

Microsoft Power Tools for Data Analysis #25-26
Data Models: Budget Vs. Actual with Excel Worksheet Formula or DAX and Data Model
Notes from Video:

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1) **Budget Vs. Actual**

- i. Businesses plan operation by making estimates of what will happen in the unknow future.
- ii. These estimates are called “budgeted” amounts or “forecasted’ amounts
- iii. The budgeted amounts are targets that the business thinks that they will achieve.
- iv. Once the actual numbers are known, the differences between Actual and Budgeted amounts are calculated to determine variances. These variances can be used to make adjustments or changes when making plans in the next period. They can help the business to see where things were exactly as planned, batter than expected or less than expected.

2) **Budget Vs. Actual with Excel Worksheet Formulas:**

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	[1] Formula in cell E4: =SUMIFS(\$L\$4:\$L\$57376,\$J\$4:\$J\$57376,C4,\$I\$4:\$I\$57376,">"&EOMONTH(B4,-1),\$I\$4:\$I\$57376,"<="&B4)													
2	[2] Formula in cell F4: =E4-D4				[3] Formula in cell G4: =F4/D4									
3	EOMonth	Product	Budget for Sales	[1] Actual Sales	[2] Variance	[3] % Variance					Date	Product	Units	Sales
4	1/31/19	Aspen	261,026	263,367	2,341	0.90%	10/23/20	Aspen	48	920.16				
5	2/28/19	Aspen	266,139	260,343	-5,796	-2.18%	12/13/20	Aspen	24	498.42				
6	3/31/19	Aspen	242,085	243,498	1,413	0.58%	12/21/19	Quad	3	131.85				
7	4/30/19	Aspen	255,811	255,107	-704	-0.28%	12/2/19	Quad	84	2215.08				
8	5/31/19	Aspen	336,485	294,545	-41,940	-12.46%	11/9/19	Aspen	12	316.31				
9	6/30/19	Aspen	314,706	243,770	-70,936	-22.54%	12/9/20	Aspen	36	747.63				
10	7/31/19	Aspen	301,014	254,449	-46,565	-15.47%	12/11/20	Carlota	12	365.81				
11	8/31/19	Aspen	318,504	266,859	-51,645	-16.21%	11/25/20	Aspen	36	747.63				

3) Budget Vs. Actual with the Data Model and DAX Formulas

i. The starting tables look like this :

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1																			
2																			
3			Budget Vs Actual - Grain Problem: Budget = Month by Product Vs Actual = Day-Date by Product																
4																			
5			Grain = Month, Product, No Duplicates					Grain = Product Line Transaction with Day Date, Yes Duplicates											
6																			
7			Base Budget by Month for Product					Actual by Transactional Product Sale											
8																			
9			EOMonth	Product	Budget			Date	Product	Units	Sales		Product	RetailPrice		Date	MonthNumber	Month	Year
10			1/31/19	Aspen	261,026			10/23/20	Aspen	48	920.16		Quad	43.95		1/1/19	1	Jan	2019
11			2/28/19	Aspen	266,139			12/13/20	Aspen	24	498.42		Carlota	36.95		1/2/19	1	Jan	2019
12			3/31/19	Aspen	242,085			12/21/19	Quad	3	131.85		Aspen	31.95		1/3/19	1	Jan	2019
13			4/30/19	Aspen	255,811			12/2/19	Quad	84	2215.08					1/4/19	1	Jan	2019
14			5/31/19	Aspen	336,485			11/9/19	Aspen	12	316.31					1/5/19	1	Jan	2019
15			6/30/19	Aspen	314,706			12/9/20	Aspen	36	747.63					1/6/19	1	Jan	2019
16			7/31/19	Aspen	301,014			12/11/20	Carlota	12	365.81					1/7/19	1	Jan	2019
17			8/31/19	Aspen	318,504			11/25/20	Aspen	36	747.63					1/8/19	1	Jan	2019
18			9/30/19	Aspen	275,060			12/25/20	Aspen	84	1610.28					1/9/19	1	Jan	2019
19			10/31/19	Aspen	1,375,481			12/11/19	Aspen	24	498.42					1/10/19	1	Jan	2019
20			11/30/19	Aspen	2,830,525			12/23/19	Aspen	12	316.31					1/11/19	1	Jan	2019

ii. The Measures we created look like this:

