



Leveraging IoT Data to Optimizing Retail Strategies with Geospatial Analytics and Power BI

Speakers



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Leveraging IoT Data to Optimize Retail Strategies with Geospatial Analytics and Power BI



In an industry where success depends on predicting customer behavior and preferences, **IoT data, geospatial analytics and Power BI**, can provide **valuable and actionable insights for retail strategies** to improve customer experience and drive sales.

In this presentation, we will explore the **advantages of leveraging IoT data** and its implementation for retail optimization.

With the increasing use of **IoT devices in retail**, businesses have **access to a wealth of data**.



What is IoT Data?

IoT data refers to the **vast amount of data collected** by physical interconnected devices, such as sensors, cameras, and smartphones and how they work together to provide insights

This data can be used to **gain insights** into **customer behavior and preferences**, as well as **optimize** processes such as **inventory management** and **supply chain logistics**.



Introduction of IoT Data in Retail Industry

Integration of IoT Data in Retail

IoT has revolutionized the retail industry, providing valuable insights into customer behavior, preferences, and movement within stores.

Types of IoT Data in Retail

IoT data in retail includes device-generated data, such as sensors, RFID tags, and beacons, as well as social media, weather, and traffic data.

Benefits of IoT Data in Retail Optimization

IoT data helps retailers personalize the shopping experience, optimize inventory management, and identify market trends, leading to increased sales and customer loyalty.

Geospatial Analytics for Retail and Its Implementation

What is Geospatial Analytics?

Geospatial analytics is the use of location-based data to gain insights and make decisions.

Geospatial Analytics is the analysis of geographic data and its relationship to other data to provide insights and decision-making tools

In retail, geospatial analytics can be used to analyze foot traffic, map out competitor locations, and optimize store layouts.

Benefits of Geospatial Analytics

- Identify new store locations
- Track customer behavior in real-time
- Optimize store layouts for maximum sales
- Geospatial analytics helps retailers analyze customer behavior, predict demand, and enhance the customer experience.

Geospatial Analytics Examples

Target uses geospatial analytics to optimize store layouts and product placement.

They analyzed foot traffic and sales data to determine that placing sunscreen near the entrance during summer months increased sales by 69%.

Geospatial analytics in retail can be used to analyze data generated from IoT devices, such as heat maps, **foot traffic analysis, basket analysis, and inventory tracking.**

Why is Geospatial Analytics Crucial in the Banking Industry?

Geospatial Analytics can provide **highly-accurate insights** and offer a range of key **advantages for the banking sector**. By identifying patterns in customer behavior, banks can better understand customer preferences, optimize product and service offerings, and create targeted marketing campaigns. Geospatial Analytics can also help banks gain a **competitive edge over rivals**.

Advantages	Examples
Better Customer Insights	Knowing which products and services are popular in particular regions can help banks tailor their offerings to local customer needs
Optimized Market Penetration	Understanding geographical location data for different banking services can inform decisions about branch placement and expansion
Enhanced Revenue Opportunities	Geospatial data analysis can help banks discover new opportunities for revenue growth and expansion

How does IoT Data help optimize Bank retail strategies?

By analyzing IoT data, banks can optimize their **retail strategies and enhance customer experiences.**

For example, banks can evaluate ATM usage, **monitor weight of currency** in ATM machines, and **enable proactive maintenance** of ATMs. By using IoT data to track customer behavior, banks can offer targeted promotions and rewards, while also optimizing branch **layouts and staffing models.**

1 Optimized ATM Usage

By monitoring ATM usage patterns through IoT data, banks can determine optimal ATM locations and ensure cash is available at peak times.

2 Streamlined Staffing Models

By monitoring in-store customer behavior with IoT devices, banks can improve staffing models, minimize wait times, and ensure customer satisfaction.

Successful Case Studies of using IoT Bank Data and Geospatial Analytics in Optimizing Retail Strategies

Many banks have already begun leveraging IoT data and Geospatial Analytics to optimize their retail strategies and improve customer experiences. One successful example is JPMC, which used IoT data to track customer behavior in its branches and optimized branch layouts, signage, staffing models and created a completely new banking experience for customers. Another example is Bank of America, which used Geospatial Analytics to optimize placement strategies for new branches, improving their branch's performance and ROI.

JPMorgan Chase (JPMC)

- Used IoT data to monitor customer behavior in branches
- Optimized signage and branch layouts
- Improved staffing models

Bank of America (BoA)

- Used Geospatial Analytics to optimize branch placement strategies
- Improved branch performance and ROI
- Provided enhanced customer experience

Challenges in Implementing IoT Data for Retail Strategies

1 Data Privacy and Security

IoT data, particularly customer data, is sensitive and prone to privacy and security breaches, requiring a robust security infrastructure and stringent data privacy policies.

2 Complexity of IoT Data

IoT data is complex and requires expertise, tools, and resources to collect, process, analyze, and interpret, making integrating it into retail strategies a resource-intensive endeavor.

3 Integration with Legacy Systems

Integrating IoT data with legacy management systems can be a complex and costly endeavor, requiring significant investment in upgrading and integrating existing infrastructure.



Power BI for Data Visualization



What is Power BI?

1

Power BI is a business analytics tool that provides interactive visualizations and business intelligence capabilities with an interface simple enough for end-users to create their own reports and dashboards.



Power BI Examples

3

Salesforce uses Power BI to gain insights into customer behavior, leading to a 10% increase in overall customer satisfaction.



Benefits of Power BI

2

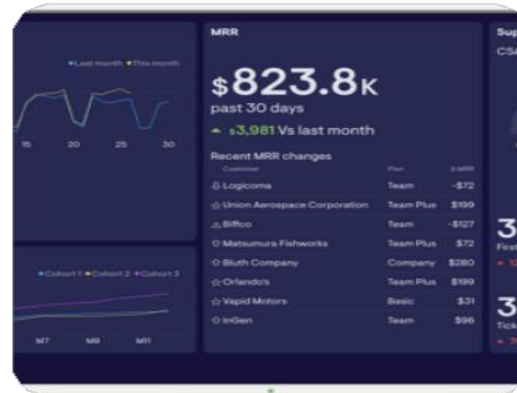
- Real-time data insights
- User-friendly interface
- Customizable dashboards and reports

Power BI and its Integration with Geospatial Analytics



What is Power BI?

Power BI is a suite of business analytics tools that provides interactive visualizations and business intelligence capabilities with an interface simple enough for end users to create their reports and dashboards.



How Geospatial Analytics Integrates with Power BI

Power BI integrates with geospatial analytics to provide powerful and interactive visualizations of IoT data, such as maps showing store performance, customer location, and buying patterns.



Benefits of Power BI Integration with Geospatial Analytics in Retail Optimization

The integration of Power BI and Geospatial analytics helps retailers derive insights and create visualizations that can be easily shared with stakeholders to drive data-driven decision making for retail optimization.

