Shares	Cumulative totals	ABC/Pareto	Per-Day calculations	Time intelligence

In this small project I present examples of the use of calculated measures and columns to construct dynamic graphs, charts, and tables. Those measures and calculated columns are generated by writing DAX expressions.
As Microsoft states *"Data Analysis Expressions (DAX) is a library of functions and operators that can be combined to build formulas and expressions in Power BI, Analysis Services, and Power Pivot in Excel data models"*.

To understand exactly how DAX works we should have a good understanding of evaluation context of DAX. The evaluation context is the filters and conditions that affect final result of DAX expression. That is, same expression can provide different outcomes depending on filters applied and the current row considered.
Two types of coexisting evaluation contexts in DAX are:

1. Filter context - defined by filters, slicer, column and rows (think about pivot table.). Filter context propagates automatically by defined relationship (arrows on the connecting lines of tables in data model). That is, you can set a filter on 'Calendar' table, and it will affect the 'Sales' table since the relationship is bidirectional (two sided arrows)
2. Row context - defined by only one row which is used to perform further calculation defined by DAX expression. Row context is defined automatically when we create calculated column, or we use iterator functions. However, propagation is not done automatically.

One of the widely used function inside DAX is 'CALCULATE' function. It is used to modify the filter context by introducing new filters or changing old ones. Apart from that, 'CALCULATE' performs context transition from row to filter context which helps us to use calculated column inside a more complex expression and get dynamic results.

To see the described concepts in action, please click (Ctrl + click in PBI desktop) the buttons above and go over presented examples, where most of the graphs and tables are generated by modifying the filter contexts and performing context transitions with the help of 'CALCULATE'. Feel free to take a look at 'MeasTable' that contains all measures used throughout the project.

There are cases when we need to compute percentages for which Grand total is always 100%.

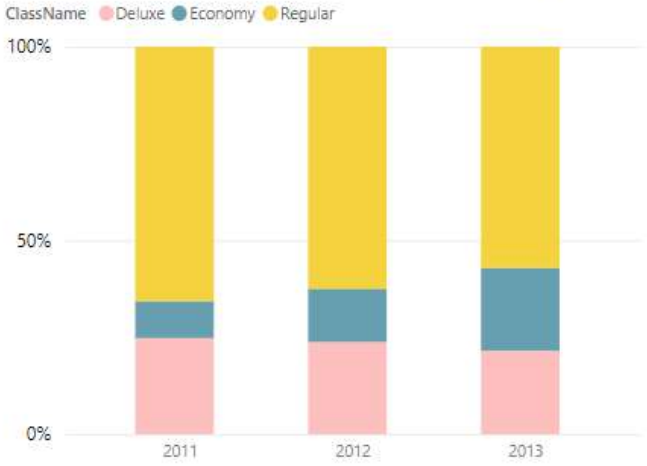
Use 'ALLSELECTED' function as a condition for 'CALCULATE' function to restrict the filter context only for selected ones.
For example, here, regardless of any external filters applied (for example, Product Category):

- [Sales % within a period] measure (used in Graph 1) returns 100% for each period
- [Sales % within a class] measure (used in Graph 2) returns 100% for each class

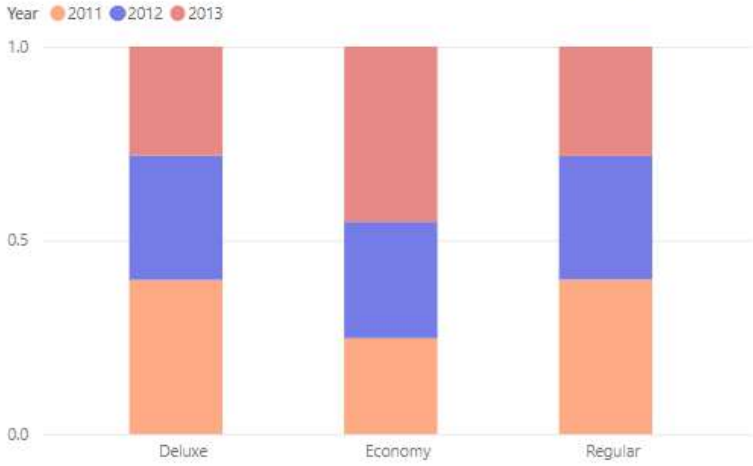
Slicer: Product Category

- Audio
- Cameras and camcorders
- Cell phones
- Computers
- Games and Toys
- Home Appliances
- Music, Movies and Audio Bo...
- TV and Video

Graph 1: Share of sales amount of each class within a period.



Graph 2: Share of sales amount of each period within a class of products.

