

Power BI Dev-in-a-Day Workshop



Workshop Agenda

- Developer Introduction to Power BI
- Developing with the Power BI REST API
- Creating Custom Visuals for Power BI
- Working with Power BI Embedded



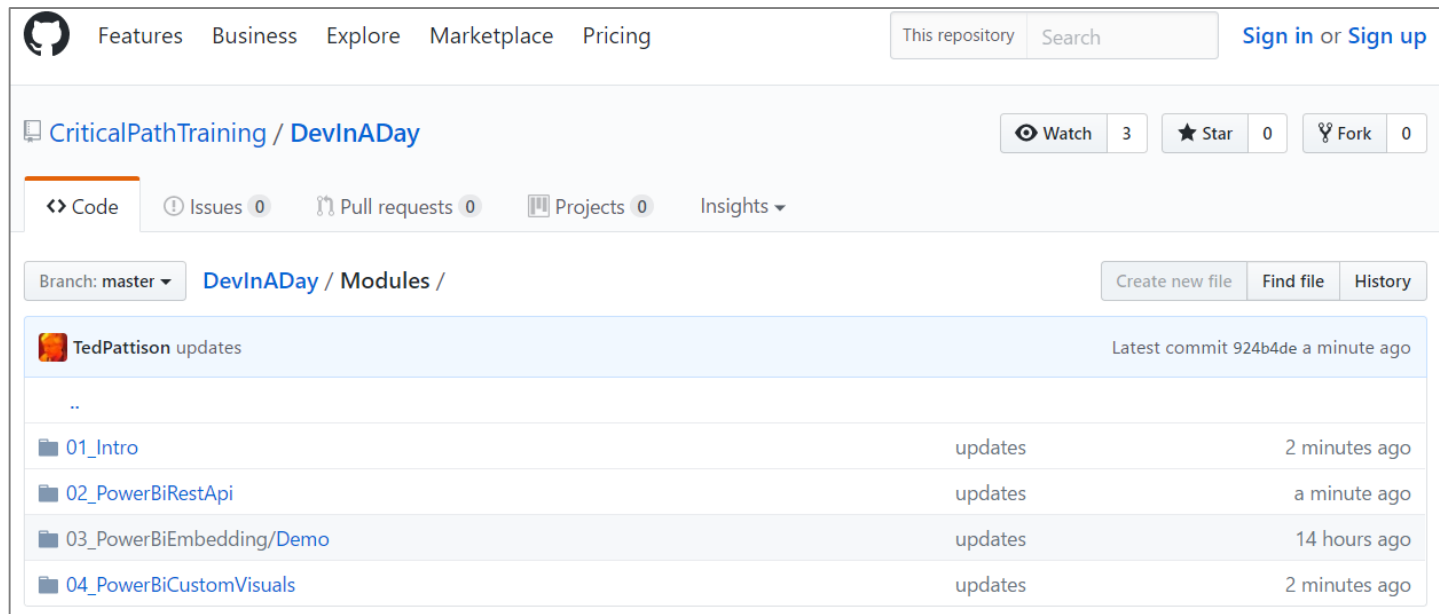
Workshop Prerequisites

- The workshop assumes attendees are comfortable with...
 - Working with the Power BI platform
 - Creating PBIX projects with Power BI Desktop
 - Developing with Visual Studio, C# and ASP.NET MVC
 - Programming with JavaScript and/or TypeScript
 - Programming against APIs based on REST and ODATA
- The workshop assumes attendees are new to...
 - Developing with Microsoft Azure in the new Azure portal
 - Developing with Node.js, npm and Visual Studio Code
 - The new Power BI App Model and developing in App Workspaces



