

1. Main page: <http://cortanaanalytics.com>
2. Before starting this module, you should be able to:
  1. Use Azure ML Studio to create and share Data Science Model
  2. Use Azure ML Studio to select a model
  3. Use Azure ML Studio to export the results in Azure SQL DB


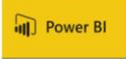
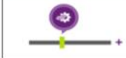








## Learning objectives

1. Publish a model using Azure ML to a REST API
2. Use Power BI to examine Data
3. Understand how to leverage code for Cortana



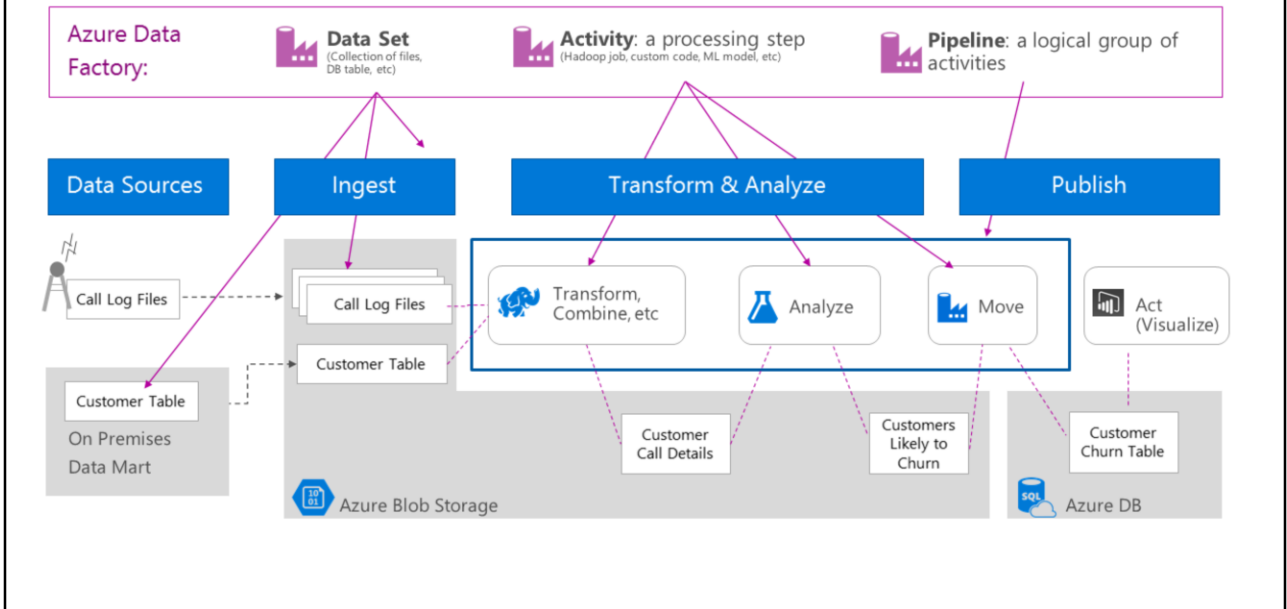
1. After you complete this Module, you will be able to:
  1. Publish a model using Azure ML to a REST API
  2. Use Power BI to examine Data
  3. Understand how to leverage code for Cortana

# Cortana Analytics Stack

	Cortana
	Power BI
	Azure Stream Analytics
	Azure HDInsight
	Azure Machine Learning
	Azure SQL DB, Data Warehouse, DocumentDB
	Azure Data Lake
	Azure Event Hubs
	Azure Data Catalog
	Azure Data Factory
	Microsoft Azure

