1. Summary of Lecture 2

2. Tutorial Week 3

3. Key assessment dates

4. Attendance & Tutorial Questions - Recognising student participation and engagement specifically identifying those who are most actively involved!

Lecturer/Tutor: Dr. Farshid Keivanian

Check your email now!
Tutorial Week 2 & 3

The document "Tutor_Week3_Business Analytics Fundamentals" pertains to a tutorial session centered around business analytics fundamentals, specifically focused on the application of Microsoft Power BI for data visualization and analysis. It guides students through various foundational concepts of business analytics, demonstrating the iterative process of investigating past business performance to optimize future planning. The tutorial also incorporates practical exercises using Power BI, covering data acquisition, management, and transformation to support informed business decisions. Additionally, the document offers insights into effective data visualization techniques and the differentiation between mere data collection and actionable intelligence.

Key assessment dates: Ask Questions and give me 1 week to reply: FKeivanian@my.holmes.edu.au

Key Assessment Dates

ASSESSMENT	DUE DATE	DUE TIME	LENGTH
Online Quizzes x 4	Refer assessment folder	9.00 pm	15 minutes once test is accessed
Group Case Study	2 June, 2024	11.59 pm	Refer to assignment instructions

ASSESSMENT	DATE	START TIME	DURATION
Final Assessment	TBC	TBC	TBC

Please refer to the assessment folders below for full details regarding submission requirements and times

Online Quizzes Information

ASSESSMENT	QUIZ DATE	QUIZ AVAILABLE
Quiz 1	14 April, 2024	6.00 am – 9.00 pm
Quiz 2	28 April, 2024	6.00 am – 9.00 pm
Quiz 3	12 May, 2024	6.00 am – 9.00 pm
Quiz 4	26 May, 2024	6.00 am – 9.00 pm

Key assessment dates: Ask Questions and give me 1 week to reply: FKeivanian@my.holmes.edu.au

Group Case Study Information

DUE DATE	2 June, 2024
DUE TIME	11.59 pm

This folder contains information about the **Group Case Study** that forms part of the assessment for this unit.

Information includes **instructions to join a group**, detailed assignment requirements and submission link.

Final Assessment Information

Availability: Item is hidden from students.

This folder contains information about the **Final Assessment** and includes detailed assessment specifications, submission requirements and submission link.

Please note that the assessment and submission link is only available during the period listed above.

The submission link will not be available once the time expires therefore it is strongly recommended you allow yourself sufficient time to complete the assessment prior to the link closing.

If you do not have internet access or if your connection is poor, it is your responsibility to seek out another source such as a public library, internet café, etc., to submit your assessment within the required time.

No late submissions are allowed.

1. Summary of Lecture 2

- In lecture week 2 of the HI6037 Fundamentals of Business Analytics course, the importance of business analytics in driving informed business decisions was emphasized. The lecture outlined the business analytics process, defining it as a continual, iterative exploration of past business performance to drive future business planning. The lecture noted that although abundant information exists, it often doesn't translate into actionable intelligence for decision-makers. This is underscored by a Gartner Research finding from 2007, which noted that only 36% of CEOs believe their management teams use the right information to run their businesses effectively.

1. Summary of Lecture 2: A Practical Example in Australia

- A practical example in the Australian context might be the transformation story of an Australian retail company that utilized business analytics to optimize its inventory management. After consistently facing issues with overstocking and stockouts, the company identified this as a critical business issue. By formulating specific questions around optimal stock levels and examining historical sales data, the company was able to refine its inventory purchase strategy, leading to improved availability of products and cost savings.

- The lecture continued to illustrate how Continental Airlines moved from being unprofitable in the early '90s to a leader in the industry by the mid-'90s, driven by a data-centric approach that offered a single view of the customer and the business. The process of identifying business issues, formulating questions, gathering and analyzing information, and then taking actions based on the insights was explored as a cyclical process contributing to this turnaround.

1. Summary of Lecture 2: A Practical Example in Australia

- In summary, business analytics is crucial for understanding and enhancing business performance. By leveraging data, companies can make informed decisions that lead to improved operations and competitive advantage. The lecture underscored the necessity of aligning the business analytics process with corporate strategy to ensure that actions taken are in service of the broader organizational goals.

2. Tutorial Week 3: Introduction to Business Analytics – Foundational Concepts to Understand

The tutorial week 3 document is centered around an introduction and tutorial for using Microsoft Power BI for data visualization and analysis. It assumes some familiarity with the foundational concepts as it guides through applying them in practical exercises using Power BI. We will be exploring an explanation of each concept with practical examples:

1. Business Analytics: It's the application of skills, technologies, and practices for continuous iterative exploration and investigation of past business performance to gain insight and drive business planning.

Example: An Australian retail company analyzes historical sales data to forecast inventory needs for the upcoming season.

2. Information vs Intelligence: Differentiating between mere data collection (information) and actionable insights (intelligence). **Example:** An Australian logistics company collects GPS tracking data (information) and uses it to optimize delivery routes (intelligence).

3. Business Analytics Process: Involves steps from identifying issues to evaluating results. **Example:** An Australian healthcare provider uses patient data to identify treatment success rates and areas for improvement.

4. Data Acquisition and Management: Evolution from simple data collection to sophisticated data mining. **Example:** An Australian bank employs advanced data mining techniques to detect fraudulent transactions.

5. OLTP vs OLAP: Knowing the difference between transactional systems (OLTP) and analytical systems (OLAP). Understanding these systems' roles in operational and analytical phases is crucial. **Example:** An Australian e-commerce platform uses OLTP for daily transactions and OLAP for analyzing customer buying patterns.

6. Data Warehousing: Understanding what a data warehouse is and its significance. Basic knowledge is essential. **Example:** An Australian telecommunications company uses a data warehouse to integrate data from various sources for analysis.

Practical Example: Using business analytics in an Australian retail chain to improve stock management and sales strategies. The chain could use historical sales data, customer feedback, and market trends analyzed through a business analytics process involving Power BI to forecast demand, optimize inventory levels, and tailor marketing campaigns, thereby reducing costs and increasing revenue.

