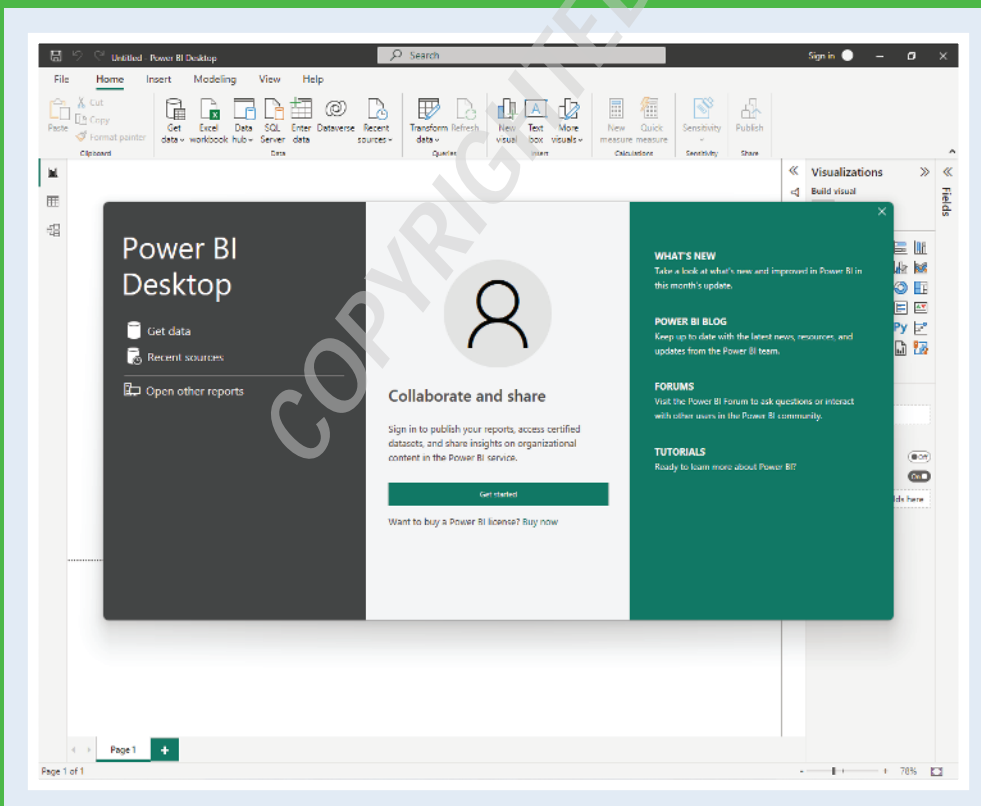


CHAPTER 1

Getting Started with Power BI

Power BI enables you to create visual analytics from data, allowing you to understand even complex data structures and effectively communicate insights gained. You need neither special mathematical skills nor programming experience to understand and acquire Power BI skills.



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What Is Power BI?

Power BI is a data-visualization app that enables you to analyze data without technical expertise or programming knowledge. BI is a standard abbreviation for *business intelligence*. Instead of needing to type in complex data queries, you can create your queries by clicking and dragging items in Power BI's graphical interface. This ease of use allows you to quickly find insights in your data and to share them with others.

You do not have to know from the start what you are looking for or how you want to present the results. Rather, Power BI takes you on a journey through your data and helps you discover relationships you did not expect to exist through visual analysis. This approach is fundamentally different from other tools, whose use requires that you already know at the beginning of your analysis which data you want to present in which form.

Power Query, an Essential Part of Power BI

Power BI also offers complex techniques of data cleansing, data modeling, and data preparation with Power Query. *Power Query* is a data transformation and data preparation engine. Power Query has a graphical user interface for retrieving data from sources and a Power Query editor for applying transformations. You can use Power Query to perform ETL processing on data. *Extract, Transform, Load*, or *ETL*, is a process that unifies data from multiple, possibly differently structured, data sources.

Power BI's Vast Variety of Data Sources

Power BI Desktop enables you to connect to a wide variety of data sources. You can use data stored in Excel workbooks or in text files in the comma-separated values format, CSV. You can use data from databases such as Access or SQL Server. You can access data in *data cubes*, which are multidimensional arrays containing values. You can also connect to data warehouses, clusters of computers running the Apache Hadoop computing framework, or various cloud services such as Google Analytics.

After connecting to the appropriate data source, you interact with the Power BI user interface to query the data with a few mouse clicks and display the results in various charts and maps. You can then arrange these visualizations into dashboards to put them into meaningful context.

