

A map of the United States with several 3D teal bar charts of varying heights placed on different states. The tallest bar is in New York, followed by Florida, Tennessee, and a smaller one in Pennsylvania. The map shows state boundaries and names, with the Gulf of Mexico visible at the bottom.

Introduction to Power BI

DASHBOARDING, REPORTING, AND ANALYTICS

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Preface

Resources

Microsoft Power BI Guided Learning	https://powerbi.microsoft.com/en-us/guided-learning/
Power BI Documentation	https://powerbi.microsoft.com/en-us/documentation/powerbi-desktop-getting-started/
Pragmatic Works – Power BI Custom Visuals	https://www.youtube.com/user/PragmaticWorks/playlists
Microsoft Power BI Monthly Updates & Talks	https://www.youtube.com/user/mspowerbi/videos
Power BI Tips	https://powerbi.tips/
Power BI Voting	https://ideas.powerbi.com/forums/265200-power-bi-ideas
Power BI Gallery	http://community.powerbi.com/t5/Galleries/ct-p/Galleries
Power BI Blog	https://powerbi.microsoft.com/en-us/blog/
PowerPivotPro – Resources for both PowerPivot and Power BI	https://powerpivotpro.com/
PowerDax – Resource Stack	http://www.powerdax.com/power-bi-training-resources/
RickGrantham – Resource Stack	http://www.rickgrantham.com/excel-resources/power-bi/
MsSQLTips – Power BI Tips	https://www.mssqltips.com/sql-server-tip-category/211/power-bi/
Guy In A Cube – Microsoft Business Analytics & Reporting	https://www.youtube.com/channel/UCFp1vaKzpfvoGai0vE5VJ0w/videos

Supplementary Disclaimer

This is a training document demonstrating how to get started with Power BI.

This document does not go into depth on how to perform advance analytics, data visualization, or financial reporting. However, the document does provide insights on the capabilities of Power BI, its fundamentals, and a brief philosophy on good reporting design. If you have any question or issue, please troubleshoot them by using “google” or the “resources” provided.

Furthermore, Power BI product is constantly updating. New features may be introduce by the time this document comes out. This document will not always be up-to-date so please review the document’s official release date and check for new Power BI updates online.

~ Anyways, Happy DashBoarding ~

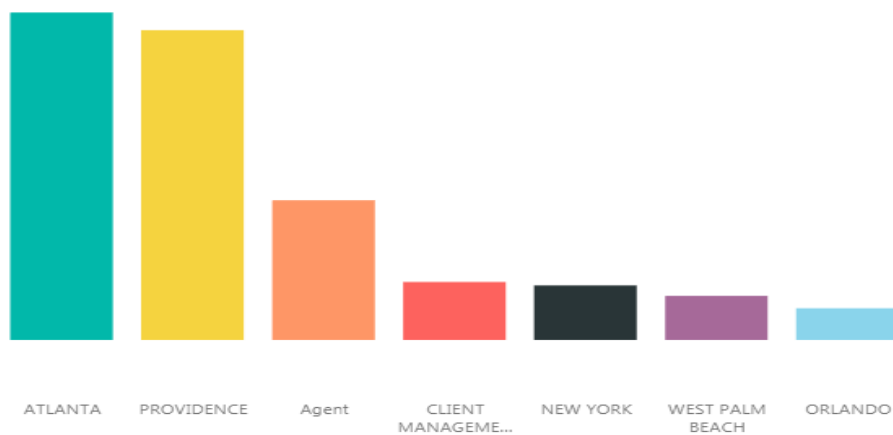
Introduction

What is Power BI

According to Microsoft:

“

Power BI is a cloud-based business analytics service that enables anyone to visualize and analyze data with greater speed, efficiency, and understanding. It connects users to a broad range of data through easy-to-use dashboards, interactive reports, and compelling visualizations that bring data to life.



Download and Installation

Power BI Desktop

<https://powerbi.microsoft.com/en-us/desktop/>

Power BI desktop is free to download. Click the link above to get started. Avoid entering your personal information, unless you want Power BI updates or newsletters.

Power BI Publisher for Excel (Optional)

<https://powerbi.microsoft.com/en-us/excel-dashboard-publisher/>

Power BI publisher is an ADD-IN for Excel. It allows you to pin images of your excel workbook to an online dashboard. Power BI publisher also makes it easier to connect to data stored online.

Power BI Mobile

<https://powerbi.microsoft.com/en-us/mobile/>

Power BI mobile is free to download on all smartphone devices.

>>> (To Download: Search “Microsoft Power BI” in the *Google Play* or *App Store* using your phone.)

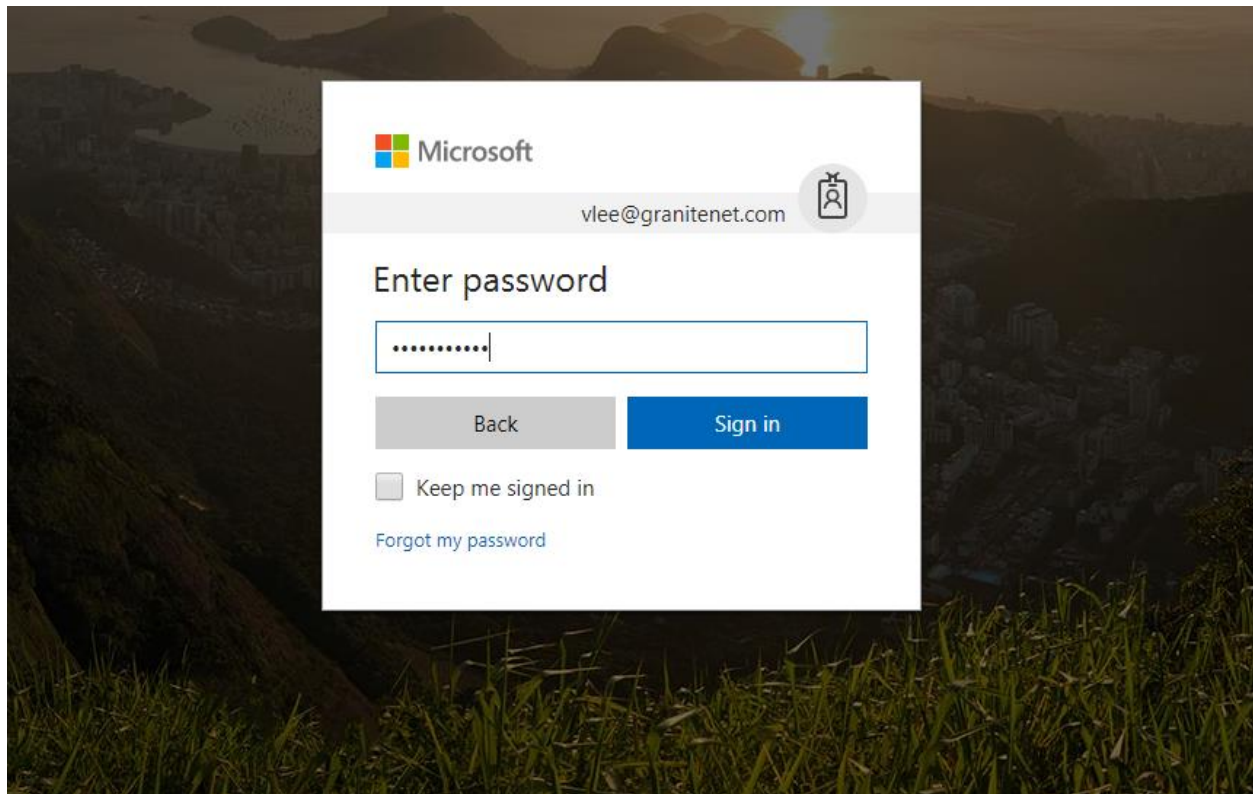
After it has finished downloading, run the application. Click the menu icon to go to your assign workspace.

Accessing Your Power BI Account

Power BI Online

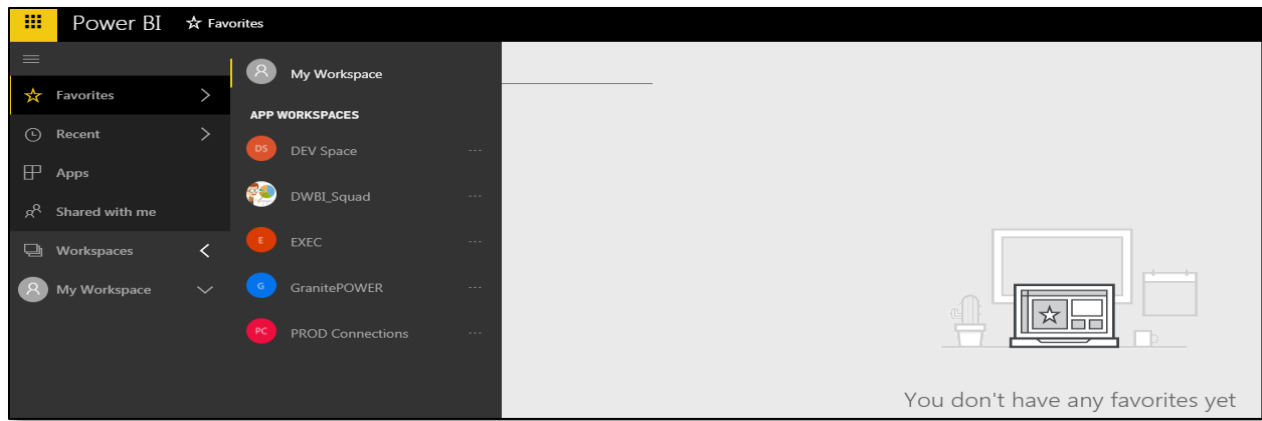
To access Power BI Online: you must first login to your Microsoft account via your granite credentials.

<https://powerbi.microsoft.com/en-us/desktop/>



Workspaces are usually already assigned to you by the administrator of your team. If you're not in a workspace ask the administrator or someone in your team to add you as a member.

Note: Before you create a new workspace, please ask your manager or whoever you report to for permission. We do not want to have dozens of floating workspaces here at Granite.

