

DATA ANALYTICS AND POWER BI

VALUE ADDED COURSE MATERIAL FOR II B.Sc COMPUTER SCIENCE

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II B.Sc COMPUTER SCIENCE

DATA ANALYTICS AND POWER BI

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SEMESTER:III COURSE CODE: 25UCSVAC1

Course Title Data Analytics and PowerBI

Unit I :

Hours :6

- 1.Data Science vs Data Analytics
- 2.Data Science in Business
- 3.Data Analytics in Business
- 4.Data Ecosystem & Lifecycle

Unit II:

Hours:6

1. Data Privacy & Ethics
2. Data Integrity
3. Data Analytics Skills needed
4. How to improve skills
5. The Data Driven Decision Making Framework

Unit III :

Hours:6

1. Introduction to Power BI
2. What is Business Intelligence
3. Components of Power BI
4. Power BI Desktop
5. Power BI Service
6. Power BI Installation steps
7. Power BI Architecture

Unit IV :

Hours:6

Power BI Desktop:

1. Features
2. Reasons
3. Multiple Views
4. Desktop Window
5. Types of Tabs
6. Supported Browsers
7. Supported Language

Unit V:

Hours:6

1. Power BI Desktop vs Power BI Service
2. Supported Data Sources
3. Comparison with other Power BI Tools

Unit I :

Hours :6

- 1.Data Science vs Data Analytics
- 2.Data Science in Business
- 3.Data Analytics in Business
- 4.Data Ecosystem & Lifecycle

The terms **Data Science** and **Data Analytics** are often used interchangeably, but they refer to different aspects of working with data. Here's a clear comparison:

1.🔍 Data Analytics

Focus: Examining existing data to find trends, insights, and answer specific questions.

✓ Characteristics:

- **Purpose:** Descriptive and diagnostic (What happened? Why did it happen?)
- **Tools:** Excel, SQL, Tableau, Power BI, Python (Pandas), R
- **Techniques:**
 - Data cleaning and wrangling
 - Statistical analysis
 - Visualization and reporting
- **Output:** Dashboards, reports, insights for decision-making

👤 Typical Roles:

- Data Analyst
- Business Intelligence Analyst
- Reporting Analyst

✦ Example:

A sales analyst uses SQL and Tableau to identify which products had the highest sales last quarter.

□ Data Science

Focus: Creating models and algorithms to make predictions or automate decisions using data.

✓ Characteristics:

- **Purpose:** Predictive and prescriptive (What will happen? What should we do?)

- **Tools:** Python, R, Jupyter, TensorFlow, PyTorch, Spark
- **Techniques:**
 - Machine learning & AI
 - Predictive modeling
 - Data engineering
 - Natural Language Processing (NLP)
- **Output:** Predictive models, recommendation systems, classification tools

Typical Roles:

- Data Scientist
- Machine Learning Engineer
- AI Specialist

Example:

A data scientist builds a machine learning model to predict customer churn using historical customer behavior data.

Summary Comparison:

Feature	Data Analytics	Data Science
Primary Goal	Understand past data	Predict future outcomes
Nature	Descriptive/Diagnostic	Predictive/Prescriptive
Techniques Used	Stats, visualization	ML, AI, modeling
Tools	SQL, Excel, Tableau	Python, R, TensorFlow
Outcomes	Reports, dashboards	Algorithms, models

Relationship:

- **Data Analytics** can be seen as a subset or foundational step in **Data Science**.
- Many Data Science projects **start** with data analysis to understand the problem.

2. Data Science in Business: An Explanation

Data Science in business refers to the use of advanced analytical tools and techniques — including statistics, machine learning, and data engineering — to extract meaningful insights from data and support **strategic decision-making**.

What Is Data Science in a Business Context?

It's the **process of collecting, analyzing, and interpreting large volumes of data** to help businesses:

- Optimize operations
 - Improve customer experiences
 - Increase profitability
 - Innovate products and services
 - Make data-driven decisions
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Key Applications of Data Science in Business

1. Customer Insights & Personalization

- **Use case:** Understanding customer behavior and preferences through purchase history and interaction data.
- **Example:** Amazon recommends products based on your past searches and purchases.

2. Predictive Analytics

- **Use case:** Forecasting future trends (e.g. sales, demand, or customer churn).
- **Example:** A telecom company predicts which customers are likely to leave and offers targeted promotions to retain them.

3. Marketing Optimization

- **Use case:** Analyzing which marketing channels perform best.
- **Example:** Facebook Ads use data science to serve the most relevant ads to the right audience at the right time.

4. Risk Management

- **Use case:** Identifying and reducing financial, operational, or cybersecurity risks.
- **Example:** Banks use data science to detect fraudulent transactions in real time.

5. Operational Efficiency

- **Use case:** Streamlining processes, reducing waste, and improving logistics.
- **Example:** A logistics company like FedEx uses route optimization algorithms to reduce delivery time and fuel cost.

6. Product Development

- **Use case:** Analyzing customer feedback and usage patterns to design better products.
- **Example:** Netflix uses viewer data to create and recommend original shows that are likely to succeed.

Tools Used in Business Data Science

- **Languages:** Python, R, SQL
- **Visualization:** Tableau, Power BI, Matplotlib
- **Machine Learning:** Scikit-learn, TensorFlow, XGBoost
- **Big Data Platforms:** Apache Spark, Hadoop
- **Databases:** MySQL, PostgreSQL, MongoDB

Benefits of Using Data Science in Business

Benefit	Impact
Informed decisions	Reduces guesswork and supports strategy
Better customer service	Enables personalization and timely responses
Competitive advantage	Leverages data to stay ahead of market trends
Increased revenue	Identifies new opportunities and optimizes pricing
Cost reduction	Improves efficiency in resource allocation

Real-World Business Example

Company: Starbucks

- Uses data science to choose new store locations by analyzing foot traffic, demographics, and competitor locations.
- Uses loyalty card data to personalize offers and understand customer behavior.

3. Data Analytics in Business: An Explanation

Data Analytics in business refers to the process of examining raw data to uncover **useful insights** and support better **operational and strategic decisions**. It focuses on understanding **what is happening in the business**, identifying trends, and helping teams make **informed choices**.

What Is Data Analytics in a Business Context?

It involves using statistical tools and techniques to analyze business data — like sales, customer behavior, or financial performance — to:

- Track performance
- Understand trends
- Solve problems
- Support decision-making

Unlike data science, which is predictive and often algorithm-driven, **data analytics is more descriptive and diagnostic**.

Key Applications of Data Analytics in Business

1. Performance Tracking

- **Use case:** Monitoring KPIs (Key Performance Indicators) like sales growth, churn rate, or customer acquisition cost.
- **Example:** A retail manager uses sales reports to track daily revenue and adjust staffing accordingly.

2. Customer Behavior Analysis

- **Use case:** Understanding what products or services customers use most.
- **Example:** An e-commerce site analyzes which items are frequently added to carts but not purchased to improve checkout design.

3. Marketing Analytics

- **Use case:** Measuring the effectiveness of marketing campaigns.
- **Example:** A company uses Google Analytics to see which social media platform drives the most traffic and conversions.

4. Financial Analysis

- **Use case:** Evaluating expenses, revenues, and profitability.
- **Example:** A finance team analyzes monthly budgets and spending trends to find cost-saving opportunities.

5. Operational Improvements

- **Use case:** Streamlining processes and reducing delays or bottlenecks.
- **Example:** A logistics company uses delivery time data to identify areas of frequent delays.

✂ Tools Used in Business Data Analytics

- **Data Manipulation:** Excel, SQL, Python (Pandas), R
- **Data Visualization:** Power BI, Tableau, Google Data Studio
- **Databases:** MySQL, PostgreSQL, Snowflake
- **Reporting Platforms:** Looker, Microsoft Power BI

□ Types of Data Analytics

Type	Question It Answers	Example in Business
Descriptive	What happened?	Monthly sales report
Diagnostic	Why did it happen?	Analyzing why sales dropped last month
Predictive (light use)	What will happen next?	Forecasting next quarter's demand
Prescriptive (basic)	What should we do about it?	Suggesting best times to launch a campaign

🚀 Benefits of Data Analytics in Business

Benefit	Impact
Better decisions	Based on facts, not intuition
Improved efficiency	Identifies waste or inefficiencies
Enhanced customer service	Enables more responsive and personalized support
Cost reduction	Spots unnecessary expenses
Risk identification	Helps detect early warning signs

🔗 Real-World Example

Company: Walmart

- Uses data analytics to track inventory and customer buying patterns.
- Analyzes point-of-sale data to determine which products should be stocked more during certain seasons.

