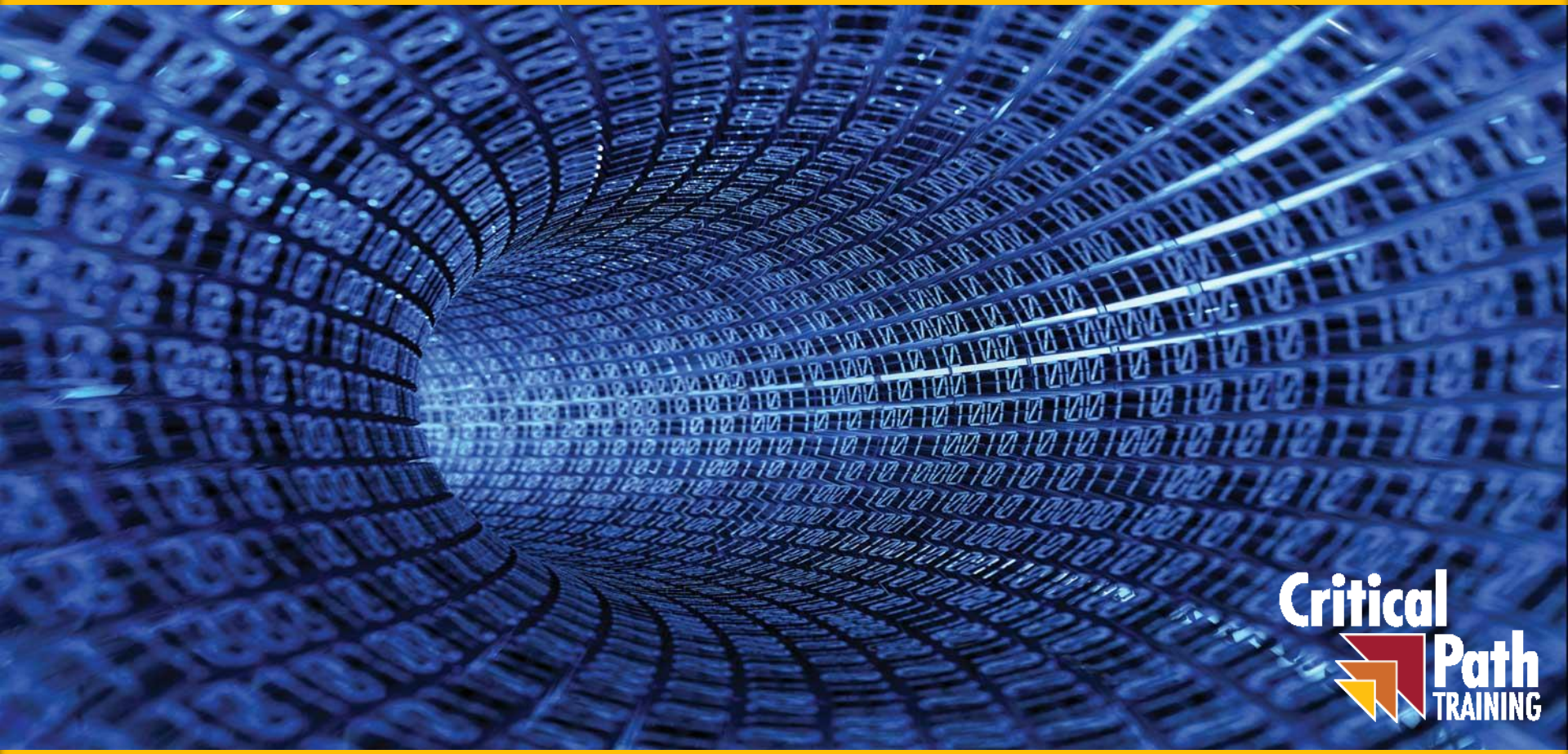
# Developer Introduction to Power BI



# Agenda

- Introduction to Power BI
- Creating PBIX Projects with Power BI Desktop
- Developer Opportunities in Power BI
- Developing for Power BI Embedded
- Creating a Power BI Development Environment

# Student Introductions

- Basic Info
  - What's your name?
  - Where do you work? (optional)
  - How long have you been a developer?
- List skills with which you already feel comfortable
  - Working with the Power BI platform
  - Creating PBIX projects with Power BI Desktop
  - Programming with JavaScript and/or TypeScript
  - Working with the R platform
  - Developing with C# and ASP.NET MVC
  - Programming against REST and ODATA web APIs
  - Developing with Microsoft Azure

# What is Power BI?

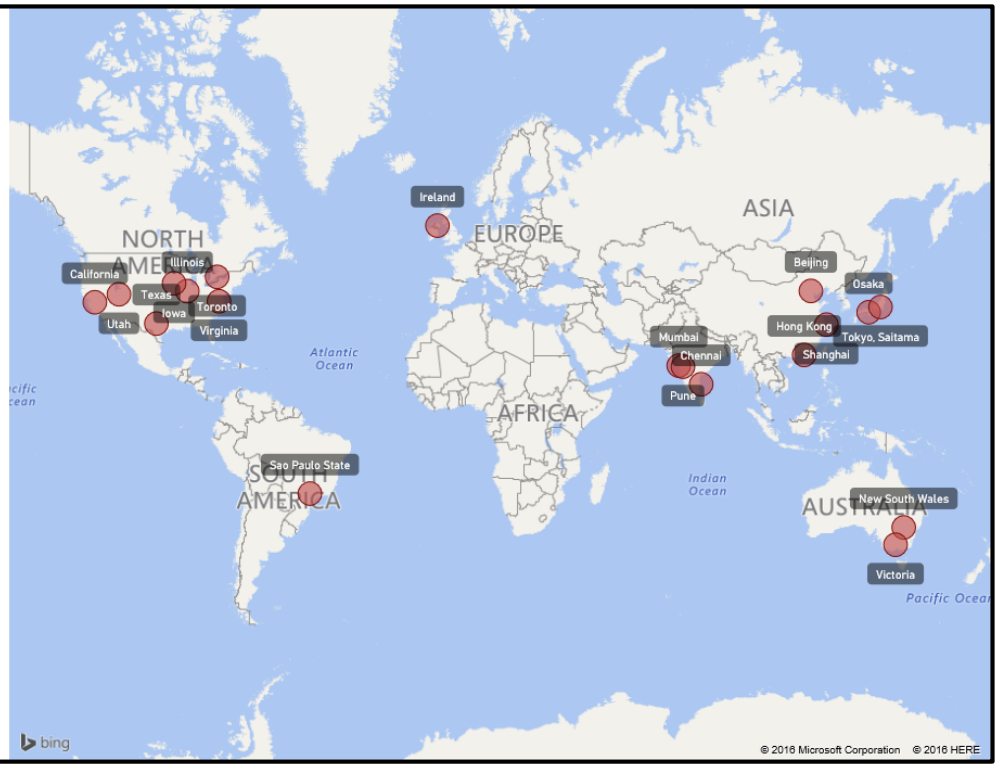
- What is Power BI?
  - Cloud-based subscription service
  - Environment which promotes self-service BI *to the end user*
  - BI Platform to assists with data import, analysis and visualization

- Power BI benefits from being a cloud-based service
  - It takes only 5 seconds to subscribe to the Power BI service
  - New users can create something significant in 5 minutes or less

