	1.44420
9	AZ-2011-6712797	11/01/2011	Evie Flockhart	Genoa	Italy	South	Consumer	16/01/2011	Economy	Liguria	8.94625
10	AZ-2011-4827146	11/01/2011	Faith Greenwood	Vienna	Austria	Central	Consumer	15/01/2011	Economy	Vienna	16.3738
11	AZ-2011-6439906	11/01/2011	Summer Hayward	Murcia	Spain	South	Consumer	15/01/2011	Economy	Murcia	-1.1306
12	AZ-2011-7053593	11/01/2011	Gracie Powell	Woking	United King	North	Consumer	11/01/2011	Immediate	England	-0.5600
13	AZ-2011-5702370	12/01/2011	Hershel Snyder	Lohne	Germany	Central	Corporate	19/01/2011	Economy	Lower Saxony	8.72208
14	AZ-2011-9927716	12/01/2011	Julia Martell	Leicester	United King	North	Home Office	17/01/2011	Economy	England	-1.1397
15	AZ-2011-2222034	12/01/2011	Viola Watson	Sheffield	United King	North	Consumer	15/01/2011	Priority	England	-1.4700
16	BN-2011-4913858	13/01/2011	Julian Dobie	Dordrecht	Netherlands	Central	Consumer	19/01/2011	Economy	South Holland	4.69039
17	BN-2011-2807470	13/01/2011	Rose Heap	Gothenburg	Sweden	North	Consumer	20/01/2011	Economy	Västra Götaland	11.9745
18	AZ-2011-5960662	14/01/2011	Ella Troy	Vienna	Austria	Central	Home Office	19/01/2011	Economy	Vienna	16.3738
19	AZ-2011-7675351	15/01/2011	Everett Dunbar	Langen	Germany	Central	Corporate	20/01/2011	Economy Plus	Lower Saxony	8.66340
20	BN-2011-3770060	17/01/2011	Georgia Birmingham	Copenhagen	Denmark	North	Home Office	23/01/2011	Economy	Hovedstaden	12.5683
21	AZ-2011-7419210	18/01/2011	Christopher Gould	Gandia	Spain	South	Corporate	21/01/2011	Priority	Valenciana	0.1844

03

Reports

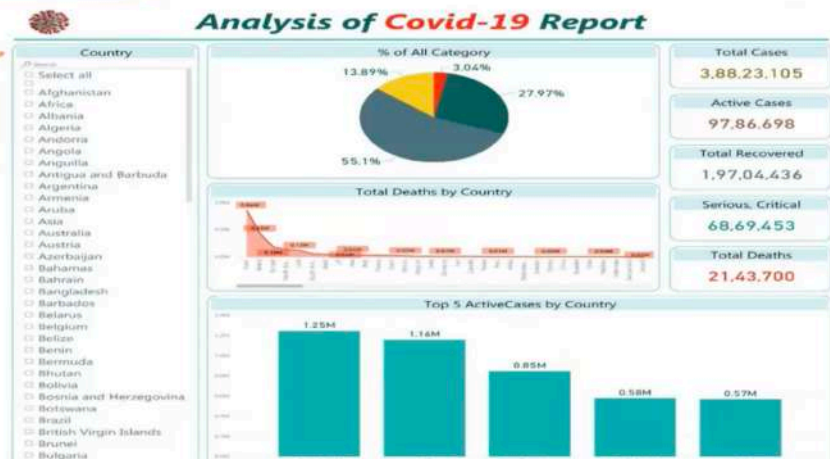
A collection of visualizations that appear together on one or more pages is report in Power BI.



04

Dashboards

A Power BI dashboard is a single page interface that uses the most- important elements of a report to tell a story.



05

Tiles

A Power BI, a tile is a single visualization found in a report or on a dashboard.



Architecture of Power BI

Power BI provides multiple software, connector, and services - Power BI desktop, Power BI service based on SaaS (Software as a Service) and Power BI mobile apps

Power BI Desktop - This is used to create reports and data visualizations on the dataset.



Power BI Service - This is a cloud service and is used to publish Power BI reports and data visualizations.



Power BI Mobile Apps - It is used to view the reports and dashboards.