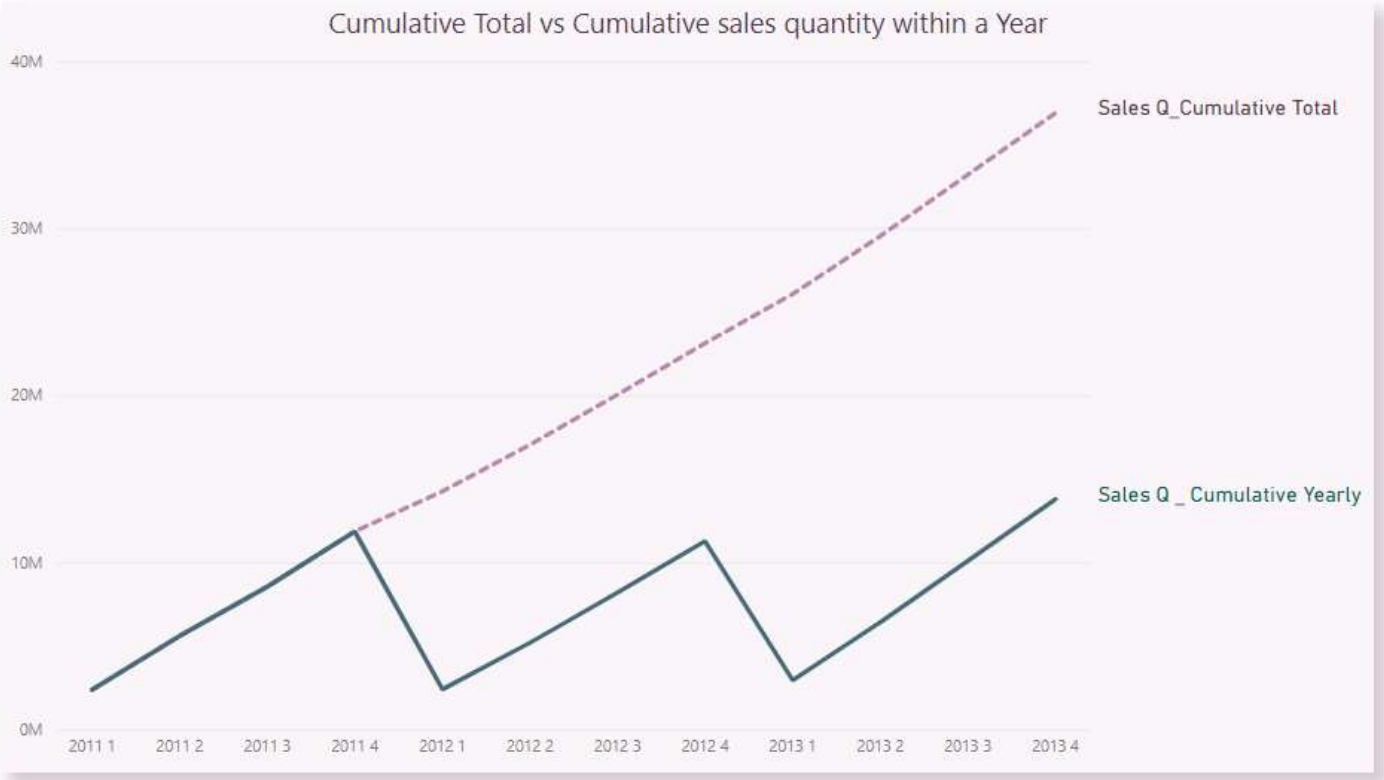


Compute cumulative values by modifying the Filter context with 'CALCULATE' function and by comparing inner and outer row contexts

Slicer by Brand

- A. Datum
- Adventure Works
- Contoso
- Fabrikam
- Litware
- Northwind Traders
- Proseware
- Southridge Video
- The Phone Company
- Wide World Importers