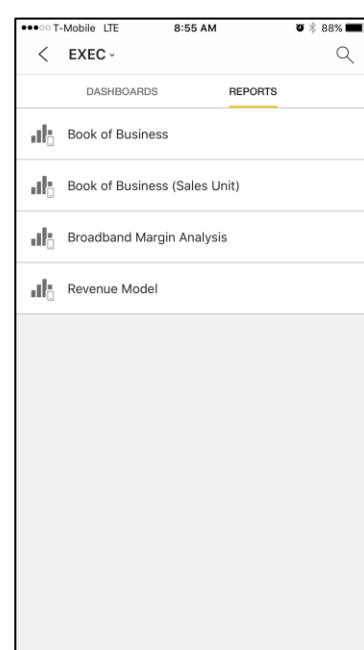
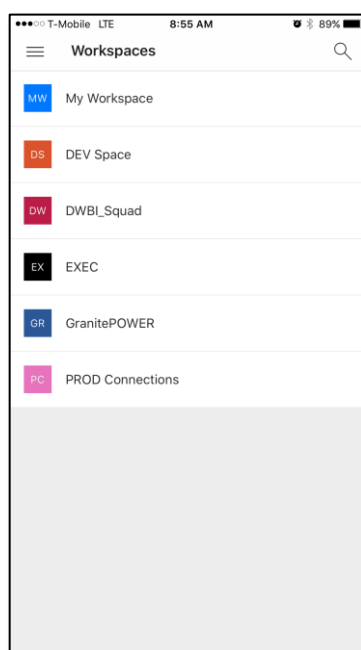
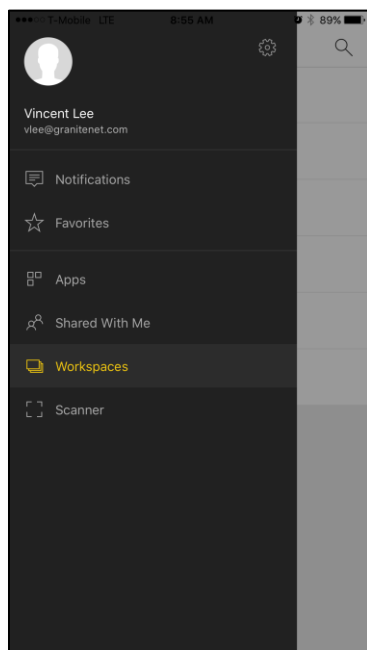


Power BI Mobile Access

To access Power BI Mobile:

Download to App > Login via Granite Credentials > Select Menu Icon > Select Your Assigned Workspace

Note: If a report is not built for mobile view (which it should) adjust it by flipping the phone horizontally.



T-Mobile LTE 10:07 AM 84%

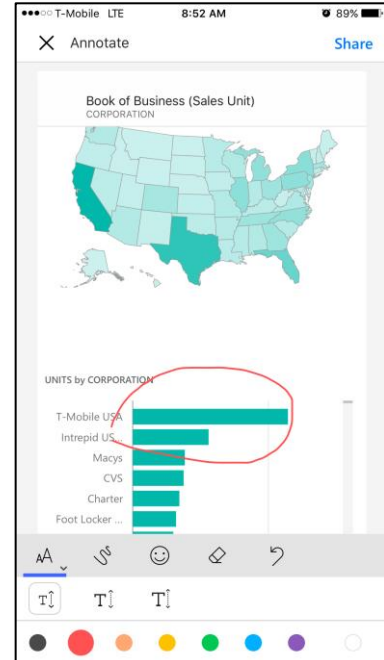
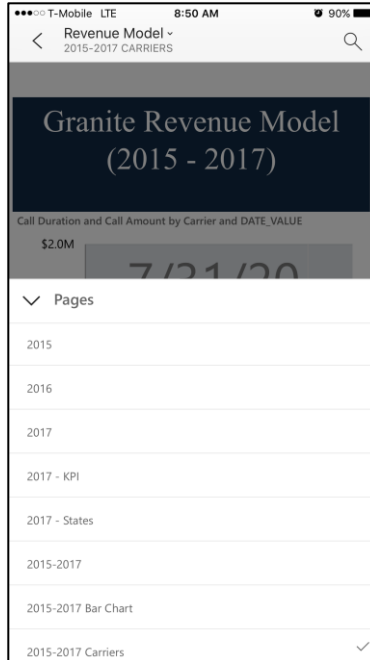
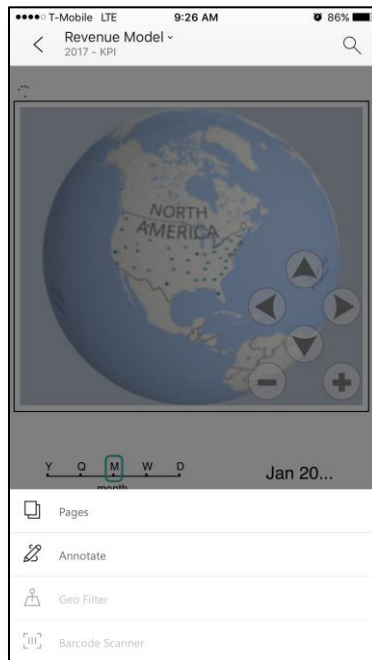
< Book of Business v TOP 10

25	JIM CHIAPPONE	PROV
26	KEVIN NICHOLS	QUIN
27	JAMES EASTON	ATLA
28	MARK CAMERON	CLIEP
29	CRAIG BOZZARIO	PROV
30	ZACHARY WILLIAMS	ATLA
31	JUSTIN HOWES	QUIN
32	JENNIFER CHU	QUIN
33	ALEX BRITO	QUIN
34	JONATHAN REECE	ATLA
35	DANIEL SENTENO	QUIN
36	ALEX NEALE	ATLA
37	BRIAN NELSON	QUIN
38	CHRISTOPHER JOHNSON	ATLA
39	PAUL SULLIVAN	PROV
40	DAMON MASON	ATLA
41	GEORGE SCHUBERT	WES
42	RAMON LUGO	NEW
43	JAMES WOLOSKI	PROV
44	MICHAEL PARKIN	PROV
45	JUSTIN ZUCCHINI	WES
46	CHETT ROLE	ATLA



Power BI mobile has additional features such as:

- Page Selection (No need the swipe left or right)
- Annotation (Write on-screen messages when sending reports)
- Geo Filtering (Filters the data based on your phone's location data)
- Barcode Scanner (Get reports on your phone by scanning a QR code)



Keys to Success

After downloading Power BI, you are now able to build dashboards, reports, and data visualizations.

“

A key metric for success when building a good dashboard or report is to allow the audience to quickly examine and understand large amounts of data in the most effective manner. We want to be able to convey a story in which the underlying data tells us about the raw information. We want to build our reports catered to our audience. Ideally, we would like to showcase KPIs, expose issues or areas that need improvement, and perform detail analytics to help us better predict future opportunities.

If you have any questions about this document feel free to email: vlee@granitenet.com

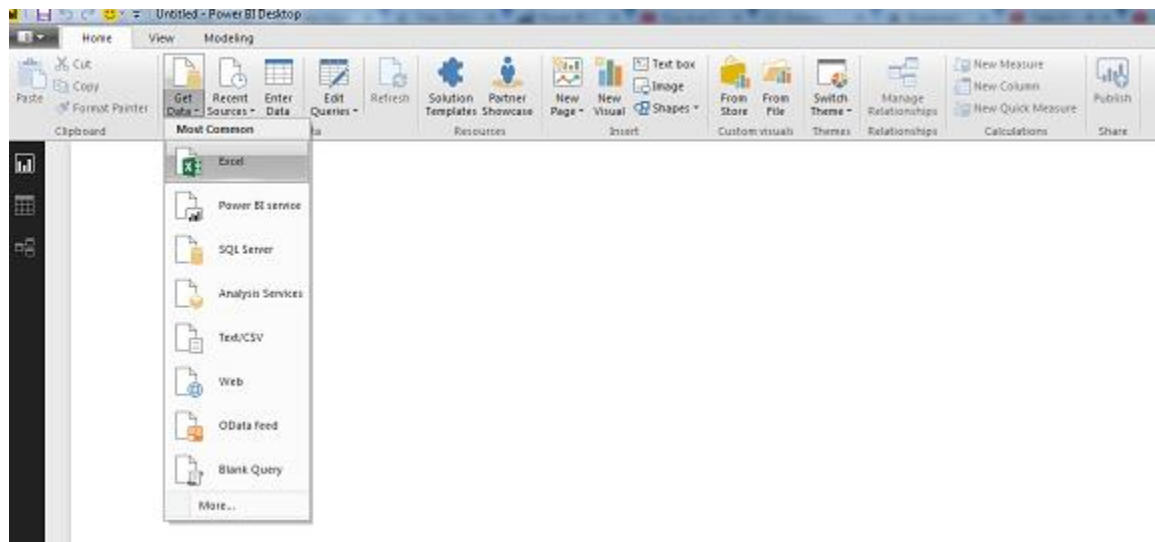
Data Management

Pulling In Your Data

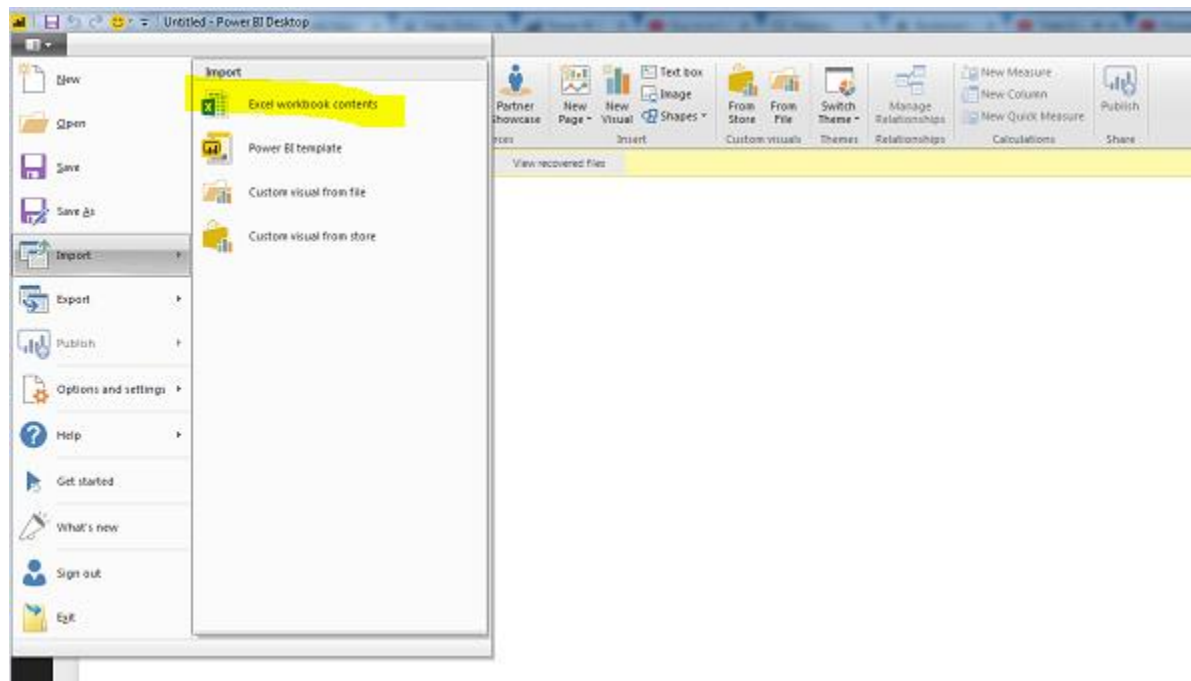
Live Connection	Import
PRO	CON
<ul style="list-style-type: none">You do not have to set refresh schedules. Live connection automatically refreshes for you.Performance is based on server-side. Queries do not consume local storage memory/space.Perfect for large datasets that you normally cannot import or pull into Excel / Power BI.Easier to manage reports for larger audiences.	<ul style="list-style-type: none">You must set your own refresh schedulesData Imports are slow at first (depending on the size of your dataset), but once you finish querying your data; performance does not become an issue.Power BI files are limited to a file size of 1 GB.Power BI allows each user 10 GB upload space.
CON	PRO
<ul style="list-style-type: none">You get the data “AS IS,” meaning you do not have the option to perform detail data manipulation such as writing DAX, creating new columns, etc.You do not have the ability to write in an online search box using natural language processing.	<ul style="list-style-type: none">You can manipulate and transform the data however you want. You can make changes to the data similar to how you would with excel.You have natural language processing / Q&A / Cortana. Essentially, this is an ability that allows you to write questions in a search box.