4.Data Ecosystem & Lifecycle: A Clear Explanation

Data Lifecycle

The **Data Lifecycle** refers to the stages that data goes through, from creation to disposal. Understanding this helps organizations manage data efficiently, securely, and effectively.

1. Data Generation/Creation

- **What it is:** Data is created or acquired from various sources (e.g., user input, sensors, business transactions, web scraping).
- **Example:** A customer places an order online—this creates new transaction data.

2. Data Collection

- **What it is:** Gathering data from multiple sources and formats (structured and unstructured).
- **Example:** Web forms, IoT devices, APIs, third-party sources.

3. Data Storage

- **What it is:** Storing collected data in databases, data lakes, or warehouses.
- **Example:** SQL databases, cloud storage (AWS S3, Azure Blob).

4. Data Processing

- **What it is:** Cleaning, transforming, and organizing data for analysis.
- **Example:** Removing duplicates, correcting errors, data enrichment.

5. Data Analysis

- **What it is:** Using tools and algorithms to generate insights or support decision-making.
- **Example:** Business intelligence dashboards, machine learning models.

6. Data Sharing/Distribution

- **What it is:** Making data accessible to users or systems in a secure and governed way.
- **Example:** APIs, reports, data marts for different departments.

7. Data Archival

- **What it is:** Moving old but potentially useful data to long-term storage.
- **Example:** Archiving 5-year-old financial records for compliance.

8. Data Disposal

- **What it is:** Securely deleting or destroying data that is no longer needed.
- **Example:** Following GDPR to remove personal data after consent withdrawal.

Data Ecosystem

The **Data Ecosystem** refers to the interconnected technologies, processes, people, and policies that enable data collection, processing, and usage.

Key Components:

Component	Description	Examples
Data Sources	Where data originates	IoT, apps, social media
Data Infrastructure	Tools to store & move data	Databases, ETL pipelines
Data Platforms	Systems to manage data	Hadoop, Snowflake, BigQuery
Analytics Tools	Software to analyze and visualize	Power BI, Tableau, Python
Governance & Security	Rules for data usage and access	GDPR, access controls, audits
People	Users and managers of data	Data engineers, analysts, stewards

How Lifecycle & Ecosystem Fit Together

The **Data Lifecycle** happens **within** the **Data Ecosystem**. Think of the lifecycle as "**how data flows**", and the ecosystem as "**everything that supports and manages that flow.**"

Summary

Term	Meaning
Data Lifecycle	The step-by-step journey data takes from creation to deletion
Data Ecosystem	The entire environment (tools, people, rules) where data is handled

Unit II:

Hours:6

1. Data Privacy & Ethics
2. Data Integrity
3. Data Analytics Skills needed
4. How to improve skills
5. The Data Driven Decision Making Framework

1.Data Privacy & Ethics refers to the principles and practices that ensure personal and sensitive data is collected, used, stored, and shared in a responsible, fair, and lawful manner. It combines legal compliance with ethical responsibility to protect individuals' rights.

1. What is Data Privacy?

Data Privacy involves protecting personal information from unauthorized access and giving individuals control over how their data is collected and used.

Key Concepts:

- **Personal Data:** Information that can identify an individual (e.g., name, email, ID number).
- **Consent:** Users must be informed and give permission before their data is collected or used.
- **Data Minimization:** Only collecting the data that is necessary for a specific purpose.
- **Access Control:** Ensuring only authorized people can access sensitive data.

Laws & Regulations:

- **GDPR (General Data Protection Regulation)** – EU law on data protection and privacy.
 - **CCPA (California Consumer Privacy Act)** – U.S. law giving consumers rights over their personal data.
 - **HIPAA** – U.S. law protecting medical information.
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2. What is Data Ethics?

Data Ethics refers to the moral obligations of organizations and individuals in handling data. It goes beyond compliance and considers what is *right*, not just what is *legal*.

Key Principles:

- **Transparency:** Being open about how data is used.
 - **Accountability:** Taking responsibility for data practices and their impact.
 - **Fairness:** Avoiding bias and discrimination in data-driven decisions.
 - **Security:** Protecting data from breaches and misuse.
 - **Respect for User Autonomy:** Allowing users control and understanding of their data.
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3. Why It Matters

- **Trust:** Ethical data practices build trust with users, customers, and partners.
 - **Reputation:** Mishandling data can damage an organization's public image.
 - **Legal Risk:** Violating privacy laws can result in heavy fines and lawsuits.
 - **Social Impact:** Ethical misuse of data (e.g., surveillance, algorithmic bias) can harm individuals or society.
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4. Real-World Examples

- **Cambridge Analytica Scandal:** Misuse of Facebook user data to influence political outcomes.
 - **AI Bias:** Facial recognition systems showing racial bias due to biased training data.
 - **Data Breaches:** Companies like Equifax exposing millions of users' personal data.
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5. Best Practices

- Implement strong data protection measures (encryption, access control).
- Regularly audit data usage and access.
- Provide clear privacy policies and get informed consent.
- Train staff on data privacy and ethics.
- Build ethical review processes for AI and data-driven projects.

2.What is Data Integrity?

Data Integrity refers to the accuracy, consistency, and reliability of data throughout its lifecycle. It ensures that data remains **complete, unaltered**, and **trustworthy** from the moment it is created until it is archived or deleted.

Key Principles of Data Integrity

1. **Accuracy**
 - Data must be correct and free from errors.
 - Example: A customer's name or account number should be entered without spelling mistakes.
 2. **Consistency**
 - Data should remain the same across different systems and formats.
 - Example: A user's email should match in both the marketing and billing databases.
 3. **Completeness**
 - No required data should be missing.
 - Example: All fields in a registration form (name, address, date of birth) must be filled out.
 4. **Validity**
 - Data must follow the correct format and meet defined rules.
 - Example: A phone number should contain only digits and match the country's format.
 5. **Timeliness**
 - Data should be up to date.
 - Example: Inventory data should reflect current stock, not last week's numbers.
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Why Data Integrity Matters

- **Decision-Making:** Organizations rely on accurate data for effective decisions.
 - **Compliance:** Many industries (e.g., healthcare, finance) have strict regulations requiring high data integrity.
 - **Trust:** Inaccurate or inconsistent data can damage credibility with customers and stakeholders.
 - **Operational Efficiency:** Reliable data helps streamline processes and avoid costly errors.
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Threats to Data Integrity

- **Human Error:** Mistyped data, accidental deletions, or incorrect updates.

- **Cyberattacks:** Hackers altering or deleting data.
 - **Software Bugs:** Faulty code causing data corruption.
 - **Hardware Failures:** Disk crashes or power outages leading to data loss.
 - **Improper Access:** Unauthorized changes by people without the right permissions.
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How to Maintain Data Integrity

1. **Validation Rules:** Use software checks to ensure correct data input.
 2. **Access Controls:** Limit who can view or modify data.
 3. **Backups:** Regularly back up data to recover it if it's lost or corrupted.
 4. **Audit Trails:** Keep logs of who changed what and when.
 5. **Encryption:** Protect data from being read or changed during transmission.
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Example

In a hospital:

- A patient's health record must remain accurate, up-to-date, and protected from unauthorized edits.
- If incorrect data is entered or tampered with, it could lead to wrong diagnoses or treatments.

3.Data Analytics Skills Needed

To succeed in **data analytics**, professionals need a mix of **technical**, **analytical**, and **communication** skills. These help them gather, process, analyze, and interpret data to support decision-making.

