

Power BI – Transformation, M coding and DAX

“Transformation, M Coding and DAX in PowerBI” is an academic assignment I worked on as part of the Business Intelligence course in my Big Data Analytics program. The intent of this project is to perform a given set of tasks using data provided by faculty to explore various PowerBI tools and functionalities especially M coding and DAX.

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Part 1: Power BI Transformation and M-Code

1. Capture the current datetime in Power Query using Power BI M-Code.



Answer:

We add a custom Column, label it as we need and input the following M-code to get the current datetime for each row - `DateTime.ToString(DateTime.LocalNow(), "yyyy-MM-dd HH:mm:ss")`

In the screenshot below, we can see this custom column showing us the date and time for each row as intended.

The screenshot shows the Power BI desktop interface with the following details:

- File**, **Home**, **Transform**, **Add Column**, **View**, **Tools**, **Help** menu items.
- Toolbar icons: Close & Apply*, New Source*, Recent Sources*, Enter Data, Data source settings, Manage Parameters, Refresh Preview, Advanced Editor, Properties, Choose Columns, Remove Columns, Keep Rows, Remove Rows, Split Column, Group By, Replace Values, Data Type: Whole Number, Use First Row as Headers, Merge Queries, Append Queries, Combine files, Text Analytics, Vision, Azure Machine Learning, AI Insights.
- Queries [1]** pane: P1-Q1 is selected.
- Transform ribbon**: Shows the formula: `= Table.AddColumn(#"Changed Type", "Current Datetime", each DateTime.ToString(DateTime.LocalNow(), "yyyy-MM-dd HH:mm:ss"))`.
- Query Settings pane**:
 - PROPERTIES**: Name: P1-Q1, All Properties.
 - APPLIED STEPS**: Source, Changed Type, Added Custom.
- Table view**: 2 COLUMNS, 3 ROWS. The table has one column labeled "Current Datetime" with values: 1. 2024-02-11 16:13:07, 2. 2024-02-11 16:13:07, 3. 2024-02-11 16:13:07.
- System tray**: Shows weather (1°C, Cloudy), search bar, taskbar icons (File Explorer, Mail, Edge, etc.), system status (ENG US, 4:26 PM, 2024-02-11).
- Bottom status bar**: PREVIEW DOWNLOADED AT 4:13 PM.

2. Create ID1, ID2, and ID3 columns against Full Name as shown in the table below and populate the required value in Power Query using M-Code.

- a. ID1: Value starts from 0 and increments by 1.
- b. ID2: Value starts from 1 and increments by 1.
- c. ID3: Value starts from 0 and increments by 5.

Note: Create a column using “Enter Data” option and populate the value mentioned in the table. Once the “Full Name” column is created add the other columns (ID1, ID2, and ID3) based on the above condition.

ID1	ID2	ID3	Full Name
0	1	0	Reily, Nicole, Abbatiello
1	2	5	Micaela, Elizabeth, Abbott
2	3	10	Breonia, Bryce, Abbott
3	4	15	Miranda, Daniela, Abella
4	5	20	Madelyn, Jacob, Abraham
5	6	25	Lyla, Nicholas, Acevedo
6	7	30	Kylia, Zoe, Acevedo
7	8	35	Jase, Marie, Adam
8	9	40	Jessica, June, Adam
9	10	45	Xaivore, Ann, Adams

Answer:

- a) ID1: Value starts from 0 and increments by 1 – Go to add a column, click on dropdown by the Index Column and select ‘from 0’ as shown in the picture below. This should add an index starting from 0 with an increment of 1. Rename the column name as needed.

The screenshot shows the Microsoft Power BI Data Editor interface. In the top ribbon, 'File', 'Home', 'Transform', 'Add Column', 'View', 'Tools', and 'Help' are visible. The 'Add Column' tab is selected. In the 'Index Column' dropdown, 'From 0' is chosen. The preview pane displays the first 10 rows of the data with an additional 'ID1' column. The 'Properties' pane on the right shows the query name is 'P1-Q2' and the applied step is 'Added Index'.

- b) ID2: Value starts from 1 and increments by 1: Go to add a column, click on dropdown by the Index Column and select ‘from 1’ as shown in the picture below. This should add an index starting from 1 with an increment of 1. Rename the column name as needed.

The screenshot shows the Power BI Transformation tool interface. In the top navigation bar, the 'Transform' tab is selected. Under the 'Add Column' section, the 'Index Column' dropdown is open, showing options like 'From 0' and 'From 1'. The 'From 1' option is highlighted. The data preview pane shows three columns: ID1, ID2, and Column1. The ID1 and ID2 columns contain numerical values starting from 1 and increasing by 1 up to 10. The Column1 column contains names. The 'APPLIED STEPS' pane on the right shows the step 'Reordered Columns1'.

- c) ID3: Value starts from 0 and increments by 5: Go to add a column, click on dropdown by the Index Column and select ‘custom’ and enter the info as shown in the picture below.

The screenshot shows the Power BI Transformation tool interface. The 'Add Index Column' dialog box is open in the foreground. It has two input fields: 'Starting Index' with value '0' and 'Increment' with value '5'. The background shows the same transformation steps as the previous screenshot, with the 'Index Column' dropdown now set to 'Custom'.

This should add an index starting from 0 with an increment of 5 as shown in the picture below.
Rename the column name as needed.

ID1	ID2	ID3	Column1
1	0	1	O'Reilly, Nicole, Abbatiello
2	1	2	Micaela, Elizabeth, Abbott
3	2	3	Breonia, Bryce, Abbott
4	3	4	Miranda, Daniela, Abella
5	4	5	Madelyn, Jacob, Abraham
6	5	6	Lyla, Nicholas, Acevedo
7	6	7	Kylia, Zoe, Acevedo
8	7	8	Jase, Marie, Adam
9	8	9	Jessica, June, Adam
10	9	10	Xaivore, Ann, Adams

- Extract First Name, Middle Name, and Last Name from the “Full Name” column as mentioned below using Power Query. [Use Enter data to create the below table with a “Full Name” column].

Note: Full Name is a combination of “First Name, Middle Name, Last Name”.

Full Name
Reily, Nicole, Abbatiello
Micaela, Elizabeth, Abbott
Breonia, Bryce, Abbott
Miranda, Daniela, Abella
Madelyn, Jacob, Abraham
Lyla, Nicholas, Acevedo
Kylia, Zoe, Acevedo
Jase, Marie, Adam
Jessica, June, Adam
Xaivore, Ann, Adams

Answer:

After making the table, head to transform and click on split columns by delimiter to transform our Full name column into three columns showing First, Middle and Last Name separately. Select the

delimiter we want to use to split the column and choose where we want to make the split. In our case, we choose at each occurrence to get each of the three parts of the Full Name.

The screenshot shows the Power BI Desktop interface. A query named 'P1-Q3' is selected in the Queries pane. The 'Full Name' column is currently selected. A 'Split Column by Delimiter' dialog box is open, prompting for a delimiter ('Comma') and specifying that it should split at each occurrence. The 'OK' button is visible at the bottom right of the dialog. The Power BI ribbon is at the top, and the Query Settings pane is on the right side of the interface.

After applying the desired settings, we press ok and we get the separated columns as shown below. Rename columns as needed.

The screenshot shows the Power BI Desktop interface after the transformation has been applied. The 'P1-Q3' query now contains three columns: 'First Name', 'Middle Name', and 'Last Name', which were previously part of a single 'Full Name' column. The 'Query Settings' pane on the right lists the steps taken: 'Changed Type', 'Split Column by Delimiter', 'Changed Type1', and 'Renamed Columns'. The Power BI ribbon is at the top, and the Query Settings pane is on the right side of the interface.

4. Extract Date from DateKey column present in the table below using Power Query.

DateKey(yyyyMMdd)
20220101
20220102
20220103
20220104
20220105
20220106
20220107
20220608
20220109
20220110

Note: Use “Enter Data” option to create the above table in Power BI.

Answer:

Enter data to make the DateKey column in a new table. Click on the data type and convert it to Date from numerical.