Importing Data through Excel / Power Pivot

EXCEL) Get Data > Excel > File



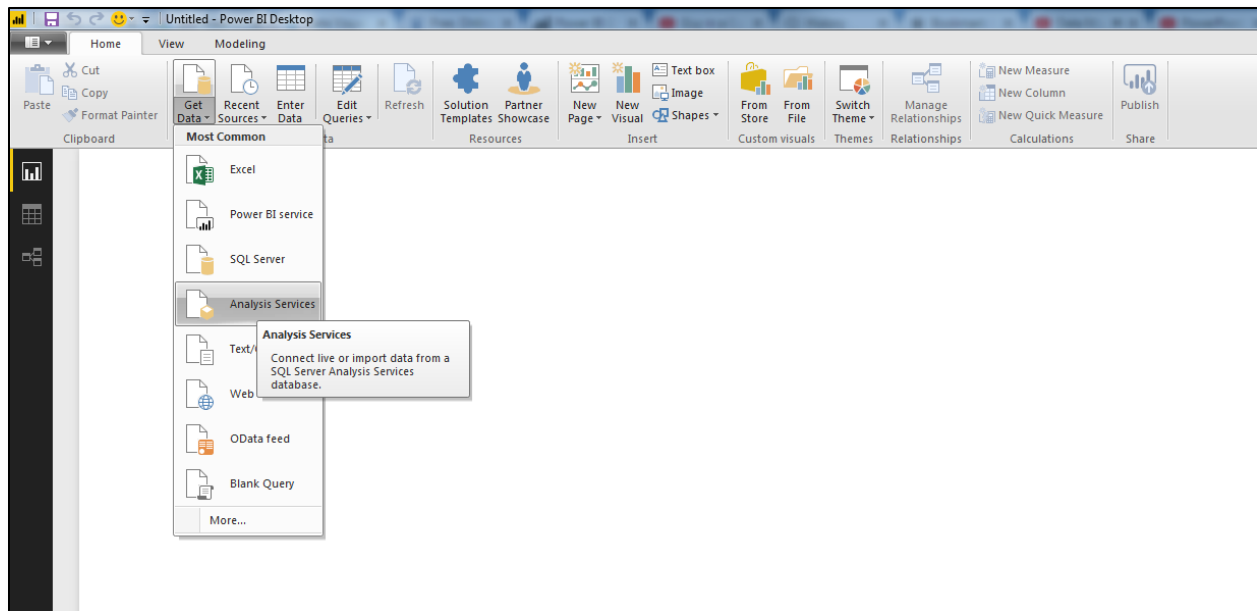
PowerPivot) File > Import > Excel Workbook Contents



Importing Data through Analysis Services

Note: Make sure you have permission credentials to the database, otherwise it will throw an error.

Analysis Services) Get Data > Analysis Services > Server_Name > Connect Live > Choose Your Data



SQL Server Analysis Services database

Server

dwanalysis.granitenet.com\tabular

Database (optional)

☐ Import
 ☒ Connect live

MDX or DAX query (optional)

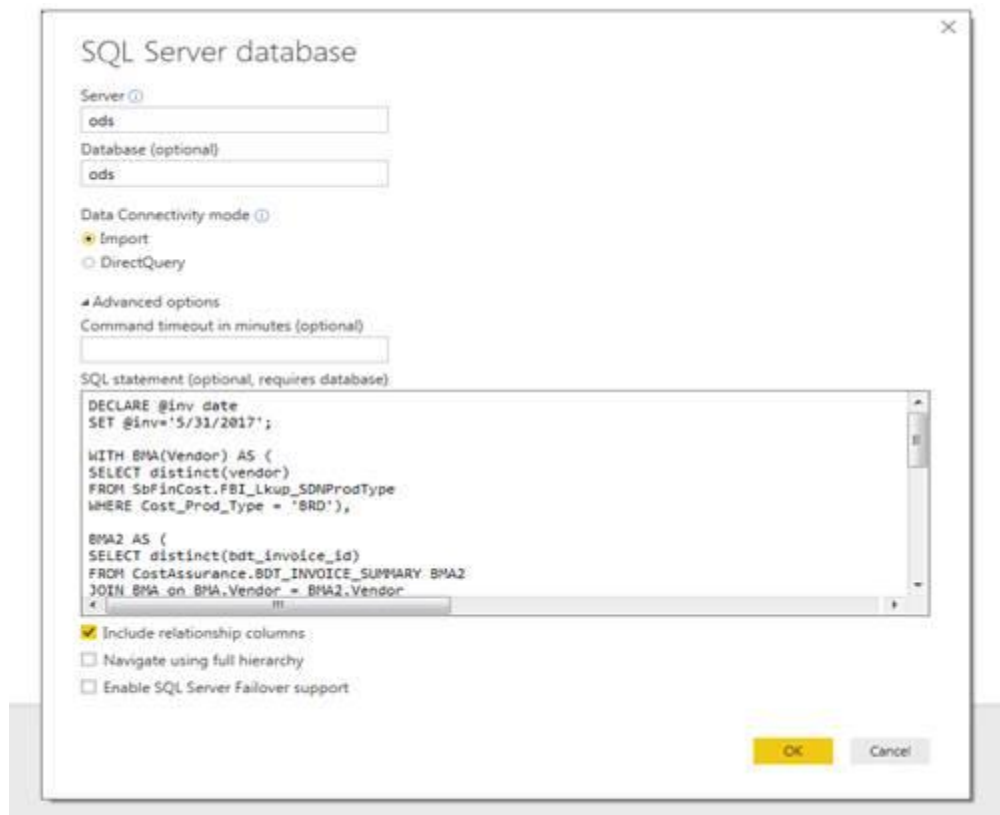
OK

Cancel

Importing Data through SQL Server

Note: Direct Query is the same as Live Connection, it queries the underlying data source.

SQL Server) Get Data > SQL Server > Server_Name > (Import or Direct Query) > Advanced Options > Define Your SQL Statement > Select OK and then wait



Power BI Settings

Power BI goes through constant updates every month (<https://www.youtube.com/user/mspowerbi/videos>). Sometimes they have hidden features or customizable options. To turn them on go to:

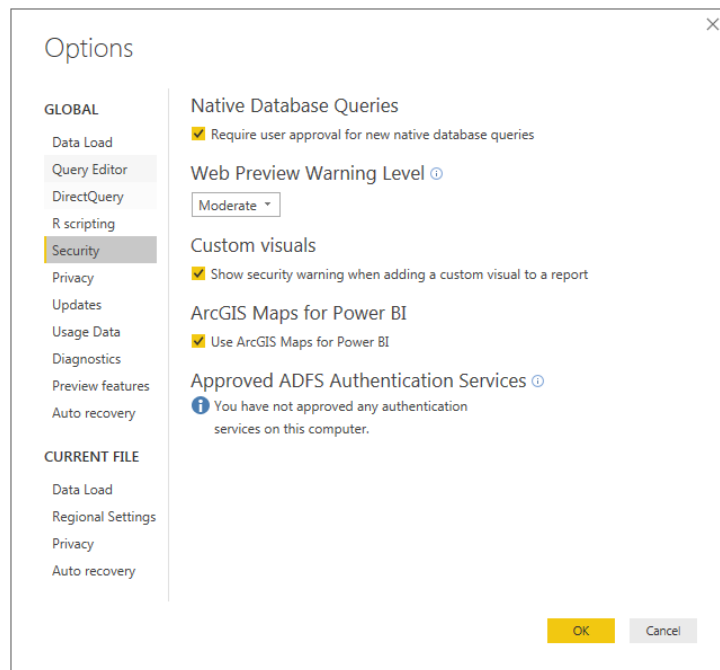
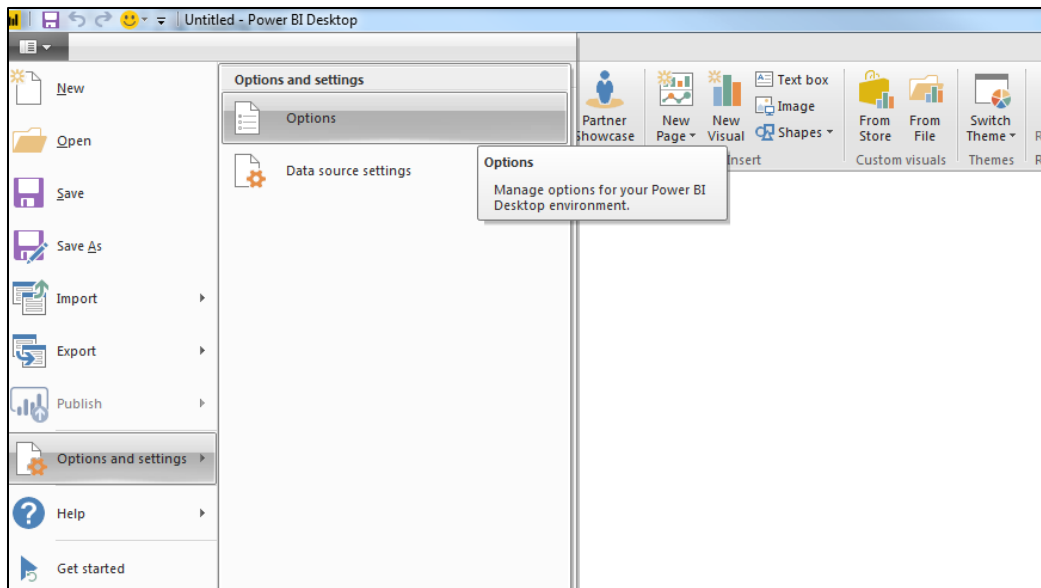
Power BI Desktop:

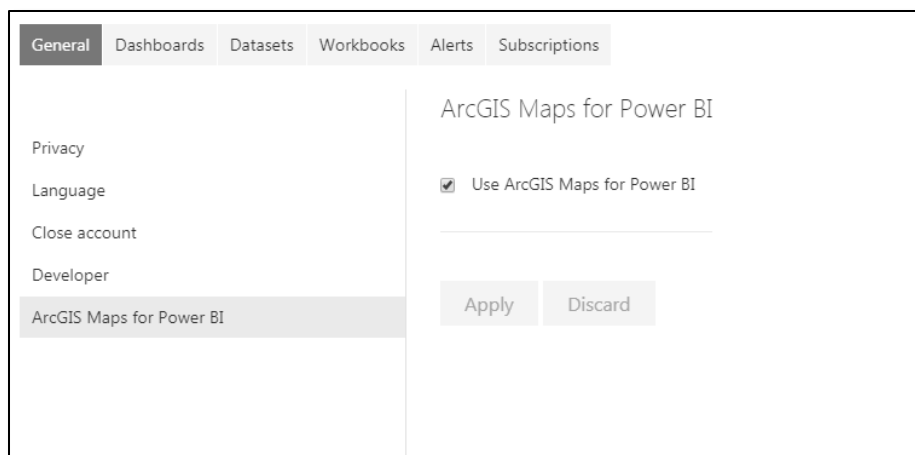
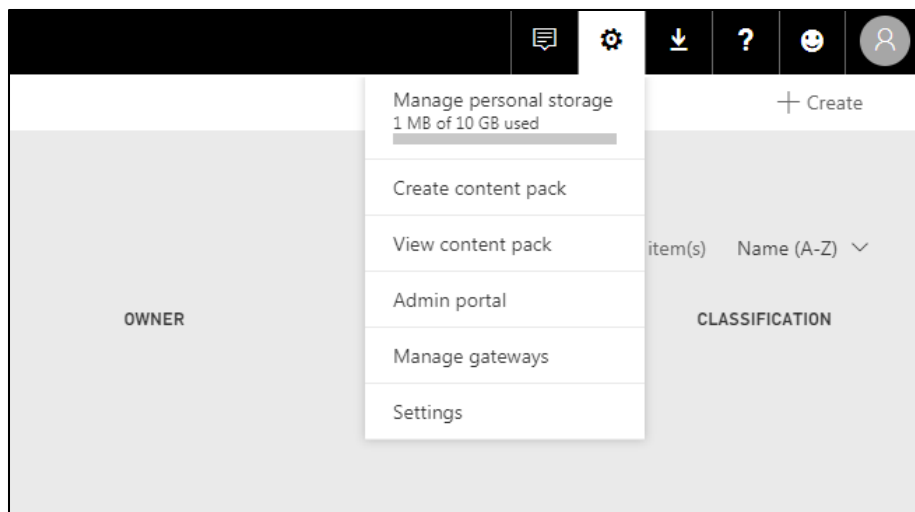
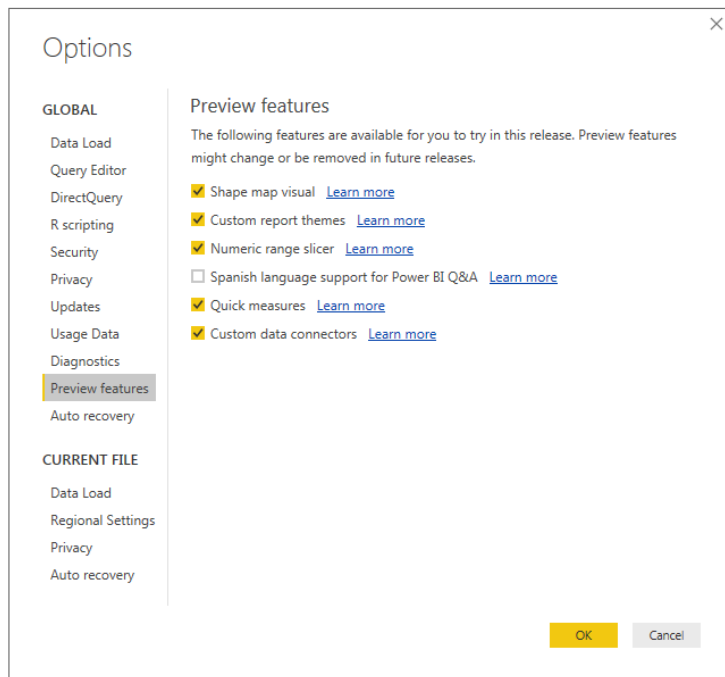
File > Options & Settings > Options > Security (Turn On ArcGIS) > Preview Features (Turn On Everything)

Power BI Online:

Settings Icon > Settings > Turn On Developer > Turn On ArcGIS

Note: If you're interested in connecting to Impala / Hadoop (Big Data) contact me or IT



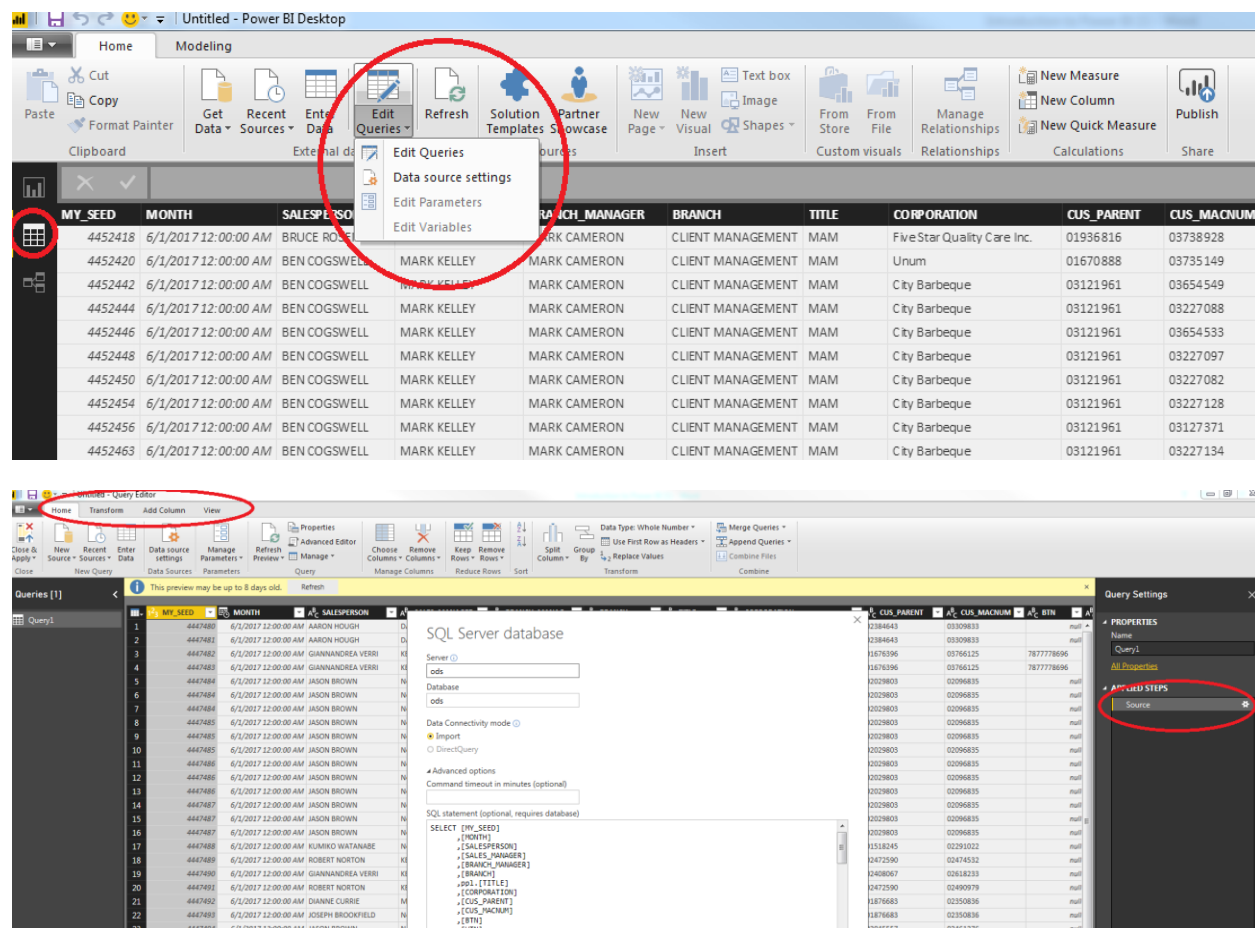


Reviewing Your Sources

Editing Your Query

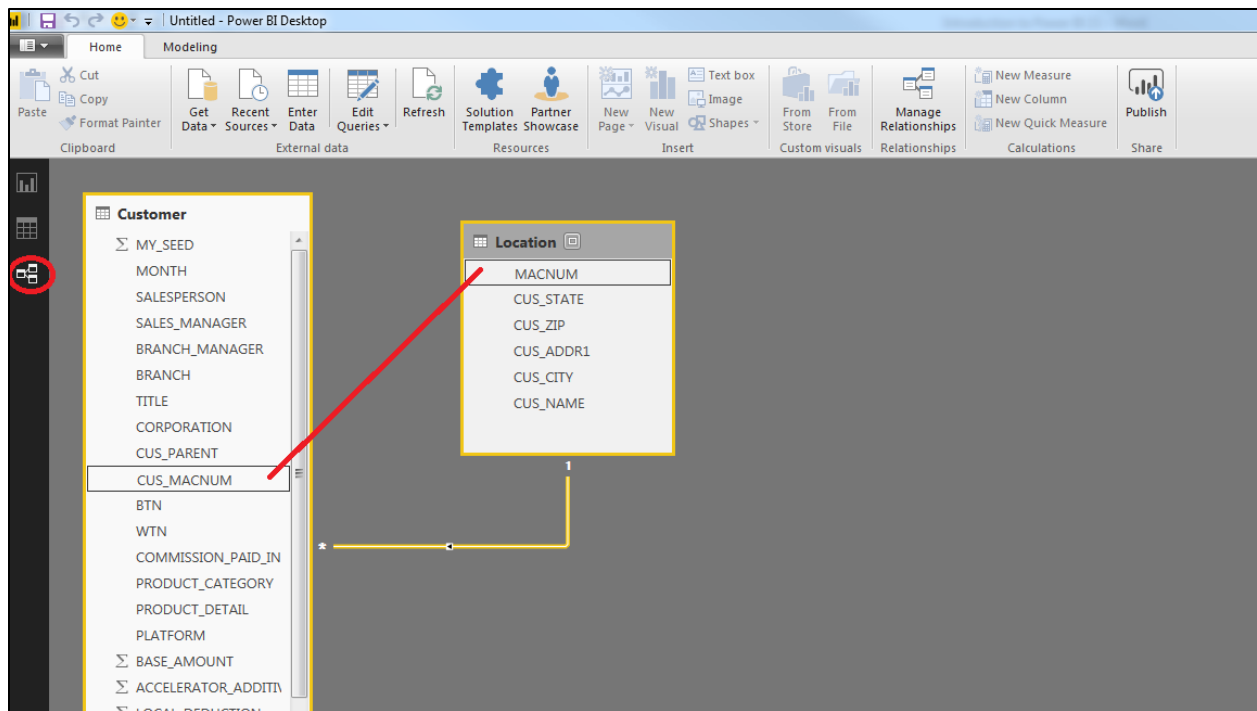
Only when you import your data, is when you are able to access the “Data View” highlighted to the left hand side of the image. Click “Edit Query” to begin your data transformation. To review the source of the query click “Source” located to the right of the second image. In order to transform your data mess around with the top toolbar.