1. Technical Skills

These are the tools and methods used to work with data.

a. Excel

- Basic data analysis, pivot tables, charts, and functions like `VLOOKUP`, `IF`, etc.

b. SQL (Structured Query Language)

- Used to query and manage data in databases.
- Example: Extracting customer purchase data from a company's database.

c. Programming Languages

- **Python:** Widely used for data cleaning, analysis, and visualization.
- **R:** Strong for statistical analysis and academic data science.

d. Data Visualization Tools

- Tools like **Tableau**, **Power BI**, or **Matplotlib/Seaborn** (in Python) to create dashboards and charts.
- Helps communicate data insights clearly.

e. Statistics and Math

- Understanding averages, distributions, correlation, regression, probability, etc.
 - Crucial for identifying patterns and making predictions.
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☐ 2. Analytical & Problem-Solving Skills

These are the thinking skills that help you interpret data.

a. Critical Thinking

- Ability to ask the right questions and understand what data means.
- Example: Why did sales drop in Q2?

b. Problem Solving

- Using data to find root causes and recommend solutions.

c. Data Cleaning & Preparation

- Real-world data is messy; skills to remove errors, handle missing data, and format it properly are essential.

d. Attention to Detail

- Small mistakes can lead to incorrect conclusions.
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🗣️ 3. Communication & Business Skills

Being able to explain your findings clearly is just as important as doing the analysis.

a. Data Storytelling

- Turning numbers into a narrative that helps stakeholders understand insights.

b. Presentation Skills

- Using charts, reports, or dashboards to present findings clearly and persuasively.

c. Domain Knowledge

- Understanding the business area (e.g., finance, marketing, healthcare) helps make more relevant and valuable insights.

4. Bonus Skills

- **Machine Learning Basics:** For predictive analytics and more advanced tasks.
- **Big Data Tools:** Familiarity with tools like Hadoop or Spark if working with large datasets.
- **Cloud Platforms:** Knowledge of AWS, Google Cloud, or Azure for data storage and processing.

✓ Summary: Core Data Analytics Skills

Skill Category	Example Tools / Concepts
Excel & Spreadsheets	Pivot tables, formulas
Programming	Python, R
Databases	SQL
Visualization	Tableau, Power BI, Matplotlib
Statistics	Regression, probability, distributions
Communication	Storytelling, presentation
Critical Thinking	Asking the right questions

4.How to Improve Your Data Analytics Skills

Improving your **data analytics skills** requires consistent practice, learning, and applying knowledge in real-world scenarios. Here's a step-by-step guide to help you grow:

1. Build a Strong Foundation

a. Learn the Basics

Start with the core areas:

- **Excel:** Learn formulas, pivot tables, charts.

- **SQL:** Practice writing queries to filter, join, and aggregate data.
- **Statistics:** Understand mean, median, standard deviation, correlation, regression, etc.

b. Take Online Courses

- Platforms: Coursera, edX, Udemy, LinkedIn Learning, DataCamp
 - Suggested beginner-friendly courses:
 - *Google Data Analytics Certificate*
 - *IBM Data Analyst Professional Certificate*
 - *Data Analysis with Python (Coursera)*
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2. Practice Regularly

a. Work on Real Datasets

- Websites like Kaggle, Data.gov, or UCI Machine Learning Repository offer free datasets.
- Try cleaning, analyzing, and visualizing them to draw insights.

b. Do Mini Projects

- Examples:
 - Analyze COVID-19 data trends.
 - Build a dashboard of monthly expenses.
 - Study customer churn or sales data.
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3. Learn Data Visualization Tools

- Start with **Excel**, then move to:
 - **Tableau** (visual dashboards)
 - **Power BI** (Microsoft's analytics tool)
 - **Python libraries:** Matplotlib, Seaborn, Plotly

Practice telling a story through charts and visuals.

4. Master a Programming Language

a. Python (Highly Recommended)

- Libraries to focus on:
 - `pandas` for data manipulation
 - `numpy` for numerical data
 - `matplotlib` and `seaborn` for visualization

b. R (Optional)

- Useful for statistical analysis and data exploration.

Start by writing small scripts to clean or analyze data.

☐ **5. Strengthen Analytical Thinking**

- Practice solving real-world problems using data.
 - Break down questions into measurable components.
 - Use logic and numbers to support your conclusions.
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☐ **6. Get Feedback and Collaborate**

- Join communities: Reddit's r/datascience, Kaggle forums, LinkedIn groups.
 - Share your work, ask for feedback, and learn from others.
 - Participate in hackathons or data challenges.
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7. Gain Domain Knowledge

- Learn the business context (e.g., marketing, healthcare, finance).
 - Understand industry-specific KPIs and how data is used to make decisions.
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8. Document Your Work

- Keep a **portfolio** of your projects.
 - Use GitHub to showcase your code.
 - Create a personal blog or LinkedIn posts to explain your insights and methods.
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☐ **9. Stay Updated**

- Follow data analytics blogs, podcasts, and YouTube channels.
 - Stay current with new tools and trends (e.g., AI in analytics, data storytelling, ethics).
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Summary: How to Improve Your Skills

Area	How to Improve
Technical Skills	Practice coding, SQL, Excel, and visualization tools
Analytical Thinking	Solve real-world problems and case studies
Communication	Present findings clearly and simply
Projects & Portfolio	Build and share real projects
Continuous Learning	Take courses, read blogs, join communities

5.The Data-Driven Decision-Making (DDDM) Framework

Data-Driven Decision Making means using data—rather than intuition or guesswork—to guide strategic and operational decisions. The DDDM framework provides a **structured process** to turn raw data into informed, impactful decisions.

🔄 Overview of the DDDM Framework

Here's a typical 6-step framework:

1. **Define the Objective**
 2. **Collect the Data**
 3. **Clean and Prepare the Data**
 4. **Analyze the Data**
 5. **Interpret and Communicate Insights**
 6. **Take Action and Monitor Results**
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🔍 Step-by-Step Explanation

1. Define the Objective

- What decision needs to be made?
- What problem are you trying to solve?

★ *Example:*

A retail store wants to reduce product returns. The goal is to identify causes of high return rates.

★ Tip: Be specific. A vague objective leads to irrelevant analysis.

2. Collect the Data

- Identify relevant data sources: internal (sales, customer feedback) or external (market trends).
- Make sure data is reliable and legally obtained.

★ Example:

Collect product details, return reasons, customer purchase history.

✦✦ *Tip: Focus on collecting the data that's most relevant to the objective.*

3. Clean and Prepare the Data

- Remove duplicates, handle missing values, correct errors.
- Standardize formats and create necessary variables or metrics.

★ Example:

Ensure all return reasons are categorized consistently (e.g., “size too big” vs. “wrong size”).

✦✦ *Tip: Poor quality data leads to poor decisions, even if the analysis is perfect.*

4. Analyze the Data

- Use statistical tools, visualization, or machine learning depending on complexity.
- Look for trends, patterns, correlations, or outliers.

★ Example:

Use visualization to identify which products or categories have higher return rates.

✦✦ *Tip: Choose the right method (e.g., descriptive stats vs. predictive models) based on your objective.*

5. Interpret and Communicate Insights

- Translate the findings into actionable insights.
- Use charts, dashboards, or simple language to explain results to stakeholders.

★ Example:

“70% of returns are from products sized ‘L’ – consider reviewing sizing guidelines.”

✦✦ *Tip: Data alone doesn't convince—clear storytelling and visuals do.*

6. Take Action and Monitor Results

- Implement the solution based on insights (e.g., change product descriptions, adjust inventory).
- Monitor key metrics to track performance and adjust if needed.

★ *Example:*

After updating sizing charts, track whether return rates decrease over the next 3 months.

✦ *Tip: DDDM is iterative—keep testing and refining decisions based on new data.*

✓ Benefits of DDDM

- Reduces risk and guesswork
 - Increases efficiency and accuracy
 - Enables proactive strategy rather than reactive responses
 - Builds trust and accountability in decisions
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□ When to Use DDDM?

