

Rapid Dashboard Development (An Introduction to Power BI)

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What we will cover

- Why Power BI?
- Creating a Power BI Report
- Getting Started with the Power BI Service
- Sharing with Power BI
- Power BI Formulas
- Exploring Power BI visuals
- Resources

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Workshop Goals

What they aren't:

- Remember everything
- Master every aspect of the tools

What they are:

- Familiarity with the toolset
- Comfort in working with the tools
- Understanding of key concepts, theories and methods
- Providing you with techniques to apply to your scenarios

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Who is Ken Puls?



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Who's Ken?

FCPA, FCMA

Owner of Excelguru.ca website, blog & forum

Microsoft MVP

2006-2015	Excel
2016-2019	Data Platform
2019-current	Office Apps & Services

Software Developer

Monkey Tools Add-in for Excel

<https://xlguru.ca/monkeytools>

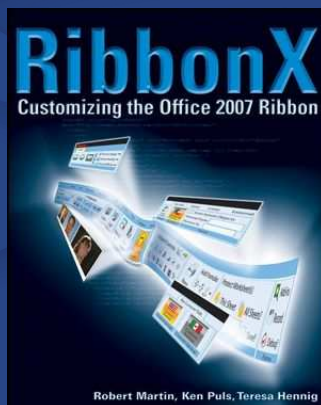


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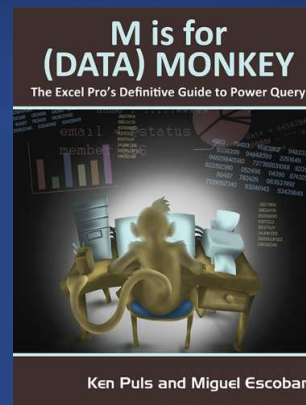
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Ken's Publications

RibbonX



M is for Data Monkey



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Our Services

Conferences



Live Training



Online Courses



Mentoring



Consulting



Make you aware

Teach You

Help you if you need it



consult@excelguru.ca

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Why Power BI?

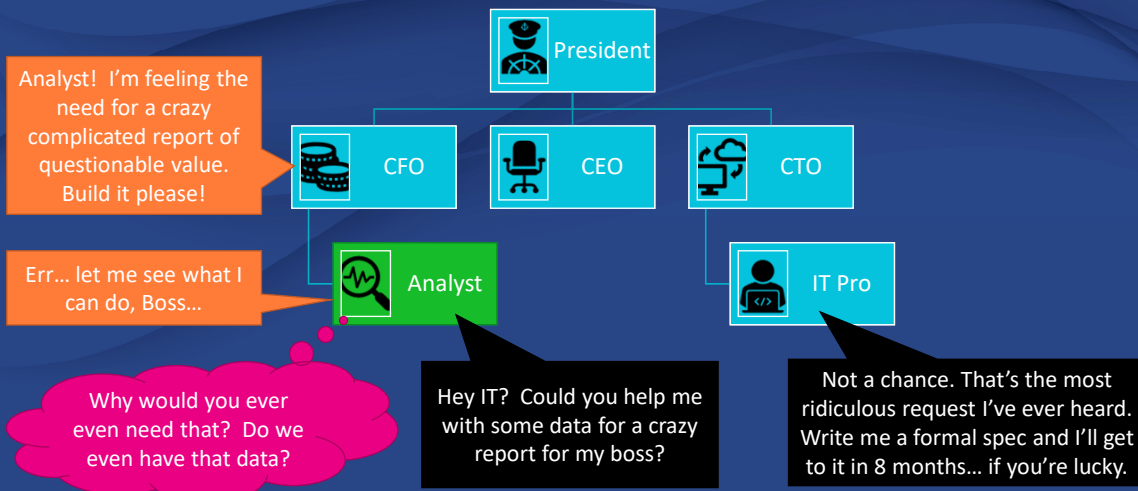


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The Organizational Divide



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From Data to Dashboards

The Power BI philosophy

- Let the analyst connect to and clean the data
- Let the analyst design the reports
- Let IT control the security and distribution

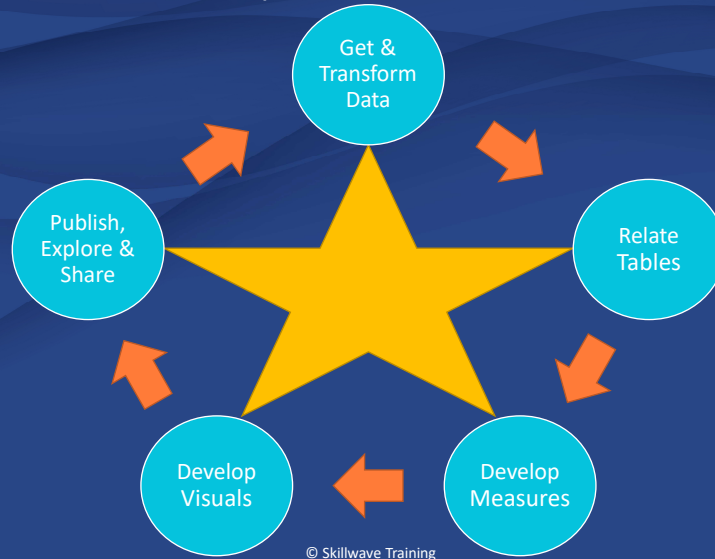


Let the analyst prototype quickly and discover what sticks, without wasting IT's resources!