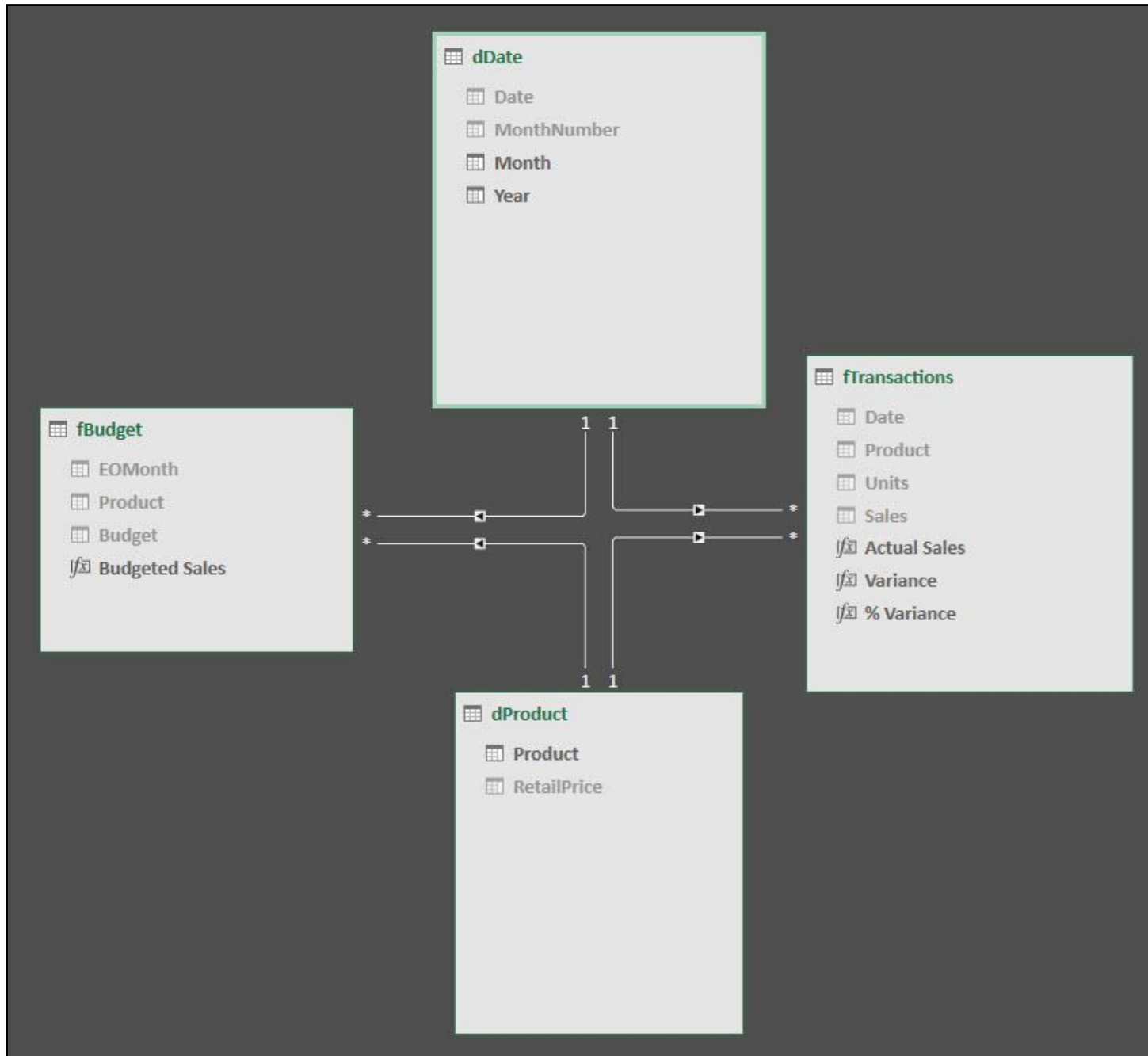
Budgeted Sales:=SUM(fBudget[Budget])

Actual Sales:=SUM(fTransactions[Sales])

Variance:=[Actual Sales]-[Budgeted Sales]