Bank of IndabaX Customer Summary Dashboard

Commercial

Institutional

Investments Only

Private Bank

Retail



2812

Total Customer



(\$585M)

Total Float



\$4bn

Total Deposit



4bn

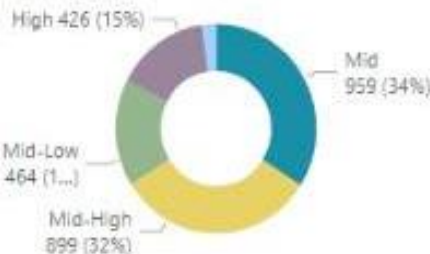
Total Loan



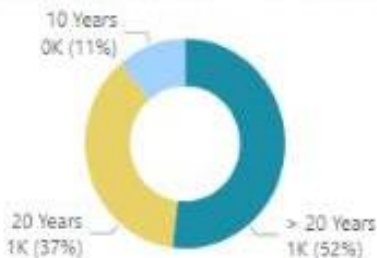
57.41M

Total Fees

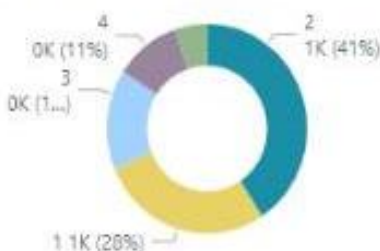
Total Customer by Income Band



Total Customer by Relationship Time Frame



Total Customer by Risk Weighting

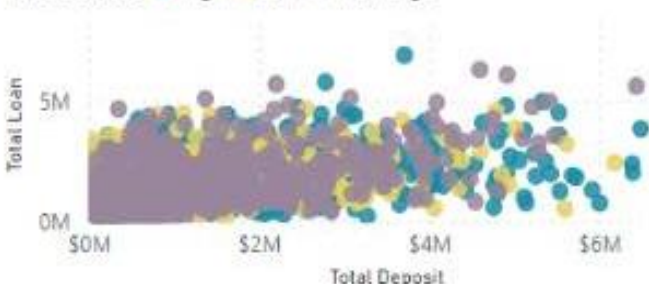


Total Deposit by City

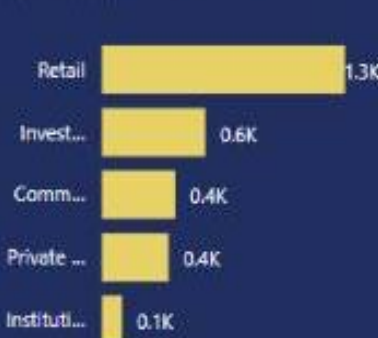


Total Deposit and Total Loan by Client ID and Fee Structure

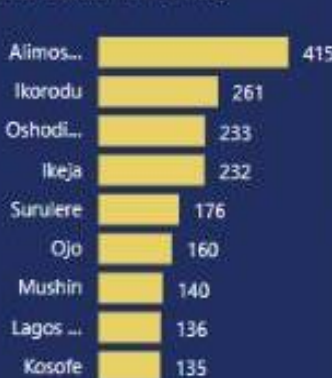
Fee Structure: High (Blue), Low (Yellow), Mid Range (Purple)



Total Customer by Banking Relationship



Total Customer by City



Name	Banking Contact	Total Deposit	Total Loan	Total Float
Adam Hughes	Adam Hernandez	\$348,921	1421567	(\$1,072,646)
Amy Martinez	Adam Hernandez	\$120,060	567941	(\$447,881)
Anna Cole	Adam Hernandez	\$802,509	2487085	(\$1,684,576)
Anne Phillips	Adam Hernandez	\$727,620	1674601	(\$946,981)
Anthony Oliver	Adam Hernandez	\$2,121,560	2899491	(\$777,931)
Benjamin Collins	Adam Hernandez	\$451,222	866188	(\$414,966)
Bobby Reid	Adam Hernandez	\$1,163,023	1473213	(\$310,190)
Brandon Andrews	Adam Hernandez	\$184,402	1892770	(\$1,708,368)



Retail Strategies with Geospatial Analytics and Power BI

COURSE OUTLINE

1	Introducing Power BI Desktop	<i>Installing Power BI, exploring the Power BI workflow, comparing Power BI vs. Excel, etc.</i>
2	Connecting & Shaping Data	<i>Connecting to source data, shaping and transforming tables, editing, merging and appending queries, etc.</i>
3	Creating a Data Model	<i>Building relational models, creating table relationships, understanding cardinality, exploring filter flow, etc.</i>
4	Adding Calculated Fields with DAX	<i>Understanding DAX syntax, adding calculated columns and measures, writing common formulas and functions, etc.</i>
5	Visualizing Data with Reports	<i>Inserting charts and visuals, customizing formats, editing interactions, applying filters and bookmarks, etc.</i>
6	Final Course Project	<i>Applying all of the skills developed throughout the course to build a pro-quality B.I. report from a brand new dataset</i>

MEET POWER BI

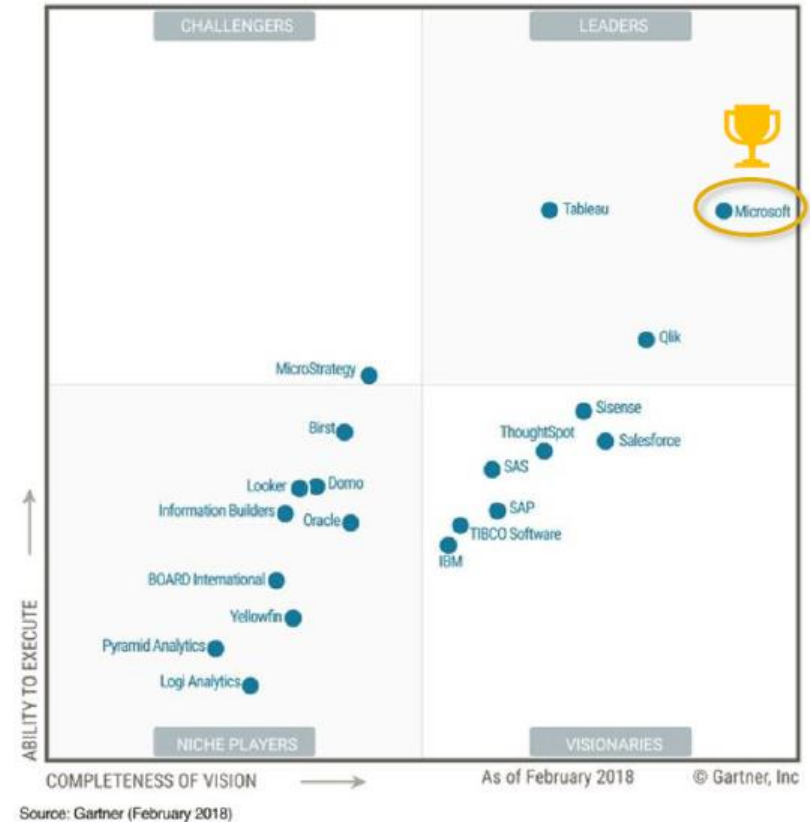


Power BI is a standalone Microsoft business intelligence product, which includes both desktop and web-based applications for loading, modeling, and visualizing data