When communicating key insights, you have a variety of options depending on the product you use, from sharing interactive dashboards to embedding them in web pages. Power BI facilitates both the presentation of insights from data and the communication process, that is, data storytelling and interactive dashboards, without requiring any programming skills.

Data Analysis and Excel

Data analysis and visualization have always been an important topic in the professional environment and a fundamental tool for business decision-making. In this environment, Microsoft Excel quickly became popular and established itself as one of the most important tools for data analysis. However, with the exponential growth of data in the world, often referred to as *big data*, and the growth of the culture of analytics and data science, Excel is reaching its limits and is being replaced by more efficient tools for data analysis such as Power BI.

Power BI, the Big Leap from Excel

Year after year, companies are focusing more on data and how to get value from it in order to sell more products, attract more customers, and increase the efficiency of the process. In this scenario, a tool that handles a large amount of data and is able to analyze data quickly and easily to present information clearly to businesses becomes essential. To address this need, Microsoft has developed Power BI, a visualization tool that is capable of handling large and complex amounts of data while changing the way you deal with charts or visualizing data.

Excel has excellent features and allows the user to work easily and effectively to analyze data. Excel is the most widespread spreadsheet tool, where it can indisputably show its full power. With the introduction of Pivot Tables in Excel in 1994 and Power Query functions in Excel 2010, Excel gained functions for editing and analyzing data in tables up to 1 million rows. Nevertheless, Excel's strength remains the calculation of complex formulas more than the processing of large amounts of data. Excel also brings good functionalities for analysis and good graphical visualizations. Ultimately, even with smaller data sets, Power BI offers better performance, more comprehensive analytics and visualizations, and the ability to share dashboards or apps across the enterprise for a "one-stop solution." In these cases, Power BI proves to be extremely useful with advantages over Excel, making data analysis more agile and efficient.

With a wide range of graphics and widgets, a good ability to handle big data, integration with different platforms and ease of use, and centralization of different data sources, Power BI is proving to be increasingly popular, both among experienced Excel users and beginners new to the world of data.

How This Book Guides You into Power BI

This book is designed to provide you with a step-by-step introduction to creating visual analytics, enabling you to understand even complex data structures and effectively communicate insights gained. Therefore, this book is of interest to a variety of audiences, such as people who have access to and want to understand data, executives who make decisions based on data, analysts and developers who create visualizations and dashboards, and aspiring data scientists.

You need neither special mathematical skills nor programming experience to understand this book and develop skill in using Power BI effectively. The book is suitable for beginners and for users who want to approach the topic of data visualization and analysis in a practical way, without extensive theoretical treatises.

Understanding the Different Components of Power BI

Microsoft groups various software products and services for data analysis under the umbrella name Power BI. For this book's purposes, the three key Power BI components are Power BI Desktop, the Power BI cloud service, and the Power BI Report Server.

Power BI Desktop is a desktop application that you use to create analyses and reports from data sources. You can then make these analyses and reports available to consumers via either the Power BI cloud service or the Power BI Report Server — or indeed both. This section explains how the different Power BI components and licensing models interact with reports.

Power BI Desktop

Power BI Desktop is a free application for Windows that is popular among analysts and business users. On the one hand, Power BI Desktop allows you to connect to local files, such as Excel and CSV, and save report files locally. On the other hand, Power BI Desktop allows you to connect to many external data sources and store them on your own report server or the Power BI cloud service. The focus of this book is Power BI Desktop, which allows you to quickly create advanced analytics and reports and gain data-driven insights.

Power BI Pro

Power BI Pro is a user-based license for the Power BI service that lets you share reports and analytics with other users. You can use collaborative functions and integrate a role and rights concept. You can also embed published reports in other applications such as Microsoft SharePoint, Microsoft Teams, or other Microsoft Power Platform applications. At the time of this writing, the Pro license cost \$9.99 per user per month; see powerbi.microsoft.com/en-us/pricing for current pricing. Power BI Pro is already included in the Microsoft 365 Enterprise E5 subscription plan.

Power BI Premium

Power BI is a platform for data analysis and is used by small companies as well as large, publicly traded corporations. Power BI Premium is used to provide

company-wide visualizations and dashboards, which can also be operated in the web browser and can also be embedded in the company intranet. As of this writing, Microsoft offers a free 30-day trial for Power BI Premium; go to powerbi.microsoft.com/en-us/power-bi-premium and click **Try Power BI for free**.