1. Platform: Microsoft Azure – <http://microsoftazure.com>
2. Storage: <https://azure.microsoft.com/en-us/documentation/services/storage/> (Blobs)
3. Azure Data Lake: <http://azure.microsoft.com/en-us/campaigns/data-lake/> (from Bing)
4. Azure Data Factory: <http://azure.microsoft.com/en-us/services/data-factory/> (Orchestration and Movement)
5. Azure Event Hubs: <http://azure.microsoft.com/en-us/services/event-hubs/> (Ingest to streaming (IoT))
6. Azure Data Catalog: <http://azure.microsoft.com/en-us/services/data-catalog/> (Social networking for data)
7. Azure DocumentDB: [https://azure.microsoft.com/en-us/services/documentdb/?WT.srch=1&WT.mc\\_ID=SEM\\_JQ3fO8dU](https://azure.microsoft.com/en-us/services/documentdb/?WT.srch=1&WT.mc_ID=SEM_JQ3fO8dU)
8. Azure SQL Data Warehouse: <http://azure.microsoft.com/en-us/services/sql-data-warehouse/>
9. Azure Stream Analytics: <http://azure.microsoft.com/en-us/services/stream-analytics/> (Consume from EH, Output to Alerting (Telco Example))
10. Azure HDInsight: <http://azure.microsoft.com/en-us/services/hdinsight/> (Platform on a Platform)
11. Azure Machine Learning: <http://azure.microsoft.com/en-us/services/machine-learning/> (Prediction and Prescription - to API)
12. Revolution R Enterprise: <http://www.revolutionanalytics.com/revolution-r-enterprise> (ML )
13. Power BI: <https://powerbi.microsoft.com/>
14. Cortana: <http://blogs.windows.com/buildingapps/2014/09/23/cortana-integration-and-speech-recognition-new-code-samples/> and <https://blogs.windows.com/buildingapps/2015/08/25/using-cortana-to-interact-with-your-customers-10-by-10/>

# Azure Data Factory Example - Churn

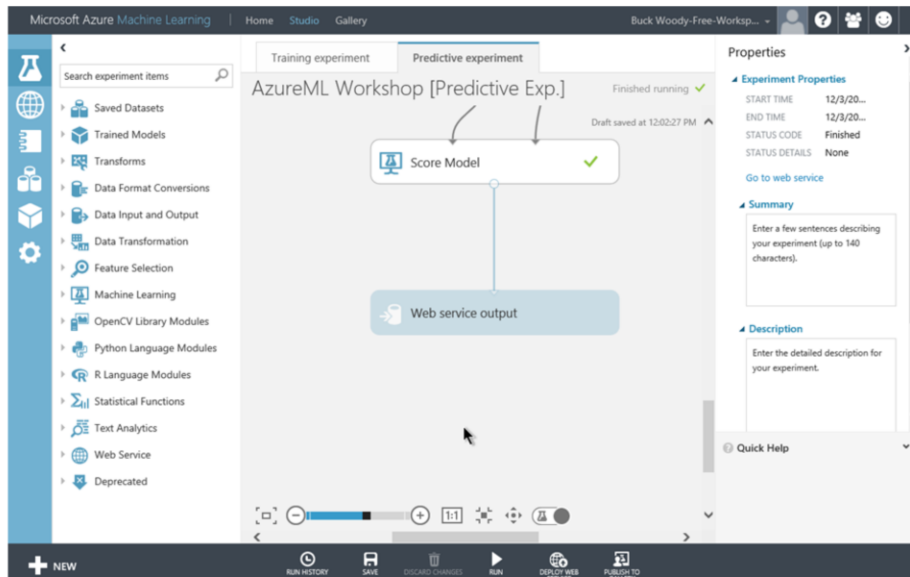


1. Scenario in the Gallery - <http://gallery.cortanaanalytics.com/Experiment/Telco-Customer-Churn-5?share=1>

# Publishing an Azure ML Model



# Creating the API



1. Complete example is here: <https://azure.microsoft.com/en-us/documentation/articles/machine-learning-walkthrough-5-publish-web-service/>

# Deploying the API - Continued

The screenshot shows the Microsoft Azure Machine Learning Studio interface. The top navigation bar includes 'Microsoft Azure Machine Learning', 'Home', 'Studio', and 'Gallery'. The user's workspace is 'Buck Woody-Free-Worksp...'. The left sidebar contains icons for a flask, globe, document, server, cube, and gear. The main content area is titled 'guinness' and has tabs for 'DASHBOARD' and 'CONFIGURATION'. Under 'DASHBOARD', there is a 'General' section with 'Published experiment' (links to 'View snapshot' and 'View latest'), a 'Description' section with the text 'No description provided for this web service.', and an 'API key' section with a text box containing a long alphanumeric string. Below this is a 'Default Endpoint' section with a table. The table has columns for 'API HELP PAGE', 'TEST', 'APPS', and 'LAST UPDATED'. The 'TEST' column has a 'Test' button. The 'APPS' column lists two entries: 'Excel 2013 or later workbook' with a download icon, both dated '10/17/2015 12:26:48 PM'. The bottom of the interface has a dark bar with a '+ NEW' button and a 'DELETE' icon.