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Dashboard Development Process



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Power BI's Update Philosophy

Desktop software is updated monthly

No backwards compatibility

Implications

You want a homogenous software install in your company!

You may not be able to use my catch-up points in this course

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Acquiring Power BI Desktop

There are multiple versions!

- Power BI Desktop

- Power BI Report Server

Acquiring Power BI Desktop

- Windows Store Version

 - Recommended install, as it is always up to date

 - No need for IT to visit your desktop

- Manual Download

 - <https://www.microsoft.com/en-us/download/details.aspx?id=58494>

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Power BI Desktop Components

Views

- Report View

- Data View

- Model View

Data Studio

- Power Query

Preview Features

- File -> Options & Settings -> Options -> Preview Features

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Building Our First Report



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Working with Excel Data

Get Data → Excel

Hotel Stays.xlsx

Select only relevant columns

Aggregate a location column

Add date columns

Month name

Month number



Start From:
A blank Power BI project

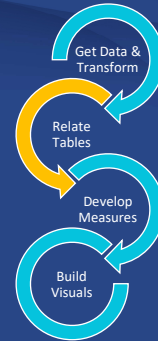
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Relate Tables

Single table model

No need to create for this model



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Develop Measures

Will use implicit measures

Not necessary... yet...



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Creating a Map Chart

Insert a Map chart

Location: Location
Size: Address
Tooltips: Hotel Brand

Modifying the Chart

Title Text: Stays by Location
Title Font: 12pt, black, centered
Data Colour: #0C386F



Catch-up Point:
Hotel Stays – Catch-up 1.pbix

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Creating a Bar Chart

Insert a Bar chart

Axis: Country
Value: Address

Modifying the Chart

Data Labels: On
X-Axis: Off
Data Colour: #0C386F
Title: Stays by Country, 12pt, black, centre



Catch-up Point:
Hotel Stays – Catch-up 2.pbix

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Creating a Column Chart

Insert a Column chart

Axis: Month Name
Value: Address

Modifying the Chart

Data Labels: On
Y-Axis: Off
Data Colour: #0C386F
Title: Stays by Date, 12pt, black, centre



Catch-up Point:
Hotel Stays – Catch-up 3.pbix

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Fixing Column Sort Orders

Default display order is by value!

Change sorting

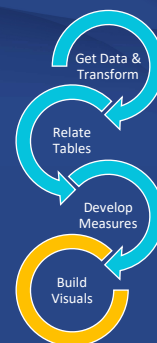
... → Sort By → Column Name

Modify sort orders

Select the Column
Column Tools → Sort By Column
Choose the column to sort by



Updating a sort order for one table updates it in ALL visuals.



Catch-up Point:
Hotel Stays – Catch-up 4.pbix

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Adding Drill Down

Adding Year to “Stays by Date”

Add Year on the axis (above month)

Symbol dictionary

-  Turn on/off drill down mode
-  Expand Hierarchy (Year-Month)
-  Next Level of Hierarchy (Months for all years)
-  Drill up



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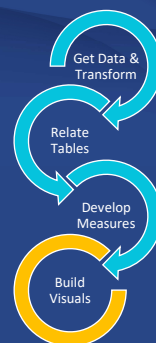
Catch-up Point:
Hotel Stays – Catch-up 5.pbix

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Adding Headers

Done with text boxes

Text:	Nights Away From Home
Font:	Set to 28pt
Style:	Bold



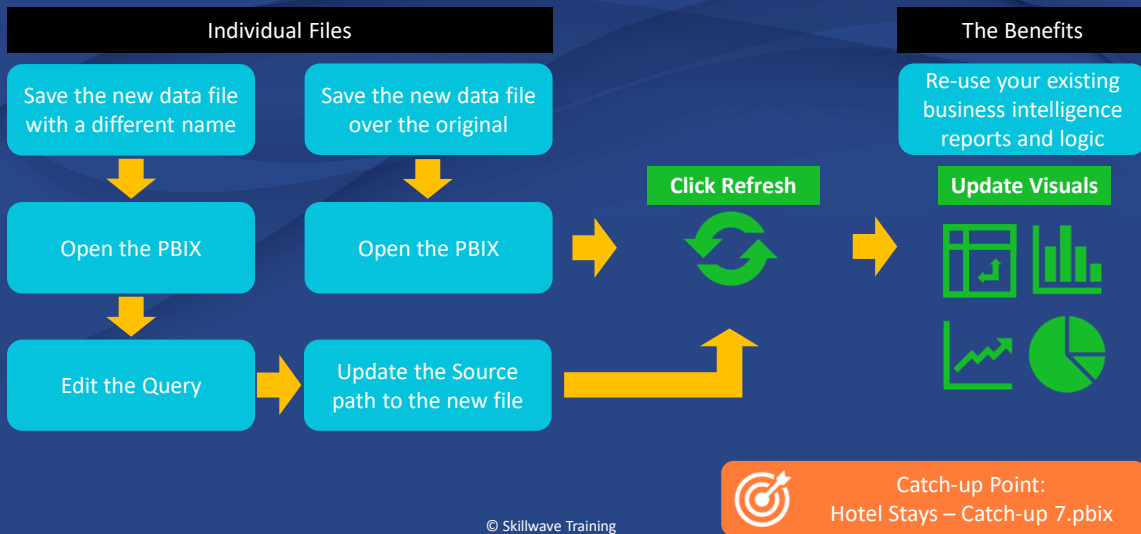
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Update Options



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Getting Started with the Power BI Service

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Signing Up

Go to <https://powerbi.com>

Click “Try free”

Complete the sign-up process

Note you must use a “work email”

i.e. no gmail.com, yahoo.com, live.com, etc...