- Business strategy (e.g., where to open a new store)
 - Marketing optimization (e.g., which ads perform best)
 - HR analytics (e.g., identifying turnover trends)
 - Customer experience (e.g., identifying pain points)
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★ Summary Table

Step	Description	Key Question
1. Define Objective	Identify the problem or decision	What do we want to solve or decide?
2. Collect Data	Gather relevant data sources	What data do we need?
3. Prepare Data	Clean and format data	Is the data usable and accurate?
4. Analyze Data	Apply tools/models to extract insights	What does the data show?
5. Interpret Results	Communicate clearly	What insights can we act on?
6. Take Action	Implement and monitor	Did our decision work?

Unit III :

Hours:6

1. Introduction to Power BI
2. What is Business Intelligence
3. Components of Power BI
4. Power BI Desktop
5. Power BI Service
6. Power BI Installation steps
7. Power BI Architecture

1. Introduction to Power BI

Power BI is a **business analytics tool** developed by **Microsoft** that helps users visualize data, share insights, and make data-driven decisions. It's widely used by businesses, analysts, and data professionals to turn raw data into **interactive dashboards and reports**.

□ What Does Power BI Do?

Power BI enables users to:

- Connect to **multiple data sources** (Excel, SQL, SharePoint, cloud databases, etc.)
 - Clean and transform data using **Power Query**
 - Create **interactive visuals** like charts, maps, and tables
 - Share insights via **dashboards, reports, and Power BI Service** (cloud)
 - Set up **real-time data monitoring** with live dashboards
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✂ Key Components of Power BI

Component	Description
Power BI Desktop	A free Windows app for creating reports and data models
Power BI Service	Online platform to share and collaborate on dashboards and reports
Power BI Mobile	Mobile app to view dashboards on phones or tablets
Power Query	Tool to connect, transform, and clean data before visualization
Power BI Gateway	Bridge to connect on-premise data to Power BI Service
Power BI Embedded	Allows developers to embed Power BI visuals in apps and websites

□ Why Use Power BI?

- **User-Friendly Interface:** Drag-and-drop design for visuals.
 - **Custom Visuals:** Choose from hundreds of visual types (bar charts, KPIs, maps, etc.).
 - **Data Refresh:** Automatic data updates and real-time dashboards.
 - **Integration:** Works well with Microsoft tools like Excel, Azure, and Teams.
 - **Security:** Built-in roles and data access control.
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🔧 Basic Workflow in Power BI

1. **Connect to Data**
 - Sources: Excel, databases, web APIs, cloud storage (like OneDrive), etc.
 2. **Transform Data**
 - Use Power Query Editor to clean and shape your data (remove nulls, split columns, change types).
 3. **Build Visuals**
 - Drag fields into charts, tables, maps, etc., and add filters or slicers for interactivity.
 4. **Create Reports**
 - Combine visuals on report pages with titles, labels, and branding.
 5. **Publish to Power BI Service**
 - Share reports online with team members or embed them in apps or websites.
 6. **Set Up Refresh and Alerts**
 - Schedule automatic data refreshes or set alerts for KPIs.
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📊 Common Visuals in Power BI

- Bar/Column Charts
 - Line Charts
 - Pie/Donut Charts
 - Maps (Geographical Data)
 - Cards and KPIs
 - Slicers (Interactive filters)
 - Tables and Matrix Views
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✓ Benefits of Power BI

- Helps **non-technical users** explore data easily.
 - Saves time with **automated reports**.
 - Encourages **collaboration** through sharing.
 - Drives **informed decision-making** through real-time insights.
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Learning Resources

- Microsoft Learn: [Power BI Guided Learning](#)
- YouTube Channels: Guy in a Cube, Enterprise DNA
- Courses: Coursera, Udemy, LinkedIn Learning

2. What is Business Intelligence (BI)?

Business Intelligence (BI) refers to the **technologies, processes, and tools** that help organizations collect, analyze, and present business data to support **better decision-making**.

In simple terms, BI helps companies **understand what is happening in their business, why it's happening, and what to do next**—by turning **raw data into meaningful insights**.

Key Goals of Business Intelligence

- Improve business decisions
 - Identify trends and patterns
 - Monitor performance and KPIs
 - Optimize operations and processes
 - Support strategic planning and forecasting
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Components of Business Intelligence

Component	Description
Data Sources	Databases, Excel, CRM systems, ERP software, cloud services, etc.
Data Warehousing	Central repository where data is cleaned and stored for analysis
Data Integration	Combines data from various sources (ETL: Extract, Transform, Load)
Analytics & Reporting	Tools that generate insights using dashboards, reports, and data visualizations
Dashboards	Visual summaries of key metrics (KPIs) and trends
Data Mining	Identifying hidden patterns and relationships in large datasets

Popular BI Tools

- **Power BI** (Microsoft)
- **Tableau**
- **QlikView / Qlik Sense**
- **Looker** (Google)

- **SAP BusinessObjects**
 - **Google Data Studio**
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❏ **How BI Works – Simple Flow**

1. **Collect:** Gather data from different sources.
 2. **Store:** Organize and clean data in a data warehouse.
 3. **Analyze:** Use BI tools to find trends, patterns, and relationships.
 4. **Visualize:** Create dashboards and reports.
 5. **Decide:** Use insights to guide business strategies and actions.
-

✔ **Benefits of Business Intelligence**

- **Faster Decision-Making:** Real-time dashboards show what's happening now.
 - **Improved Efficiency:** Identify bottlenecks and areas to improve.
 - **Better Forecasting:** Use historical trends to predict future performance.
 - **Customer Insights:** Understand behavior, preferences, and feedback.
 - **Competitive Advantage:** Spot trends before competitors do.
-

🏢 **BI in Action – Real Examples**

Industry	Use Case
Retail	Analyze sales by region or product
Healthcare	Monitor patient outcomes and treatment costs
Finance	Detect fraud or forecast revenue
Marketing	Track campaign performance and ROI
Manufacturing	Optimize supply chain and inventory

✦ **Business Intelligence vs Data Analytics**

Aspect	Business Intelligence	Data Analytics
Focus	Descriptive – what happened?	Diagnostic & Predictive – why/how?
Tools	Dashboards, reports	Statistical models, machine learning
Audience	Business users, executives	Analysts, data scientists

⚙️ 3. Components of Power BI

Power BI is made up of several integrated components that work together to help users **connect to data, transform it, visualize it, and share insights**. Each component has a unique role in the **data analysis and reporting process**.

🖥️ 1. Power BI Desktop

- **Purpose:** The main development tool for creating reports.
- **Key Features:**
 - Data import and modeling
 - Data transformation using Power Query
 - Drag-and-drop visuals
 - DAX (Data Analysis Expressions) for calculations
- **Audience:** Data analysts, report creators

✓ You build your dashboards and reports here before publishing them.

☁️ 2. Power BI Service (PowerBI.com)

- **Purpose:** A **cloud-based platform** for sharing and collaborating on reports and dashboards.
- **Key Features:**
 - Publish and view reports from Power BI Desktop
 - Create dashboards by pinning visuals
 - Schedule automatic data refreshes
 - Set alerts and share content
- **Audience:** Business users, managers, teams

✓ Enables sharing of live reports and real-time data monitoring.

📱 3. Power BI Mobile App

- **Purpose:** Access reports and dashboards on-the-go.
- **Devices Supported:** iOS, Android, Windows
- **Key Features:**
 - Touch-friendly reports

- Alerts and push notifications
- View real-time data anywhere

✓ Great for executives and field teams who need quick access to KPIs.

🔌 4. Power BI Gateway

- **Purpose:** Acts as a **bridge** between on-premise data (e.g., SQL Server, Excel files) and the Power BI Service.
- **Types:**
 - **Personal Gateway:** For individual use
 - **Enterprise Gateway:** For teams/organizations

✓ Essential for connecting live, secure, local data to the cloud.

🏠 5. Power BI Report Server

- **Purpose:** Allows organizations to **host reports on-premise** (instead of the cloud).
- **Features:**
 - Similar to Power BI Service but installed locally
 - Supports paginated reports and interactive dashboards

✓ Ideal for companies with strict data security or regulatory requirements.

