

DATA MANIPULATION AND REPORTING WITH POWER BI

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Purpose of this lab

After completing this lab you should be able to, use different DAX functions to create calculated columns, measure and tables.

Using DAX Scenario

The CMO (Chief Medical Officer) of a healthcare organization wants to analyze the performance of his hospital. He wants to judge the performance in terms of the quality of healthcare service provided to the patients which is very important from the standpoint of,

1. Producing different healthcare statistics that can help in improving the overall patient care.
2. Becoming NABL compliant.

Similarly, he also wants to judge the performance of his hospital in terms of the revenue generated by selling different types of products and services. The points below describe the detailed requirement of the dashboard. Based on last 4 years data, the CMO wants to know the,

1. Number of OPD, IPD and Emergency patient visits.
2. Distribution of patients in different health categories.
3. The efficiency of the hospital in curing different type of diseases.
4. The top performing products and services of the hospital in terms of revenue generation and units sold.
5. The death causing diseases across,
 - a. Various age groups
 - b. Cities
 - c. Gender

Create Calculated Columns

- 1) Create Month Column
 - a. Launch PowerBI desktop.
 - b. Open the “Healthcare Performance Dashboard” file saved earlier.
 - c. Navigate to the “Date View”.
 - d. From the “Fields” panel on the right side, select the “Visits” table.
 - e. From the “Modeling” tab at the top, click on “New Column”.
 - f. In the formulae bar, type the following formulae.

$$\text{Month} = \text{CONCATENATE}(\text{FORMAT}([\text{Visit Date}], "mm"), (\text{FORMAT}([\text{Visit Date}], "yyyy"))$$
 - g. Select the newly created column from the “Fields” panel on the right.
 - h. From the “Modeling” tab at the top make sure that the “Datatype” and “Format” is set to “Text”.
 - i. “Month” column should be created with appropriate formatting under “Visits” table.

Height (m)	Weight (kg)	BMI	BMI Category	Primary Diagnosis ID	Discharge Date	Total Stay	Discharge Disposition	Gender	Visit Type	Year	Month
1.69	78.71	27.56	Overweight	39	Sunday, January 12, 2014	0		1 Male	OPD	2014	01 2014
1.69	78.71	27.56	Overweight	42	Monday, January 13, 2014	0		1 Male	OPD	2014	01 2014

2) Create Year Column

- From the “Modeling” tab at the top, click on “New Column” again.
- In the formulae bar, type the following formulae. $\text{Year} = \text{YEAR}([\text{Visit Date}])$
- Select the newly created column from the “Fields” panel on the right.
- From the “Modeling” tab at the top make sure that the “Datatype” and “Format” is set to “Text”.
- “Year” column should be created with appropriate formatting under “Visits” table.

3) Create BMI Category Column

- From the “Modeling” tab at the top, click on “New Column” again.
- In the formulae bar, type the following formulae. $\text{BMI Category} = \text{IF}([\text{BMI}] < 18.5, \text{"Underweight"}, \text{IF}(\text{AND}([\text{BMI}] > 18.4, [\text{BMI}] < 25), \text{"Healthy"}, \text{IF}(\text{AND}([\text{BMI}] > 24.9, [\text{BMI}] < 30), \text{"Overweight"}, \text{IF}([\text{BMI}] > 29.9, \text{"Obese"})))$
- Select the newly created column from the “Fields” panel on the right.
- From the “Modeling” tab at the top make sure that the “Datatype” and “Format” is set to “Text”.
- “BMI Category” column should be created with appropriate formatting under “Visits” table.