Power BI Embedded

With Power BI Embedded, you can integrate reports and analyses on your website and make them available to your customers without them having to log in to the Power BI service. Power BI Embedded uses a different licensing model: Your company pays for Power BI capacity that you make available for your customers to use, rather than customers needing to have their own Power BI accounts.

Power BI Report Server

The Power BI Report Server is a server platform on which you can publish and view reports in the same way as Power BI Premium. However, this is not a cloud platform but a so-called “on-premise” solution that you can integrate into your own network.

Power BI Mobile

Power BI Mobile is an application for iOS and Android smartphones and tablets and Windows devices that lets you access your data and the Power BI service on the go.

Power BI is part of Microsoft's Power Platform, a set of tools for creating data-driven solutions to business needs. In addition to Power BI, Power Platform includes the Power Apps development environment, the Power Automate framework, the Power Virtual Agents tool for creating chatbots, and the Power Pages tool for building business-oriented websites quickly.

Power Apps

Power Apps is a development environment with little or no code, where you can develop your own applications to solve various business challenges. For example, you could develop a Power App that accesses a SharePoint list for data display and data entry. You could then deploy that app to your organization's iPhones, iPads, and Android devices.

Power Automate

Power Automate is a framework that allows end users to create "flows" that automate organizational processes. For example, you might develop a flow that automatically sends an email notification to supervisors when an employee submits a particular electronic form.

Power Virtual Agents

Power Virtual Agents is a no-code tool that lets you create chatbots to communicate with customers and employees.

Using the Power Platform

Each of these components — Power Apps, Power Automate, and Power Virtual Agents — can be used by Power BI to provide insights that drive your work forward. What follows are some examples of how each component might work with Power BI.

For example, in Power Apps, you could set up an application that allows an inspector to take notes in the field and upload that data to a SQL Server database. A Power BI report could also connect to that SQL Server database, retrieve the information uploaded by the Power App, and update the report based on the new data added by the multiple inspectors in the field using the Power App.

As another example, consider *virtual agents*, which are software programs that provide customer service to humans and mimic a customer service representative. With virtual agents, large amounts of data are collected as end users interact with your chatbots. All of this data is collected and stored, which means Power BI can generate reports on it. This creates an end-to-end reporting solution that allows your business to get textual insights into what your customers really want from your business.

Install Power BI Desktop

You can install Power BI Desktop in only a few minutes and begin creating visual data analytics. Before you start installing Power BI Desktop, make sure that your computer meets the necessary system requirements; see the tip for details.

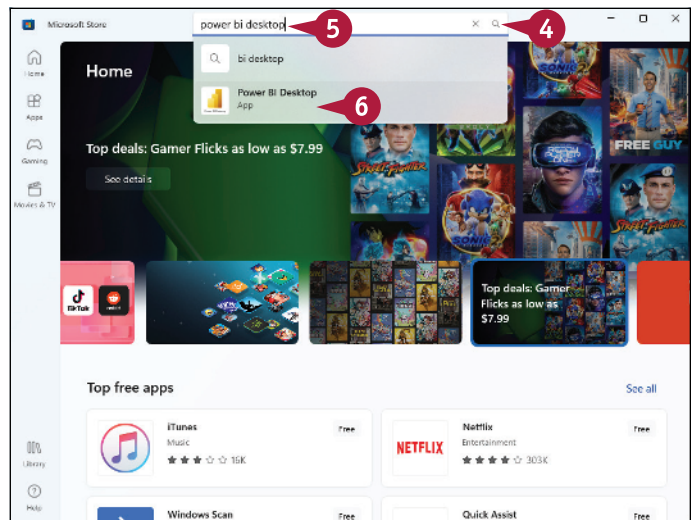
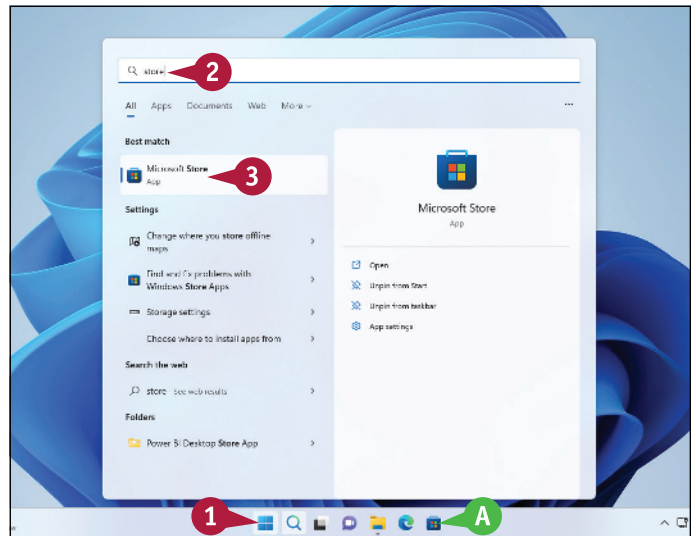
The requirements of Power BI Desktop on your system are comparable to other Microsoft Office applications. However, how much data you connect and how many visualizations you display at the same time also play a major role. For complex analyses and large amounts of data, you will get a more comfortable experience with a powerful processor and more memory.