<https://powerbi.microsoft.com/en-us/guided-learning/powerbi-learning-1-3-clean-and-transform-data-with-query-editor/>



Managing Relationships

Only when you import your data can you keep querying or adding datasets. When you have more than one query you can build relationships or joins with one another. It is as simple as dragging the primary key on top of a foreign key.



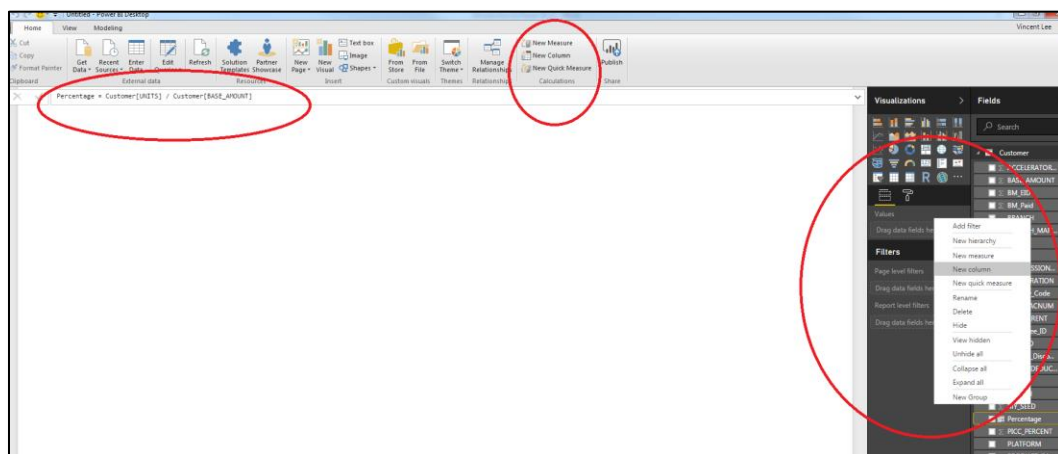
Creating New Fields

Creating New Measures

Right click on Fields or search the top of the toolbar, hit **“Create New Measure.”** Calculated measures are used for aggregated formulas and simple adjustments, otherwise use columns instead. Writing new measures or columns is **the same as writing DAX in excel.**

Creating New Columns

Only when you import your data can you create new columns or variables. Simply right click on Fields or search the top of the toolbar, hit **“Create New Column.”** Calculated columns are different from measures because they’re used to define new values, filter, separate, etc.



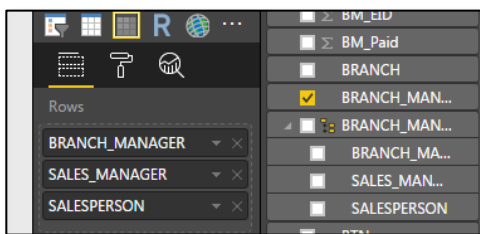
Implementing Drill Down / Hierarchy

Drill downs and Hierarchies allow someone to look at the granularity of the data by grouping related fields together. If you imported your data you can drag fields on top of each other to create a new hierarchical column. On both import and live connection you can drag fields on above each other to form hierarchy on certain Power BI visuals.

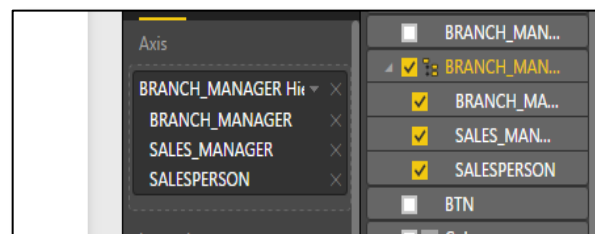
Drill down is performed by clicking the arrow button on a selected visual. There are different types of drill down or drill up options.

- (1) Drills down on one field to the next.
- (2) Expands drill down onto the next level of the hierarchy while keeping all fields.
- (3) Turns on Drill down by click on the visual instead of the button.

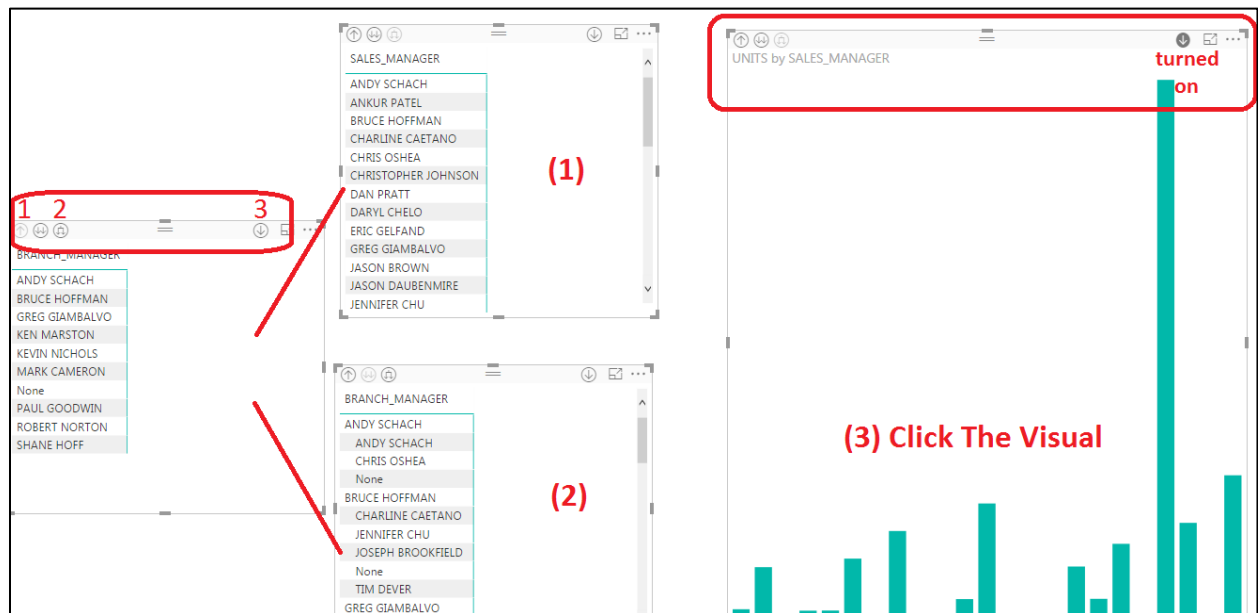
<https://powerbi.microsoft.com/en-us/documentation/powerbi-desktop-inline-hierarchy-labels/>



BOTH



IMPORTED ONLY



Why Having Clean Data Is Important

“

Having clean data is essential to making great visuals while performing proper data analysis. When you have messy unstructured data, building reports become much harder. Messy data reduces readability as well as time, it contains outliers which skews the decision making process, and obstructs the focus of the message that you're trying to pass along. For analysts, we spend hours and hours cleansing our data to tell a factual story. Tabular data with live connection (such as Server Analysis) have default datasets that are already been prepared for you. Otherwise, if you're importing raw data from SQL Server or through an Excel Sheet be sure to spend the time to clean it.

Publishing and Sharing Reports

Managing Workspaces

Creating Workspaces and Adding New Members

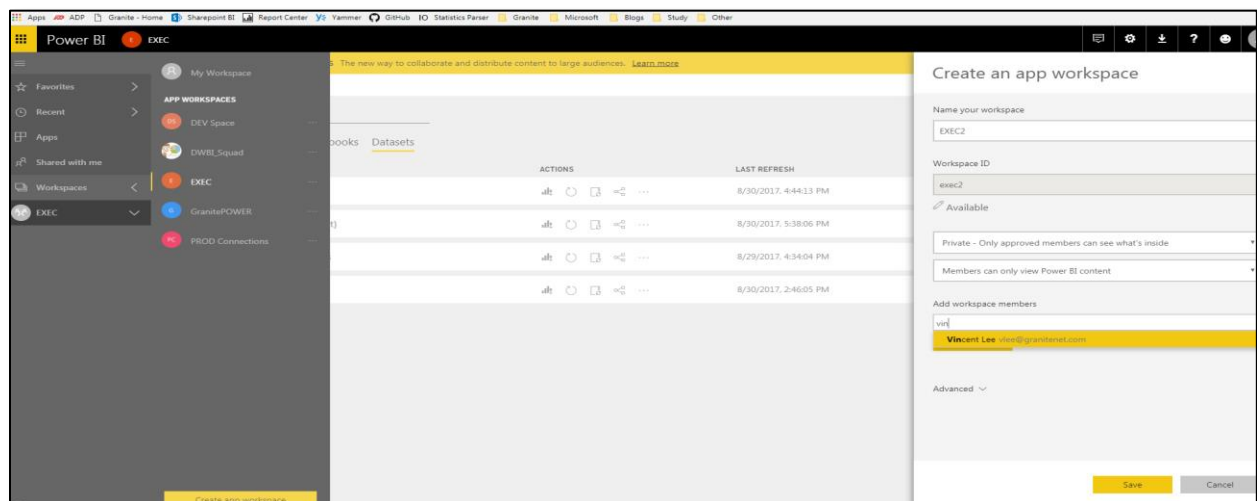
To Create a Workspace:

Menu Icon > Create App Workspace > Make it Private > Rename and Add Members via Email Addresses

To Add New Members to an Existing Workspace:

Menu Icon > (. .) Icon > Add Members via Email Addresses

Note: You only have 10 GB of personal data upload in which you can contribute to any number of workspaces, but each workspace only has a pool of 10 GB (this would be changed if we had Premium)