2. Tutorial Week 3: Understanding the Datasets

- Location.xlsx

- This Excel file contains geographical information useful for linking sales data with specific locations within the retail chain. Here's what each column represents:

- **City:** Contains codes representing various cities where the stores are located.

- **State #:** Lists numerical codes for states correlating to the city codes.

- **Description:** Provides the descriptive name of each city linked to the city codes.

- For geographic analysis or demographic studies, we use Location.xlsx

	A	B	C	D
1	City	State #	Description	
2	CT212	8050456	GILLETTE	
3	CT486	8050456	RAWLINS	
4	CT498	8050456	ROCK SPRINGS	
5	CT49	8050453	BELLINGHAM	
6	CT65	8050453	BOTHELL	
7	CT284	8050453	KENT	
8	CT291	8050453	KIRKLAND	
9	CT331	8050453	LYNNWOOD	
10	CT427	8050453	OLYMPIA	
11	CT433	8050453	OTHELLO	
12	CT470	8050453	PORT ANGELES	
13	CT491	8050453	RENTON	
14	CT537	8050453	SEATTLE	
15	CT557	8050453	SPOKANE	
16	CT634	8050453	YAKIMA	
17	CT299	8050449	LA VERKIN	
18	CT351	8050449	MEADOW	
19	CT525	8050449	SANDY	
20	CT32	8050448	AUSTIN	
21	CT43	8050448	BEAUMONT	
22	CT76	8050448	BRYAN	
23	CT110	8050448	CLEVELAND	
24	CT120	8050448	CONROE	
25	CT131	8050448	DALLAS	
26	CT137	8050448	DAYTON	

State | State & Region | Region

2. Tutorial Week 3: Understanding the Datasets

- W3 Uluru Goods.xlsx

- This file offers a comprehensive look at the sales performance of Uluru Goods across various stores. Detailed fields include:

- **Order_ID:** Unique identifier for each order placed.

- **Date:** The date each order was made (in Excel date format, which can be converted to a standard date).

- **Store_ID** and **Store_desc:** Identifier and description of the store where the order was placed.

- **Longitude** and **Latitude:** Geographic coordinates of the store, useful for spatial analysis.

- **City_ID** and **City_desc:** Links to the geographical location file for matching store locations with city details.

- **Cat_ID** and **Category:** Category identifier and description, which categorize the products sold.

- **Product_ID** and **Prod_desc:** Details of the individual products sold.

- **Price, Quantity_Sold, Original_Sales_Price, Discount_Percent, Discount, Sales_Revenue, Gross_Margin:** All pertain to the pricing, sales volume, discounts given, revenues generated, and margins on products sold. For sales performance, we use 'W4 Uluru Goods.xlsx' which contains sales data.

2. Tutorial Week 3: Using the Data with Power BI

- Data Integration and Analysis

- **Query Editor:** First, use the Query Editor in Power BI to import and cleanse the data from both Excel files. This involves tasks such as changing column names to more meaningful ones, converting data types appropriately, and removing unnecessary rows or columns.

- **Data Modelling:** Combine data from the two Excel files by linking them via common identifiers like city codes or store IDs. This is crucial for performing comprehensive analyses that incorporate location-based insights.

- **Data Visualization:** After modeling, use Power BI to create visualizations. For instance, sales performance can be visualized geographically, or trends over time can be analyzed through line graphs or bar charts.

Each of these topics is elaborated on, particularly focusing on how to prepare, transform, and model the data using various Power BI tools, making the content quite comprehensive in addressing the processes of handling and visualizing data in Power BI.

2. Tutorial Week 3: Practical Exercise

- **Forecasting and Optimization:** Use historical sales data to forecast future demands, using Power BI's forecasting tools. This aligns with the Microsoft Power BI document's scenario of using Power BI to analyze sales revenues and costs, aiming to enhance the business analytics environment of a company.

- Overall, the provided Microsoft Power BI document serves as an introduction to using Power BI for data manipulation and visualization. It is more geared towards foundational skills in handling and visualizing data rather than advanced analytical applications.

2. Tutorial Week 3: Installation

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

2. Tutorial Week 3: Installation

Microsoft Power BI

MOTIVATION

This material is an introduction to how to use Microsoft Power BI. It will cover acquiring a data source and how to transform the data source using the Query Editor. It can be used in the classroom or for self-study.

On completion of the course, students will be able to understand the basic concepts of data visualization and exploration with this tool.

The material also serves as a reference for occasional users of Microsoft Power BI.

LEARNING METHOD

The learning method used is "guided learning." The benefit of this method is that knowledge is imparted quickly. Students also acquire practical skills and competencies. As with an exercise, this method explains a process or procedure in detail.

Exercises at the end enable students to put their knowledge into practice.

Product
Microsoft Power BI Desktop

Level
Beginner

Focus
Business Analytics

Author
Paul Hawking

Version 1

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Microsoft Power BI

Microsoft Power Bi is business Intelligence solution that provides users with tools for aggregating, analyzing, visualizing and sharing data. The purpose of this tutorial is to introduce students to Power BI. This includes familiarisation with the Power BI user interface and acquiring and transforming data sets. Power BI has the functionality to interact with a range of data in differing environments.
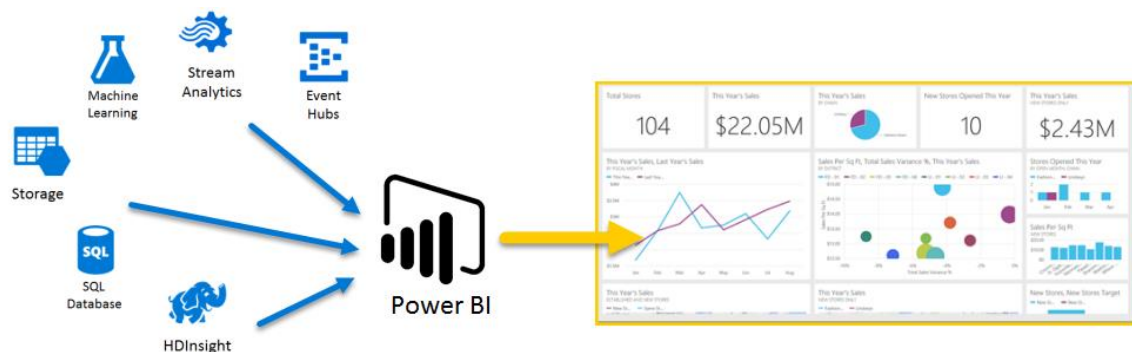
The Power BI environment provides a number of tools designed to support the varying requirements of users. These include:

Power BI Desktop

The Windows-desktop-based application for PCs and desktops, primarily for designing and publishing reports.