Install Power BI Desktop

- A** If Microsoft Store (📦) appears on the taskbar, click **Microsoft Store** (📦) and go to step 4.
- 1** In Windows, click **Start** (🇺🇸).
- 2** Type **store**.
- 3** Click **Microsoft Store** (📦).

The Microsoft Store app opens.

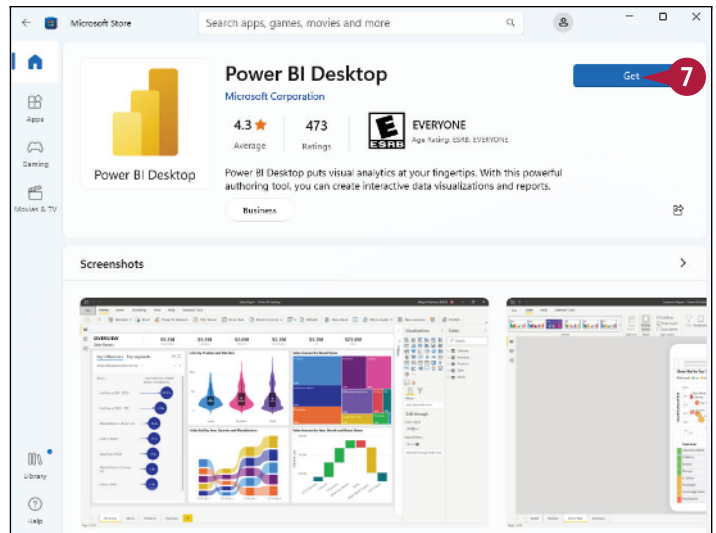
- 4** Click **Search** (🔍).
- 5** Type **power bi desktop**.
- 6** Click **Power BI Desktop** (📦).



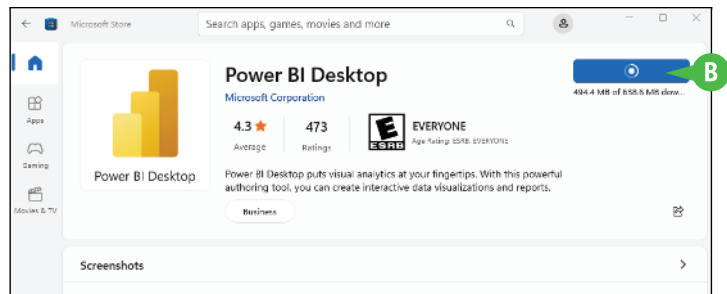
The product page for Power BI Desktop appears.

Note: To determine whether Power BI Desktop will run on your computer, scroll down to the System Requirements section on the product page and look for the message *This product should work on your device*. See the tip for more information on system requirements.

7 Click **Get**.

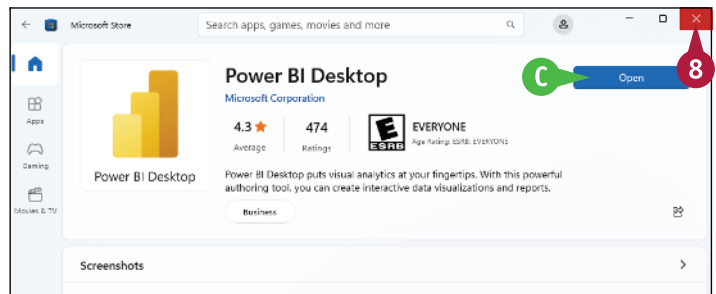


B Power BI Desktop begins downloading and installing on your computer.



When the download and installation is complete, the Open button appears.

C You can click **Open** to open Power BI Desktop directly from the Microsoft Store app.



8 Click **Close** (✖).

The Microsoft Store app closes.

TIP

What are the system requirements for Power BI Desktop?

To run Power BI Desktop, you need a PC running Windows 10 version 14393.0 or later, such as Windows 11, with at least 2 GB of disk space free. Microsoft recommends a Windows 10 PC with a minimum of 2 GB of RAM, but for reasonable performance, 4 GB is a realistic minimum, and 8 GB or more will give better performance. Windows 11 requires at least 4 GB of RAM; for good performance, treat 8 GB as a realistic minimum, and get 16 GB or more if possible.