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Your Workshop Credentials

Your account for today’s session:

Username: _____@powerbidemos.com

Password: PowerBI!



Please record your assigned user ID as I don’t store them with real user names!

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Using Our Own Data in the Web

Method

Get Data → Files → Local File
Import Excel data

Pros

Can still build reports

Cons

No query builder
No ability to manipulate source data

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Publishing Our PBIX Reports

Publishing

Save your *.pbix under a descriptive name
Log in to Power BI (in Power BI Desktop)
Go to File → Publish
Publish to “My Workspace”

Power BI will now contain

A copy of your dataset
A copy of your report

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Catch-up Point:
Hotel Stays – Complete.pbix

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Reports vs Dashboards

Reports

- Created in Power BI Desktop
- Can also be created in the Power BI Service
- Can interact with visuals

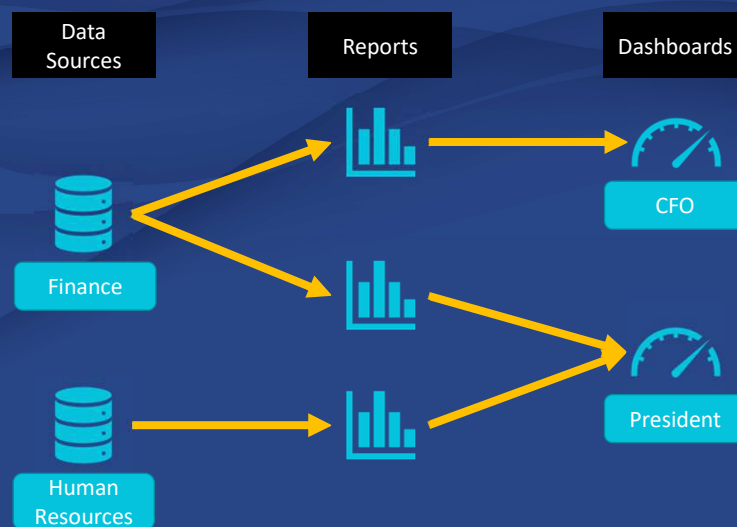
Dashboards

- Can only be created in the Power BI Service
- Summary only, no interaction
- Use “pinned” visuals created elsewhere
- Link back to the original Report

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Power BI Object Relationships



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Creating Dashboards

Visuals can be pinned to dashboards from

- Reports (pin individual items)
- Reports (pin live page)
- Pin from Excel
- Quick Insights
- Other dashboards
- Q&A

Manually Adding Tiles

Allows images, text boxes, video, web content

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Using Power BI to Discover Insights

Generating good visuals can be hard...

So why not let Power BI help?

Go to either

Reports → ... → Quick Insights

Datasets → ... → Quick Insights

Wait for generation

View Insights



Any Insight-generated visual can be pinned to a dashboard.

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Ask a Question?

Natural Language Query Interface

Available on all dashboards

Allows end user to find their own insights



Any generated visual can be pinned to a dashboard.

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License Feature Comparison

Features - General	Free	Pro	Premium
Author & publish content with the Power BI Desktop	✓	✓	
Create dashboards	✓	✓	
View dashboards	✓	✓	✓
Explore data with Natural Language (Q&A)	✓	✓	✓
Access your dashboards on mobile devices	✓	✓	✓
Refresh of anonymous web data (web pages & api's)	✓	✓	✓
Refresh of OneDrive for Business/Office 365 groups	✓	✓	✓
Refresh of on-premises sources via Personal Gateway	✓	✓	✓

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License Feature Comparison

Features – Pro Requirements	Free	Pro	Premium
Refresh of on-premises sources via Enterprise Gateway		✓	✓
Consume live data sources with full interactivity		✓	✓
Use Analyze in Excel features		✓	✓
Publish to web	✓	✓	
Share dashboards and reports with other users		✓	✓



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

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Sharing Options in Power BI



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Web Free Distribution of PBIX Files

Sharing Raw *.pbix files

Can be distributed by file share or email

Potential refresh issues

Access to data source (no access, no refresh)