Power BI Service

The SaaS (software as a service) based online service supports collaboration and sharing of information with colleagues.

Power BI Mobile Apps

The Power BI Mobile apps for Android and iOS devices, as well as for Windows phones and tablets.

Power BI Gateway

Gateways used to sync external data in and out of Power BI.

Power BI Embedded

Power BI REST API can be used to build dashboards and reports into the custom applications that serves Power BI users, as well as non-Power BI users.

Power BI Report Server

An On-Premises Power BI Reporting solution for companies that won't or can't store data in the cloud-based Power BI Service.

Power BI Visuals Marketplace

A marketplace of custom visuals and R-powered visuals.

Power BI Desktop

Power BI Desktop has a number of components that can be used to acquire, transform, visualise and analyse data. These include:

```
┌─────────────────┐      ┌─────────────────┐      ┌─────────────────┐
│ Data            │ ──►  │ Data Modelling  │ ──►  │ Data            │
│ Preparation     │      │                 │      │ Visualization   │
│                 │      │  • Relationship │      │                 │
│  • Query Editor │      │    View         │      │  • Report View  │
│                 │      │  • Data View    │      │                 │
└─────────────────┘      └─────────────────┘      └─────────────────┘
```
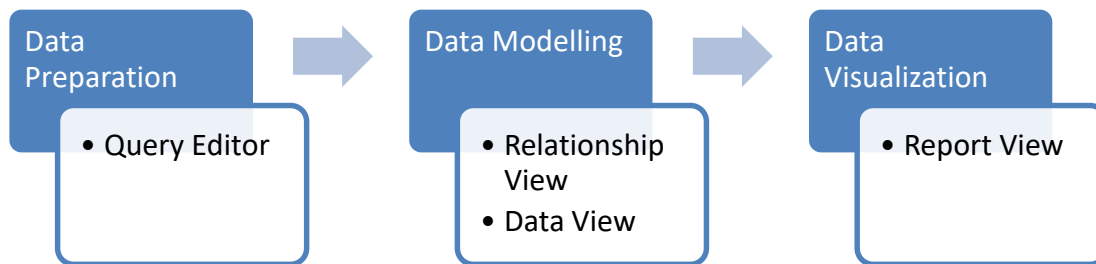
- **Query Editor**, where you can connect to one or many data sources, transform the data to meet your needs, then load that model into Power BI Desktop
- **Data View** – see the data in your report in data model format. You can add measures, create new columns, and manage relationships
- **Relationships View** – Used to create relationships between the datasets defined in *Data* view. Power BI Desktop attempts to identify the relationships automatically, but a user can also define them manually
- **Report view:** A canvas for building and viewing reports based on the datasets defined in **Data *View.***

We will be using each of the components throughout the various tutorials.

Scenario - Data Set

Company History

Uluru Goods is an American based company sells apparel, groceries, household, hardware and camping equipment throughout America. Due to several tax and export issues, Uluru Goods headquarters is located in Philadelphia and has warehouses for shipping in both San Diego and Miami. San Diego handles West Coast distribution

while Miami handles East Coast distribution.   The company would like a business analytics environment to get a better understanding of their sales revenues and costs for various products and product categories.

Products
As mentioned previously Uluru Goods sells apparel, groceries, household, hardware and camping equipment. The range of products includes:

Product Category	Product
Apparel	
	Rain Jacket
	Gloves
	Boots
Grocery	
	Water
	Beef Jerky
Household	
	Bucket
	Mop
	Hammer
	Nails
Camping	
	Tarp
	Canteen

Data Set
The data supplied records the sales of products for each store. The data dictionary is below:

Field	Data Type	Description
Actuals	Text	Version of data
Order_ID	Number	Unique identifier of orders
Date	Date	Date of order
Store_ID	Text	Unique identifier of store
Store_desc	Text	Name of store
Longitude	Number	Longitude of store
Latitude	Number	Latitude
City_ID	Text	Unique identifier of City where store is located

City_Desc	Text	5	Name of City where store is located
Cat_ID	Text		Unique identifier of Product Category
Category	Text		Name of Product Category
Product_ID	Text		Unique identifier of Product Category
Prod_desc	Text		Name of Product
Price	Number		Price of product item
Quantity_Sold	Number		Number of products sold
Original_Sales_Price	Number		Original sales price of products per order before any discounts applied
Discount_Percent	Number		Discount percentage
Discount	Number		Discount amount
Sales_Revenue	Number		sales price of products per order after any discounts applied
Gross_Margin	Number		Profit margin

Goals

The purpose of this tutorial is to introduce students to the analytical capabilities of Microsoft Power Bi Students will define and create an analytical data model based on a provided data set. This model will then be used to explore the data to answer a number of queries. The model will also form the basis for a series of visualisations and dashboards.

Opening Power BI

Microsoft Power BI Desktop is tool freely available from Microsoft. It can be accessed at https://powerbi.microsoft.com/en-us/desktop/ . Once Power Bi has been installed it needs to be opened for the first time.