Start and Pin Power BI Desktop

After you have successfully installed Power BI Desktop, as described in the previous section, you can launch the app from the Windows Start menu. If you want to launch Power BI Desktop more quickly in the future, you can pin Power BI Desktop to your Start menu, making it always appear there. For even faster launching without opening the Start menu, you can pin Power BI Desktop to the taskbar.

This section shows Windows 11. If your computer has Windows 10, the Start menu is located in the lower-left corner of the screen by default.

Start and Pin Power BI Desktop

Start Power BI Desktop

- 1 Click **Start** (🪟).

The Start menu opens.

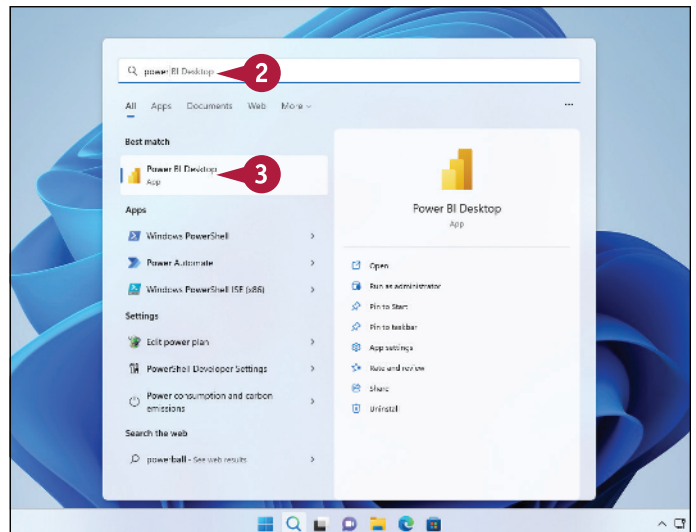
- A If Power BI Desktop (📊) appears in the Recommended section, click **Power BI Desktop** (📊) and go to step 4.



- 2 Start typing **power bi desktop**.

The Start menu displays search results as you type.

- 3 Click **Power BI Desktop** (📊).

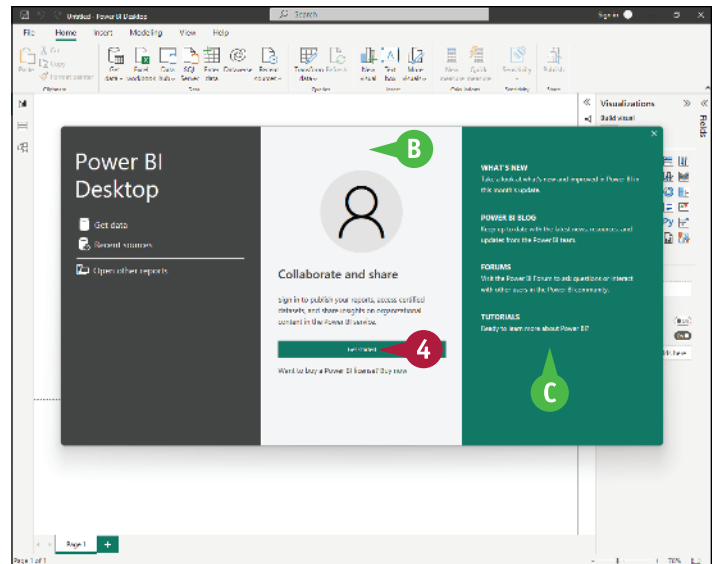


Power BI Desktop opens.

- B** The Power BI Desktop splash screen appears.
- C** The right pane contains links you can click to display various types of information about Power BI.
- 4** Click **Get Started**.

The splash screen closes.

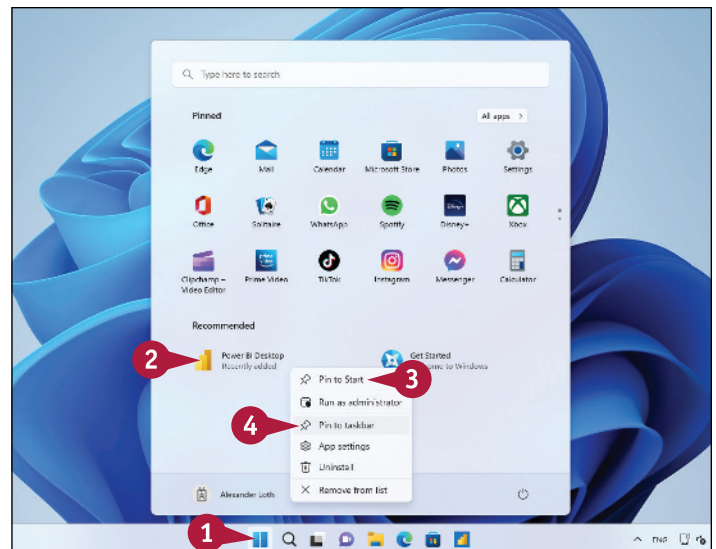
You can now start using Power BI Desktop.



