Power Pivot and Excel dynamic arrays

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CMI Webinar series

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Overview of Seminar

Excel power Pivot

- Background & Availability
- The data model

- Demonstrations
  - Loading a JSON dataset (Tweets)
  - Manipulating a 246M row dataset (UKDS SN 7591)

- Excel Dynamic Arrays
  - What are they
  - Demo of some of the new Functions

Length : up to 1h 15mins + question time

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Overview of Seminar

This is a coding FREE Webinar

Both of the Power Pivot demonstrations today could be done by writing programming code in Python or R or any other language, but today we are going to let the mouse do most of the work for us.

The Dynamic Arrays demo does, as you would expect make use of Excel formulae.

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Power Pivot – Background and availability

- Power Pivot used to be only available as an Excel add-in
- Now available on most versions of Excel
- Has its own item 'Power Pivot' in the menu bar.
- Works with Power Query and Power View which are now all integrated into Excel

- Can be used to :
  - perform powerful data analysis
  - create complex data models.
  - process large amounts of data (much more than 1M rows)
  - Import a variety of file types

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Power Pivot – The Data Model

- A collection of tables with relationships
- An analytical database inside the Excel workbook – with its own set of features and functions to aid Data Analysis
- Power Pivot supports files up to 2GB in size and enables you to work with up to 4GB of data in memory
- The data in the data model is stored in a highly compressed form.

Power Pivot – JSON Demonstration

- In this demonstration we are going to take a file containing 100 Tweets downloaded using the Twitter API and load the bits of the Tweets of interest into an Excel spreadsheet.

Before we start, a bit about JSON

- Designed for application <-> application communication but is human-readable
- Extensively used by API's (Application Programming Interfaces)
- Many tools to make it more readable by Humans e.g. JSON Editor and addins to the popular browsers

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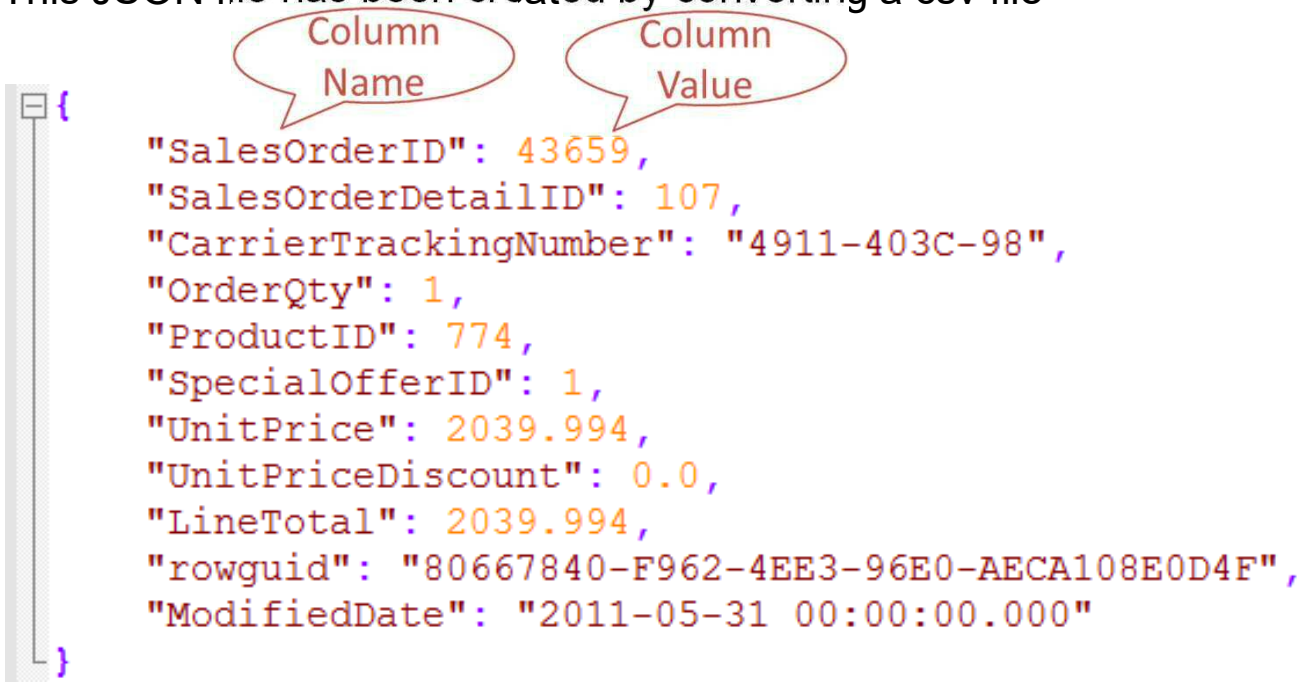
An example of simple JSON

- This JSON file has been created by converting a csv file



- You can always convert a csv file into JSON

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An example of complex JSON

This JSON is a very small part returned from a Twitter API call.


```
"coordinates": null,
"entities": {
    "symbols": [],
    "user_mentions": [{
        "id": 36691271,
        "indices": [3,
        14],
        "id_str": "36691271",
        "screen_name": "LSELibrary",
        "name": "LSE Library"
    }],
```


The nested structures “{…}” can be accommodated by using a ‘.’ notation in the column name. So the “id_str” element could have a column name of entities.user_mentions.id_str.