1. Open   Power BI

The following screen appears:
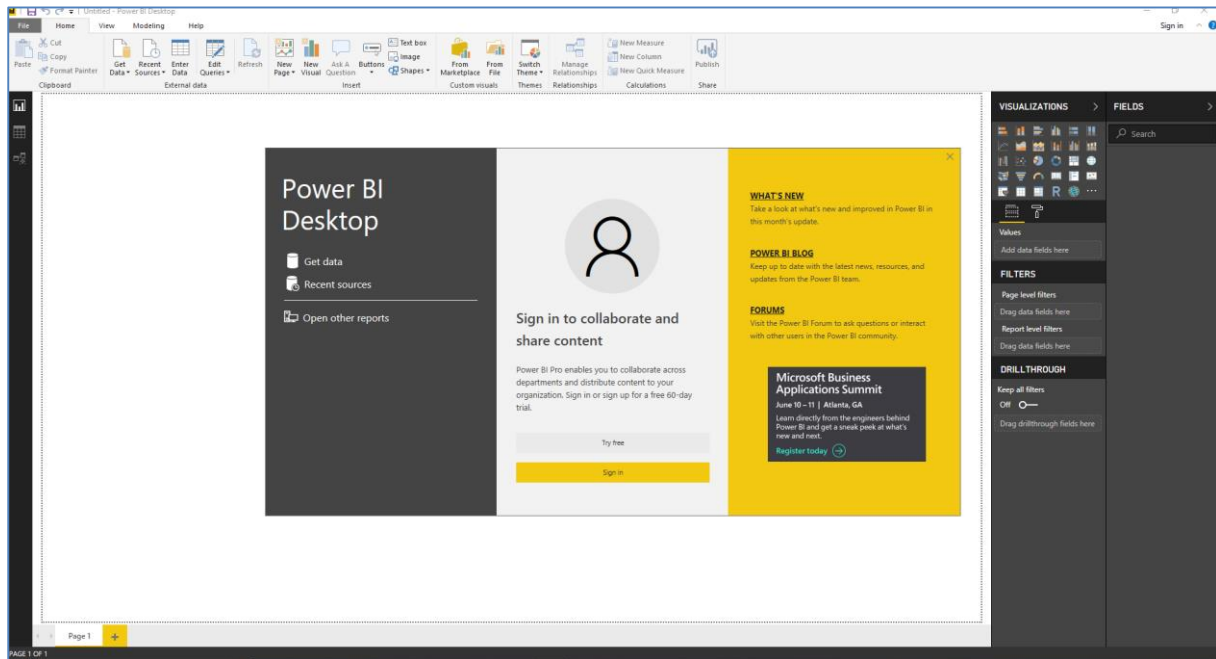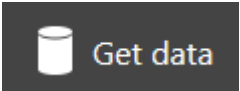
You will notice that there is an option to **sign in**. This used to support the sharing of data with colleagues. Click on try free and follow the steps to create a free account. You can save your work on your account and use it every tutorial.
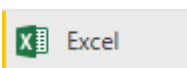
Getting Data

As mentioned previously Power BI can be connected to multiple data sources including Microsoft Excel and Access files, text files, and online services such as Salesforce, Microsoft Dynamics, and Azure Storage. For the purpose of this exercise you will acquire data from Microsoft Excel.
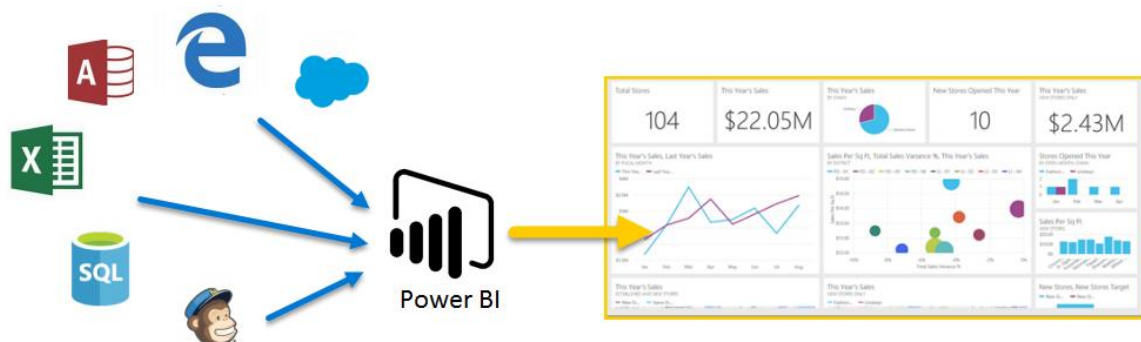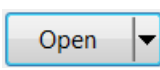
2. Click to display the available data source formats.
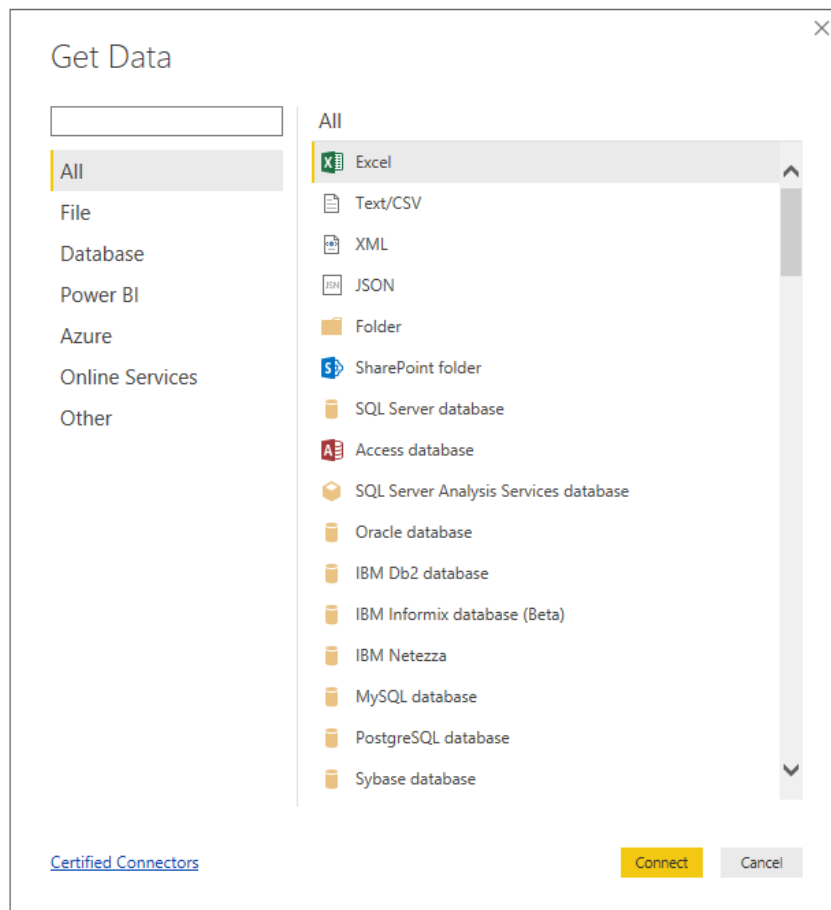
3. Click to select this data source format.

