The Cortana Intelligence Suite
Foundations – Deployment

Microsoft Machine Learning and Data Science Team
CortanaIntelligence.com

1. Main page: http://cortanaanalytics.com
2. To begin this module, you should have:
    1. Basic Math and Stats skills
    2. Business and Domain Awareness
    3. General Computing Background

NOTE: These workbooks contain many resources to lead you through the course, and provide a rich set of references that you can use to learn much more about these topics. If the links do not resolve properly, type the link address in manually in your web browser. If the links have changed or been removed, simply enter the title of the link in a web search engine to find the new location or a corollary reference.
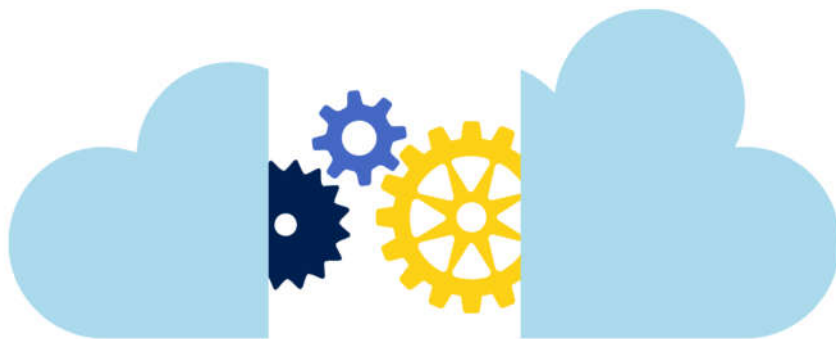
Section 6 Learning Objectives

1. Understand how to publish an Azure ML API
2. Understand the access methods of Azure Storage and Intelligent processing systems
3. Understand the options to send a HIVE query to an HDI system
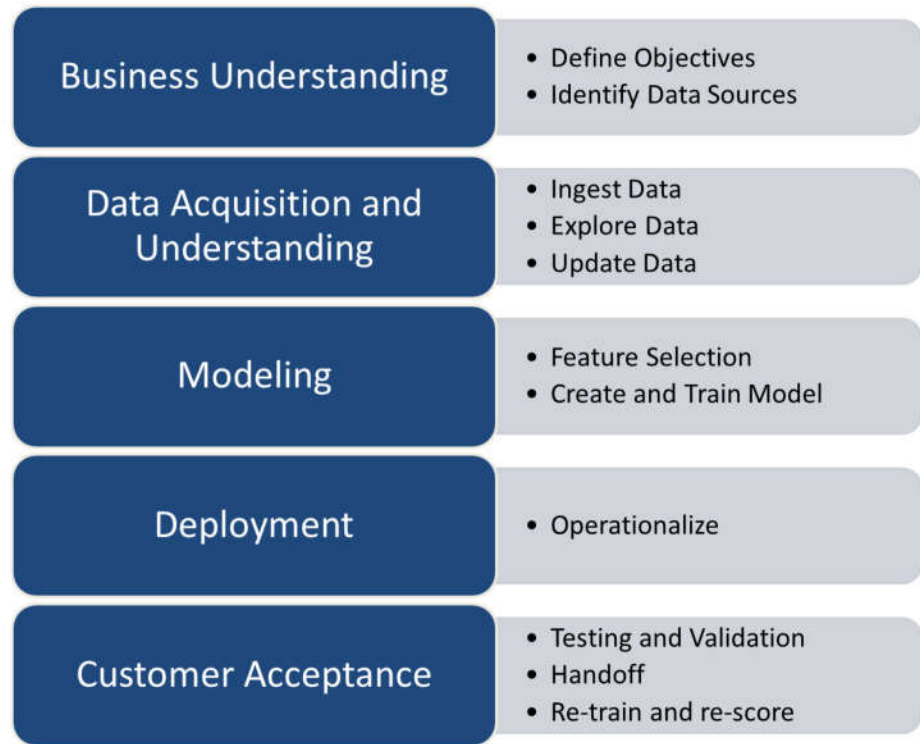4. Use Power BI to Access Data

1. At the end of this Module, you will:
   1. Understand how to publish an Azure ML API
   2. Understand the access methods of Azure Storage and Intelligent processing systems
   3. Understand the options to send a HIVE query to an HDI system
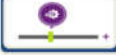   4. Use Power BI to Access Data

The Data Science Process and Platform

The Team Data Science Process

Business Understanding	• Define Objectives • Identify Data Sources
Data Acquisition and Understanding	• Ingest Data • Explore Data • Update Data
Modeling	• Feature Selection • Create and Train Model
Deployment	• Operationalize
Customer Acceptance	• Testing and Validation • Handoff • Re-train and re-score