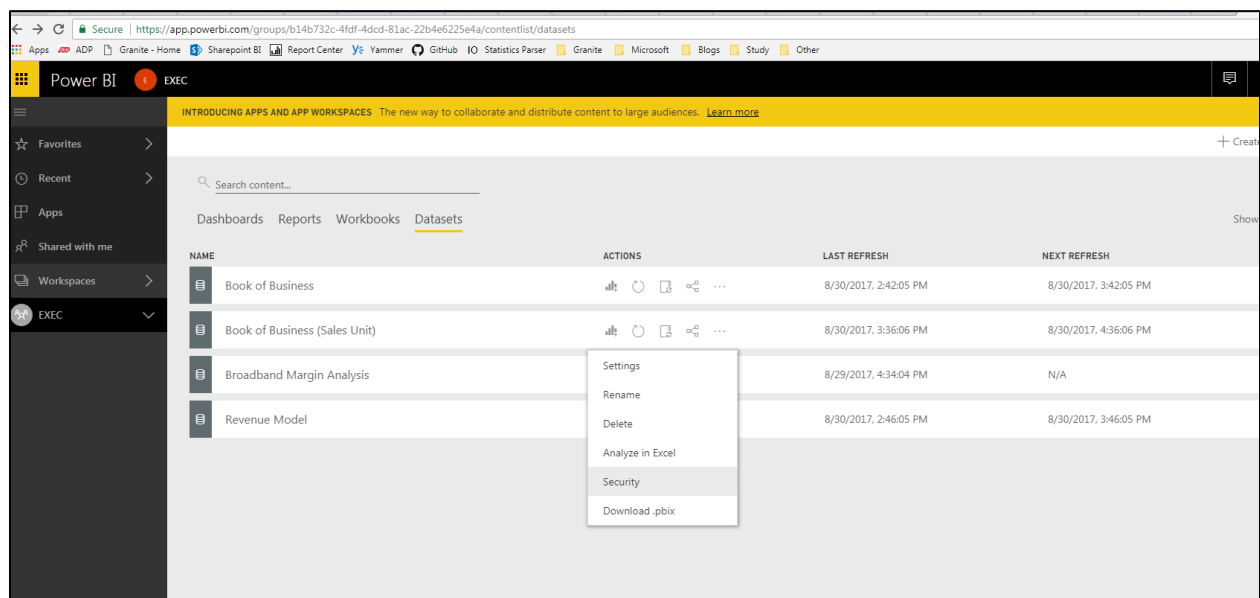
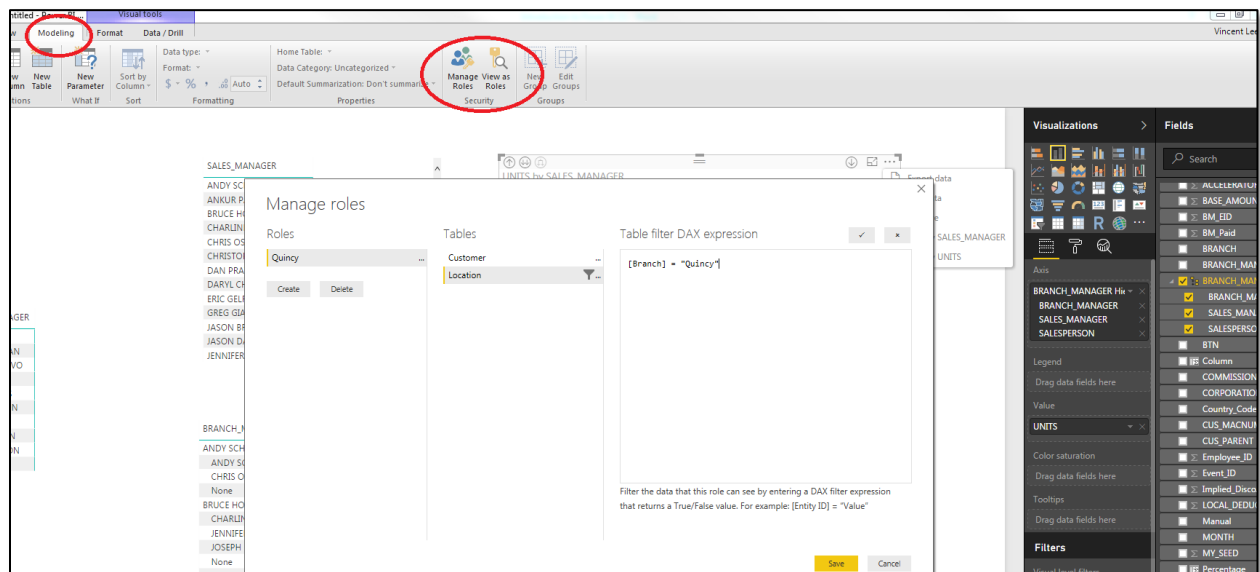
Row Level Security

Row level security is **defined** in Power BI Desktop while role level security is **assigned** Power BI Online.

Go to: Modeling > Manage Roles > Create > Rename Your New Role > Select Your Table > Define DAX

Defining your DAX expression is the same as writing a WHERE clause. Filter all the data that you don't want this particular person or role to see. When you're done you can select view as roles to see what changes you have made. *To assign row level security to the individual go to Power BI Online.*

Go to: Datasets > Actions > ... > Security > Add roles via email addresses



Exporting / Publishing Data

Focus Mode & Exporting the Data into an Excel File

In order to view Focus Mode or Full screen Mode:

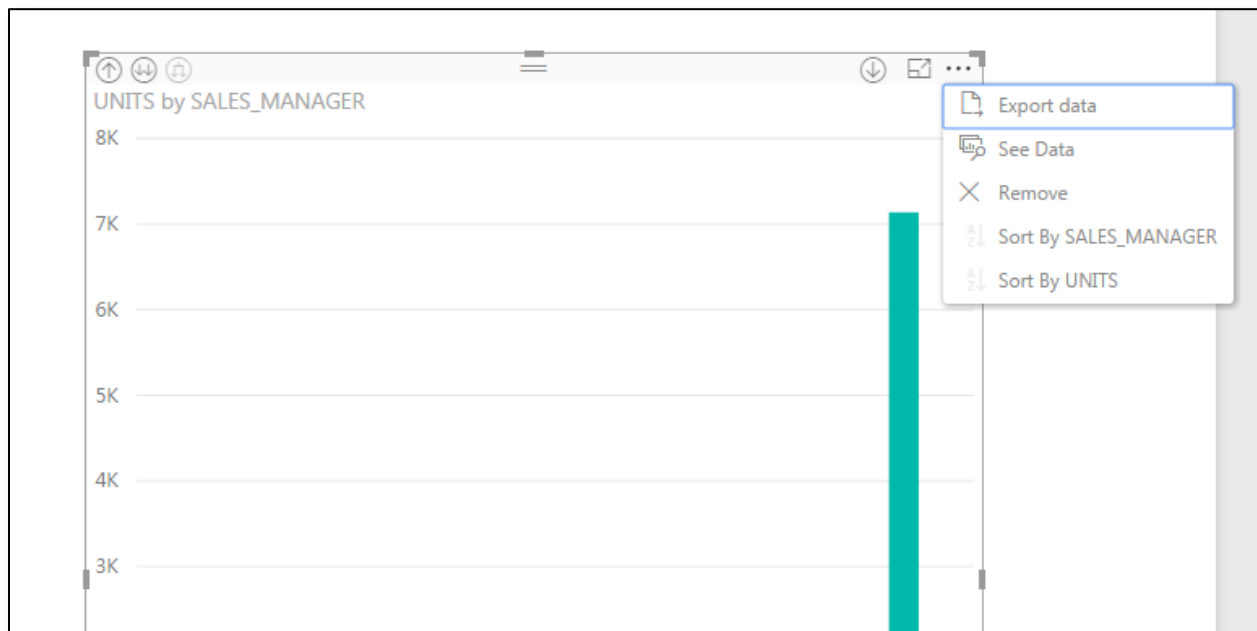
(1) Select a visual and click “Focus Mode” or the window icon on the top right corner

In order to export data and save it as an Excel File:


(1) Select the “ellipsis icon” or “. . .” that is also locate on the top right corner

(2) At this point you can “view the data” to see what you’re going to be exporting or just hit “export”

Note: These are the same actions for PowerBI Online, but when you’re online you have the option to **Print** and you have the option to **Analyze In Excel (Only if it is a model in Analysis Service)**.



Publishing Your Report

Hit publish and save your report into its dedicated workspace. For personal reports that only you can read and write; save it to “My Workspace.” When reports are publish online; anyone in the workspace group can see it. Depending on the configurations others may edit the report directly. Reports can be exported as a power point, excel, or a power bi file. To share or send reports use this  icon, then enter the email of a licensed Power BI User. Now you can start building dashboards.

Building Dashboards and Visualizations

Understanding Data & Chart Types

Facts and Dimensions

What are Facts?	What are Dimensions?
<ul style="list-style-type: none">• Numerical Variables• May consist of measures or metrics. Typically numbers being tracked in business• May consist of primary/foreign keys• EX: Quantity, Revenue, Cost, IDs	<ul style="list-style-type: none">• Categorical Variables• May consist of descriptive or textual fields• May consist of business parameters such as lookup or reference tables.• EX: Geography, Employees, Product

Building Different Chart Types

<https://powerbi.microsoft.com/en-us/guided-learning/powerbi-learning-3-1-intro-visualizations/>

To build a visualization in Power BI:

(1) *Choose Your Visual*

(2) *Check Your Field or Drag It Into The Empty Box*

[Note: Dimensions = legend, details, axis, etc. | Facts = values, goals, measures, etc.]

(3) *Modeling Tab* – If your data type is incorrectly formatted change it in the navbar above (if greyed out, click the field you want to model or reformat)

(4) *Format (Paint Roller Icon)* – Design Option (Change Color, Text Description, Background, etc.)