API HELP PAGE	TEST	APPS	LAST UPDATED
<a href="#">REQUEST/RESPONSE</a>	<button>Test</button>	Excel 2013 or later workbook	10/17/2015 12:26:48 PM
<a href="#">BATCH EXECUTION</a>		Excel 2013 or later workbook	10/17/2015 12:26:48 PM

1. Complete tutorial, end to end, with a simple dataset - <http://blogs.msdn.com/b/cdndevs/archive/2016/02/18/step-by-step-how-to-predict-the-future-with-machine-learning.aspx>

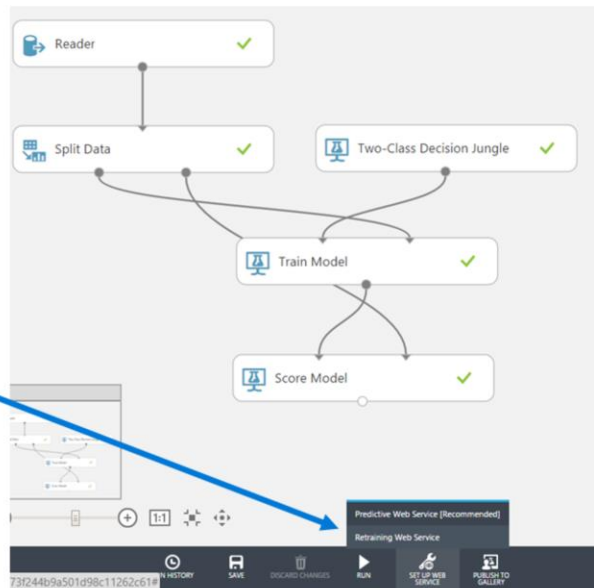


1. Open your saved Experiment
2. The instructor will lead you through the lab on the slides that follow.



# Deploy

1. Trim down the experiment – delete unwanted models and make sure “Score Model” is the endpoint
2. Click “Set Up Web Service -> Predictive Web Service”

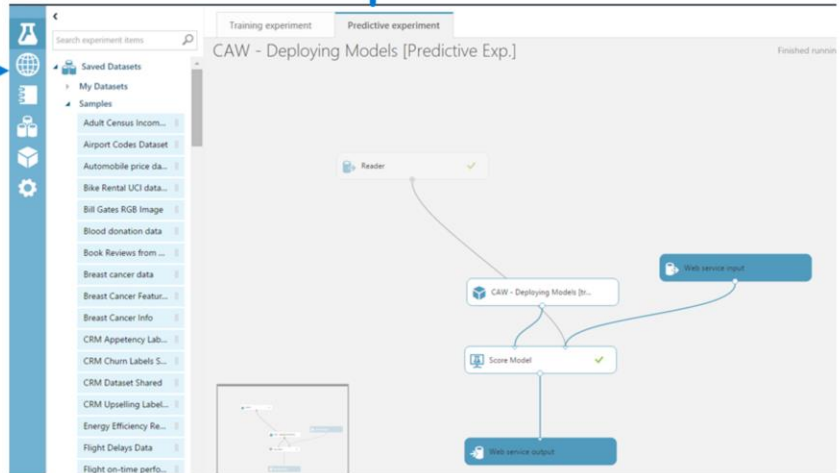


# Deploy



1. The experiment will be converted to a predictive experiment in a new tab

2. Click the globe to access your new web service



# Deploy



**caw - deploying models [predictive exp.]**

DASHBOARD CONFIGURATION

General

Published experiment

[View snapshot](#) [View latest](#)

Description

No description provided for this web service.