# Power BI Benefits from Microsoft Azure

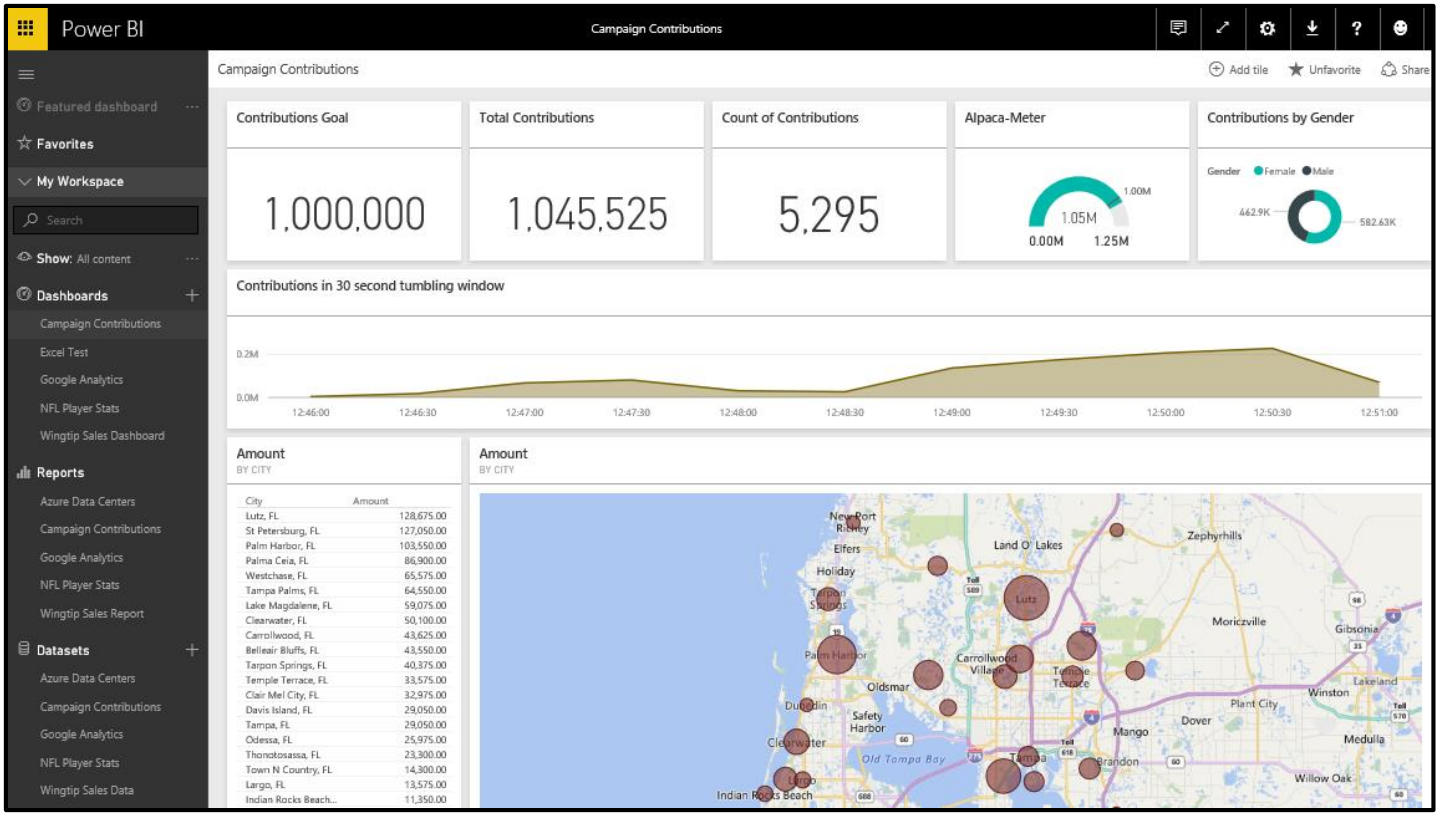
- Power BI is built on top of Microsoft Azure
  - Power BI solutions can be scaled as required
  - Power BI solutions have global reach

| Azure Region | Location |
|---|---|
| Australia East | New South Wales |
| Australia Southeast | Victoria |
| Brazil South | Sao Paulo State |
| Canada Central | Toronto |
| Canada East | Quebec City |
| Central India | Pune |
| Central US | Iowa |
| China East | Shanghai |
| China North | Beijing |
| East Asia | Hong Kong |
| East US | Virginia |
| East US 2 | Virginia |
| Japan East | Tokyo, Saitama |
| Japan West | Osaka |
| North Central US | Illinois |
| North Europe | Ireland |
| South Central US | Texas |
| South India | Chennai |
| Southeast Asia | Singapore |
| US Gov Iowa | Iowa |
| US Gov Virginia | Virginia |
| West Central US | Texas |
| West Europe | Netherlands |
| West India | Mumbai |
| West US | California |
| West US 2 | Utah |



# The Power BI Service

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



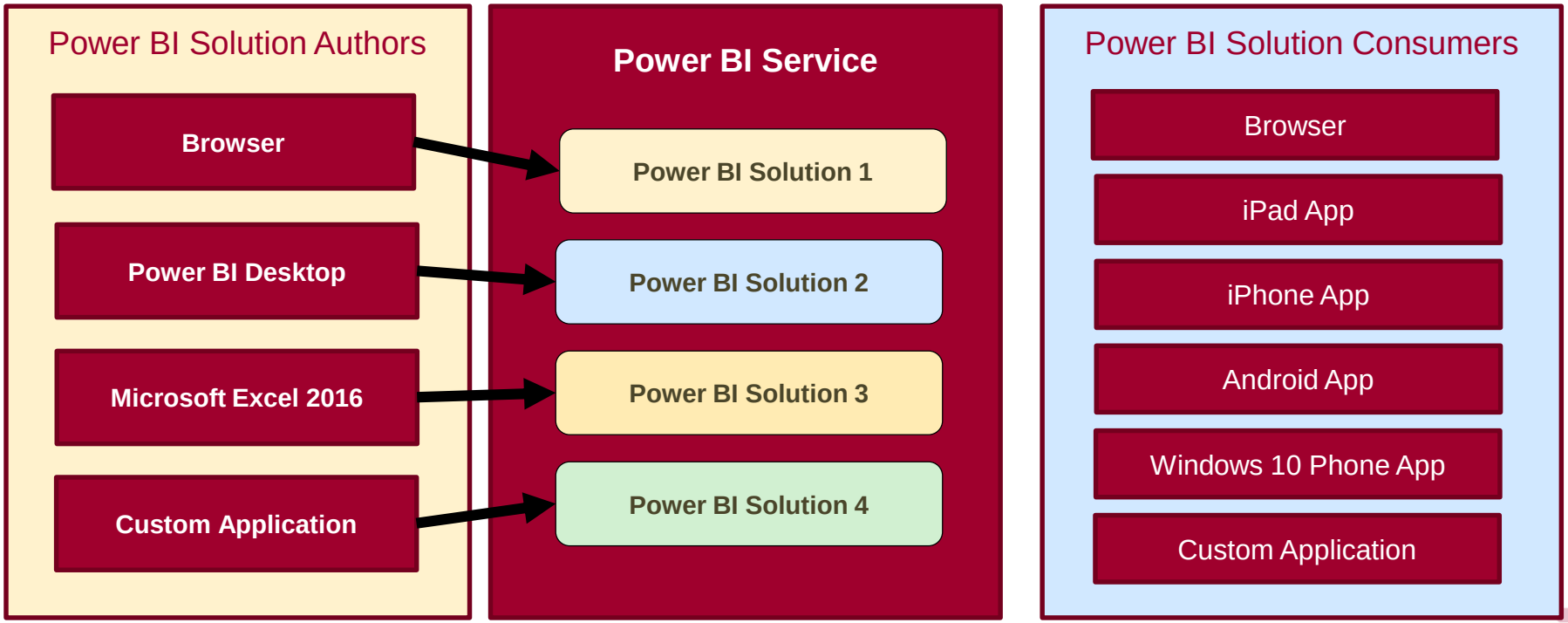
# Power BI Standard versus Power BI Pro

- Power BI offer licenses for two different subscriptions
  - Standard license is free
  - Pro licenses is $10 per month or free with Office 365 E5
  - Power BI pricing is much lower than the competition (e.g. Tableau)

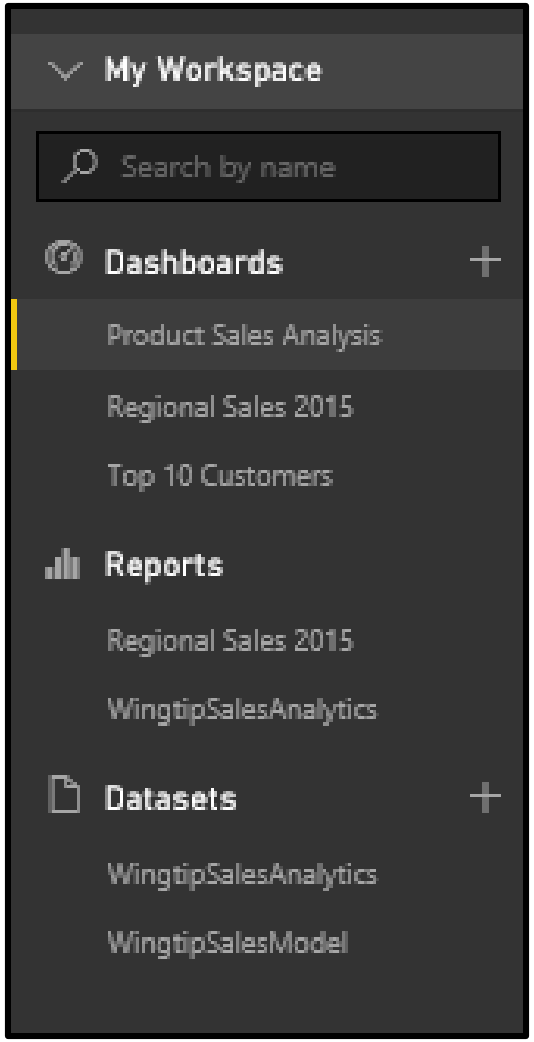
| | Power BI Standard | Power BI Pro |
|---|---|---|
| Data capacity limit | 1 GB | 10 GB |
| Incoming Data Streams | 10K rows/hour | 1M rows/hour |
| Ability to refresh a dataset | Daily | Hourly |
| Consume live data with interactivity | NO | YES |
| Access on-premises data with gateway | NO | YES |
| Use Group Workspaces | NO | YES |
| Use Organizational Content Packs | NO | YES |
| Use Row-level Security (RLS) | NO | YES |
| Access a DirectConnect Dataset | NO | YES |