🔗 6. Power Query

- **Purpose:** A tool built into Power BI Desktop to **clean, transform, and load (ETL) data**.
- **Features:**
 - Remove duplicates, filter rows, merge data
 - Apply transformations with a no-code interface

✓ Helps prepare data before it's analyzed.

📦 7. DAX (Data Analysis Expressions)

- **Purpose:** A formula language used to create **calculated columns, measures, and tables** in Power BI.
- **Similar to:** Excel formulas, but more powerful for data models

✓ Used for advanced calculations like YTD totals, running totals, etc.

✂ 8. Power BI Visuals

- **Purpose:** Components used to display data—charts, graphs, maps, etc.
- **Types:**
 - Built-in visuals (bar, pie, line, etc.)
 - Custom visuals from AppSource
 - AI-powered visuals (decomposition tree, smart narratives)

✓ Enhances storytelling and makes data easy to understand.

📄 Summary Table: Power BI Components

Component	Description	Primary Use
Power BI Desktop	Build reports and visuals	Data modeling & report creation
Power BI Service	Share and view dashboards online	Collaboration & publishing
Power BI Mobile	Access reports on smartphones/tablets	On-the-go insights
Power BI Gateway	Connect local data to Power BI cloud	Real-time data access
Power BI Report Server	Host Power BI reports on-premise	Secure/internal use
Power Query	Clean and transform data	Data preparation
DAX	Create custom metrics and calculations	Advanced analysis
Power BI Visuals	Display data through charts and graphics	Data storytelling

4. 📄 Power BI Desktop

Power BI Desktop is a **free, Windows-based application** that serves as the primary tool for **creating Power BI reports and data models**. It allows users—especially data analysts and business intelligence professionals—to connect to data, transform it, and build interactive visualizations.

🔑 Key Features of Power BI Desktop

1. **Connect to Multiple Data Sources**
 - Excel files, CSV, databases (SQL Server, Oracle, MySQL)
 - Cloud sources (Azure, Salesforce, Google Analytics)
 - Web APIs and many more
 2. **Data Transformation & Cleaning (Power Query Editor)**
 - Remove duplicates, filter rows, split columns
 - Merge or append tables
 - Change data types and apply business logic without coding
 3. **Data Modeling**
 - Create relationships between tables
 - Define calculated columns and measures using **DAX** (Data Analysis Expressions)
 - Build hierarchies and data categories
 4. **Build Interactive Reports**
 - Drag-and-drop visualizations: bar charts, line charts, maps, tables, KPIs, slicers (filters)
 - Add slicers and filters to let users explore data dynamically
 - Customize report pages with text boxes, images, and shapes
 5. **Advanced Analytics**
 - Use forecasting, clustering, and AI visuals (like key influencers)
 - Integrate R and Python scripts for custom analysis
 6. **Publish and Share**
 - Once the report is ready, publish it to **Power BI Service** (cloud) for sharing and collaboration
 - Export to PDF or PowerPoint
-

🔑 Why Use Power BI Desktop?

- **User-friendly interface** with drag-and-drop design—no heavy coding required.
 - Powerful enough for complex data models and analysis.
 - Ideal for creating **interactive, visually appealing reports**.
 - Acts as the **starting point** for Power BI workflows before publishing.
-

✂ Typical Workflow in Power BI Desktop

1. **Get Data:** Import or connect to your data sources.
 2. **Transform Data:** Clean and shape your data using Power Query.
 3. **Create Relationships:** Define how tables relate to each other.
 4. **Build Visuals:** Design reports using charts, maps, tables, etc.
 5. **Add Calculations:** Use DAX to create custom metrics.
 6. **Save & Publish:** Save your file (.pbix) and publish it to Power BI Service.
-

✈ Summary

Feature	Description
Data Connectivity	Connects to dozens of data sources
Data Preparation	Clean, transform, and shape data easily
Data Modeling	Build relationships and calculations (DAX)
Report Building	Drag-and-drop interactive visualizations
Sharing	Publish reports to Power BI Service

5.☁ Power BI Service

Power BI Service (also called **PowerBI.com**) is Microsoft's **cloud-based platform** that allows users to **publish, share, collaborate, and manage** Power BI reports and dashboards online.

🔑 Key Features of Power BI Service

1. **Publish and Share Reports**
 - Upload reports created in **Power BI Desktop**.
 - Share dashboards and reports securely with colleagues and stakeholders.
2. **Create Dashboards**
 - Pin visuals from multiple reports to create consolidated, interactive dashboards.
 - Customize layouts for quick monitoring of key metrics (KPIs).
3. **Collaboration & Workspaces**
 - Organize reports and dashboards into **workspaces** for teams or projects.
 - Assign roles and permissions to control who can view or edit content.
4. **Data Refresh & Scheduling**

- Set automatic data refresh schedules so reports always show up-to-date information.
- Connect to live data sources with real-time updates.
- 5. **Alerts and Notifications**
 - Create alerts on key metrics to get notified when data changes or hits certain thresholds.
- 6. **Apps**
 - Package collections of dashboards and reports into **Power BI Apps** for easier distribution across large groups.
- 7. **Q&A (Natural Language Queries)**
 - Ask questions in natural language (like “total sales last month”) to get instant answers and visuals.
- 8. **Integration with Other Microsoft Services**
 - Embed Power BI reports in **Microsoft Teams, SharePoint, or Office 365** apps.
 - Use with **Azure Active Directory** for secure access control.

✂ How Power BI Service Fits in the Workflow

Step	Location
Build Reports	Power BI Desktop
Publish & Share	Power BI Service (Cloud)
Collaborate & Monitor	Power BI Service and Mobile App

📱 Power BI Mobile Integration

- Access your dashboards and reports anywhere.
 - Receive push notifications and data alerts on the go.
-

✓ Benefits of Power BI Service

- **Anywhere Access:** View and interact with reports from any device with internet access.
 - **Collaboration:** Share insights easily and control permissions.
 - **Real-Time Data:** Stay updated with live dashboards and scheduled refreshes.
 - **Scalability:** Supports individuals, teams, and entire organizations.
-

★ Summary Table

Feature	Description
Publishing	Upload reports from Power BI Desktop

Feature	Description
Sharing & Collaboration	Share reports, create workspaces, assign roles
Dashboards	Pin visuals from reports for quick insights
Data Refresh	Schedule automatic or live data updates
Alerts	Set notifications on critical metrics
Natural Language Q&A	Ask questions and get instant visual responses

6. 📖 Power BI Desktop Installation Steps

Step 1: Check System Requirements

- **Operating System:** Windows 10 or later (64-bit recommended)
 - **Disk Space:** At least 1 GB free space
 - **RAM:** Minimum 4 GB (8 GB recommended)
 - **Internet:** Required for download and updates
-

Step 2: Download Power BI Desktop

1. Go to the official Microsoft Power BI Desktop download page:
<https://powerbi.microsoft.com/desktop/>
 2. Click the “**Download free**” button.
 3. You may be redirected to the Microsoft Store or get a direct installer (.exe).
-

Step 3: Install Power BI Desktop

- **If from Microsoft Store:**
 1. Click **Get** or **Install**.
 2. Wait for the app to download and install automatically.
 - **If using the standalone installer (.exe):**
 1. Run the downloaded installer file.
 2. Accept the license agreement.
 3. Choose the installation folder (default is fine for most users).
 4. Click **Install** and wait for the process to complete.
 5. Click **Finish**.
-

Step 4: Launch Power BI Desktop

- Open Power BI Desktop from the **Start menu** or **desktop shortcut**.
 - The first time it opens, it may take a few seconds to load.
 - You're ready to start connecting to data and building reports!
-

Step 5: Sign In (Optional but Recommended)

- Click **Sign In** (top-right corner) to use your Microsoft account.
 - Signing in enables you to **publish reports** to Power BI Service and access online features.
-

✓ Tips

- Keep Power BI Desktop updated for the latest features and security fixes.
- If your organization uses Power BI Service, ask your admin if any specific version or settings are required.
- Power BI Desktop is free to download and use for report creation.