Attendee Workshop Materials

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



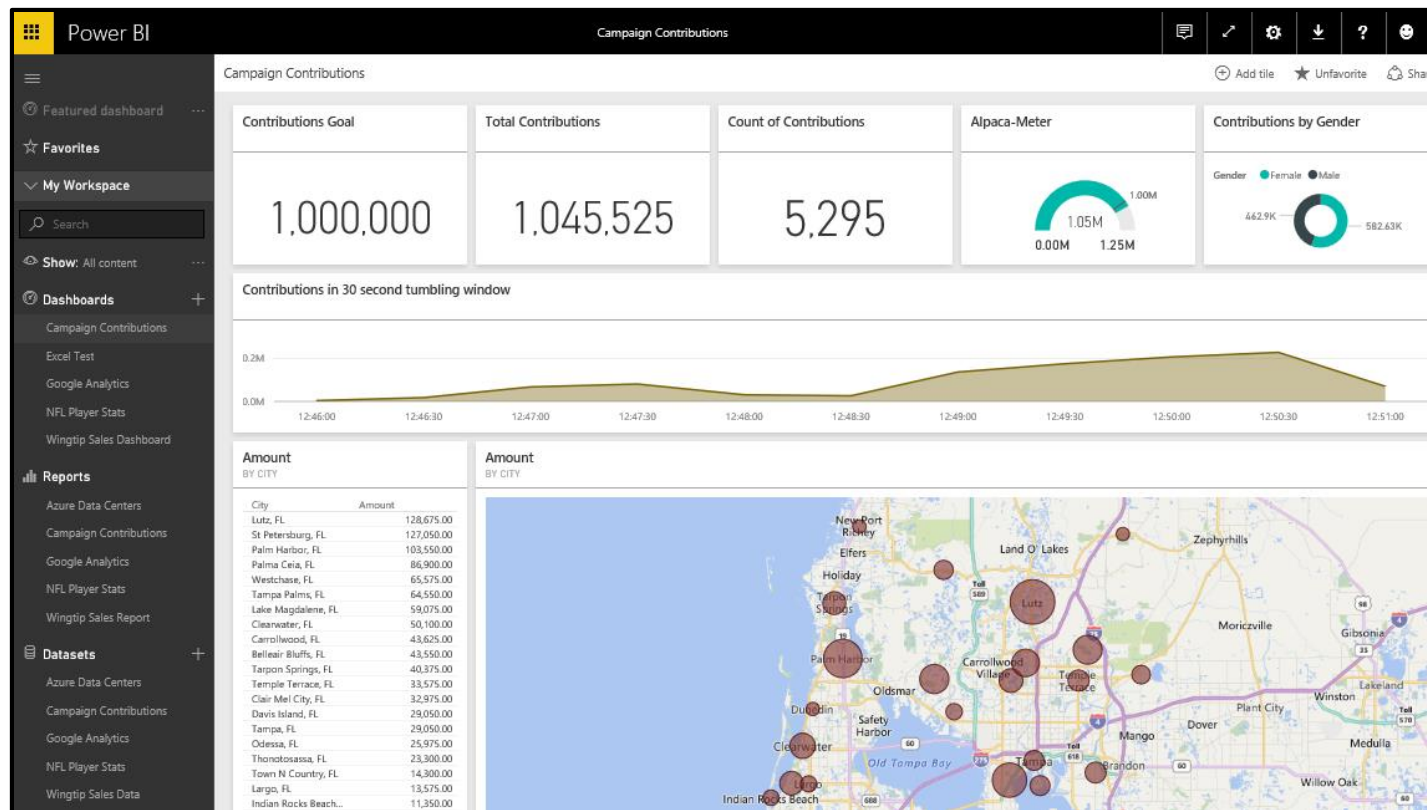
Agenda

- Developer Introduction to the Power BI Platform
 - Developer Opportunities in Power BI
 - Creating PBIX Projects with Power BI Desktop
 - Getting Up and Running with App Workspaces



The Power BI Service

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





DEMO

**Logging into the Power BI service
using the browser**

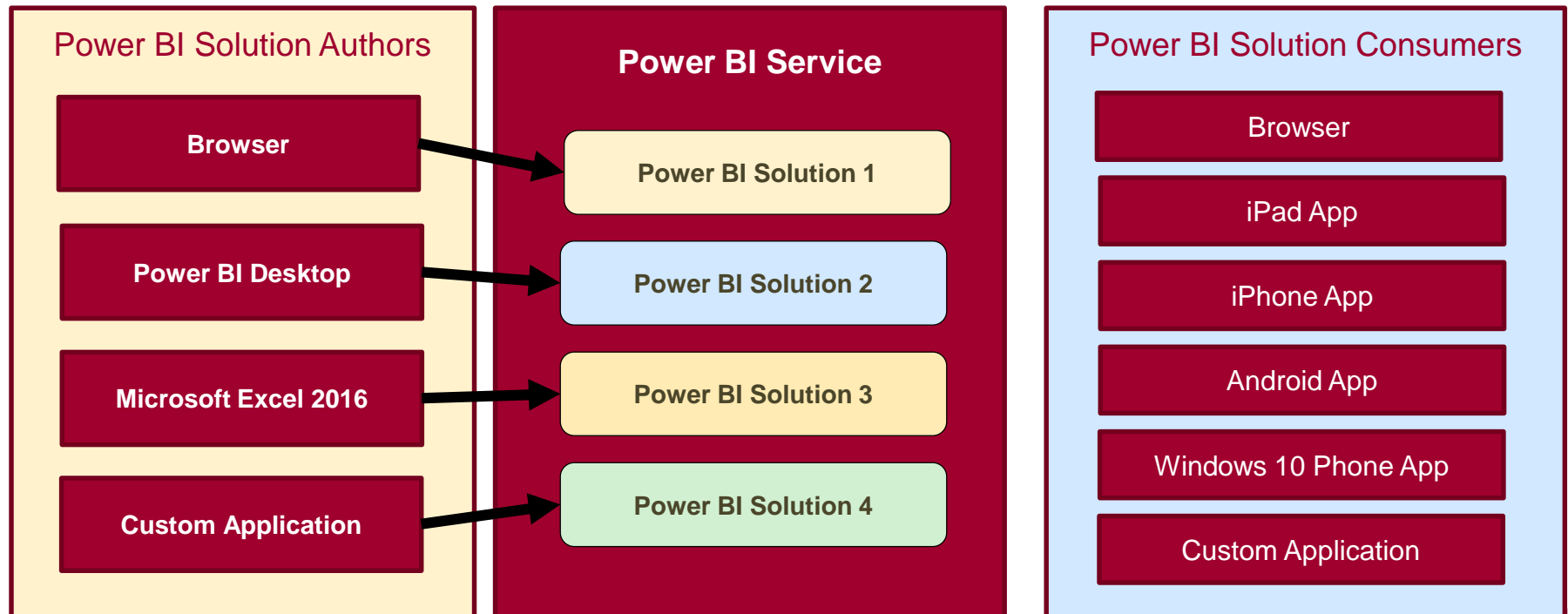
Power BI Licensing

- Microsoft initially offered two Power BI licensing options
 - Power BI Free license
 - Power BI Pro license (\$10/month)
 - Everything has been running within a shared capacity
- Microsoft recently introduced Power BI Premium licensing
 - Power BI Premium customers can create dedicated capacities
 - Power BI Premium licensing has monthly fee for dedicated capacity
 - Dedicated capacity remove limits on upload size and # of refreshes
 - Dedicated capacity can serve Power BI content to non-licensed users
- More info at <https://powerbi.microsoft.com/en-us/pricing/>
 - Please ask questions about licensing offline and not during lectures