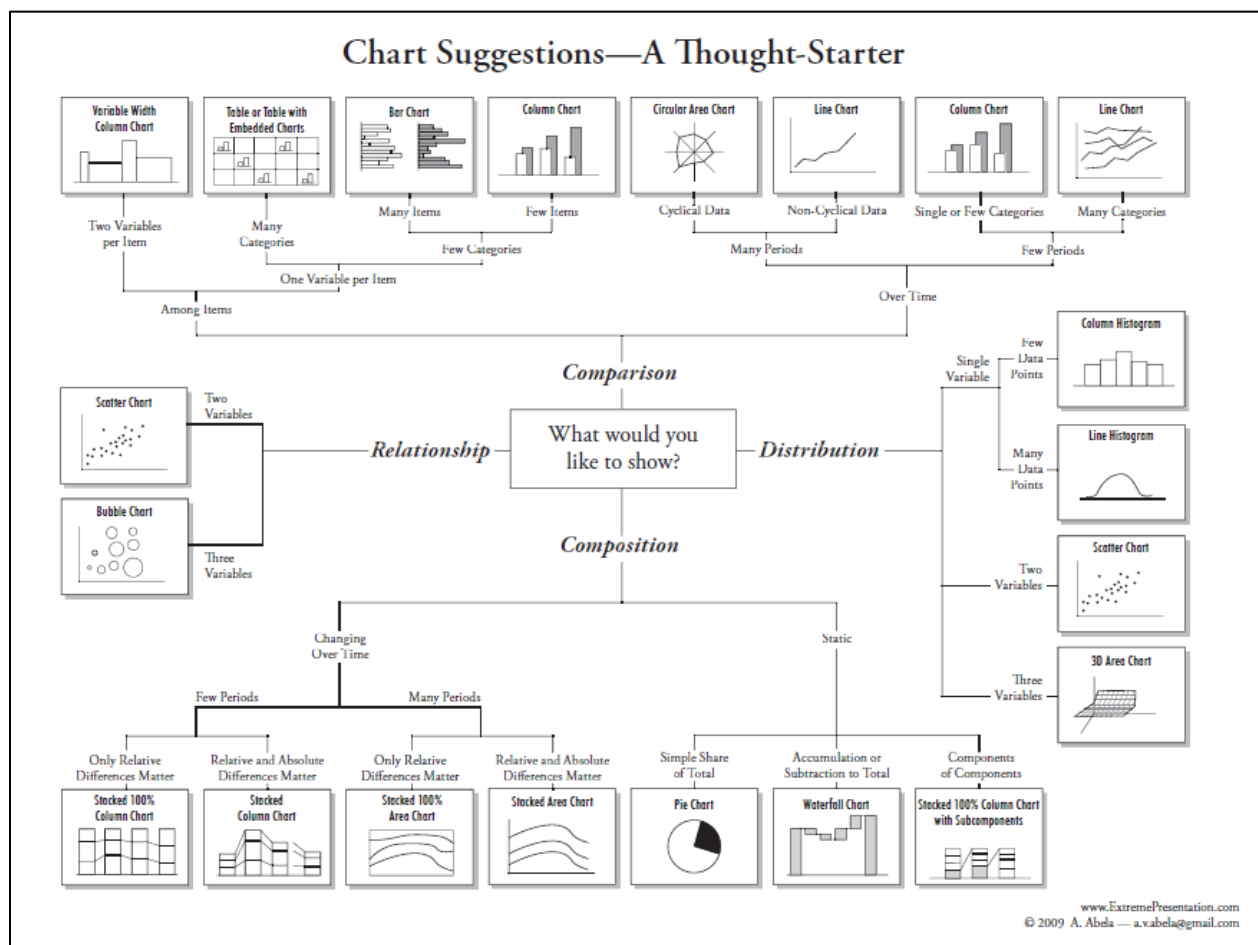
(5) *Analytics (If available)* – Highlights trends or KPI in a visualization

Tips & Tricks

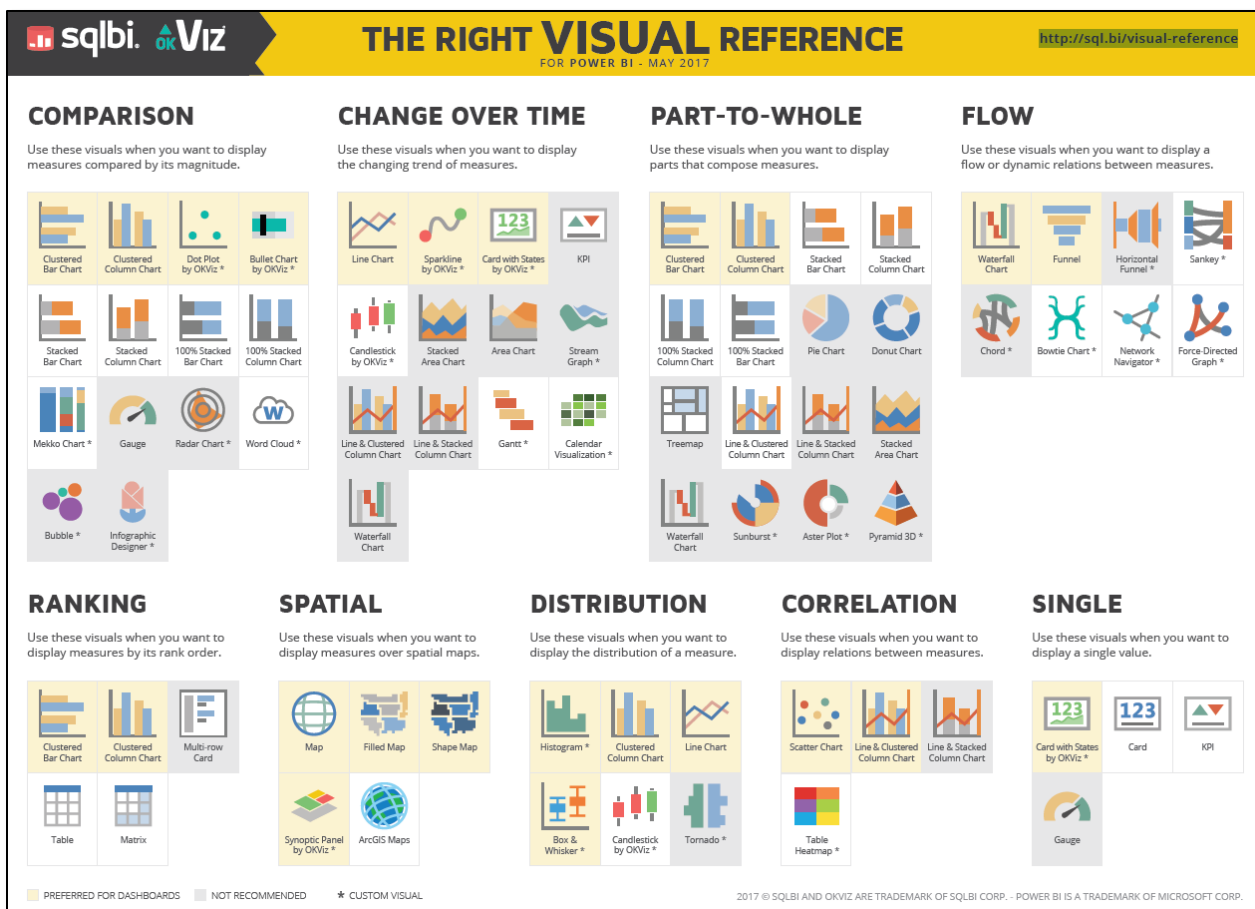
- **Hold Shift when resizing objects:** Creates Perfect Squares and Circles
- **Ctrl C & Ctrl V (copy & paste):** If the visual contains the same chart or data duplicating it saves you a lot of time
- **Duplicate page:** If you have similar visuals or design aspects, copying a page can save you a lot of time
- **Page Filters:** Instead of filtering each object manual, apply a page/report filter
- **Right Click Data Points:** Allows you to see records, include, exclude, and group data
- **Navbar > Format:** If you're a perfectionist, align and distribute allows you to center or straighten an object.

How to Pick a Chart

<http://extremepresentation.typepad.com/files/choosing-a-good-chart-09.pdf>



<https://www.sqlbi.com/wp-content/uploads/videotraining/dashboarddesign/visuals-reference-may2017-A3.pdf>



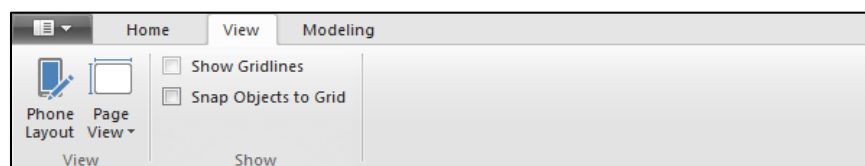
Designing Power BI Mobile

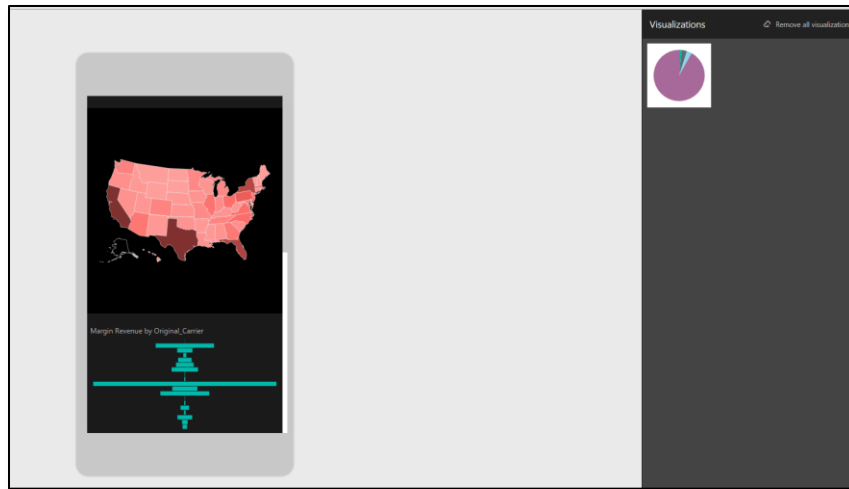
Mobile View / Report

When building visualization you should always include a phone layout or a mobile view.

Go to: View > Phone Layout (to your right you have “tiles” of visualizations that you created earlier)

Simply drag those tiles from your right and replace them in the smartphone. All you have to do is resize and position your visualization. This is your only option when customizing the phone’s layout.





The Differences between Desktop & Mobile

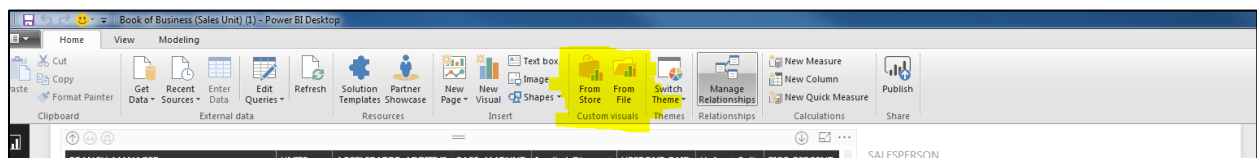
My preference is to build the desktop version before modifying the mobile layout. You might want to switch it around this depending on who your audience is. The main differences that you should keep in mind between desktop and mobile is the vertical view vs. horizontal view. Mobile also has limitation based on its interactions with touch, the limited screen size, and the type of visuals it can properly fit.