More information at powerbi.microsoft.com



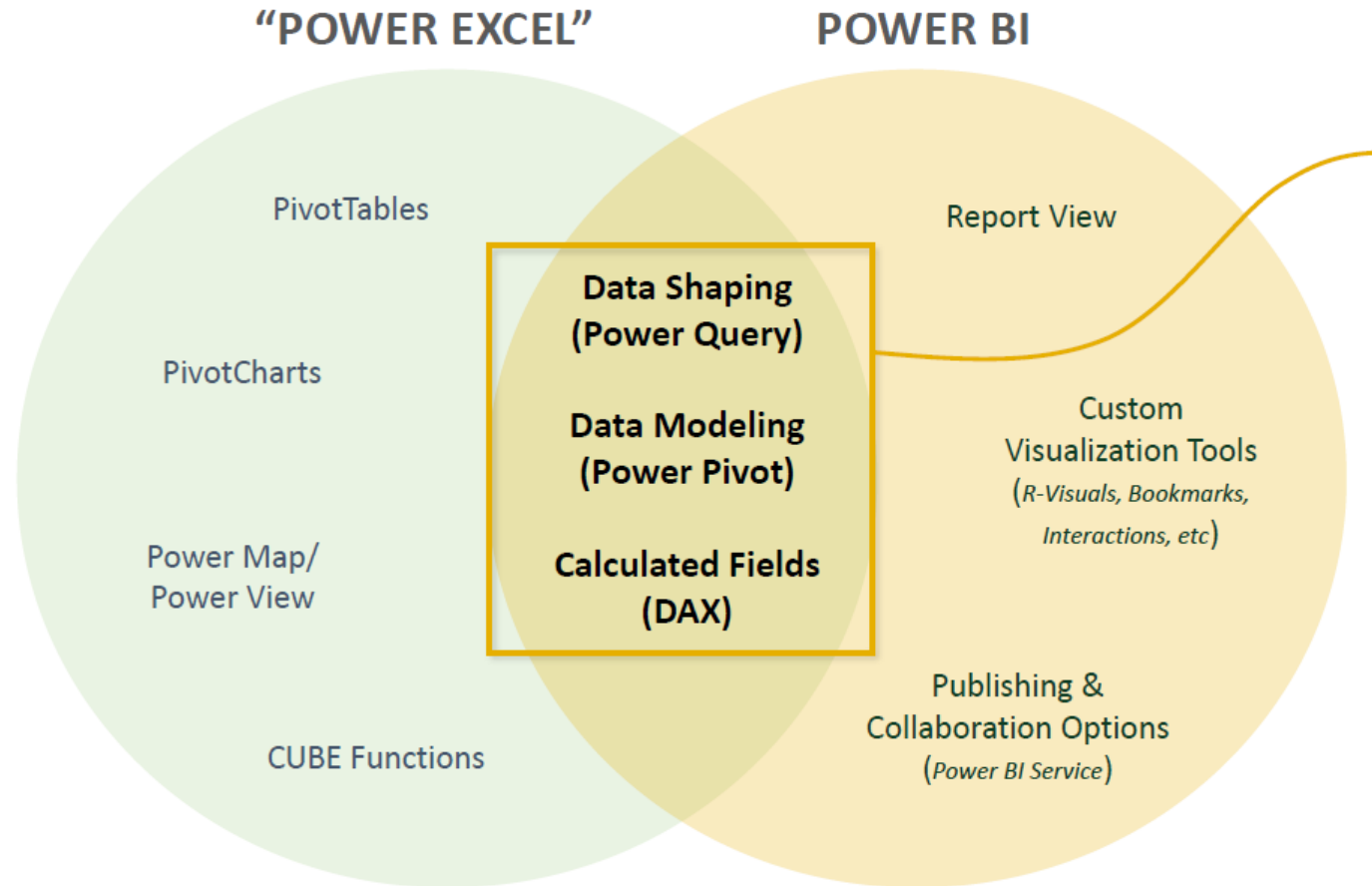
Figure 1. Magic Quadrant for Analytics and Business Intelligence Platforms



WHY POWER BI?

- **Connect, transform and analyze *millions* of rows of data**
 - *Access data from virtually anywhere (database tables, flat files, cloud services, folders, etc), and create fully automated data shaping and loading (ETL) procedures*
- **Build relational models to blend data from multiple sources**
 - *Create table relationships to analyze holistic performance across an entire data model*
- **Define complex calculations using Data Analysis Expressions (DAX)**
 - *Enhance datasets and enable advanced analytics with powerful and portable DAX expressions*
- **Visualize data with interactive reports & dashboards**
 - *Build custom business intelligence tools with best-in-class visualization and dashboard features*
- **Power BI is the industry leader among BI platforms**
 - *Microsoft Power BI is intuitive, powerful and absolutely FREE to get started*

POWER BI VS. “POWER EXCEL”

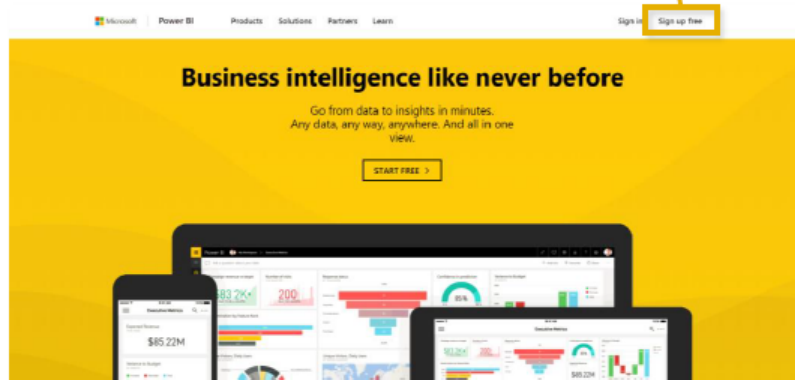


“Power Excel” and Power BI are built on top of the ***exact same engine!***

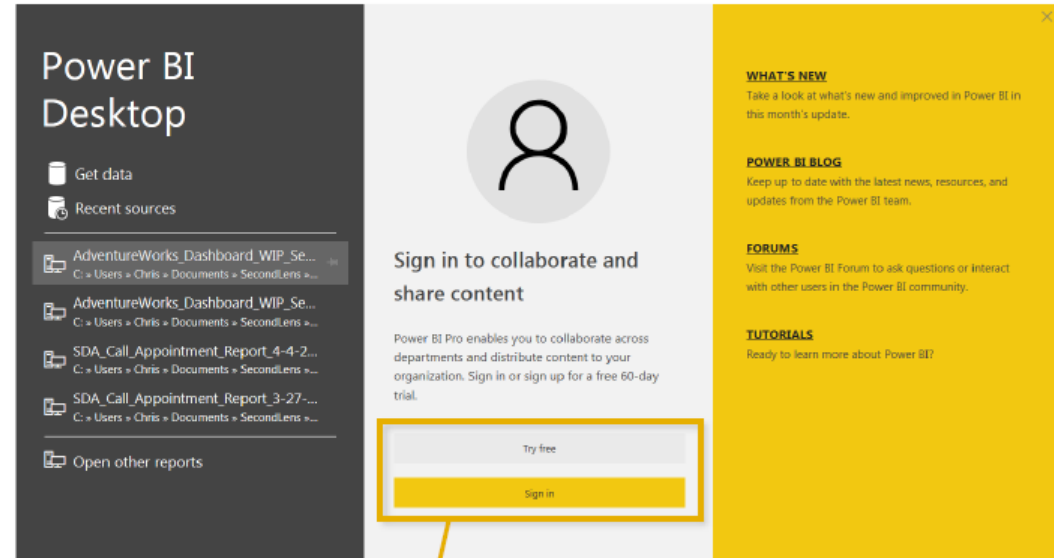
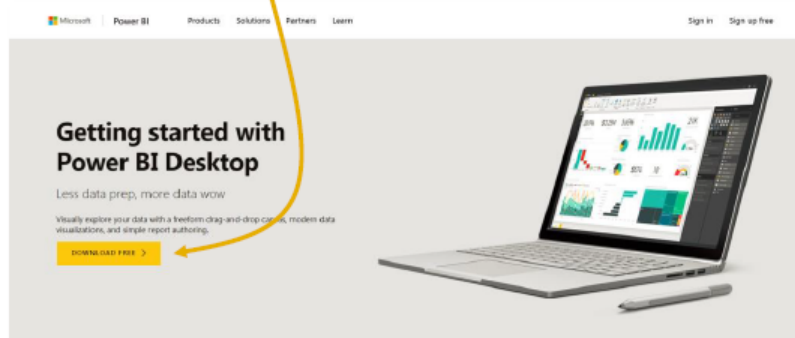
- Power BI takes the same data shaping, modeling and analytics capabilities and adds ***new reporting and publishing tools***
- Transitioning is easy; you can import an ***entire data model*** directly from Excel!