# Power BI Service Architecture

- 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



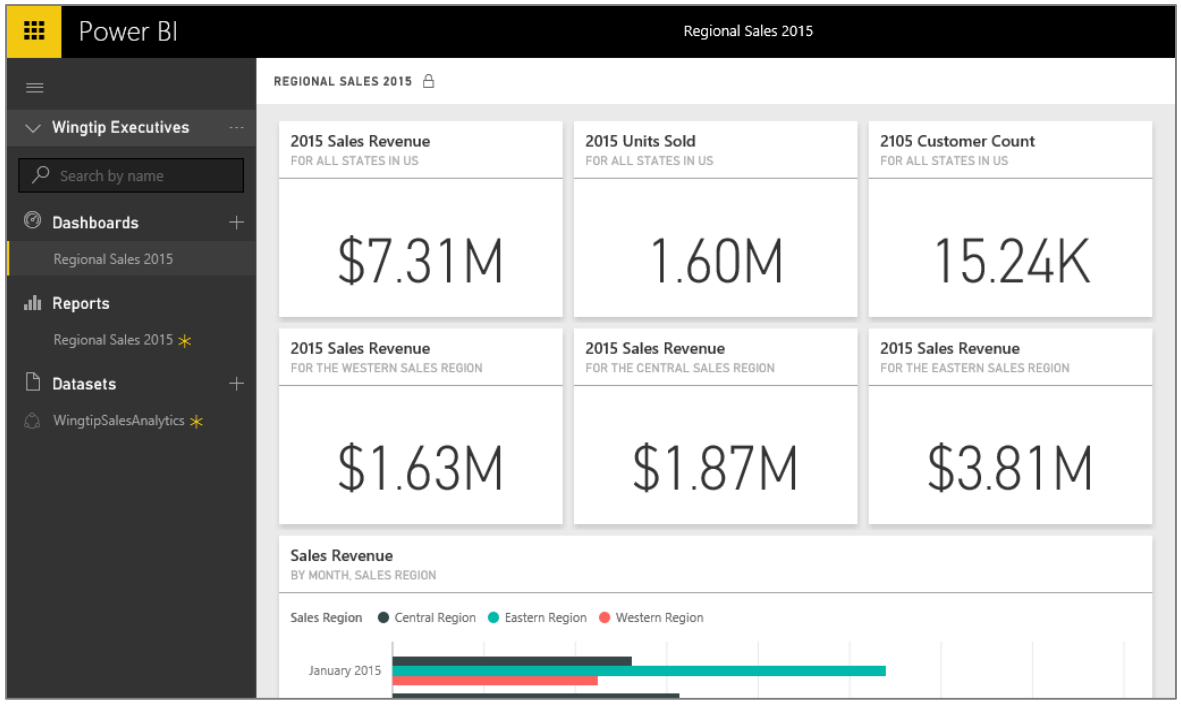
# Central Power BI Concepts




- Workspace
  - Provides user context and asset container
  - Every user has personal workspace
  - Team development requires group workspaces
- Dashboard
  - Consolidated view into reports and datasets
  - Custom solution entry point for mobile users
- Report
  - Collection of pages with tables & visualizations
  - Provides interactive control of filtering
- Dataset
  - Data model containing one or more tables
  - Can be very simple or very complex

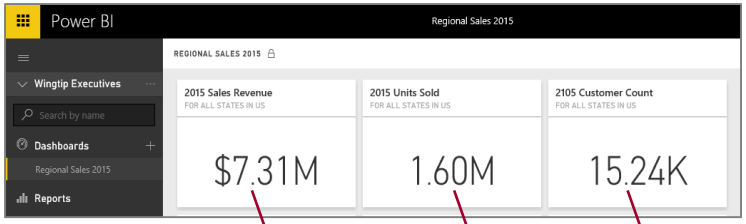
# Dashboards and Tiles

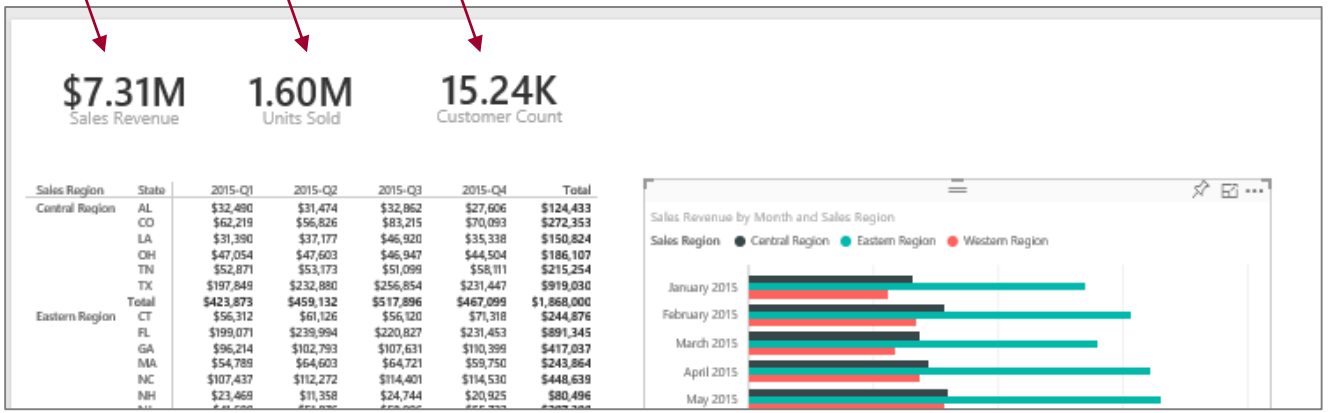
- Dashboard is a collection of tiles
  - Tile can be created by pinning visual from a report
  - Tile can be created by pinning query result from dataset



# Dashboards and Reports

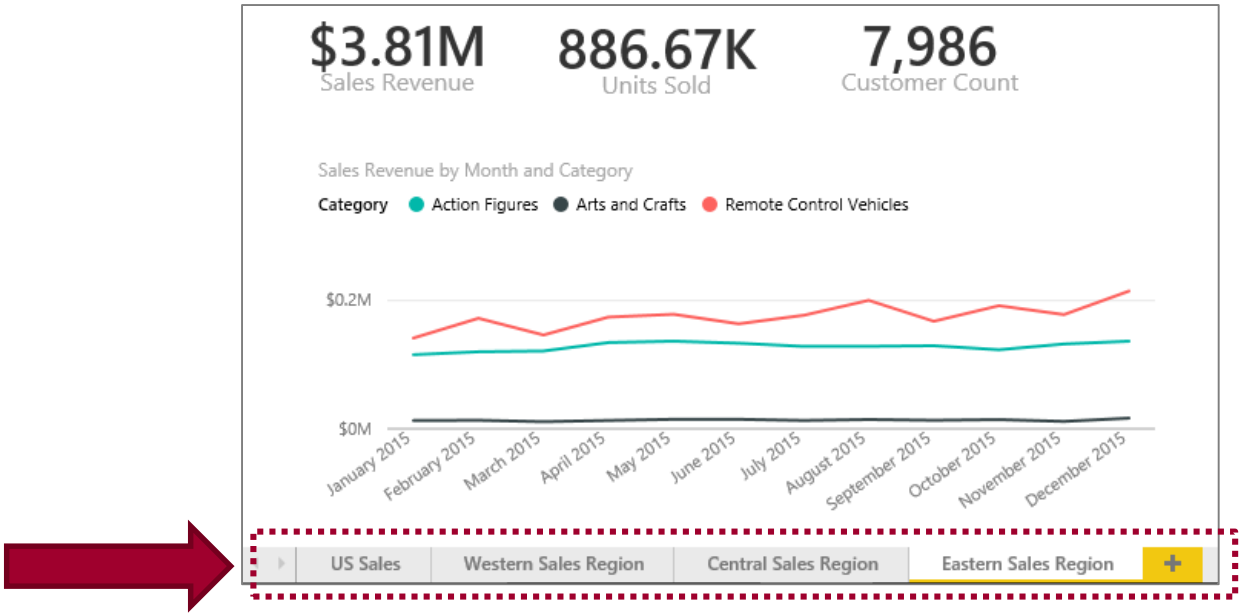
- Dashboards link users to reports
  - Dashboard tiles designed to provide high-level view
  - Clicking tiles drills down into report to see more detail



