

# **PBI365**

# **Power BI Certification**

# **Bootcamp**

***Building Solutions on the Power BI Platform***

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Course Manual Version 1.9

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## About This Training Course

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|                      |                                 |
|----------------------|---------------------------------|
| <b>Course Title:</b> | Power BI Certification Bootcamp |
| <b>Course Code:</b>  | PBI365                          |
| <b>Audience:</b>     | Technical Specialists           |
| <b>Format:</b>       | In-person and Remote            |
| <b>Length</b>        | 3 Days                          |

### Course Description

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**Power BI Certification Bootcamp** is an advanced 3-day training class designed to prepare students to pass Microsoft certification exam **70-778: Analyzing and Visualizing Data with Microsoft Power BI**. During the course, students will gain the real-world skills required to design, deploy, upgrade and monitor reporting and dashboard solutions using the rapidly-evolving Power BI platform. All the essential Power BI concepts and techniques discussed in lectures are reinforced with hands-on lab exercises in which students will move through the actual steps required to build reporting and dashboard solutions and then to distribute those solutions to a wide audience using app workspaces and the Power Bi app model.

This course includes in-depth coverage of the query tools and data modeling tools in Power BI Desktop. Students will learn how to design complex queries and to write advanced DAX expressions to calculate rankings, rolling averages and year-to-year comparisons. Students will also learn how to design interactive reports using slicers, bookmarks and drillthrough pages. The course discusses essential differences between reports and dashboards and also examines the strengths and weaknesses between the various types of datasets including imported datasets, DirectQuery datasets and LiveConnect datasets.

This course discusses distributing Power BI content and administrating the Power BI environment at the tenant-level. Students will learn when and how to install an on-premises data gateway to provide connectivity to on-premises data sources such as SQL Server. The course demonstrates how to configure tenant-level settings for Power BI and how to monitor report and dashboard usage within an organization using Power BI audit logs. Along the way, students will learn how to configure row-level security (RLS) and how to leverage the R data analytics platform to extend a Power BI Desktop project using R script visuals.

### Student Prerequisites

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Due to the accelerated nature of this training class, it is recommended that students have 6 months or more experience working with the Power BI Service and Power BI Desktop. All students will require a Windows PC running Windows 10, Windows 8.1 or Windows 7 to complete the lab exercises for this course.



# About the Hands-on Labs

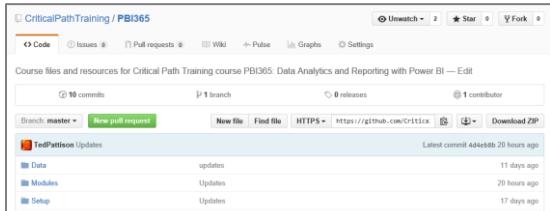
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**Power BI Certification Bootcamp (PBI365)** includes a rich set of hands-on lab exercises designed to reinforce the key concepts and techniques that you learned about in the lectures. The lab exercises for Power BI Certification Bootcamp were designed to run on a student workstation or laptop running the Windows operating system. We recommend that you use Windows 10 but you can also use any version of Windows that support Power BI Desktop. Therefore, it is also possible to complete these lab exercises on any Windows PC running Windows 8.1 or Windows 7.

## GitHub Repository for this course

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Student files for this course are maintained in a GitHub fil repository at <https://github.com/CriticalPathTraining/PBI365>.



## Student Workstation Prerequisites

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All lab exercises should be completed on a student workstation that has the following software.

1. Windows 10, Windows 8.1 or Windows 7.
2. One or more Internet browsers (Chrome, Edge, IE, etc.)
3. Microsoft Excel 2016 or Microsoft Excel 2013 - *If you don't already have it, you can optionally install it during lab 1.*
4. Power BI Desktop – *If you don't already have it, you will it install during lab 2.*

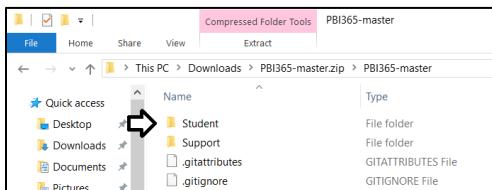
## Copying the Student Lab Files to Your Windows PC

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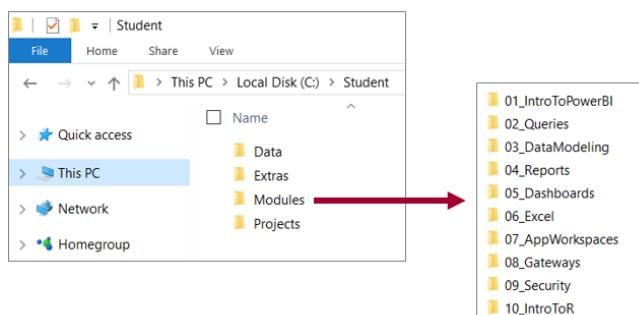
The most recent version of the electronic student files for this course are kept in the **Student** folder of the GitHub repository for this course. You can download the zip archive for this repository from the following URL.

<https://github.com/CriticalPathTraining/PBI365/archive/master.zip>

It is recommended that you that you download the master zip archive and make a local copy of the **Student** folder so that you have a local copy of the files you will need on your computer workstation when going through these labs exercise. Once you download the master zip archive, open it and copy the **Student** folder to a new local folder.



Copy the **Student** folder from the master zip archive to a new local folder at **C:\Student**.





# **Module 01: Introducing the Power BI Platform**

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## **Module Description**

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This module provides an overview of the Power BI platform and explains the role of the Power BI Service, Power BI Desktop and Power BI Mobile. Students will learn how to get started with the Power BI Service creating reports and dashboards using a browser. The module also provides students with a quick primer on working with Power BI Desktop and installing the Power BI app on a mobile device. This introductory module concludes with a discussion of how to keep current with all the monthly updates that Microsoft consistently applies to Power BI Desktop and the Power BI Service.

## **Module Agenda**

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- Understanding the Power BI Platform
- Creating a Trial Office 365 Tenant for Testing
- Creating Datasets, Reports and Dashboards
- Getting Started with Power BI Desktop
- Staying in Sync with Monthly Updates

## **Topics Covered**

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- Live Labs for PBI365
- Student Files for This Course
- Student Background
- What is Business Intelligence?
- What is Power BI?
- Power BI Authors and Consumers
- Power BI Licensing
- Power BI Report Server
- Creating a Power BI Lab Environment
- Microsoft 365 admin center
- The Power BI Service
- Light Grey is the New Black
- The Power BI Admin Portal
- Central Power BI Concepts
- Reports and Pages
- Report Authoring
- Visuals (aka Visualizations)
- Editing Visual Properties
- Report and Datasets
- Dashboards and Tiles
- Creating Dashboards
- Dashboards and Reports
- Working with Power BI Desktop
- Installing Power BI Desktop
- Working with Power BI Desktop
- Getting Around in Power BI Desktop
- Projects and PBIX Files
- Publishing a Power BI Desktop Project
- Power BI Team Blog
- Power BI Community Forums
- Power BI User Group (PUG)

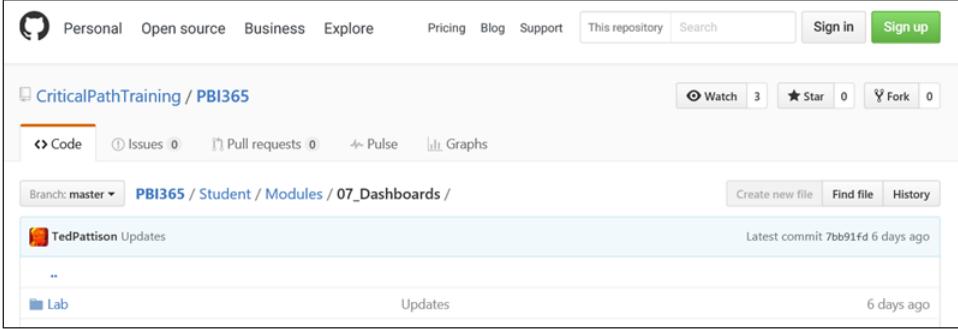
## **Instructor Demos**

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- Creating Azure AD User Accounts in an Office 365 Tenant
- Creating Reports and Dashboards using the Power BI Service
- Getting Up and Running with Power BI Desktop
- Publishing a PBIX Project File to the Power BI Service

## Live Labs for PBI365

- Student files for this course maintained in GitHub
  - Students files updated frequently
  - Go to <https://github.com/CriticalPathTraining/PBI365>

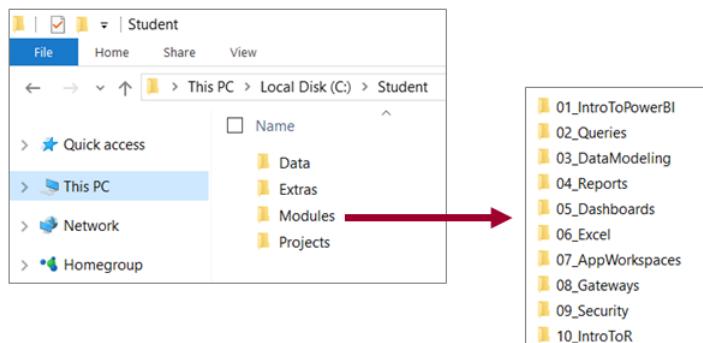


At Critical Path Training, we try our best to stay on top of all of Microsoft's updates as they are applied to the Power BI platform. As you can imagine, this cloud cadence of monthly updates can pose a serious problem to many training companies and content vendors who are faced with the challenge of having to update their courseware on a monthly basis.

Critical Path Training has responded to challenge of dealing with monthly updates with a new student experience that we refer to as **Live Labs**. All the electronic student files for completing lab exercises are published in a public GitHub repository which can be accessed with a browser at <https://github.com/CriticalPathTraining/PBI365>. The Live Labs experience allows us to short circuit the standard courseware publishing process which make it possible to make updates immediately available to all our students.

## Student Files for This Course

- Copy the **Student** folder from the master zip archive
  - Create a new local folder at **C:\Student**
- Each module has folder inside **Student\Modules** folder
  - Slides and lab writeup available through student manual (not in GitHub repository)



The most recent version of the electronic student files for this course are kept in the **Student** folder of the GitHub repository for this course. You can download the zip archive for this repository from the following URL.

<https://github.com/CriticalPathTraining/PBI365/archive/master.zip>

It is recommended that you download the master zip archive and make a local copy of the **Student** folder so that you have a local copy of the files you will need on your computer workstation when going through these labs exercise. Once you download the master zip archive, open it and copy the **Student** folder to a new local folder. Note that each module of the course has its own folder in the **Student\Modules** folder.

## Student Background

- What is your name?
- What are you doing with Power BI?
- Which products/services have you used
  - Excel
  - Access
  - SQL Server, SSRS, SSAS
  - SharePoint and Office 365
  - Tableau
  - Dynamics 365
  - Salesforce
  - Others



When you are called upon by the instructor, please provide a brief background by answering the following questions.

## What is Business Intelligence?

- BI focuses on business health and performance
  - Gather insights into health of business processes
  - Take corrective actions in a timely fashion
- BI projects typically involve the following...
  - Integrate data from multiple sources
  - Perform data transformation and complex calculations
  - Analyze large data sets with rapid query response
  - Create insightful reports and visualizations
  - Provide insights that are “actionable”



"Business Intelligence" is a widely used term that can mean different things to different people. However, BI generally refers to the practice of monitoring business health and performance. People who perform BI roles in an organization have the job of gathering insights into health of business processes and helping the organization take corrective actions in a timely fashion.

Many BI projects share a common set of chores. These include importing and integrating data from multiple sources and performing data transformation and complex calculations on that data. Once the data has been imported and transformed, there is then the need to analyze large data sets with rapid query response and to create insightful reports and visualizations for business executives and managers. And most importantly, a BI project must provide insights that can be used to take action. If a BI project does not produce insights that are actionable, it lacks real business value.

## What is Power BI?

- What is Power BI?
  - A cloud-based analytics service for licensed subscribers
  - Environment which supports and promotes self-service BI
  - Powerful builder tools for importing, modeling and visualizing data
  - Enterprise-grade platform for deploying reports and dashboards
  - On-premises server product supporting subset of cloud features

Power BI  
Service

Power BI  
Desktop

Power BI  
Report Server



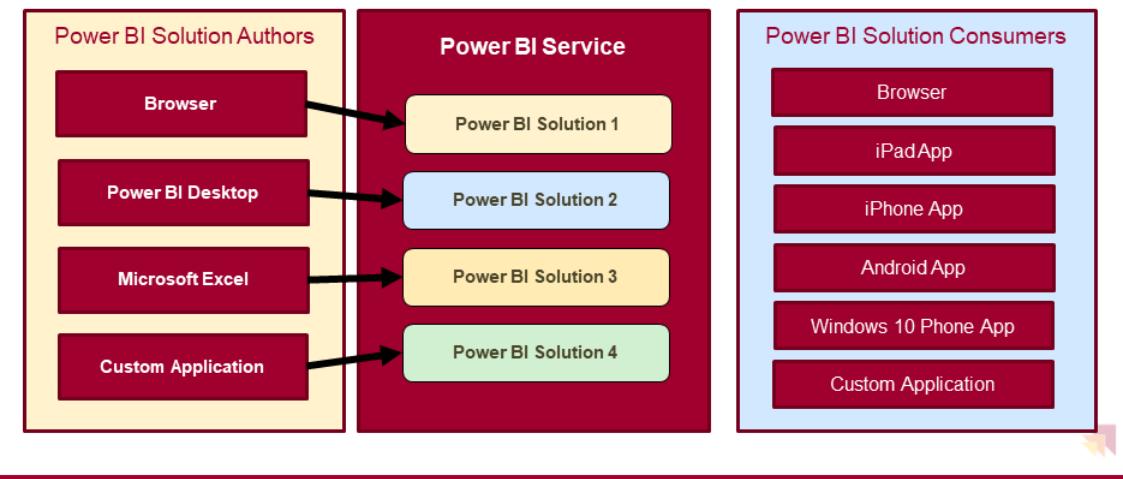
Power BI is a cloud-based subscription service from which provides business users with an environment participate in self-service BI. For ad-hoc scenarios it provides an end user with a straight-forward manner to import and analyze and to visualize insights from that data. To system integrators and data professionals, Power BI represents a platform for creating business solutions that assists with data analysis and insight visualization.

Because Power BI benefits is a cloud-based service, a new user can subscribe in under a minute. Another important goal of the Power BI team at Microsoft was to remove dependencies so that new users can quickly begin importing data and creating visuals using nothing more than the browser.

As of March 2016, the Power BI service has experienced strong adoption numbers. The Power BI service has surpassed 5 million subscribers who come from over 200,000 different organizations. The Power BI service subscribers come from many different countries and take advantage of the fact that the Power BI service has been localized for over 40 different languages.

## Power BI Authors and Consumers

- Power BI support for authors and consumers
  - BI solution authors have a choice in authoring tools
  - BI solutions consumers can use wide range of devices



Power BI is a platform that can be used to perform ad-hoc data analytics and reporting. It is also a platform that caters to BI solution authors and to the consumers of those BI solutions.

BI solution authors can choose between authoring tools including the browser, Power BI Desktop and Microsoft Excel. Microsoft positions Power BI Desktop as the premiere tool for authoring BI solutions due to its powerful query and data modeling features (aka Power Query and Power Pivot). Note that it is also possible for application developers to automate the creation of a BI solution in the Power BI service using the Power BI REST API.

Another powerful aspect of the BI platform is that BI solutions consumers can use wide range of devices to access dashboard and reports in the Power BI service. Dashboards and reports are fully accessible across recent versions of the industry's most popular browsers including Internet Explorer, Edge, Chrome, FireFox, Opera and Safari. The Power BI platform also provides a Power BI consumer app on devices including iPhones, iPad, Android, Windows surface and Windows 10 phone. It is also possible for application developers to embed Reports and Dashboard tiles from Power BI into external applications and websites.

## Power BI Licensing

- User-based licensing
  - Power BI (free)  
\$0.00 user/month  
A cloud-based business analytics service that enables anyone to visualize and analyze data with greater speed, efficiency, and understanding. It includes Office 365 services.  
Office 2016 desktop & mobile apps  
Not included  
Office 365 services
  - Power BI Pro  
\$9.99 user/month  
A cloud-based business analytics service that enables anyone to visualize and analyze data with greater speed, efficiency, and understanding. Power BI Pro includes Office 365 services.  
Office 2016 desktop & mobile apps  
Not included  
Office 365 services
  - Office 365 Enterprise E5  
\$35.00 user/month  
The Office suite, plus email, instant messaging, HD video conferencing, 1 TB personal file storage and sharing, and advanced security, analytics and PSTN. It includes Office 365 services.  
Office 2016 desktop & mobile apps  
Not included  
Office 365 services
- Capacity-based Licensing
  - Power BI Premium P1  
\$4,995.00 instance/month  
Power BI capacity dedicated to your organization, unlocking unlimited content distribution and dependable performance. P1 offers 8 virtual cores.  
Office 2016 desktop & mobile apps  
Not included  
Office 365 services
  - Power BI Premium P2  
\$9,995.00 instance/month  
Power BI capacity dedicated to your organization, unlocking unlimited content distribution and dependable performance. P1 offers 16 virtual cores.  
Office 2016 desktop & mobile apps  
Not included  
Office 365 services
  - Power BI Premium P3  
\$19,995.00 instance/month  
Power BI capacity dedicated to your organization, unlocking unlimited content distribution and dependable performance. P1 offers 32 virtual cores.  
Office 2016 desktop & mobile apps  
Not included  
Office 365 services
  - Power BI Premium EM3 (Month to Month)  
\$2,495.00 instance/month  
Embed Power BI content in your custom application, powered by 4 virtual cores of dedicated capacity. Some Premium features are disabled.  
Office 2016 desktop & mobile apps  
Not included  
Office 365 services

Power BI Licensing can be confusing due to the fact Microsoft sells Power BI using both user-based licensing and capacity-based licensing. In organizations that are only using user-based licensing, users with the Power BI free license cannot share content with other users nor can they consume content shared by others. This means that all users will require a Power BI pro license regardless of whether they are authoring reports and dashboards or just consuming reports and dashboards created by others.

Capacity-based licensing is an option that will appeal to larger organizations. For example, an organization can acquire a Power BI Premium subscription that allows them to take advantage of the Power BI platform's capacity-based licensing model. This makes it possible to share Power BI content with users with the Power BI free license as long as the reports and dashboards are served from a workspace running in a licensed capacity.

Consider a simple example of an organization which has 20 Power BI content authors and 1000 other users who will be read-only consumers for content created in Power BI. Without capacity-based licensing, a company would have to purchase a Power BI Pro license for all users.

- 1020 Power BI Pro licenses @ \$10/month = \$10,200/month

If an organization purchases the Power BI Premium P1 SKU for \$5000 per month, it will lower its overall licensing cost

- 20 Power BI Pro licenses @ \$10/month = \$200/month
- 1 Power BI Premium P1 license @ \$5000/month
- Total cost = \$5200/month

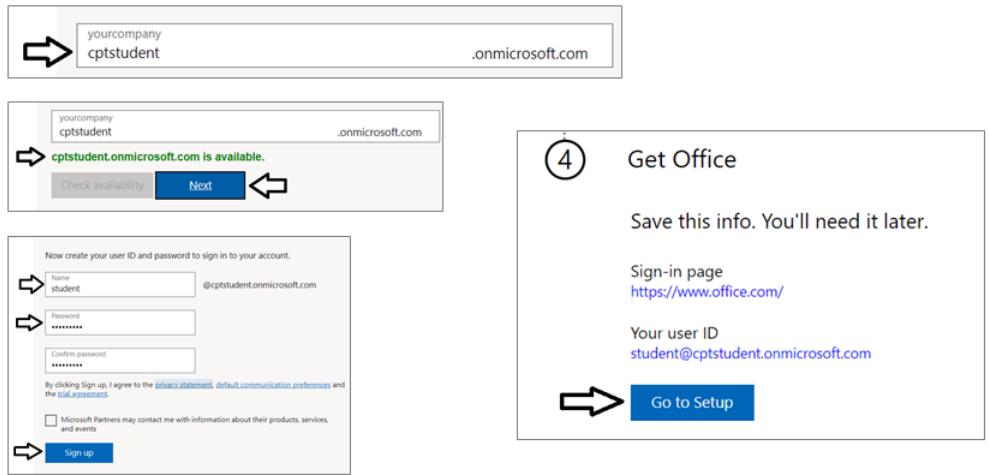
## Power BI Report Server

- Power BI Report Server provides limited PBI functionality
  - Designed for customers that need to keep all IT on-premises
  - Supports publishing reports built with Power BI Desktop
  - Builders must use special release of Power BI Desktop
- Power BI features missing from Power BI Report Server
  - Dashboards
  - Dataflows
  - Row Level Security
  - Deployment using Apps
  - Natural Language Q&A
  - Power BI Service API



## Creating a Power BI Lab Environment

- Sign up for an Office 365 E5 trial account
  - Sign up process creates new Azure AD tenant
  - Tenant created with user account which is Global tenant admin
  - Tenant gets 30-day trial subscription for 25 Office 365 E5 licenses



In the lab exercises for this course, you will go through the steps to sign up for an Office 365 Enterprise E5 trial account. By doing this you will create a new Office 365 tenant which makes it possible to create multiple user accounts. A key point here is that you are creating a trial account for an entire Office 365 organization as opposed to creating a trial account for a single user.