1. This process largely follows the CRISP-DM model: http://www.sv-europe.com/crisp-dm-methodology/
2. It also references the Cortana Intelligence process: https://azure.microsoft.com/en-us/documentation/articles/data-science-process-overview/
3. A complete process diagram is here: https://azure.microsoft.com/en-us/documentation/learning-paths/cortana-analytics-process/
4. Some walkthrough's of the various services: https://azure.microsoft.com/en-us/documentation/articles/data-science-process-walkthroughs/
5. An integrated process and toolset allows for a more close-to-intent deployment

6. Iterations are required to close in on the solution – but are harder tio management and monitor

Microsoft Data Science

The Cortana Intelligence Platform

	Cortana, Cognitive Services, Bot Framework
Power BI	Power BI
	Stream Analytics
	HDInsight
	Azure Machine Learning (MRS)
	SQL Data Warehouse (SQL DB, Document DB)
	Data Lake
	Event Hubs
	Data Factory
	Data Catalog
	Microsoft Azure

1. Platform and Storage: Microsoft Azure – http://microsoftazure.com Storage: https://azure.microsoft.com/en-us/documentation/services/storage/ (Host It)
2. Azure Data Catalog: http://azure.microsoft.com/en-us/services/data-catalog (Doc It)
3. Azure Data Factory: http://azure.microsoft.com/en-us/services/data-factory/   (Move It)
4. Azure Event Hubs: http://azure.microsoft.com/en-us/services/event-hubs/ (Bring It)
5. Azure Data Lake: http://azure.microsoft.com/en-us/campaigns/data-lake/ (Store It)
6. Azure DocumentDB: https://azure.microsoft.com/en-us/services/documentdb/ , Azure SQL Data Warehouse: http://azure.microsoft.com/en-us/services/sql-data-warehouse/ (Relate It)
7. Azure Machine Learning: http://azure.microsoft.com/en-us/services/machine-learning/ (Learn It)
8. Azure HDInsight: http://azure.microsoft.com/en-us/services/hdinsight/ (Scale It)
9. Azure Stream Analytics: http://azure.microsoft.com/en-us/services/stream-analytics/ (Stream It)
10. Power BI: https://powerbi.microsoft.com/ (See It)
11. 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/ and https://developer.microsoft.com/en-us/Cortana   (Say It)
12. Cognitive Services: https://www.microsoft.com/cognitive-services
13. Bot Framework: https://dev.botframework.com/
14. All of the components within the suite: https://www.microsoft.com/en-us/server-cloud/cortana-intelligence-suite/what-is-cortana-intelligence.aspx
15. What can I do with it? https://gallery.cortanaintelligence.com/

16. Getting Started Quickly: https://caqs.azure.net/#gallery

Module 1:
Azure ML API

1. List of API's: https://azure.microsoft.com/en-us/services/cognitive-services/

Azure ML – Publish as a Web Service

- Build the model
- Run the Experiment
- Create a Predictive Experiment
  - A. Click on Web Service set up button
  - B. Click on Create a Predictive Experiment
- Modify the predictive experiment
  - A. Connect the Web Service Input to Score
  - B. Add a Project Columns after Score and only allow Scored Labels and Probabilities
  - C. Move the Web Service Output to after Project Columns module
- Run, then deploy the Web Service
- Test the Web Service using the Test Dialogue
- Review Sample Code on the RRS Help Page

1. Publishing Steps: https://azure.microsoft.com/en-us/documentation/articles/machine-learning-walkthrough-5-publish-web-service/

Module 2:
Accessing using Intelligent Processing

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1. Cognitive Services: https://azure.microsoft.com/en-us/documentation/services/cognitive-services/

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&MSPPError=-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

Options for Data Sourcing

- API Sources
- Storage Sources
- Coding access (REST)

1. Azure Storage Services REST API Reference – https://msdn.microsoft.com/en-us/library/azure/dd179355.aspx

Module 3:
Querying with HIVE

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1. Understanding HIVE: http://hive.apache.org/