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



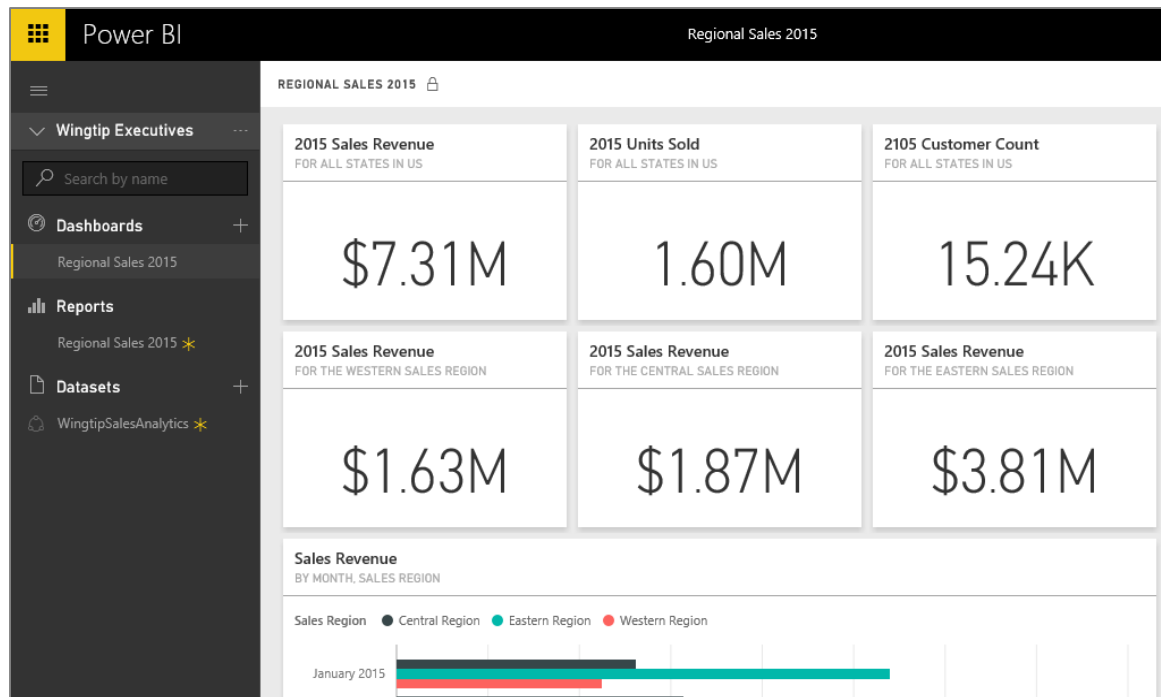
Central Power BI Concepts

- **Workspace (aka Group)**
 - Provides boundary for storing, securing and sharing content
 - Every user has personal workspace
 - App workspaces used for collaboration and wide-scale deployment
- **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



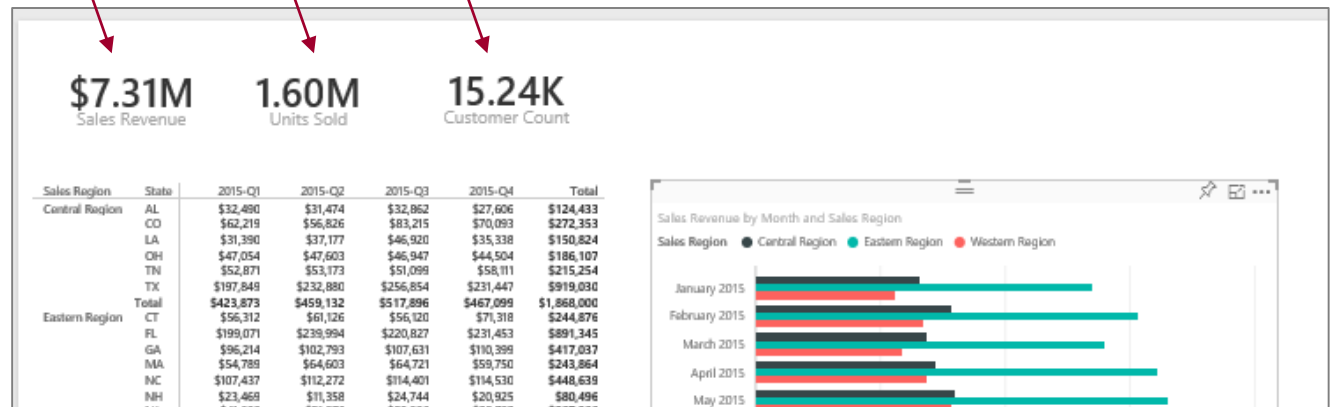
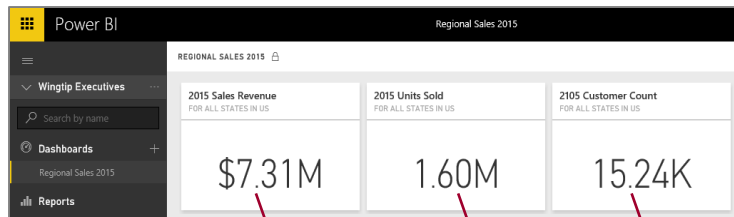
Dashboards and Tiles