Regions for cumulative



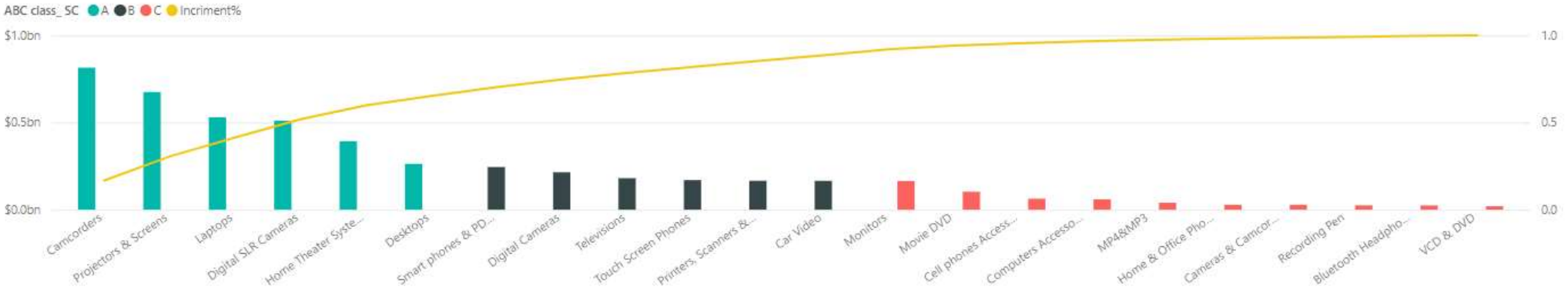
With the help of inner and outer row contexts inside a calculated column we can sort the values and generate new (user-defined) classes for a variable based on the sorted values.

The table in left shows ABC classification ***based on all of products*** by categories.
The second option presented in the right table shows the number of products for each category based on ABC classification done ***within each category***.
Click on the names of categories or subcategories to expand the table.

Finally, we can do ABC classification for groups of products (For example, take subcategories). The Pareto diagram below shows ABC classification of subcategories where A is first 70%, B is between 70% and 90%, and C is last 10%

ProductCategory	A	B	C	**Total**
Audio	4	4	107	**115**
Cameras and camcorders	163	98	111	**372**
Cell phones	45	85	155	**285**
Computers	165	100	341	**606**
Music, Movies and Audio Books	12	22	56	**90**
TV and Video	83	90	49	**222**
Total	**472**	**399**	**819**	**1690**

ProductCat	A	B	C	**Total**
Audio	44	38	33	**115**
Cameras and camcorders	119	97	156	**372**
Cell phones	96	57	132	**285**
Computers	133	146	327	**606**
Music, Movies and Audio Books	25	13	52	**90**
TV and Video	101	57	64	**222**
Total	**518**	**408**	**764**	**1690**



To provide these simple graphs, I used calculated measures presented in the table below.

Year	Sales Amount	Number of days	Daily sales	DailySales_weekday	DailySales_weekend
2011	**$3,144,393,292.1311**	**365**	**$8,614,776.1428**	**$8,625,027.5095**	**$8,589,391.8062**
1	$606,736,602.2517	90	$6,741,517.8028	$6,727,683.9702	$6,775,570.3138
2	$848,827,201.3114	91	$9,327,771.443	$9,345,701.838	$9,282,945.4555
3	$793,881,696.342	92	$8,629,148.8733	$8,659,856.4853	$8,551,198.7811
4	$894,947,792.226	92	$9,727,693.3938	$9,737,142.0136	$9,704,946.7164
2012	**$2,642,413,217.0324**	**366**	**$7,219,708.2433**	**$7,220,978.9715**	**$7,216,549.576**
1	$558,470,281.4676	91	$6,137,036.0601	$6,152,898.6876	$6,097,379.4913
2	$658,806,976.1078	91	$7,239,637.1001	$7,252,314.858	$7,207,942.7054
3	$705,371,511.819	92	$7,667,081.6502	$7,672,743.7174	$7,653,450.7477
4	$719,764,447.638	92	$7,823,526.6048	$7,797,095.2949	$7,890,621.4683
2013	**$2,554,417,855.6689**	**365**	**$6,998,405.084**	**$6,985,899.3496**	**$7,029,789.6676**
1	$545,876,791.8135	90	$6,065,297.6868	$6,063,824.6345	$6,068,923.6618
2	$674,020,404.9164	91	$7,406,817.6364	$7,372,663.1518	$7,492,203.848
3	$664,200,190.401	92	$7,219,567.287	$7,193,740.1472	$7,285,128.4879
4	$670,320,468.538	92	$7,286,092.0493	$7,291,287.8644	$7,272,902.6726
Total	**$8,341,224,364.8324**	**1096**	**$7,610,606.1723**	**$7,609,338.1001**	**$7,613,764.2375**