![Microsoft Data Science]
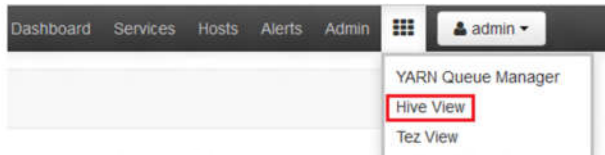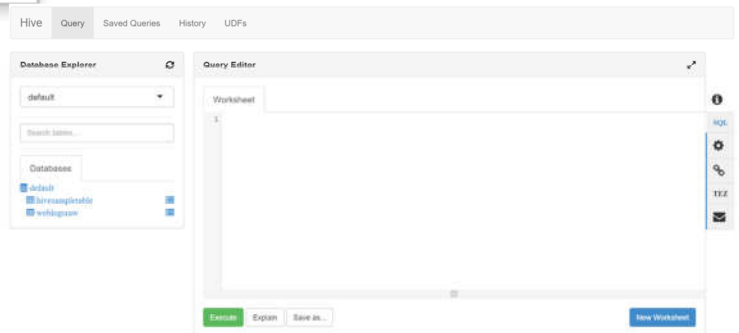
Hive Query in Ambari

- Navigate to Ambari Views from Azure Portal.
- Select Hive view from list of views:

- Enter new table queries in the Query Editor
- View tables in the database explorer

1. More about Ambari Views: https://azure.microsoft.com/en-us/blog/using-ambari-views-to-author-hive-and-pig-queries/

![Microsoft Data Science]

Cortana Intelligence Suite Workshop Class Notebook

Module 4:
Querying with Power BI

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1. Data Sources for Power BI:
   https://powerbi.microsoft.com/en-us/documentation/powerbi-service-get-data/
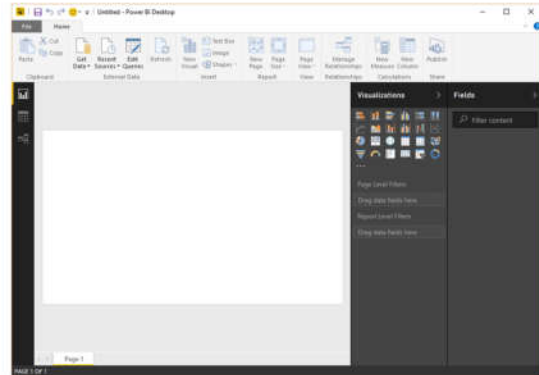
Power BI

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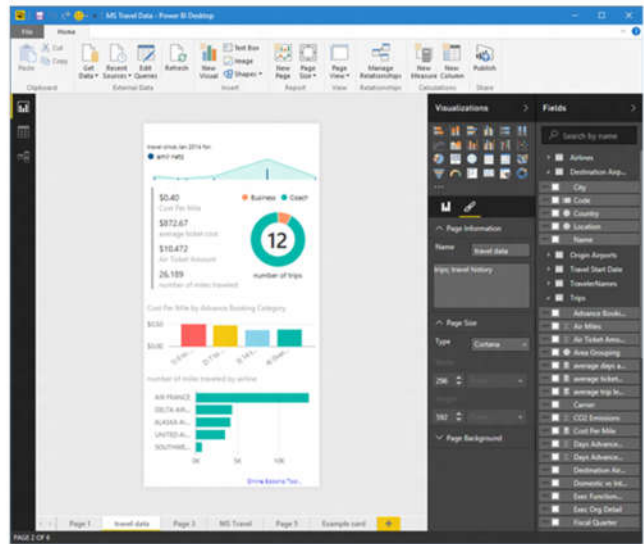- Publish
  - Local
  - To Service

1. Guided Learning: https://powerbi.microsoft.com/en-us/guided-learning/
2. 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=kBrlM2A3_104984382

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=eyJrIjoiYWU2ZWQyNzYtOWNlZi00YmU2LWIyYjYtMjk1MWY5YjIyZGIyIiwidCI6ImY1NDViZDY2LTdjM2YtNDcyOS04NTFhLWI3Y2EzYWM5ZmI2ZSIsImMiOjh9