- 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



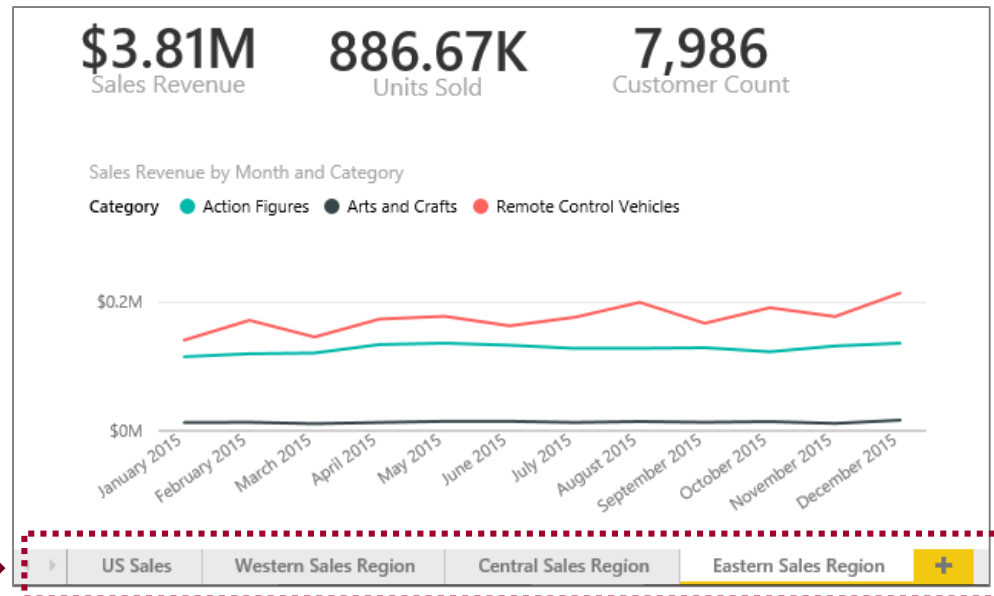
Dashboards and Reports

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



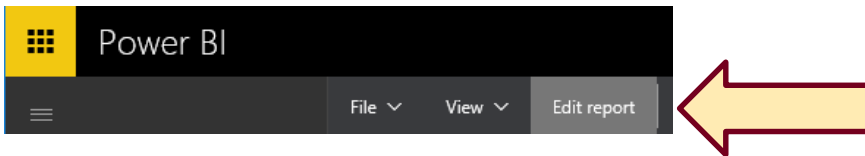
Reports and Pages

- 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



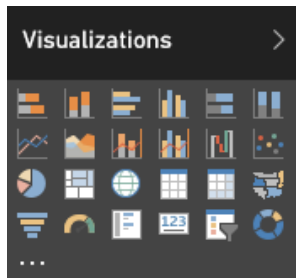
- Report design tools appear on right side of page

A screenshot of the Power BI report authoring interface in edit mode. The report is titled 'Wingtip Sales Analysis' and is displayed in 'Reading view'. The main content area shows a table with 5 rows of product data. On the right side, the 'Visualizations' pane is open, showing various chart and table icons. Below the icons, the 'Fields' pane is visible, showing a list of fields including 'Category', 'Product Rank', 'Product Image', and 'Sales Revenue'. The 'Filters' pane is also open, showing filters for 'Product Rank' and 'Sales Revenue'. The left sidebar contains navigation options like 'Featured dashboard', 'My Workspace', 'Dashboards', 'Reports', and 'Datasets'.

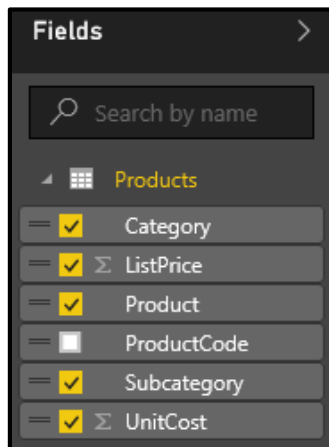
Product Rank	Product	Product Image	Sales Revenue
1	Godzilla Action Figure		\$1,379,383
2	Twitter Follower Action Figure		\$920,244
3	Captain America Action Figure		\$408,883
4	Perry the Platypus Action Figure		\$313,270
5	Spiderman Action Figure		\$287,516

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

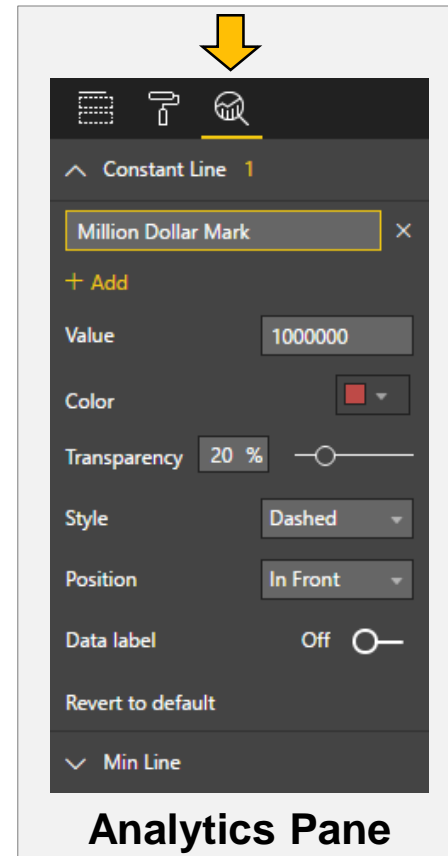
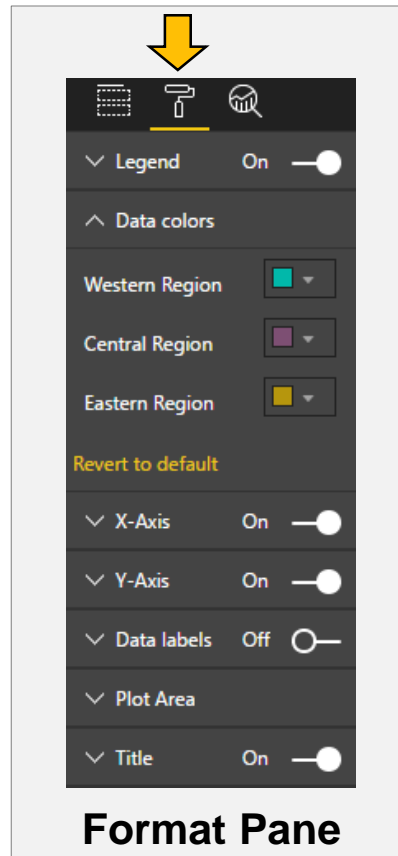
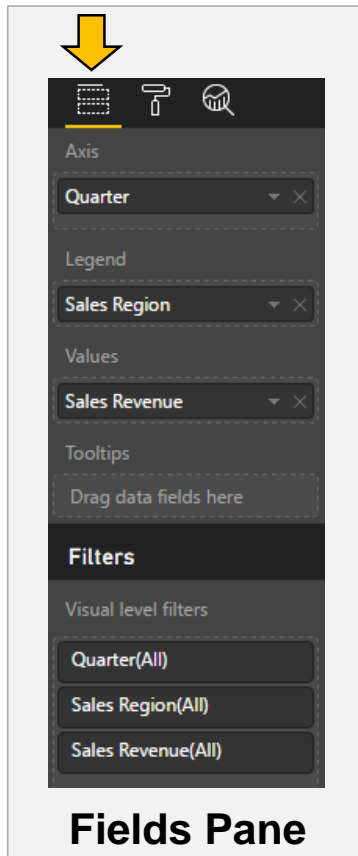