This extracts our numerical DateKey Data and converts it into Date format as shown below:

The screenshot shows the Power BI Transformation interface. The main area displays a query named "P1-Q4" with the following M code:

```
Table.TransformColumnTypes(Source,{{"DateKey(yyyyMMdd)", type date}})
```

The preview pane shows the resulting data:

DateKey(yyyyMMdd)	Date
1	2022-01-01
2	2022-01-02
3	2022-01-03
4	2022-01-04
5	2022-01-05
6	2022-01-06
7	2022-01-07
8	2022-01-08
9	2022-01-09
10	2022-01-10

The Query Settings pane on the right shows the following details:

- PROPERTIES**: Name is P1-Q4.
- APPLIED STEPS**: A single step named "Source" with the sub-step "Changed Type".

5. Create two parameters to input the Server and Database name and import a Product table using Power Query.

Use the following configuration for the parameters-

- Parameter1: Servername
Local server as Localhost & 127.0.0.1
- Parameter2: Database
Database as “AdventureWorks2014” & “AdventureWorks2012”

Once the parameter is created, import the mentioned table using MS SQL Server connector.

Note: Before performing the above exercise make sure you have restored the mentioned database.

Refer to the below URL to download the database backup file, after downloading the .bak file restore to the local SQL Server database.

- ✓ AdventureWorks2014: <https://github.com/Microsoft/sql-server-samples/releases/download/adventureworks/AdventureWorks2014.bak>
- ✓ AdventureWorks2012: <https://github.com/Microsoft/sql-server-samples/releases/download/adventureworks/AdventureWorks2012.bak>

Answer:

Dropdown Manage Parameters and select New parameter, fill out the configurations as needed as shown below for Servername and do the same steps for Database parameter and click ok. This creates our parameters for further use as required.

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File Home Transform Add Column View Tools Help

Queries [4]

DateKeyyyyMMdd

Create a new parameter that can be referenced by other queries in this file.

1 2022-01-01
2 2022-01-02
3 2022-01-03
4 2022-01-04
5 2022-01-05
6 2022-01-06
7 2022-01-07
8 2022-06-08
9 2022-01-09
10 2022-01-10

Column profiling based on top 1000 rows

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Queries [4]

DateKeyyyyMMdd

1 2022-01-01
2 2022-01-02
3 2022-01-03
4 2022-01-04
5 2022-01-05
6 2022-01-06
7 2022-01-07
8 2022-06-08
9 2022-01-09
10 2022-01-10

Manage Parameters

ServerName

Description To navigate to different server names as required

Required

Type Any

Suggested Values List of values

1 Localhost
2 127.0.0.1

Default Value Localhost

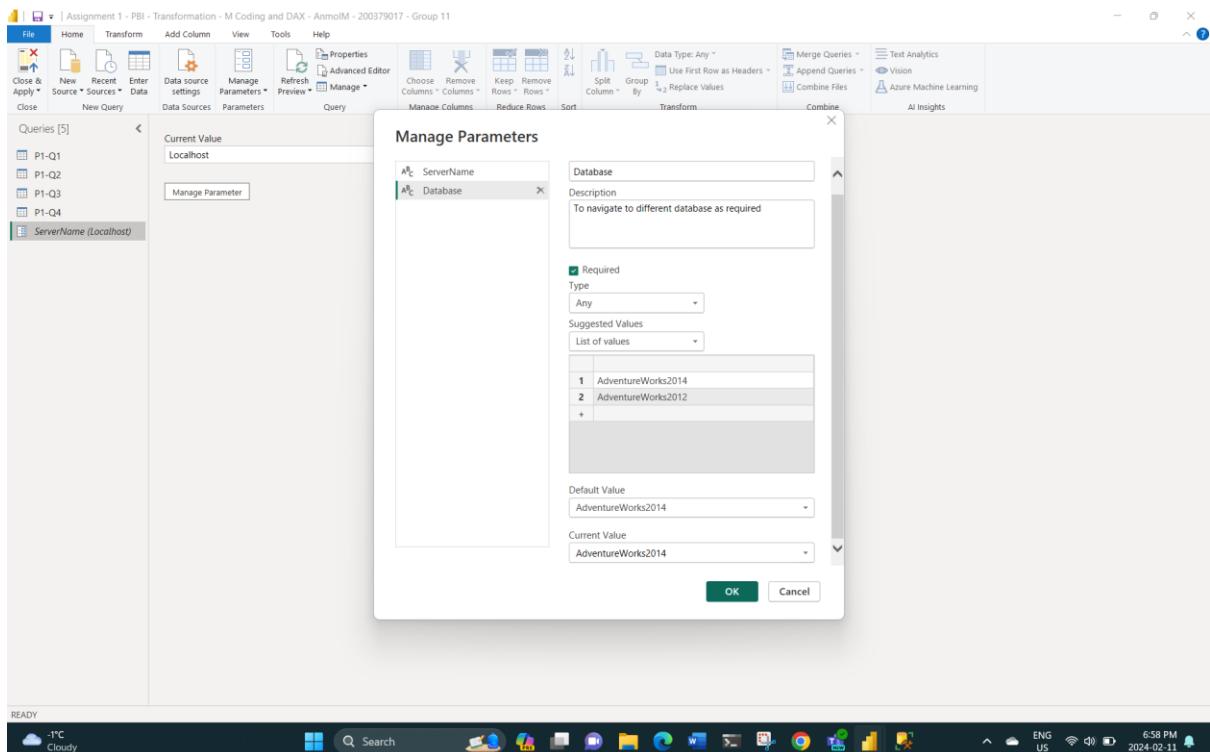
Current Value Localhost

OK Cancel

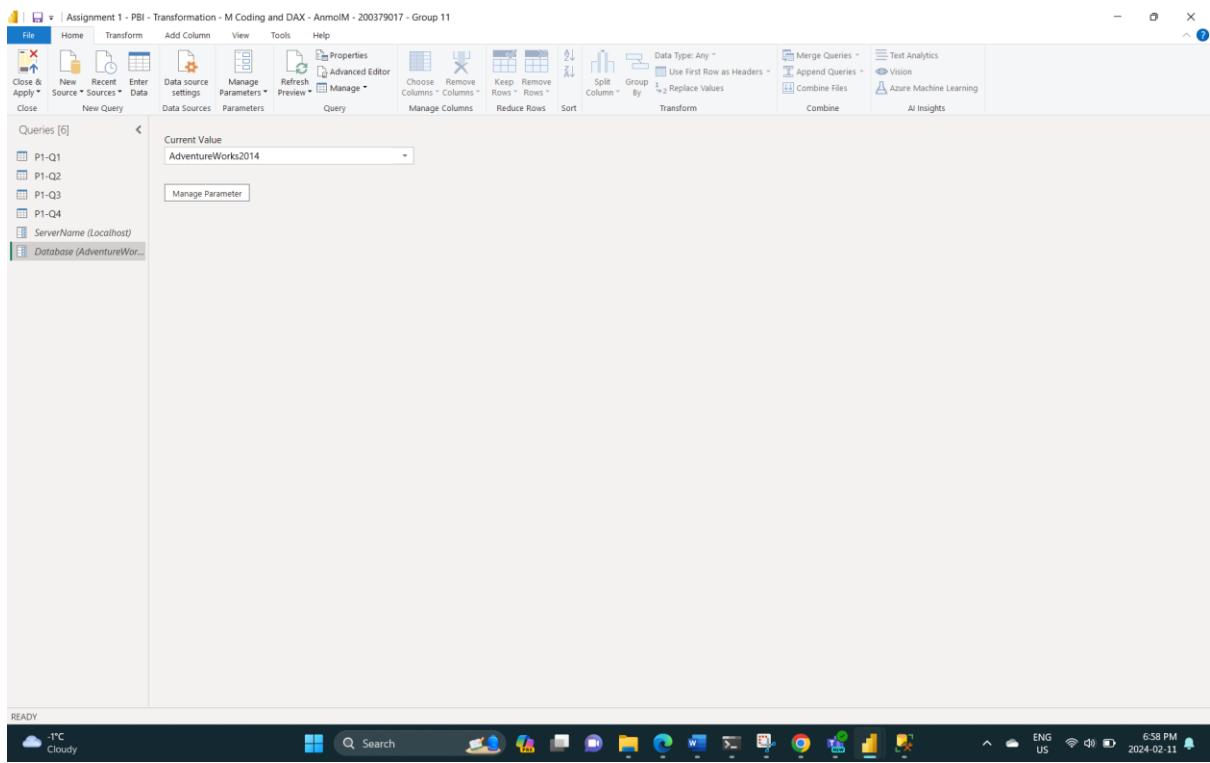
Column profiling based on top 1000 rows

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As we can see in the screenshot below, our two parameters have been created and can be accessed from under the queries tab:



Now we import a product table using our created parameters. Click on new source and select SQL server, select our newly created parameters under server name and database to import. After a connection has been made, import the table from the selected database per criteria as shown below.