6. Power BI Architecture Overview

Power BI's architecture is designed to **connect, transform, analyze, and visualize data** from multiple sources, delivering interactive reports and dashboards both on-premises and in the cloud.

🔍 Key Layers of Power BI Architecture

1. Data Sources Layer

Power BI can connect to a wide variety of data sources including:

- **On-Premises:** SQL Server, Oracle, Excel files, SharePoint, local databases
- **Cloud:** Azure SQL Database, Azure Data Lake, Salesforce, Google Analytics, Dynamics 365
- **Other sources:** Web APIs, CSV, JSON files, etc.

2. Data Ingestion & Preparation Layer

- **Power Query:** Extract, transform, and load (ETL) data into Power BI Desktop or Power BI Service.
 - Cleans and shapes raw data for analysis.
 - Supports complex data mashups and transformations without coding.
-

3. Data Storage & Modeling Layer

- **Data Models** created in Power BI Desktop:
 - Tables, relationships, hierarchies
 - Calculated columns, measures via **DAX (Data Analysis Expressions)**
 - **VertiPaq Engine:** In-memory analytics engine that compresses data and allows ultra-fast querying.
 - Data models can be imported or connected live depending on source.
-

4. Visualization Layer

- Users create **reports and dashboards** using drag-and-drop visuals.
 - Supports a wide range of charts, maps, tables, and custom visuals.
 - Interactive filtering and slicing enable dynamic data exploration.
-

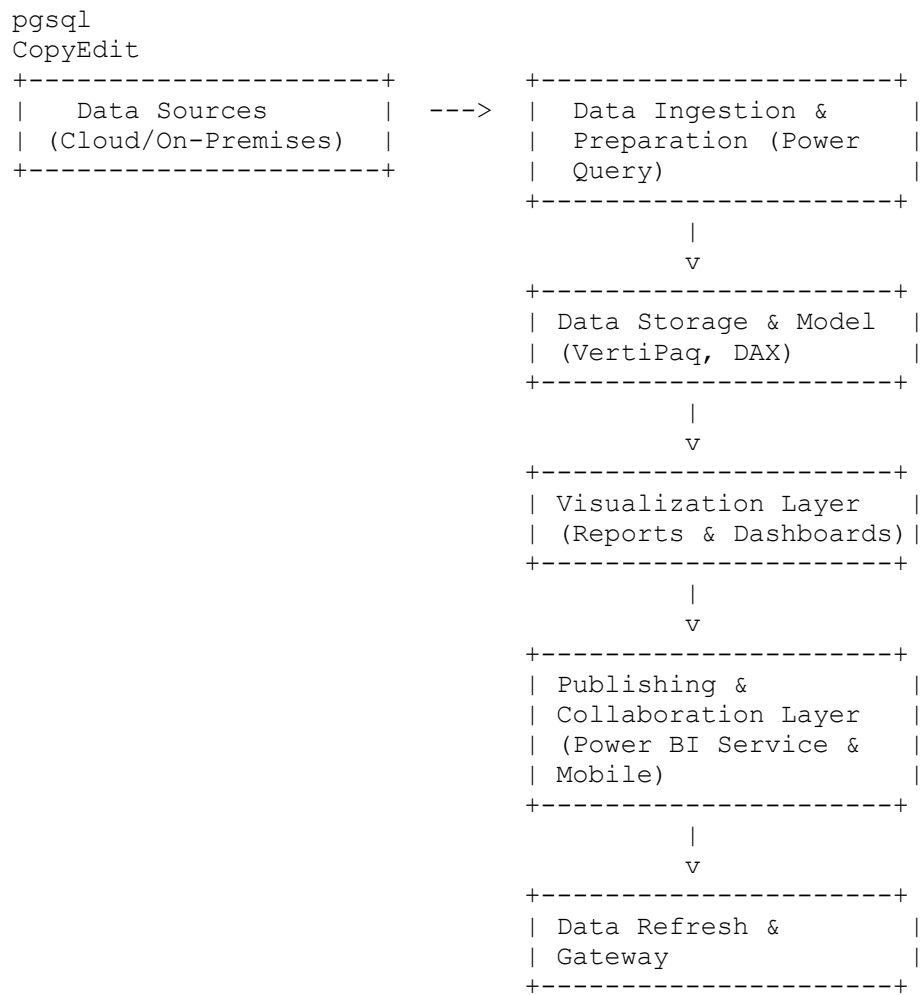
5. Publishing & Collaboration Layer

- **Power BI Service (Cloud)**
 - Publish reports from Power BI Desktop
 - Share dashboards and collaborate in workspaces
 - Schedule data refreshes and set alerts
 - **Power BI Mobile App**
 - Access reports and dashboards on smartphones and tablets.
-

6. Data Refresh & Gateway Layer

- **Data Refresh:** Keeps data up-to-date in Power BI Service via scheduled refreshes or live connections.
 - **Power BI Gateway:** Bridges on-premises data sources to Power BI Service securely.
 - **Personal Gateway** for individual users
 - **Enterprise Gateway** for large-scale deployments and teams
-

Summary Diagram



✓ Why Power BI Architecture Matters

- **Scalability:** Supports everything from individual analysts to large enterprises.
- **Performance:** In-memory engine ensures fast data processing.
- **Flexibility:** Works with diverse data sources and deployment options.
- **Security:** Gateways and Azure Active Directory protect data access.

Unit IV :

Hours:6

Power BI Desktop:

1. Features
2. Reasons
3. Multiple Views
4. Desktop Window
5. Types of Tabs
6. Supported Browsers
7. Supported Language

1. 🚀 Features of Power BI Desktop

Power BI Desktop is a powerful, free application designed for building rich, interactive data reports and dashboards. Here are its key features:

1. Wide Data Connectivity

- Connect to **hundreds of data sources**: Excel, SQL Server, Azure, SharePoint, Oracle, CSV, Web APIs, and many more.
 - Support for both **import mode** and **direct query/live connections** to data sources.
-

2. Power Query Editor (Data Transformation)

- Intuitive, no-code interface for **cleaning, shaping, and transforming data**.
 - Merge, append, filter, pivot/unpivot, split columns, remove duplicates, and more.
 - Automate data prep with **repeatable queries**.
-

3. Data Modeling

- Create relationships between tables (one-to-one, one-to-many).
- Define calculated columns, measures, and tables using **DAX (Data Analysis Expressions)**.
- Build hierarchies (e.g., Year > Quarter > Month).
- Manage data categories and formatting.

4. Interactive Visualizations

- Drag-and-drop to build visuals like bar charts, pie charts, maps, tables, KPIs, gauges, slicers, and more.
- Customize colors, labels, and formatting.
- Support for **custom visuals** from Microsoft AppSource.
- Interactive filters and slicers enable dynamic exploration of data.

5. Advanced Analytics

- Built-in forecasting, clustering, and key influencer visuals.
- Integrate R and Python scripts for complex statistical analysis.
- Quick insights and AI-powered visualizations.

6. Report Authoring

- Design multi-page reports with customizable layouts.
- Add text boxes, images, shapes, and buttons for storytelling.
- Support bookmarks and drill-through actions to create interactive navigation.

7. Publishing and Sharing

- Save reports as `.pbix` files.
- Publish reports directly to **Power BI Service** for online sharing and collaboration.
- Export reports to PDF or PowerPoint.

8. Performance Optimization

- In-memory VertiPaq engine compresses data for fast querying.
- Manage query folding to push transformations back to the data source when possible.