Architecture of Power BI



Comparison of Power BI and Tableau



Power BI



+ a b | e a u

77+ Data Sources (Also connect the live & Outlook, Gmail Data)

77+ Data Sources



Power BI vs Tableau (Charts)



Power BI



+ a b | e a u

30+ Default charts & 250 charts from marketplace (80 charts are free)

24 Default charts



Power BI vs Tableau (UI)



Power BI



+ a b | e a u

Power BI Difficult User Interface As compare Tableau

Tableau very Simple User Interface



Power BI vs Tableau (Function)



Power BI



+99 Functions Easy to use just Button Click

+800 M Functions, +300 DAX Functions



+180 Functions (Difficult to use)



Power BI vs Tableau (ETL Tool)



Power BI



**Inbuilt ETL Tool (Power Query)
10 year old in market**



**No Inbuilt ETL Tool (Tableau Prep)
3 year old in market**



Power BI vs Tableau (AI in BI)



Power BI



Greater Scope AI in BI (artificial intelligence in business intelligence)



AI in BI Limited Scope



Power BI vs Tableau (Creativity)



Power BI



Creativity is not good in Power BI As compare Tableau



Creativity is very good in Tableau



Power BI vs Tableau (Price)

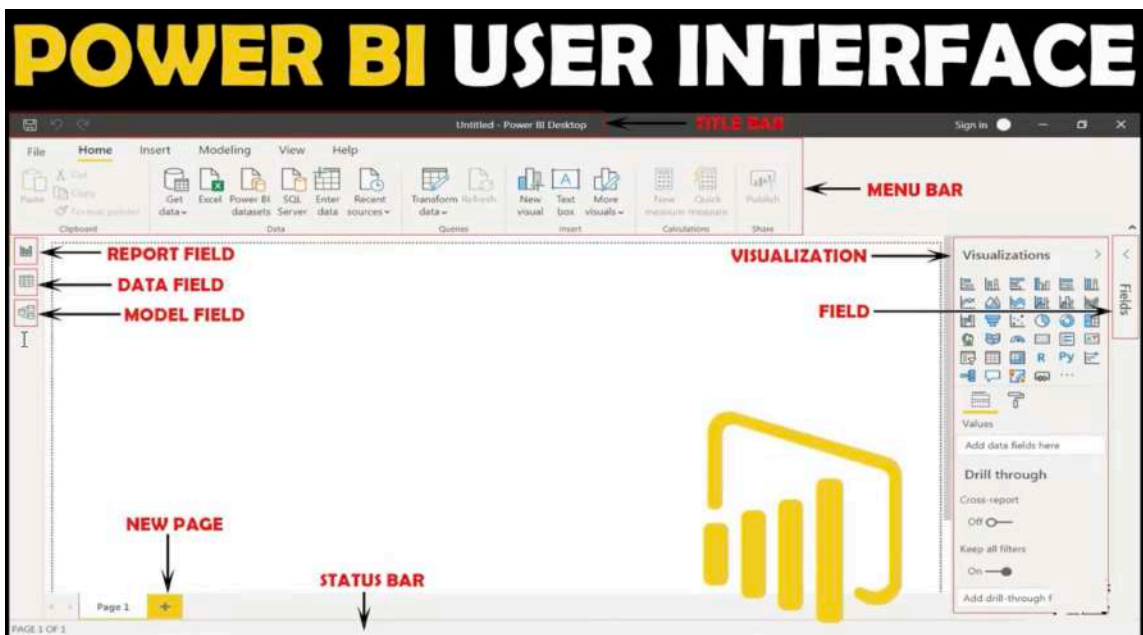


Power BI



Power BI desktop (Free), Power BI Service, Power Query (Inbuilt)- 10\$ (Per User Per Month)

Tableau desktop, Tableau Online, Tableau Prep- 70\$ (Per User Per Month)



Components Of Power BI

Power Query: - It helps in finding editing and loading External Data.

Power Pivot:

It helps in Data Modeling Relationships.

Power View

It is data Visualization Tool.

Power Map

3D View of Geo Map.

Management Gateways: - It Joins the Data to the Cloud

7 Steps Process of Making Report

Extract

Transform

Load

Data Modelling

DAX

Building Report

Publish Report

Power Query	Power Pivot
To Clean Data	To do Data Modelling
Uses M Functions	Uses DAX Functions
Requires More memory for M Functions	Light weight Functions, does not occupy much space

Data Analysis Expressions (DAX) is a programming language that is used throughout Microsoft Power BI for creating calculated columns, measures, and custom tables. It is a collection of functions, operators, and constants that can be used in a formula, or expression, to calculate and return one or more values.

What is a M Query ? M Query is a “mashup” query language used to query a large number of data from data sources. It is used during the data import which is the 1st step where data gets imported in data model of Power BI Desktop where the queries are using M in the background.

In []: