

# Developer Introduction to Power BI



# Agenda

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



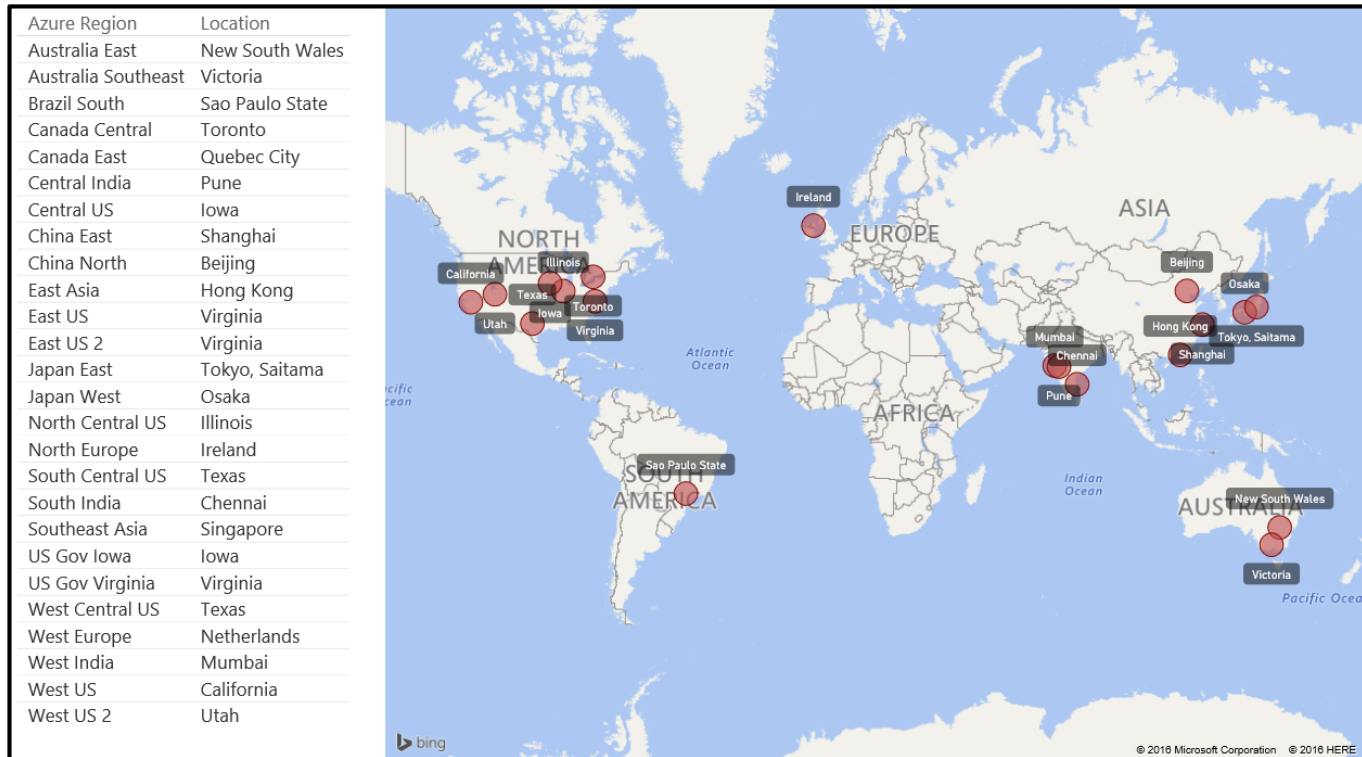
# What is Power BI?

- 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

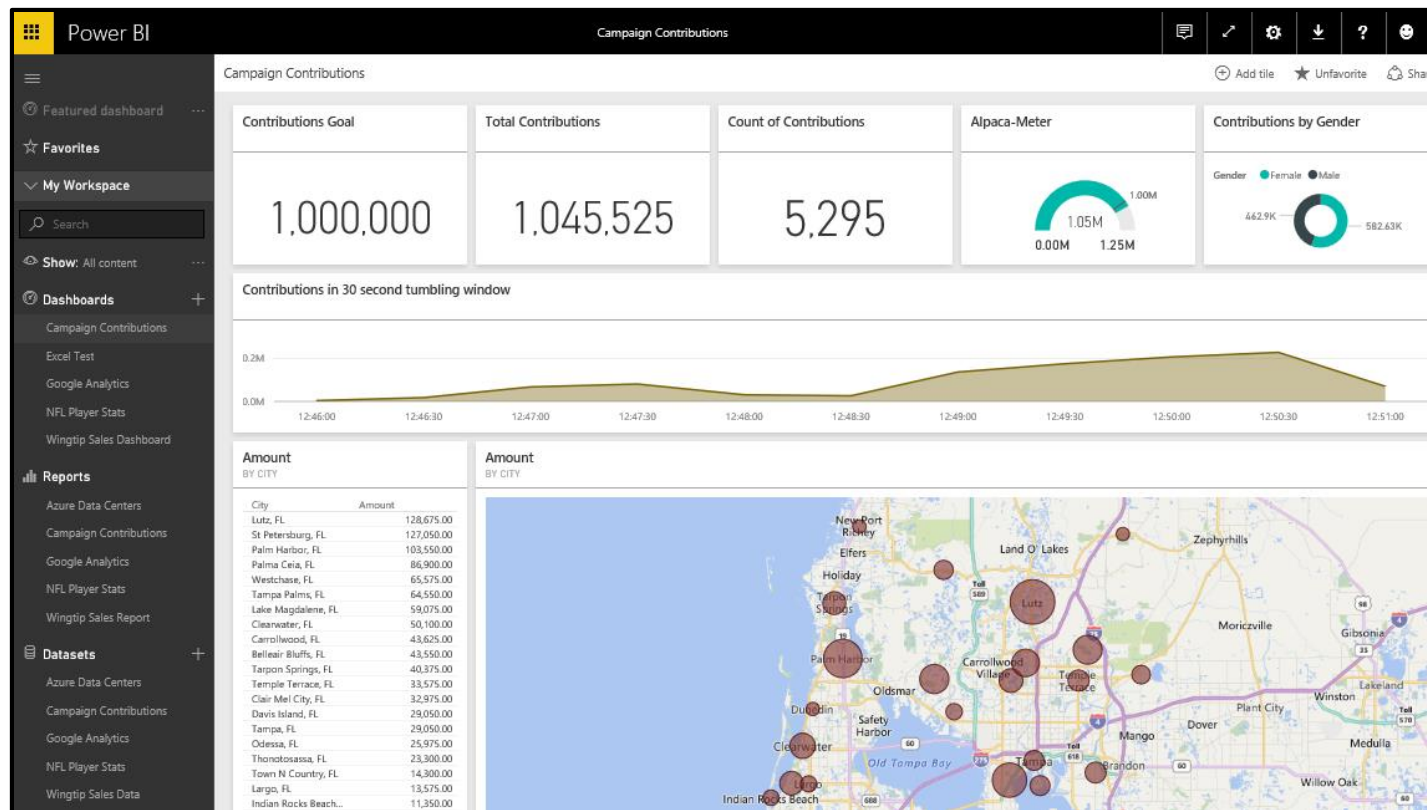
- Power BI is built on top of Microsoft Azure
  - Power BI solutions can be scaled as required
  - Power BI solutions have global reach