API key

5hUFY2tSX+ue4t9fK8im6aACKLZk5K9wT181rGmXc8+rOtsaFbyN8k5g+IWd1PG7I35FdKEyMDnfezgqpd2Hw==

Default Endpoint

API HELP PAGE TEST APPS

REQUEST/RESPONSE BATCH EXECUTION

TEST

Excel 2013 or later Excel 2010 or earlier workbook

Excel 2013 or later workbook

Ready-to-use Excel sheets

API Use Documentation

Manual Entry Testing

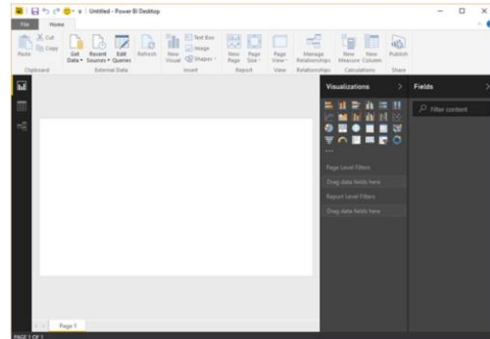
# Using Power BI



1. Primary Site: <https://powerbi.microsoft.com/en-us/desktop>
2. Full set of learning tools: <http://social.technet.microsoft.com/wiki/contents/articles/18462.power-bi-learning-resources.aspx>

# Power BI

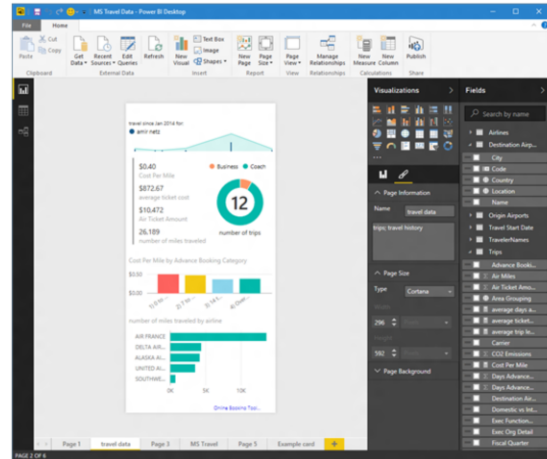
- A Reporting System for Multiple Data Sources
- Available in:
  - Microsoft Excel
  - Web Portal
  - Power BI Desktop
  - Mobile apps (iOS, Android, Windows)
- Author
  - Connect to Data
  - Shape the Data
  - Model the Data
  - Report on the Data
- Publish
  - Local
  - To Service



1. 4-part online course for Power BI in Excel 2013: [https://mva.microsoft.com/en-US/training-courses/data-visualizations-with-power-bi-in-excel-2013-8889?l=kBrIM2A3\\_104984382](https://mva.microsoft.com/en-US/training-courses/data-visualizations-with-power-bi-in-excel-2013-8889?l=kBrIM2A3_104984382)
2. <https://azure.microsoft.com/en-us/blog/getting-started-with-azure-data-factory-and-azure-machine-learning-4/>
3. <https://technet.microsoft.com/en-us/library/ms124659%28v=sql.100%29.aspx>
4. <https://msftdbprodsamples.codeplex.com/releases/view/37304>
5. <https://azure.microsoft.com/en-us/documentation/samples/>

# Power BI - Accessing

- Microsoft Excel
- Web Portal
- Power BI Desktop
- Mobile apps (iOS, Android, Windows)



1. Web Portal – <http://powerbi.com>
2. Power BI Desktop - <https://powerbi.microsoft.com/en-us/documentation/powerbi-desktop-latest-update/>
3. Excel - <https://support.office.com/en-us/article/Get-Transform-in-Excel-2016-881c63c6-37c5-4ca2-b616-59e18d75b4de?ui=en-US&rs=en-US&ad=US>
4. Mobile Apps - <https://powerbi.microsoft.com/en-us/Mobile>
5. Use this link to see what you are able to do:  
<https://app.powerbi.com/view?r=eyJrJoiYWU2ZWQyNzYtOWNlZi00YmU2LWlyYjYtMjk1MWY5YjlyZGlyliwidCI6ImY1NDViZDY2LTdjM2YtNDcyOS04NTFhLWI3Y2EzYWM5Zml2ZSIsImMiOjhh9>