When you initially create the new Office 365 tenant, you will be prompted to enter the user name and password for a new user account. This initial user account will be created with full tenant administrator capabilities. This means that this account will have full administrative control over user management and group management within the Office 365 tenant. This account will also be able to see and modify the organization-wide administrative settings for important cloud services such as Exchange, SharePoint Online and, of course, Power BI.

A significant benefit of creating a test environment in this fashion is that you can create additional users which makes it possible to test Power BI scenarios such as security related to dashboard sharing and dashboard deployment using organizational content packs. An Office 365 Enterprise E5 trial account allows you to add up to 25 user accounts for testing purposes. You will also be able to create and configure group workspaces to test Power BI security features such as row-level security (RLS).

## Microsoft 365 admin center

- Microsoft 365 admin center used for tenant administration
  - You will have full control because you are a Global tenant admin
  - You can create user accounts and groups
  - You can create subscriptions and assign licenses

The screenshot shows the Microsoft 365 Admin Center interface. The left sidebar has navigation links for Home, Users (Active users selected), Contacts, Guest users, Deleted users, Devices, Groups, Roles, Resources, and Billing. The main content area is titled 'Active users' and shows a table with columns for Display name, Username, and Licenses. The table lists six users: Austin Powers, Carrie Mathison, Emma Peel, Jack Bauer, Jack Rabbit, and Jack Ryan, each with their respective email addresses and license details.

| Display name    | Username   | Licenses                           |
|-----------------|--|------------------------------------|
| Austin Powers   | AustinP@sharepointconfessions.onmicrosoft.com    | Power BI Pro                       |
| Carrie Mathison | CarrieM@sharepointconfessions.onmicrosoft.com    | Power BI Pro                       |
| Emma Peel       | EmmaP@sharepointconfessions.onmicrosoft.com      | Microsoft 365 E5 , Power BI Pro    |
| Jack Bauer      | JackB@sharepointconfessions.onmicrosoft.com      | Microsoft 365 E5 , Power BI (free) |
| Jack Rabbit     | JackRabbit@sharepointconfessions.onmicrosoft.com | Power BI (free)                    |
| Jack Ryan       | JackR@sharepointconfessions.onmicrosoft.com      | Power BI (free)                    |

Once you have created your new Office 365 Enterprise E5 trial account, you should become familiar with the process of navigating around inside the Office 365 admin center. For example, you need to learn how to add new user accounts. You should also learn how to view and create groups in Office 365. That's because every Power BI group workspace is backed by an underlying Office 365 group. That means that you can use the Office 365 admin center to add and remove users from a Power BI group workspace.

## The Power BI Service

- The Power BI Service
  - Provides cloud-based foundation for Power BI platform
  - Provides browser-based portal at <https://app.powerbi.com>

| Sales Region   | 2013        | 2014        | 2015        |
|----------------|-------------|-------------|-------------|
| Central Region | \$914,877   | \$1,712,919 | \$2,045,320 |
| AL             | \$28,026    | \$108,815   | \$174,660   |
| LA             | \$48,412    | \$102,811   | \$234,933   |
| TX             | \$38,440    | \$142,272   | \$181,710   |
| Eastern Region | \$232,268   | \$97,464    | \$138,210   |
| NC             | \$192,768   | \$67,964    | \$87,580    |
| GA             | \$124,682   | \$57,259    | \$79,497    |
| Total          | \$1,482,695 | \$3,499,539 | \$4,902,578 |

You can think of the Power BI service as the heart and sole of the Power BI platform. Licensed users can access the Power BI service using any modern browser through its primary URL which is <https://app.powerbi.com>. Once a user has been authenticated against the common endpoint of <https://app.powerbi.com>, the user is then connected to the Azure data center which hosts the user's Power BI workspaces.

Using the browser, a Power BI subscriber can view dashboards and interactive reports. The browser-based experience of the Power BI service also provides support to import datasets and to create reports and dashboards.

# Light Grey is the New Black

The screenshot shows a Power BI dashboard titled "Wingtip Sales Analysis" with a subtitle "Data updated 10/12/19". The dashboard features a bar chart titled "Sales by Geography" showing sales for various states: GA, NC, FL, AL, LA, and TX. A legend indicates that teal bars represent the "Central Region" and dark grey bars represent the "Eastern Region". Below the chart is a map of the United States and Mexico with circular data points overlaid on the states. To the right of the map is a table titled "Sales Region" with columns for 2010, 2014, 2015, and Total. The table shows sales figures for Central, AL, LA, TX, NC, and a total row. The left sidebar of the Power BI interface is visible, showing navigation links like Home, Favorites, Recent, Apps, Workspaces, and the current workspace "Wingtip Sales".

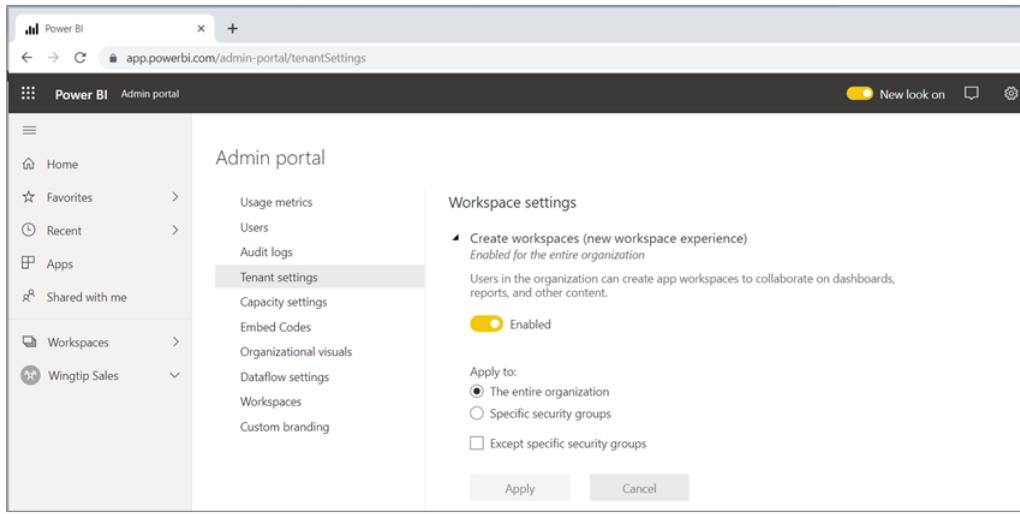
The easiest way to access Power BI is by connecting to the Power BI Service with a browser at <https://app.powerbi.com>.

The Power BI Service supports all modern browsers and is also accessible on mobile devices by installing the Power BI app published by Microsoft.

Any user accessing the Power BI Service in the browser requires a Power BI license which can be either a Power BI Pro license or a Power BI free license. Every user with a Power BI license gets a personal workspace which provides a place to begin creating datasets, reports and dashboards.

## The Power BI Admin Portal

- Admin portal used to configure tenant-level settings
  - Accessible at <https://app.powerbi.com/admin-portal>
  - Accessible by global tenant admins and Power BI Service admins



Power BI provides an Admin portal at <https://app.powerbi.com/admin-portal> which can be used to configure tenant-level settings for the Power BI environment. You can use the Power BI admin portal to disable specific Power BI features across an entire organization. For example, you can prevent all users or a specific set of users from sharing Power BI reports with external users and from publishing Power BI reports on the web which are accessible through anonymous access.

In order to access the Power BI admin portal, a user must have administrator-level permissions for Power BI. This includes users in the role of the global tenant admin as well as users who have been configured with the role of Power BI Service Administrator.

## Central Power BI Concepts

- Workspace
  - Secured container for Power BI resources
  - Created as personal workspaces and app workspaces
- Dashboard
  - Consolidated high-level view into reports and datasets
  - Provides great experience on mobile device (e.g. iPhone, Android, tablet, etc.)
- Report
  - Collection of one or more pages with tables & visualizations
  - Provides consumer with interactive control through filtering and bookmarks
- Dataset
  - In-memory data model containing one or more tables
  - Used to supply the underlying data to reports and dashboards
- Dataflows
  - Persistent data store used for more complex ETL requirements
  - Not required in most Power BI scenarios



You can think of a workspace as a container that holds three different kinds of assets; dashboards, reports and datasets. Every dashboard, report and dataset created in Power BI must be created within the scope of a specific workspace. A workspace also provides a user context because the current workspace always determines which set of dashboards, reports and datasets are visible to the user.

Every Power BI subscriber has a personal workspace which is named **My Workspace**. An organization can also create app workspaces which make it possible to achieve team-based authoring and staged deployment of custom solutions. The course will go into greater detail on working with app workspaces later in module 7 when discussing how to deploy reports and dashboards.

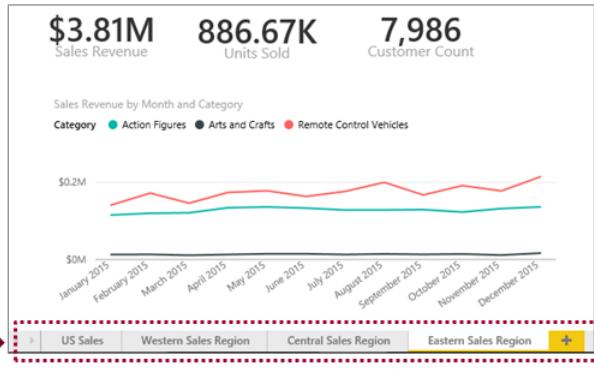
A dashboard typically serves as the top-level entry point into a custom data analytics solution. In Power BI, a dashboard is created as a consolidated view on top of reports and datasets. Dashboards are also important to Power BI mobile users because their display is often optimized for mobile devices such as iPhones, Android phones and Windows 10 phone.

A report is a collection of pages that is associated with exactly one underlying dataset. Each page in a report serves as a canvas on which you can add tables, matrices and other types of visualizations. While dashboards are designed to provide a high-level overview, reports are the opposite because they are used to drill down into the lower-level details. Reports also provide much more interactive filtering control for custom solutions in which the user must be given the ability to drill down into further levels of detail.

A dataset is a collection of one or more tables that defines a data model. A simple dataset can contain a single table with three columns and ten rows. However, a dataset often contains multiple tables which have relationships between them. In the upcoming lab exercises in this course, you will design a dataset using all the different query and data modeling features of Power BI Desktop.

## Reports and Pages

- Reports contain one or more pages
  - A report can be designed with a single page
  - A report can be designed with many pages
  - Tabbed navigation located at bottom of report view
  - Each report is associated with exactly one dataset



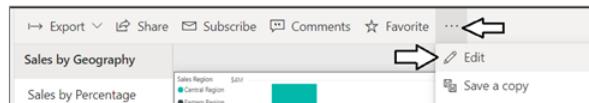
A report contains a collection of one or more pages. Simple report might contain just a single page while a more complicated report can contain 10 pages or more. It's up to you to decide how many pages you want to add to each report you create.

Each report displays a tabbed navigation menu at the bottom. This provides the means to navigate between pages in a multipage page report. This menu also supplies a button with a plus (+) sign on the right which makes it possible to add new pages when a report is in design view. You can also right-click on a page in the tabbed navigation menu to rename a page or to duplicate it to clone a copy.

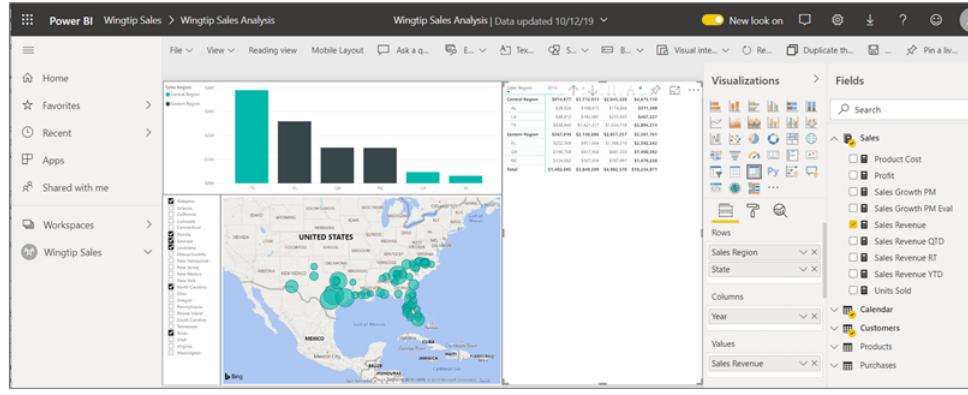
Keep in mind that each report is associated with exactly one underlying dataset. A report cannot see or display data from any other dataset. You should also understand that deleting a dataset will also delete any report that is based on that dataset.

## Report Authoring

- Report initially opens in reading view
  - Select Edit command to switch report to edit mode



- Report design tools appear on right side of page

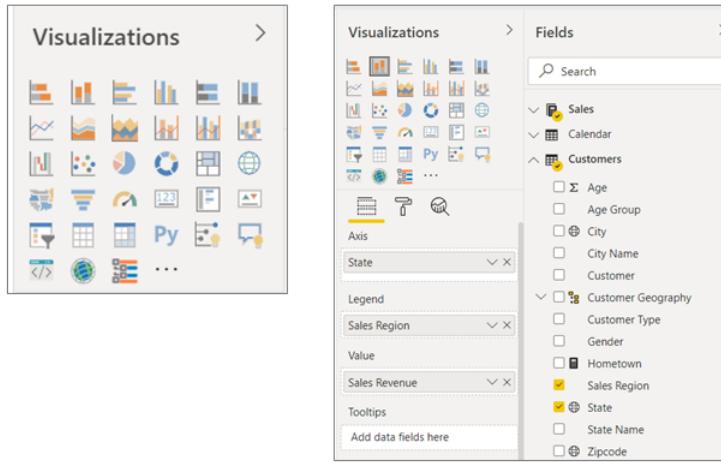


Reports can be viewed in Reading view or in Edit view. When you first navigate to a report, it is initially displayed in reading view which means you cannot edit the report. However, you can click the **Edit report** button in the toolbar to move over into edit view whenever you need to edit a report.

When you switch a report from reading view to edit view, a set of report editing tools appear on the right side of the page. These tools such as the Visualizations pane and the Fields list make it possible to design reports by adding new visuals and configuring their properties.

## Visuals (aka Visualizations)

- Reports are designed using visual (aka visualizations)
  - Each visual is based on an underlying visualization type
  - Visualization type can be changed using **Visualizations** pane
  - Visuals configured using fields from tables in **Fields** list



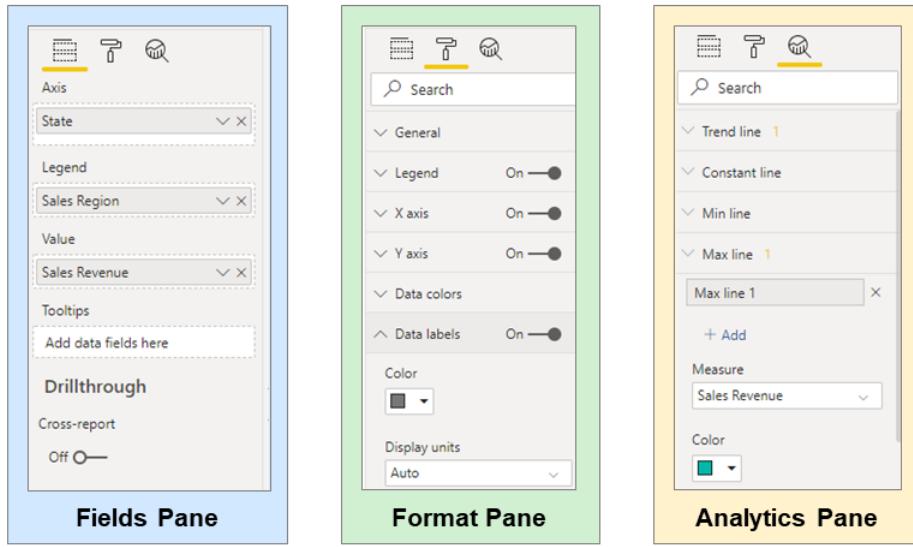
Pages within a report are designed by adding elements known as visuals. Note that Microsoft documentation uses the term “visual” and the term “visualization” interchangeably. In other words, there is no difference between a visual and a visualization. You sound a bit smarter when you use the term “visualization”, but it’s faster to say “visual” because the word only contain three syllables instead of six.

Each visual is based on an underlying visualization type. The set of visualization types available to you when designing a report are displayed in the **Visualizations** pane. Power BI defines a set of built-in visualization types which always appear in the Visualizations pane. One especially appealing aspect of the Power BI platform is that the set of available visualization types is extensible by adding custom visuals which you will learn about in module 6 of this training course.

When working with visuals while designing a report, you will often interact with the **Fields** list on the right side of the Power BI service application window. The Fields list displays all the tables and fields from the dataset associated with the current report. The Fields list is what makes it possible to associate one or more fields with a visual to populate it with data.

## Editing Visual Properties

- Visual properties modified using three property panes
  - Visual properties vary depending on visualization type



When you are working with the Power BI report editor in the browser, the properties of a visual can be modified using three different property panes on the right side of the Power BI service application windows. These three panes include the Fields pane, the Format pane and the Analytics pane. The screenshot in the slide above show where to click to activate each of these panes.

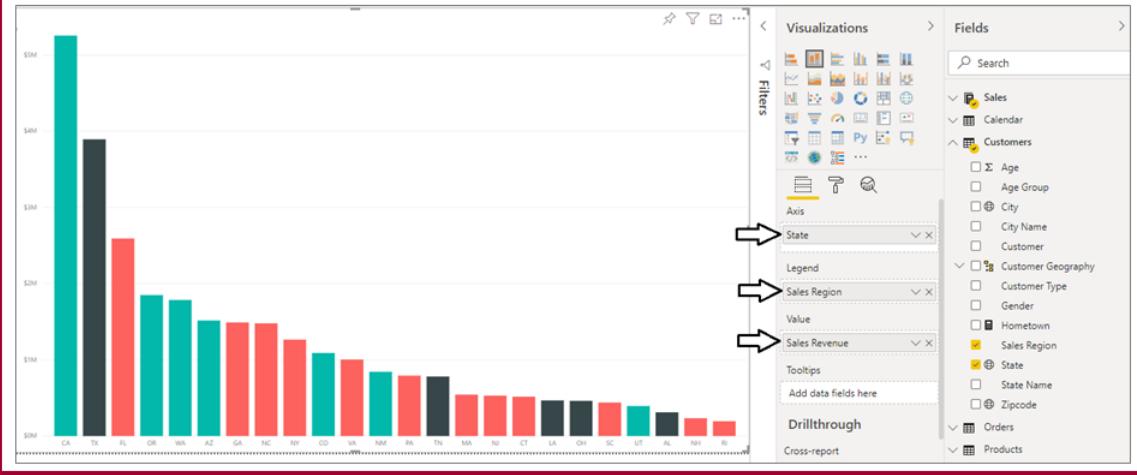
The **Fields** pane contains wells where you add fields from the tables of the dataset associated with the current report. The types of wells will vary greatly between different types of visualizations. For example, a line chart visual will contain wells such as **Axis**, **Legend** and **Values**. A map visual will contain wells such as **Location**, **Legend** and **Size**. A table visual only contains a single well for fields named **Values**.

The **Format** pane contains properties which affect the visual's display characteristics such as color, font size and whether the visual will have a border.

The **Analytics** pane is a new comer as it was just added to the Power BI platform with the August 2016 updates. Currently, only a handful of visuals contain properties which is displayed in the Analytics pane. The purpose of the Analytics pane is to enhance a visual with analytical elements such as trend lines and constant lines.