File paths are always hard coded

Templates

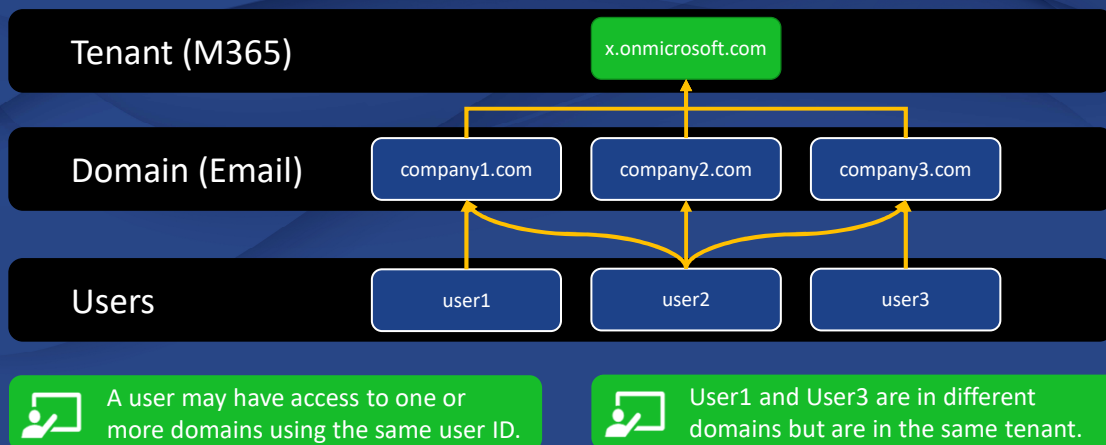
Advanced topic!

Can be used with parameters to prompt for input

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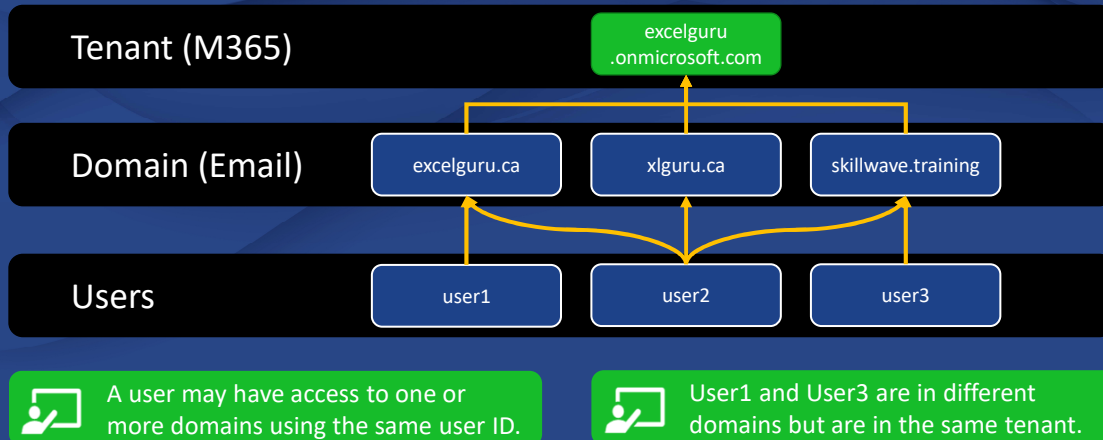
Understanding “Tenancy”



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Understanding “Tenancy”



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Sharing Dashboards In-Tenant

Done in the Power BI service

Click Share

Options:

Allow re-sharing
Email recipient

The screenshot shows the 'Share dashboard' dialog box with the following details:

- Share** (selected) / Access
- Grant access to:** A search bar containing 'demo' and a dropdown showing 'I'.
- Recipients:** A list showing 'Demo Manager demos@excelguru.ca' and 'Demo User demouser@excelguru.ca' (highlighted in yellow).
- Information:** A note stating 'Recipients will have access to the same data, reports, and workbooks as you have in this dashboard, unless their access is restricted by row-level security defined for the dataset. [Learn more](#)'.
- Options:** Two checked checkboxes: 'Allow recipients to share your dashboard' and 'Send email notification to recipients'.
- Buttons:** 'Share' and 'Cancel' at the bottom right.

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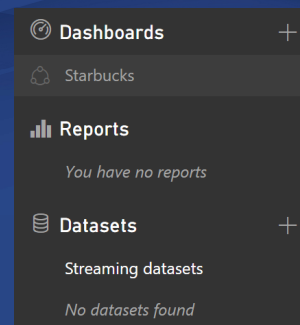
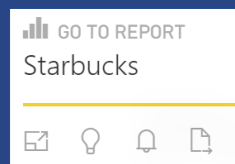
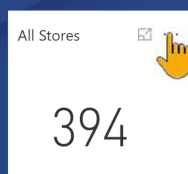
What Can the User See?

The dashboard only?

Actually no!

Click a tile to go to the report

Click the ... for more options



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Hiding Model Columns From Q&A

Open Power BI Desktop

Hide Individual Columns

Report View:

Data/Model View:

Right click the column in the fields list -> Hide

Right click the column -> Hide in report view

Hide Entire Tables

Report View:

Data/Model View:

Right click the column in the fields list -> Hide

Right click the table -> Hide in report view

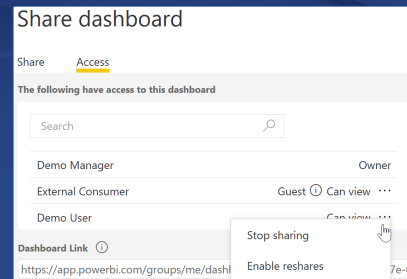
Re-publish to Power BI

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Managing Shared Resources

Follow same route as to share
Choose the Access tab
Modify as required



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Embedding Reports in Web Pages

Works for Reports, not dashboards
In the Power BI Service
Select your report → File → Publish to Web

Provides

An email link to a public facing web page
An HTML iFrame to embed in a web page



Embedded reports are completely interactive
and work even if you have a free license!