# 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 Licensing

- User-based licensing

<p>Power BI (free)</p> <p>\$0.00 user/month</p> <p>A cloud-based business analytics service that enables anyone to visualize and analyze data with greater speed, efficiency, and understanding. It ...</p> <p>Office 2016 desktop &amp; mobile apps Not included</p> <p>Office 365 services </p> <p>...</p>	<p>Power BI Pro</p> <p>\$9.99 user/month</p> <p>A cloud-based business analytics service that enables anyone to visualize and analyze data with greater speed, efficiency, and understanding. Power ...</p> <p>Office 2016 desktop &amp; mobile apps Not included</p> <p>Office 365 services </p> <p>...</p>	<p>Office 365 Enterprise E5</p> <p>\$35.00 user/month</p> <p>The Office suite, plus email, instant messaging, HD video conferencing, 1 TB personal file storage and sharing, and advanced security, analytics and PSTN ...</p> <p>Office 2016 desktop &amp; mobile apps </p> <p>Office 365 services </p> <p>...</p>
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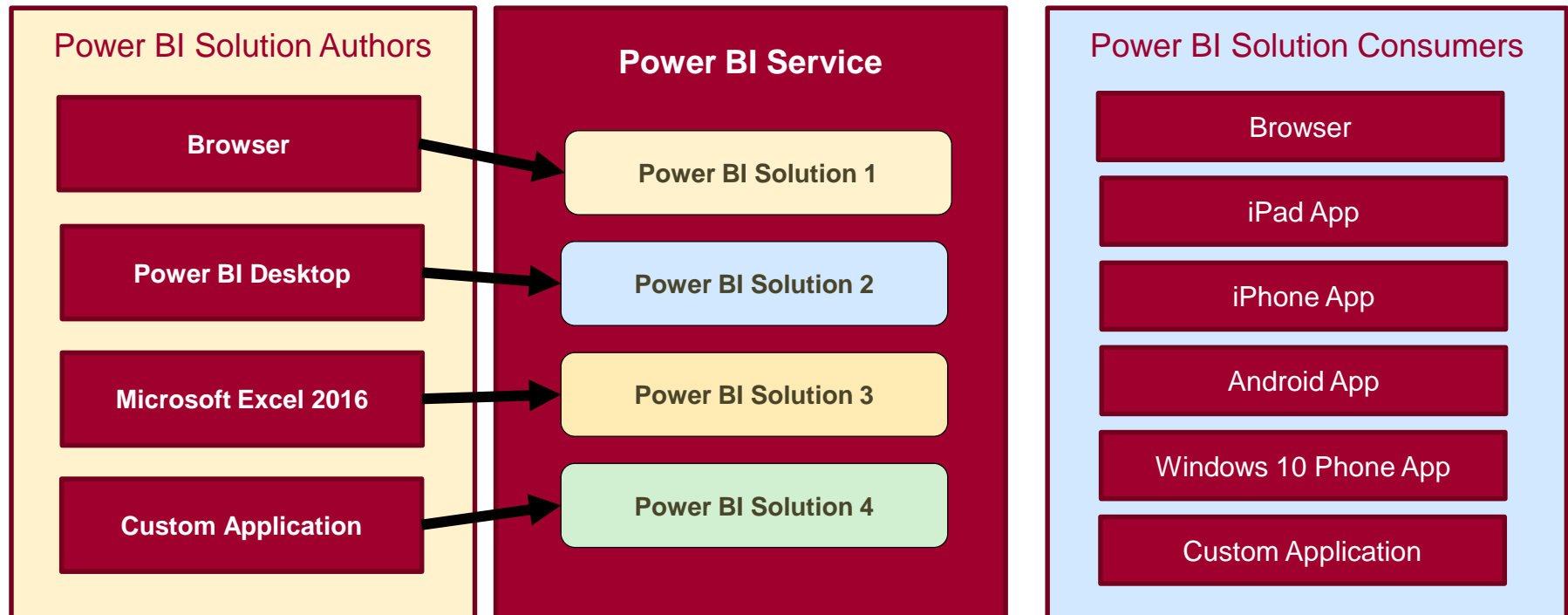
- Capacity-based Licensing

<p>Power BI Premium P1</p> <p>\$4,995.00 instance/month</p> <p>Power BI capacity dedicated to your organization, unlocking unlimited content distribution and dependable performance. P1 offers 8 virtual cores ...</p> <p>Office 2016 desktop &amp; mobile apps Not included</p> <p>Office 365 services </p> <p>...</p>	<p>Power BI Premium P2</p> <p>\$9,995.00 instance/month</p> <p>Power BI capacity dedicated to your organization, unlocking unlimited content distribution and dependable performance. P1 offers 16 virtual cores ...</p> <p>Office 2016 desktop &amp; mobile apps Not included</p> <p>Office 365 services </p> <p>...</p>	<p>Power BI Premium P3</p> <p>\$19,995.00 instance/month</p> <p>Power BI capacity dedicated to your organization, unlocking unlimited content distribution and dependable performance. P1 offers 32 virtual cores ...</p> <p>Office 2016 desktop &amp; mobile apps Not included</p> <p>Office 365 services </p> <p>...</p>	<p>Power BI Premium EM3 (Month to Month)</p> <p>\$2,495.00 instance/month</p> <p>Embed Power BI content in your custom application, powered by 4 virtual cores of dedicated capacity. Some Premium features are disabled ...</p> <p>Office 2016 desktop &amp; mobile apps Not included</p> <p>Office 365 services </p> <p>...</p>
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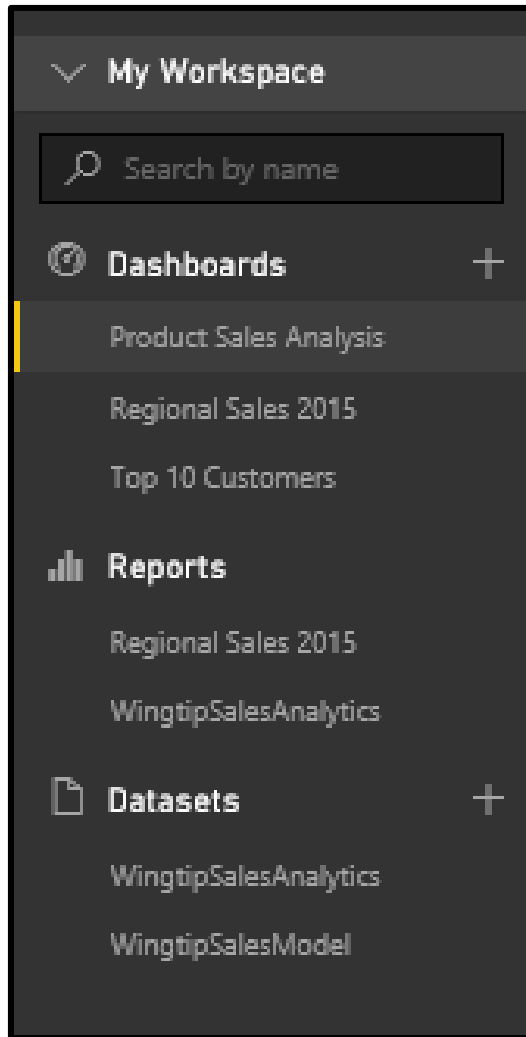
# Power BI Service Architecture

- 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

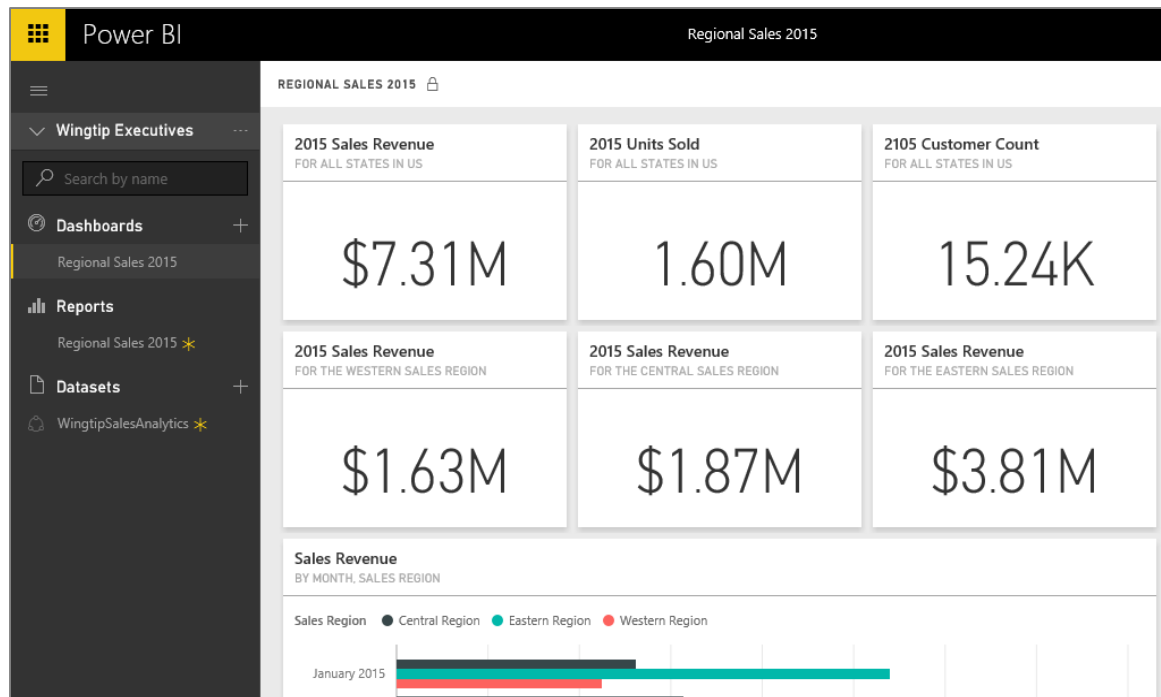


- **Workspace**
  - Provides user context and asset container
  - Every user has personal workspace
  - Team development requires group workspaces
- **Dashboard**
  - Consolidated view into reports and datasets
  - Custom solution entry point for mobile users
- **Report**
  - Collection of pages with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



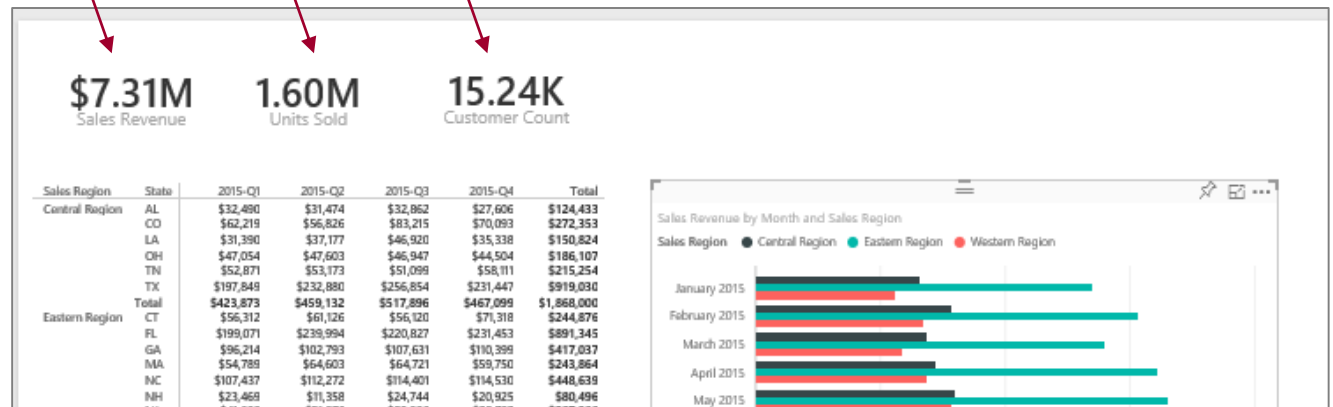
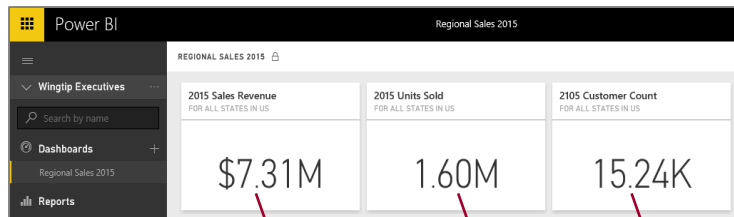
# Dashboards and Tiles

- 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



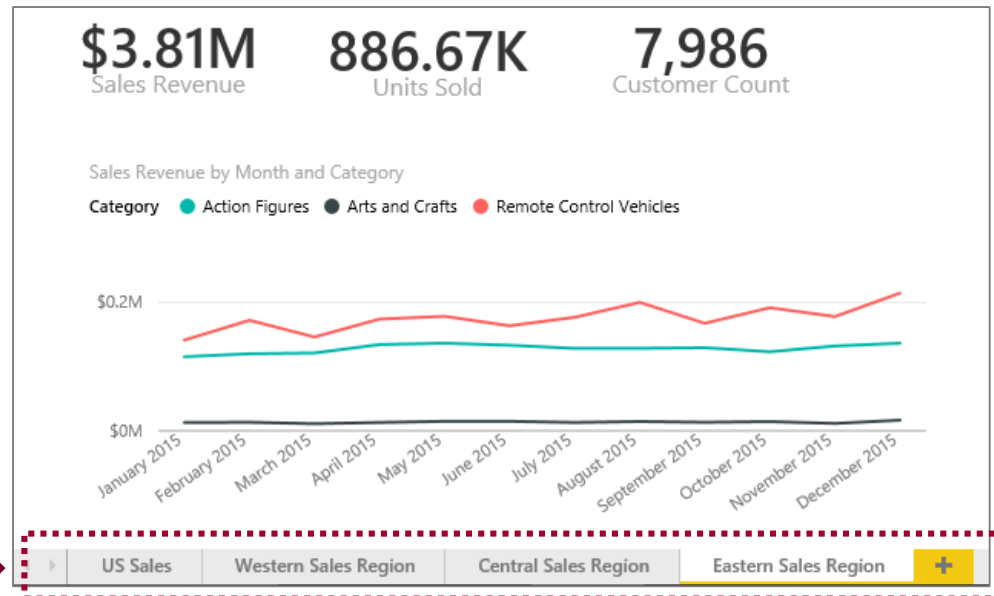
# Dashboards and Reports

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



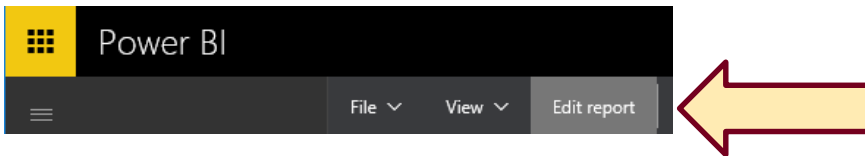
# Reports and Pages

- 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

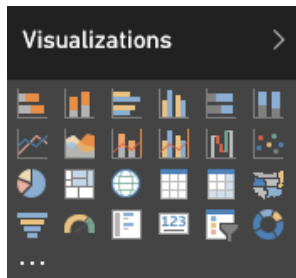
The screenshot displays the Power BI report authoring interface in edit mode. The top navigation bar shows the 'Edit report' button. The main area is divided into three sections: a left sidebar with navigation options (Featured dashboard, Favorites, My Workspace, Dashboards, Reports, Datasets), a central data table, and a right sidebar with visualization and field options. The central data table is titled 'Wingtip Sales Analysis\*' and contains the following data:

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

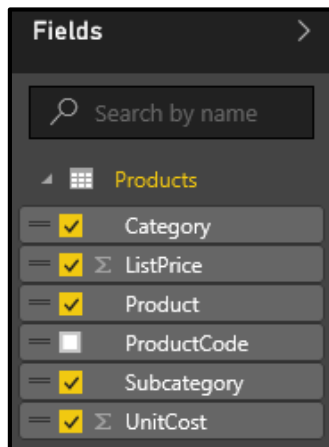
The right sidebar shows the 'Visualizations' pane with various chart types and the 'Fields' pane with a list of available fields (Sales, Calendar, Customers, Products) and their subcategories (Category, Product, Product Rank, Subcategory). The 'Filters' pane shows the current filters applied to the report.

# 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



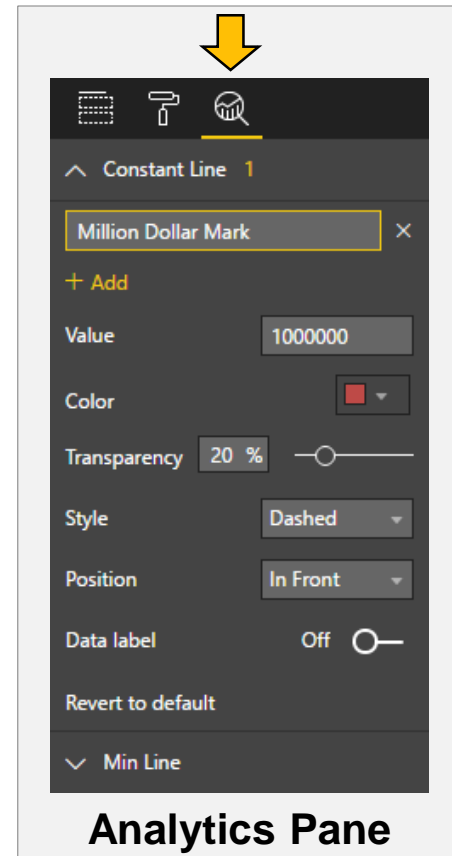
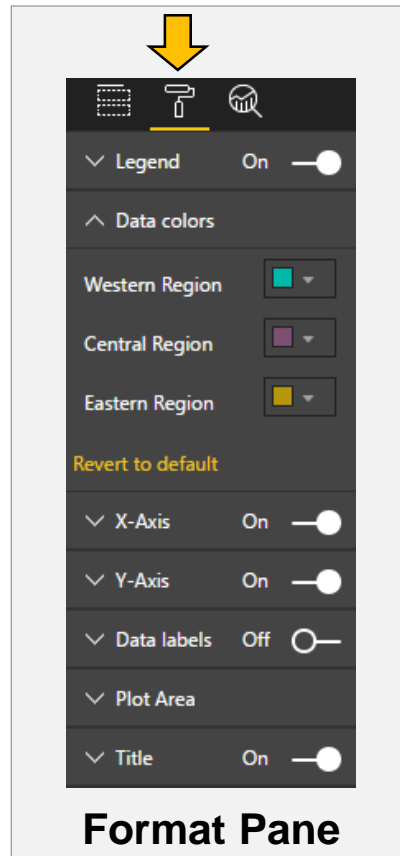
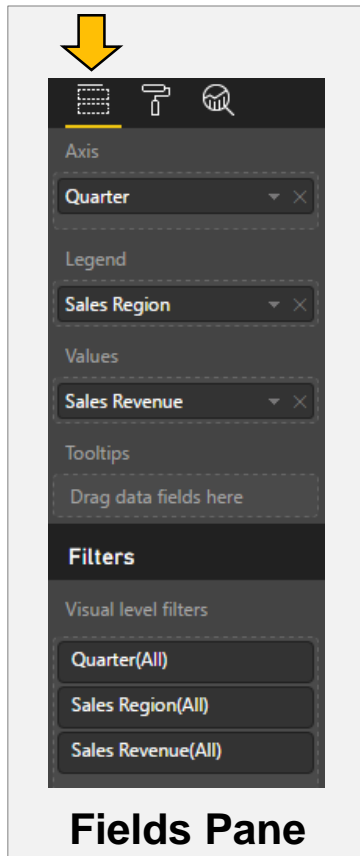
- Visuals creating by using fields from tables inside **Fields** list





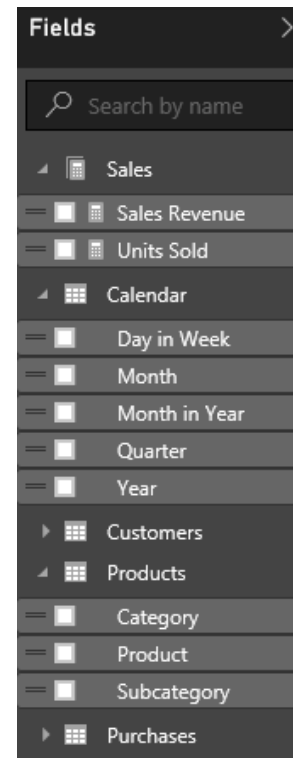
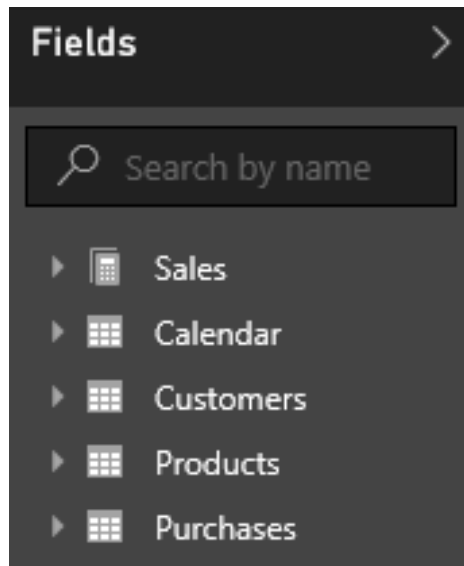
# Editing Visual Properties

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



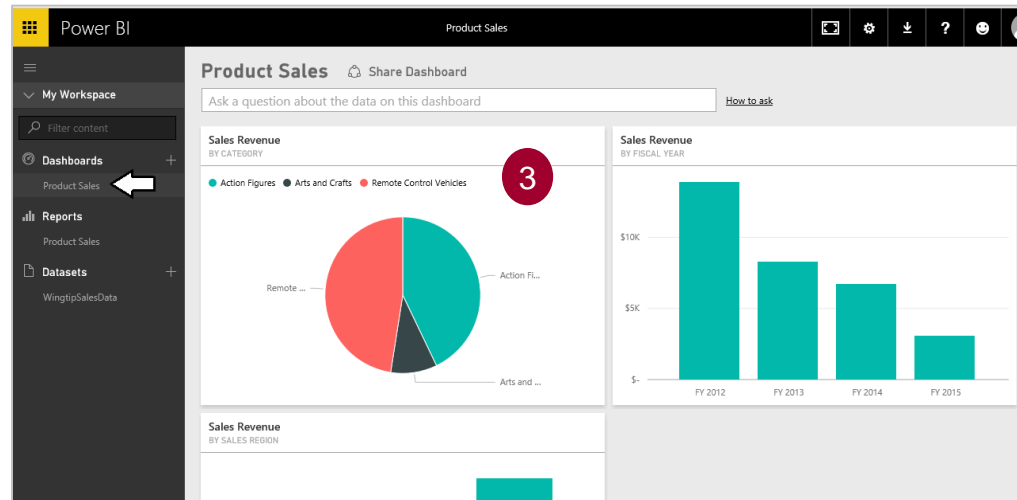
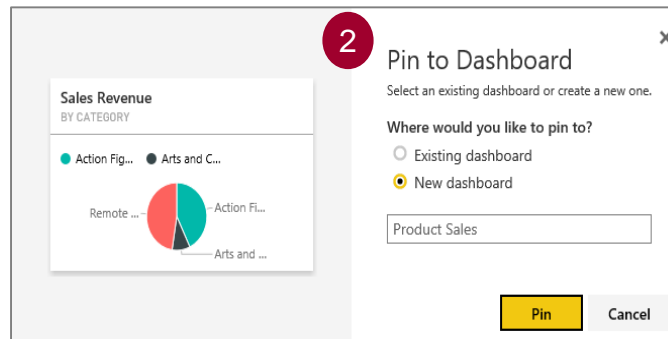
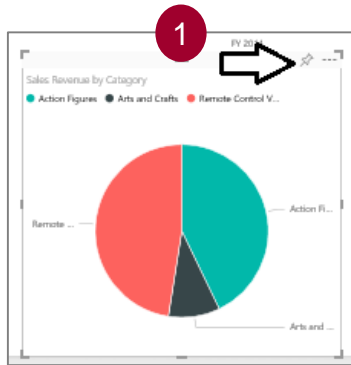
# Report and Datasets

- 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



# Creating Dashboards

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





**DEMO**

# Getting started with Datasets, Reports and Dashboards

# Agenda

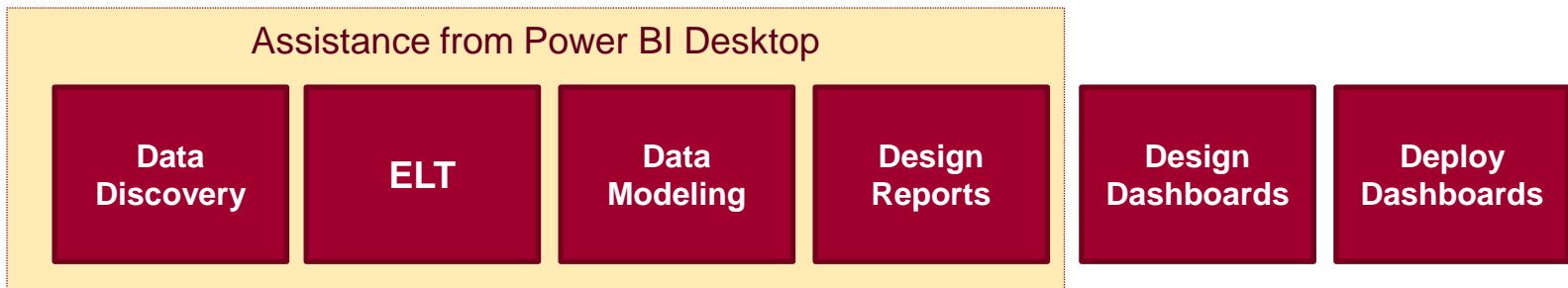
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# Working with Power BI Desktop

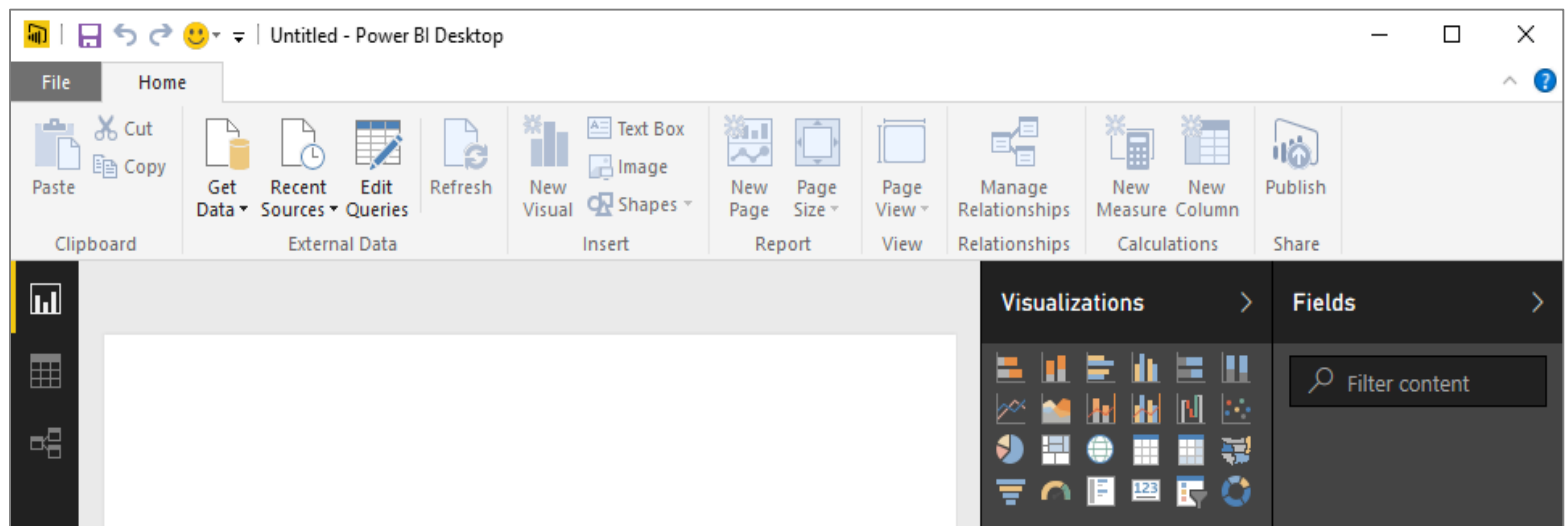
- Power BI Desktop focuses on first four phases
  - Query features for Data Discovery
  - Query features for ETL
  - Design features and DAX language for data modeling
  - Report design using a visual report designer
  - No support for designing dashboards
  - No support for packaging an entire solution





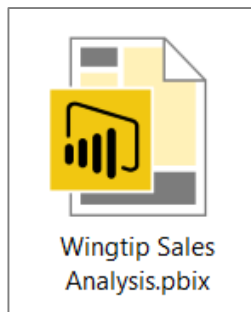
# Working with Power BI Desktop

- 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



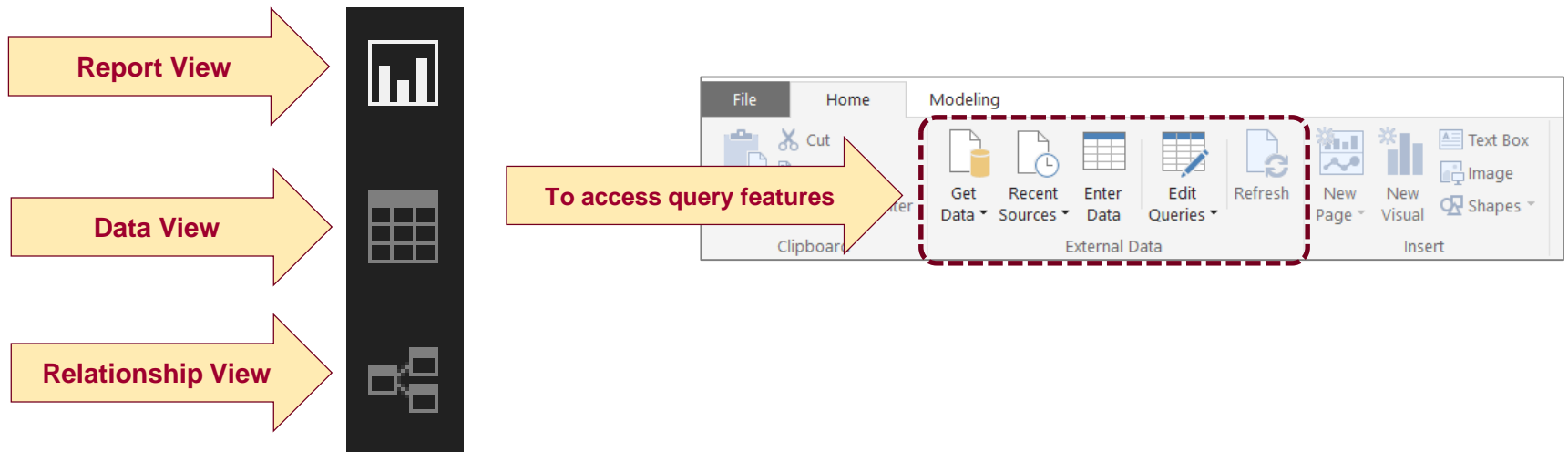
# Projects and PBIX Files

- 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



# 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

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# Developer Opportunities in Power BI

1. Developing Custom Visuals
2. Programming the Power BI Service API
3. Embedding Reports in Custom Applications
4. Developing Solutions with Real-time dashboards
5. Developing Custom Solutions using R
6. Developing Custom Connectors using M





# 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



# Developing with the Power BI Service API

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



# Integrating R with Power BI

- What is R?
  - Platform for statistics, data analysis and visualization
  - Programming language + Runtime layer + Libraries
  - Strong ability to generate statistics and visualizations
- Where can you use R code in Power BI?
  - Inside a query to perform data extraction and cleanup
  - Inside an R visual to generate rich visualizations



# Developing Custom Data Connectors

- Custom Connectors let you write reusable query logic
  - Custom connector is written using M programming language
  - Custom connector can be used across PBIX project files
- Common motivation for developing a custom connector
  - Creating a friendly view of a REST API for business analyst
  - Providing branding on top of existing connector
  - Exposing a limited/filtered view over your data source
  - Control how mashup engine authenticates against datasource
  - Implementing OAuth v2 authentication flow for a SaaS offering