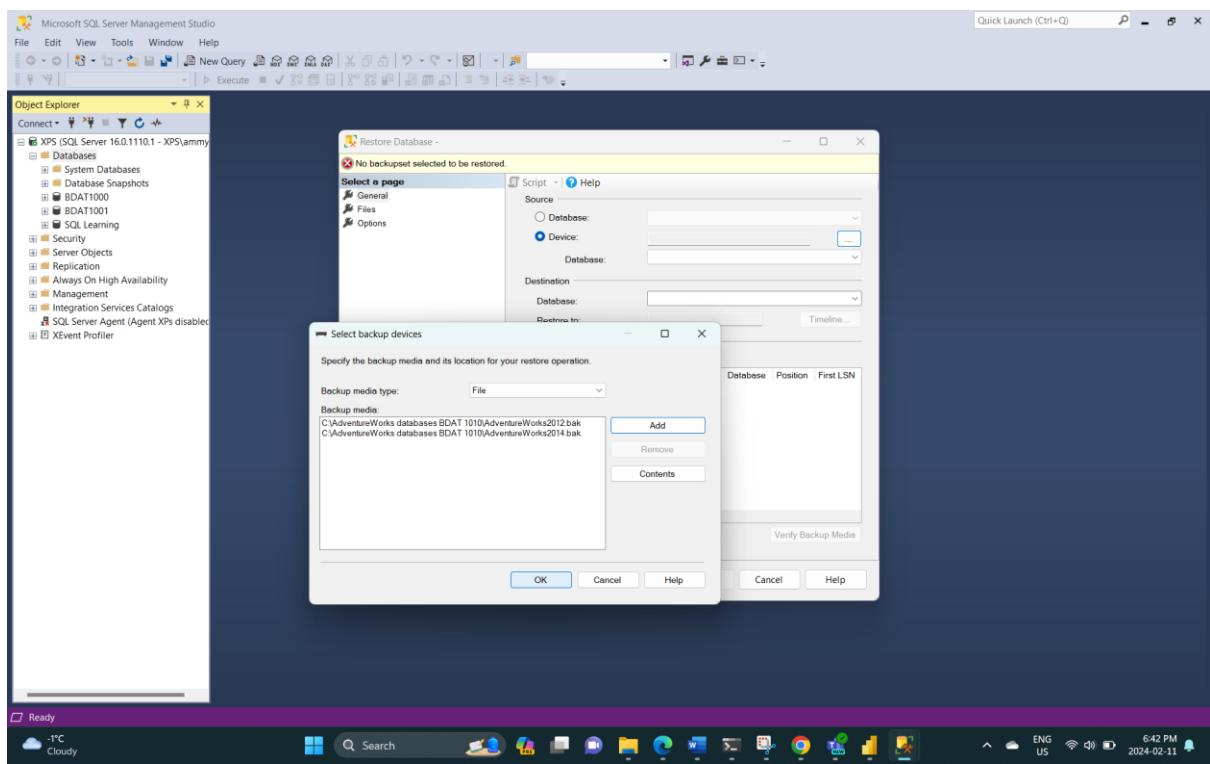
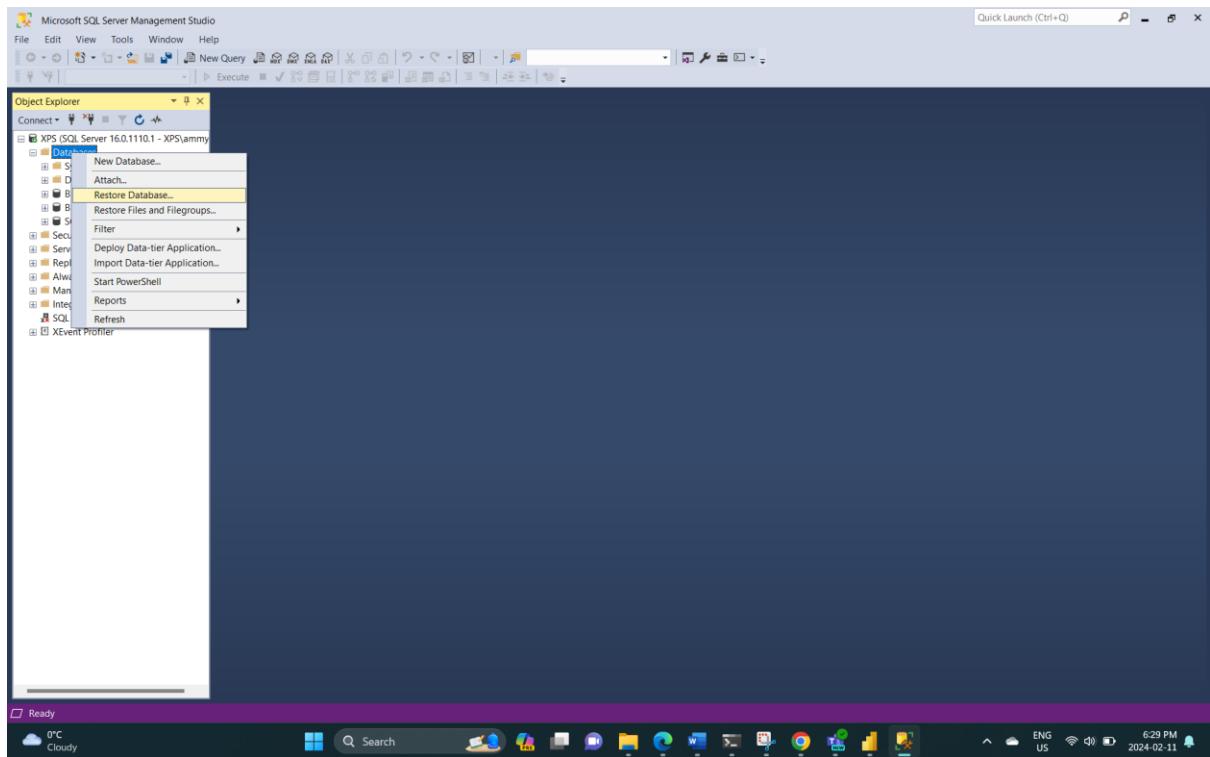
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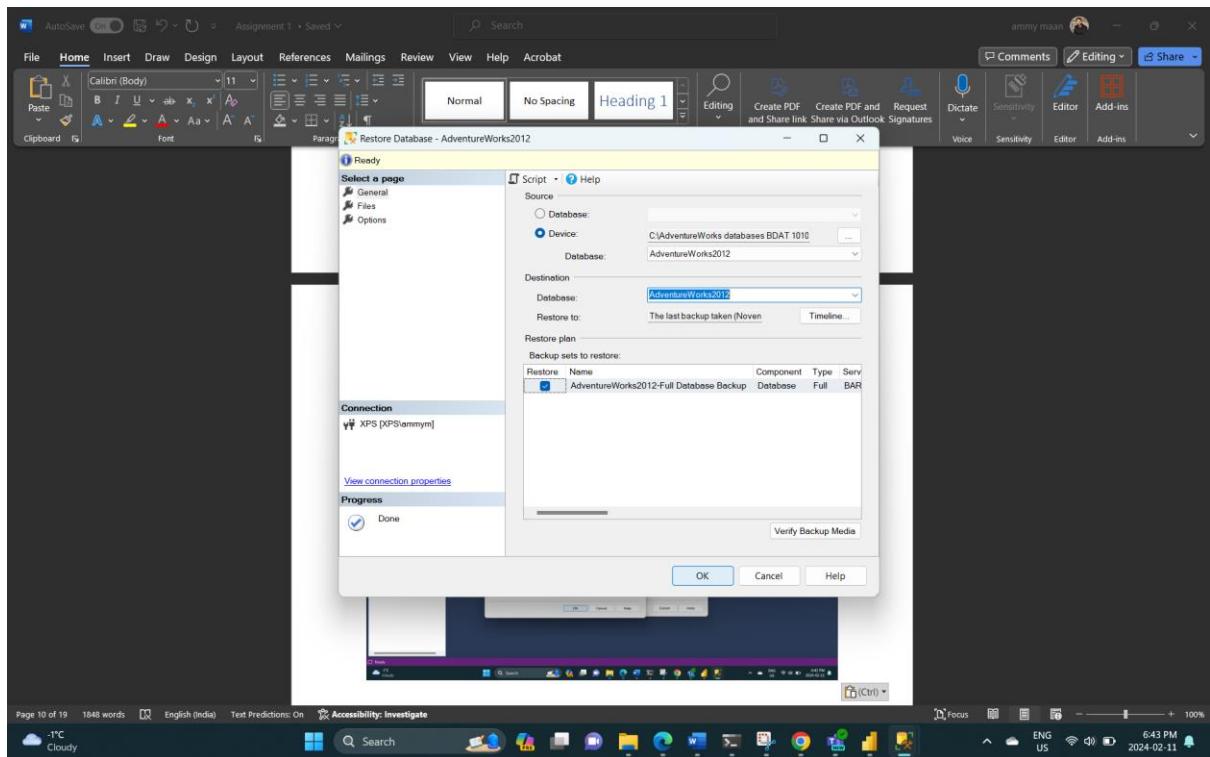
The screenshot shows the Power BI desktop interface. In the top ribbon, the 'Navigator' tab is selected. The left sidebar lists 'Queries [6]' including P1-Q1 through P1-Q4, ServerName (localhost), and Database (AdventureWorks). The main area displays the 'Production.Product' table with columns: ProductID, Name, ProductNumber, MakeFlag, and FinishedGood. A preview of the data is shown, truncated due to size limits. The bottom status bar shows the date and time as 2024-02-11 7:02 PM.