Embedded reports use public URLs. They are
accessible even if hidden behind a login page!

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What About the Refresh?

Dashboard/reports are always show last publish/refresh

Updating your data

- Manually publish updated *.pbix files

- Schedule the refresh

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Power BI Formulas



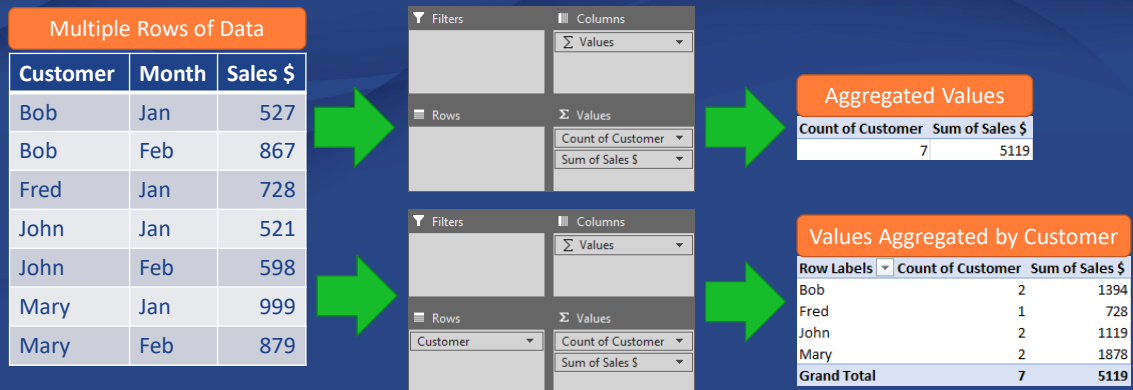
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The Purpose of PivotTables & Power BI Visuals

It's ALL about aggregating values!



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Aggregation is Done With Measures

Measure Types

- Implicit: Drag a column into the Values area
- Explicit: You define the measure using DAX

Advantages of Explicit measures

- Discoverable names
- Default formatting
- More robust formula options
- Update it once and it fixes all instances



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Aggregating a Column with DAX

Format of Aggregation Functions

Measure = `FUNCTION (TableName [ColumnName])`

Recommended to use fully qualified field names

Counting Formulae

`COUNT (table[column])`
`COUNTA (table[column])`
`DISTINCTCOUNT (table[column])`
`COUNTROWS (table)`

Statistical Formulae

`SUM (table[column])`
`MAX (table[column])`
`MIN (table[column])`
`AVERAGE (table[column])`

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Start From:
[Intro to DAX - Begin.pbix](#)

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Compound Measures

Performing arithmetic on other measures

No need to fully qualify measures

Examples:

`[MeasureName] * value`

Bonus Range = `[Budget] * 1.05`

`[Measure1] - [Measure2]`

Price Spread = `[Highest Price] - [Lowest Price]`

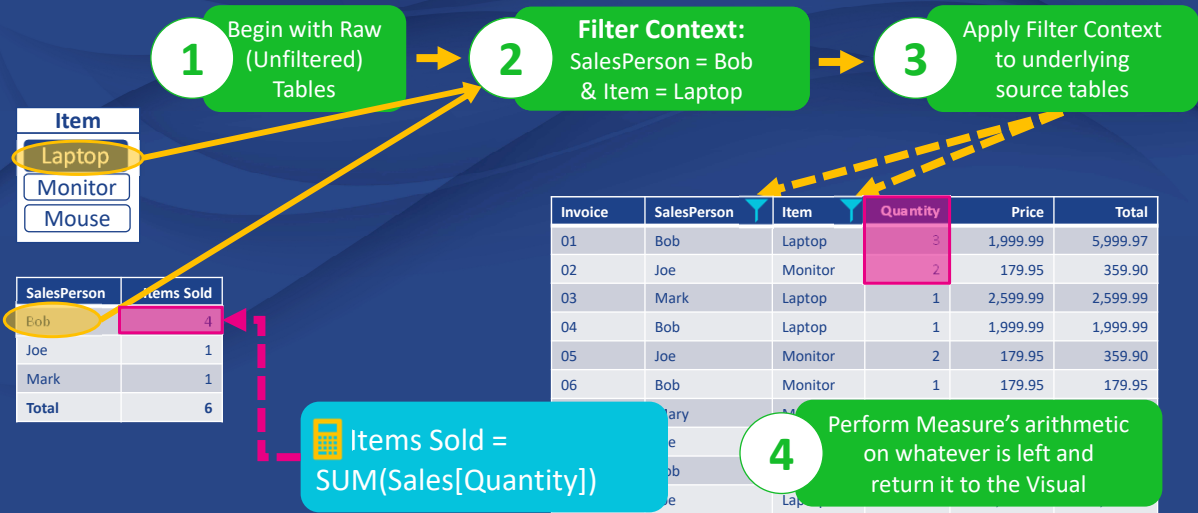
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Catch-up Point:
[Intro to DAX – Catch-up 01.pbix](#)

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Understanding Filter Context



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Case Study

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Case Study: The Loaded Pencil

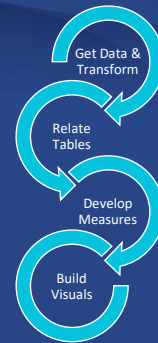
Fictional Bar/Grill

Data is “based on a true story”