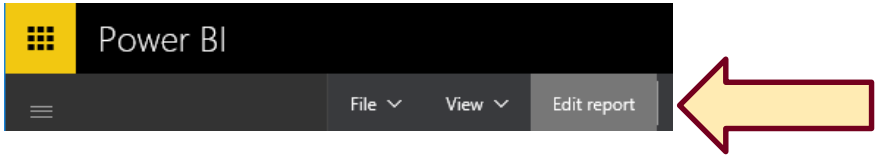
# Reports and Pages

- 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

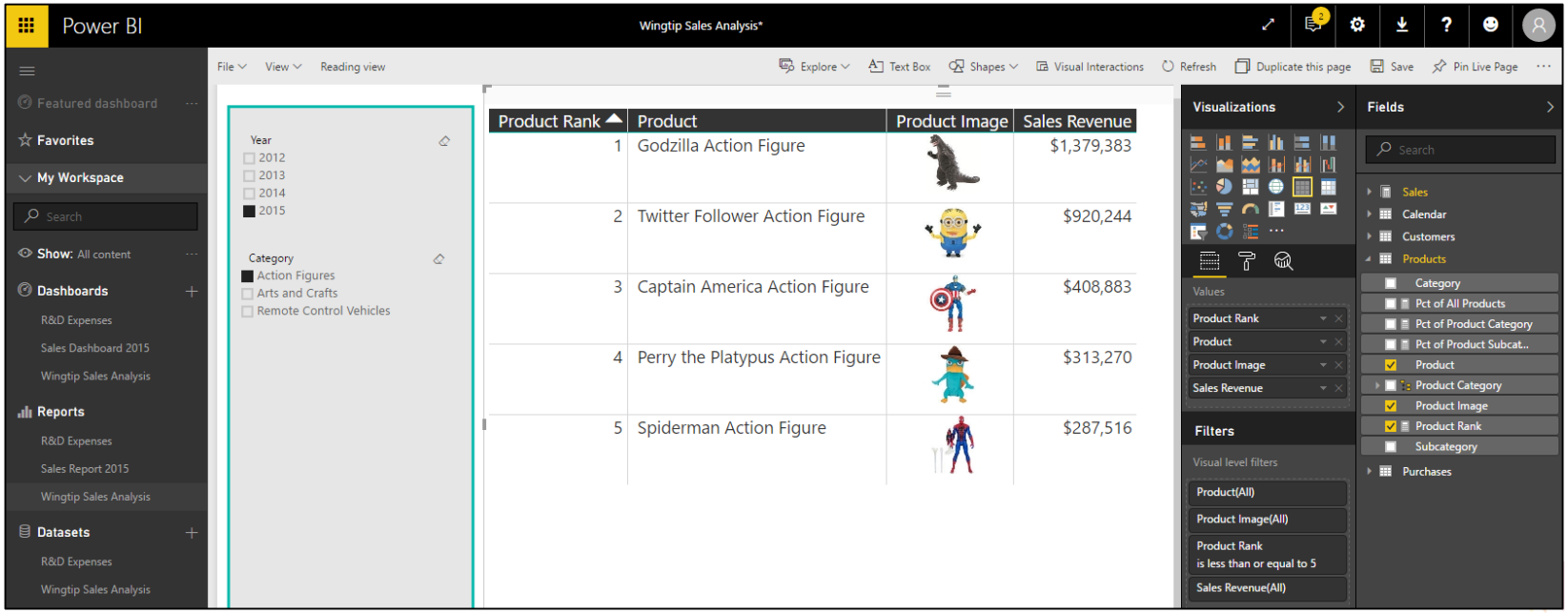


# Report Authoring

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

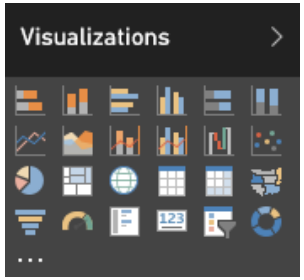



  - Report design tools appear on right side of page

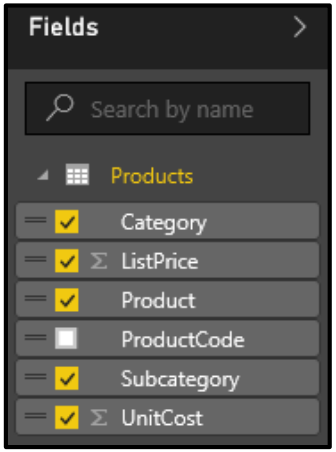


# Visuals (aka Visualizations)

- Reports are designed using visual (aka visualizations)
  - Each visuals is based on an underlying visualization type
  - Visualization type can be changed using **Visualizations** pane

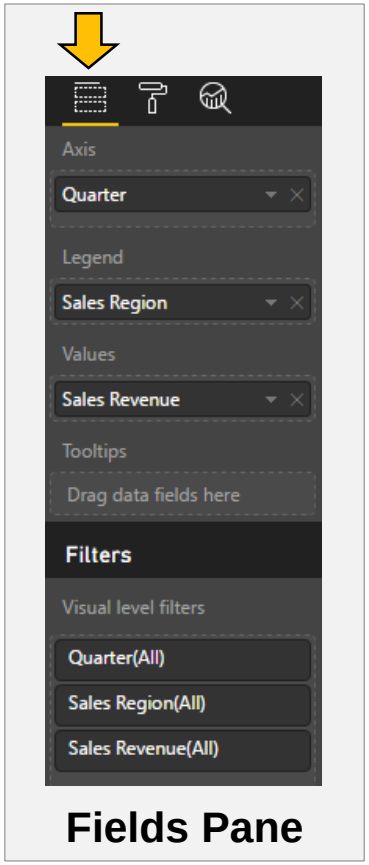



  - Visuals creating by using fields from tables inside **Fields** list

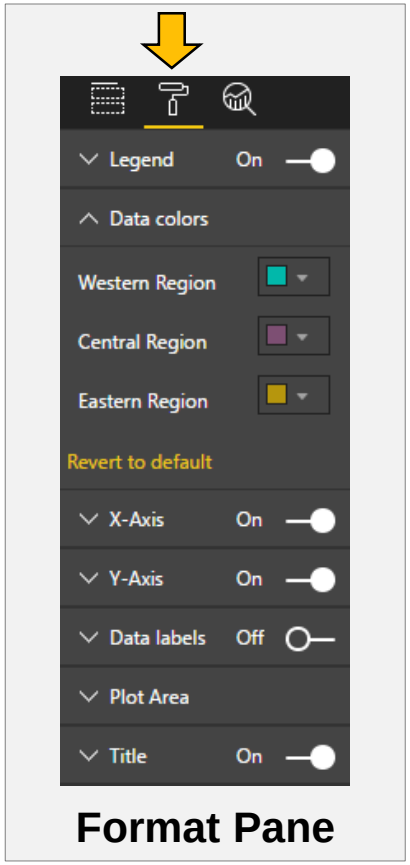


# Editing Visual Properties

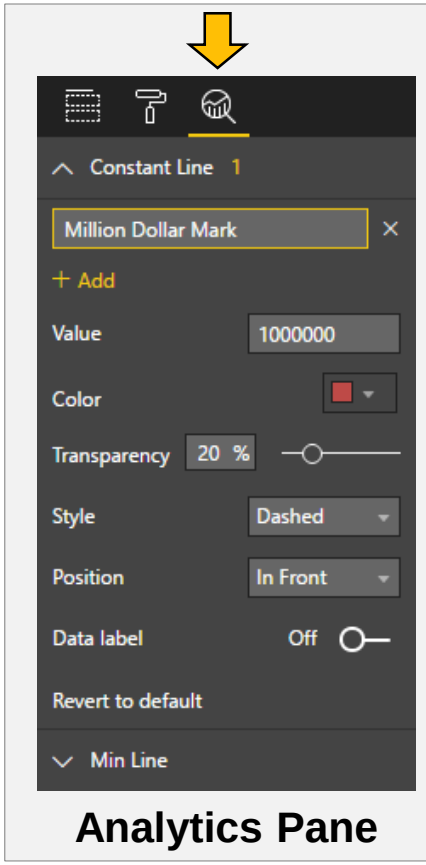
- Visual properties modified using three property panes
  - Visual properties vary greatly depending on type of visualization