4. Click to accept the data source and proceed to the next step.

Move to and select the file **W3 Uluru Goods.xlsx**. Your workshop leader will provide this file.

5. Click to continue.

The Navigator window appears on screen with the W1 Uluru Goods and its workbooks displayed
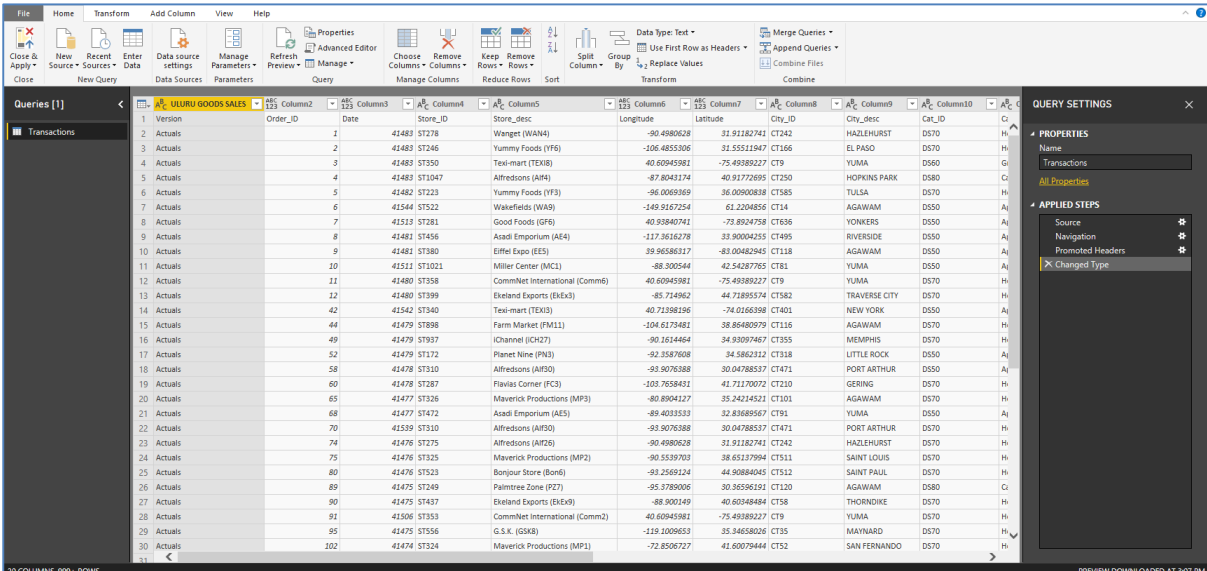
6.   Click [ ] ⊞ Transactions   to select this sheet.

Power BI then loads the selected workbook and displays a preview of the data. There are 2 options to consider – **Load** or **Edit.** If you select **Load** then the entire data set will be imported into a **Data Model** in Power BI. The **Edit** command opens the **Query Editor** which allows the user to prepare or transform the data. This could include the adding or removing of columns and rows, the edit of column headings. For the purpose of this tutorial we will use the Query Editor.

7.   Click   [Edit]   to open the **Query Editor**.

Query Editor
The **Query Editor** appears on screen with a preview of the data set.

Query Editor

<table>
<tr><td>Data Preparation

• Query Editor</td><td>The Query Editor enables a user to prepare the data. You can make changes to the data, such as changing a data type, removing columns, or combining data from multiple sources. However, these changes do not affect the original source files.

The Query Editor screen has a number of components that you should become familiar with.</td></tr>
</table>

March 2019
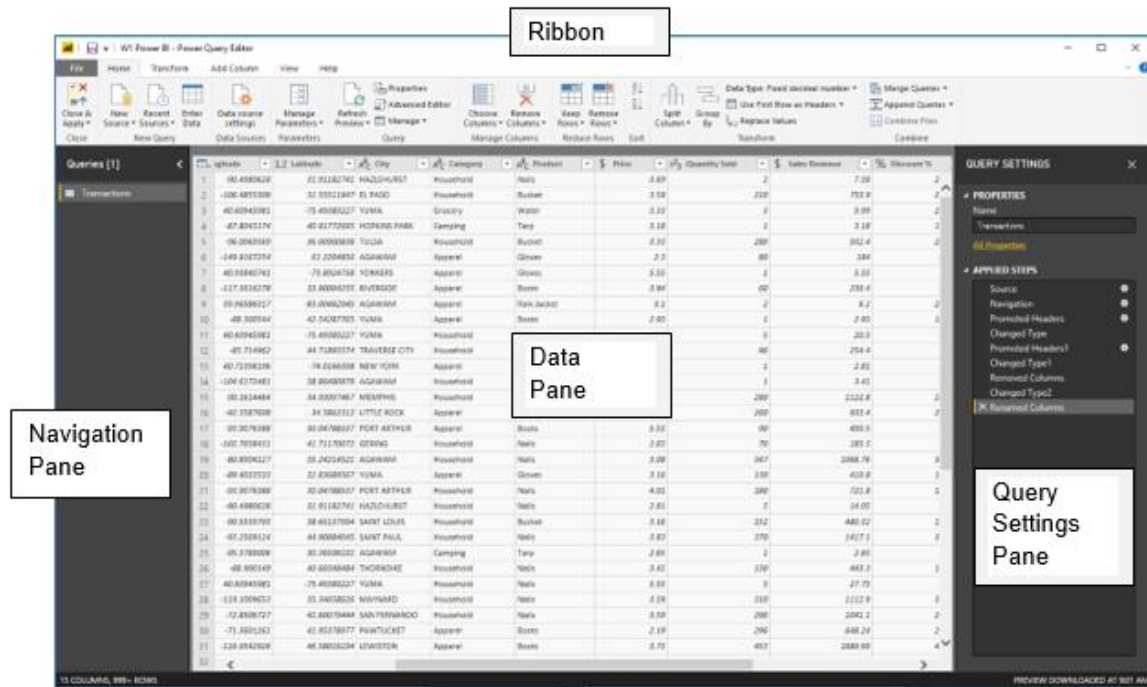
Ribbon – The Query Editor Ribbon provides icons to interact with the data in the query. It consists of four tabs - **Home**, **Transform**, **Add Column**, and **View.**