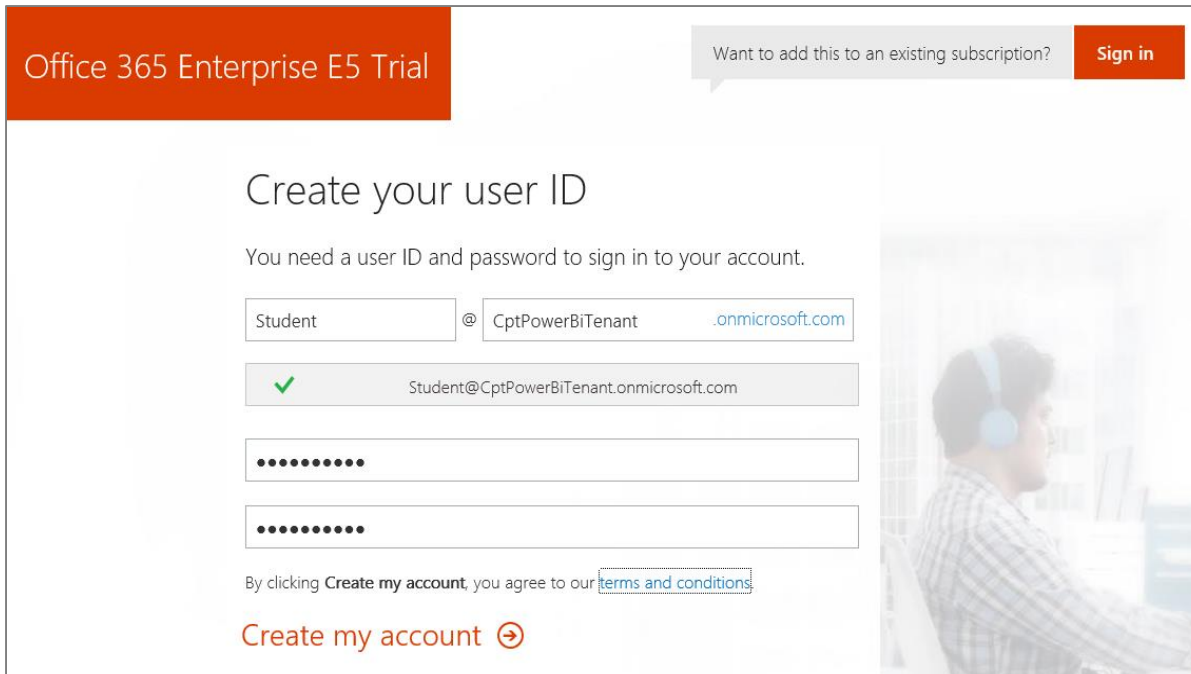
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# Creating a Power BI Dev Environment

- 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



The screenshot shows the 'Office 365 Enterprise E5 Trial' sign-up page. At the top left, there is an orange banner with the text 'Office 365 Enterprise E5 Trial'. To the right of this banner, there is a grey box with the text 'Want to add this to an existing subscription?' and an orange 'Sign in' button. The main heading is 'Create your user ID'. Below this, it says 'You need a user ID and password to sign in to your account.' There are two input fields: the first contains 'Student' and the second contains 'CptPowerBiTenant.onmicrosoft.com'. Below these fields is a green checkmark icon and the text 'Student@CptPowerBiTenant.onmicrosoft.com'. There are two more input fields, both containing dots, representing password fields. At the bottom, it says 'By clicking Create my account, you agree to our [terms and conditions](#)'. Below this is an orange 'Create my account' button with a right arrow icon. On the right side of the page, there is a blurred image of a person wearing a headset and working at a computer.





# 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

The screenshot displays the Office 365 Admin Center interface. The left-hand navigation pane includes links for Home, Users, Active users (selected), Contacts, Deleted users, Data migration, Groups, and Resources. The main content area is titled 'Home > Active users' and shows a list of active users. At the top of the list, there are controls for '+ Add a user', a 'More' dropdown, a 'Filters' dropdown set to 'All users', a search bar, and an 'Export' button. The user list contains two entries: James Bond and Ted Pattison, both with Office 365 Enterprise E5 licenses. Below the list, there are three informational cards: '+ User' (explaining that users are people in the organization), 'Types of users' (explaining different user types), and 'Filters' (explaining how filtering helps manage the list).

	Display name	User name	Status
<input type="checkbox"/>	James Bond	JamesB@PowerBiBootcamp.onmicrosoft.com	Office 365 Enterprise E5
<input type="checkbox"/>	Ted Pattison	Student@PowerBiBootcamp.onmicrosoft.com	Office 365 Enterprise E5



# Creating User Accounts for Testing

- Can be accomplished in Microsoft 365 Admin center
- Can be automated using PowerShell

```
CreateUserAccountsFromCSV.ps1 X
27
28 $mailNickname = $firstNameClean + $lastNameClean.SubString(0,1)
29 $userPrincipalName = $mailNickname + "@" + $classroomDomain
30
31 $password = "pass@word1"
32 $passwordProfile = New-Object -TypeName Microsoft.Open.AzureAD.Model.PasswordProfile
33 $passwordProfile.Password = $password
34 $passwordProfile.EnforceChangePasswordPolicy = $false
35 $passwordProfile.ForceChangePasswordNextLogin = $false
36
37 # Create new user account for student
38 $newUser = New-AzureADUser `
39     -DisplayName $displayName `
40     -GivenName $firstName `
41     -Surname $lastName `
42     -MailNickName $mailNickname `
43     -PasswordProfile $passwordProfile `
44     -PasswordPolicies "DisablePasswordExpiration, DisableStrongPassword" `
45     -UserPrincipalName $userPrincipalName `
46     -UsageLocation "US" `
47     -AccountEnabled $True
48
```