- Visuals creating by using fields from tables inside **Fields** list



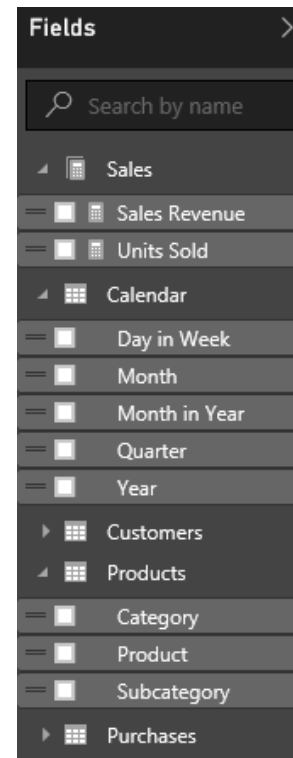
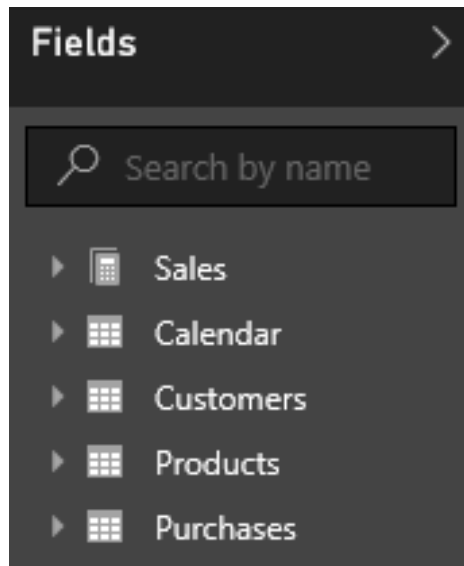
Editing Visual Properties

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



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





DEMO

Getting started with Datasets, Reports and Dashboards

Agenda

- ✓ Developer Introduction to the Power BI Platform
- Developer Opportunities in Power BI
 - Creating PBIX Projects with Power BI Desktop
 - Getting Up and Running with App Workspaces



Developer Opportunities in Power BI

1. Designing App Workspaces and Publishing Apps
2. Programming the Power BI REST API
3. Developing Custom Visuals
4. Embedding Power BI Content in Websites



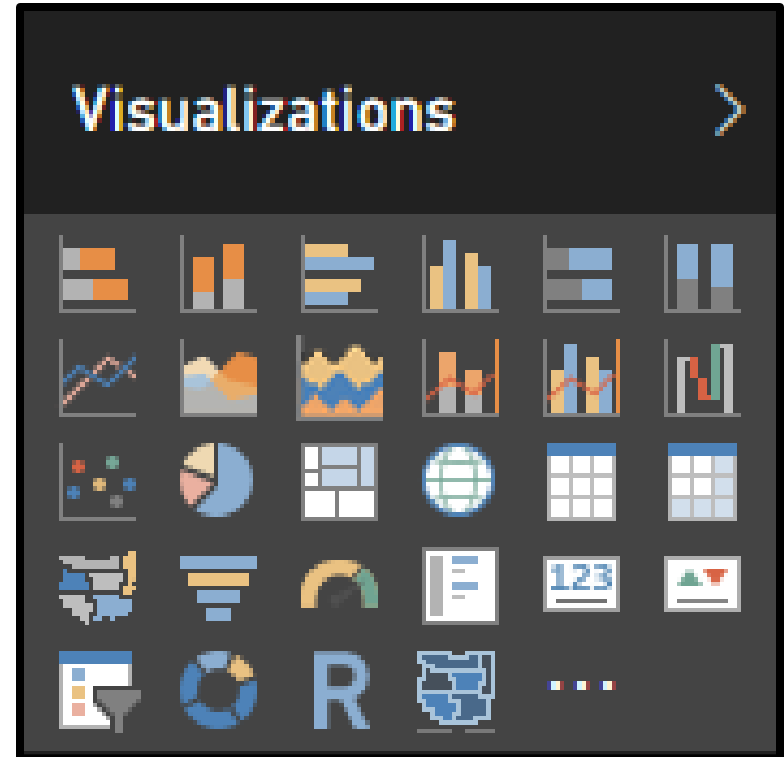
Developing with the Power BI REST API

- Used to develop desktop and web 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
 - Create streaming datasets for real-time dashboards
 - Embed reports, dashboards and tiles into web apps



Built-in Visualization Types

- Table and Matrix
- Bar charts and Column charts
- Pie charts and Doughnut chart
- Line chart and Area chart
- Scatter chart and Combo charts
- Card and Multi-row Card
- Treemap
- Waterfall charts
- Funnel charts
- Gauge charts
- Map and Filled Map
- Slicer
- R script visual
- Shape map (in preview)



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** was Power BI Embedded V1?