Our job:

Create useful visuals/metrics

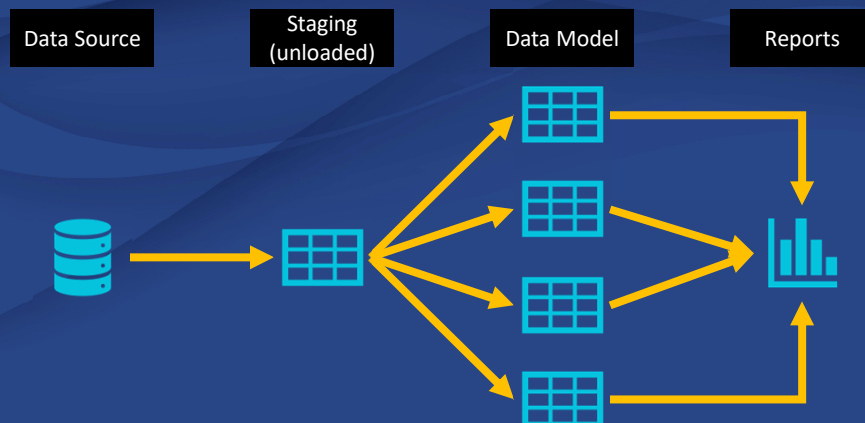
Discover some insights



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Building a Staged Model



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Giving YOU access to an Azure Database!

Connect to Azure Database

Get Data → Other Sources → Azure SQL Database

Connection Details

Server: `xlgdemos.database.windows.net`

Database: `LoadedPencil`

Security (Database)

Username: `demos`

Password: `PowerBI!`



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Laying the Groundwork

Connect to any database table

Delete all steps except "Source"

Rename this query to AzureDB

Right click and choose to Disable Load



Start From:
A blank Power BI project

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Importing the Model Tables

For each Database table:

- Reference the AzureDB table
- Drill in to the required table
- Rename the Query
- Reshape the data as required



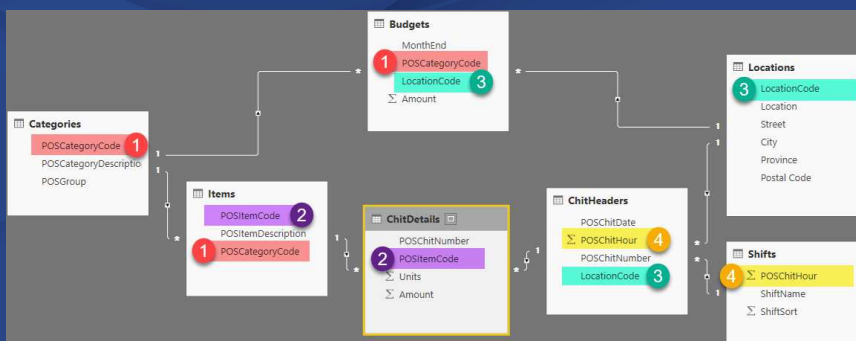
Catch-up Point:
Loaded Pencil – Begin.pbix

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The Model Relationship Diagram

Model relationships are created for you!



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Creating the Base Measures

What do we want to measure?

Selected Units = `SUM (ChitDetails [Units])`

Sales \$ = `SUM (ChitDetails [Amount])`

Budget \$ = `SUM (Budgets [Amount])`

Force users to use your measures

Hide the unaggregated fields



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Catch-up Point: Loaded Pencil –
Catch-up 02.pbix

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Let's Get Visual!



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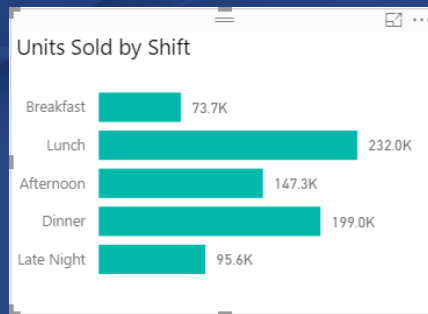
98

Bar Chart – Sales Units by Shift

Clustered Bar Chart

Modifications

- Add data labels
- Remove X Axis
- Adjust title
- Adjust sort order



Catch-up Point: Loaded Pencil –
Catch-up 03.pbix

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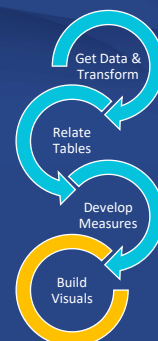
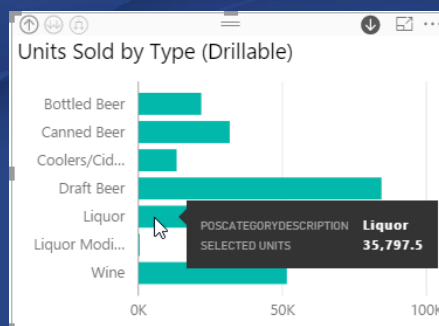
100