Navigation Pane – This Pane list the queries available for selection, viewing, and transforming.

Data Pane – Data from the selected query is displayed.

Query Settings Pane – Lists the query's properties and applied steps.

Transforming Data

Often when data is loaded it is not suitable for analysis due to its structure and format. You can transform the data to prepare it for analysis. You do this before it is loaded it into a Data Model for analysis.

When you view the data you will realise that the column names are not very meaningful and need to be changed before any analysis can occur.
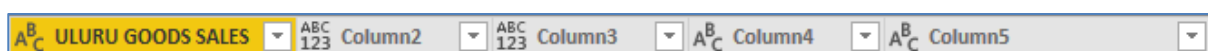
You could right-click each column heading to display a context menu to rename the column heading. However, you may have noticed that the first row contains more appropriate column headings.
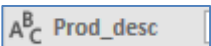
To make this row the new column headings:

8.   Click   [Use First Row as Headers ▾]   on the **Home Ribbon**.

You will notice that the column headings have changed. Also each of the steps you perform in transforming data is recorded by **Query Editor**, and each time this query connects to the data source those steps are carried out so that the data is always shaped the way you specified. You can also select one of the **Applied Steps** to reverse it if necessary.
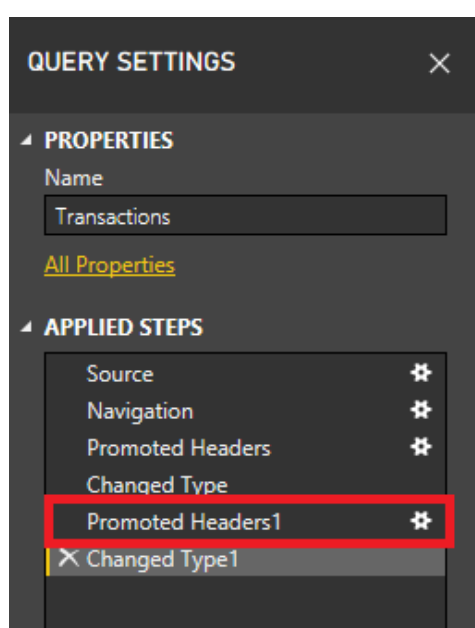
Although we have changed the column headings they could be more meaningful for the intended users of the reports. For example, Prod_desc would be more meaningful if it was referred to as Product. To change a column heading:

9.   Right click   [A^BC Prod_desc]   to display the context menu.

10.   Select   [Rename...]   to highlight the heading.

11.   Type   Product to replace the existing heading.

12.   Click   elsewhere in the data sheet to accept the change.

👍 *Test Your Skills*

Rename the following Columns:

Column	New Heading
Store_desc	Store
City_Desc	City
Price	Number
Quantity_Sold	Quantity Sold
Original_Sales_Price	Sales Revenue
Discount_Percent	Discount %
Discount	Discount $
Sales_Revenue	Discounted Sales Revenue
Gross_Margin	Profit

The current data set contains a number of columns that are required for the analysis. These columns and the data they contain should be removed from the data set. To do this:

13.   Click   A^BC Version   to select this column.

14.   Click   Remove Columns ▾   to remove the column.

👍 *Test Your Skills*

Delete the following Columns:

Column
Store_ID
City_ID
Cat_ID

Data Types

When you load data into Power BI it will attempt to convert the data type of the source column into a data type that better supports more efficient storage, calculations, and data analysis. The data types ion Power BI are:
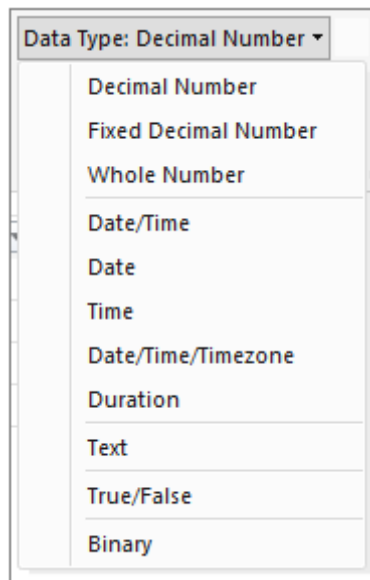
Further details about data types can be found at https://docs.microsoft.com/en-us/power-bi/desktop-data-types

If you review your data set you will realise that incorrect data types have been applied. For example, Date column. The data type is indicated by in the column header., For example ᴬᴮ_C or 1²₃ . To change the data type of the date column:

15.   Click [1²₃ Date ▾] to select the Date column.
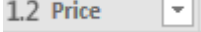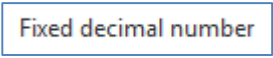
16.   Click [Data Type: Whole Number ▾] on the **Home** ribbon to display the available data types.
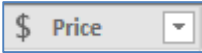
This Data Type icon will change depending on the existing data type of the column selected.

17.   Select [Date] .

You will notice that the data type has now been formatted as a Date.

The Price column data type should be currency. In Power Bi you use the Fixed Decimal Number for currency. An alternate technique for changing data types is via the context menu.