- Power BI Embedded V1 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
- Key Points about Power BI Embedded V1
 - It eliminates need for Power BI license for each user
 - It decouples user security from app security
 - It opens up PBI platform to commercial applications
 - now being replaced by newer infrastructure



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. Upload PBIX file to app workspace
 - Use browser, PBI Desktop, PowerShell, Power BI REST API
3. Develop Apps with Embedded Reports, Dashboards and Tiles
 - Can be accomplished using ASP.NET MVC
 - Can be accomplished using Client-side SPA (e.g. Angular app)



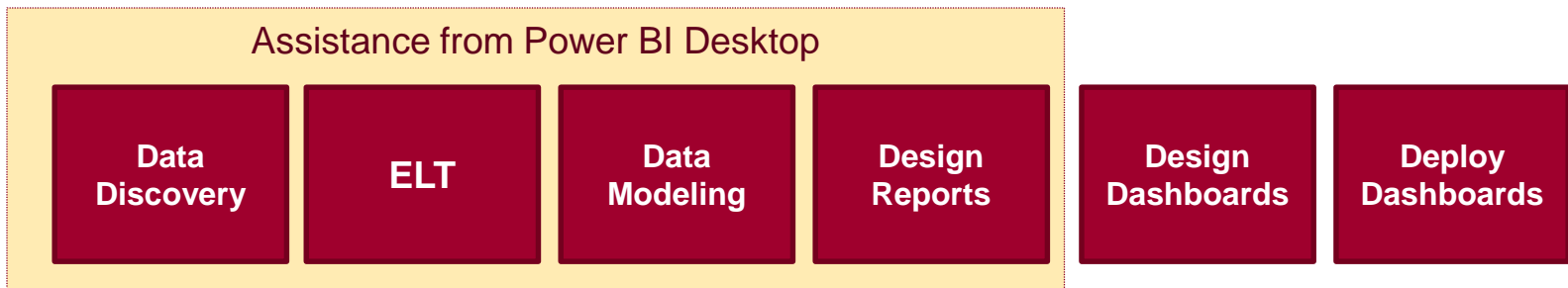
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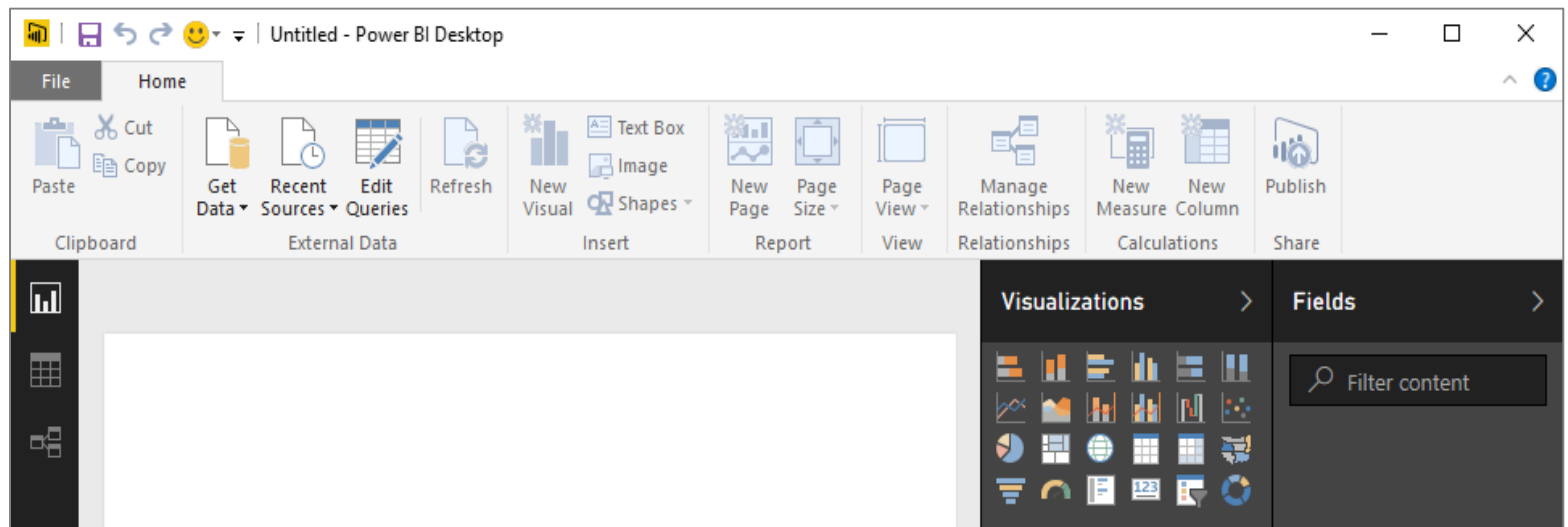
Working with Power BI Desktop

- 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



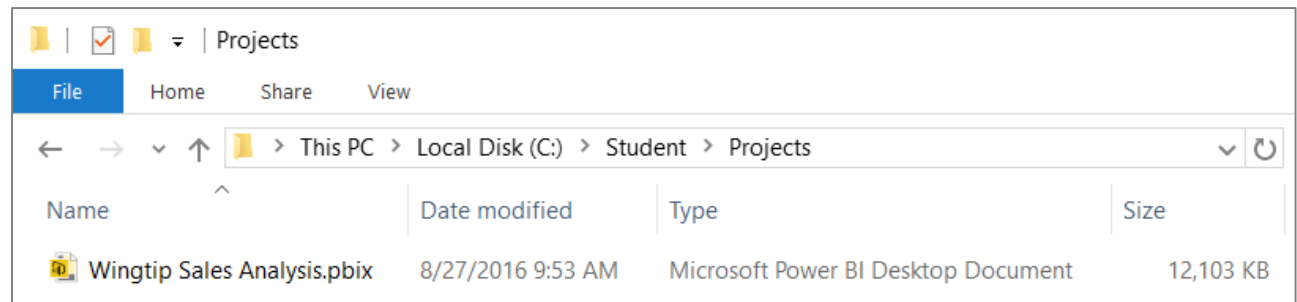
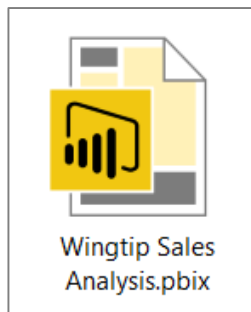
Working with Power BI Desktop