## Report and Datasets

- Each report is based on single underlying dataset
  - **Fields list** in report designer shows tables and fields
  - Fields added to a visual's data roles in **Fields pane**

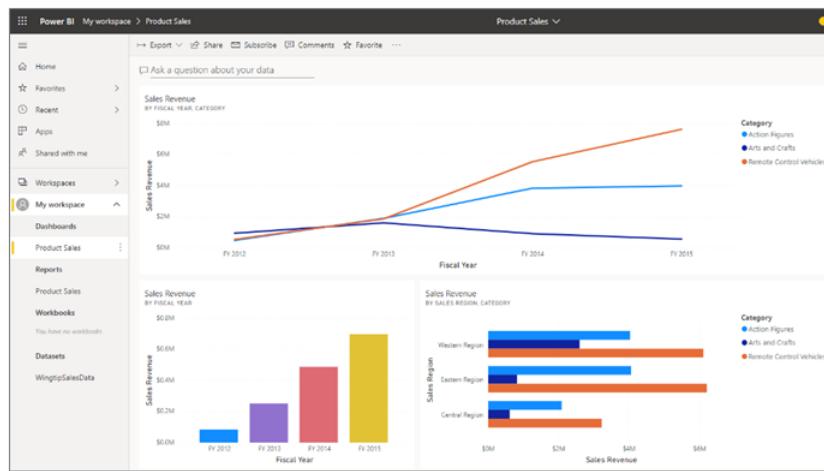


As you know, each report is based on an underlying dataset. The Fields list displays the tables and fields from the dataset that is associated with the current report. When you begin to design report, the Fields list makes it possible to add fields into the wells inside the Fields pane for specific visuals so they can be populated with data.

When you are using the browser to edit a report, it is important to understand that you are only a dataset consumer. You have no ability to actually edit the underlying dataset. The next lecture of this training course will introduce you to a essential tool named Power BI Desktop. When you begin using Power BI Desktop, you will be able to begin editing and designing datasets with a powerful set of data modeling tools.

## Dashboards and Tiles

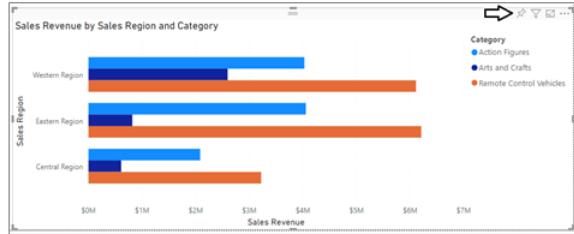
- Dashboard is a collection of tiles
  - Tiles can be created by pinning visual from a report
  - Tiles can be created by pinning Q&A search result



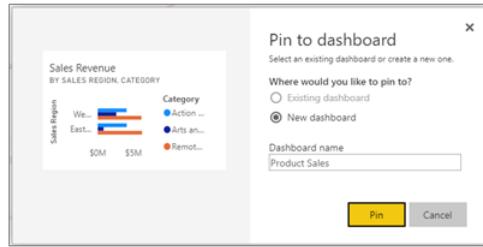
A dashboard in Power BI is displayed as a collection of dashboard tiles. There are two primary ways to create tiles when designing a dashboard. The most common way to create a tile in a dashboard is to pin a visual from a report. However, a tile can also be added to a dashboard in Power BI by executing the natural language Q&A query and then pinning the query results to create a new tile.

## Creating Dashboards

- Dashboards contain tiles
  - Tiles created from visuals using thumbtack button



- New tiles can be added to new or existing dashboard

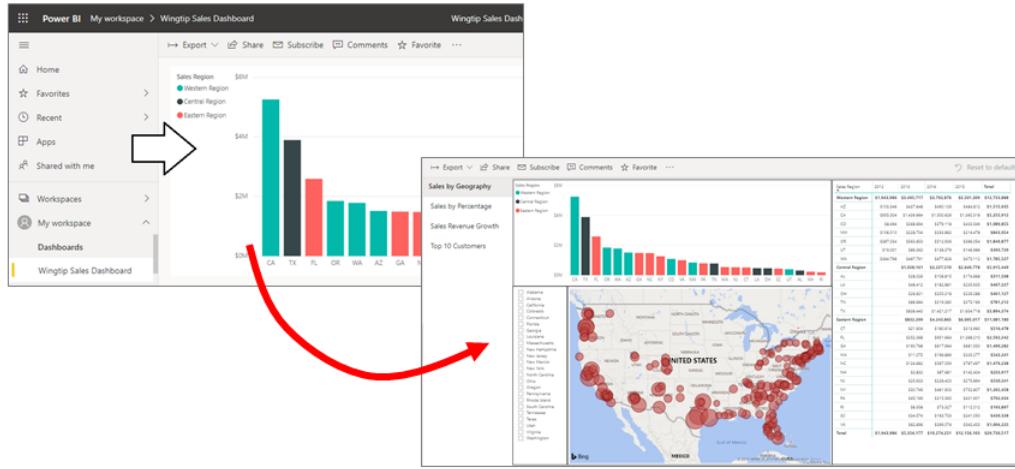


Once you have created a report in your personal workspace, it's pretty easy to take the next step and create a dashboard by following these steps.

- (1) Navigate to a report, hover the mouse over a visual and then click on the thumbtack button to pin it to a dashboard.
- (2) When the **Pin to Dashboard** dialog appears, you can elect to pin the visual to a new dashboard or to an existing dashboard.
- (3) Once you have pinned the visual, you can navigate to the dashboard and see the tile that has been created.

## Dashboards and Reports

- Dashboards link users to reports
  - Dashboard tiles designed to provide high-level view
  - Clicking tiles drills down into report to see more detail

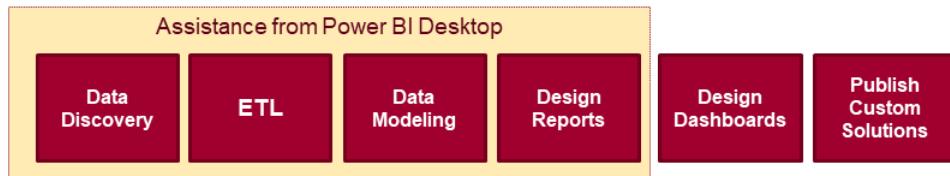


When you create a dashboard tile by pinning a visual from a report, you create a navigation path. When a user examines the dashboard and clicks on that tile, the user will be redirected to the underlying report.

This navigation path created by a dashboard tile emphasizes the key relationship between a dashboard and a report. The dashboard should be designed to convey a high-level overview of the data being analyzed. When a user sees something in a dashboard that needs further inspection, they can click on a tile to navigate to a report where they can dive down into greater levels of detail.

## Working with Power BI Desktop

- Power BI Desktop focuses on first four phases
  - Query features for Data Discovery
  - Query features for ETL
  - Design features and DAX language for data modeling
  - Report design using a visual report designer
  - No support for designing dashboards
  - Not used to package custom solutions with dashboards



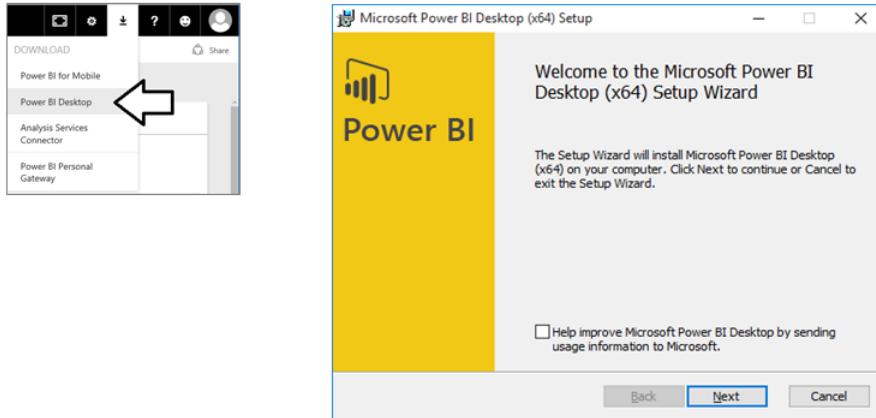
Power BI Desktop doesn't do everything. Instead, it focuses on the first four phases of creating a custom BI solution.

When you begin a project in the data discovery phase, Power BI Desktop is an excellent tool to begin inspecting different forms of data and to assess how useable and useful that data might be to the project. Once you have determined what data you need to work with, the powerful and easy-to-use query features of Power BI Desktop will take you through the ETL phase. Power BI Desktop also provides a rich set of features for modeling data and designing reports.

Currently, Power BI Desktop provides no support for designing dashboards. Once you have designed a data model and a report in a local Power BI Desktop project and then you have published the project to the Power BI service, you will use a browser to complete the final steps of designing a dashboard and deploying all your work using dashboard sharing or an organizational content pack.

## Installing Power BI Desktop

- Power BI Desktop quick & easy to install over the Internet
  - Select Power BI Desktop option from Power BI Download menu
  - Power BI Desktop downloads & installs in less than a minute



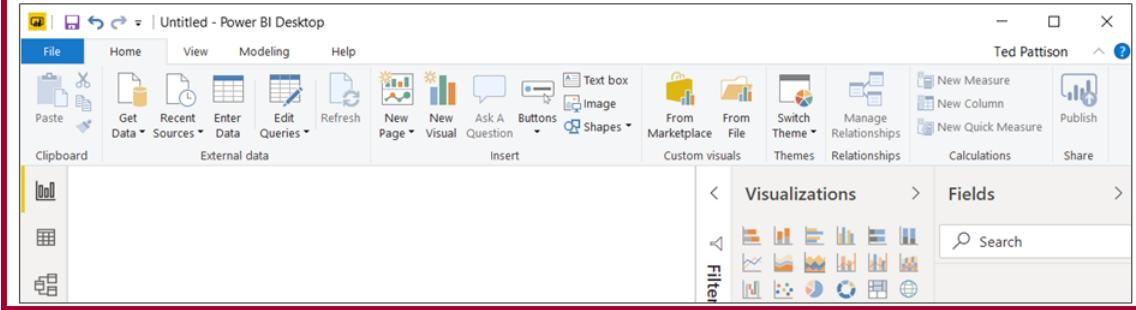
Of course, you can't use Power BI Desktop until you installed it on a computer running Windows. Fortunately, it can be downloaded and installed in less than a minute using a standard Internet connection. Just log into the Power BI service and select the **Power BI Desktop** option from the **Download** menu to begin the download and installation process.

We recommend installing Power BI Desktop on a computer or a virtual machine running a 64-bit version of either Windows 10 or Windows Server 2016. However, it is possible to install Power BI Desktop on older 32-bit versions of Windows all the way back to Windows 7 and Windows Server 2008 R2. The main advantage of using a 64-bit version of Windows over a 32-bit version is that you can load much larger datasets into memory and you can install and test Power BI Gateways which do not support 32-bit operating systems.

Power BI Desktop is built on top of .NET Framework version 4.5 which is automatically installed with recent versions of Windows. However, older versions of Windows might require you to download and install .NET Framework version 4.5 before you will be able to install Power BI Desktop.

## Working with Power BI Desktop

- Power BI Desktop is a Windows application
  - Work is saved and published in terms of PBIX projects
  - You can work on multiple projects at once
  - Each project runs in its own Power BI Desktop instance
  - Power BI Desktop can freeze up or act buggy
  - Quit & restart Power BI Desktop if it acts strangely



When you work with Power BI Desktop, all the work you do creating queries, modeling data and designing report is saved and published in terms of projects. For example, you might create one project for expense reporting and another project to create a mobile dashboard for sales analysis.

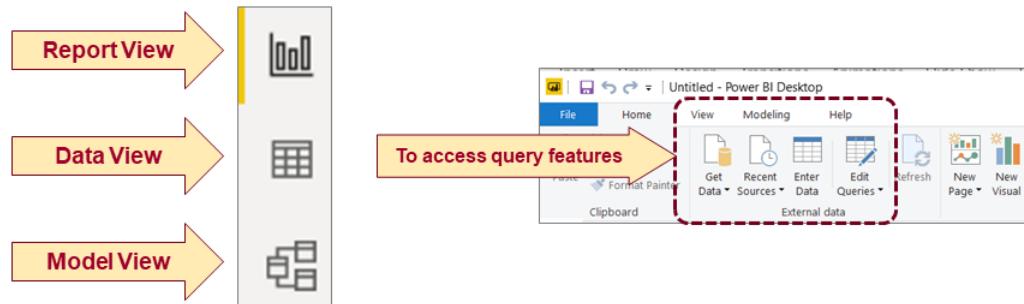
Power BI Desktop has commands to open projects and to create new project but it provides no command to close a project. For this reason, it's easy to start up several instances of Power BI Desktop at once by mistake which can become confusing. When you are done working on a project, you should quit that instance of Power BI Desktop to keep the number of running instances of Power BI Desktop to a minimum.

Power BI Desktop is a cutting-edge Windows application. There are many parts of it that you will absolutely love. But you must keep in mind that Power BI Desktop is an application that has very short release cycles and constantly introduces new preview features. It's not going to be as polished or as stable as some of your other favorite Windows applications.

There will likely be a time this week when you are cussing out Power BI Desktop because it's frozen up on you after you've done a bunch of design work without saving your changes. Other times Power BI Desktop might prompt you with dialog boxes that don't display correctly. If you think that Power BI Desktop is behaving strangely, save your work then shut it down and restart it. But don't let this get you down. We would have never gotten to the moon if we were too afraid to take risks.

## Getting Around in Power BI Desktop

- What do you need to learn to use Power BI Desktop?
  - Query features for importing data
  - Designing data model & writing DAX expressions
  - Designing reports with Power BI Desktop report designer
- Navigating between view modes

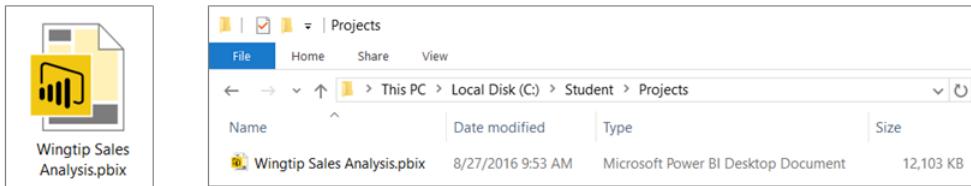


What do you need to learn to get up to speed on Power BI Desktop? There are three main areas to focus on at first which include creating queries, modeling data and designing reports. First, you must learn how to design queries which import data. The creation of queries is what allows you to create a base set of tables in the dataset for a Power BI Desktop project. Next, you must learn how to use the data modeling features so you can extend the project's dataset to create a rich data model with things like calculated columns, measures and hierarchies. After that, you must learn how to use the report designer in Power BI Desktop to present the data analysis for your project using tables and visual images and to provide the user with interactive capabilities.

You will use Power BI Desktop's main application window to model data and to design reports. The main application window provides a left navigation menu that allows you to switch back and forth between report view, data view and relationship view. When you need to create and design queries, you will do that in a separate Query Editor window which can be opened using one of the menu buttons in the ribbon of the main application window inside the **External Data** group on the **Home** tab.

## Projects and PBIX Files

- Power BI Desktop projects saved using PBIX files
  - PBIX file contains data source definitions
  - PBIX file contains query definitions
  - PBIX file contains data imported from queries
  - PBIX file contains exactly one data model definition
  - PBIX file contains exactly one report
  - PBIX file never contains data source credentials



Power BI Desktop projects are saved, loaded and published using PBIX files. A PBIX file is a ZIP archive created using the Open Packaging Convention format just like common Office documents such as DOCX files and XLSX files. The files for datasets that are stored inside and loaded from a PBIX file are managed internally by Power BI Desktop using Microsoft's xVelocity Tabular database engine.

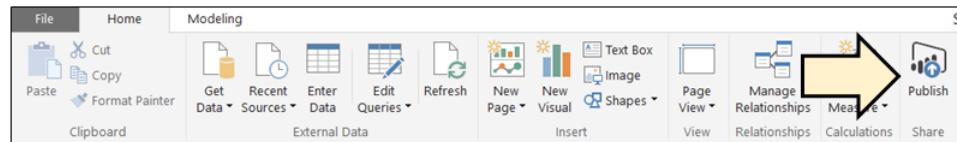
Each project created using Power BI Desktop is stored as a single PBIX file. Just about everything you create and configure when using Power BI Desktop is stored inside the PBIX file for one specific project. A PBIX file stores data source definitions and query definitions as well as tables of data which are populated and refreshed when queries are executed. A PBIX files also includes all the work you have done with data modeling and report design.

From a project management perspective, it's important to understand that a PBIX file represents a single project which contains exactly one dataset and exactly one report. You cannot add a second report to a Power BI Desktop project. However, you can add as many pages as you would like to a project's one and only report.

You should take note that Power BI Desktop will never store data source credentials in a PBIX file. For example, PBIX files never contain the user name and password required to access a secured resource such as a Online service or an on-premises SQL server database. Instead, Power BI Desktop provides the convenience of storing data source credentials in a local cache so you are not required to continually log into the same data source when working with Power BI Desktop. But these credentials are never published along with a PBIX file. After you publish a Power BI Desktop project by uploading its PBIX file, you will be required to configure data source credentials separately using the browser or by using some other automated technique.

## Publishing a Power BI Desktop Project

- Power BI Desktop provides **Publish** command
  - Used to publish project to Power BI service



- Requires logging into your Office 365 account



- Published articles added to target workspace

When you have completed designing the data model and report for a Power BI Desktop project, the next step is to publish it which effectively deploys your project to the Power BI service in the Microsoft cloud. You can execute the Publish command using the **Publish** command button in the ribbon or the **Publish** menu command in the **File** menu.

In order to publish a Power BI Desktop project, you must establish a login session from Power BI Desktop to the Power BI service. Once you have logged into the Power BI service using an Office 365 account with a Power BI license, you can then publish the project to your personal workspace or any group workspace in which you have editing permissions.

## Power BI Team Blog

- Power BI Team Blog is an Essential Resource  
<https://powerbi.microsoft.com/en-us/blog/>
- Be on the lookout for monthly updates

### Power BI Service and Mobile June Feature Summary

Announcements    Features    July 11, 2018 by Nikhil Gaekwad

The month of June flew by quickly for Power BI. With summer in the air and MBAS just around the corner, we are laser focused on planning another unforgettable conference for you in Seattle! There...



Microsoft typically applies monthly updates to the Power BI platform in the last week of each month. Microsoft has been consistent at synchronizing updates to Power BI service along with its updates to Power BI Desktop. That means that the tools are staying in sync with the underlying platform. Microsoft has also been very good about complimenting their monthly platform updates with a blog post which details which features have been added or updated.

The Power BI Team Blog is an essential resource for any professional working with the Power BI platform. This blog is accessible through the URL at <https://powerbi.microsoft.com/en-us/blog>. Anyone that wants to claim expertise with the Power BI platform should be proactive about reading the blog post for monthly updates as soon as it is posted.

## Power BI Community Forums

- Located at <https://community.powerbi.com/>
  - Great place to get answers to tough questions

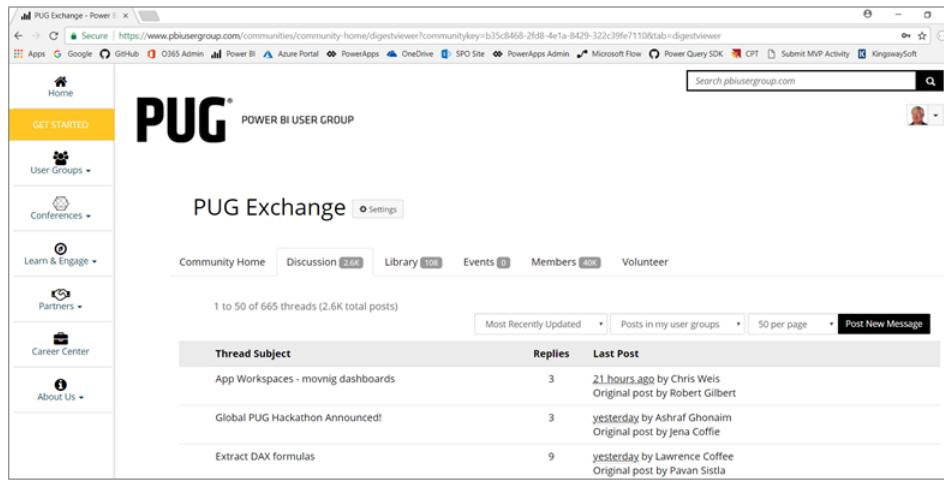
The screenshot shows a web browser window for the Microsoft Power BI Community forums. The address bar indicates a secure connection to <https://community.powerbi.com/>. The page header includes links for Microsoft, Power BI, Products, Solutions, Partners, and Learn. Below the header, a section titled "Forums (9 Items)" is displayed. Two forums are listed:

| TITLE  | POSTS  |
|--|--------|
| <b>Desktop</b><br>Data shaping, modeling, and report building in the Power BI Desktop app.<br>Latest Topic - the traditional cultures - the Roma                       | 174296 |
| <b>Service</b><br>Dashboards, reports, sharing, and everything else you do at app.powerbi.com.<br>Latest Topic - One dashboard multiple recipients with locked filt... | 38336  |

Microsoft maintains a very active set of technical forums focusing on Power BI at <https://community.powerbi.com/>. This is a great place to post tough questions and get quality answers from Microsoft Product Team members and Microsoft MVPs. It is worth your while to create an account in this community and explore the resources that are available.