18. Right Click **1.2 Price ▼** to select the Price column and display the contest menu.

19. Select **Change Type ▶** to display the data types.

20. Select **Fixed decimal number**.

Notice the column header change sto indicate that the data Type has been applied **$ Price ▼**. However, the data is not displayed as currency. We will cover this at a later stage in data formatting.
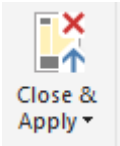
👍 *Test Your Skills*

Change the Data Types of the following columns:

Field	Data Type
Original_Sales_Price	Fixed decimal number
Discount_Percent	Percentage
Discount	Fixed decimal number
Sales_Revenue	Fixed decimal number
Gross_Margin	Fixed decimal number

Saving

It is important to save your work at regular intervals to prevent the loss of any work. The saving process will close the Query Editor and applies the changes to the data model into Power BI Desktop. To save your changes:
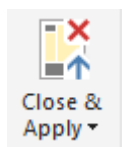
21. Click **Close & Apply ▼** to save your changes.

22. Type *W1 Power BI* as the **File name:** .

23. Choose an appropriate location for where the file will be stored.

24.   Click   [Save]   to complete the process.

A dialog screen appears to display the status. The file is saved with a .pbix extension.

Once you have your query where you want it, or if you just want to make sure your work is saved, Power BI Desktop can save your work in the form of a .pbix file. The Report View screen appears:
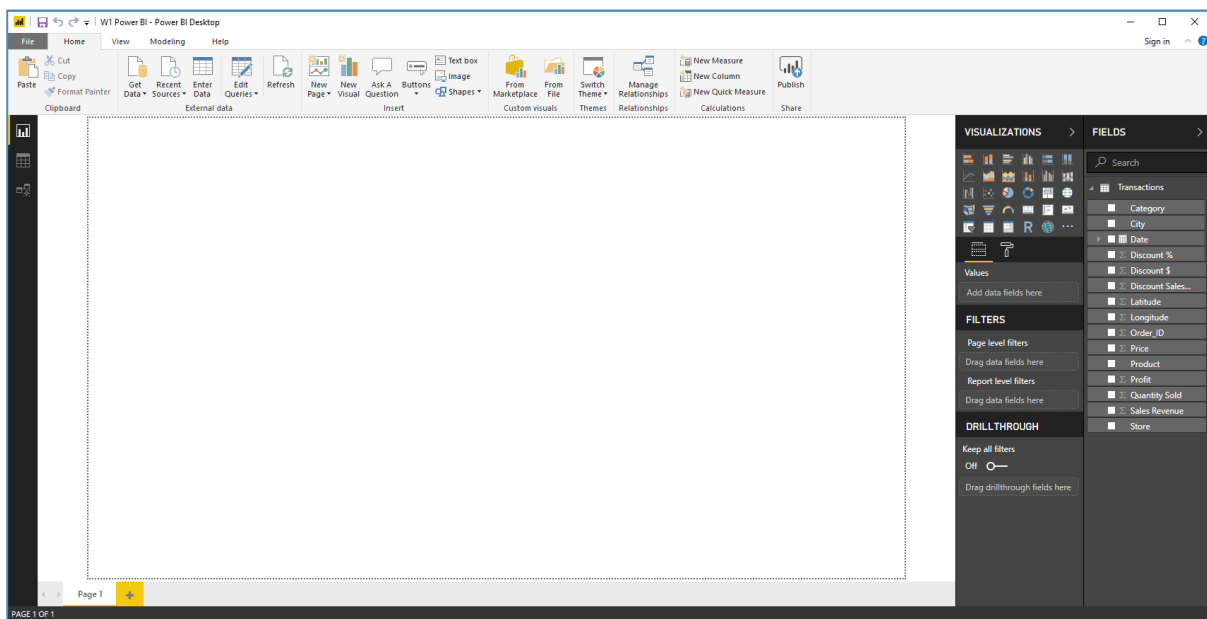
The Report View screen enables a user to Model and Visualise the data prepared in the Query Editor.

However, before we continue we need make some more data available for the analysis. The data which we require is associated with City, State and Region and is stored in the Location Excel file. To acquire additional data for the analysis for first return to the Query Editor.
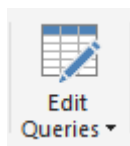
25.   Click   [Edit Queries]   to open the **Query Editor**.

The **Query Editor** opens with prepared data displayed. To acquire the additional data:

26. Click **New Source** on the **Home Ribbon** to display a dialog screen to the select the **Data Source** type.
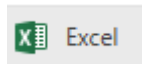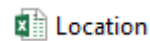
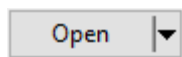27. Click **Excel** to select this **Data Source** type.

28. Click **Connect** to continue.

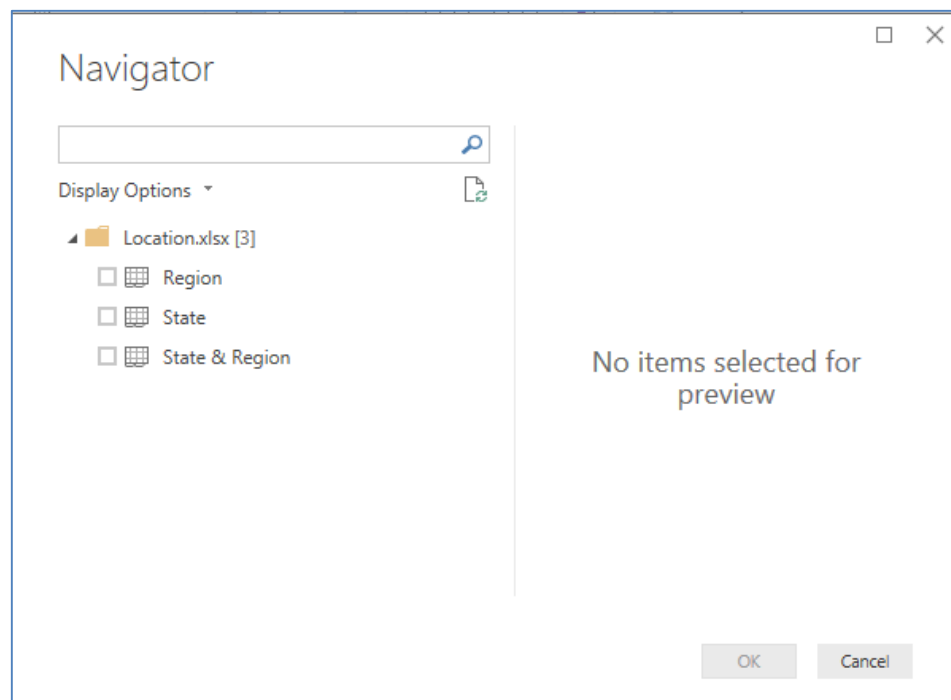29. Navigate to the Location Excel file.
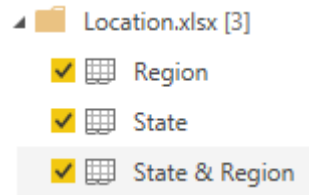
30. Click **Location** to select the file.