INSTALLING POWER BI DESKTOP

1) Head to powerbi.microsoft.com and click "Sign Up Free"



2) Click "Download Free" to start the Power BI Desktop download

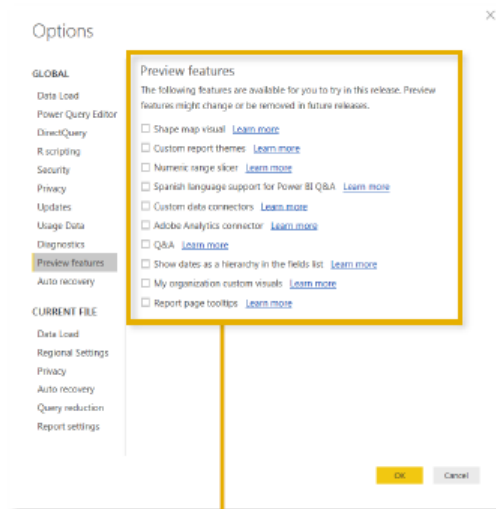


IMPORTANT: You do **not** need to sign in or register for a Power BI Pro account to access Power BI Desktop (*you can simply close this window*)

- Sign-in is only required to access the sharing and collaboration tools available through Power BI Service (app.powerbi.com)
- **Note:** Microsoft requires a **work** or **school** e-mail address

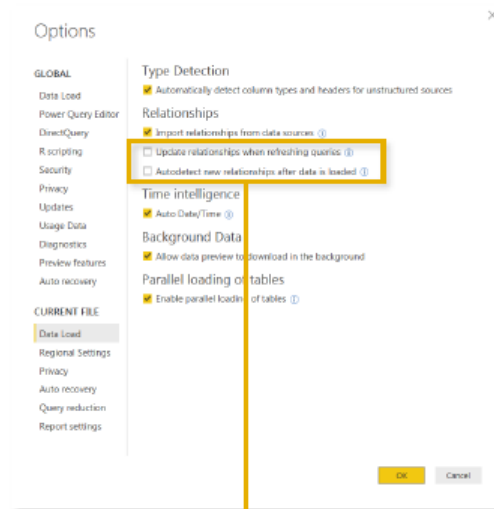
COURSE OPTIONS & SETTINGS

PREVIEW FEATURES



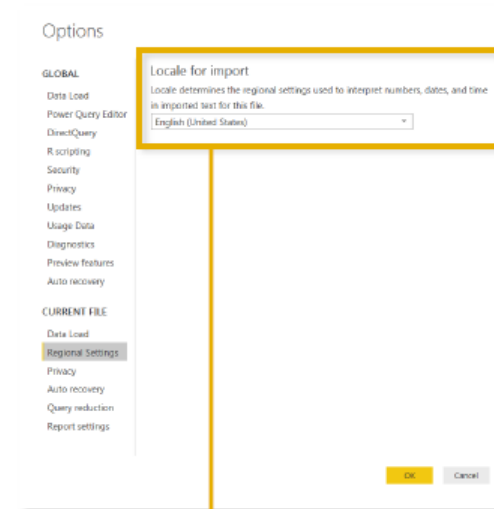
1) In the “**Preview Features**” tab, deselect any active features while you are taking the course

DATA LOAD



2) In the “**Data Load**” tab, deselect the “*Update relationships*” and “*Autodetect new relationships after data is loaded*” options

REGIONAL SETTINGS



3) In the “**Regional Settings**” tab, make sure to use the “*English (United States)*” locale for import

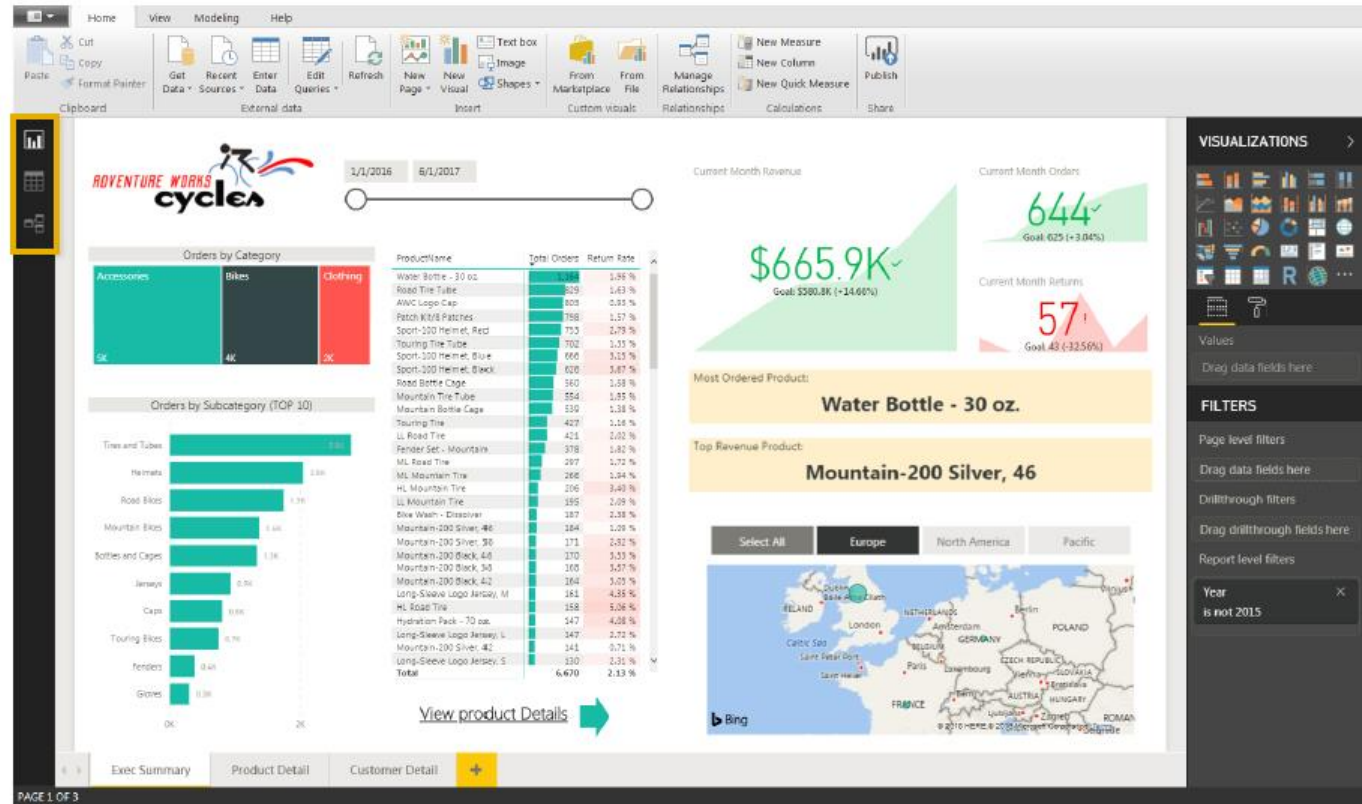
THE POWER BI INTERFACE

Three Core Views:

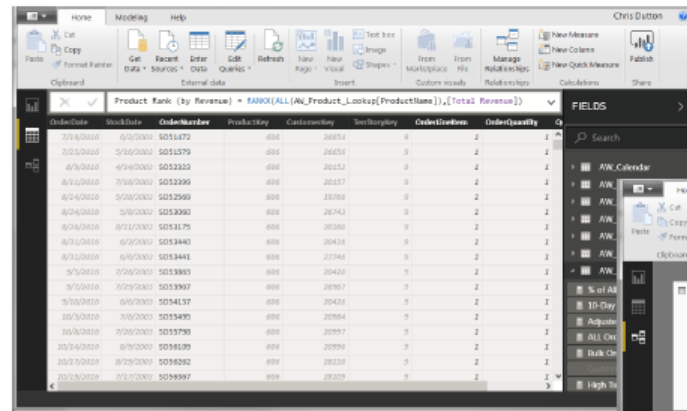
Report

Data


Relationships

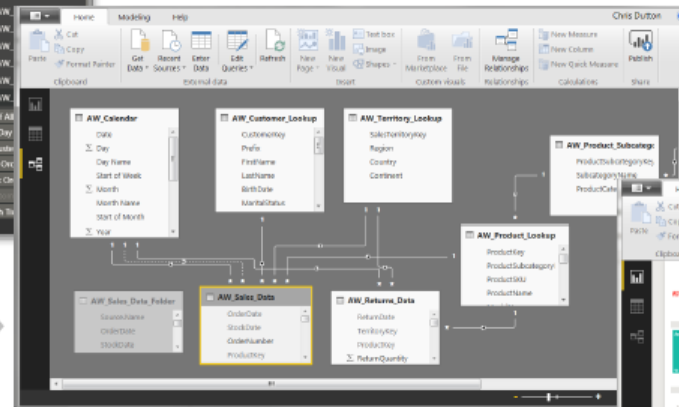



THE POWER BI WORKFLOW

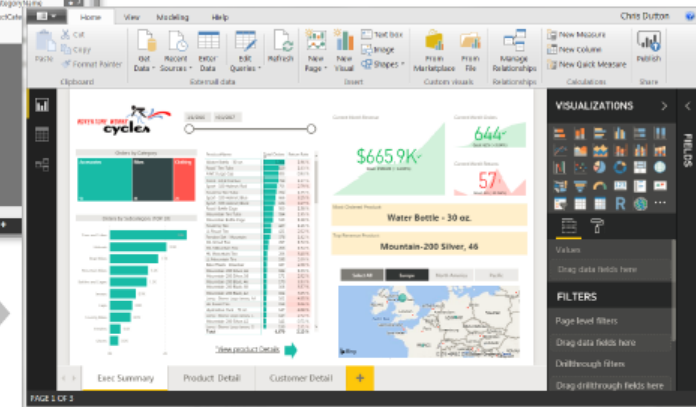



OrderDate	StockDate	OrderMeasure	ProductKey	CustomerKey	TerritoryKey	OrderDateKey	OrderQuantity
5/1/2018	6/2/2018	\$051872	808	28854	0	2	1
7/2/2018	5/6/2018	\$051570	808	28854	0	2	1
8/7/2018	4/9/2018	\$052333	808	28152	0	2	1
8/11/2018	7/18/2018	\$052390	808	28157	0	2	1
8/14/2018	5/28/2018	\$052390	808	18785	0	2	1
8/16/2018	5/8/2018	\$052390	808	28743	0	2	1
8/16/2018	8/11/2018	\$053175	808	28380	0	2	1
8/17/2018	6/3/2018	\$053440	808	28438	0	2	1
8/17/2018	6/9/2018	\$053441	808	27748	0	2	1
9/5/2018	7/28/2018	\$053985	808	28400	0	2	1
9/7/2018	7/29/2018	\$053987	808	28917	0	2	1
9/10/2018	6/8/2018	\$054137	808	28406	0	2	1
10/5/2018	3/8/2018	\$053495	808	28584	0	2	1
10/6/2018	7/28/2018	\$053780	808	28917	0	2	1
10/14/2018	6/9/2018	\$056139	808	28598	0	2	1
10/17/2018	8/28/2018	\$059282	808	28220	0	2	1
10/17/2018	7/17/2018	\$059387	808	28220	0	2	1

 **Connect, shape and transform raw data**

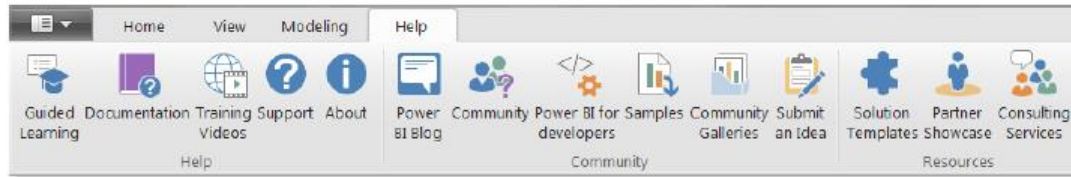


 **Build table relationships to tie sources together**



 **Design interactive reports to explore and visualize data**

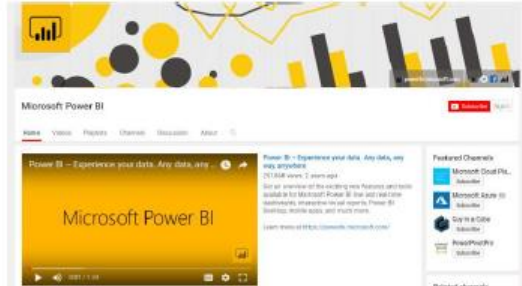
HELPFUL RESOURCES



The “Help” tab includes documentation, training videos, sample files, templates, and links to support blogs and communities – all within Power BI Desktop



The Microsoft Power BI blog (powerbi.microsoft.com/blog) publishes monthly summaries to showcase new features



The Microsoft Power BI YouTube Channel publishes demos, feature summaries, and advanced tutorials (check out “Guy in a Cube” too!)