## Power BI User Group (PUG)

- Located at <http://pbiusergroup.com/>
  - PUG Exchange is another place to get questions answered
  - Also let's you find and connect with local Power BI User Groups



The screenshot shows a web browser window for the PUG Exchange site. The URL in the address bar is https://www.pbiusergroup.com/communities/community-home/digestviewer?communitykey=b35cb468-26d9-4e1a-8429-322c39fe7110&tab=digestviewer. The page title is "PUG Exchange". On the left, there is a vertical navigation menu with options: Home, GET STARTED (highlighted), User Groups, Conferences, Learn & Engage, Partners, Career Center, and About Us. The main content area shows a forum interface with tabs for Community Home, Discussion (2.6K), Library (108), Events (0), Members (40K), and Volunteer. Below the tabs, it says "1 to 50 of 665 threads (2.6K total posts)". There are dropdown menus for "Most Recently Updated", "Posts in my user groups", and "50 per page", along with a "Post New Message" button. A table lists three threads:

| Thread Subject                     | Replies | Last Post   |
|------------------------------------|---------|---|
| App Workspaces - moving dashboards | 3       | 21 hours ago by Chris Weis<br>Original post by Robert Gilbert |
| Global PUG Hackathon Announced!    | 3       | yesterday by Ashraf Ghonaim<br>Original post by Jena Coffie   |
| Extract DAX formulas               | 9       | yesterday by Lawrence Coffee<br>Original post by Pavan Sistla |

The Power BI User group maintains a world-wide community site at <http://pbiusergroup.com/>. You can use this site to find or start up a local Power BI user group. There is also a valuable set of technical forum where you can get answers to questions especially those that involve Power BI integration with financial software such as Dynamics 365, Microsoft CRM, Navision, Axapta, Great Plains and Solomon.

# Module 01 Lab: Getting Up and Running with the Power BI Service

**Setup Time:** 60 minutes

**Lab Folder:** C:\Student\Modules\01\_IntroToPowerBI\Lab

**Overview:** You will begin this lab by creating a new Azure AD tenant with trial licenses for Office 365 E5 subscriptions. Note that the Office 365 E5 license includes a Power BI Pro license which is required to complete the lab exercise of this course. After that, you will get started with the Power BI Service creating a dataset, a report and a dashboard. In the final exercise you will ensure you have a recent version of Power BI Desktop.

## Exercise 1: Sign Up for an Office 365 E5 Trial

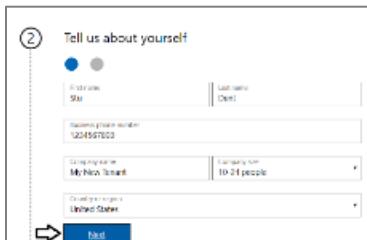
In this exercise you will create a new Azure AD trial tenant. This new Azure AD tenant will serve as your Power BI environment for publishing and deploying reports and dashboards.

1. Navigate to the Office 365 trial sign up web page.
  - a) Launch the Chrome browser.
  - b) Copy and paste the following URL into the address bar of the incognito window to navigate to the signup page.  
<https://go.microsoft.com/fwlink/?LinkId=698279&culture=en-US&country=US>
  - c) You should now see the form you need to fill out to create your new **Office 365 E5** trial.
  - d) Enter your email address and click **Next**.



If you enter an email address for an organization account, the form provides the option to sign in using your . Do not click the **Sign in** button because you don't want to sign with an existing organization account. The purpose of this exercise is to create a new organizational account in a new Microsoft 365 tenant.

- e) Click the Create a new account instead link.
- f) Enter your First name and Last name.
- g) Enter your mobile phone number as the **Business phone number**.
- h) Provides values for **Company size** and **Country or region** and click **Next**.



Whatever **Company name** you enter will be used as the name of the Azure AD tenant that will be created during the sign up process.

- i) When prompted to prove you're not a robot, select the **Text me** option and enter the Phone number of your mobile phone.
- j) Click **Send Verification Code**.

(2) Tell us about yourself

Prove. You're. Not. A. Robot.  
Enter a number that isn't VoIP or toll free.

Text me  Call me

Code (+1) 1234567890

We don't save this phone number or use it for any other purpose.

**Send Verification Code**

- k) Retrieve the access code from your mobile device and use it to complete the validation process.

Verification code  
951424

Didn't get it or need a new code? [Try again](#)

**Verify** Change my phone number

- l) In the **Create your business identity** step, locate the textbox into which you will enter a domain name.

(3) Create your business identity

To set up your account, you'll need a domain name. [What is a domain?](#)

You'll probably want a custom domain name for your business at some point. For now, choose a name for your domain using onmicrosoft.com

yourcompany .onmicrosoft.com

**Check availability** **Next**

Note that the company name you enter in this textbox will be used to create an Internet domain name for a new Microsoft 365 tenant. For example, if you were to enter a company name of **cptstudent**, it would result in the creation of a new Office 365 tenant within a domain of **cptstudent.onMicrosoft.com**. The user name you enter will be used to create the first user account which will be given global admin permissions throughout the Azure AD tenant. If you enter a user name of **Student**, then the email address as well as user principal name for this account will be **student@cptstudent.onMicrosoft.com**

- m) Enter a domain name for your new Microsoft 365 tenant.

yourcompany cptstudent .onmicrosoft.com

- n) If the domain name you enter is not available, modify the domain name until you can verify that it is available.
- o) Once you have created a domain name that is available, click **Next**.

yourcompany cptstudent .onmicrosoft.com

**cptstudent.onmicrosoft.com is available.**

**Check availability** **Next**

- p) Enter a **Name** for your user account, a **Password** that you will remember and then click **Sign up**.

Now create your user ID and password to sign in to your account.

Name: student @cptstudent.onmicrosoft.com

Password:  .....

Confirm password:  .....

By clicking Sign up, I agree to the [privacy statement](#), [default communication preferences](#) and the [trial agreement](#).

Microsoft Partners may contact me with information about their products, services, and events

**Sign up**

At this point, the Sign up process should begin to provision your new Microsoft 365 tenant and your new organizational account.

- q) Once the provision process completes, take note of your new **user ID** and click the **Go To Setup** button.

④ Get Office

Save this info. You'll need it later.

Sign-in page  
<https://www.office.com/>

Your user ID  
student@cptstudent.onmicrosoft.com

**Go to Setup**

You have just created a new Microsoft 365 tenant with a 30-day trial for 25 Office 365 E5 licenses. Note that some Microsoft cloud services within your new tenant such as the Microsoft 365 admin center, Power BI, PowerApps and Flow can be accessed immediately. Other Office 365 services such as SharePoint Online, OneDrive for Business and your Outlook mailbox will not be ready immediately and can take some time to provision.

- r) If you see the Personalize your sign-in and email setup page, click Exit and continue later.

Office 365 E5 Setup

Step 1 Personalize sign-in Step 2 Add users Step 3 Get apps Step 4 Connect domain

Personalize your sign-in and email

The domain you choose will become the part of your email address that comes after the @ symbol. You and your staff will use it to sign in and it's how customers will send you email.

• Connect a domain you already own.  
Enter the domain name you own. For example, yourcompany.com  
What's a domain and why do you need one?

• Continue using [student@onmicrosoft.com](mailto:student@onmicrosoft.com) for email and signing in.  
Why would you use this domain?

Next [Exit and continue later](#)

- s) You should now be located at the home page of the **Microsoft 365 admin center**.

Microsoft 365 admin center

Home Users Groups Billing Customize navigation Show all

My New Tenant Search users, groups, settings or tasks + Add card Dark mode What's new? The new admin center

Finish setting up Office 365 E5

Start by setting up your domain

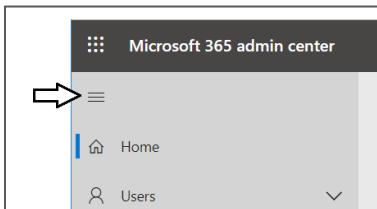
We'll help you set up a more professional domain name for your email addresses and website. It's best to do this as soon as possible to help you avoid repetitive work later like changing email addresses.

Go to setup Remind me later

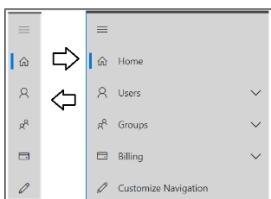
If you don't see the home page of the **Microsoft 365 admin center**, navigate to <https://admin.microsoft.com/Adminportal>.

2. Inspect the set of active users in the current Azure AD tenant.

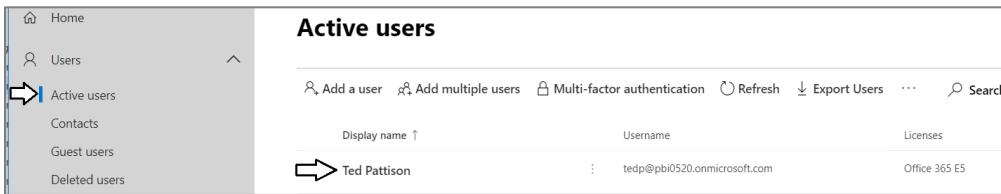
- a) Locate the top **Collapse navigation menu** with the hamburger icon just under the Microsoft 365 App Launcher menu.



- b) Toggle the **Collapse navigation menu** button to see how it collapses and expands the left navigation menu.



- c) Navigate to the **Active users** view where you should be able to verify that the user account you are currently logged in as is the only user account that exists in the current tenant.

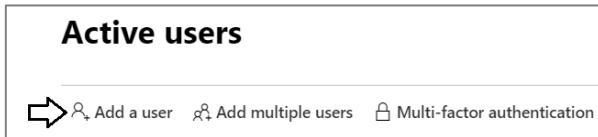


| Display name ↑ | Username                     | Licenses      |
|----------------|------------------------------|---------------|
| Ted Pattison   | tedp@pbio520.onmicrosoft.com | Office 365 E5 |

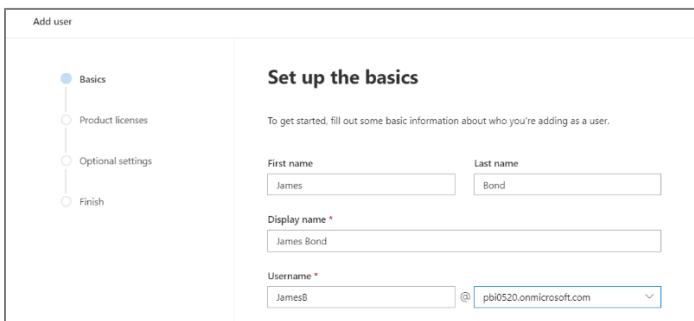
Remember that your account is global tenant administrator. You have permissions to configure any settings throughout the tenant.

3. Create a second Azure AD user account in your new Azure AD tenant.

- a) On the **Active Users** page, click the **Add a user** button to create a new user account



- b) Fill in the **Set up the basics** form with information for a new user account. When creating this account, you can use any name you would like. These lab instructions will demonstrate this by creating a user account for a person named **James Bond** with a user name and email of **JamesB@cptstudent.onmicrosoft.com**.



|            |           |
|------------|-----------|
| First name | Last name |
| James      | Bond      |

|                |
|----------------|
| Display name * |
| James Bond     |

|            |
|------------|
| Username * |
| JamesB     |

- c) Move below to the **Password settings** section.

- d) Select the option for Let me create the password.
- e) Enter a password of **pass@word1** into the textbox labeled **Password**.
- f) Uncheck the checkbox for the Require this user change their password when they first sign in option.
- g) Click **Next**.

>Password settings

Auto-generate password

Let me create the password

Password \*

\*\*\*\*\* Strong

Require this user to change their password when they first sign in

Send password in email upon completion

Next

- h) In the **Product licenses** section, make sure the **Office 365 E5** license is set to **On**.

Assign product licenses

Select location \*

United States

Licenses (1) \*

Assign user a product license

Office 365 E5 94 of 95 licenses available

Create user without product license (not recommended)

They may have limited or no access to Office 365 until you assign a product license.

Next

Note that the new account is usually assigned a trial license for **Office 365 E5** plan. However, it's a good practice to check and make sure the new user has been assigned a license for **Office 365 E5** which includes the **Power BI Pro** license.

- i) Click the **Next** button down below.
- j) On the Optional settings view, click Next.

Add user

Optional settings

Roles (User: no administration access)

Profile info

Next

- k) On the **Finish** view, Click the **Finish adding** button at the bottom to create the new user account.

You're almost done - review and finish adding

Assigned Settings

Display and username  
James Bond  
JamesB0nd@pb0520.onmicrosoft.com  
Edit

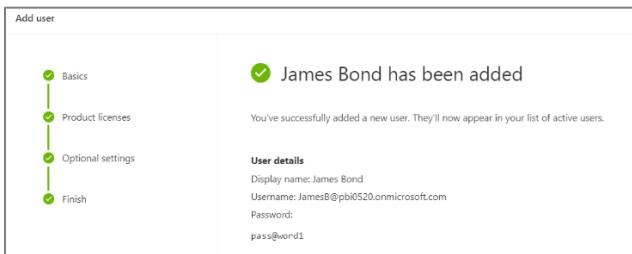
Password  
Type: Custom password  
Edit

Product licenses  
Office 365 E5  
Edit

Roles (default)  
User (no administrator access)  
Edit

Finish adding

- l) You should see the **Finish** view with a message indicating that the new user account has been created.



- m) Click the **Close** button at the bottom of the **Finish** view to close the **Add User** pane on the right.
- n) Verify that the new user account has been created and is displayed along with your primary Office 365 user account.

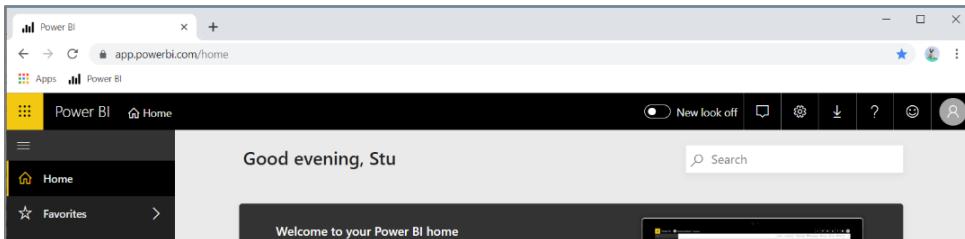
Now you have a secondary user account that does not have any administrative permissions. It's important that you test reports, dashboards and apps with standard user accounts to ensure your application doesn't require users with special permissions.

## Exercise 2: Use the Power BI Service to Import a New Dataset

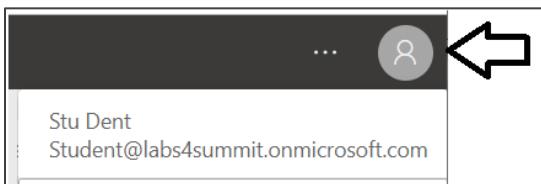
In this exercise you will begin by importing data from an Excel workbook to create a new Power BI dataset. In the exercise steps that follow, you will create a report and a dashboard.

1. Log into the Power BI Service with your new organizational account.

- a) Navigate the Power BI portal at <https://app.powerbi.com> and if prompted, log in using your new organizational account.



- b) Drop down the User login menu in the top right corner of the screen and make sure you are logged with the new user account you just created and that you are not logged on using pre-existing user account such as your work account.

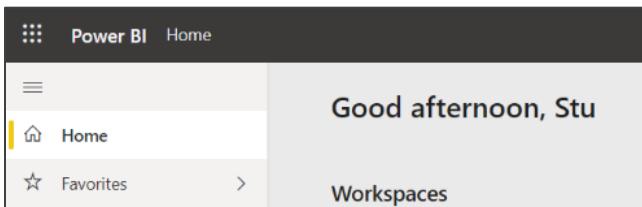


- c) Locate the **New look** toggle and switch it from **New look off** to **New look on**.

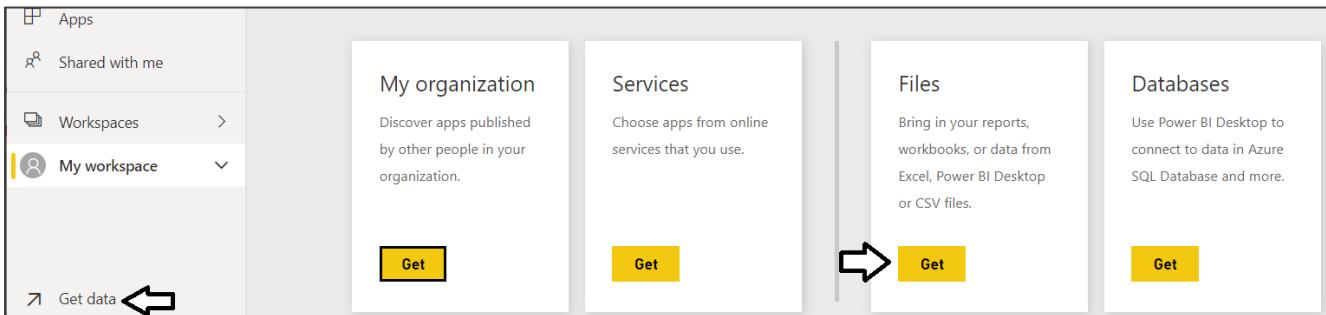


- d) Click the **Dismiss** button to remove the **Welcome to your Power BI home** panel.

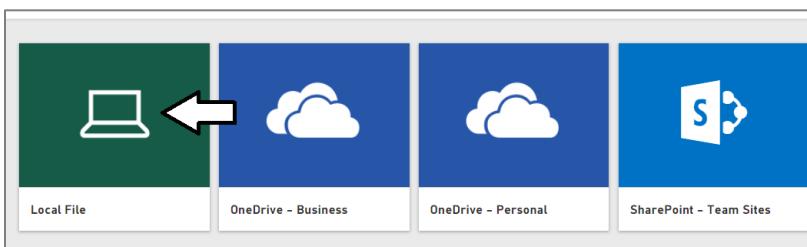




- b) Click the **Get data** link in the bottom left corner of the page
- c) Click in the **Get** button in the **Files** tile under the **Import or Connect to Data** section header.



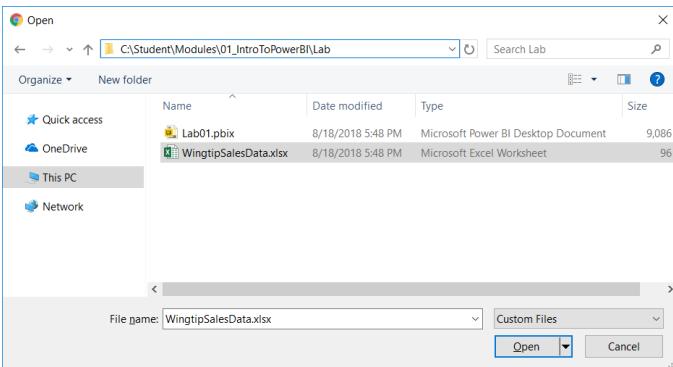
- d) On the next page you should see several tiles which indicate your choices for the location of the file you would like to connect to or import. Click on the tile with the caption **OneDrive – Business** so you can import data from the Excel workbook you uploaded to your OneDrive site in a previous exercise.



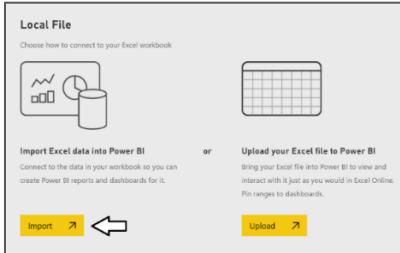
- e) In the File Open dialog, select the Excel workbook named **WingtipSalesData.xlsx** at the following path.