# Power BI – Authoring Reports



## Components:

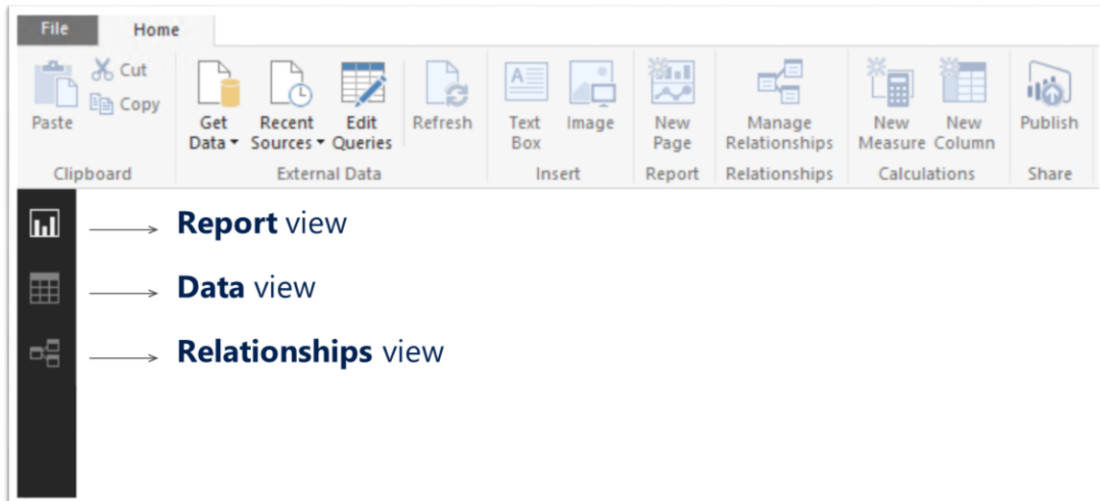
- Datasets
- Reports
- Dashboards

## Process:

- Connect to Data
- Shape the Data
- Model the Data
- Report on the Data

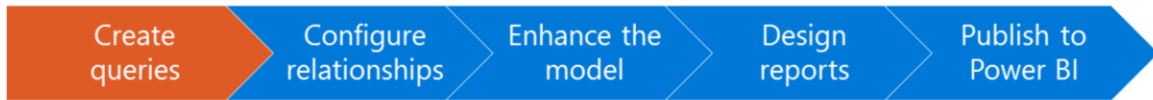
1. Getting Started: <https://powerbi.microsoft.com/en-us/documentation/powerbi-desktop-getting-started/>

# Power BI Desktop Views





# Power BI Desktop – Query Editor



## Purpose:

- Filter
- Cleanse
- Reshape

## Power BI – Calculations/Measures

### Calculated Columns:

- Adds new column
- Materialized and Stored in View

### Measures:

- Add aggregation logic
- Not Materialized
- Time Intelligence

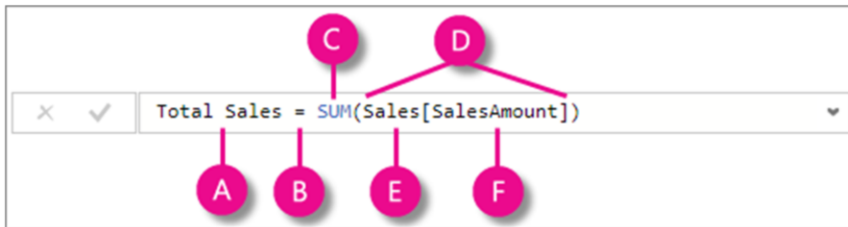
## Power BI – DAX

### Data Analysis eXpressions (DAX) Functions:

- Excel (~80)
- Table
- Aggregate
- Relationship Navigation
- Context Modification
- Time Intelligence