Fields Pane



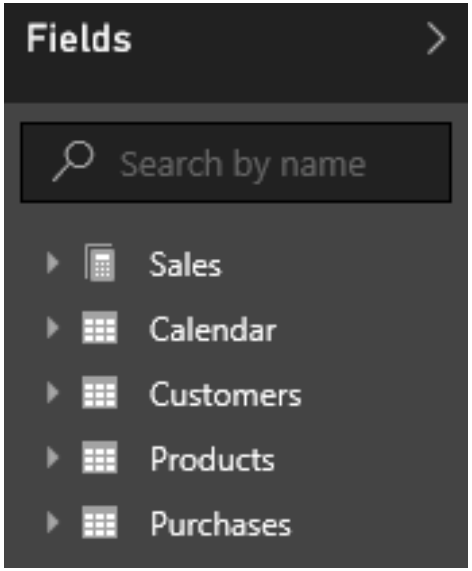

Format Pane

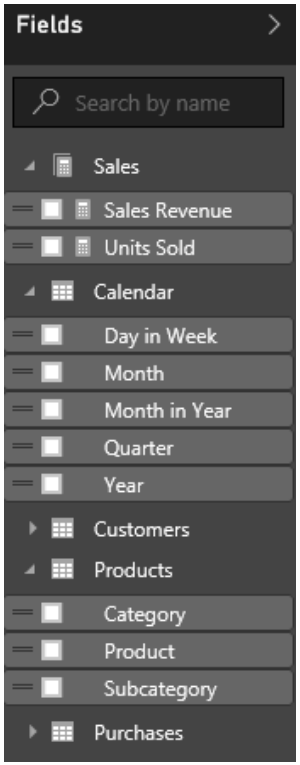



Analytics Pane

# Report and Datasets

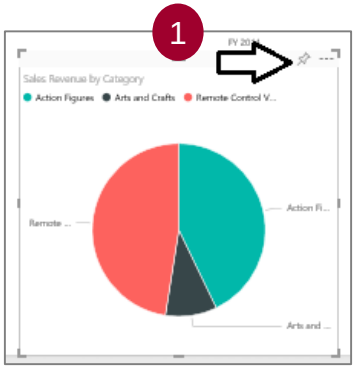
- Each report is based on an underlying dataset
  - **Fields** list in report designer shows tables and fields
  - Report author sees tables & fields as dataset consumer

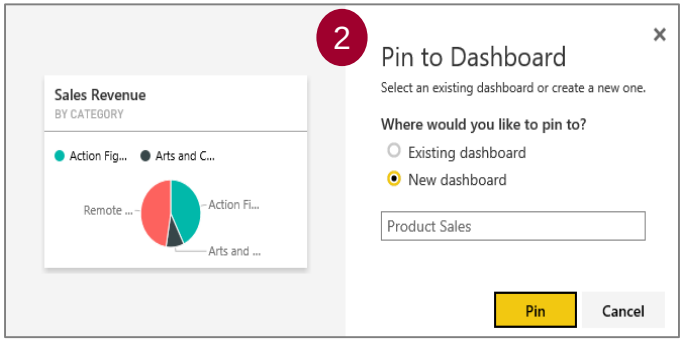


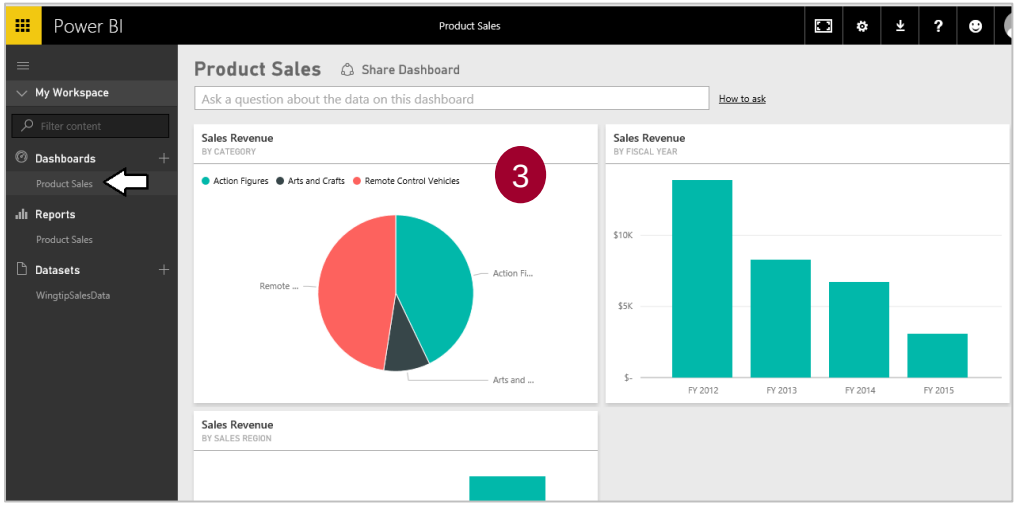



# Creating Dashboards

- Dashboards contain tiles
  - Tiles created from visuals on report pages



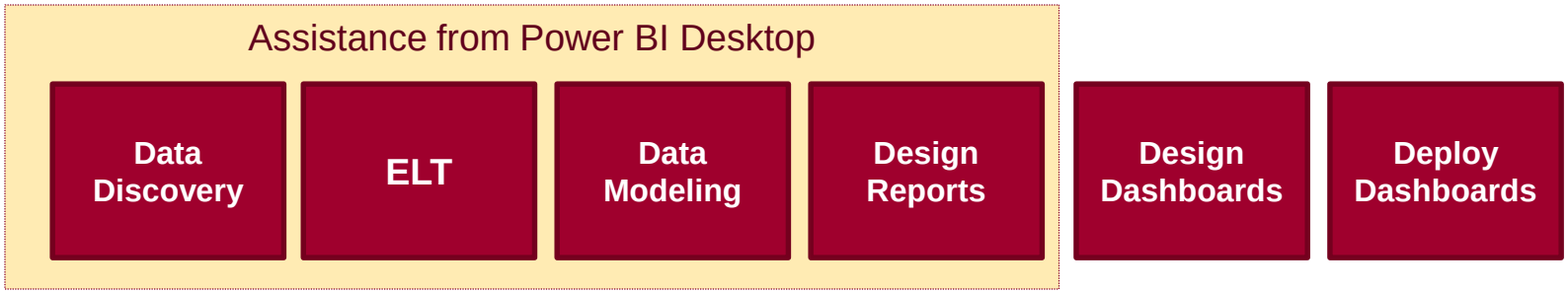

DEMO
Getting started with Datasets,
Reports and Dashboards

# Agenda

- ✓ Introduction to Power BI
- ➢ Creating PBIX Projects with Power BI Desktop
- Developer Opportunities in Power BI
- Developing for Power BI Embedded
- Creating a Power BI Development Environment

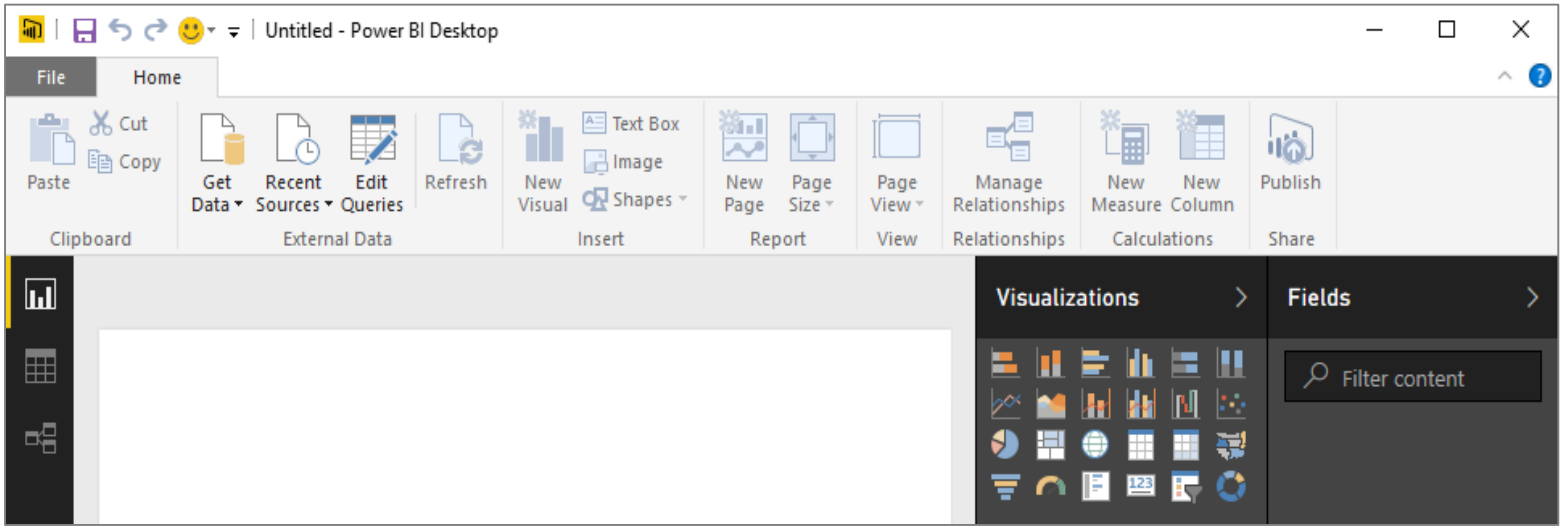
# Working with Power BI Desktop

- 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
  - No support for packaging an entire solution