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An example of complex JSON


```
"coordinates": null,
"entities": {
    "symbols": [],
    "user_mentions": [{
        "id": 36691271,
        "indices": [3,
        14],
        "id_str": "36691271",
        "screen_name": "LSELibrary",
        "name": "LSE Library"
    },
```


- The "[…]" symbols represents an array or list of items which are normally referenced by an index number. You cannot easily flatten these into a simple table. In a relational model, you would separate these out into a table by themselves and create a relationship between it and the main table.

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Relational Table and JSON terms

- Relational tables and JSON use different terms to refer to similar items of data

- A ‘table’ in referred to as a ‘collection’ in JSON
- A ‘row’ of a table equates to a ‘document’ in JSON
- A ‘column’ in a table is referred to as a ‘field’ in JSON

- In the demo we are going to take a collection of JSON documents which have individual fields in them and create a single table with rows and columns in it.

Loading a JSON Dataset (Tweets)

DEMO

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Manipulating a 246M row dataset

- In this demonstration we will manipulate a 246M row dataset.
- The original dataset is 7,165,636Kb
- When loading into the Excel data model the Excel filesize is 650,533Kb

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Manipulating a 246M row dataset

The Steps

1. Load the edrp_gas file
2. Create new columns for Month and Year
3. Group the dataset by Anon_Id, Month and Year
4. Load the Geography file
5. Create relationship between the edrp_gas table and the Geography table
6. Create pivot table in Excel
7. Add the Months table into the model
8. Create a relationship between the Months table and the edrp_gas table
9. Modify the Months table in the data model using the ‘sort by column’ feature
10. Redo the Pivot table and Pivot chart.
11. Add slicers to create a small dashboard.

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Manipulating a 246M row dataset

Because of the time taken to perform the first three steps we will actually start the ‘live’ demo from step 4.

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Edrp_gas

	ANON_ID	ADVANCEDATETIME	HH	GASKWH
1	12191	18FEB08:08:00:00	16	6.1
2	3695	18FEB08:08:00:00	16	7.1
3	9267	18FEB08:08:00:00	16	13.3
4	4869	18FEB08:08:00:00	16	0
5	12866	18FEB08:08:00:00	16	4.2
6	6013	18FEB08:08:00:00	16	5.1
7	12914	18FEB08:08:00:00	16	0
8	14736	18FEB08:08:00:00	16	7.9
9	14736	18FEB08:08:30:00	17	5.1
10	12914	18FEB08:08:30:00	17	4.9
11	6013	18FEB08:08:30:00	17	1.8
12	12866	18FEB08:08:30:00	17	3.4
13	4869	18FEB08:08:30:00	17	0.3
14	9267	18FEB08:08:30:00	17	13.1
15	3695	18FEB08:08:30:00	17	6
16	12191	18FEB08:08:30:00	17	6.1
17	12009	18FEB08:08:30:00	17	7.399
18	16019	18FEB08:08:30:00	17	5.8
19	11846	18FEB08:08:30:00	17	8.3
20	11846	18FEB08:09:00:00	18	7.7
21	16019	18FEB08:09:00:00	18	6.2
22	12009	18FEB08:09:00:00	18	6.4
23	12191	18FEB08:09:00:00	18	5.9
24	3695	18FEB08:09:00:00	18	5.4
25	9267	18FEB08:09:00:00	18	2.8

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Edrp_gas – with added columns

```
= Table.AddColumn(#"Added Custom", "Year", each Text.Middle([ADVANCEDATETIME],5,2))
```

	ANON_ID	ADVANCEDATETIME	HH	GASKWH	Month	Year
1	12191	18FEB08:08:00:00	16	6.1	FEB	08
2	3695	18FEB08:08:00:00	16	7.1	FEB	08
3	9267	18FEB08:08:00:00	16	13.3	FEB	08
4	4869	18FEB08:08:00:00	16	0	FEB	08
5	12866	18FEB08:08:00:00	16	4.2	FEB	08
6	6013	18FEB08:08:00:00	16	5.1	FEB	08
7	12914	18FEB08:08:00:00	16	0	FEB	08
8	14736	18FEB08:08:00:00	16	7.9	FEB	08
9	14736	18FEB08:08:30:00	17	5.1	FEB	08
10	12914	18FEB08:08:30:00	17	4.9	FEB	08
11	6013	18FEB08:08:30:00	17	1.8	FEB	08
12	12866	18FEB08:08:30:00	17	3.4	FEB	08
13	4869	18FEB08:08:30:00	17	0.3	FEB	08
14	9267	18FEB08:08:30:00	17	13.1	FEB	08
15	3695	18FEB08:08:30:00	17	6	FEB	08
16	12191	18FEB08:08:30:00	17	6.1	FEB	08
17	12009	18FEB08:08:30:00	17	7.399	FEB	08
18	16019	18FEB08:08:30:00	17	5.8	FEB	08
19	11846	18FEB08:08:30:00	17	8.3	FEB	08
20	11846	18FEB08:09:00:00	18	7.7	FEB	08
21	16019	18FEB08:09:00:00	18	6.2	FEB	08
22	12009	18FEB08:09:00:00	18	6.4	FEB	08