1. Fundamentals: <https://powerbi.microsoft.com/en-us/documentation/powerbi-desktop-quickstart-learn-dax-basics/>

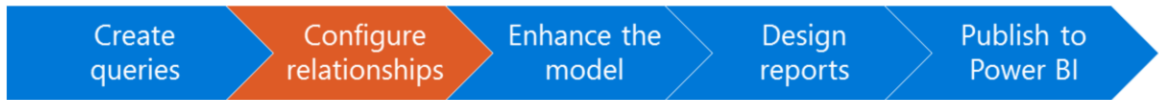
# Power BI – DAX Components



- A** – Measure name
- B** – Beginning of formula
- C** – SUM, DAX function
- D** – Parenthesis surrounding function arguments
- E** – Referenced table
- F** – Referenced column

1. More on reading a DAX here: <https://powerbi.microsoft.com/en-us/documentation/powerbi-desktop-quickstart-learn-dax-basics/>

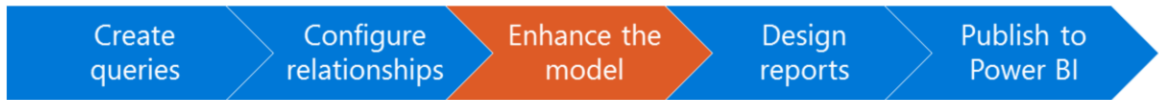
# Power BI Desktop – Relationships



## Purpose:

- Connect Data
- Visualize

## Power BI Desktop – Model



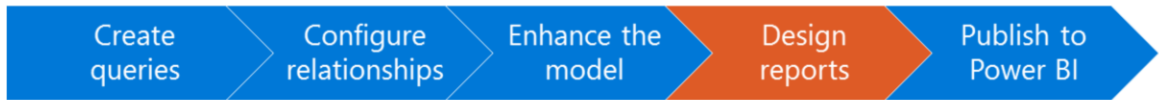
### Purpose:

- Propagate Filters
- Calculations
- Measures

### Tasks:

- Data Type
- Format
- Sort Order
- Visibility

## Power BI Desktop – Reports



### Purpose:

- Reporting
- Display and Manipulation



1. We will work through a simple connection in class
2. Open the Power BI Excel Example.xlsx sheet from inside the Resources folder in your Class Assets
3. Navigate to this site: <https://powerbi.microsoft.com/en-us/documentation/powerbi-sample-opportunity-analysis-take-a-tour/>
4. Walk through the Opportunity Tracking Sample as shown
5. To explore more datasets, check here: <https://powerbi.microsoft.com/en-us/documentation/powerbi-sample-datasets/>



# Cortana



1. What Developers Need To Know About the Cortana API - <https://channel9.msdn.com/Blogs/Dev-Inspiration/What-Developers-Need-To-Know-About-the-Cortana-API>
2. Full Training Course: <https://mva.microsoft.com/en-US/training-courses/universal-windows-app-development-with-cortana-and-the-speech-sdk-8487>
3. Quickstart - <https://code.msdn.microsoft.com/Voice-Commands-Quickstart-64ce68ce> (Note - will install Windows Phone emulator in your VS)
4. Training Series on Microsoft Virtual Academy: <https://mva.microsoft.com/en-US/training-courses/universal-windows-app-development-with-cortana-and-the-speech-sdk-8487>
5. <https://channel9.msdn.com/Shows/Visual-Studio-Toolbox/App-Development-with-Cortana>
6. <https://msdn.microsoft.com/en-us/library/windows/apps/xaml/dn974230.aspx?f=255&MSPPErr=-2147217396>
7. <https://github.com/Microsoft/Windows-universal-samples/tree/master/Samples/SpeechRecognitionAndSynthesis>
8. <https://github.com/Microsoft/Windows-universal-samples/tree/master/Samples/CortanaVoiceCommand>
9. <http://www.slideshare.net/ActiveNick/building-windows-10-universal-apps-with-speech-and-Cortana>
10. [https://mva.microsoft.com/en-US/training-courses/universal-windows-app-development-with-cortana-and-the-speech-sdk-8487?l=20D3s5Xz\\_5904984382](https://mva.microsoft.com/en-US/training-courses/universal-windows-app-development-with-cortana-and-the-speech-sdk-8487?l=20D3s5Xz_5904984382)



1. Publish a model using Azure ML to a REST API
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