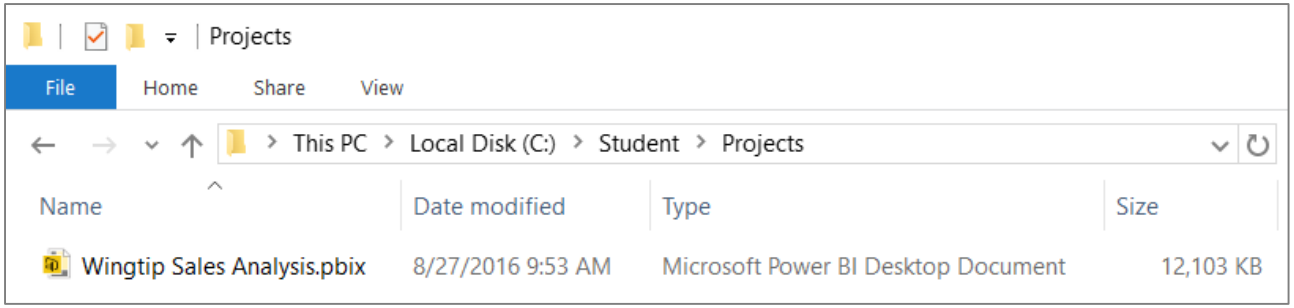
# Working with Power BI Desktop

- Power BI Desktop is a Windows application
  - Work is saved and published in terms of 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



# Projects and PBIX Files

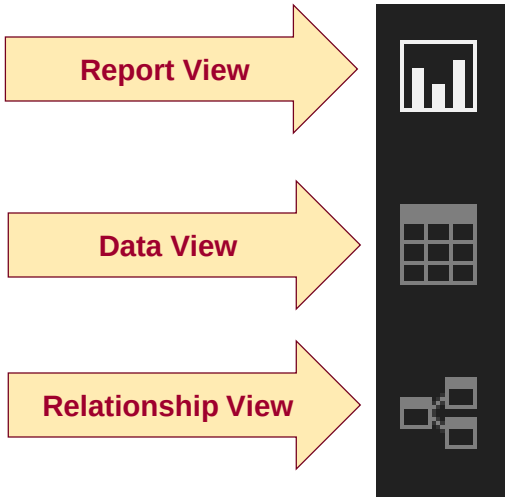
- Power BI Desktop projects saved using PBIX files
  - PBIX file contains data source definitions
  - PBIX file contains query definitions
  - PBIX file contains data imported from queries
  - PBIX file contains exactly one data model definition
  - PBIX file contains exactly one report
  - PBIX file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

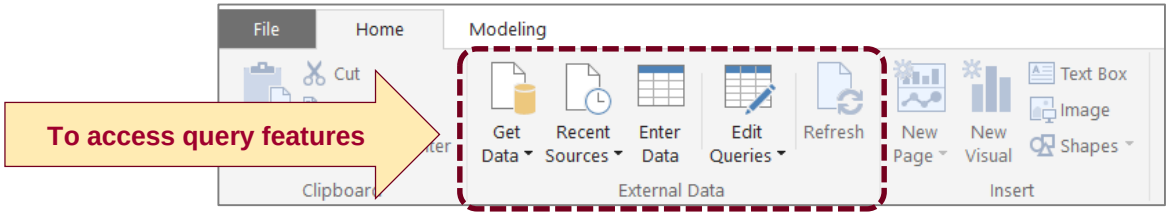



# Getting Around in Power BI Desktop

- What do you need to learn to use Power BI Desktop?
  - Query features for importing data
  - Design features for modeling data
  - Report designer for creating reports

- Navigating between view modes




DEMO
Getting Up and Running
with Power BI Desktop

# Agenda

- ✓ Introduction to Power BI
- ✓ Creating PBIX Projects with Power BI Desktop
- ➢ Developer Opportunities in Power BI
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# Developer Opportunities in Power BI

1. Developing Custom Visuals
2. Writing and Integrating Code Written in R
3. Programming the Power BI REST API
4. Embedding Power BI Reports in Websites
5. Developing Solutions using Power BI Embedded

# Developing Custom Visuals

- What is involved?
  - Learning to program in TypeScript instead of JavaScript
  - Learning to use graphics libraries such as D3.js
  - Getting up to speed on the cross-platform toolchain
  - Creating and debugging custom visuals using Node.js
  - Packaging custom visuals for distribution

# What is R?

- What is R?
  - Platform for statistics, data analysis and visualization
  - Free, cross-platform, open source software
  - Programming language + Runtime layer + Libraries
  - R code distributed and versioned using packages
  - Flourishing ecosystem of R package authors
- Why do you need it?
  - Analyzing data and generating statistics
  - Creating rich graphs and charts
  - Fitting statistical models for predictive analysis

# Writing and Testing R Code in Scripts

01_GettingStarted.R

Source on Save

```r
# use <- for variable assignment
message <- "Hello World"

print(message)

# create vector using the c function
vector1 <- c(2, 4, 6,  8)

# create vectors using sequence
vector2 <- 1:10
vector3 = letters[1:5]
vector4 = LETTERS[24:26]
vector6 = 2^(1:8)

# create vector with electin years
election.years <- seq(from = 1996, to = 2016, by = 4)

# enumerate through election years using for loop
for (year in election.years){
    print(paste(year, "is an election year"))
}

# remove all objects from workspace
rm(list=objects())
```

# Where Can You Use R Code in PBIDT?

- As a data source to a query
  - You can use R code to import and reshape data
- Within a Query Applied Step
  - You can use R code to add transforms to a query
- Inside an R Visual in a Power BI Report
  - You can use R code to creates charts from your data

# Developing with the Power BI REST API

- Used to develop web and desktop applications
  - Requires registering app with Azure Active Directory
- What can you do with the Power BI REST API?
  - Upload PBIX files and configure data sources
  - Embed PBI reports and dashboard tiles into web apps
  - Create streaming dataset for real-time dashboards

# Agenda

- ✓ Introduction to Power BI
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# What is Power BI Embedded?

- Power BI Embedded is an Azure Service
  - PBI Embedded service can be provisioned on-demand
  - Service provisioned in terms of workspace collections
  - PBI Embedded service requires an Azure subscription

- What is the core value of Power BI Embedded?
  - It eliminates need for Power BI license for each user
  - It eliminates need for Office 365 account for each user
  - It decouples user security from app security
  - It opens up PBI platform to commercial applications

# PowerBI.com versus Power BI Embedded

## PowerBI.com

- Accessed via https://app.powerbi.com
- Requires Office 365 accounts
- Requires Power BI License
- Custom development not required
- Azure subscription not required

## Power BI Embedded

- Accessed via custom URL
- No Office 365 accounts required
- No Power BI user licenses required
- Requires custom development
- Requires Azure subscription

# The Big Picture for Power BI Embedded

1. Create > Design > Test a PBIX project file on local PC
   - Done using Power BI Desktop
   - Note that Power BI Desktop only runs on Windows
2. Provision Azure resources for Power BI Embedded
   - Create a Power BI workspace collection
   - Create Power BI workspaces
3. Upload PBIX file to Power BI Embedded workspace
   - Use PowerShell, Power BI CLI or Azure REST API
4. Develop Web App with Embedded Power BI Reports
   - Most easily accomplished using ASP.NET MVC