Bar Chart – Sales Units by Group

Clustered Bar Chart

Modifications

- Add data labels
- Remove X Axis
- Adjust title
- Add Drill Through



Catch-up Point: Loaded Pencil –
Catch-up 04.pbix

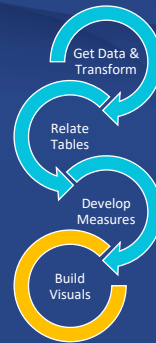
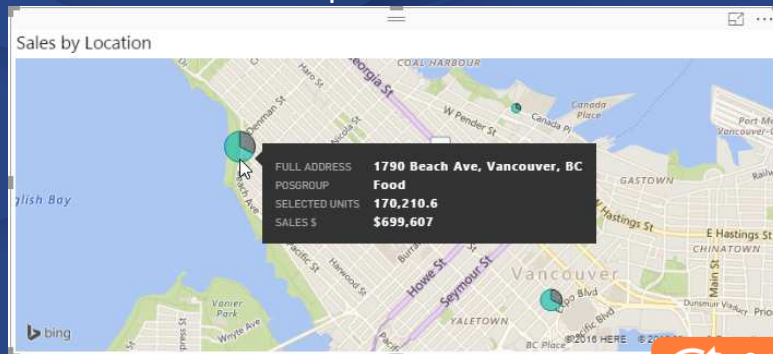
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Map Visuals – Sales by Location

Map Chart

Modifications: Add Tooltips



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Catch-up 05.pbix

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Card Visuals

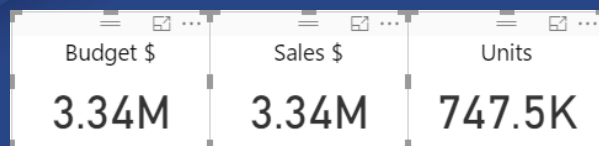
Good for one statistic only

Formatting tricks

Turn off category labels & use title

Allows richer formatting

Allows re-naming measures without confusion



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Cards vs Multi-Row Cards

Multiple Single Cards

Pros

- Can change names
- Can change formats

Cons

- Have to align manually

Budget \$	Sales \$	Units
3.34M	3.34M	747.5K

Multi-Row Card

Pros

- Alignment is automatic

Cons

- Cannot change names
- Cannot change formats
- Cannot centre

3,340,000.24	3,342,812.75	747,544.35
Budgets \$	Sales \$	Units



Catch-up Point: Loaded Pencil –
Catch-up 06.pbix

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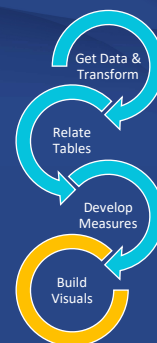
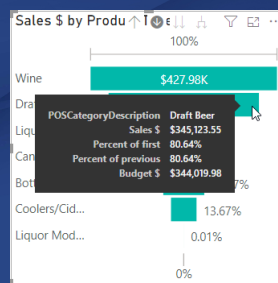
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Funnel Charts – Unit Sales

Funnel Chart

Modifications

- Drill Down
- Label Styles
- Tooltips



Catch-up Point: Loaded Pencil –
Catch-up 07.pbix

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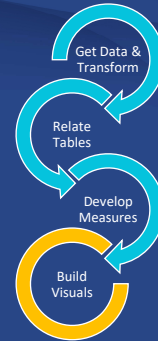
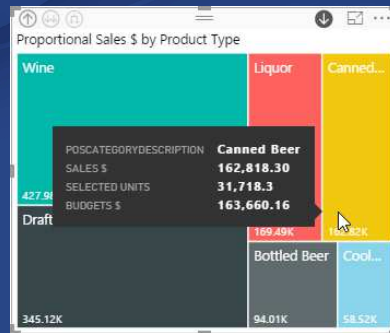
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Treemaps

Treemap

Modifications

- Add a drill down level
- Adding data labels
- Tooltips



Catch-up Point: Loaded Pencil – Catch-up 08.pbix

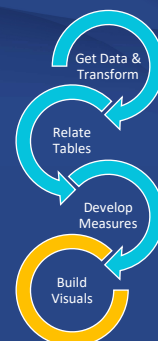
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Matrix

Similar to an Excel PivotTable

Gross Revenues by Location									
POSGroup	Location	Ethical Development		Tax Ender		The Squintz		Total	
		Sales \$	Budget \$	Sales \$	Budget \$	Sales \$	Budget \$		
Alcohol	Bottled Beer	29,992.80	30,861.56	30,017.00	30,861.56	34,004.20	31,796.86	94,014.00	93,519.98
	Canned Beer	52,896.10	54,007.86	53,420.60	54,007.86	56,501.60	55,644.44	162,818.30	163,660.16
	Coolers/Ciders	18,732.20	18,737.44	19,172.80	18,737.44	20,613.20	19,305.14	58,518.20	56,780.02
	Draft Beer	113,622.15	113,526.56	114,343.40	113,526.56	117,158.00	116,966.86	345,123.55	344,019.98
	Liquor	59,847.75	56,212.14	50,972.55	56,212.14	58,674.40	57,915.56	169,494.70	170,339.84
	Liquor Modifiers	4.65				37.40		42.05	
	Wine	147,380.15	141,081.56	134,568.65	141,081.56	146,027.70	145,356.86	427,976.50	427,519.98
	Total	422,475.80	414,427.12	402,495.00	414,427.12	433,016.50	426,985.72	1,257,987.30	1,255,839.96
Food	Appetizers	53,060.10	52,905.56	53,221.95	52,905.56	54,703.00	54,508.86	160,985.05	160,319.98
	Breakfast	48,823.30	48,496.86	50,254.60	48,496.86	47,728.05	49,966.44	146,805.95	146,980.16
	Burgers	82,888.60	80,460.56	80,214.15	80,460.56	80,410.95	82,898.86	243,513.90	243,819.98
	Deserts	8,805.30	8,817.56	9,062.95	8,817.56	10,286.60	9,084.86	28,154.85	26,719.98
	Entrees	204,308.65	202,804.86	200,358.35	202,804.86	209,687.20	208,950.44	614,354.20	614,560.16
	Food Modifiers	0.00	0.00			0.00		0.00	
	Non Alc Beverage	116,010.20	115,731.00	115,715.45	115,731.00	118,558.05	119,238.00	350,283.70	350,700.00
	Sandwiches	118,442.85	115,731.00	115,129.80	115,731.00	118,153.60	119,238.00	351,726.25	350,700.00
	Soups/Salads	62,654.00	62,825.44	62,831.60	62,825.44	63,515.95	64,729.14	189,001.55	190,380.02
	Total	694,993.20	687,772.84	686,788.85	687,772.84	703,043.40	708,614.60	2,084,825.45	2,084,160.28
Total		1,117,469.00	1,102,199.96	1,089,283.85	1,102,199.96	1,136,059.90	1,135,600.32	3,342,812.75	3,340,000.24