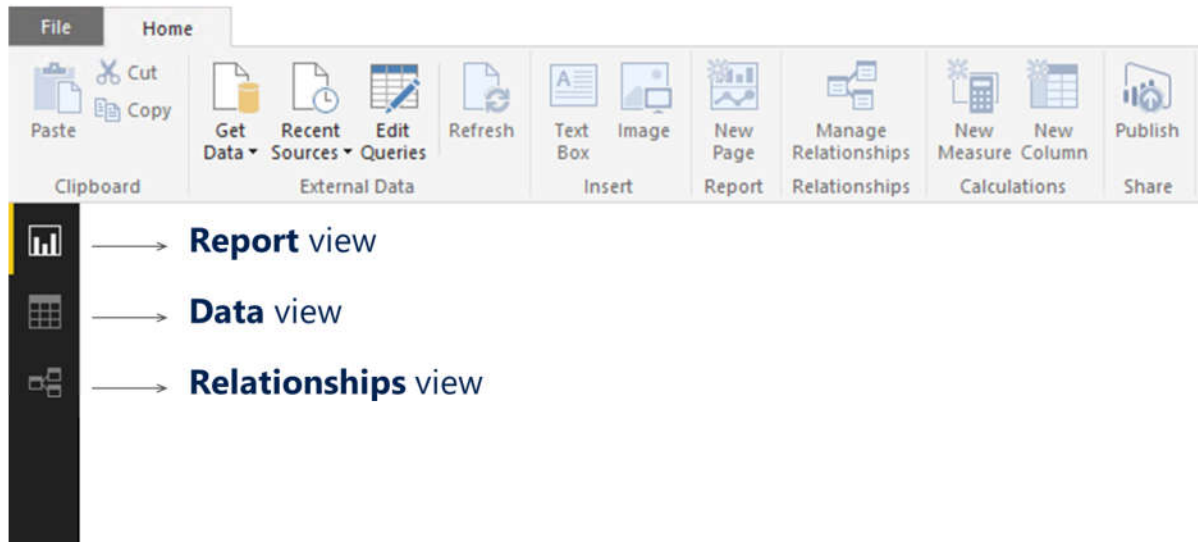# Power BI – Authoring Reports

Microsoft Power BI

Components:

- Data
- Reports
- Dashboards

Process:

1. Connect to Data
2. Shape the Data
3. Model the Data
4. Report on the Data

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

Power BI Desktop Views

1. Data View: https://powerbi.microsoft.com/en-us/documentation/powerbi-desktop-data-view/
2. Relationship View: https://powerbi.microsoft.com/en-us/documentation/powerbi-desktop-relationship-view/
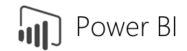3. Report View: https://powerbi.microsoft.com/en-us/documentation/powerbi-desktop-report-view/

1. Option 1: First-time, comprehensive example:
   https://powerbi.microsoft.com/en-us/documentation/powerbi-desktop-getting-started/
2. Option 2: EMEA soccer data example :
   http://tinyurl.com/buckwoodypbi1
3. Option 3: US retirement example:
   http://tinyurl.com/buckwoodypbi2
4. Option 4: Open Power BI or Excel, and use this data source:
   http://services.odata.org/V4/Northwind/Northwind.svc/
   1. Define Relationships
   2. Change the data types to be appropriate for location, summation, etc.
   3. Create linked graphics based on those relationships and data elements

Creating Impactful Reports

Power BI

1. On Demand Webinar: http://bit.ly/29q32I1
2. Interesting Example of Good Visualization: http://www.datapointed.net/2010/01/crayola-crayon-color-chart/
3. Another one: http://community.powerbi.com/t5/Data-Stories-Gallery/Vizion-Solutions-MLB-Analysis/m-p/60504
4. Great book on data visualization: The Wall Street Journal Guide to Information Graphics: The Dos and Don'ts of Presenting Data, Facts, and Figures Paperback – December 16, 2013
5. Article on Data Storytelling: http://www.forbes.com/sites/brentdykes/2016/03/31/data-storytelling-the-essential-data-science-skill-everyone-needs/#47248463f0c8

Creating a Useful Report

Power BI

- Find and Verify your Source Data
  - Locate the most authoritative data
  - Get permission where required
- Shape and Model the Data
  - Find the main message
  - Remove extraneous data
  - Change the types to be more effective in interactive layouts
- Select the right Graphic
  - Scale, increments, axes
  - Simple is better
  - Tell a story

1. From the book The Wall Street Journal Guide to Information Graphics: http://www.amazon.com/Street-Journal-Guide-Information-Graphics/dp/0393347281
2. Finding the right visualization: http://blogs.msdn.com/b/microsoft_business_intelligence1/archive/2012/10/08/best-practices-in-data-visualization.aspx

Creating Useful Dashboards

Power BI

- Consider the audience
  - Make sure you account for culture
- Single Screens where possible
  - Use all your whitespace
  - Fonts and readability
- Make the most important data the biggest
  - Top right is the most valuable space
  - Use cards with linked charts
- Show information once
  - No data overlap

1. Full article: https://powerbi.microsoft.com/en-us/documentation/powerbi-service-tips-for-designing-a-great-dashboard/

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Interaction and Integration   📊 Power BI

- Linking Charts
  - Find out what the audience needs to see
- Add Slicers where needed
  - Allows for one visualization to be many
- Integrate with Cortana
  - Link your accounts

1. Power BI Q and A: https://powerbi.microsoft.com/en-us/documentation/powerbi-service-q-and-a/
2. R Visualizations: http://community.powerbi.com/t5/R-Script-Showcase/bd-p/RVisuals?utm_content=buffer78b5e&utm_medium=social&utm_source=facebook.com&utm_campaign=buffer

Questions?