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The screenshot shows the Power BI desktop interface with a query editor open. The left sidebar lists 'Queries [7]' including P1-Q1 through P1-Q4, ServerName (localhost), Database (AdventureWorks), and P1-Q5 Production Product. The main area shows a large dataset with 43 columns and 504 rows, with a note about column profiling based on the top 1000 rows. The right side shows 'Query Settings' with 'Source' set to 'Navigation'. The bottom status bar shows the date and time as 2024-02-11 7:03 PM.

#Note to self - Restoring a database: Connect to SQL Server, right click on databases and click on restore database and follow instructions as shown below:





6. Convert the below table to matrix structure (Expected output) using Power Query.

Input Dataset:

Year	Month	Sales
2021	Jan	520
2021	Feb	360
2021	Mar	210
2021	Apr	320
2020	May	160
2020	Jun	963
2020	Jul	201
2020	Jan	302
2020	Feb	500
2020	Mar	450

Expected Output:

Year	Jan	Feb	Mar	Apr	May	Jun	Jul
2020	302	500	450	null	160	963	201
2021	520	360	210	320	null	null	null

Note: Use “Enter Data” option to create the above table in Power BI.

Answer:

Create the table as follows, then select months column and click on pivot column based on our desired outcome. In this case we select Sales as values and under advanced setting, select don't aggregate to keep the values free from additional aggregations.

Screenshot of Power BI Desktop showing the 'Transform' tab selected. A context menu is open over a table named 'P1-Q6' with the following DAX query:

```
= Table.TransformColumnTypes(Source,{{"Year", Int64.Type}, {"Month", type text}, {"Sales", Int64.Type}})
```

The context menu includes options like Transpose, Reverse Rows, Detect Data Type, Fill, Pivot Column, and Convert to List. The 'Pivot Column' option is highlighted.

A 'Pivot Column' dialog box is open, prompting the user to use the names in column "Month" to create new columns. The 'Values Column' dropdown is set to "Sales". Advanced options include "Aggregate Value Function" set to "Don't Aggregate".

The main Power BI interface shows the transformed table with 3 columns and 10 rows. The Query Settings pane on the right shows the query name is 'P1-Q6' and the applied step is 'Changed Type'.

After performing this step, we get our result.

Screenshot of Power BI Desktop showing the 'Transform' tab selected. A context menu is open over a table named 'P1-Q6' with the following DAX query:

```
= Table.Pivot("#'Changed Type'", List.Distinct(#'Changed Type'[Month]), "Month", "Sales")
```

The context menu includes options like Transpose, Reverse Rows, Detect Data Type, Fill, Pivot Column, and Convert to List. The 'Pivot Column' option is highlighted.

A 'Pivot Column' dialog box is open, prompting the user to use the names in column "Month" to create new columns. The 'Values Column' dropdown is set to "Sales". Advanced options include "Aggregate Value Function" set to "Don't Aggregate".

The main Power BI interface shows the pivoted table with 8 columns and 2 rows. The Query Settings pane on the right shows the query name is 'P1-Q6' and the applied step is 'Pivoted Column'.

7. Combine all the records from “StudentFromLocationA” table with “StudentFromLocationB” table using Power Query. You can use Append Query to combine these two tables.

Note: Use “Enter Data” option to create the below tables in Power BI.

StudentFromLocationA:

ID	First Name	Last Name	DOB	Department
1	Reily	Abbatiello	20-06-2000	IT
2	Micaela	Abbott	15-08-1995	MCA
3	Breonia	Abbott	18-02-1998	ME
4	Miranda	Abella	20-03-1999	ECE
5	Madelyn	Abraham	30-12-2000	CSE

StudentFromLocationB:

ID	First Name	Last Name	DOB	Department
8	Jackson	Adcock	15-02-2000	ME
9	Kara	Adeeb	21-08-1995	CSE
10	Brittany	Adkins	18-02-1996	MCA
11	Julia	Agan	23-05-1994	IT
12	Anyssa	Aguilar	15-09-2000	ECE

Answer:

Click on append Queries and select the two table we want to append.

The screenshot shows the Microsoft Power BI Transformation interface. In the center, a dialog box titled "Append" is open, indicating that it's used to concatenate rows from two tables into a single table. The "Two tables" option is selected. Below the options, there are dropdown menus for "First table" (set to "P1-Q7A") and "Second table" (set to "P1-Q7B"). At the bottom of the dialog are "OK" and "Cancel" buttons. The background of the interface shows the Power BI ribbon at the top and a preview of the combined data in the main workspace. The preview shows five columns and five rows of data, matching the structure of the two tables provided in the question. The status bar at the bottom right shows the date and time as "2024-02-11 8:12 PM".

This will join our two tables in order of selection as shown below:

The screenshot shows the Power BI desktop interface. In the center, there is a preview of a table named "Table.Combine({#P1-Q7A", "#P1-Q7B"})". The table has five columns: ID, First Name, Last Name, DOB, and Department. The data consists of 10 rows. The "Applied Steps" pane on the right shows a single step named "Source". The status bar at the bottom right shows the date and time as "2024-02-11 8:15 PM".

- Merge all the records from the “Student” table with “Department” using Power Query. You can use Merge Query to combine these two tables. Here DepartmentID is a key column in both the tables.

Note: Use “Enter Data” option to create the below tables in Power BI.