**C:\Student\Modules\01\_IntroToPowerBI\Lab\wingtipSalesData.xlsx**

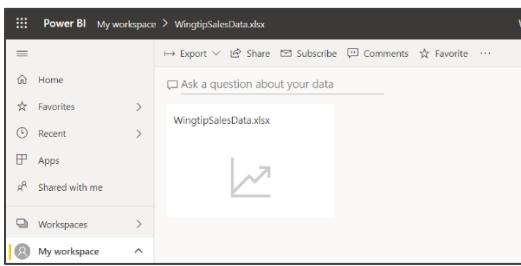
- f) Once you have selected the workbook file named **WingtipSalesData.xlsx** in the open dialog, click the **Open** button to begin the process of importing the data to create a new dataset.



- g) After clicking the **Open** button in the previous step, you are taken to a page which prompts you to **Choose how to connect to your Excel workbook**. Click the **Import** button on the bottom left-hand side of the page to import data from the Excel workbook into the Power BI service to create a new dataset.

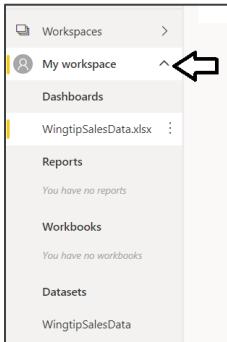


- h) After the import process has completed, the Power BI service will display a dashboard that was created during the import of the file **WingtipSalesData.xlsx**.

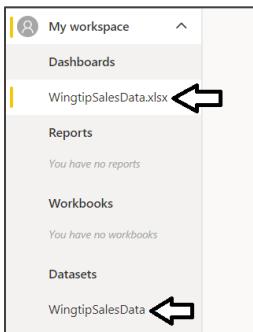


4. If it's not already expanded, expand the **My Workspace** menu at the bottom of the left navigation menu.

- a) Click the **My Workspace** drop down menu at the bottom of the left navigation menu to see the workspace contents.



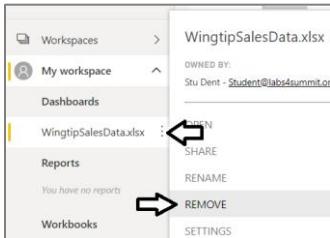
- b) You should see there is a dashboard named **WingtipSalesData.xlsx** and a dataset named **WingtipSalesData**.



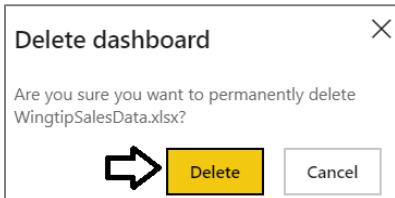
Note that when importing data from an Excel workbook that the Power BI service creates both a new dataset and a new dashboard. However, you might want just the dataset but not the dashboard. You should delete the dashboard if you do not plan to use it.

5. Delete the dashboard named **WingtipSalesData.xlsx**.

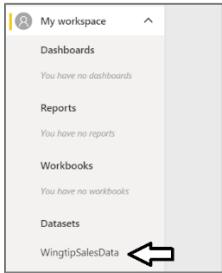
- a) Expand the ellipse menu to the right of the **WingtipSalesData.xlsx** dashboard and selecting the **REMOVE** command.



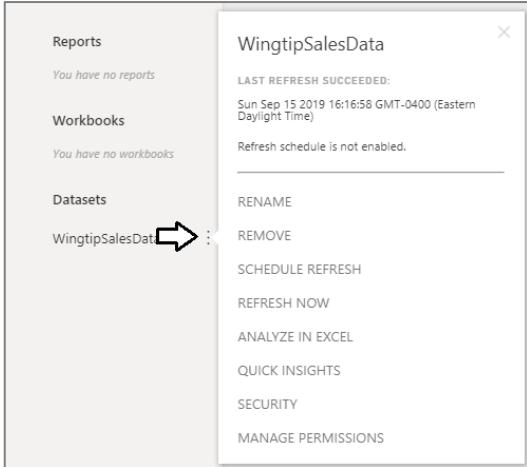
- b) When prompted, confirm you want to delete this dashboard.



- c) Your personal workspace now contains the **WingtipSalesData** dataset but there should not be any dashboards or reports.



6. Expand the dataset flyout menu to the right of the **WingtipSalesData** dataset link just to see what menu commands are available from you to run on the new dataset you have just created.



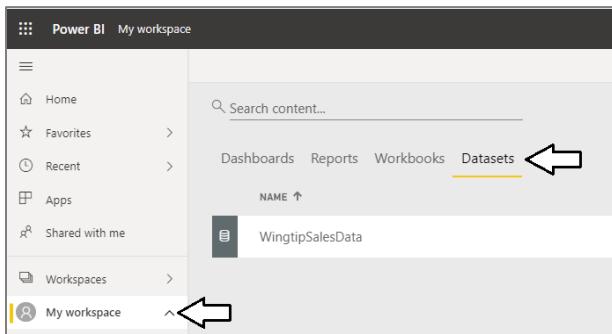
Currently, there's no need to execute any of the commands in the dataset menu. You should just observe the commands available on an imported dataset. You can see the commands including **RENAME**, **REMOVE**, **SCHEDULE REFRESH**, **REFRESH NOW**, **ANALYZE IN EXCEL**, **QUICK INSIGHTS**, **SECURITY**, **MANAGE PERMISSIONS**.

### Exercise 3: Create a New Power BI Report

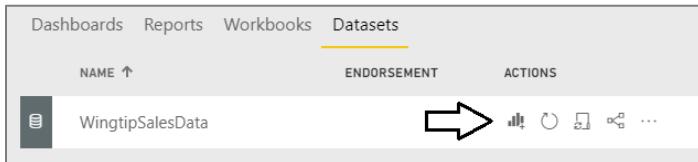
Now that you have created a dataset, the next setup step involves creating a new report with two pages of visualizations.

1. Create a new report using the **WingtipSalesData** dataset.

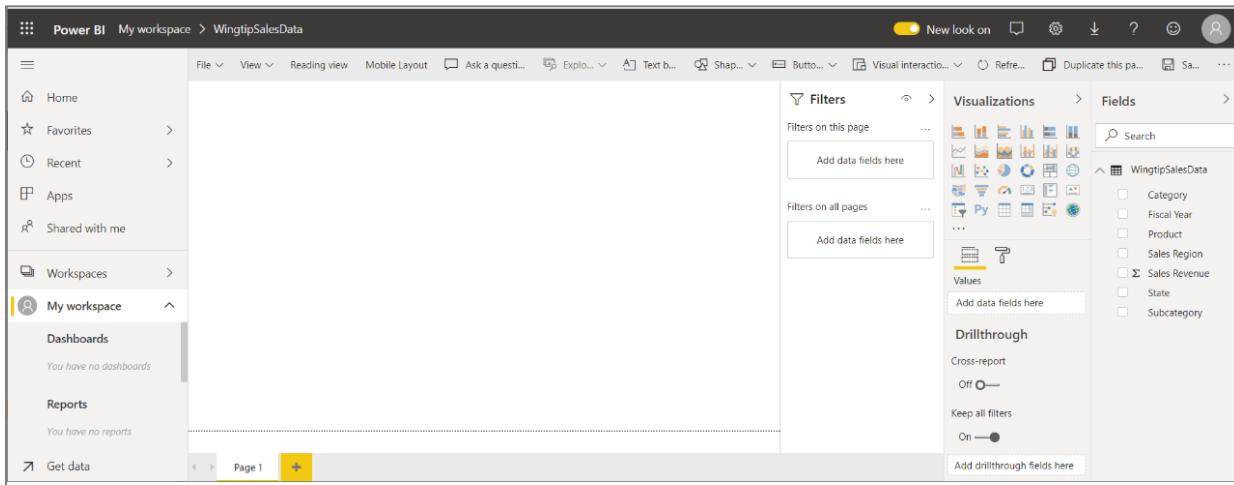
- a) Click the **My Workspace** menu link in the left navigation and to display the summary page for your personal workspace. After you do this, click the **Datasets** link so your screen matches the following screenshot.



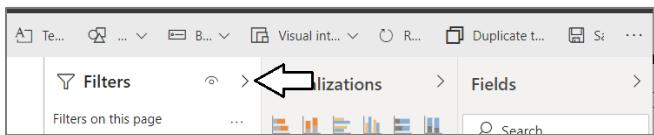
- b) Locate the dataset named **WingtipSalesData** and click the **Create Report** button to the right.



- c) You should now see a new report in edit view with the **Fields** list on the right-hand side of the page.



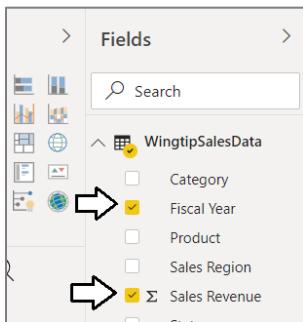
- d) Click the button at the top right corner of the **Filter** pane to collapse it.



There are so many great features in Power BI like the new Filter pane. However, you often have to close the panes for various features because there will not be much room left over for the report designer where you will be doing your work.

2. Add a new visual to the report to create a line chart.

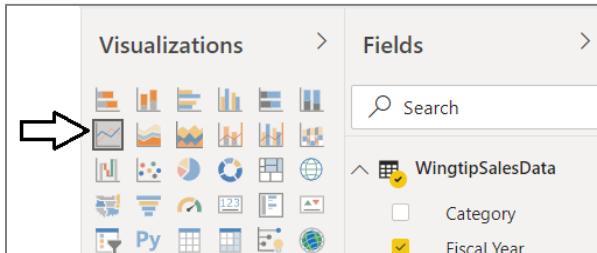
- a) In the **Fields** list on the right-hand side of the page, click the checkbox beside **Fiscal Year** and then select the checkbox beside **Sales Revenue**.



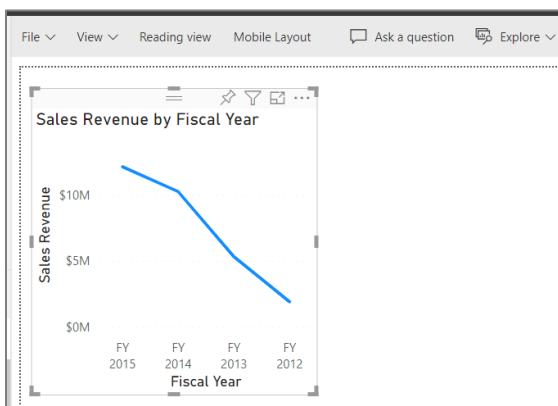
- b) This should create a table visual in the new report as shown in the following screenshot.

| Fiscal Year  | Sales Revenue          |
|--------------|------------------------|
| FY 2012      | \$1,943,986.21         |
| FY 2013      | \$5,356,177.07         |
| FY 2014      | \$10,274,250.63        |
| FY 2015      | \$12,156,103.23        |
| <b>Total</b> | <b>\$29,730,517.14</b> |

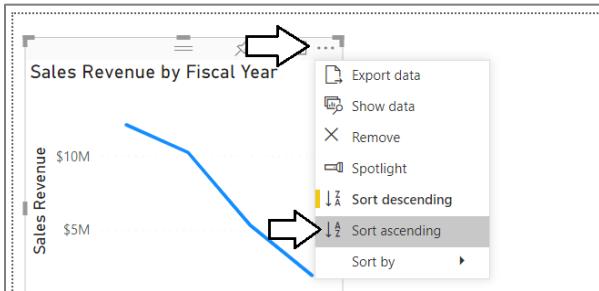
- c) Change the visual type from a table to a line chart by clicking the **Line chart** button in the **Visualizations** list.



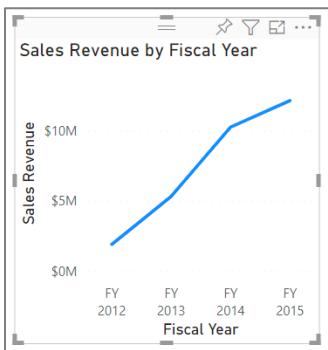
- d) At this point, you should see that the visual on the report now displays a line chart.



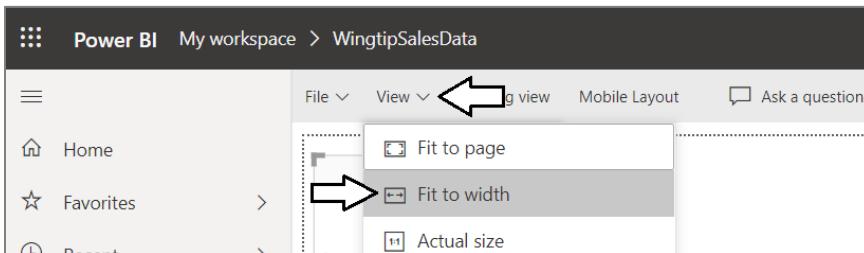
- e) Drop down the ellipse menu in the top right corner of the visual and select the **Sort Ascending** menu command.



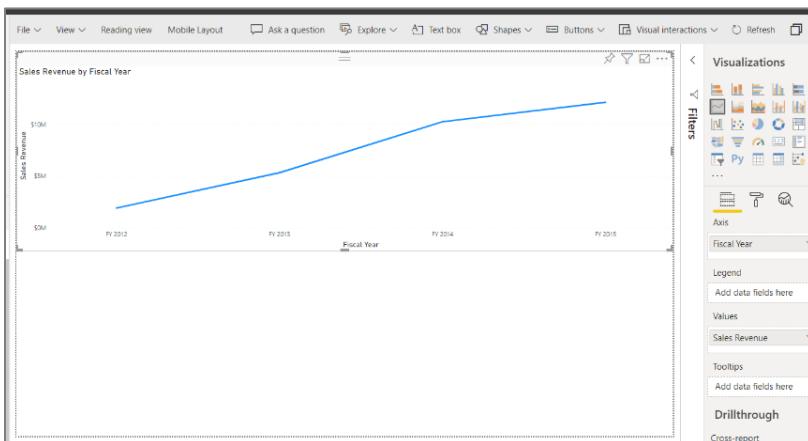
- f) The year values in the X axis should now increase as you move to the left.



- g) Select the **Fit to width** command from the report **View** menu to see the entire width of the report in the report designer.



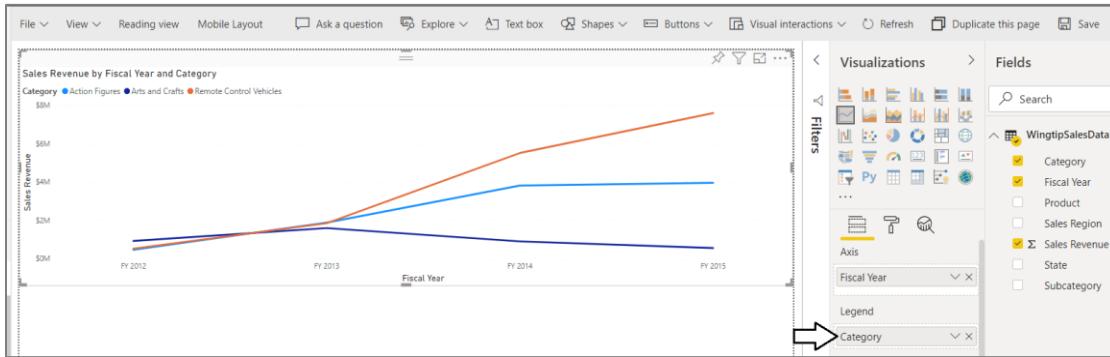
- h) Select the handle at the bottom-right corner of the visualization and resize it so it takes up the width of the current report page.



Next, you will add a new dimension to your visual to show how sales revenue is distributed across product categories.

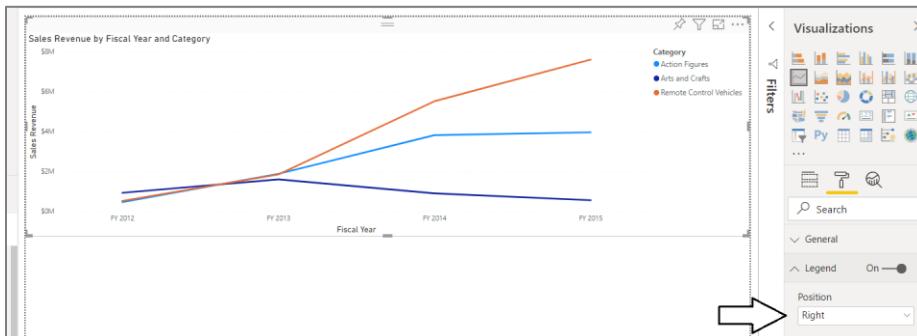
3. Extend the line chart to break out sales revenue by product category.

- Make sure the visual with the line chart is selected and then drag-and-drop the **Category** field from the **Fields** list into the **Legend** well in the **Visualizations** pane as shown in the following screenshot.

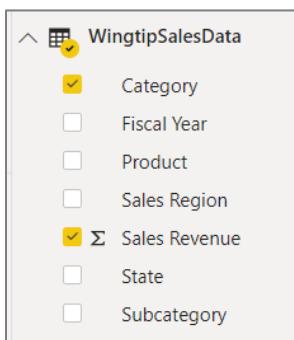


At this point, your visual should match the line chart shown in the following screenshot.

- Reposition the Line chart's legend.
- Make sure the visual with the Line chart is selected.
- In the **Visualizations** pane, click the pen icon to activate the **Format** properties pane.
- In the **Legend** section, locate the **Position** property and update it to **Right**.
- The legend should now be displayed in the upper right corner of the line chart visual.



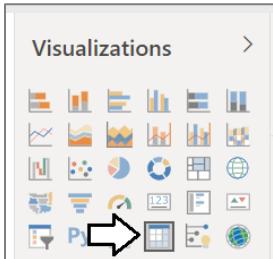
- Add a second visualization to the current report page.
- Begin by clicking the white space under the line chart visualization so that the visualization is no longer selected.
- Return to the **Fields** list.
- Select the checkbox beside the **Category** field.
- Select the checkbox beside the **Sales Revenue** field.



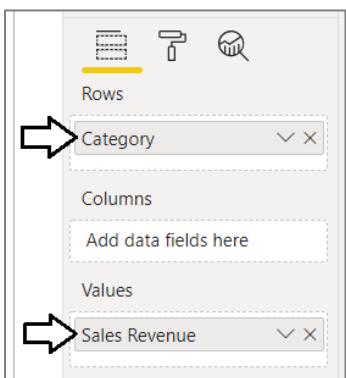
- You should see that a new table visual has been created like the table visual shown in the following screenshot.

| Category                | Sales Revenue   |
|-------------------------|-----------------|
| Action Figures          | \$10,166,652.50 |
| Arts and Crafts         | \$4,023,339.29  |
| Remote Control Vehicles | \$15,540,525.35 |
| Total                   | \$29,730,517.14 |

- f) Change the type of visualization from table to matrix by clicking the **Matrix** button in the **Visualizations** list.



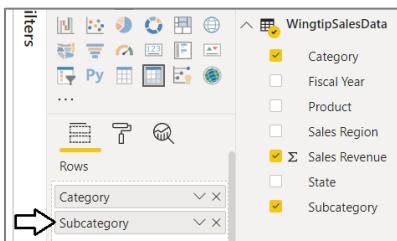
- g) If you examine the **Fields** pane under the **Visualizations** list, you should see that the **Rows** well contains the **Category** field while the **Values** well contains the **Sales Revenue** field.



- h) At this point your matrix visual should look like the following screenshot.

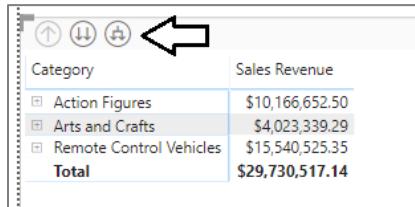
| Category                | Sales Revenue   |
|-------------------------|-----------------|
| Action Figures          | \$10,166,652.50 |
| Arts and Crafts         | \$4,023,339.29  |
| Remote Control Vehicles | \$15,540,525.35 |
| Total                   | \$29,730,517.14 |

- i) Drag and drop the **Subcategory** field from the **Fields** list into the **Rows** well below the **Category** field.



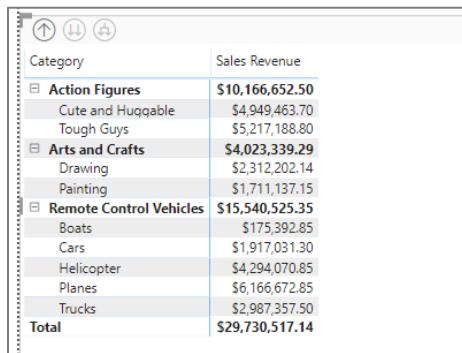
Once you have two or more fields to the **Rows** well of a matrix visual, a new set of button appear at the top of the visual which makes it possible to expand the levels of rows which are displayed.