# Agenda

- ✓ Introduction to Power BI
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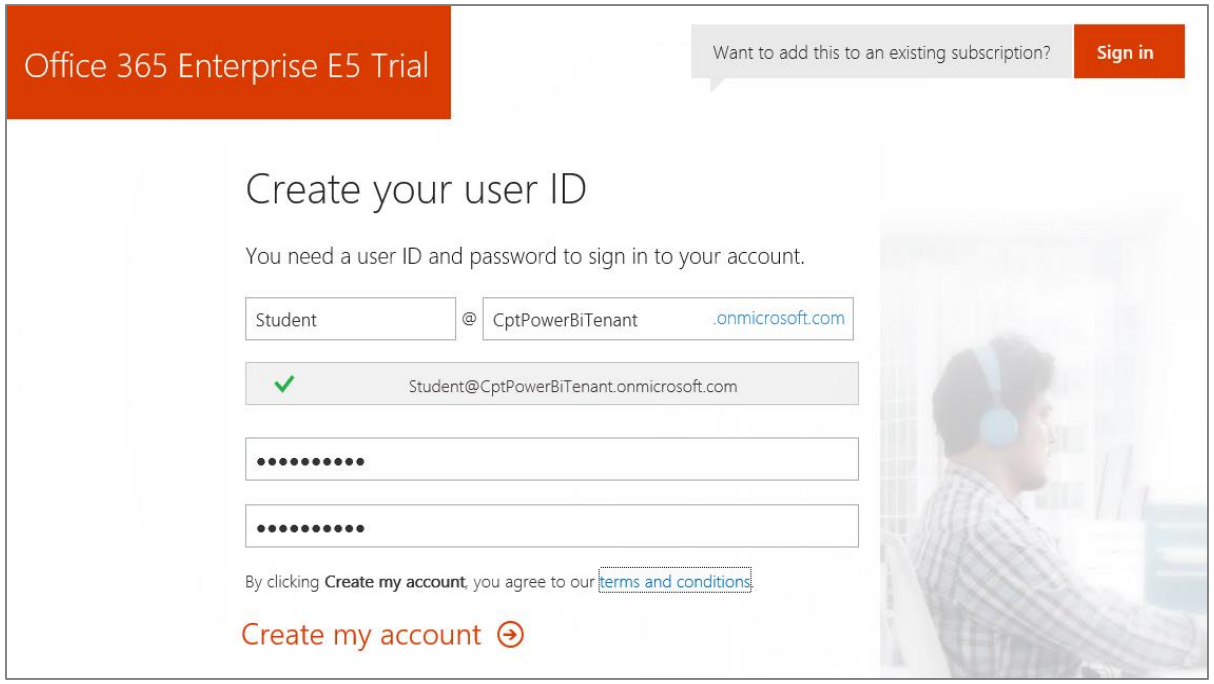
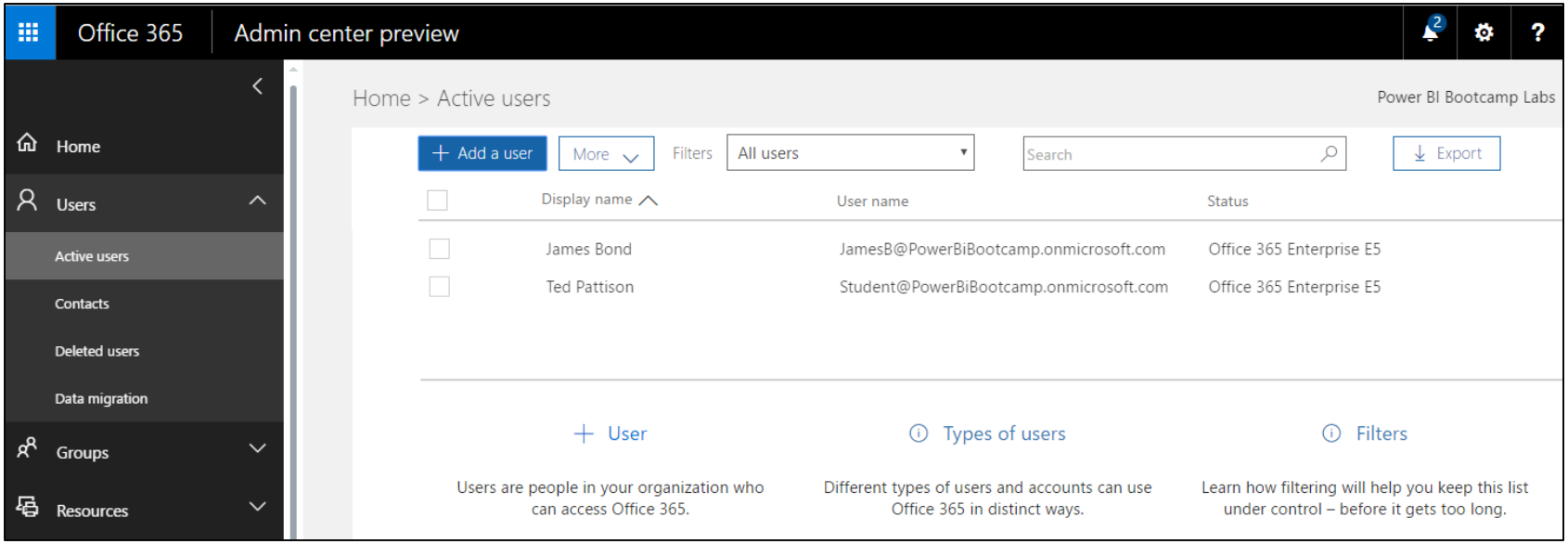
# Creating a Power BI Dev Environment

- Sign up for an Office 365 Enterprise E5 trial account
  - Creates a new Office 365 tenant
  - Creates an account which is tenant administrator
  - You can create 25 user accounts for testing purposes
  - You can create and test Office 365 unified groups



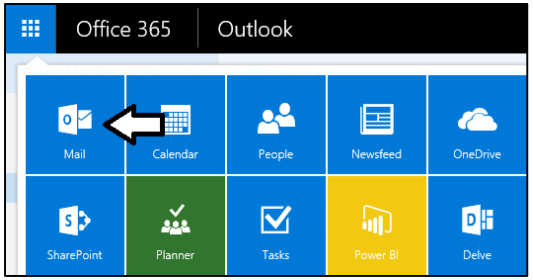
# Office 365 admin center

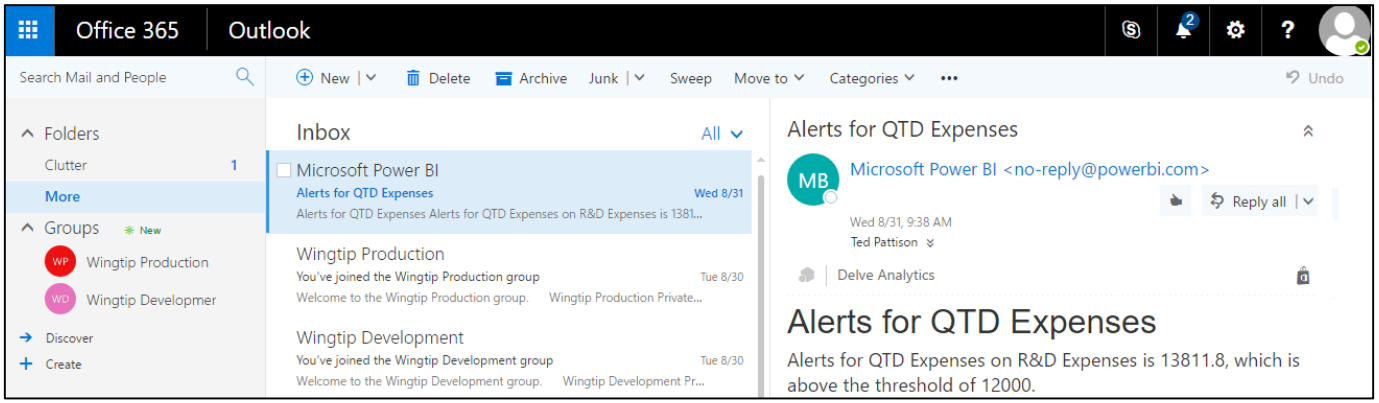
- Chores to accomplish in Office 365 admin center
  - Learn how to add secondary user accounts for testing
  - Learn how to view and manage groups



# Accessing Your Office 365 Mailbox

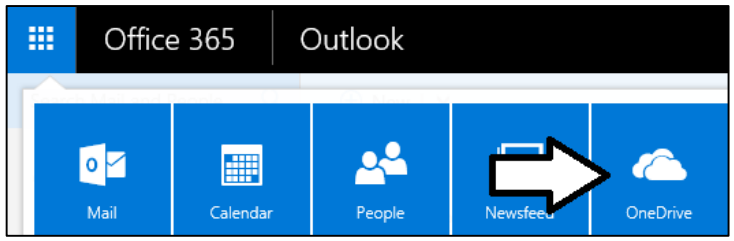
- Make sure you can access your Exchange Inbox
  - Accessible in browser using Outlook Web App (OWA)
  - View messages sent by Power BI service
  - View and interact with Office 365 groups