Student				
ID	First Name	Last Name	DOB	DepartmentID
1	Kara	Adams	20-06-2000	1
2	Brittany	Adcock	15-08-1995	2
3	Brian	Adeeb	18-02-1998	3
4	Julia	Adkins	20-03-1999	1
5	Tea	Agan	30-12-2000	2

Department		
DepartmentID	Department Code	Department Name
1	IT	Information Technology
2	ME	Mechanical Engineering
3	CSE	Computer Science Engineering

Answer:

Select Merge Queries and select the tables we want to merge and the common column we have in both in order to join. We select Left join, as this function keeps all the info from our main table and joins the department info from our second table to the available rows.

The screenshot shows the Power BI Desktop interface with the 'Merge' dialog open. The 'Queries [18]' pane on the left lists various queries, including P1-Q1 through P1-Q8B. The main area displays the 'Merge' dialog with two tables selected: P1-Q8A and P1-Q8B. The resulting merged table has columns: ID, First Name, Last Name, DOB, and DepartmentID. The 'Join Kind' dropdown is set to 'Left Outer (all from first, matching from second)'. The 'APPLIED STEPS' pane on the right shows a step named 'Changed Type'.

After this step, the merged table is created as follows. Expand the columns as needed.

The screenshot shows the Power BI Desktop interface with the 'NestedJoin' dialog open. The 'Queries [14]' pane on the left lists various queries, including P1-Q1 through P1-Q8B and a new entry 'Merge1'. The main area displays the 'NestedJoin' dialog with two tables selected: P1-Q8A and P1-Q8B. The resulting table has columns: ID, First Name, Last Name, DOB, and DepartmentID. The 'APPLIED STEPS' pane on the right shows a step named 'Source'.

After removing unneeded columns or duplicate columns, the table should look as follows:

The screenshot shows the Power BI Desktop interface. In the center, there is a query editor displaying a table with columns: ID, First Name, Last Name, DOB, DepartmentID, Department Code, and Department. The data consists of five rows with sample employee information. To the right of the editor, the 'Applied Steps' pane is open, showing a single step named 'Renamed Columns'. The properties for this step show the source as 'Expanded P1-Q8B' and the action as 'Removed Columns'. The bottom right corner of the screen shows a taskbar with various icons and the date/time as 2024-02-11 8:27 PM.

- Download “2020-monthly-visitor-statistics.xlsx” file from the link given below. After downloading the file, load the “Days by Island” sheet in Power BI Desktop and apply Power Query transformation to extract a part of the data (highlighted in the dataset snapshot).

Note: Download “2020-monthly-visitor-statistics.xlsx” file from the below URL:

<https://www.hawaiitourismauthority.org/media/7901/2020-monthly-visitor-statistics.xlsx>

Input Dataset: -

2020 Visitor Days by Island and Month (Arrivals by Air)													
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
O'ahu	36,47,908	31,06,258	17,19,457	92,974	1,91,462	3,11,721	3,56,088	4,55,805	3,18,122	5,22,327	8,63,638	12,43,871	1,28,29,630
Maui	21,97,687	19,62,660	10,57,111	13,195	31,900	54,141	62,432	66,381	87,807	3,13,046	7,12,026	9,94,709	75,53,095
Moloka'i	35,919	28,029	14,135	212	1,922	2,796	3,688	1,434	2,592	7,359	8,247	11,615	1,17,947
Lāna'i	25,108	23,405	9,158	34	178	1,073	1,365	1,033	711	6,084	6,622	8,457	83,228
Kaua'i	9,20,439	8,37,629	4,42,047	5,960	17,333	30,915	39,219	46,169	44,253	1,59,765	3,22,018	74,607	29,40,354
Hawai'i Island	14,45,673	11,63,151	6,66,084	19,249	40,412	72,483	1,04,803	1,30,566	1,60,688	2,13,822	3,73,547	6,02,066	49,92,542

Notes: monthly data may not add up to total due to rounding

2020 Visitor Arrivals by Island and Month (Arrivals by Air)													
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
O'ahu	5,06,708	4,67,959	2,36,640	3,601	7,365	13,029	16,448	16,917	11,885	36,009	76,662	1,13,090	15,06,316
Maui	2,43,086	2,34,823	1,25,353	624	1,131	1,988	2,568	2,453	2,479	23,178	63,748	91,171	7,92,602
Moloka'i	6,858	5,089	2,384	31	76	114	225	109	75	375	640	1,050	17,025
Lāna'i	6,066	6,146	2,604	21	26	64	121	81	39	595	904	1,257	17,924
Kaua'i	1,13,796	1,10,478	56,725	306	603	1,068	1,349	1,342	1,096	11,249	28,487	3,762	3,30,263
Hawai'i Island	1,65,297	1,48,204	77,933	701	1,300	2,605	3,608	3,683	3,642	10,641	28,056	48,147	4,93,817

2020 Visitor Average Length of Stay by Island and Month (Arrivals by Air)													
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
O'ahu	7.20	6.64	7.27	25.82	26.00	23.92	21.65	26.94	26.77	14.51	11.27	11.00	8.52
Maui	9.04	8.36	8.43	21.13	28.22	27.23	24.31	27.06	35.42	13.51	11.17	10.91	9.53
Moloka'i	5.24	5.51	5.93	6.94	25.37	24.49	16.42	13.19	34.45	19.62	12.89	11.06	6.93

Expected Output: -

	Island Name	Month	Number of Visitors
1	O'ahu	JAN	3647908
2	O'ahu	FEB	3106258
3	O'ahu	MAR	1719457
4	O'ahu	APR	92974
5	O'ahu	MAY	191462
6	O'ahu	JUN	311721
7	O'ahu	JUL	356088
8	O'ahu	AUG	455805
9	O'ahu	SEP	318122
10	O'ahu	OCT	522327
11	O'ahu	NOV	863638
12	O'ahu	DEC	1243871
13	Maui	JAN	2197687
14	Maui	FEB	1962660
15	Maui	MAR	1057111
16	Maui	APR	13195
17	Maui	MAY	31900
18	Maui	JUN	54141
19	Maui	JUL	62432
20	Maui	AUG	66381
21	Maui	SEP	87807
22	Maui	OCT	313046
23	Maui	NOV	712026
24	Maui	DEC	994709
25	Moloka'i	JAN	35919
26	Moloka'i	FEB	28029
27	Moloka'i	MAR	14135
28	Moloka'i	APR	212

Answer:

Import the required sheet and transform the table to keep first 8 rows only, then remove the first empty row and the last 'total' column. Then we make the first row with month names our headers and edit first columns name to 'Island Name'

Assignment 1 - PBI - Transformation - M Coding and DAX - AnmolM - 200379017 - Group 11

Navigator

Days by Island

2020 Visitor Days by Island and Month (Arrivals by Air)

	Column2	Column3
O'ahu	3647907.708	null
Maui	2197686.599	null
Moloka'i	35918.9785	212.295685
Lāna'i	25107.51367	1921.782161
Kaua'i	920438.5923	34.00796763
Hawai'i Island	1445672.652	17332.73563

Notes: monthly data may not add up to total due to rounding

2020 Visitor Arrivals by Island and Month (Arrivals by Air)

	Column2	Column3
O'ahu	506707.7507	null
Maui	243085.8196	null
Moloka'i	6857.505947	null
Lāna'i	6065.824125	null
Kaua'i	113795.7501	null
Hawai'i Island	165297.1786	null

2020 Visitor Average Length of Stay by Island and Month (Arrivals by Air)

	Column2	Column3
O'ahu	506707.7507	null
Maui	243085.8196	null
Moloka'i	6857.505947	null
Lāna'i	6065.824125	null
Kaua'i	113795.7501	null
Hawai'i Island	165297.1786	null

Total Expenditure (\$ mil) (Exp by MMA)

Per Person Per Day Spending (\$)

Per Person Per Trip Spending (\$)

Total Expenditure (\$ mil) (Exp by MMA)

OK Cancel

7 COLUMNS, 5 ROWS Column profiling based on top 1000 rows PREVIEW DOWNLOADED AT 8:27 PM

After this, our table should look like below:

Assignment 1 - PBI - Transformation - M Coding and DAX - AnmolM - 200379017 - Group 11

Queries [15]

P1-Q9 Days by Island

Island Name	12 JAN	12 FEB	12 MAR	12 APR	12 MAY	12 JUN
O'ahu	3647907.708	3106258.146	1719456.871	92973.58937	191462.3304	
Maui	2197686.599	1962659.826	1057111.384	13195.16138	31899.70806	
Moloka'i	35918.9785	28029.3134	14134.69645	212.295685	1921.782161	
Lāna'i	25107.51367	23405.11162	9158.807713	34.00796763	178.4088656	
Kaua'i	920438.5923	837629.2741	442046.945	5959.679091	17332.73563	
Hawai'i Island	1445672.652	1163150.51	666084.4624	19248.635	40411.88217	

13 COLUMNS, 6 ROWS Column profiling based on top 1000 rows PREVIEW DOWNLOADED AT 8:31 PM

Then we select all the month columns and unpivot columns. This brings us to our required output. Rename columns as needed.