- j) Click on the **Expand All One Level** button so the matrix shows subcategories in addition to categories.



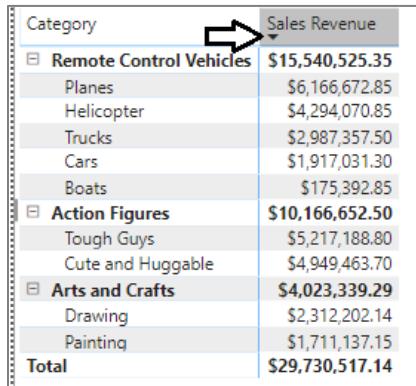
| Category                | Sales Revenue          |
|-------------------------|------------------------|
| Action Figures          | \$10,166,652.50        |
| Arts and Crafts         | \$4,023,339.29         |
| Remote Control Vehicles | \$15,540,525.35        |
| <b>Total</b>            | <b>\$29,730,517.14</b> |

- k) The matrix in your report should now appear like the matrix shown in the following screenshot.



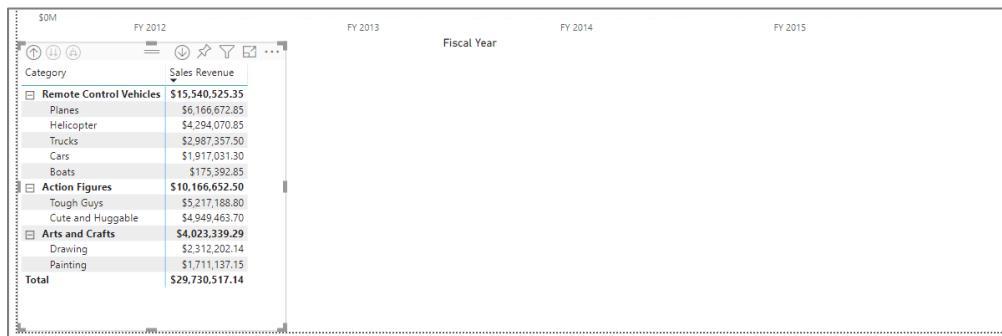
| Category                | Sales Revenue   |
|-------------------------|-----------------|
| Action Figures          | \$10,166,652.50 |
| Cute and Huggable       | \$4,949,463.70  |
| Tough Guys              | \$5,217,188.80  |
| Arts and Crafts         | \$4,023,339.29  |
| Drawing                 | \$2,312,202.14  |
| Painting                | \$1,711,137.15  |
| Remote Control Vehicles | \$15,540,525.35 |
| Boats                   | \$175,392.85    |
| Cars                    | \$1,917,031.30  |
| Helicopter              | \$4,294,070.85  |
| Planes                  | \$6,166,672.85  |
| Trucks                  | \$2,987,357.50  |
| Total                   | \$29,730,517.14 |

- l) Inside the matrix, click on the **Sales Revenue** column header to resort the data in the matrix so that the product categories and subcategories with the highest amounts of sales revenue are sorted to the top of the matrix.



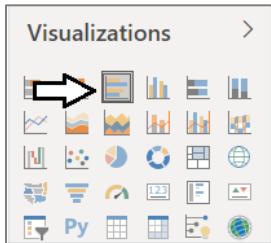
| Category                | Sales Revenue   |
|-------------------------|-----------------|
| Remote Control Vehicles | \$15,540,525.35 |
| Planes                  | \$6,166,672.85  |
| Helicopter              | \$4,294,070.85  |
| Trucks                  | \$2,987,357.50  |
| Cars                    | \$1,917,031.30  |
| Boats                   | \$175,392.85    |
| Action Figures          | \$10,166,652.50 |
| Tough Guys              | \$5,217,188.80  |
| Cute and Huggable       | \$4,949,463.70  |
| Arts and Crafts         | \$4,023,339.29  |
| Drawing                 | \$2,312,202.14  |
| Painting                | \$1,711,137.15  |
| Total                   | \$29,730,517.14 |

- m) Using the mouse, decrease the width of the matrix visual show it is just wide enough to display its two columns.

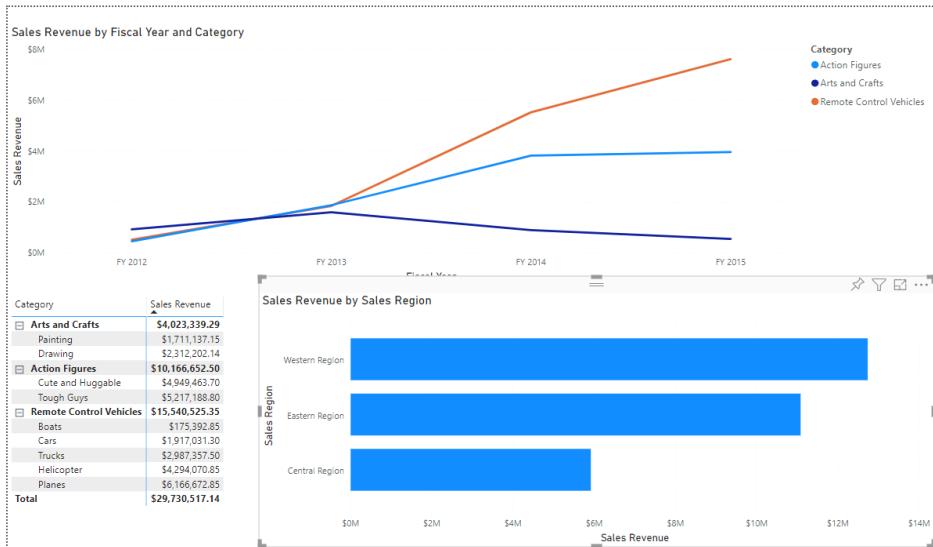


6. Add a third visual to the current report page.

- Click the white space on the report page outside of the two existing visuals so that neither visual is selected.
- Return to the **Fields** list and select the checkbox beside the **Sales Region** field.
- Select the checkbox beside the **Sales Revenue** field.
- After creating the new visual, change the visualization type to a to a **Clustered bar chart** using the **Visualizations** list.

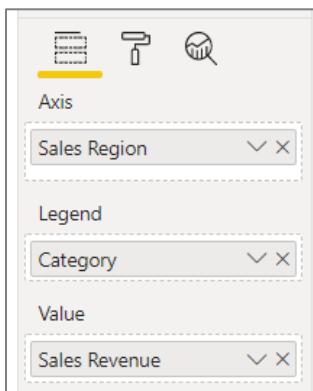


- The new visual should be created to take up the remaining lower, right-hand section of the page.

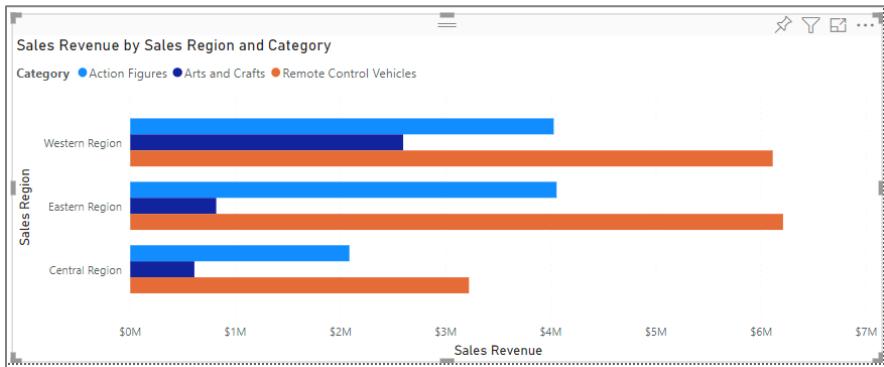


Next, you will add a legend to the Clustered bar chart to visualize how revenue breaks down across product categories.

- Make sure the **Clustered bar chart** visual is selected.
- Navigate to the Field pane for the new **Clustered bar chart**.
- Drag the **Category** field from the **Fields** list into the **Legend** well in the **Field properties** pane.



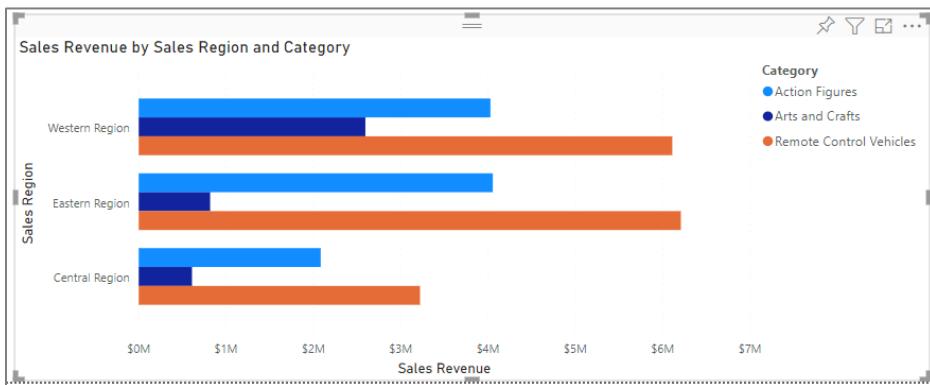
- i) You should now see revenue for each sales region is further broken out by product category.



- j) Modify the position of the legend for the Clustered bar chart to the right.



- k) Your Clustered bar chart should now look like the one in the following screenshot.



If you have time, you might explore the other options available for editing the appearance of a visualization by examining the other options that are available on the **Visualizations** task pane when a visual is selected. Note that the set of available options change depending on what type of visual is selected.

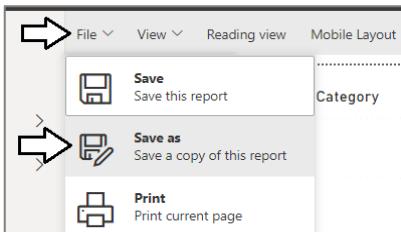
7. Now it is time to save the report. Begin by changing the name of the current page. Locate the report page name section at the bottom left of the current page and observe that the page has been given an initial name of **Page 1**.



8. Double click on the page name of **Page 1** to enter edit mode and then update the page name to **Sales by Product Category**.



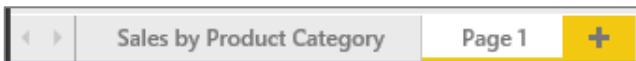
9. Save the report by dropping down the **File** menu and selecting the **Save As** menu command.



10. When prompted, enter a report name of **Product Sales** and click the **Save** button.



11. After saving the **Product Sales** report, you should be able to see a link for it in the **Reports** section of the left-hand navigation.  
12. Now, add a second page to the **Product Sales** report. Accomplish this by clicking the button with the plus (+) sign to the right of the page name. The Power BI service will respond by creating a second page named **Page 1**.



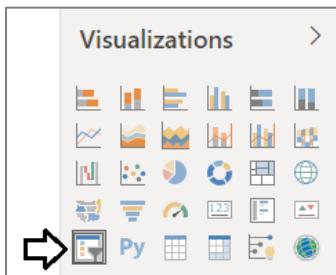
13. Change the name of the second page from **Page 1** to **Sales by Product..**



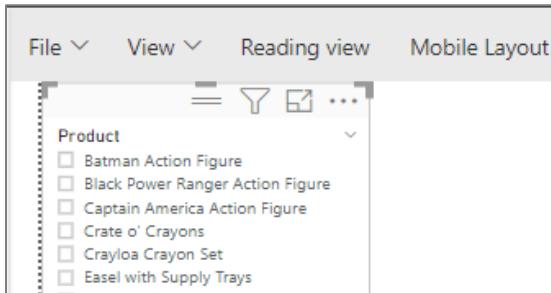
14. On the new **Sales by Product** page, add a new slicer visual  
a) Add a new table visual by selecting the checkbox beside the **Product** field from the **Fields** list.  
b) Resize the height of the table visual to the entire height of the report to display all products at once without a scrollbar.

A screenshot of the Power BI service interface on the 'Sales by Product' page. The left pane shows a list of products. The right pane contains a 'Fields' list with 'WingtipSalesData' expanded, showing fields like Category, Fiscal Year, Product (which is checked), Sales Region, Sales Revenue, State, and Subcategory. A 'Visualizations' list is also present. In the center, there is a table visual showing product data. The table has a single row with many columns, representing all products. The height of the table is adjusted to fit the page.

- c) Change the type of visualization from a table to a slicer by clicking the **Slicer** button in the **Visualizations** list.



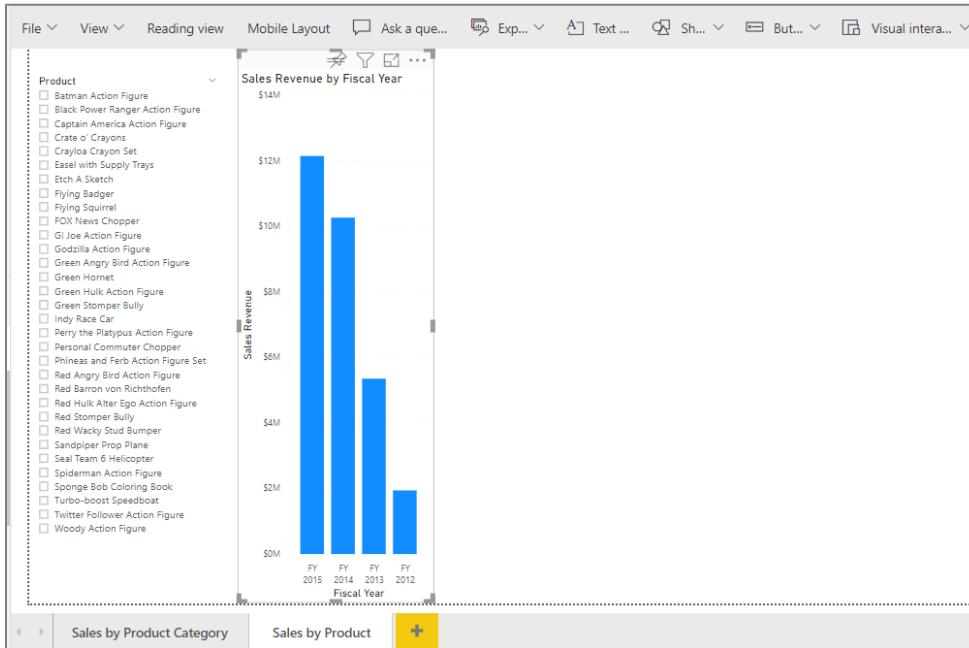
- d) Now that the visualization has been changed to a slicer, you should see that each product has an associated checkbox.



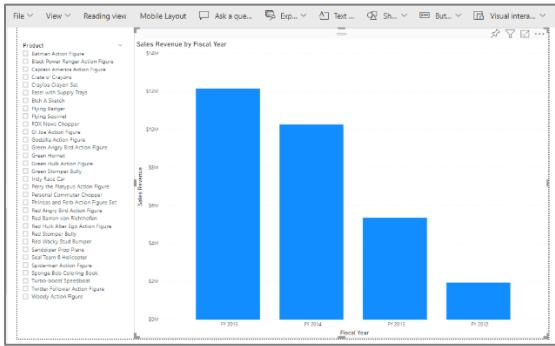
Keep in mind that this slicer visual adds the ability for the current user to interact with this report by selecting one or more products using these checkboxes. When a user changes the selection of products, the Power BI service will automatically refresh the other visualizations on the page by filtering the results using the selected product or products. Learning how to make reports interactive is a key to creating effective BI solutions with Power BI.

15. Add a second visualization to **Sales by Product** page.

- Click whitespace in the report to ensure the first visualization is not selected.
- Create a new visualization by selecting the checkbox for the **Sales Revenue** field and then selecting the **Fiscal Year** field.
- The new visual should appear as a clustered column which should match the following screenshot.

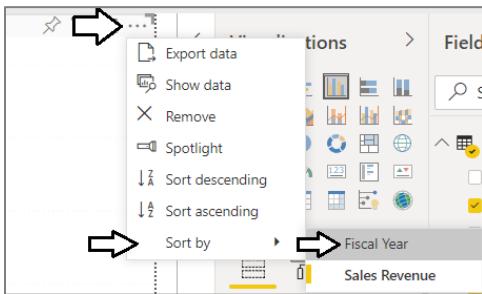


- d) Resize the bar chart visual to take up the entire page height and the remaining width as shown in the following screenshot.



Note that the bar chart has been created with the fiscal years decreasing as it moves from left to right. In the next step you will reverse the order of the columns in this bar chart so that columns for earlier years are sorted to the left and that later years are sorted right.

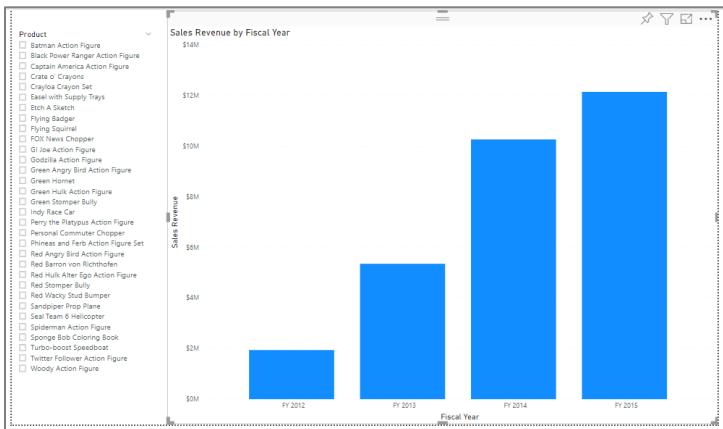
- e) Click the flyout menu at the top-right corner of the bar chart visual and select the **Sort by > Fiscal Year** menu command.



- f) Click the flyout menu at the top-right corner of the bar chart visual and select the **Sort Ascending** menu command.

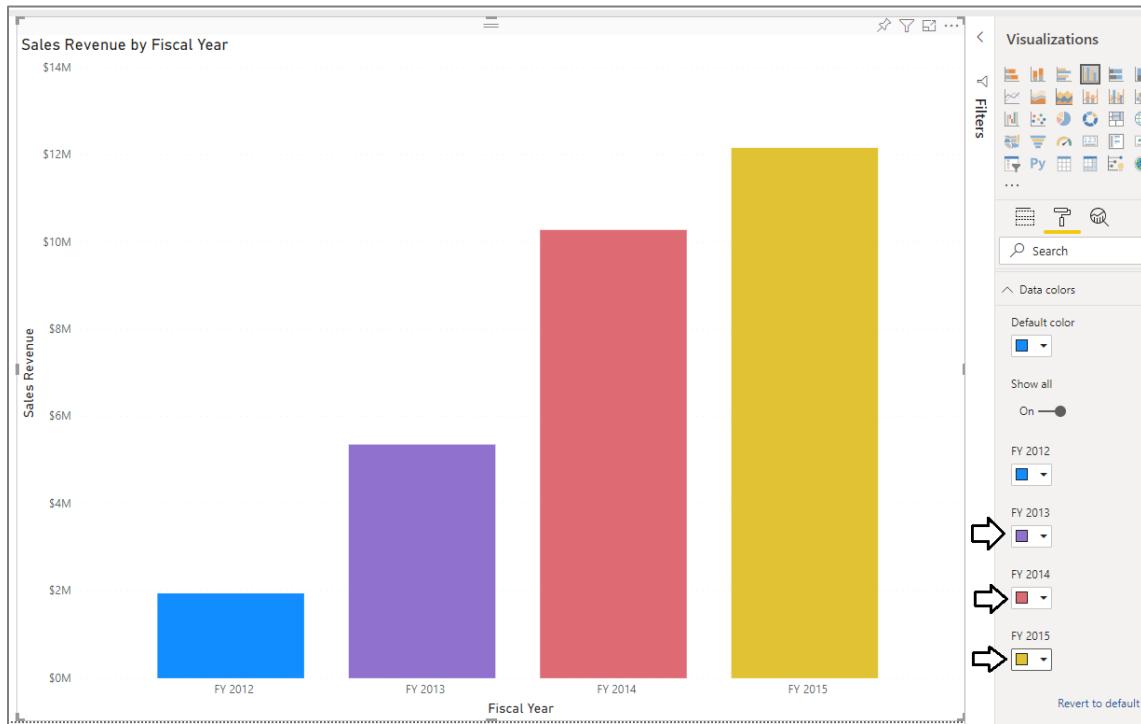


- g) The bar chart should now display its bars with fiscal year increasing as you move to the right.