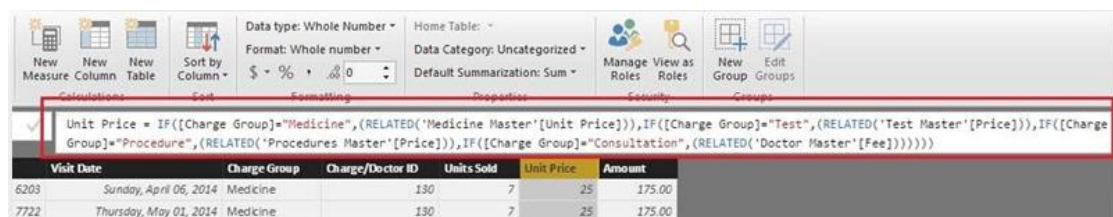
Height (m)	Weight (kg)	BMI	BMI Category	Primary Diagnosis ID	Discharge Date	Total Stay	Discharge Disposition	Gender	Visit type	Year	Month	BMI Category
1.69	78.71	27.56	Overweight	39	Sunday, January 12, 2014	0		1 Male	OPD	2014	01 2014	Overweight

4) Create Unit Price Column

- From the “Fields” panel on the right side, select the “Billing” table.
- From the “Modeling” tab at the top, click on “New Column”.
- In the formulae bar, type the following formulae.
 $\text{Unit Price} = \text{IF}([\text{Charge Group}] = \text{"Medicine"}, (\text{RELATED}(\text{"Medicine Master"}[\text{Unit}$

Price])),IF([Charge Group]="Test",(RELATED('Test Master'[Price])),IF([Charge Group]="Procedure",(RELATED('Procedures Master'[Price])),IF([Charge Group]="Consultation",(RELATED('Doctor Master'[Fee])))))))

- n. Select the newly created column from the “Fields” panel on the right.
- o. From the “Modeling” tab at the top make sure that the “Datatype” and “Format” is set to “Whole Number”.
- p. “Unit Price” measure should be created with appropriate formatting under “Billing” table.



5) Create Amount Column

- g. From the “Modeling” tab at the top, click on “New Column”.
- h. In the formulae bar, type the following formulae. Amount = [Unit Price]*[Units Sold]
- i. Select the newly created column from the “Fields” panel on the right.
- j. From the “Modeling” tab at the top make sure that the “Datatype” and “Format” is set to “Decimal Number”.
- k. “Amount” measure should be created with appropriate formatting under “Billing” table.
- l. From the “Modeling” tab at the top make sure that the “Format” is set to “Decimal Number”, the “Thousands Separator” is disabled and the “Decimal Places” are set to 2.

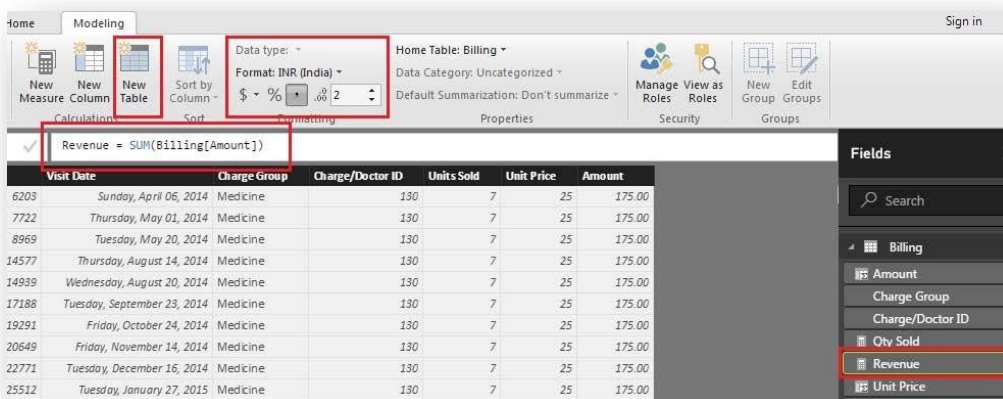
Create Calculated Measures

1) Create Revenue Measure

- a. With the “Billing” table in view, click on “New Measure” from the “Modeling” tab at the top.
- b. In the formulae bar, type the following formulae. Revenue = SUM(Billing[Amount])
- c. Select the newly created measure from the “Fields” panel on the right.
- d. From the “Modeling” tab at the top make sure that the “Format” is set to “INR

(India)", the "ThousandsSeparator" is enabled and the "Decimal Places" are set to 2.