10. Transform the below dataset using Power Query transformation.

Input Dataset: -

Col1	Col2	Col3	Col4	Col5	Col6	Col7
	2020			2021		
	Technology	Office Supplies	Furniture	Technology	Office Supplies	Furniture
Jan	433.2	255.4	2.6	4.7	93.9	122.8
Feb	435.0	229.1	2.1	5.7	83.4	97.4
Mar	409.3	230.7	1.9	6.3	74.2	89.2
Apr	377.6	209.2	2.0	4.4	87.9	86.4
May	403.4	226.0	1.2	5.8	86.3	83.4
Jun	471.8	260.0	2.2	3.8	106.5	121.9
Jul	540.5	272.1	2.4	3.4	106.5	116.5
Aug	485.5	243.6	2.4	3.4	100.3	120.3
Sep	432.8	183.4	1.7	3.3	83.7	95.6
Oct	442.7	234.1	2.3	4.6	88.1	108.9
Nov	419.6	197.8	2.1	4.8	80.9	116.5
Dec	532.8	260.0	2.5	6.4	96.2	133.5

Note: Use “Enter Data” option to create the above table in Power BI.

Expected Output: -

A _B _C Year	A _B _C Product	A _B _C Month	1.2 Sales
1 2020	Technology	Jan	433.2
2 2020	Technology	Feb	435
3 2020	Technology	Mar	409.3
4 2020	Technology	Apr	377.6
5 2020	Technology	May	403.4
6 2020	Technology	Jun	471.8
7 2020	Technology	Jul	540.5
8 2020	Technology	Aug	485.5
9 2020	Technology	Sep	432.8
10 2020	Technology	Oct	442.7
11 2020	Technology	Nov	419.6
12 2020	Technology	Dec	532.8
13 2020	Office Supplies	Jan	255.4
14 2020	Office Supplies	Feb	229.1
15 2020	Office Supplies	Mar	230.7
16 2020	Office Supplies	Apr	209.2
17 2020	Office Supplies	May	226
18 2020	Office Supplies	Jun	260
19 2020	Office Supplies	Jul	272.1
20 2020	Office Supplies	Aug	243.6
21 2020	Office Supplies	Sep	183.4
22 2020	Office Supplies	Oct	234.1
23 2020	Office Supplies	Nov	197.8
24 2020	Office Supplies	Dec	260
25 2020	Furniture	Jan	2.6

Answer:

We input our data to make the table below:

A _B _C Col1	A _B _C Col2	A _B _C Col3	A _B _C Col4	A _B _C Col5	A _B _C Col6	A _B _C Col7
1	2020	2020	2020	2021	2021	2021
2	Technology	Office Supplies	Furniture	Technology	Office Supplies	Furniture
3	433.2	255.4	2.6	4.7	93.9	122.8
4 Feb	435.0	229.1	2.1	5.7	83.4	97.4
5 Mar	409.3	230.7	1.9	6.3	74.2	89.2
6 Apr	377.6	209.2	2.0	4.4	87.9	86.4
7 May	403.4	226.0	1.2	5.8	86.3	83.4
8 Jun	471.8	260.0	2.2	3.8	106.5	121.9
9 Jul	540.5	272.1	2.4	3.4	106.5	116.5
10 Aug	485.5	243.6	2.4	3.4	100.3	120.3
11 Sep	432.8	183.4	1.7	3.3	83.7	95.6
12 Oct	442.7	234.1	2.3	4.6	88.1	108.9
13 Nov	419.6	197.8	2.1	4.8	80.9	116.5
14 Dec	532.8	260.0	2.5	6.4	96.2	133.5

Then we transpose the columns and make the first row as headers:

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File Home Transform Add Column View Tools Help

Queries [16]

P1-Q1 P1-Q2 P1-Q3 P1-Q4 ServerName (localhost) Database (AdventureW... P1-Q5 Production Product P1-Q6 P1-Q7 P1-Q8 P1-Q9 Days by Island P1-Q10

1 2020 Technology 1.2 Jan 433.2 12 Feb 435 12 Mar 409.3 12 Apr 377.6 12 May

2 2020 Office Supplies 235.4 229.1 230.7 209.2

3 2020 Furniture 2.6 2.1 1.9 2

4 2021 Technology 4.7 5.7 6.3 4.4

5 2021 Office Supplies 93.9 83.4 74.2 87.9

6 2021 Furniture 122.8 97.4 89.2 86.4

14 COLUMNS, 6 ROWS Column profiling based on top 1000 rows

Cloudy ENG US 8:50 PM 2024-02-11

Now we select the month columns and unpivot to get the desired output. Rename the columns as needed.

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File Home Transform Add Column View Tools Help

Queries [16]

P1-Q1 P1-Q2 P1-Q3 P1-Q4 ServerName (localhost) Database (AdventureW... P1-Q5 Production Product P1-Q6 P1-Q7 P1-Q8 P1-Q9 Days by Island P1-Q10

1 2020 Technology Jan 433.2

2 2020 Technology Feb 435

3 2020 Technology Mar 409.3

4 2020 Technology Apr 377.6

5 2020 Technology May 403.4

6 2020 Technology Jun 471.8

7 2020 Technology Jul 540.5

8 2020 Technology Aug 485.5

9 2020 Technology Sep 432.8

10 2020 Technology Oct 442.7

11 2020 Technology Nov 419.6

12 2020 Technology Dec 532.8

13 2020 Office Supplies Jan 255.4

14 2020 Office Supplies Feb 229.1

15 2020 Office Supplies Mar 230.7

16 2020 Office Supplies Apr 209.2

17 2020 Office Supplies May 226

18 2020 Office Supplies Jun 260

19 2020 Office Supplies Jul 272.1

20 2020 Office Supplies Aug 243.6

21 2020 Office Supplies Sep 183.4

22 2020 Office Supplies Oct 234.1

23 2020 Office Supplies Nov 197.8

24 2020 Office Supplies Dec 260

25 2020 Furniture Jan 2.6

26 2020 Furniture Feb 2.1

27 2020 Furniture Mar 1.9

28 2020 Furniture Apr 2

29 2020 Furniture May 1.2

30 2020 Furniture Jun 2.2

31 2020 Furniture Jul 2.4

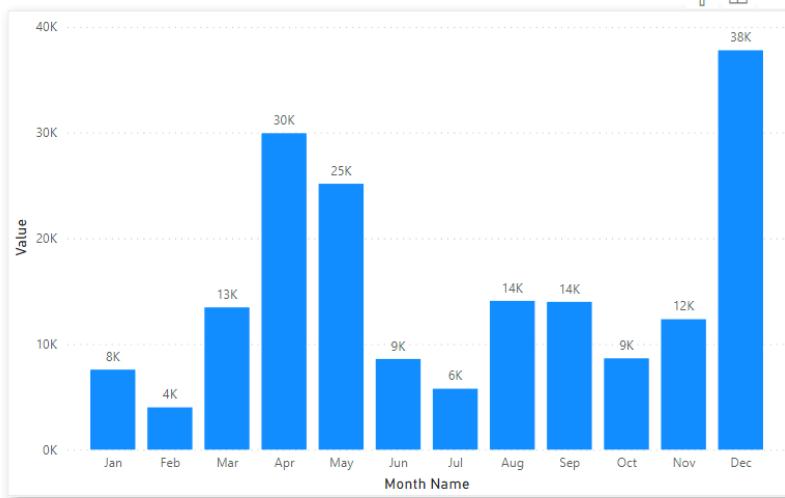
32 2020 Furniture Aug 2.4

4 COLUMNS, 72 ROWS Column profiling based on top 1000 rows

Cloudy ENG US 8:52 PM 2024-02-11

Part 2: DAX

- Sort the month name as shown in the snapshot using Power BI DAX. [Use Q1 sheet from DAX_Data.xlsx file].