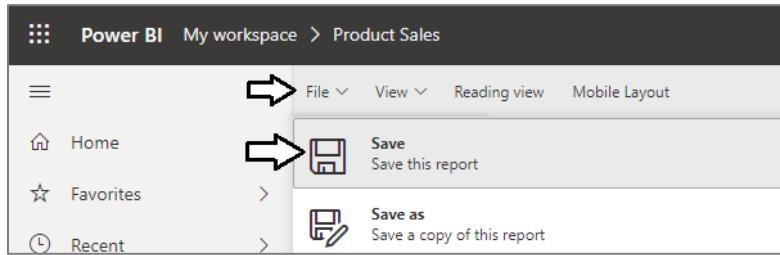


- h) With the bar chart selected, look inside the **Format** properties pane and locate the **Data colors** section. Inside the **Data colors** section, you should see that the **Show all** property is set to **Off**.
- i) Change the **Show all** property to **On**.

- j) Assign a different color to each of the 4 fiscal years.
- k) Your bar chart should now display bars that have a different color for each year.

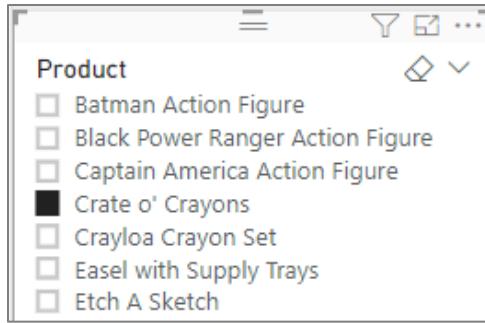


- l) Save your work by executing the **Save** command from the **File** menu.

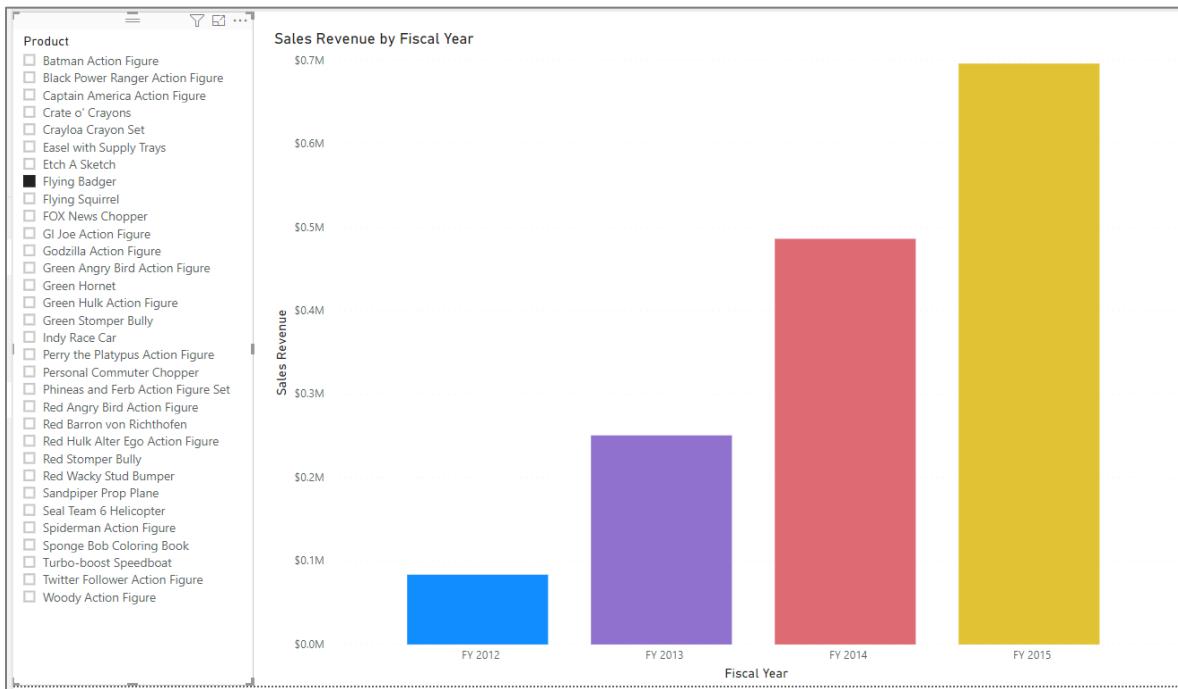


16. Test out the interactive effect of selecting products in the slicer.

- a) Select one product at a time.

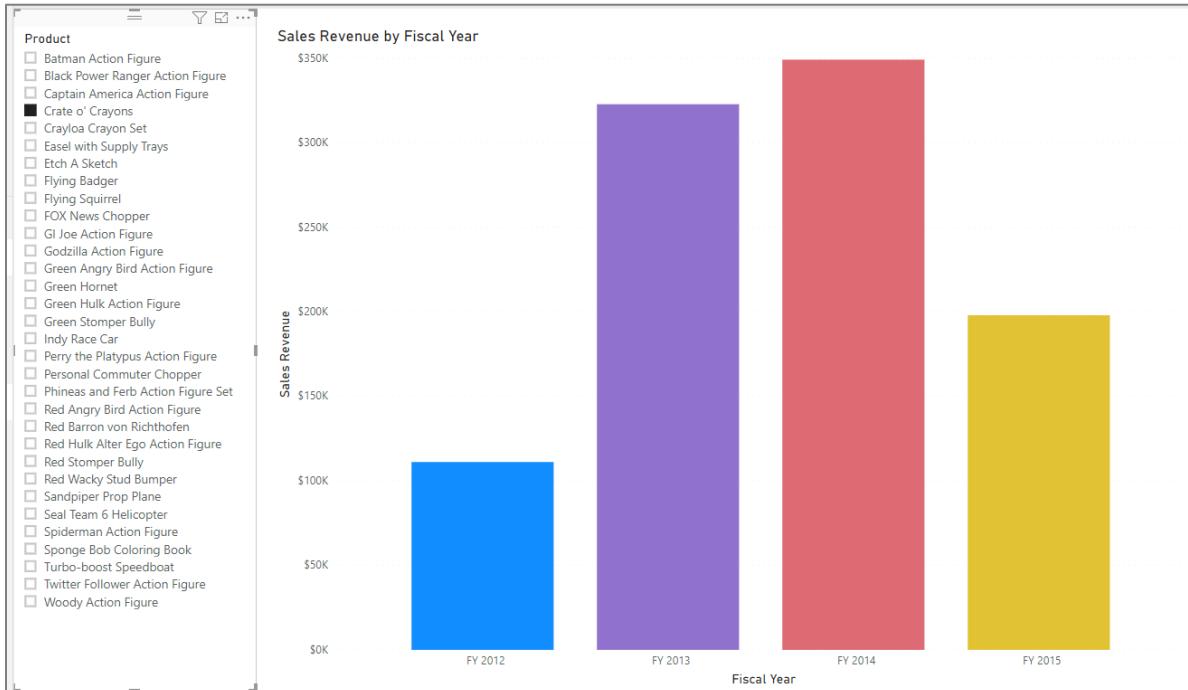


- b) Observe how the column chart automatically refreshes to show sales data for one product at a time.



Play the role of a business analyst and determine which products have the most positive increases in sales revenue from year to year. Also, find the products with downward trending sales. If you examine the sales data for the **Crate o' Crayons**, you can see that sales revenue for this product is trending in the wrong direction over the last four years.

- c) What other products are shows decreasing sales in this set of 32 products?

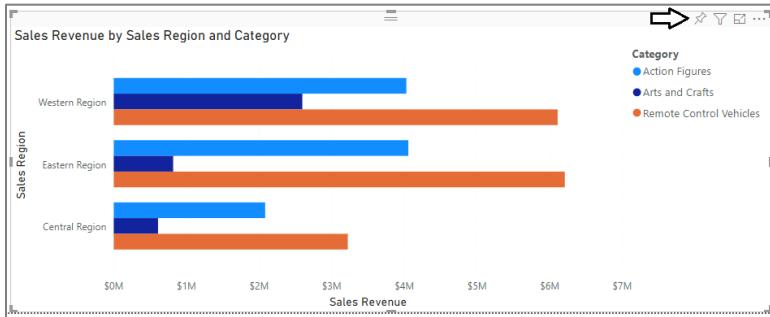


Now that you've created a report with multiple pages, it is time to create a new dashboard.

## Exercise 4: Create a Power BI Dashboard

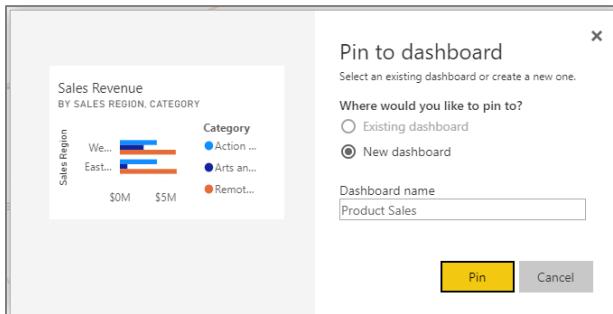
While you have already created a dataset and a report, you will now create a dashboard.

1. Create a new dashboard by pinning report visuals to create dashboard tiles.
  - a) Navigate to the Sales by Product Category page of the Product Sales report.
  - b) Inspect the Clustered bar chart with product categories.
  - c) Locate and click the button with the thumbtack icon which is used to pin a report visualization to a dashboard.

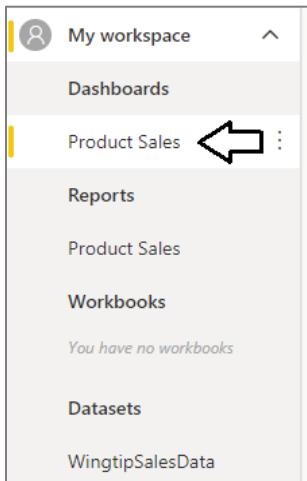


When you click the thumbtack, you will be prompted with the **Pin to dashboard** dialog which asks where to pin the visualization.

- d) In the **Pin to dashboard** dialog, select the option to pin the visualization to a **New Dashboard**.
- e) Give the new dashboard a name of **Product Sales**.
- f) When the **Pin to Dashboard** form is filled out like the one shown in the following screenshot, click the **Pin** button.

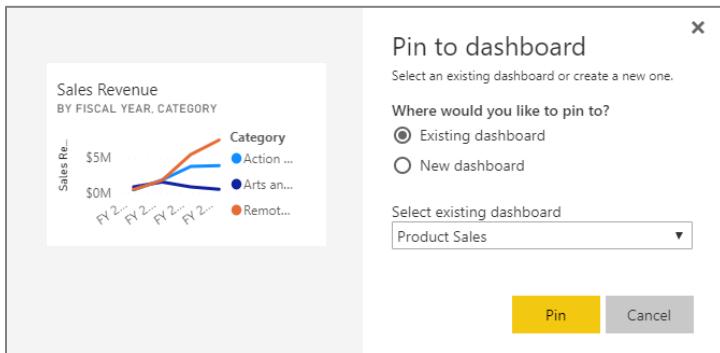


- g) At this point, the new **Product Sales** dashboard should be created and a link to it should appear in the left navigation menu.



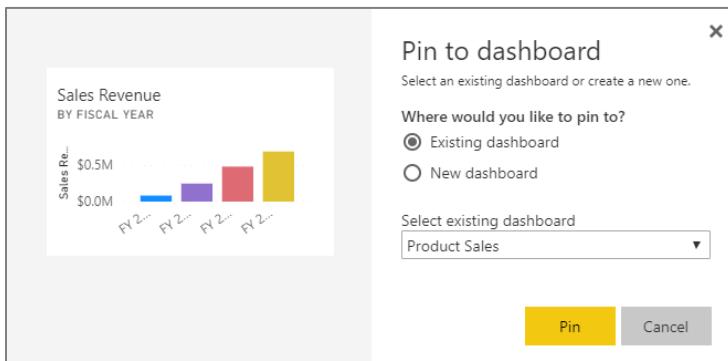
2. Pin another report visual to create a second dashboard tile.

- Make sure you are still on the **Sales by Product Category** page of the **Product Sales** report.
- Click the thumbtack button on the line chart visual to create a second dashboard tile in the Product Sales dashboard.



3. Pin another report visual to create a third dashboard tile.

- Navigate to the **Sales by Product** page of **Product Sales** report.
- Click the thumbtack button on the bar chart visual to create a third dashboard tile in the **Product Sales** dashboard.



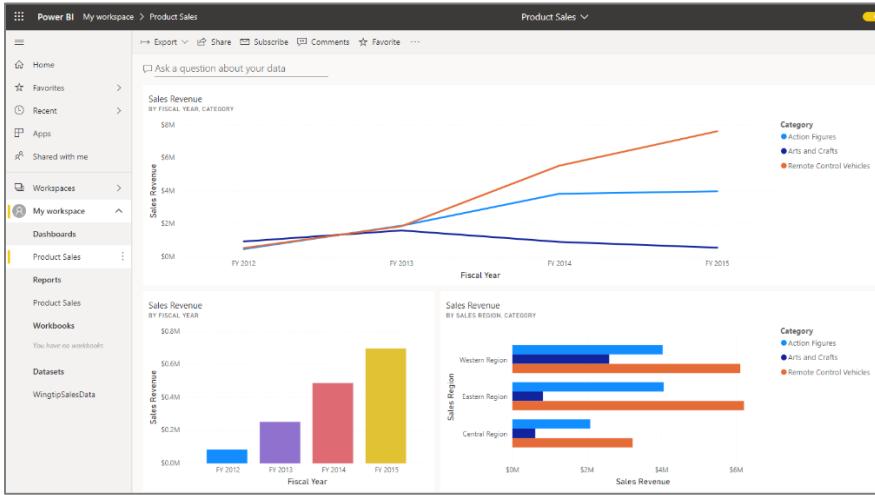
4. Inspect the new **Product Sales** dashboard.

- Click on the **Product Sales** link in the **Dashboards** section of the left navigation to display the **Product Sales** dashboard.
- You should see that there are three tiles that have been created from the three report visualizations that you pinned.



Note that you can move or resize the tiles inside the dashboard because the dashboard is always in edit mode.

- c) Use your mouse to rearrange the tiles in the dashboard to match the screenshot below.



5. Experiment by clicking on the tiles in the dashboard.

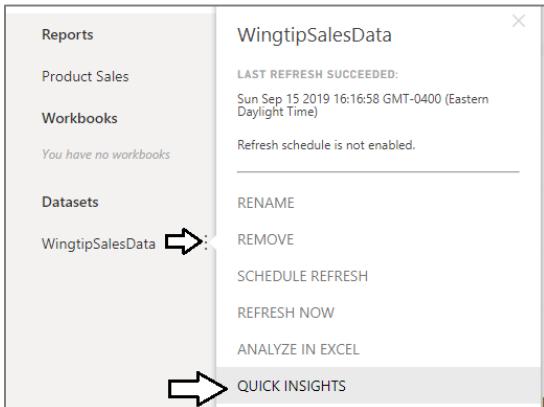
- a) You will find that clicking a tile will navigate the user to the report and page that contains the visualization that was pinned.

## Exercise 5: Get Quick Insights on a Power BI Dataset

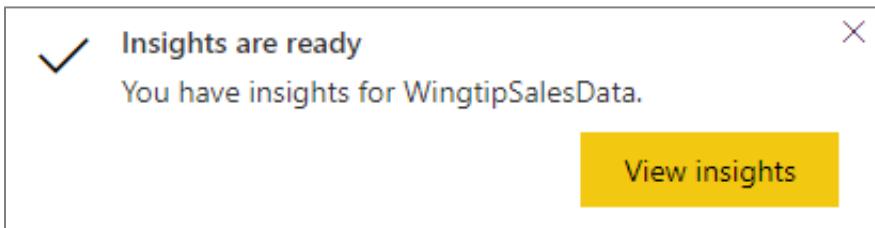
In this exercise, you will run a Power BI command to generate quick insights for the WingtipSalesData dataset.

1. Get Quick Insights for the **WingtipSaleData** dataset.

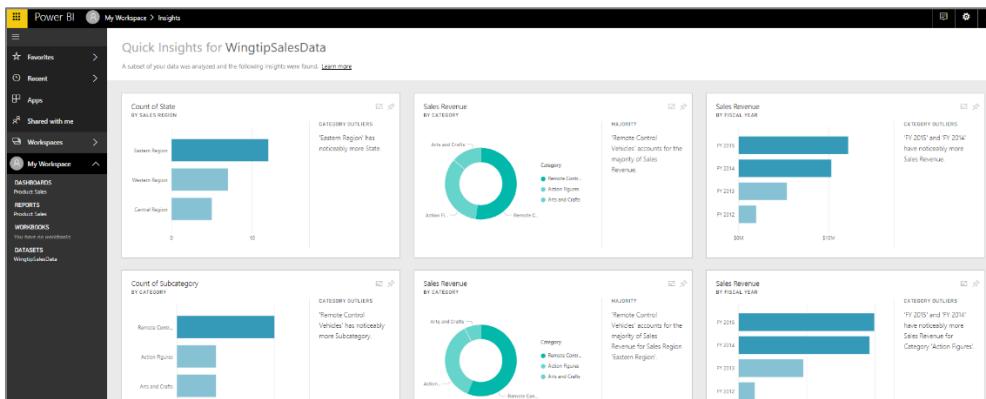
- a) Drop down the fly out menu for the **WingtipSaleData** dataset and click the **QUICK INSIGHTS** menu command.



- b) After a few seconds you should see a Insights are ready notification.  
c) Click on the View insights button.



- d) Inspect the page with the title **Quick Insights for WingtipSalesData** and review the quick insights that have been generated.



## Exercise 6: Getting Started with Power BI Desktop

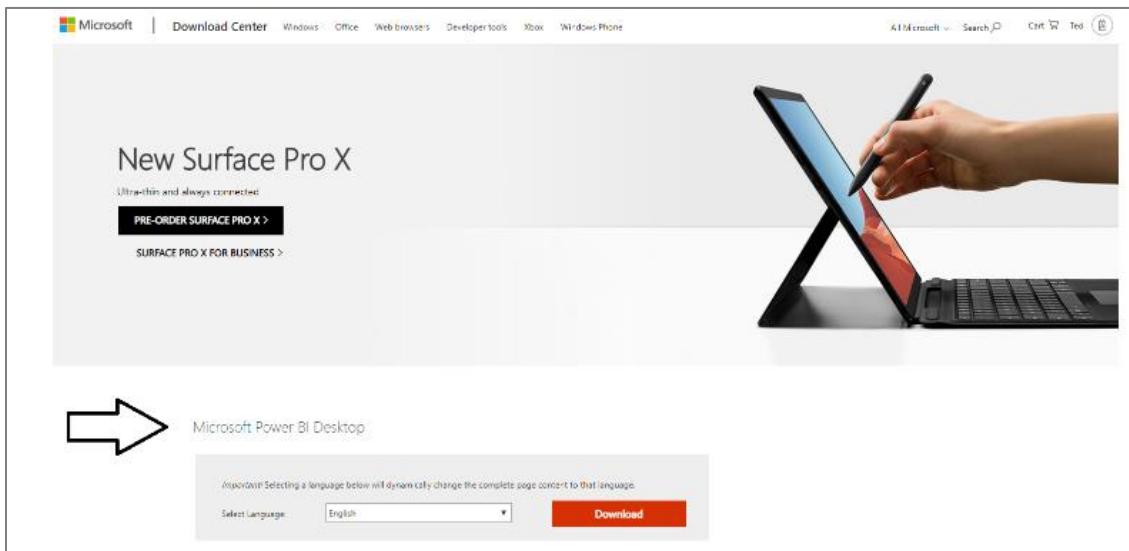
In this exercise, you will begin by installing Power BI Desktop if you don't already have it installed or you need an updated version. If a recent version of Power BI Desktop is already installed on your PC, you can skip ahead in this exercise to step 3.

1. Download the EXE installation file for Power BI Desktop.

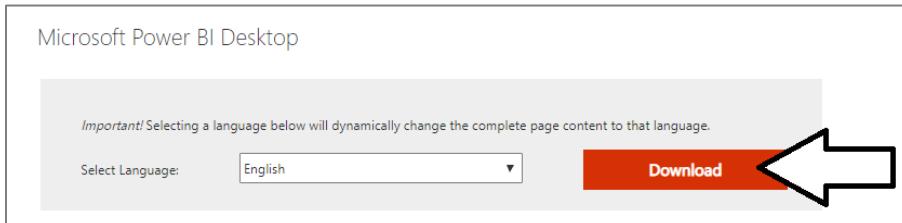
- a) Using the browser, navigate to the following URL.