- e. "Revenue" measure should be created with appropriate formatting under "Billing" table.



2) Create Qty Sold Measure

- a. Click on "New Measure" from the "Modeling" tab at the top.
- b. In the formulae bar, type the following formulae.
Qty Sold = SUM(Billing[Units Sold]).
- c. Select the newly created measure from the "Fields" panel on the right.
- d. From the "Modeling" tab at the top make sure that the "Format" is set to "Whole Number", the "Thousands Separator" is disabled, and the "Decimal Places" are set to 0.
- e. "Qty Sold" measure should be created with appropriate formatting under "Billing" table.

3) Create Visit Count Measure

- a. From the "Fields" panel on the right side, select the "Visits" table.
- b. From the "Modeling" tab at the top, click on "New Measure".
- c. In the formulae bar, type the following formulae.
Visit Count = COUNT(Visits[Visit ID])
- d. Select the newly created measure from the "Fields" panel on the right.
- e. From the "Modeling" tab at the top make sure that the "Format" is set to "Whole Number", the "Thousands Separator" is disabled and the "Decimal Places" are set to 0.

- f. “Visit Count” measure should be created with appropriate formatting under “Visits” table.

4) Create Death Count Measure

- g. From the “Modeling” tab at the top, click on “New Measure”.
- h. In the formulae bar, type the following formulae.
Death Count = (CALCULATE(COUNT(Visits[Visit ID]),Visits[Discharge Disposition]=10))
- i. Select the newly created measure from the “Fields” panel on the right.
- j. From the “Modeling” tab at the top make sure that the “Format” is set to “Whole Number”, the “Thousands Separator” is disabled and the “Decimal Places” are set to 0.
- k. “Death Count” measure should be created with appropriate formatting under “Visits” table.

Visit Date	Center ID	Patient ID	Patient Age	Age Group	Doctor ID	Height (m)	Weight (kg)	BMI
752	Sunday, January 12, 2014	4	14578	71	61 - 90	16	1.69	78.71

5) Create Admission Count Measure

- l. From the “Modeling” tab at the top, click on “New Measure”.
- m. In the formulae bar, type the following formulae.
Admission Count = CALCULATE(COUNT(Visits[Visit ID]),NOT(Visits[Visit Type]="OPD"))
- n. Select the newly created measure from the “Fields” panel on the right.
- o. From the “Modeling” tab at the top make sure that the “Format” is set to “Whole Number”, the “Thousands Separator” is disabled and the “Decimal Places” are set to 0.
- p. “Admission Count” measure should be created with appropriate formatting under “Visits” table.

6) Create Length of Stay Measure

- q. From the “Modeling” tab at the top, click on “New Measure”.
- r. In the formulae bar, type the following formulae.
Length of Stay = CALCULATE(AVERAGE(Visits[Total Stay]),NOT(Visits[Visit Type]="OPD"))
- s. Select the newly created measure from the “Fields” panel on the right.
- t. From the “Modeling” tab at the top make sure that the “Format” is

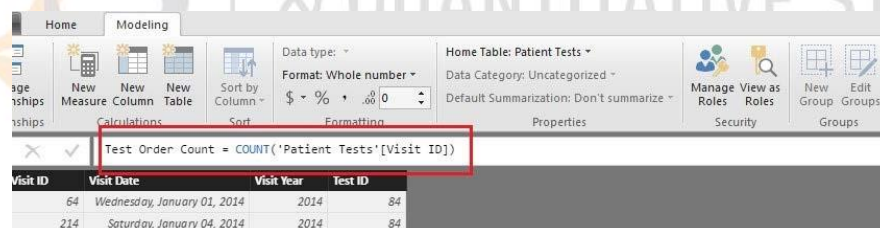
set to “Decimal Number”, the “Thousands Separator” is disabled and the “Decimal Places” are set to 2.