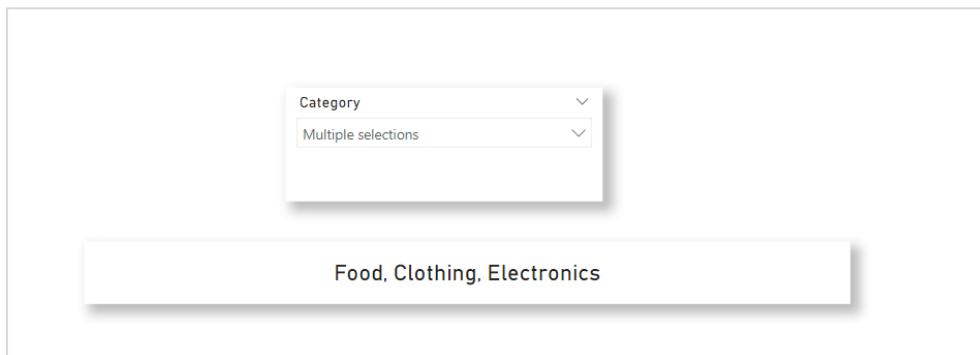
Answer:

Create a new column MonthNum using DAX that gives the number for each Month name. and use it to sort the month names in the chart.

The screenshot shows the Power BI desktop application with the following details:

- File**, **Home**, **Insert**, **Modeling**, **View**, **Optimize**, **Help**, **Format**, **Data / Drill** tabs are visible.
- The main area displays a bar chart titled "Month by Value". The Y-axis is labeled "Value" and ranges from 0K to 40K. The X-axis is labeled "Month" and lists the months from Jan to Dec. The bars are blue and labeled with their respective values: Jan (8K), Feb (4K), Mar (13K), Apr (30K), May (25K), Jun (9K), Jul (6K), Aug (14K), Sep (14K), Oct (9K), Nov (12K), and Dec (38K).
- The **Data** view pane on the right shows the data source structure:
 - Filters**: Min of MonthNum is (All), Month is (All), Sum of Value is (All).
 - Visualizations**: Build visual, Refresh, Share.
 - Data**: Search, P1-Q1, P1-Q10, P1-Q2, P1-Q3, P1-Q4, P1-Q5 Production Pro..., P1-Q6, P1-Q7, P1-Q7A, P1-Q7B, P1-Q8, P1-Q8A, P1-Q8B, P1-Q9, P1-Q9 Days by Island, Q1 (selected), Q2, Q3, Q4, Q5, Q6, Q7, Q8.
- The bottom status bar shows "Page 1 of 1", "Cloudy", "ENG US", "10:06 PM 2024-02-11", and a battery icon.

- Capture the Values selected from the slicer, if nothing is selected then show "All". Use card visuals to display the value. [Use Q2 sheet from DAX_Data.xlsx].



Answer:

We use ISFILTERED, IF, NOT and CONCATENATEX functions to concatenate and present all items that are selected by the filter.

A screenshot of the Power BI desktop application. The ribbon at the top shows 'Assignment 1 - PBI - Transformation - M Coding and DAX - AnmolM - 200379017 - Group 11'. The main workspace displays a card visual with the text 'Food, Clothing, Electronics' and a bar chart titled 'Sum of Value by Category' with three bars labeled 'Electronics', 'Food', and 'Clothing'. The Data pane on the right is open, showing the data model with tables like 'P1-Q1' through 'Q7' and measures like 'Sum of Value'. The status bar at the bottom shows 'Page 2 of 2' and the date '2024-02-11'.

3. Use the DAX function to extract the Item name, Item ID, and Price from the “Item Description” column (which contains a combination of Item Name, Item ID, and price). [Use Q3 sheet from DAX_Data.xlsx].

Items Description(Name.ID.Price)	Item Name	Item Id	Price
Clothing.1TM1002.600	Clothing	1TM1002	600
Electrical.1TM1004.800	Electrical	1TM1004	800
Electronics.1TM1003.400	Electronics	1TM1003	400
Food.1TM1001.500	Food	1TM1001	500
Furniture.1TM1005.700	Furniture	1TM1005	700

Answer:

We use LEFT, MID, RIGHT and FIND functions to extract the text based on the position of the delimiter.

The screenshot shows the Power BI desktop interface. On the left, a data view displays a table with four columns: Items Description(Name.ID.Price), Item Name, Item ID, and Price. The data rows correspond to the table above. On the right, the Power BI Data Model ribbon is visible, showing various data sources and transformation tools. The ribbon tabs include File, Home, Insert, Modeling, View, Optimize, Help, Format, and Data / Drill. The Home tab is selected. The Data / Drill tab is open, showing the 'Filters' and 'Visualizations' sections. The 'Filters' section lists filters for ItemID, ItemName, Item Description(Name...), and Price. The 'Visualizations' section shows a list of visualizations, and the 'Data' section shows a list of data items, including Q1 through Q8 and Q9-Q11. The bottom of the screen shows the Windows taskbar with various icons and the system tray.

4. Write a DAX function to calculate sum of Budget cost where [Type] = Capex and [Period] = Total. [Use Q4 sheet from DAX_Data.xlsx].



Answer:

We use the SUMX function along with FILTER to filter the values from the table to only when Budget Cost is 'Capex' and Period is 'Total'.

The screenshot shows the Power BI desktop application. In the top ribbon, the 'Measure tools' tab is selected. The formula bar displays the DAX measure definition:

```
Measure_Sum = SUMX(FILTER('Q4', 'Q4'[Type]="Capex" && 'Q4'[Period]="Total"), 'Q4'[Budgeted Cost])
```

The visualizations pane on the right shows various chart types and the selected 'Measure_Sum' measure. The data pane shows the structure of the 'Q4' table with columns: Period, Type, and Budgeted Cost. The current value for the measure is 1747, which is also displayed in the main canvas area.

5. Calculate the MAX of the number after multiplying with a constant value and put this into a column say as MAX_Value, use the formula for the calculation as shown below-

$\text{MAX_Value} = \text{MAXX}([\text{M}] * 1750, [\text{W}] * 1, [\text{V}] * 330)$

Note: S, M, W, and V are the column name. [Use Q5 sheet from DAX_Data.xlsx].

Input Data:			
S	M	W	V
1	15	500	60
2	10	60000	2
3	12.5	284000	300
4	5	4200	360
5	10	40250	240

Expected Result			
M	W	V	Max_Value
26250	500	19800	26250
17500	60000	660	60000
21875	284000	99000	284000
8750	4200	118800	118800
17500	40250	79200	79200

Answer:

6. The table is having item name column, add two columns based on the following value, 1st column contains a value based on the distinct item and 2nd column contains a value based on the item by skipping the row if there is a tie as shown in the screenshot below. [Use Q6 sheet from DAX_Data.xlsx].

Input Data:	
Item ID	Item Name
1	Apple
2	Apple
3	Banana
4	Banana
5	Candy
6	Candy
7	Candy

Expected Result			
Item ID	Item Name	ID1	ID2
1	Apple	1	1
2	Apple	1	1
3	Banana	2	3
4	Banana	2	3
5	Candy	3	5
6	Candy	3	5
7	Candy	3	5

Answer:

We add 1st column using RANKX function using Dense Ties. This column contains value for every distinct item.