<https://aka.ms/pbiSingleInstaller>

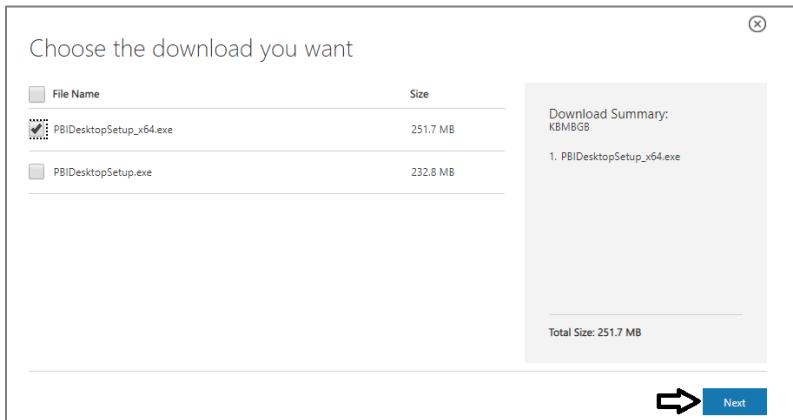
- b) Move down the web page and locate the **Microsoft Power BI Desktop** section.



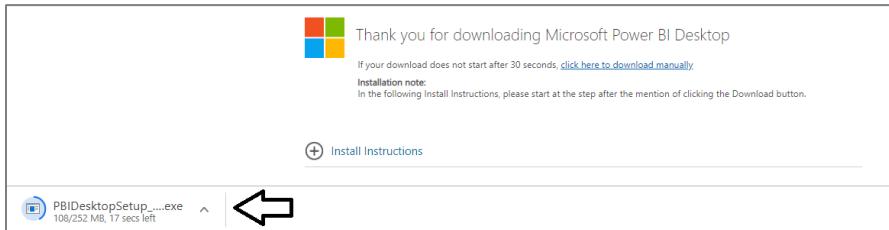
- c) Click the Download button to download the EXE-based installation program for Power BI Desktop.



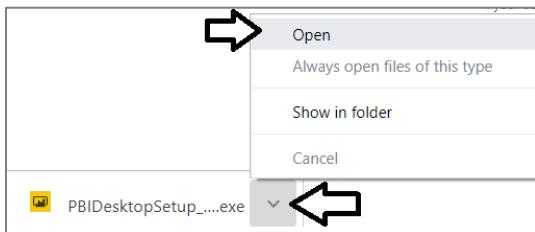
- d) Download the 64-bit version. (If you are running a 32-bit version of Windows, select the other EXE without 64 in its name).
- e) Click **Next** to download the installation file named **PBIDesktopSetup\_x64.exe**.



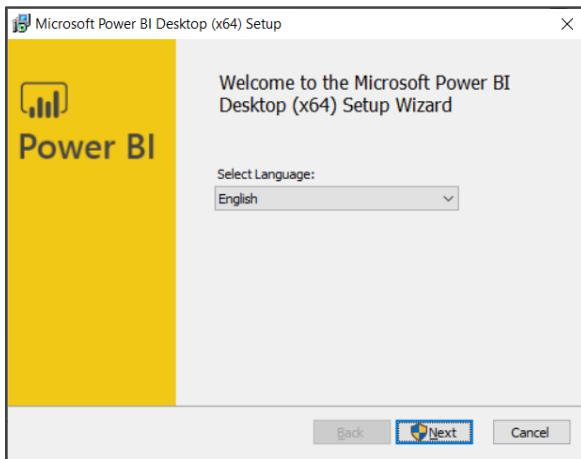
- f) Wait until **PBIDesktopSetup\_x64.exe** has finishing downloaded



2. Select **Open** on **PBIDesktopSetup\_x64.exe** to begin the installation of Power BI Desktop.



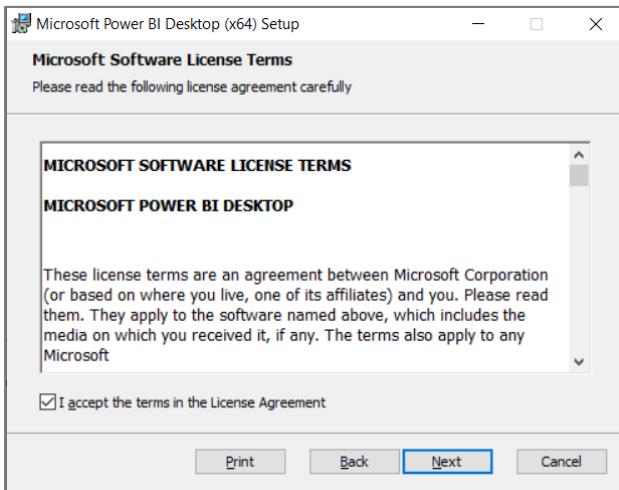
- a) When you see the Welcome screen, click **Next** to continue with the installation.



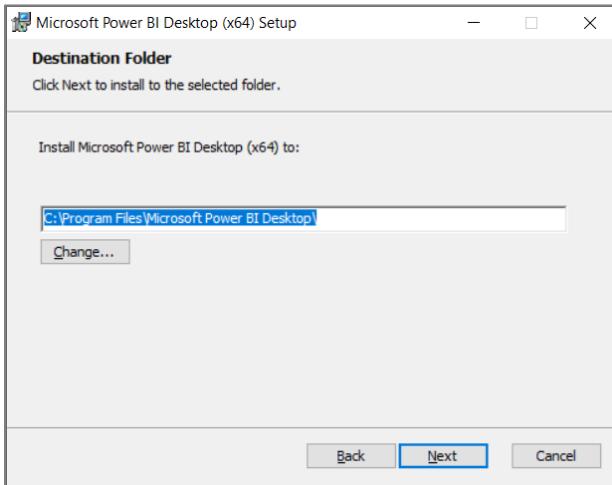
- b) Click **Next** again to move past the Welcome screen.



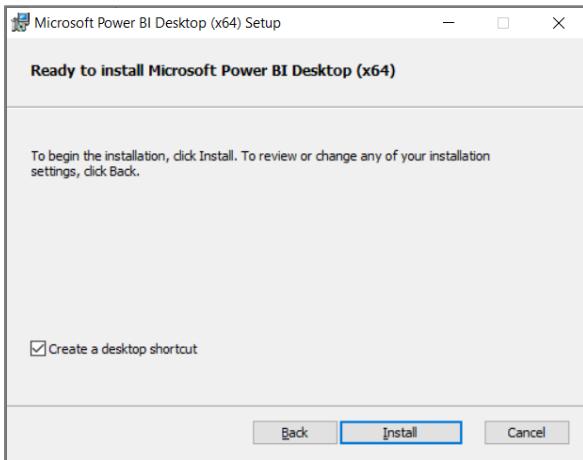
- c) Click the checkbox to accept the license agreement and click **Next**.



- d) Accept the default location for the installation and click **Next**.



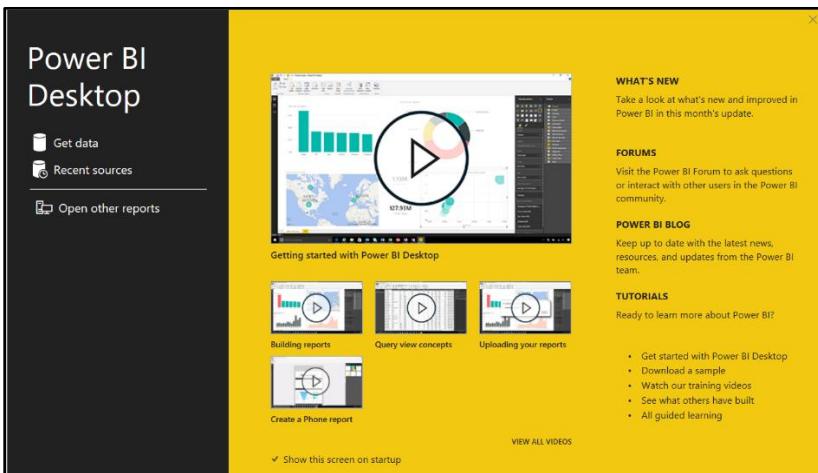
- e) On the next screen, click **Install**.



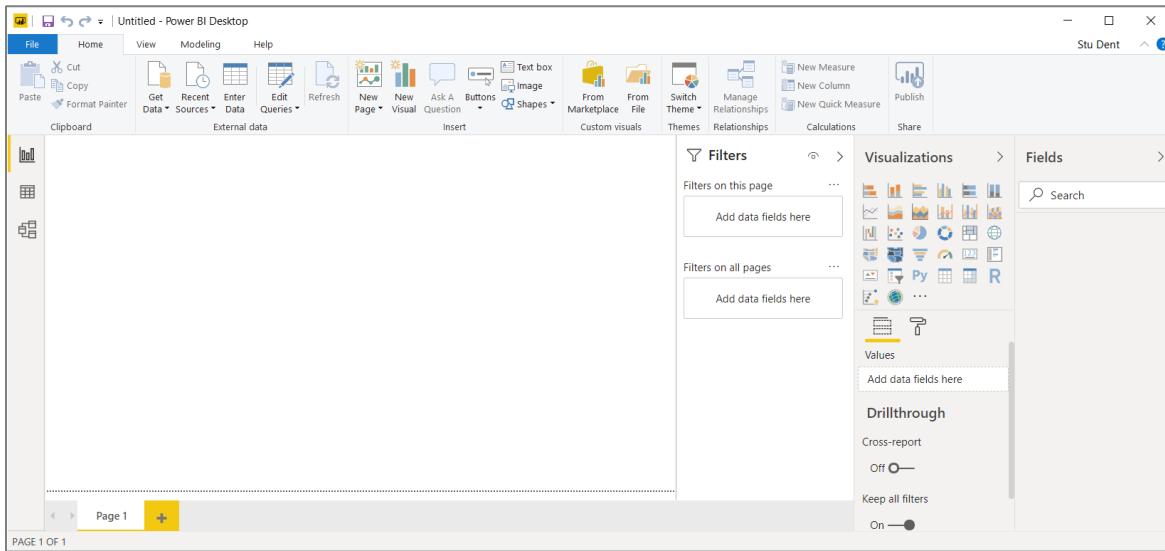
- f) When you see the **Completed the Microsoft Power BI Desktop Setup Wizard** screen, click **Finish** to launch Power BI Desktop.



- g) When Power BI Desktop launches for the first time, it displays a Welcome screen as shown in the following desktop. Click the (X) button in the upper right corner to close this window.

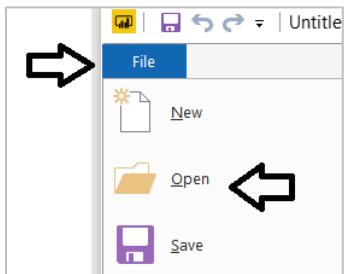


- h) At this point, you should have Power BI Desktop running with a new, unsaved project as shown in the following screenshot.

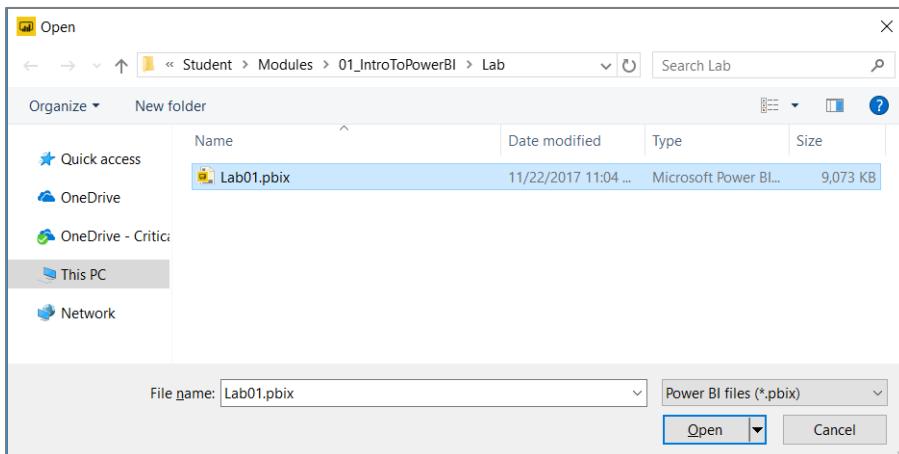


You can start this exercise here if Power BI Desktop was already installed.

3. Open the Power BI Desktop project file named **Lab01.pbix**.
- Select the **File > Open** command from within Power BI Desktop.



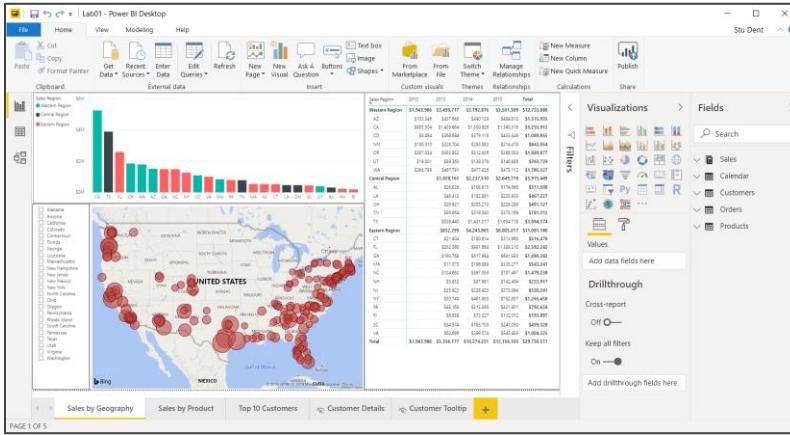
- Locate the PBIX file located at the following path.  
**C:\student\Modules\01\_IntroToPowerBI\Lab\Lab01.pbix**
- Open **Lab01.pbix** to load this project into Power BI Desktop.



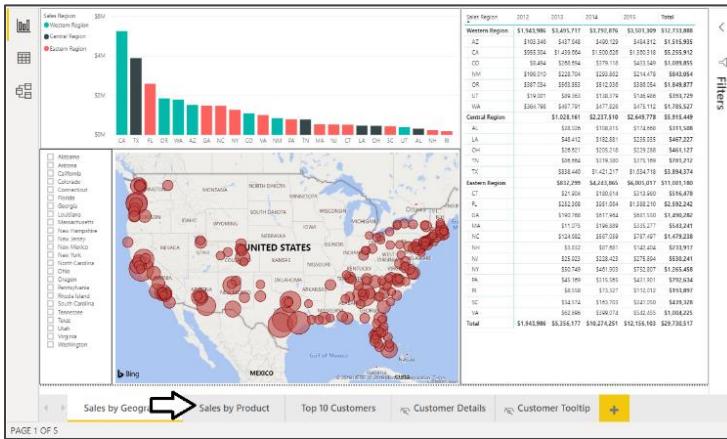
The project should now be open in Power BI desktop.

#### 4. Inspect the contents of the Power BI Desktop project named **Lab01.pbix**.

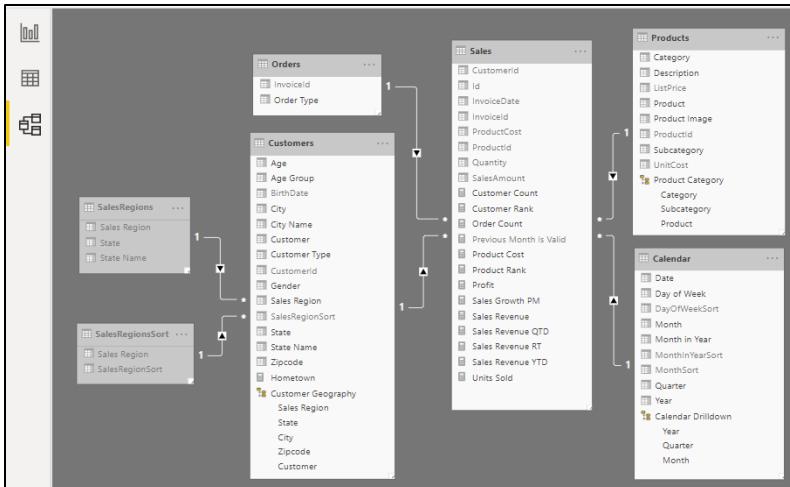
- a) Inspect the report that has been created inside this project. You should see if provides four pages.



- b) Using the navigation tabs at the bottom of the report, move from page to page to inspect each page in the report.



- c) Click on the Relationship view button in the left navigation to see the tables included in data model and their relationships.



- d) Click on the Data view button in the left navigation to see a tabular view of the data inside the project's data model. Note that you can select a table in the FIELDS list on the right to see the data in that table.

| ProductId | Product                            | Description  | UnitCost |
|-----------|------------------------------------|--|----------|
| 1         | Batman Action Figure               | A super hero who sometimes plays the role of a dark knight.            |          |
| 2         | Captain America Action Figure      | A super action figure that protects freedom and the American way.      |          |
| 3         | Gi Joe Action Figure               | A classic action figure from the 1970s.                                |          |
| 4         | Green Hulk Action Figure           | An overly muscular action figure that strips naked when angry.         |          |
| 5         | Red Hulk Alter Ego Action Figure   | A case of anabolic steroids with a most unfortunate outcome.           |          |
| 6         | Godzilla Action Figure             | The classic and adorable action figure from those old Japanese movies. |          |
| 7         | Perry the Platypus Action Figure   | A platypus who plays an overly intelligent detective sleuth on TV.     |          |
| 8         | Green Angry Bird Action Figure     | A funny looking green bird that really hates pigs.                     |          |
| 9         | Red Angry Bird Action Figure       | A funny looking red bird that also hates pigs.                         |          |
| 10        | Phineas and Ferb Action Figure Set | The dynamic duo of the younger generation.                             |          |
| 11        | Black Power Ranger Action Figure   | A particularly violent action figure for violent children.             |          |
| 12        | Woody Action Figure                | The lovable, soft-spoken cowboy from Toy Story.                        |          |

You do not need to make any changes to the Power BI Desktop project named **Lab01.pbix**. The purpose of this lab is for you to open an existing project that has already been completed and then to publish it to your personal workspace.

## 5. Publish the **Lab01.pbix** project to the Power BI Service.

- a) Navigate to the **Home** tab in the ribbon and click the **Publish** button on the far right-hand side.

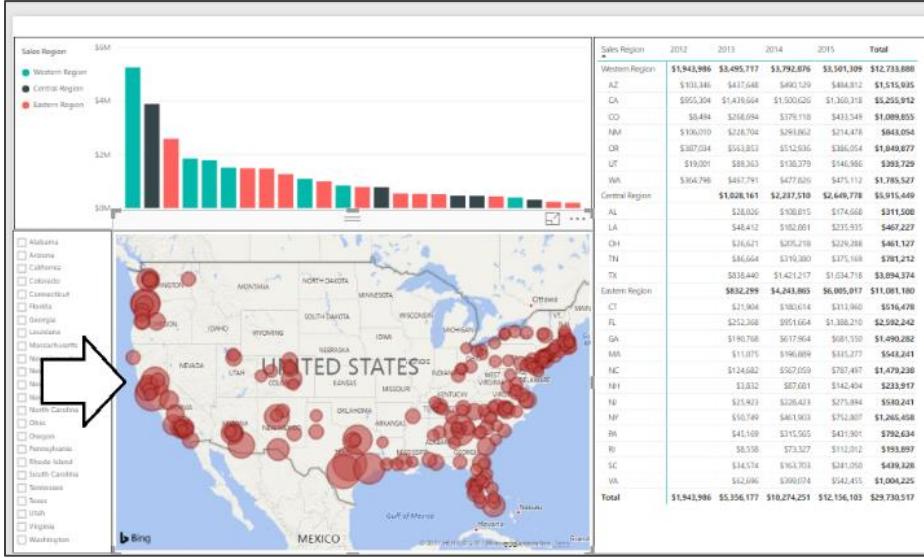
- b) When prompted with the **Sign in to Power BI** dialog, click the **Sign In** button

- c) When prompted for your password, sign into the Power BI service.  
d) When Power BI Desktop prompts you with the **Publish to Power BI** dialog, select **My workspace** and then click **Select**.



6. Change the type of the visual that displays sales revenue by month and purchase type.

- Return back to Power BI Desktop and make sure you are in report view for the project named **Lab01.pbix**.
- Return to the **Sales by Geography** page.
- Select the **Map** visual.



- Update the **Default color** property in the **Data colors** section in the **Format pane** to change the color of the bubbles from red to a different color such as yellow or purple.

The figure shows the 'Format pane' in Power BI Desktop. It has tabs for 'Gridlines', 'Text', and 'Image'. The 'Text' tab is selected. Under 'Data colors', there is a section for 'Default color' with a dropdown menu currently set to 'Red'. A black arrow points to this dropdown menu.

- Verify that the bubbles in the Map visual are now a different color than red.



- Save your changes to **Lab01.pbix**.