% Variance:=DIVIDE([Variance],[Budgeted Sales])

iii. The Final Data Model with Tables, Relationships, Measure and Hidden Columns looks like this :



iv. The Final Data Model PivotTable looks like this :

	Product	Year	Month	Actual Sales	Budgeted Sales	Variance	% Variance
	Aspen	2019	Jan	\$263,367.28	\$261,026.28	\$2,341.00	0.90%
			Feb	\$260,343.20	\$266,139.20	-\$5,796.00	-2.18%
			Mar	\$243,497.62	\$242,084.62	\$1,413.00	0.58%
			Apr	\$255,106.62	\$255,810.62	-\$704.00	-0.28%
			May	\$294,545.00	\$336,485.00	-\$41,940.00	-12.46%
			Jun	\$243,769.98	\$314,705.98	-\$70,936.00	-22.54%
			Jul	\$254,449.26	\$301,014.26	-\$46,565.00	-15.47%
			Aug	\$266,859.40	\$318,504.40	-\$51,645.00	-16.21%
			Sep	\$251,428.39	\$275,060.39	-\$23,632.00	-8.59%
			Oct	\$1,329,852.94	\$1,375,480.94	-\$45,628.00	-3.32%
			Nov	\$2,915,804.51	\$2,830,524.51	\$85,280.00	3.01%
			Dec	\$2,436,087.75	\$2,345,748.75	\$90,339.00	3.85%
		2019 Total		\$9,015,111.95	\$9,122,584.95	-\$107,473.00	-1.18%
		2020	Jan	\$248,027.31	\$325,463.31	-\$77,436.00	-23.79%
			Feb	\$269,601.58	\$266,471.58	\$3,130.00	1.17%
			Mar	\$261,363.28	\$343,068.28	-\$81,705.00	-23.82%
			Apr	\$229,029.84	\$210,544.84	\$18,485.00	8.78%
			May	\$221,176.48	\$183,812.48	\$37,364.00	20.33%
			Jun	\$235,682.63	\$269,180.63	-\$33,498.00	-12.44%
			Jul	\$271,730.23	\$290,873.23	-\$19,143.00	-6.58%
			Aug	\$214,267.24	\$247,731.24	-\$33,464.00	-13.51%
			Sep	\$243,814.68	\$291,061.68	-\$47,247.00	-16.23%
			Oct	\$906,926.45	\$953,278.45	-\$46,352.00	-4.86%
			Nov	\$2,634,313.89	\$2,542,560.89	\$91,753.00	3.61%
			Dec	\$3,049,951.89	\$3,035,612.89	\$14,339.00	0.47%
		2020 Total		\$8,785,885.50	\$8,959,659.50	-\$173,774.00	-1.94%
	Aspen Total			\$17,800,997.45	\$18,082,244.45	-\$281,247.00	-1.56%
	Carlota	2019	Jan	\$202,270.05	\$165,161.05	\$37,109.00	22.47%
			Feb	\$182,750.32	\$205,856.32	-\$23,106.00	-11.22%
			Mar	\$242,907.78	\$229,690.78	\$13,217.00	5.75%
			Apr	\$234,422.17	\$242,299.17	-\$7,877.00	-3.25%
			May	\$224,344.99	\$207,926.99	\$16,418.00	7.90%

PivotTable Fields

Active All

Choose fields to add to report: ⚙

Search 🔍

- ∨ ∑ fBudget
 - f: Budgeted Sales
- ∨ ∑ fTransactions
 - f: Actual Sales
 - f: Variance
 - f: % Variance
- ∨ 📅 dDate
 - Month
 - Year
- ∨ 📦 dProduct
 - Product

Drag fields between areas below:

Filters

Columns

∑ Values

Rows

Product

Year

Month

Values

Actual Sales

Budgeted Sales

Variance

% Variance

v. Picture of how Relations Flow :

1 Month from dDate Table

Jan condition filters dDate Table down to rows with Jan

Year	Product	Month	Actual Sales	Budgeted Sales	Variance	% Variance
=2019	=Aspen	Jan	\$263,367.28	\$261,026.28	\$2,341.00	0.90%
		Feb	\$260,348.20	\$266,139.20	-\$5,796.00	-2.18%
		Mar	\$243,497.62	\$242,084.62	\$1,413.00	0.58%
		Apr				