Pin Power BI Desktop

- 1** Click **Start** (Windows logo).
- The Start menu opens.
- 2** Right-click **Power BI Desktop** (Power BI icon).
- 3** To pin Power BI Desktop to the Start menu, click **Pin to Start** (Pin icon).
- 4** To pin Power BI Desktop to the taskbar, click **Pin to taskbar** (Pin icon).

After pinning the Power BI Desktop icon to the Start menu or the taskbar, you can start Power BI Desktop quickly by clicking the icon on the Start menu or the taskbar.



TIP

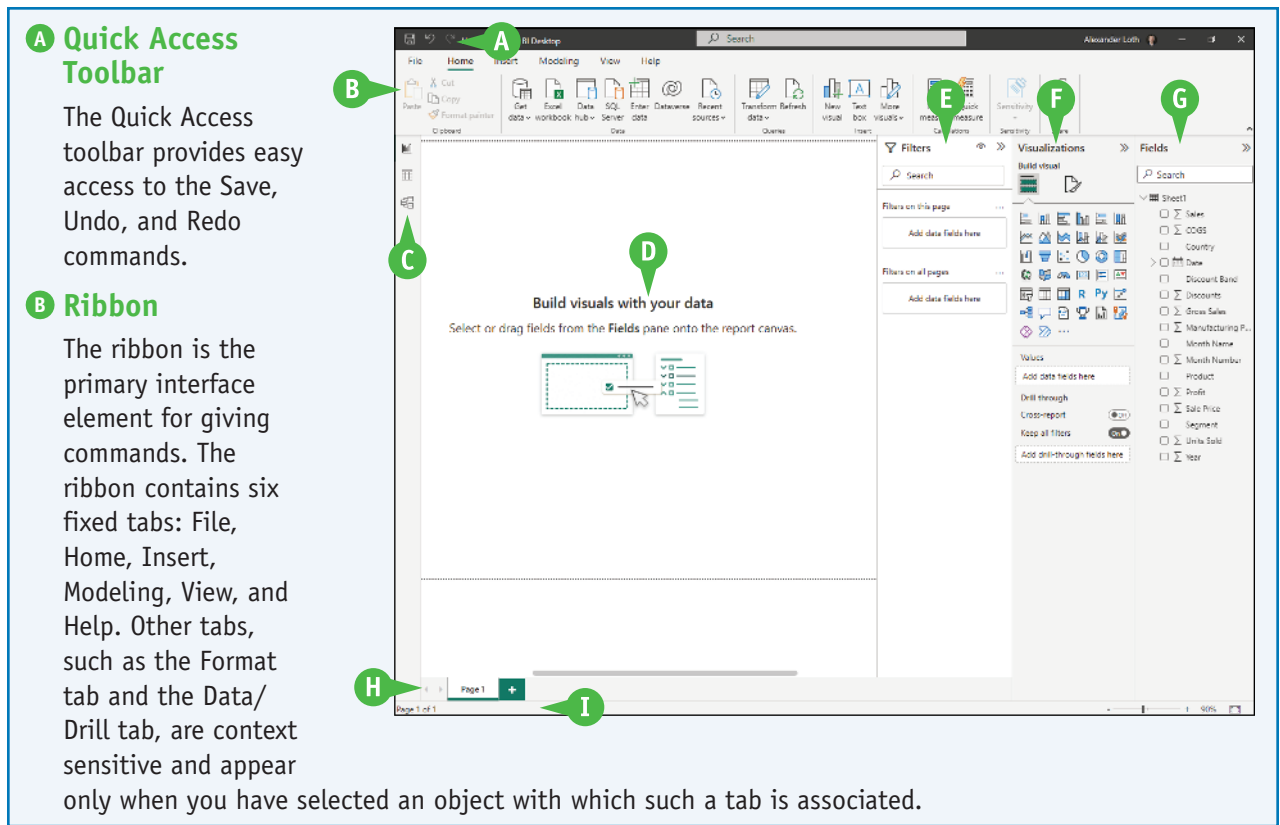
Is Power BI available for the Mac or Linux?