**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

## 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...



# Power BI Community Forums

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

Home - Microsoft Power

Secure | <https://community.powerbi.com>

Apps Google GitHub O365 Admin Power BI Azure Portal PowerApps OneDrive SPO Site

Microsoft | Power BI Products Solutions Partners Learn

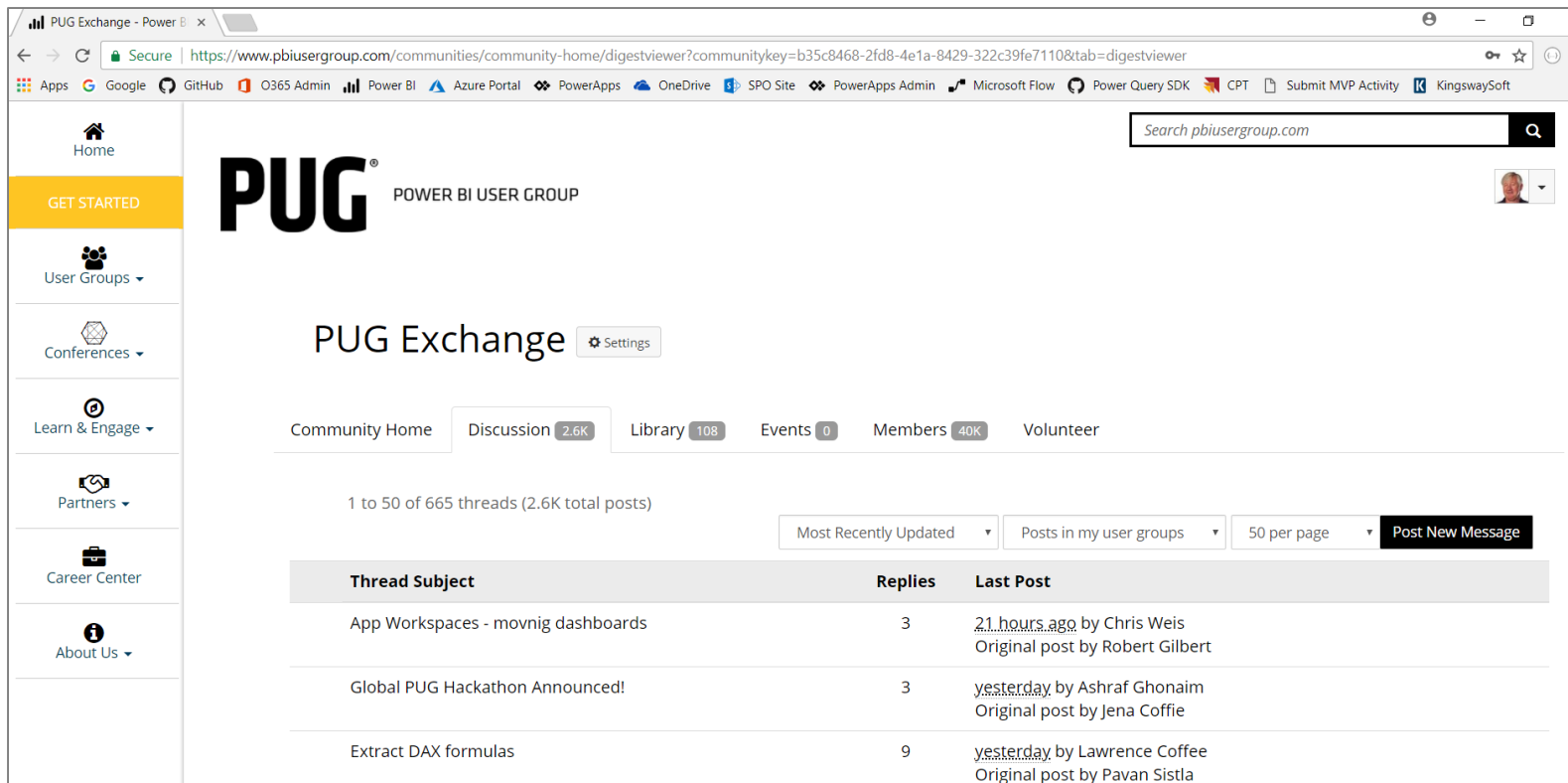
Forums (9 Items)

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



# Power BI User Group (PUG)

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



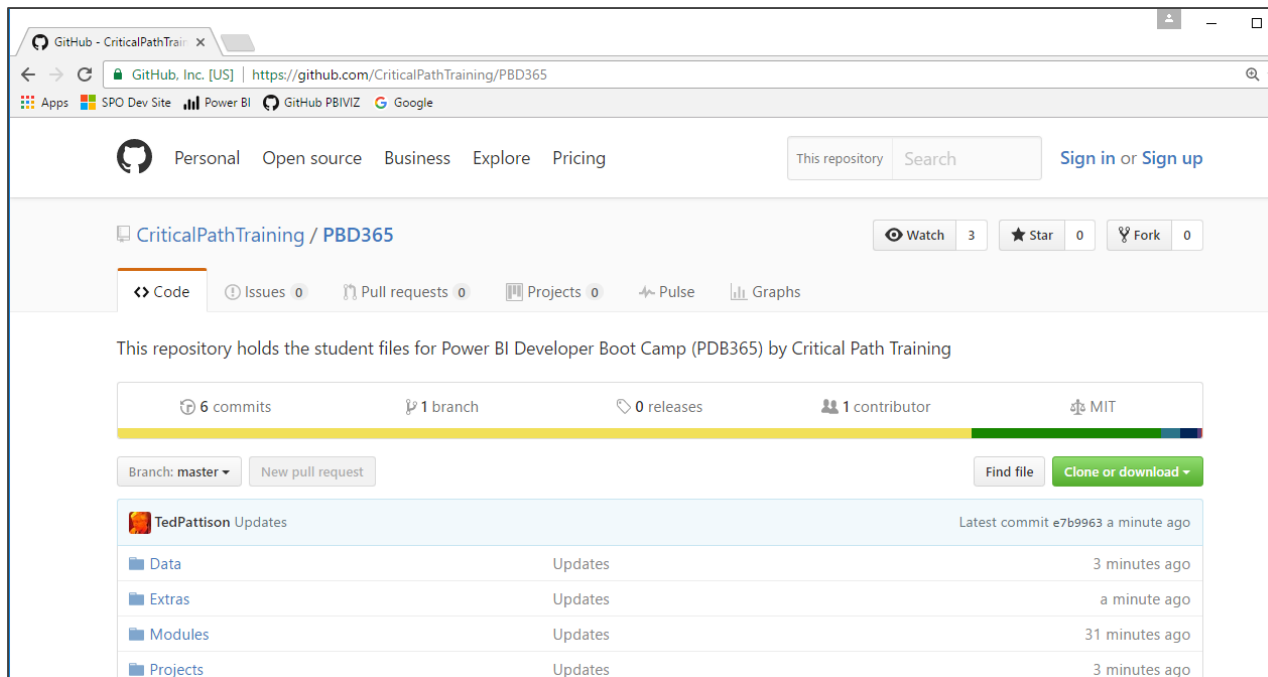
The screenshot shows the PUG Exchange website interface. The left sidebar contains navigation links: Home, GET STARTED, User Groups, Conferences, Learn & Engage, Partners, Career Center, and About Us. The main header features the PUG logo and the text 'POWER BI USER GROUP'. Below the header, the 'PUG Exchange' section includes a 'Settings' button and a navigation bar with links to Community Home, Discussion (2.6K), Library (108), Events (0), Members (40K), and Volunteer. The main content area displays a list of discussion threads, showing 1 to 50 of 665 threads (2.6K total posts). The threads are sorted by 'Most Recently Updated' and show 50 posts per page. A 'Post New Message' button is located at the bottom right of the thread list.

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



# 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>





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