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Tables

Similar to Matrix

Same formatting methods/benefits
Similar formatting shortcuts

Major Differences

Row labels fill down
No subtotals
No column field

Location	Sales \$	Budget \$
Ethical Development	1,117,469.00	1,102,199.96
Tax Evader	1,089,283.85	1,102,199.96
The Squintz	1,136,059.90	1,135,600.32
Total	3,342,812.75	3,340,000.24



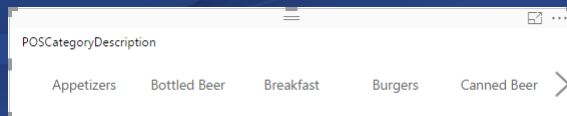
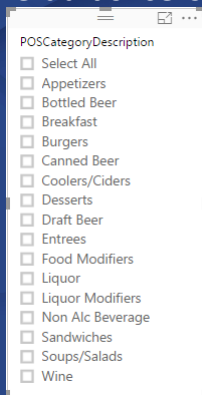
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Slicers

Default slicers are awful:



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Custom Visuals



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Acquiring Custom Visuals

A whole gallery of additional visuals

Go to Home → More Visuals → From AppSource
Browse till you find something interesting

To use:

Import into your project
Enjoy!



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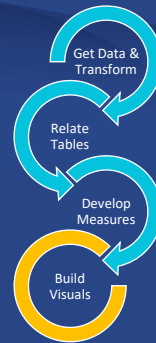
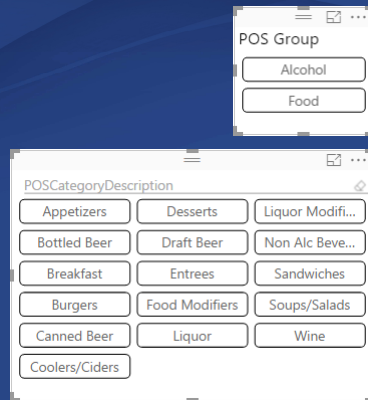
120

Chiclet Slicer

Publisher: Microsoft

Important Features

- Looks like a real slicer!
- Can use images
- More formatting options
- Optional single select



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Updating Custom Visuals

The downsides

- Sadly manual
- No notifications

Update process

- Go back to AppSource
- Re-import into the project
- Say yes when asked to update



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Resources & Reference Materials



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Power Pivot and Power BI

This book is REQUIRED for anyone trying to learn Power Pivot

You're entitled to a 30% discount on the e-Book!

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Code: ATTENDEE



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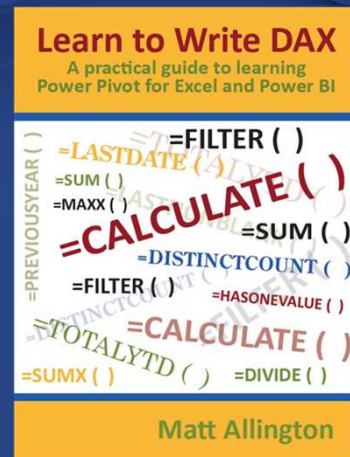
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M is for (Data) Monkey

The definitive guide to Power Query

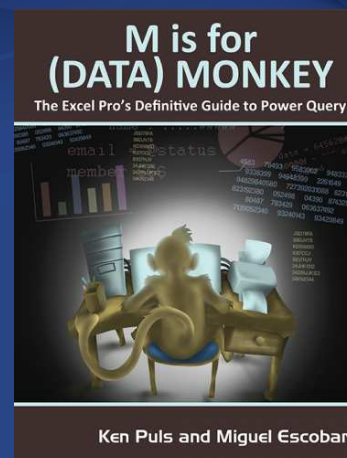
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Vancouver Power BI User Group

Local group of Power BI and Modern Excel enthusiasts

Dedicated to sharing techniques and inspire incredible data analytics and dashboards

Meet-ups held on second Thursday of every month



For more information:

<https://www.meetup.com/Vancouver-Power-BI-User-Group/>

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