As of this writing, Power BI Desktop is available only for Windows, so Mac users and Linux users cannot install and use Power BI Desktop natively. On either macOS or Linux, you can install virtual-machine software, such as Parallels Desktop for macOS, from www.parallels.com, or the free VirtualBox for either macOS or Linux, from www.virtualbox.org. Install Windows on the virtual machine, and then install Power BI Desktop. Another approach is to use a cloud PC, such as Microsoft's Windows 365 Cloud PC service, which you can access from macOS, Linux, Windows, iOS and iPadOS, Android, and most other current operating systems.

Explore the Power BI Workspace

Like many of Microsoft's professional apps, Power BI Desktop has a ribbon-driven interface rather than menus. If you are familiar with Microsoft apps such as Word or Excel, the Power BI Desktop ribbon will look familiar; if not, you can quickly master how to use it.

Below the ribbon is the Canvas, the area on which you create visualizations. To the left of the Canvas is the View bar; to the right of the Canvas are the Filters pane, the Visualizations pane, and the Fields pane, which you can collapse and expand as needed. At the bottom of the Power BI Desktop window is the status bar.



A Quick Access Toolbar
The Quick Access toolbar provides easy access to the Save, Undo, and Redo commands.

B Ribbon
The ribbon is the primary interface element for giving commands. The ribbon contains six fixed tabs: File, Home, Insert, Modeling, View, and Help. Other tabs, such as the Format tab and the Data/Drill tab, are context sensitive and appear only when you have selected an object with which such a tab is associated.

C View Bar

D Canvas

E Filters Pane

F Visualizations Pane

G Fields Pane

H Page Navigation

I Status Bar

C View Bar

The View bar, on the left side of the Power BI Desktop window, enables you to switch between three views: Report, Data, and Model. By default, Report view is selected.

D Canvas

The Canvas is the area on which you create and manipulate your visualizations.

E Filters Pane

In the Filters pane, you can filter data fields to limit the analysis to the relevant data range. You can control whether the filtering applies to a single visualization, a single page, or all pages of your file. You can expand the Filters pane, the Visualizations pane, and the Fields pane by clicking **Expand** (⟨⟨), and you can collapse them by clicking **Collapse** (⟩⟩).

F Visualizations Pane

In the Visualizations pane, you can create a new data visualization, change the chart type of an existing visualization, and adjust the formatting. A series of icons shows you the available visualization types and helps to quickly select the desired chart. Here, also depending on the selected visualization, you can assign data fields or calculation results to the visualizations and add visual features such as tool tips, drill-through references, and additional analyses. You can also load various other powerful visualizations from the Microsoft Store.

G Fields Pane

The Fields pane gives you an overview of which data fields and calculations are available in your source. A sum sign, Σ , in front of a field name indicates a field that Power BI has evaluated as being suitable for summation or aggregation.

H Tab Bar

The tab bar below the Canvas enables you to create new pages and navigate from one to another. Click **Add** (+) to add a page. Click a page's tab to display that page. When there are more pages than can appear on the tab bar, click **Go to Start** (◀) or **Go to End** (▶) to scroll the displayed tabs left or right.

I Status Bar

The status bar, at the bottom of the Power BI Desktop window, displays current information, such as the page number and the number of pages, and contains the zoom slider, the Zoom Menu button (such as 90%), and the Fit to Page button (Fit to Page icon).

continued ►

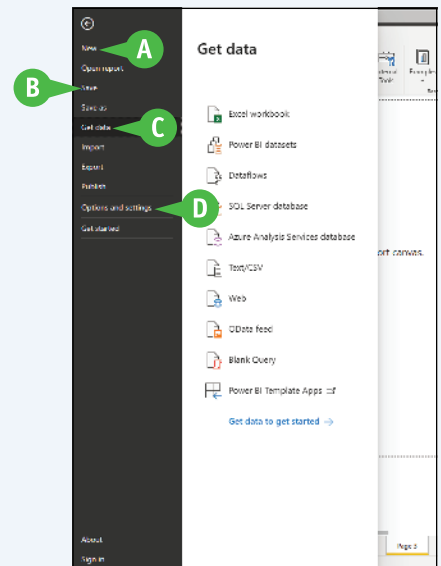
Explore the Power BI Workspace (continued)

The Power BI Desktop ribbon contains six fixed tabs: File, Home, Insert, Modeling, View, and Help, looking from left to right. This section gives you an overview of these six tabs.