31. Click **Open**.

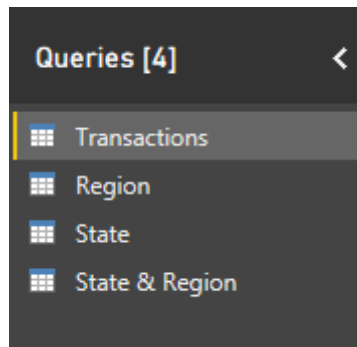The Navigator screen appears listing the worksheets contained in the Location file.

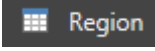32. Click each of the worksheets to select them.

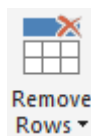Notice that a preview of the data appears with each worksheet you click.

33.   Click   OK   to continue.

The worksheets have been added to the Query Editor. They now appear in the **Navigation Pane**.

34.   Click   Region   to view the data.

You will notice that many of the rows contain *null* values. Null values indicate that the rows contain no data. These should be removed.

35.   Click   Remove Rows ▾   on the **Home Ribbon** to display the options.

36.   Click   Remove Blank Rows   to remove the null values.

37.   Click   State   to view the data.

You will notice that there are columns that contain null values.
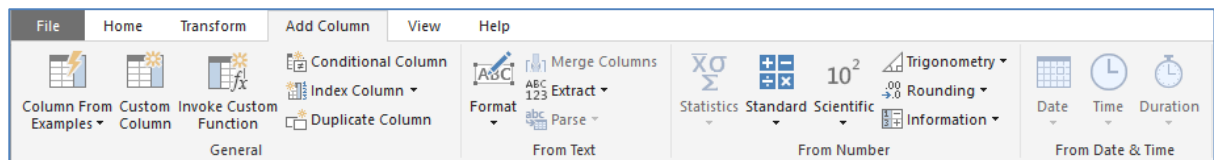
Test Your Skills

- Remove columns with null values in the State query:
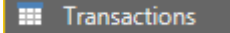- Remove rows with null values in the State query and Sate & Region query

Adding Columns

You can easily add a new custom column of data to your model using Query Editor in Power BI Desktop. There are number of functions to add columns which can be found on the **Add Columns Ribbon**.
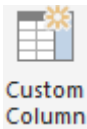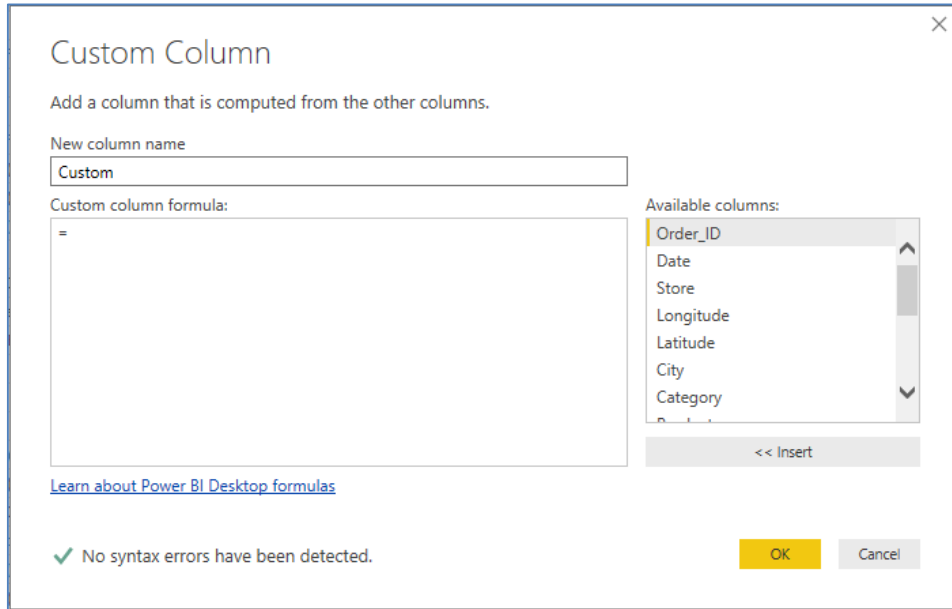

Uluru Goods wants to tract the costs of goods in each order where products are sold. Currently there is no column containing this data however it can be calculated from the other data available. A new column needs to be crated which contains the cost of goods for each order. This is calculated by:
(Discount Revenue – Profit) / Quantity Sold

We will use the Custom Column. In the Query Editor you can create custom formulas that operate on multiple columns in your table, then place the results of such formulas into a new (custom) column. The formulas are created using the Power Query Formula Language (M Formula).

38.   Click   to display this query.

39.   Click   to display the Custom Column dialog screen.

40. Type *Cost of Goods* in the **New column name** field.

41. Type *=([Discount Sales Revenue]-[Profit])/[Quantity Sold]* in the **Custom column formula**.

42. Click [OK] to complete the process.

The new column appears populated with data.

43. Change the Data Type of this field to Fixed decimal number.

44. Save the queries

You have now completed this tutorial on Power BI. In this tutorial you have:
- Load BI
- Acquired Data
- Familiarised yourself with Query Editor
- Transformed the data
- Changed data Types
- Added custom columns
- Saved your work