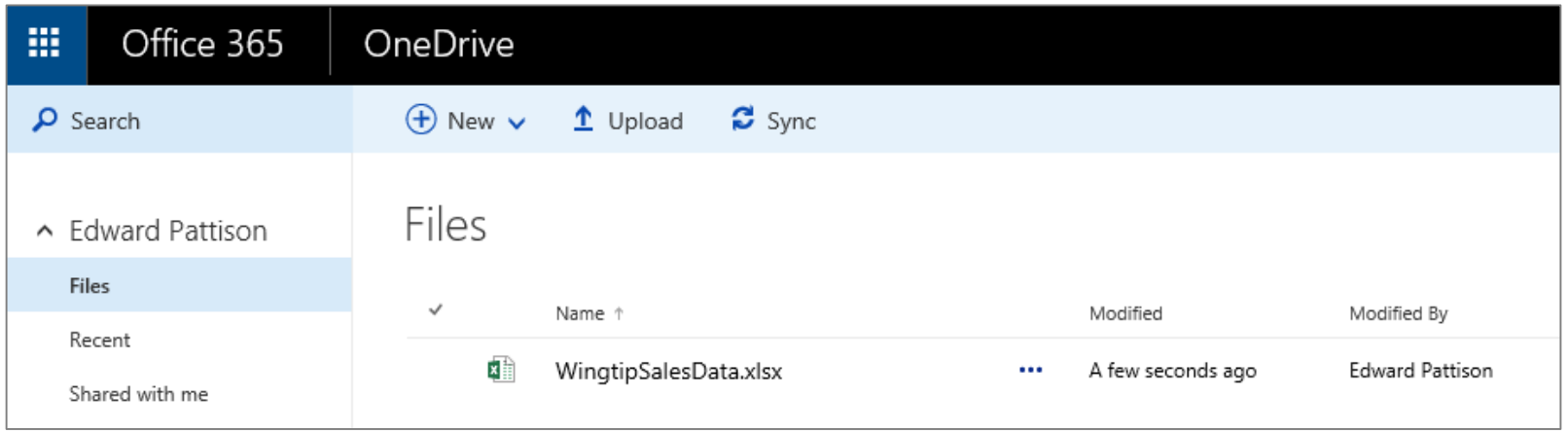


# Uploading Data Files to OneDrive for Business

- Preferred location for data files consumed by Power BI service
  - Excel workbooks
  - CSV files
  - PBIX files created using Power BI Desktop



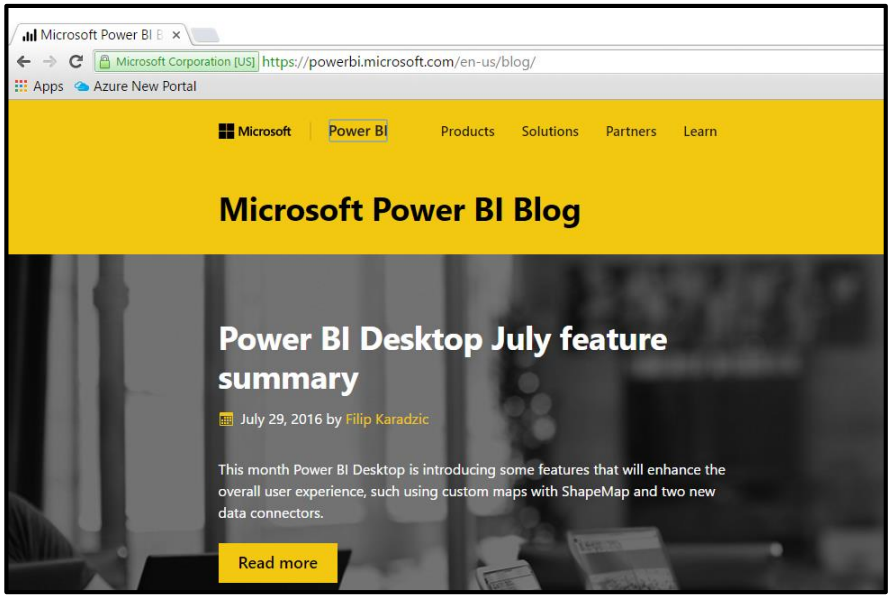

DEMO
Managing Users and Subscriptions
in the Office 365 admin center

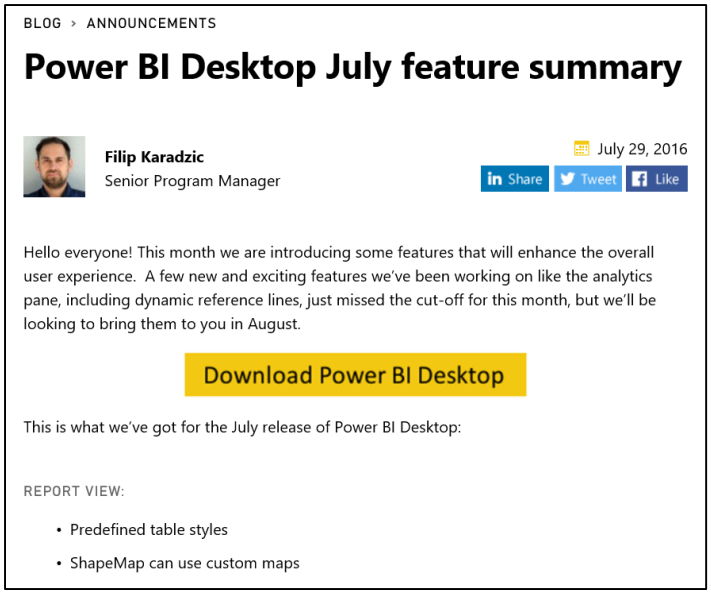
# Power BI Team Blog

- Power BI Team Blog is an Essential Resource

https://powerbi.microsoft.com/en-us/blog/

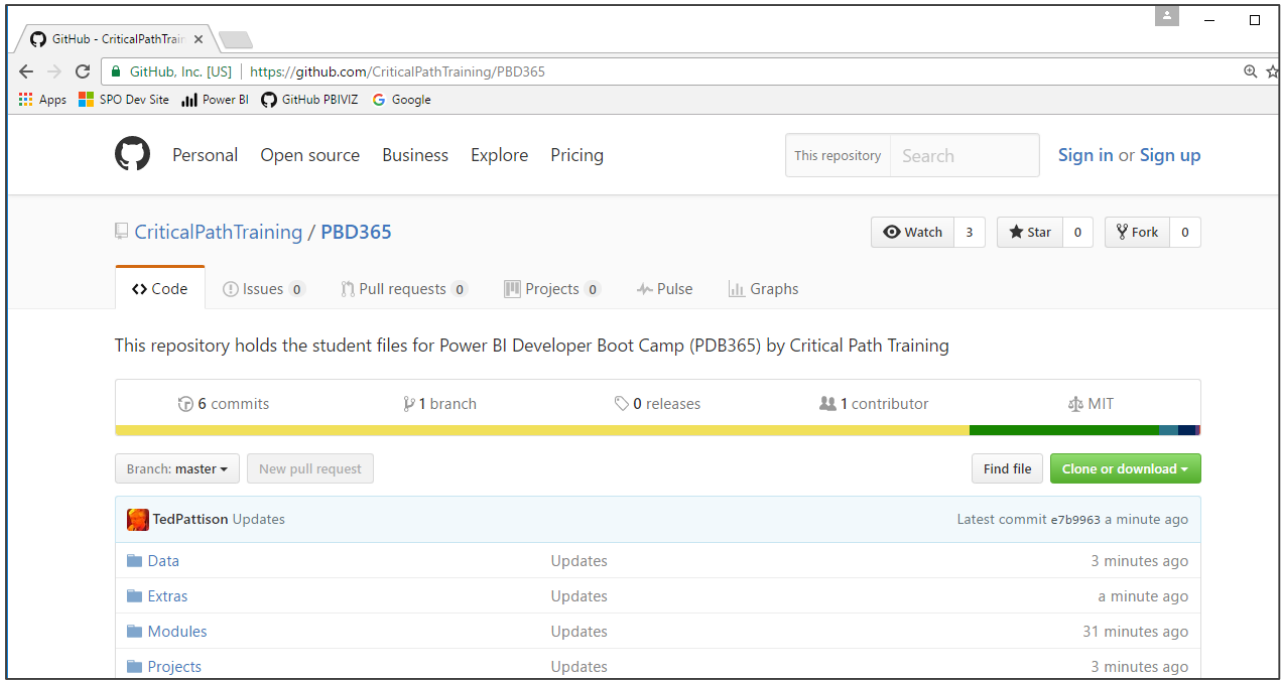
- Be on the lookout for monthly updates



# Live Labs for PBD365

- Student files for this course maintained in GitHub
  - Students files updated on a monthly basis
  - Lab write-ups available in PDF and XPS formats
  - Go to https://github.com/CriticalPathTraining/PBD365



# Summary

- ✓ Introduction to Power BI
- ✓ Creating PBIX Projects with Power BI Desktop
- ✓ Developer Opportunities in Power BI
- ✓ Developing for Power BI Embedded
- ✓ Creating a Power BI Development Environment