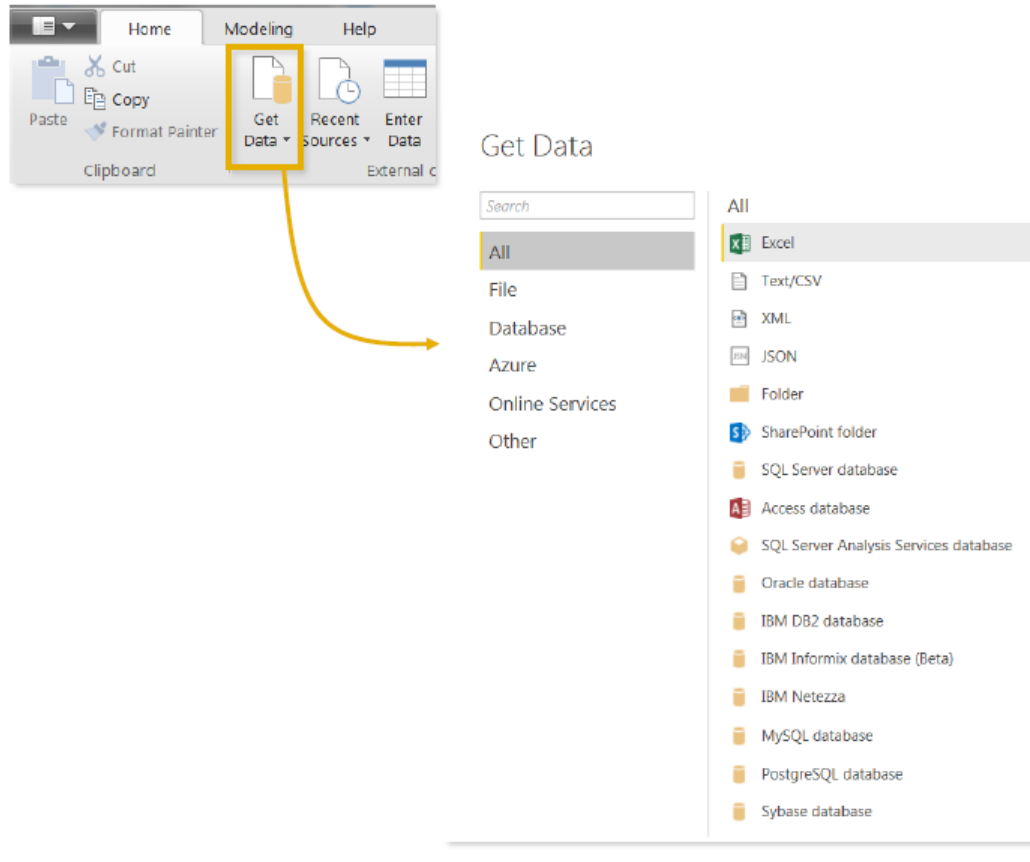


Power BI User Groups (PUG) are communities of users, which include both local meet-ups and helpful online forums (pbusergroup.com)



CONNECTING & SHAPING DATA

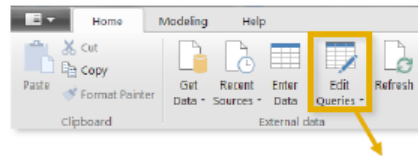
TYPES OF DATA CONNECTORS



Power BI can connect to virtually **any** type of source data, including (*but not limited to*):

- **Flat files & Folders** (*csv, text, xls, etc*)
- **Databases** (*SQL, Access, Oracle, IBM, Azure, etc*)
- **Online Services** (*Sharepoint, GitHub, Dynamics 365, Google Analytics, Salesforce, Power BI Service, etc*)
- **Others** (*Web feeds, R scripts, Spark, Hadoop, etc*)

THE QUERY EDITOR



Query Editing Tools (Table transformations, calculated columns, etc)

Formula Bar
(this is "M" code)

Query List

Home Transform Add Column View Help

Close & Apply New Source Recent Sources Enter Data Data source settings Manage Parameters Refresh Preview Advanced Editor Choose Columns Remove Columns Keep Rows Remove Rows Split Column Group By Data Type: Date Use First Row as Headers Replace Values Merge Queries Append Queries Combine Files Combine

Queries [13]

Transform File from AW_Sales_Data... Sample Query [2] Sample File (2) Sample File Parameter2 (Sample... Transform Sample File from AW_S... Transform File from AW_Sales_Data... Other Queries [9] AW_Sales_Data AW_Territory_Lookup AW_Product_Lookup AW_Customer_Lookup AW_Sales_Data_Folder AW_Calendar AW_Product_Subcategory_Lookup AW>Returns_Data AW_Product_Category_Lookup

Table.RemoveColumns(#'Changed Type2',{'OrderID'})

	OrderDate	StockDate	OrderNumber	ProductKey	CustomerKey
1	1/1/2015	9/21/2001	SO45080	332	146
2	1/1/2015	12/3/2001	SO45079	312	295
3	1/1/2015	10/29/2001	SO45082	350	114
4	1/1/2015	11/16/2001	SO45081	338	267
5	1/2/2015	12/15/2001	SO45083	312	146
6	1/2/2015	10/12/2001	SO45084	310	291
7	1/2/2015	12/18/2001	SO45086	314	185
8	1/2/2015	10/9/2001	SO45085	312	185
9	1/3/2015	10/3/2001	SO45093	312	185
10	1/3/2015	9/29/2001	SO45090	310	291
11	1/3/2015	12/11/2001	SO45088	345	115
12	1/3/2015	10/24/2001	SO45092	313	185
13	1/3/2015	12/16/2001	SO45089	351	255
14	1/3/2015	10/26/2001	SO45091	314	185
15	1/3/2015	9/11/2001	SO45087	350	115
16	1/3/2015	9/11/2001	SO45094	310	227
17	1/4/2015	10/30/2001	SO45096	312	124
18	1/4/2015	10/30/2001	SO45097	313	291
19	1/4/2015	9/15/2001	SO45098	310	291
20	1/4/2015	12/7/2001	SO45095	344	115
21					

9 COLUMNS, 999+ ROWS

PREVIEW DOWNLOADED AT 1:27 PM

QUERY SETTINGS

PROPERTIES

Name: AW_Sales_Data

APPLIED STEPS

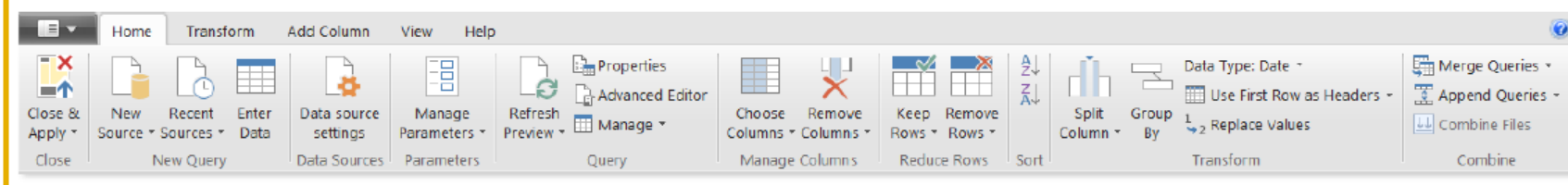
- Source
- Promoted Headers
- Changed Type
- Added Index
- Reordered Columns
- Renamed Columns
- Changed Type1
- Added Conditional Column
- Filtered Rows
- Changed Type2
- Removed Columns