- 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



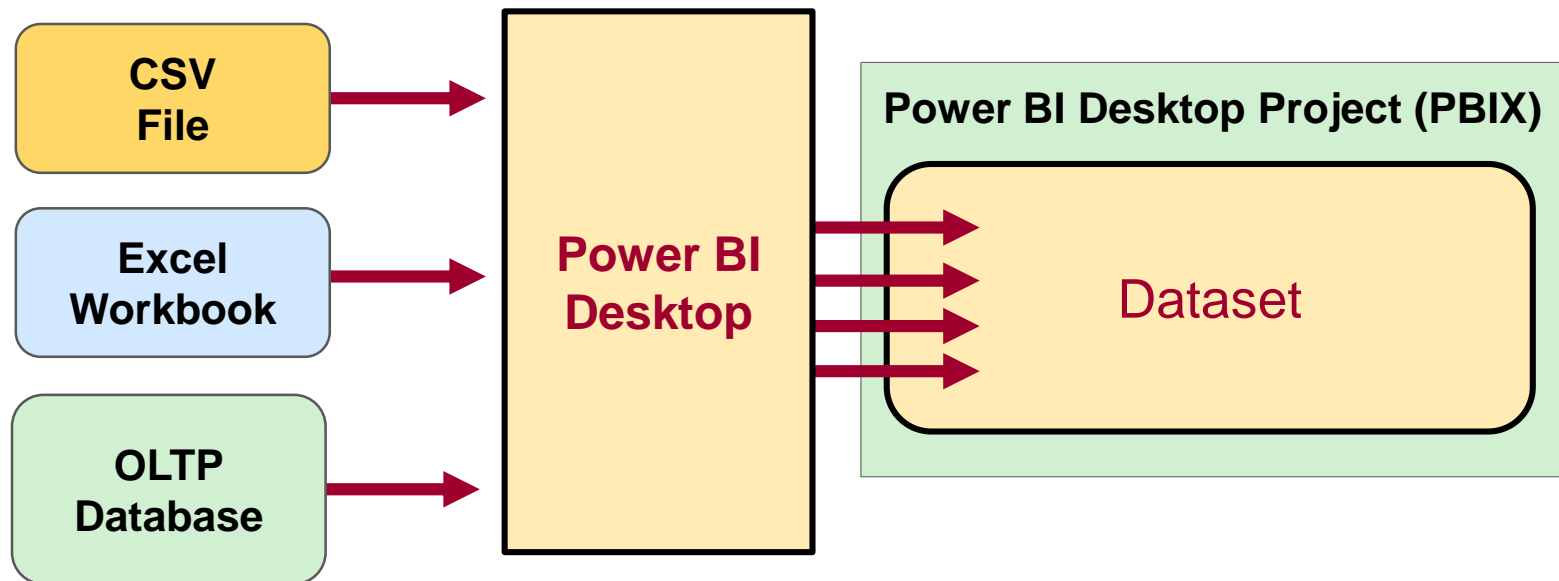
Projects and PBIX Files

- 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



Power BI Desktop is an ETL Tool

- ETL process is essential part of any BI Project
 - **Extract** the data from wherever it lives
 - **Transform** the shape of the data for better analysis
 - **Load** the data into dataset for analysis and reporting



Query Steps

- A query is created as a sequence of steps
 - Each step is a parameterized operation on the data
 - Each step has formula which can be viewed/edited in formula bar
 - Query starts with Source step to extract data from a data source
 - Additional steps added to perform transform operations on data
 - You can replay query operations one by one by clicking on steps

The screenshot displays the Power BI Query Editor interface. At the top, the ribbon includes 'File', 'Home', 'Transform', 'Add Column', and 'View'. Below the ribbon, the 'Formula Bar' is active, showing the formula: `= Table.ReplaceValue("#Replaced Female Values","M","Male",Replacer.ReplaceText,`. A red dashed box highlights the formula bar, with a callout box labeled 'step formula bar' pointing to it. On the left, the 'Queries [6]' pane lists 'Customers', 'Sales', 'Purchases', 'Products', 'SalesRegions', and 'SalesRegionsSort'. The main area shows a data table with columns: CustomerId, Customer, State, City, Zipcode, and Gender. The table contains 14 rows of data. On the right, the 'Query Settings' pane is open, showing the 'Properties' section with 'Name' set to 'Customers'. Below it, the 'Applied Steps' section is highlighted with a red dashed box, showing a sequential list of steps: Source, Navigation, Removed Other Columns, Merged Columns, Reordered Columns, Replaced Female Values, Replaced Male Values (selected), Changed Type, and Added Conditional Column. A callout box labeled 'sequential list of steps for query' points to this list.

CustomerId	Customer	State	City	Zipcode	Gender
1	Nina Diaz	CA	Eureka	95501	Female
2	Melinda Carter	CA	Napa	94558	Female
3	Pam Miller	CA	Napa	94558	Female
4	Merle Blackwell	CA	Sacramento	95823	Female
5	Ariel Hale	CA	Sacramento	95818	Male
6	Randy Carter	CA	Sacramento	95818	Male
7	Lillie Hinton	CA	Eureka	95501	Female
8	Ladonna Moody	CA	Napa	94559	Female
9	Buddy McKay	OR	Bend	97701	Male
10	Warren Sykes	CA	Sacramento	95818	Male
11	Jan Rutledge	OR	Portland	97216	Female
12	Dallas Lester	OR	Eugene	97402	Male
13	Matthew Zimmerman	OR	Portland	97220	Male
14	Sheryl Hernandez	CA	Sacramento	95823	Female

Advanced Editor

- Power BI Desktop based on "M" functional language
 - Query in Power BI Desktop saved as set of M statements in code
 - Query Editor generates code in M behind the scenes
 - Advanced users can view & modify query code in Advanced Editor



Data Modeling with Power BI Desktop

- Steps to create a data model with Power Pivot
 - Create relationships between tables
 - Modify columns (rename, set formatting, convert type)
 - Create calculated columns
 - Create measures
 - Add column metadata
 - Create dimensional hierarchies
 - Add Calendar table(s)