- u. “Length of Stay” measure should be created with appropriate formatting under “Visits” table.

Create Calculated Rank Measures

1) Create Test Order Count Measure

- a. From the “Fields” panel on the right side, select the “Patient Tests” table.
- b. From the “Modeling” tab at the top, click on “New Measure”.
- c. In the formulae bar, type the following formulae. Test Order Count = COUNT('Patient Tests'[Visit ID])
- d. Select the newly created measure from the “Fields” panel on the right.
- e. From the “Modeling” tab at the top make sure that the “Format” is set to “Whole Number”, the “Thousands Separator” is disabled and the “Decimal Places” are set to 0.
- f. “Test Order Count” measure should be created with appropriate formatting under “Patient Tests” table.



2) Create Medicine Order Count Measure

- a. From the “Fields” panel on the right side, select the “Patient Medications” table.
- b. From the “Modeling” tab at the top, click on “New Measure”.
- c. In the formulae bar, type the following formulae.
Medicine Order Count = COUNT('Patient Medications'[Visit ID])
- d. Select the newly created measure from the “Fields” panel on the right.
- e. From the “Modeling” tab at the top make sure that the “Format” is set to “Whole Number”, the “Thousands Separator” is disabled and the “Decimal Places” are set to 0.
- f. “Medicine Order Count” measure should be created with appropriate formatting under “Patient Medications” table.

3) Create Procedure Order Count Measure

- From the “Fields” panel on the right side, select the “Patient Procedures” table.
- From the “Modeling” tab at the top, click on “New Measure”.
- In the formulae bar, type the following formulae.

$$\text{Procedure Order Count} = \text{COUNT}(\text{'Patient Procedures' [Visit ID]})$$
- Select the newly created measure from the “Fields” panel on the right.
- From the “Modeling” tab at the top make sure that the “Format” is set to “Whole Number”, the “Thousands Separator” is disabled and the “Decimal Places” are set to 0.
- “Procedure Order Count” measure should be created with appropriate formatting under “Patient ProceduresTable”.

4) Create TopN Physicians Measure

- From the “Fields” panel on the right side, select the “Doctor Master” table.
- From the “Modeling” tab at the top, click on “New Measure”.
- In the formulae bar, type the following formulae.

$$\text{TopN Physicians} = \text{RANKX}(\text{ALL}(\text{'Doctor Master'}), \text{Visits [Visit Count]},, \text{DESC})$$
- Select the newly created measure from the “Fields” panel on the right.
- From the “Modeling” tab at the top make sure that the “Format” is set to “Whole Number”, the “Thousands Separator” is disabled and the “Decimal Places” are set to 0.
- “TopN Physicians” measure should be created with appropriate formatting under “Doctor Master” table.

The screenshot shows the Power BI Desktop interface. The formula bar at the top contains the measure: `Top Physicians = RANKX(ALL('Doctor Master'), Visits[Visit Count],, DESC)`. Below the formula bar, a table is displayed with the following data:

Primary Physician	Fee	Speciality
1 Dr. Lalit Dongre	400	Cardiologist
2 Dr. Poonam Harkut	800	Cardiologist
3 Dr. Naresh Gour	100	Oncologist

5) Create TopN Medicines Measure

- From the “Fields” panel on the right side, select the “Medicine Master” table.
- From the “Modeling” tab at the top, click on “New Measure”.
- In the formulae bar, type the following formulae.

$$\text{TopN Medicines} = \text{RANKX}(\text{ALL}(\text{'Medicine Master'}), [\text{Medicine Order Count}],, \text{DESC})$$

- d. Select the newly created measure from the “Fields” panel on the right.
- e. From the “Modeling” tab at the top make sure that the “Format” is set to “Whole Number”, the “Thousands Separator” is disabled and the “Decimal Places” are set to 0.
- f. “TopN Medicines” measure should be created with appropriate formatting under “Medicine Master” table.