9. Integration with Microsoft Ecosystem

- Works seamlessly with Excel, Azure, Microsoft Teams, SharePoint, and other Microsoft 365 tools.
 - Supports Azure Active Directory for security and authentication.
-

Summary Table

Feature	Description
Data Connectivity	Connect to many on-premises and cloud sources
Power Query Editor	Clean and transform data without coding
Data Modeling	Build relationships and calculations with DAX
Visualizations	Rich, customizable charts and visuals
Advanced Analytics	Forecasting, clustering, R/Python integration
Report Authoring	Multi-page, interactive, and narrative reports
Publishing & Sharing	Publish to Power BI Service and export options
Performance	Fast in-memory engine and query optimization
Microsoft Integration	Works with Excel, Teams, Azure, and more

2. 🔥 Reasons to Use Power BI Desktop

- 1. Free and Easy to Get Started**
 - Power BI Desktop is completely free to download and use, making it accessible for anyone who wants to analyze data.
 - 2. Connects to a Wide Variety of Data Sources**
 - Whether your data is in Excel, databases, cloud services, or web APIs, Power BI Desktop can connect to it all in one place.
 - 3. Powerful Data Transformation with Power Query**
 - You can clean and shape your raw data easily without writing code, enabling accurate and ready-to-analyze datasets.
 - 4. Robust Data Modeling Capabilities**
 - Create complex relationships and calculations using DAX, helping you uncover deep insights.
 - 5. Rich and Interactive Visualizations**
 - Create stunning reports with charts, maps, KPIs, and custom visuals that make data easy to understand.
 - 6. Seamless Integration with Microsoft Ecosystem**
 - Works perfectly with tools like Excel, Azure, SharePoint, and Teams, boosting productivity.
 - 7. Publish and Share Insights Easily**
 - Publish reports to Power BI Service for sharing and collaboration across your organization.
 - 8. Strong Performance**
 - The in-memory VertiPaq engine compresses data and runs queries super fast.
 - 9. Continuous Updates and Community Support**
 - Microsoft frequently updates Power BI Desktop with new features based on user feedback, plus a huge community and resources are available online.
-

Summary

Reason	Benefit
Free to use	No cost barrier to start analyzing data
Wide data source connectivity	One tool for many data types
Easy data prep with Power Query	Saves time and improves data quality
Advanced modeling with DAX	Enables complex analysis
Interactive visuals	Makes data storytelling engaging
Microsoft ecosystem integration	Enhances collaboration and workflow
Easy publishing and sharing	Quick distribution of insights
High performance	Fast data processing
Regular updates & community	Keeps tool cutting-edge and supported

3. Multiple Views in Power BI

Power BI allows users to work with their data and reports through different **views**, each designed for a specific part of the report creation and data analysis process. Understanding these views helps you efficiently build and manage your reports.

Main Views in Power BI Desktop

1. Report View

- **Purpose:** Design and create interactive reports.
 - **Features:**
 - Drag-and-drop visuals (charts, tables, maps, slicers) onto report pages.
 - Add multiple pages to build comprehensive reports.
 - Arrange and format visuals.
 - Create bookmarks, drill-throughs, and tooltips.
-

2. Data View

- **Purpose:** Explore and review the raw or transformed data loaded into Power BI.
- **Features:**
 - View data tables in tabular form.
 - Inspect values, data types, and relationships.

- Create calculated columns using DAX.
- Validate data after transformations.

3. Model View

- **Purpose:** Manage relationships and structure of data tables.
- **Features:**
 - Visualize table relationships (one-to-one, one-to-many).
 - Create and edit relationships.
 - Define hierarchies and set table properties.
 - Manage data categories and formatting.

Why Multiple Views Matter

- **Report View** focuses on **visual storytelling** and user experience.
- **Data View** helps in **verifying and calculating data** before visualization.
- **Model View** is essential for **building an efficient data model** that powers your reports.

Summary Table

View	Purpose	Key Activities
Report View	Create and design reports	Add visuals, format pages, interactivity
Data View	Examine and modify data tables	Inspect data, create calculated columns
Model View	Manage data relationships	Define and edit table relationships, hierarchies

4.Power BI Desktop Window Overview

When you open **Power BI Desktop**, you'll see a well-organized interface made up of different panes and views designed to help you connect, model, and visualize your data.

Here's a breakdown of the **main sections of the Power BI Desktop window**:

1. Ribbon (Top Toolbar)

- Located at the top of the window.
- Contains tabs like:

- **Home:** Data loading, transformations, visuals
- **Insert:** Add visuals, text boxes, images
- **Modeling:** Create measures, columns, format data
- **View:** Page layout settings, themes
- **Help:** Links to documentation and updates

□ 2. Views Pane (Left Sidebar)

- Lets you switch between the three core views:

Icon	View Name	Purpose
	Report View	Build and design reports
	Data View	See and explore data tables
	Model View	Manage data model relationships

□ 3. Canvas Area (Center Workspace)

- The main area where you:
 - Create and arrange visuals in **Report View**
 - Explore data in **Data View**
 - Work with table relationships in **Model View**

4. Fields Pane (Right Sidebar - Top Section)

- Shows tables and fields from your data model.
- Drag fields onto the canvas to create visuals.
- Right-click to create measures, calculated columns, or hierarchies.

5. Visualizations Pane (Right Sidebar - Middle Section)

- Choose and customize visuals like:
 - Bar charts, line charts, maps, slicers, gauges, etc.
- Customize visual formatting, filters, and data options.

6. Filters Pane (Right Sidebar - Bottom Section)

- Apply **filters** at:
 - **Visual level:** Only affect a single visual
 - **Page level:** Affect all visuals on a report page
 - **Report level:** Affect all pages in the report

🔗 7. Formula Bar (Visible in Data View)

- Used to write **DAX formulas** for calculated columns and measures.
-

☐ Power BI Desktop Window Layout Summary

```
pgsql
CopyEdit
+-----+
| Ribbon (Home, Insert, Modeling, View, Help) |
+-----+
| Views Pane | Canvas Area (Report/Data/Model) | Fields & Visualizations |
| 📄 ↻ | (Main workspace for building) | Fields, Visuals, Filters |
+-----+-----+-----+
```

5.📄 Types of Tabs in Power BI Desktop

In Power BI Desktop, the **ribbon** at the top contains various **tabs**, similar to Microsoft Excel or Word. Each tab includes specific tools and options to help you perform tasks such as importing data, transforming it, building models, creating visuals, and more.

📄^{TOP} Main Tabs in Power BI Desktop

Here are the most commonly used tabs:

1. Home Tab

- Used for starting and managing your report.
 - **Key Features:**
 - Get Data (connect to sources)
 - Transform Data (open Power Query Editor)
 - Manage Relationships
 - New Measure, New Column
 - Refresh
 - Publish (to Power BI Service)
-

2. Insert Tab

- Add new elements to your report.
 - **Key Features:**
 - Visuals (e.g., charts, maps)
 - Text box
 - Image
 - Shapes and buttons
 - Power Automate visuals
-

3. Modeling Tab

- Work with data models and DAX expressions.
 - **Key Features:**
 - New Table, New Column, New Measure
 - Manage Relationships
 - View as Role (row-level security testing)
 - Format data types
 - Sort by column
-

4. View Tab

- Customize the look and feel of your report.
 - **Key Features:**
 - Themes
 - Page view settings (Fit to Page, Actual Size)
 - Bookmarks
 - Selection and Sync Panes
 - Performance Analyzer
-

5. Help Tab

- Provides support and learning resources.
 - **Key Features:**
 - Guided learning
 - Documentation and blogs
 - Community forum
 - About Power BI
-

6. File Tab (*Located in the top-left corner – like a menu*)

- Used for basic file operations.
- **Key Features:**

- New, Open, Save, Save As
 - Export to PDF
 - Options and Settings
 - Publish and Account settings
-

Dynamic/Contextual Tabs

- Sometimes, when you select a **visual**, an extra tab (e.g., **Format** or **Visual Tools**) appears to provide more specific options for formatting or editing.
-

Summary Table

Tab Name	Purpose
Home	Core data operations and publishing
Insert	Add visuals, text, and media
Modeling	Create and manage DAX models
View	Customize report appearance & tools
Help	Access resources and documentation
File	Save, open, export, settings
Contextual	Format or configure selected visuals

6. Supported Browsers for Power BI (Power BI Service)

To access **Power BI Service** (the online platform for viewing and sharing reports and dashboards), you need a modern web browser. Microsoft supports the following:

Fully Supported Browsers

Browser	Version Requirements
Microsoft Edge	Latest version recommended
Google Chrome	Latest version recommended
Mozilla Firefox	Latest version recommended
Apple Safari	Latest version (macOS only)

⚠ Note: Internet Explorer is **not supported**. Microsoft officially ended support for Internet Explorer in Power BI as of **August 2021**.