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Understanding App Workspaces

- App workspaces required for team-based development
 - Assets in personal workspaces can only be edited by one person
 - Assets in app workspace can be edited by team members
- App workspaces provide secure, updatable deployment
 - App workspace can be secured using private membership



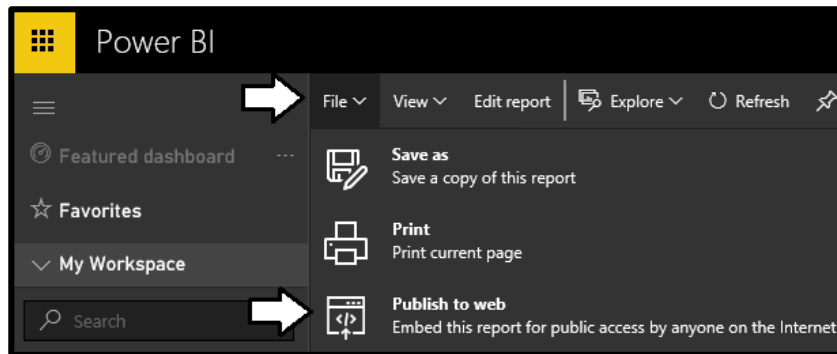


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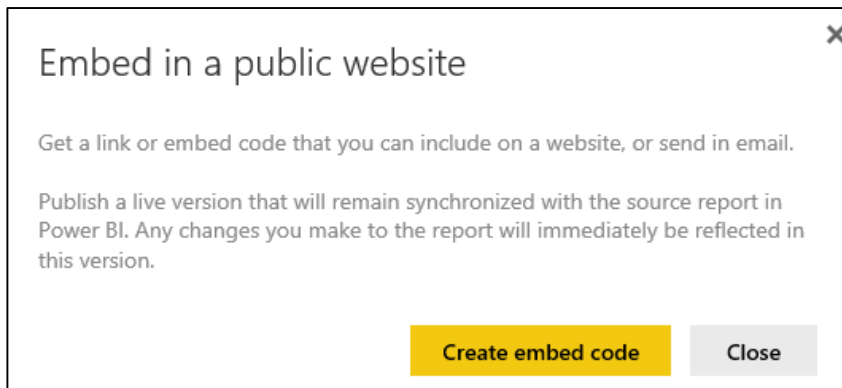
Using an App Workspace to Design and Publish a Power BI App

Publish to Web

- **Publish to Web** command available on reports
 - Not supported for reports and datasets which implement RLS



- **Publish to Web** command used to generate embed codes



Generating Embed Codes

- Used to provide anonymous access to report
 - Provide link which can be posted, emailed or texted
 - Provides **iFrame** HTML element for embedding in public web site

Success! ✕

Link you can send in email

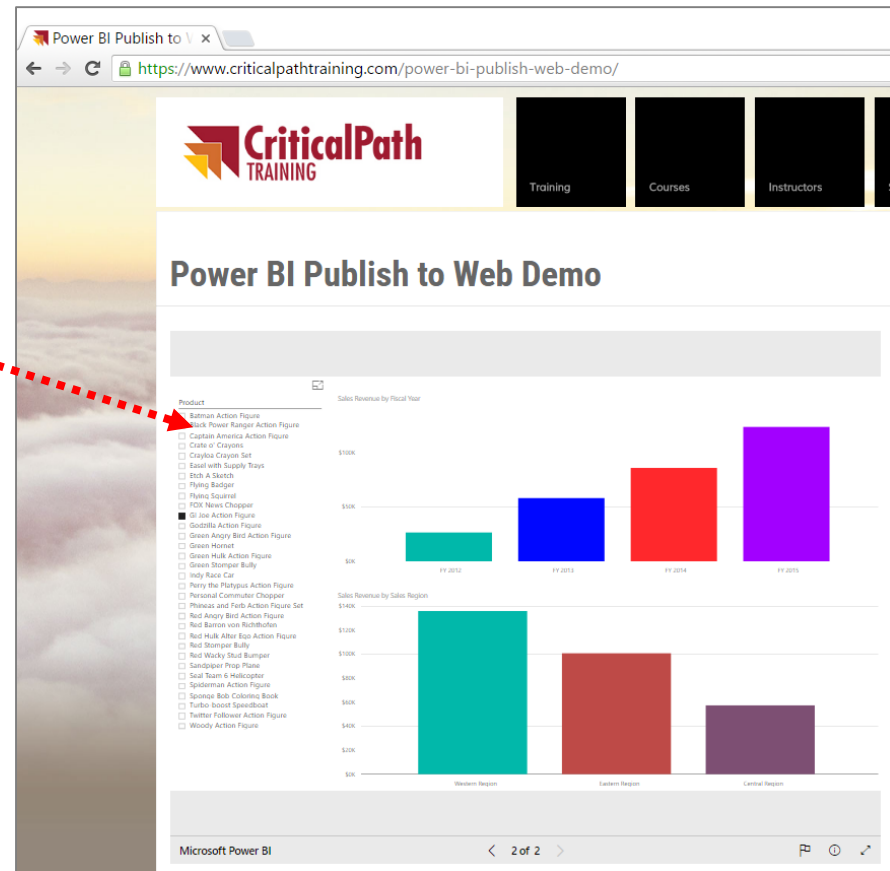
<https://app.powerbi.com/view?r=eyJrljoiYTM3YjlkNzctNWY5My00YTUyLl>

Html you can paste into your blog or website

`<iframe width="933" height="700" src="https://app.powerbi.com/view?r=eyJrljoiYTM3YjlkNzctNWY5My00YTUyLl" />`

Size

Close





DEMO

**Embedding a Report in a Web Appp
using the Publish to Web Feature**

Summary

- ✓ Developer Introduction to the Power BI Platform
- ✓ Developer Opportunities in Power BI
- ✓ Creating PBIX Projects with Power BI Desktop
- ✓ Getting up and Running with App Workspaces