Table Name & Properties

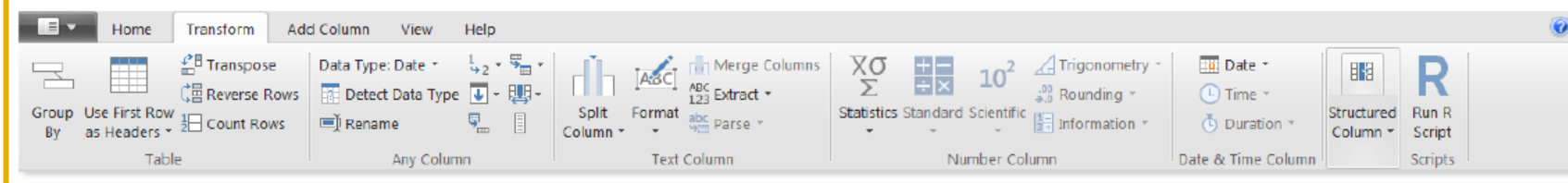
Applied Steps
(like a macro)

QUERY EDITING TOOLS

The **HOME** tab includes general settings and common table transformation tools



The **TRANSFORM** tab includes tools to modify existing columns (splitting/grouping, transposing, extracting text, etc)



The **ADD COLUMN** tools create new columns (based on conditional rules, text operations, calculations, dates, etc)



BASIC TABLE TRANSFORMATIONS

Sort values (A-Z, Low-High, etc.) **Change data type (date, \$, %, text, etc.)**

Promote header row

Choose or remove columns

Tip: use the "Remove Other Columns" option if you always want a specific set

Keep or remove rows

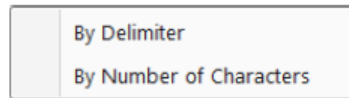
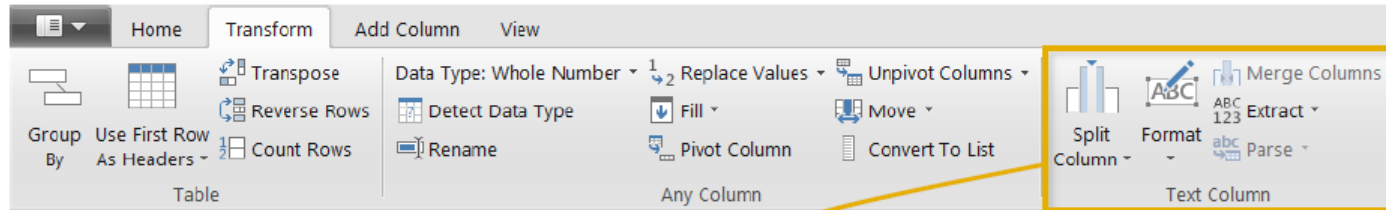
Tip: use the "Remove Duplicates" option to create a new lookup table from scratch

Duplicate, move & rename columns

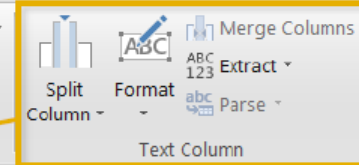
Tip: Right-click the column header to access common tools

OrderDa	OrderDa	OrderDa
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22	1/5/2015	9/19/2001 SO45101
23	1/5/2015	11/21/2001 SO45100

TEXT-SPECIFIC TOOLS

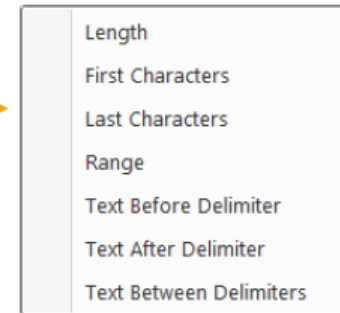


Split a text column based on either a specific delimiter or a number of characters



Format a text column to upper, lower or proper case, or add a prefix or suffix

Tip: Use "Trim" to eliminate leading & trailing spaces, or "Clean" to remove non-printable characters



Extract characters from a text column based on fixed lengths, first/last, ranges or delimiters

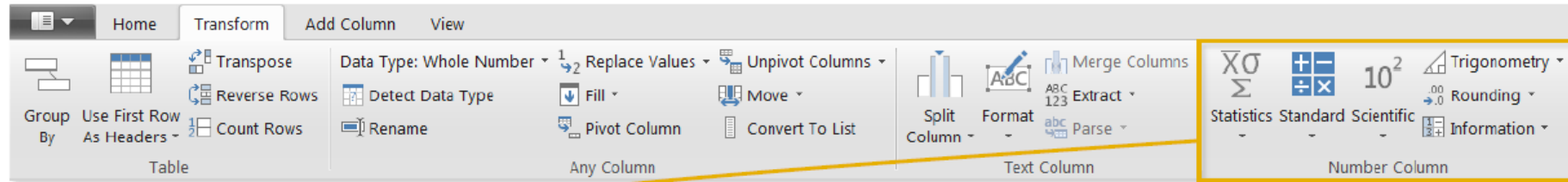
Tip: Select two or more columns to merge (or concatenate) fields



HEY THIS IS IMPORTANT!

You can access many of these tools in both the "Transform" and "Add Column" menus -- the difference is whether you want to **add a new column** or **modify an existing one**

NUMBER-SPECIFIC TOOLS



Sum
Minimum
Maximum
Median
Average
Standard Deviation
Count Values
Count Distinct Values

Statistics functions allow you to evaluate basic stats for the selected column (sum, min/max, average, count, countdistinct, etc)

Note: These tools return a SINGLE value, and are commonly used to explore a table rather than prepare it for loading

Add
Multiply
Subtract
Divide
Integer-Divide
Modulo
Percentage
Percent Of

Standard

Absolute Value
Power
Square Root
Exponent
Logarithm
Factorial

Scientific

Sine
Cosine
Tangent
Arcsine
Arccosine
Arctangent

Trigonometry

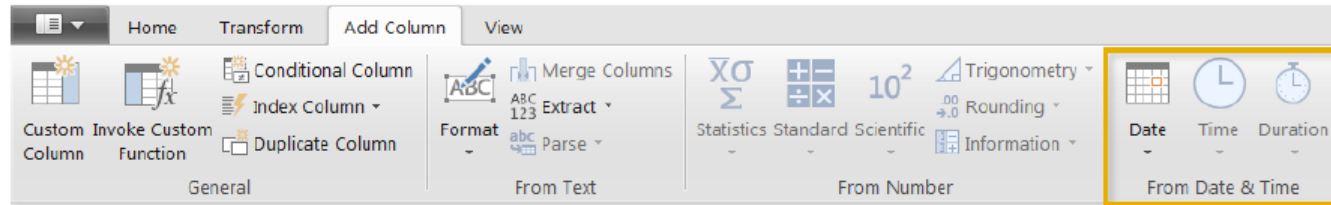
Standard, Scientific and Trigonometry tools allow you to apply standard operations (addition, multiplication, division, etc.) or more advanced calculations (power, logarithm, sine, tangent, etc) to each value in a column

Note: Unlike the Statistics options, these tools are applied to each individual row in the table

Is Even
Is Odd
Sign

Information tools allow you to define binary flags (TRUE/FALSE or 1/0) to mark each row in a column as even, odd, positive or negative

DATE-SPECIFIC TOOLS



Date & Time tools are relatively straight-forward, and include the following options:

- **Age:** Difference between the current time and the date in each row
- **Date Only:** Removes the time component of a date/time field
- **Year/Month/Quarter/Week/Day:** Extracts individual components from a date field (Time-specific options include Hour, Minute, Second, etc.)
- **Earliest/Latest:** Evaluates the earliest or latest date from a column as a single value (can only be accessed from the “Transform” menu)