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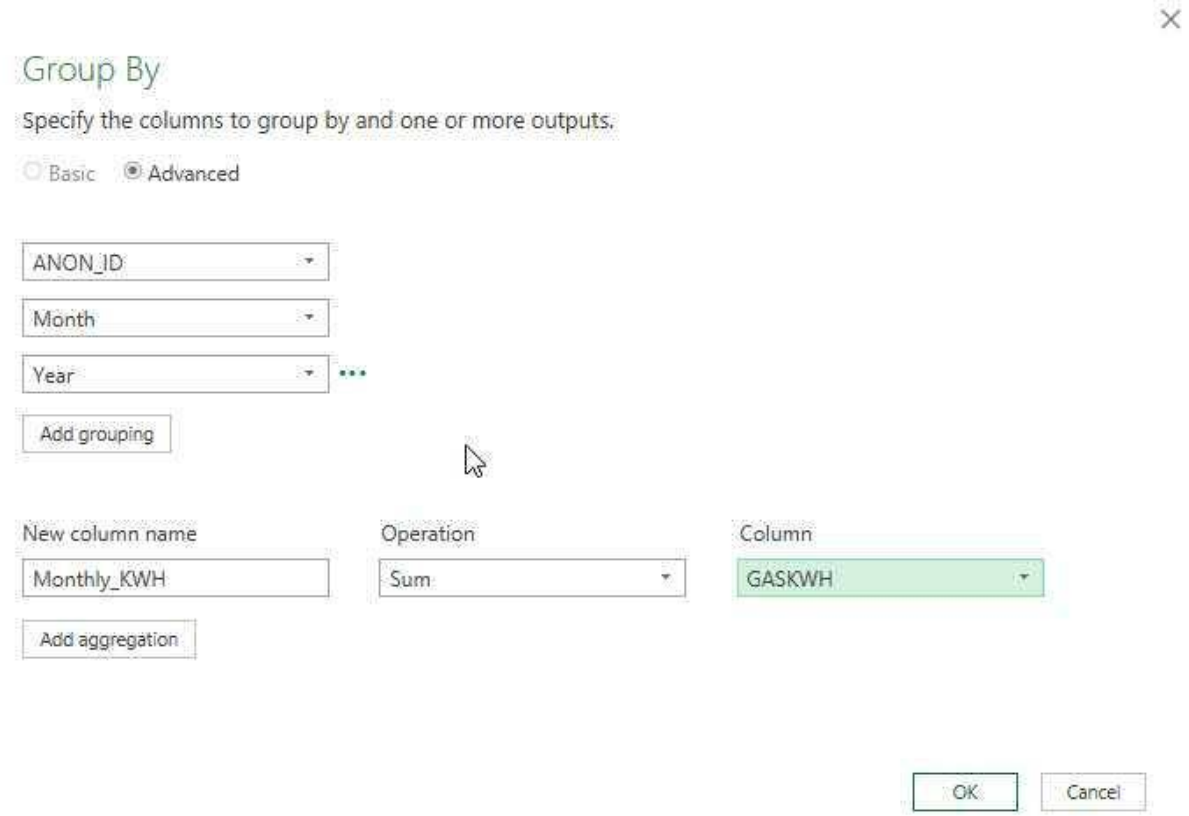
Edrp_gas – The Group By screen



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Manipulating a 246M row dataset

Demo

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Excel Dynamic Arrays

- Now a not so new feature of Excel, in most of the versions
- Allows a function to return more than a single cell response
- Used to have to use "Ctrl-Shift-Enter" and “{…}” to enter arrays, not now!
- Now some new functions are available
- Some older functions behave differently
- There are new easy ways to access or reference the dynamic arrays created

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Excel Dynamic Arrays

- How do I know if I have them?
  - Type in the formula ‘=A1:A3’

	A	B	C	D	E
1	1		1		=A1:A3
2	2		2		
3	3		3		
4					

  - If you only get the answer of ‘1’ in cell C1 then you don’t.
  - Alternatively you could just try search for one of the new functions such as ‘unique’.

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Excel Dynamic Arrays – The new functions

- There are 6 new functions

- FILTER function
- RANDARRAY function
- SEQUENCE function
- SORT function
- SORTBY function
- UNIQUE function

- We will look at some of them in the demo.

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Demo

Additional Info

Excel Dynamic Arrays

https://support.microsoft.com/en-us/office/dynamic-array-formulas-and-spilled-array-behavior-205c6b06-03ba-4151-89a1-87a7eb36e531

Power Pivot

https://support.office.com/en-gb/article/Power-Pivot-Powerful-data-analysis-and-data-modeling-in-Excel-A9C2C6E2-CC49-4976-A7D7-40896795D045

https://support.office.com/en-us/article/get-transform-and-power-pivot-in-excel-42d895c2-d1d7-41d0-88da-d1ed7ecc102d

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Questions

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