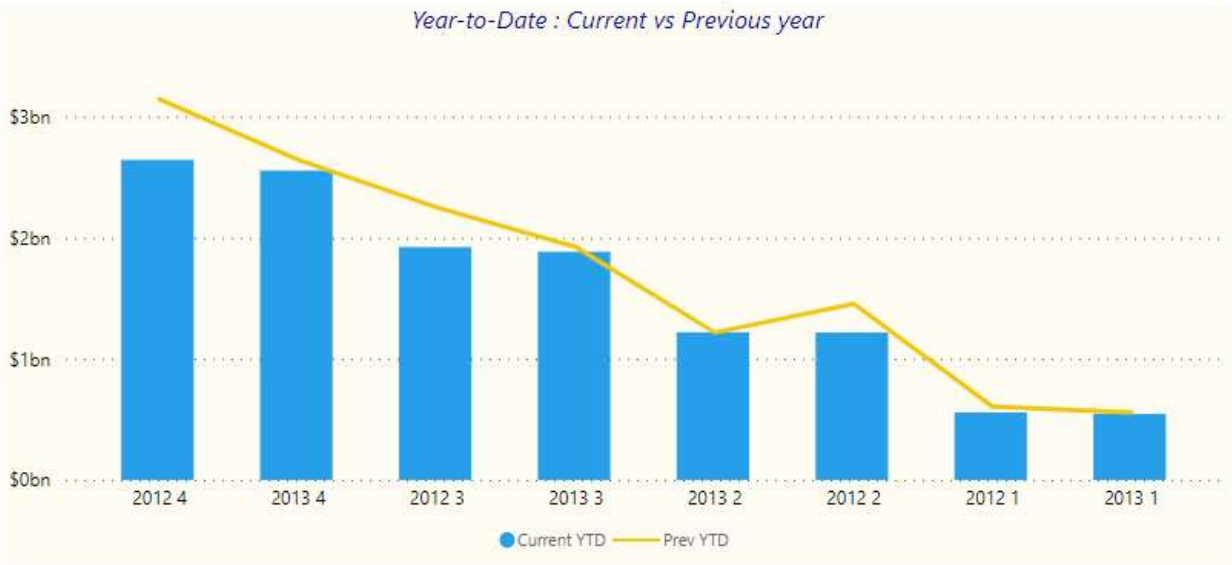
BrandName

- A. Datum
- Adventure Works
- Contoso
- Fabrikam
- Litware
- Northwind Traders
- Proseware
- Southridge Video
- The Phone Company
- Wide World Importers

Time intelligence functions make easy to work with trends and other time related KPIs.

'Year over Year' and 'Year Over Year YTD' KPIs presented in the tables below are calculated with the help of two time intelligence functions: `SAMEPERIODLASTYEAR' and "DATEYTD'

Year	Current YTD	Prev YTD	Year Over Year YTD	YOY_YTD %
2012	**$2,642,413,217.0324**	**$3,144,393,292.1311**	**($501,980,075.0987)**	**0.84**
1	$558,470,281.4676	$606,736,602.2517	($48,266,320.7841)	0.92
2	$1,217,277,257.5754	$1,455,563,803.5631	($238,286,545.9877)	0.84
3	$1,922,648,769.3944	$2,249,445,499.9051	($326,796,730.5107)	0.85
4	$2,642,413,217.0324	$3,144,393,292.1311	($501,980,075.0987)	0.84
2013	**$2,554,417,855.6689**	**$2,642,413,217.0324**	**($87,995,361.3635)**	**0.97**
1	$545,876,791.8135	$558,470,281.4676	($12,593,489.6541)	0.98
2	$1,219,897,196.7299	$1,217,277,257.5754	$2,619,939.1545	1.00
3	$1,884,097,387.1309	$1,922,648,769.3944	($38,551,382.2635)	0.98
4	$2,554,417,855.6689	$2,642,413,217.0324	($87,995,361.3635)	0.97
Total				



Year	Current Sales	PrevYear Sales	Year Over Year	YOY%
2012	**$2,642,413,217.0324**	**$3,144,393,292.1311**	**($501,980,075.0987)**	**0.84**
1	$558,470,281.4676	$606,736,602.2517	($48,266,320.7841)	0.92
2	$658,806,976.1078	$848,827,201.3114	($190,020,225.2036)	0.78
3	$705,371,511.819	$793,881,696.342	($88,510,184.523)	0.89
4	$719,764,447.638	$894,947,792.226	($175,183,344.588)	0.80
2013	**$2,554,417,855.6689**	**$2,642,413,217.0324**	**($87,995,361.3635)**	**0.97**
1	$545,876,791.8135	$558,470,281.4676	($12,593,489.6541)	0.98
2	$674,020,404.9164	$658,806,976.1078	$15,213,428.8086	1.02
3	$664,200,190.401	$705,371,511.819	($41,171,321.418)	0.94
4	$670,320,468.538	$719,764,447.638	($49,443,979.1)	0.93
Total	**$5,196,831,072.7013**	**$8,341,224,364.8324**	**($3,144,393,292.1311)**	**0.62**