Age	
Date Only	
Parse	
Year	▸
Month	▸
Quarter	▸
Week	▸
Day	▸
Subtract Days	
Combine Date and Time	
Earliest	
Latest	

Note: You will almost always want to perform these operations from the “Add Column” menu to build out new fields, rather than transforming an individual date/time column



PRO TIP:

Load up a table containing a **single date column** and use Date tools to build out an **entire calendar table**

DAX SYNTAX

MEASURE NAME

- **Note:** Measures are always surrounded in brackets (i.e. **[Total Quantity]**) when referenced in formulas, so spaces are OK

Total Quantity: =SUM(Transactions[quantity])

Referenced
TABLE NAME

Referenced
COLUMN NAME

FUNCTION NAME

- Calculated columns don't always use functions, but measures do:
 - In a **Calculated Column**, =Transactions[quantity] returns the value from the quantity column in each row (since it evaluates one row at a time)
 - In a **Measure**, =Transactions[quantity] will return an **error** since Power BI doesn't know how to translate that as a single value (you need some sort of aggregation)

Note: This is a "fully qualified" column, since it's preceded by the table name -- table names with spaces must be surrounded by **single quotes**:

- Without a space: Transactions[quantity]
- With a space: 'Transactions Table'[quantity]



PRO TIP:

For **column** references, use the fully qualified name (i.e. **Table[Column]**)
For **measure** references, just use the measure name (i.e. **[Measure]**)

DAX OPERATORS

Arithmetic Operator	Meaning	Example
+	Addition	2 + 7
-	Subtraction	5 - 3
*	Multiplication	2 * 6
/	Division	4 / 2
^	Exponent	2 ^ 5

Comparison Operator	Meaning	Example
=	Equal to	[City]="Boston"
>	Greater than	[Quantity]>10
<	Less than	[Quantity]<10
>=	Greater than or equal to	[Unit_Price]>=2.5
<=	Less than or equal to	[Unit_Price]<=2.5
<>	Not equal to	[Country]<>"Mexico"

Pay attention to these!

Text/Logical Operator	Meaning	Example
&	Concatenates two values to produce one text string	[City] & " " & [State]
&&	Create an AND condition between two logical expressions	(([State]="MA") && ([Quantity]>10))
(double pipe)	Create an OR condition between two logical expressions	(([State]="MA") ([State]="CT"))
IN	Creates a logical OR condition based on a given list (using curly brackets)	'Store Lookup'[State] IN { "MA", "CT", "NY" }

**Head to www.msdn.microsoft.com for more information about DAX syntax, operators, troubleshooting, etc*

COMMON FUNCTION CATEGORIES

MATH & STATS Functions

Basic **aggregation** functions as well as “**iterators**” evaluated at the row-level

Common Examples:

- SUM
- AVERAGE
- MAX/MIN
- DIVIDE
- COUNT/COUNTA
- COUNTROWS
- DISTINCTCOUNT

Iterator Functions:

- SUMX
- AVERAGEX
- MAXX/MINX
- RANKX
- COUNTX

LOGICAL Functions

Functions for returning information about values in a given **conditional expression**

Common Examples:

- IF
- IFERROR
- AND
- OR
- NOT
- SWITCH
- TRUE
- FALSE

TEXT Functions

Functions to manipulate **text strings** or **control formats** for dates, times or numbers

Common Examples:

- CONCATENATE
- FORMAT
- LEFT/MID/RIGHT
- UPPER/LOWER
- PROPER
- LEN
- SEARCH/FIND
- REPLACE
- REPT
- SUBSTITUTE
- TRIM
- UNICHAR

FILTER Functions

Lookup functions based on related tables and **filtering** functions for dynamic calculations

Common Examples:

- CALCULATE
- FILTER
- ALL
- ALLEXCEPT
- RELATED
- RELATEDTABLE
- DISTINCT
- VALUES
- EARLIER/EARLIEST
- HASONESVALUE
- HASONEFILTER
- ISFILTERED
- USERRELATIONSHIP

DATE & TIME Functions

Basic **date and time** functions as well as advanced **time intelligence** operations

Common Examples:

- DATEDIFF
- YEARFRAC
- YEAR/MONTH/DAY
- HOUR/MINUTE/SECOND
- TODAY/NOW
- WEEKDAY/WEEKNUM

Time Intelligence Functions:

- DATESYTD
- DATESQTD
- DATESMTD
- DATEADD
- DATESINPERIOD

BASIC DATE & TIME FUNCTIONS

DAY/MONTH/ YEAR()	Returns the day of the month (1-31), month of the year (1-12), or year of a given date	= DAY/MONTH/YEAR (Date)
HOUR/MINUTE/ SECOND()	Returns the hour (0-23), minute (0-59), or second (0-59) of a given datetime value	= HOUR/MINUTE/SECOND (Datetime)
TODAY/NOW()	Returns the current date or exact time	= TODAY/NOW ()
WEEKDAY/ WEEKNUM()	Returns a weekday number from 1 (Sunday) to 7 (Saturday), or the week # of the year	= WEEKDAY/WEEKNUM (Date, [ReturnType])
EOMONTH()	Returns the date of the last day of the month, +/- a specified number of months	= EOMONTH (StartDate, Months)
DATEDIFF()	Returns the difference between two dates, based on a selected interval	= DATEDIFF (Date1, Date2, Interval)

BASIC LOGICAL FUNCTIONS (IF/AND/OR)

IF()

Checks if a given condition is met, and returns one value if the condition is TRUE, and another if the condition is FALSE

=**IF**(LogicalTest, ResultIfTrue, *[ResultIfFalse]*)

IFERROR()

Evaluates an expression and returns a specified value if the expression returns an error, otherwise returns the expression itself

=**IFERROR**(Value, ValueIfError)

AND()

Checks whether both arguments are TRUE, and returns TRUE if both arguments are TRUE, otherwise returns FALSE

=**AND**(Logical1, Logical2)

OR()

Checks whether one of the arguments is TRUE to return TRUE, and returns FALSE if both arguments are FALSE

=**OR**(Logical1, Logical2)

***Note:** Use the && and // operators if you want to include more than two conditions!*

BASIC MATH & STATS FUNCTIONS

SUM()

Evaluates the sum of a column

=**SUM**(ColumnName)

AVERAGE()

Returns the average (arithmetic mean) of all the numbers in a column

=**AVERAGE**(ColumnName)

MAX()

Returns the largest value in a column or between two scalar expressions

=**MAX**(ColumnName) or =**MAX**(Scalar1, [Scalar2])

MIN()

Returns the smallest value in a column or between two scalar expressions

=**MIN**(ColumnName) or =**MIN**(Scalar1, [Scalar2])

DIVIDE()

Performs division and returns the alternate result (or blank) if div/0

=**DIVIDE**(Numerator, Denominator, [AlternateResult])

COUNT, COUNTA, DISTINCTCOUNT & COUNTROWS

COUNT()

Counts the number of cells in a column that contain numbers

=**COUNT**(ColumnName)

COUNTA()

Counts the number of non-empty cells in a column (numerical and non-numerical)

=**COUNTA**(ColumnName)

DISTINCTCOUNT()

Counts the number of distinct or unique values in a column

=**DISTINCTCOUNT**(ColumnName)

COUNTROWS()

Counts the number of rows in the specified table, or a table defined by an expression

=**COUNTROWS**(Table)



Demo Session

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