Jan Days Filter flows from 1 to many side in fTransactions

3

2

1/31/2019 Filter flows from 1 to many side in fBudget

Date	MonthNumber	Month	Year
1/1/19	1	Jan	2019
1/2/19	1	Jan	2019
1/3/19	1	Jan	2019
1/4/19	1	Jan	2019
1/5/19	1	Jan	2019
1/6/19	1	Jan	2019
1/7/19	1	Jan	2019
1/8/19	1	Jan	2019
1/9/19	1	Jan	2019
1/10/19	1	Jan	2019
1/11/19	1	Jan	2019
1/12/19	1	Jan	2019
1/13/19	1	Jan	2019
1/14/19	1	Jan	2019
1/15/19	1	Jan	2019
1/16/19	1	Jan	2019
1/17/19	1	Jan	2019
1/18/19	1	Jan	2019
1/19/19	1	Jan	2019
1/20/19	1	Jan	2019
1/21/19	1	Jan	2019
1/22/19	1	Jan	2019
1/23/19	1	Jan	2019
1/24/19	1	Jan	2019
1/25/19	1	Jan	2019
1/26/19	1	Jan	2019
1/27/19	1	Jan	2019
1/28/19	1	Jan	2019
1/29/19	1	Jan	2019
1/30/19	1	Jan	2019
1/31/19	1	Jan	2019

Date	Product	Custom	Units	Sales
1/27/19	Quad	C3	1	43.95
1/23/19	Quad	C4	5	181.29
1/3/19	Quad	C3	48	1265.76
1/14/19	Aspen	C2	12	316.31
1/14/19	Quad	C7	5	181.29
1/23/19	Aspen	C1	36	747.63
1/1/19	Quad	C8	36	1028.43
1/11/19	Quad	C3	2	87.9
1/9/19	Carlota	C2	12	365.81
1/12/19	Aspen	C1	5	131.79
1/15/19	Aspen	C8	24	498.42
1/8/19	Aspen	C2	120	2012.85
1/26/19	Aspen	C3	60	1150.2
1/30/19	Quad	C5	36	1028.43
1/17/19	Carlota	C6	4	147.8
1/20/19	Carlota	C5	3	110.85
1/28/19	Quad	C5	12	435.11
1/9/19	Aspen	C1	1	31.95
1/12/19	Aspen	C1	132	2214.14
1/22/19	Aspen	C3	3	95.85
1/12/19	Aspen	C1	24	498.42
1/11/19	Aspen	C3	120	2012.85
1/17/19	Carlota	C8	1	36.95
1/4/19	Quad	C4	3	131.85
1/5/19	Carlota	C7	24	576.42
1/20/19	Quad	C6	5	181.29
1/21/19	Carlota	C7	24	576.42
1/17/19	Carlota	C2	12	365.81
1/6/19	Quad	C6	5	181.29

EOMonth	Product	Budget
1/31/19	Aspen	261,026
1/31/19	Carlota	165,161
1/31/19	Quad	177,626

4

2

3

1

4

Not required for class, but related:

If you do not want a relationship between budget table and other tables, you can simulate the relationship with this formula:

Budgeted Product Month Sales:

```
=CALCULATE(  
    SUM(fBudget[Budget]),  
    INTERSECT(VALUES(fBudget[EOMonth]),VALUES(dDate[EOMonth])),  
    INTERSECT(VALUES(fBudget[Product]),VALUES(dProduct[Product])))
```

- The INTERSECT functions runs and AND Logical Test, but the left and right table are NOT commutative. INTERSECT (A,B) can be different than INTERSECT(B,A).
- If the table without the relationship is the target table and the other table has a column in the filter context you want to use to filter the target table, you use this patter:

```
INTERSECT(VALUES(TargetColumn),VALUES(FilterContextToRead))
```

If you are in **Power BI Desktop**, then you can use TREATAS rather than the INTERSECT function. TREATAS is faster calculating (important for big data) and it requires that you invert the left and right tables, the FilterContextToRead and TargetColumn tables, as seen here:

Budgeted Product by Month Sales:

```
= CALCULATE(  
    SUM(fBudget[Budget]),  
    TREATAS(VALUES(dProduct[Product]),fBudget[Product]),  
    TREATAS(VALUES(dDate[End of Month]),fBudget[EOMonth]))
```