6) Create TopN Procedures Measure

- a. From the “Fields” panel on the right side, select the “Procedures Master” table.
- b. From the “Modeling” tab at the top, click on “New Measure”.
- c. In the formulae bar, type the following formulae.

$$\text{TopN Procedures} = \text{RANKX}(\text{ALL}('Procedures Master'), 'Patient Procedures'[ProcedureOrder Count],, \text{DESC})$$
- d. Select the newly created measure from the “Fields” panel on the right.
- e. From the “Modeling” tab at the top make sure that the “Format” is set to “Whole Number”, the “Thousands Separator” is disabled and the “Decimal Places” are set to 0.
- f. “TopN Procedures” measure should be created with appropriate formatting under “Procedure Master” table.

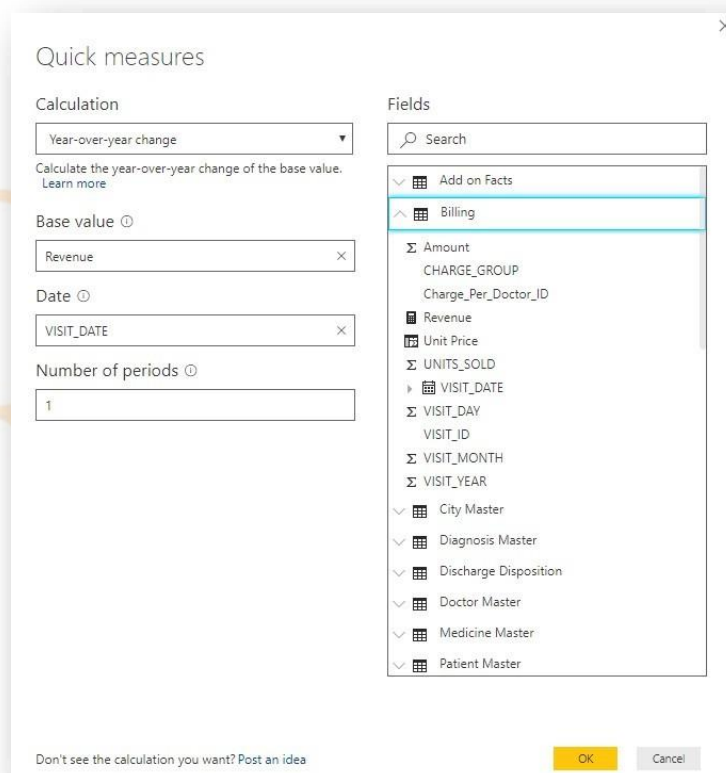
7) Create TopN Tests Measure

- a. From the “Fields” panel on the right side, select the “Test Master” table.
- b. From the “Modeling” tab at the top, click on “New Measure”.
- c. In the formulae bar, type the following formulae.

$$\text{TopN Tests} = \text{RANKX}(\text{ALL}('Test Master'), 'Patient Tests'[Test Order Count],, \text{DESC})$$
- d. Select the newly created measure from the “Fields” panel on the right.
- e. From the “Modeling” tab at the top make sure that the “Format” is set to “Whole Number”, the “Thousands Separator” is disabled and the “Decimal Places” are set to 0.
- f. “TopN Tests” measure should be created with appropriate formatting under “Test Master” table.