☐ Browser Recommendations

- **Enable JavaScript** – Power BI relies heavily on JavaScript for rendering visuals and interactivity.
 - **Enable Cookies** – Required for authentication and session management.
 - **Disable Pop-up Blockers** – Some Power BI features (like exporting or authentication) may open new windows.
-

📱 Mobile Browsers

For best experience on mobile devices, use the **Power BI Mobile App** available for:

- **iOS (App Store)**
- **Android (Google Play)**

You can access Power BI via mobile browsers, but it's limited compared to the app experience.

🚫 Unsupported or Limited Browsers

- **Internet Explorer:** No longer supported.
 - **Opera, Brave, or other lesser-known browsers:** May work but are not officially supported or tested by Microsoft.
-

✓ Summary

Browser	Supported	Notes
Microsoft Edge	✓	Best for Windows users
Google Chrome	✓	Most commonly used
Mozilla Firefox	✓	Full support
Apple Safari	✓	For macOS users
Internet Explorer	✗	Deprecated and unsupported

7.🌐 Supported Languages in Power BI

Power BI supports a wide range of **languages** to ensure accessibility for users across the globe. This includes the **Power BI Desktop**, **Power BI Service**, **Power BI Mobile App**, and **Power BI documentation**.

✔ Supported Areas of Language Localization

Component	Description
Power BI Desktop	Interface, menus, tooltips, and messages localized
Power BI Service	Online interface available in multiple languages
Power BI Mobile App	Language based on device settings
Power Query	Formula bar and messages localized
DAX Functions	Still use English function names universally

🌐 Common Supported Languages

Here are just a few of the many languages Power BI supports:

- English
- French
- German
- Spanish
- Portuguese (Brazil)
- Italian
- Dutch
- Japanese
- Korean
- Chinese (Simplified and Traditional)
- Russian
- Arabic
- Turkish
- Polish
- Swedish
- Czech
- Hebrew
- Hindi (limited UI elements)
- Thai
- Vietnamese

✔ Microsoft regularly adds new languages and updates localization quality.

✂ How to Change Language in Power BI Desktop

1. Open **Power BI Desktop**.
 2. Go to **File > Options and Settings > Options**.
 3. Under **Regional Settings**, choose your **preferred language**.
 4. Restart Power BI Desktop for changes to take effect.
-

🌐 How to Change Language in Power BI Service



1. Go to <https://app.powerbi.com>.
 2. Click your **profile icon** (top-right).
 3. Select **Settings > General > Language**.
 4. Choose your desired language and save.
-

⚠ Notes

- DAX function names and M (Power Query) language keywords are **always in English**, regardless of UI language.
- Reports and dashboards can be created in one language but viewed in another using **language detection** or **translation features** in Premium.

1.88 Power BI Desktop vs Power BI Service: Key Differences

Power BI comes in two main components:

-  **Power BI Desktop** – A free Windows application for **developing reports**
-  **Power BI Service** – A cloud-based platform for **publishing, sharing, and collaborating**

□ Comparison Table

Feature	Power BI Desktop	Power BI Service
Platform	Windows-only application	Web-based (browser)
Purpose	Create and design reports and models	Share, view, collaborate, and manage reports
Cost	Free	Requires a Power BI Pro or Premium license for sharing and collaboration
Data Sources	Connects to many local and cloud sources	Connects mainly to cloud-based sources
Data Transformation	Full Power Query Editor capabilities	Limited/no transformation capabilities
Data Modeling	Build relationships, DAX measures, calculated columns	View-only (no data modeling changes)
Visual Creation	Full visual creation and formatting tools	View and interact with visuals
Publishing	Publish reports to the Power BI Service	Cannot publish from the service
Sharing & Collaboration	Not supported locally	Share dashboards, collaborate, and comment
Scheduled Data Refresh	Manual refresh only	Automatic scheduled refresh (with Pro/Premium)
Row-Level Security (RLS)	Define security rules	Enforce security rules
Apps and Workspaces	Not available	Organize reports in workspaces and apps

When to Use Each

Use Power BI Desktop when:

- You're building or editing complex reports
- You need to clean, transform, or model data
- You want to create custom DAX measures or visuals

Use Power BI Service when:

- You want to share or collaborate on reports with your team
 - You need automated refreshes and alerts
 - You want to create dashboards and monitor KPIs live
 - You're organizing content for enterprise use (via apps/workspaces)
-

Typical Workflow

1. **Build** reports in **Power BI Desktop**.
2. **Publish** to **Power BI Service**.
3. **Share & collaborate** with others in **Power BI Service**.

2. Supported Data Sources in Power BI

Power BI supports a **wide variety of data sources**, allowing you to connect to, import, and transform data from both local files and cloud services.

1. File-Based Sources

- Excel (.xlsx, .xls)
 - CSV/Text files (.csv, .txt)
 - XML
 - JSON
 - PDF
 - SharePoint folder
 - Folder (combine multiple files)
-

2. Database Sources

- **SQL Server** (On-premises or Azure)

- MySQL
- PostgreSQL
- Oracle Database
- IBM DB2
- Teradata
- Amazon Redshift
- SAP HANA
- Snowflake
- Google BigQuery

⚠ Some require specific drivers or credentials.

3. Online Services / Cloud Sources

- SharePoint Online
 - OneDrive
 - Google Drive (via connector or API)
 - Azure SQL Database
 - Azure Synapse Analytics
 - Azure Data Lake
 - Dynamics 365
 - Salesforce
 - Google Analytics
 - Adobe Analytics
 - Facebook, LinkedIn, Twitter (via APIs)
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4. Microsoft Services

- Microsoft Excel and Access
 - Microsoft Exchange
 - Microsoft Teams
 - Microsoft Dataverse
 - Azure Blob Storage
 - Power Platform Dataflows
 - Power BI datasets and dataflows
-

5. Web and API Sources

- Web (from a public or authenticated URL)
- OData Feed
- REST APIs (via Web connector and Power Query)
- R and Python scripts
- ODBC or OLE DB connections

⚙ 6. Custom & Advanced Sources

- R Script
 - Python Script
 - Blank Query (manual M-code)
 - Custom connectors (for proprietary systems)
-

✓ How to Connect

In **Power BI Desktop**:

Go to **Home > Get Data** → Choose your data source

📌 Summary

Category	Examples
Files	Excel, CSV, PDF, JSON, Folder
Databases	SQL Server, MySQL, Oracle, PostgreSQL
Online Services	SharePoint, Azure, Dynamics 365, Google Analytics
Microsoft Tools	Excel, Access, Dataverse, Power BI Datasets
Web/API	Web, OData, REST APIs, R/Python Scripts

🔍 3. Power BI Desktop vs. Power BI Report Server

Feature	Power BI Desktop	Power BI Report Server (PBIRS)
Deployment	Build and design reports	Host and manage reports on-premises
Usage	Development only	Enterprise-level sharing in secure environments
Cloud Dependency	No	No (on-premises deployment)
License Required	Free (for authoring)	Requires Power BI Premium or SQL Server Enterprise

Reports created in Desktop must be saved in a specific version to be used in PBIRS.

🔍 4. Power BI Desktop vs. Power BI Data Gateway

Feature	Power BI Desktop	Power BI Data Gateway
Purpose	Design and create reports	Bridge to connect on-premise data to Power BI Service
Role	Authoring tool	Connectivity tool
User Interaction	Direct user interface	Runs in the background
Required For	No (used locally)	Yes, if refreshing on-premises data in the cloud

5. Summary: Use Each Tool When You Need To...

Tool	Use Case
Power BI Desktop	Build, model, and design reports and visuals
Power BI Service	Share, collaborate, automate, and monitor dashboards
Power BI Mobile	Access reports on the go
Power BI Report Server	Deliver reports in secure, on-premise environments
Power BI Gateway	Refresh cloud reports with data from on-premise sources