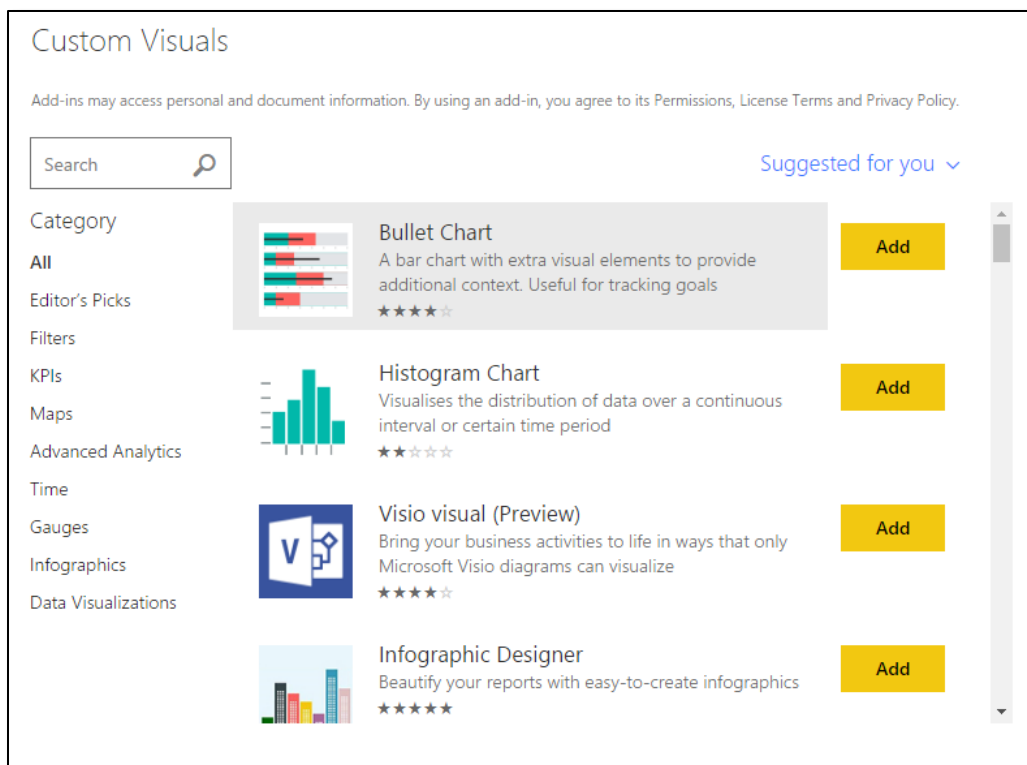
Creating Custom Visuals

Microsoft Store

The Microsoft Store provides you with free open source custom visuals.

To download Custom Visuals go to: Home > From Store (or google Microsoft Store and Import From File)





My Favorite Custom Visuals

Enlighten Aquarium – Animates fishes as Data points. Everyone keeps asking me to set managers as shark.

Rotating Tile – Animates cards or KPI as rotating tiles which can be used to display multiple fields.

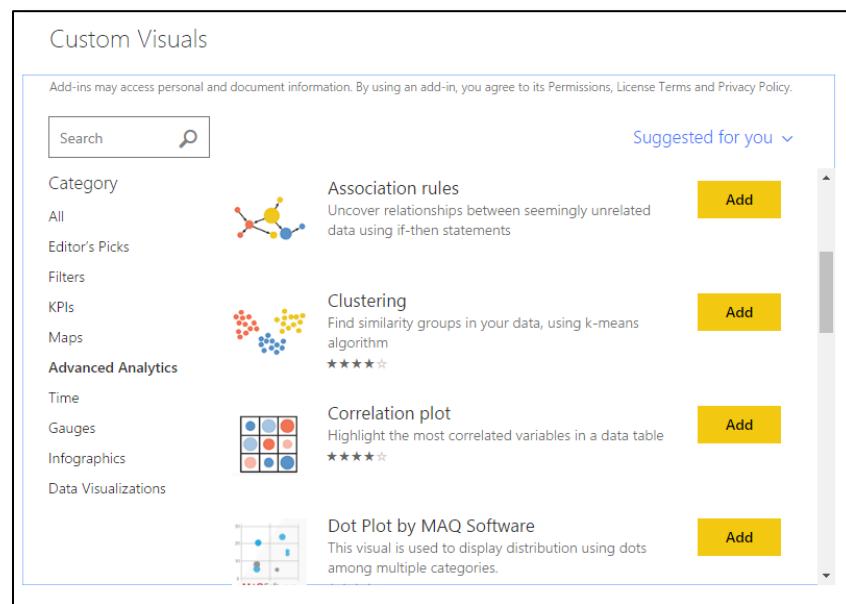
SandDance – A powerful Microsoft visualization perfect for scattered data or assigning facets.

Radar Chart – Perfect for multivariate or circular data.

Infographic Designer – Transform Data points and bar charts into images.



Advanced Analytics – Provides you with a list of R Visuals. For those who don't know, R is a statistical programming language for data analysis. Most of these R Visuals allow you to create machine learning plot without writing code. However, if you are an R Programmer you can input custom scripts into Power BI.



Pros & Cons

PROS	CONS
<ul style="list-style-type: none"> • Custom Visual offer exciting impactful designs • Provides you with charts that are more efficient: <ul style="list-style-type: none"> ○ Drill Down Chart ○ Advanced Analytics ○ And More • More opportunities at your disposal • Custom Visuals stay up when you publish 	<ul style="list-style-type: none"> • You have to search for a custom visuals every time you create new power bi report • Custom Visuals lack hierarchy and other formats such as header or color adjustments • Custom Visuals can sometimes be buggy • Custom Visuals may not work well with the dataset that you have provided

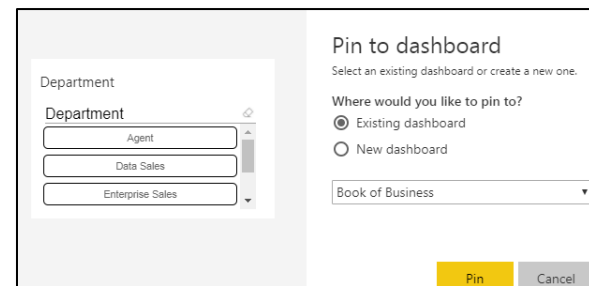
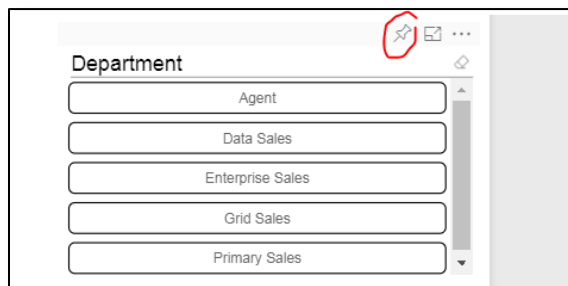
Building Dashboards

A dashboard is a single page view that is also a collection of multiple reports:
<https://powerbi.microsoft.com/en-us/documentation/powerbi-service-dashboards/>

Pinning Tiles

Dashboards can only be created online, you can add or remove any number of items onto a dashboard. However, making changes to the information must come directly from its source. So you must make an adjustment to the report itself to effectively change the dashboard.

A tile is a single visual. These tiles are the same as pinning tiles on a Mobile View. Pinning tiles can easily be done by going into a report in Power BI online. Click on any visual and hit the “Pin” icon.



Pinning Reports

Pinning reports are just as easy as pinning tiles. On the navbar, click on “Pin Live Page” to pin a report. Once you’re done, go to your dashboard to resize and position your tiles. Don’t forget to create a mobile layout for your dashboard and check its performance as a whole (icons are on the top right navbar).

Note: Pinning Tiles will bring you back to the report. Pinning Live Page allows you to interact with it



Alerts

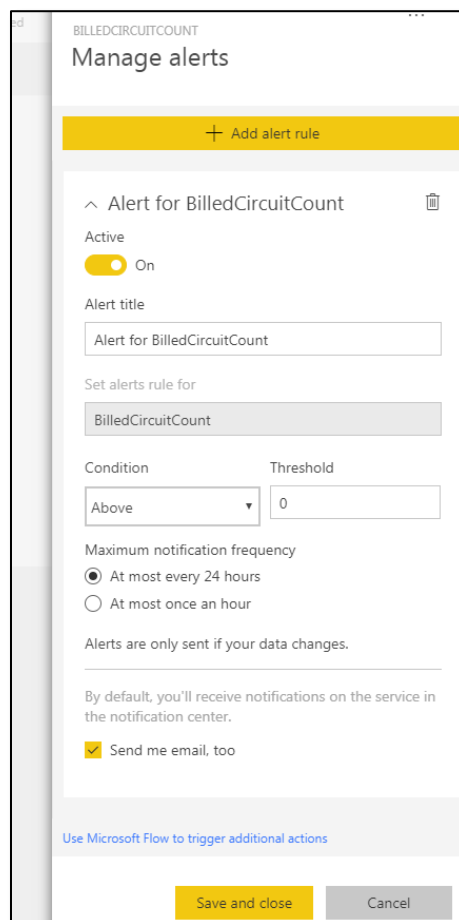
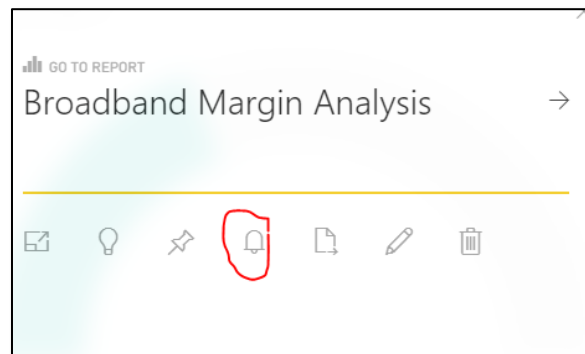
To create an alert on Power BI mobile or online follow these instructions:

(1) Select a number card or a gauge visualization that has been pinned to a dashboard.

- (2) Hit the (. .) icon and click on Manage Alerts or the bell icon.
- (3) Add Alert Rule.
- (4) Define your condition and threshold.
- (5) Choose whether you want the notification every hour or 24 hours. (Does not actually notify you like this unless you have real time data).

<https://powerbi.microsoft.com/en-us/documentation/powerbi-service-set-data-alerts/>

<https://powerbi.microsoft.com/en-us/documentation/powerbi-mobile-set-data-alerts-in-the-iphone-app/>



Perspectives of Good Design

“

Good Design Is Subjective...

Good Design Appeals to Your Audience....

Today ... Good Design is Clean, Organize, and Minimal.

Although this is opinionated, top UI Designers & Data Visualization Officers say to keep your design “simple” and “digestible”. Make sure to camouflage any unnecessary data. Limit the number of colors, fonts, and charts that you can put on one page. Lastly, make your message focus and clear.

Conclusion

“

Building visualizations are easy. Building proper reports are hard. In the end, practice make perfect.

Good Luck and Happy Dashboarding!