Create Quick Measures

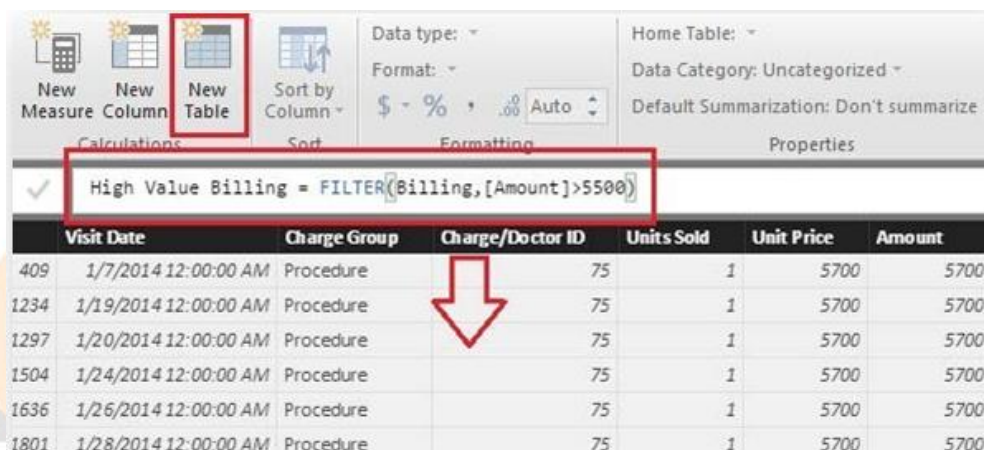
- 1) Create Year Over Year Change of Revenue measure
 - a. From the “Home” menu, click on “New Quick Measure”.
 - b. In the “Quick Measures” window, under the “Calculation” list, select “Year-over-yearchange”.
 - c. From the right-side “Fields” panel, expand the “Billing” table, drag the “Revenue” measure and drop it on the “Base Value” box.
 - d. Similarly expand the “Visits” table, drag the “Visit Date” column and drop it on the “Date” box.
 - e. Keep the “Number of Periods” as 1.
 - f. Click on Ok to save the measure.



Note: Please note this measure is created using “Visit Date” as the context. Hence, when you use this measure in a visual, make sure you’ve also used the “Visit Date” dimension in same visual, otherwise the quick measure won’t work properly. Its ok to use other additional dimensions in the same visual, apart from “Visit Date”.

Create Calculated Table

- 1) Create a filtered table.
 - a. While you are in the “Data View”, click on “New Table” button from the “Modeling” tab at the top.
 - b. In the formulae bar, type the following formulae. High Value Billing
= FILTER(Billing,[Amount]>5500)
 - c. A new table should be created containing only those rows where the “Amount” is greater than 5500.
 - d. Save all the changes to the file.



	Visit Date	Charge Group	Charge/Doctor ID	Units Sold	Unit Price	Amount
409	1/7/2014 12:00:00 AM	Procedure	75	1	5700	5700
1234	1/19/2014 12:00:00 AM	Procedure	75	1	5700	5700
1297	1/20/2014 12:00:00 AM	Procedure	75	1	5700	5700
1504	1/24/2014 12:00:00 AM	Procedure	75	1	5700	5700
1636	1/26/2014 12:00:00 AM	Procedure	75	1	5700	5700
1801	1/28/2014 12:00:00 AM	Procedure	75	1	5700	5700

- 2) Create an aggregated table
 - a. From the “Modeling” tab, click on “New Table”.
 - b. In the formulae bar, type the following formulae.
Summary Table =
SUMMARIZE(Visits,[GENDER],[AGE_GROUP],[VISIT_TYPE],"Visit Count",COUNTROWS(Visits))
 - c. This would create a new aggregated table that uses gender, age group and visit type columns for grouping and Countrows expression to calculate the “Visit Count” fact column.

The screenshot shows the Power BI Desktop interface. The DAX formula bar at the top contains the formula: `1 Summary Table = SUMMARIZE(Visits,[GENDER],[AGE_GROUP],[VISIT_TYPE],"Visit Count",COUNTROWS(Visits))`. Below the formula bar, a table is displayed with the following data:

GENDER	AGE_GROUP	VISIT_TYPE	Visit Count
Male	0 - 10	OPD	2131
Female	0 - 10	OPD	2252
Male	11 - 30	OPD	3404
Female	11 - 30	OPD	3278