Power BI Desktop also has context-sensitive tabs, which appear when you have selected an object for which the tabs are relevant. For example, when you select a visual, the Format tab appears, giving you access to controls for configuring interactions with the visual and arranging it on the canvas.

The Files Tab and Backstage View

Clicking the File tab at the left end of the ribbon opens Backstage view, which gives you access to commands for creating, saving, and managing documents. For example, you can click **New** (A) to open a new Power BI Desktop window, click **Save** (B) to save the active report, click **Get Data** (C) to display the Get Data commands, or click **Options and settings** (D) to configure Power BI Desktop.

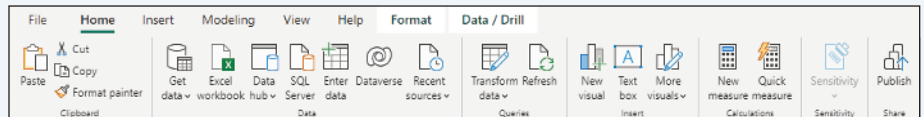


The Home Tab

The Home tab contains seven groups of controls.

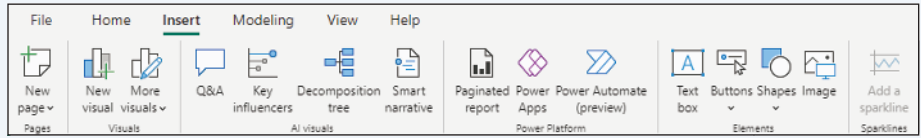
The Clipboard group

enables you to use the Cut, Copy, Paste, and Format Painter commands. The Data group allows you to create connections to data sources. The Queries group lets you transform data and refresh your existing queries. From the Insert group, you can insert visuals and text boxes. The Calculations group enables you to create new *measures*, or calculations. The Sensitivity group allows you to apply sensitivity labels to reports. The Share group lets you upload the report to the Power BI service.



The Insert Tab

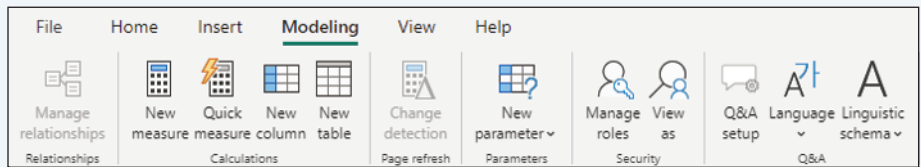
The Insert tab contains six groups. The Pages group enables you to add new



pages to the report. The Visuals group provides controls for adding visuals to the report. The AI Visuals group lets you add elements such as a Q&A section and a decomposition tree. The Power Platform group helps you add Power Apps to the report; see the section “Understanding Power BI as Part of the Power Platform,” earlier in this chapter, for more about Power Apps. The Elements group lets you insert text boxes, buttons, shapes, and images. The Sparklines group allows you to add *sparklines*, miniature charts that illustrate a single data series.

The Modeling Tab

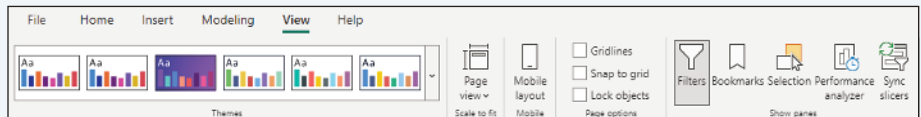
The Modeling tab contains six groups. The Relationship group contains the Manage



Relationships button, which you click to open the Manage Relationships dialog box, where you configure the relationships between different tables you are using. The Calculations group enables you to create new measures, columns, and tables. The Page Refresh group allows you to configure the frequency at which Power BI Desktop checks your data sources for changes. The What If group lets you add new parameters to your report. The Security group provides controls for managing security roles for other users and for viewing your report from another user’s point of view. The Q&A group enables you to configure a Q&A section, set its language, and import and export linguistic schemas.

The View Tab

The View tab contains five groups. From the Themes group, you can



apply a preset visual theme to the report. The Scale to Fit group lets you choose whether to view the report at its actual size, fit it to a page, or fit it to the window width. The Page Options group enables you to add gridlines, control whether objects snap to the grid, and lock objects to prevent movement. The Show Panes group allows you to control which panes appear in the report window.

The Help Tab

The Help tab contains four groups. The Info group contains only the About button, which you



can click to display information about Power BI Desktop and your current session. The Help group gives you access to specific help resources. The Community group provides links to community support and external tools. The Resources group lets you access examples and Power BI consulting services.