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File Home Insert Modeling View Optimize Help Format Data / Drill Table tools Column tools

Name: Column_DistinctRank Format: Whole number Summarization: Sum Data category: Uncategorized

Structure: Column_DistinctRank = RANKX('Q6-copy','Q6-copy'[Item Name],,ASC,Dense)

Formatting: Sort by column: Sort Data groups: Groups Manage relationships: Relationships New column: Calculations

Properties: Item ID is (All) Item Name is (All) Add data fields here

Filters on this visual: Column_DistinctRank is (All) Item ID is (All) Item Name is (All) Add data fields here

Filters on this page: Add data fields here

Filters on all pages: Add data fields here

Visualizations: Build visual: P1-Q1, P1-Q10, P1-Q2, P1-Q3, P1-Q4, P1-Q5 Production Pro..., P1-Q6, P1-Q7, P1-Q7A, P1-Q7B, P1-Q8, P1-Q8A, P1-Q8B, P1-Q9 Days by Island, Q1, Q2, Q3, Q4, Q5, Q5-copy, Q6, Q6-copy, Column_DistinctRank, Item ID, Item Name

Columns: Item ID, Item Name, Column_DistinctRank

Drill through: Cross-report: Keep all filters: Add drill-through fields here

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Now we add the second column using RANKX function but we change Ties to Skip this time, to get our desired results that is skipping a column in case of a tie.

Assignment 1 - PBI - Transformation - M Coding and DAX - AnmolM - 200379017 - Group 11

File Home Insert Modeling View Optimize Help Format Data / Drill Table tools Column tools

Name: Column_SkipRank Format: Whole number Summarization: Sum Data category: Uncategorized

Structure: Column_SkipRank = RANKX('Q6-copy','Q6-copy'[Item Name],,ASC,Skip)

Formatting: Sort by column: Sort Data groups: Groups Manage relationships: Relationships New column: Calculations

Properties: Item ID is (All) Item Name is (All) Add data fields here

Filters on this visual: Column_DistinctRank is (All) Column_SkipRank is (All) Item ID is (All) Item Name is (All) Add data fields here

Filters on this page: Add data fields here

Filters on all pages: Add data fields here

Visualizations: Build visual: P1-Q1, P1-Q10, P1-Q2, P1-Q3, P1-Q4, P1-Q5 Production Pro..., P1-Q6, P1-Q7, P1-Q7A, P1-Q7B, P1-Q8, P1-Q8A, P1-Q8B, P1-Q9 Days by Island, Q1, Q2, Q3, Q4, Q5, Q5-copy, Q6, Q6-copy, Column_DistinctRank, Column_SkipRank, Item ID, Item Name

Columns: Item ID, Item Name, Column_DistinctRank, Column_SkipRank

Drill through: Cross-report: Keep all filters: Add drill-through fields here

Page 6 of 9 12:29 AM 2024-02-12

7. Create a bar graph as shown below with previous year and present year sales month on month basis. [Use Q7 sheet from DAX_Data.xlsx].



Answer:

We create two new measures that calculate sum of the selected year and then the selected year – 1 to give us current year sales and previous year sales.

The screenshot shows the PowerBI desktop application interface. The main area displays a bar chart titled "CurrentYearSales and PrevYearSales by Month". The chart has two data series: "CurrentYearSales" (blue bars) and "PrevYearSales" (orange bars), grouped by month from January to December. The Y-axis represents sales values from 0K to 10K. The PowerBI ribbon is at the top, and the "Filters" and "Visualizations" panes are open on the right. The "Filters" pane shows a "Year" dropdown with options for "Blank", "2020", "2021", and "2022", with "2021" selected. The "Visualizations" pane lists various visualizations available in the workspace, including charts and tables for different quarters (Q1-Q10) and specific reports like "P1-Q9 Days by Island". The "Data" pane shows the schema of the data model, including tables like "P1-Q8", "P1-Q9", "Q1", "Q2", "Q3", "Q4", "Q5", "Q6", "Q7", "Q8", "Q9", and "Table8". The bottom of the screen shows the Windows taskbar with various pinned icons and the system tray.

8. Write a DAX function to create a filter (Region= "South") set of rows from an existing table to a new table as shown in the snapshot below. [Use Q9 sheet from DAX_Data.xlsx].

ID	Region	State	Sales
1	South	Brighton and Hove	1500
2	South	Milton Keynes	2600
3	South	Southampton	3600
4	South	Portsmouth	4100
5	South	Slough	5100
6	South	Reading	3600
7	South	Oxford	7400
8	South	High Wycombe	8000
9	South	Basingstoke	6300
10	South	Maidstone	9000
11	South	Crawley	4000
12	South	Worthing	3200
13	South	Gillingham	1253
14	South	Eastbourne	2000
Total			61653

Answer:

We use the summarize function to create a new table from the existing table and use Filter to make the region 'South'.

The screenshot shows the Power BI desktop interface with the following details:

- Title Bar:** Assignment 1 - PBI - Transformation - M Coding and DAX - AnmolM - 200379017 - Group 11
- File, Home, Insert, Modeling, View, Optimize, Help, Format, Data / Drill, Table tools** tabs are visible.
- Structure ribbon:** Shows 'Name Table8' and various table management options.
- Data pane:** Displays the DAX formula: `Table8 = SUMMARIZE(FILTER(Q8, Q8[Region] = "South"), Q8[ID], Q8[Region], Q8[State], Q8[Sales])`.
- Visualizations pane:** Shows various visualization icons.
- Data pane (right):** Shows the columns of the new table 'Table8' with their respective data types and options to add fields or drill-through.
- Bottom Taskbar:** Shows the status bar with weather (Cloudy), system info (ENG US), battery level (73%), and the date/time (12:51 AM 2024-02-12).

9. Create a bar graph as shown below with swapping axis as profit, sales, or quantity on a parameter(slicer). [Use Q9 sheet from DAX_Data.xlsx].



Answer:

We create sum/total measures for each entity to take data from Sales, Profit and Qty columns, then create an index table which we use as our parameter slicer. Then we create a new measure that use SWITCH function to switch index values from our slicer table with our SUM/total measures which we use to plot our chart as shown below.

The screenshot shows the PowerBI desktop environment with the following details:

- Ribbon:** File, Home, Insert, Modeling, View, Optimize, Help.
- Data Sources:** Get data, Excel workbook hub, Data, SQL Server data, Data, Recent sources, Transform data, New visual, Text box insert, More visuals, New measure, Quick measure, Calculations, Sensitivity.
- Visualizations:** Filters, Visualizations, Data.
- Values:** A list of measures including P1-Q8, P1-Q8A, P1-Q8B, P1-Q8 Days by Island, Parameter Slicer, Q1, Q2, Q3, Q4, Q5, Q5-copy, Q6, Q6-copy, Q7, Q8, Q9, and various summation measures like $\sum ID$, $\sum Month$, etc.
- Bottom Navigation:** Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q10, a plus sign for new visual, and a search bar.

10. Generate a calendar table that has the following columns-

Date: containing a date value

DateKey: containing a date in integer format, ex- 26-05-2022 → 20220626

Year: containing a year value from date

MonthNo: containing a month number from date

MonthName: containing month name from date

Day: containing day from date

Quarter: containing quarter from date

WeekNo: containing week no from date

WeekDay: containing week day from day

DateKey	Date	Year	Quarter	MonthNo	MonthName	Day	WeekNo	WeekDay
20150102	02-01-2015	2015	Q1	1	Jan	2	1	6
20150103	03-01-2015	2015	Q1	1	Jan	3	1	7
20150104	04-01-2015	2015	Q1	1	Jan	4	2	1
20150105	05-01-2015	2015	Q1	1	Jan	5	2	2
20150106	06-01-2015	2015	Q1	1	Jan	6	2	3
20150107	07-01-2015	2015	Q1	1	Jan	7	2	4
20150108	08-01-2015	2015	Q1	1	Jan	8	2	5
20150109	09-01-2015	2015	Q1	1	Jan	9	2	6
20150110	10-01-2015	2015	Q1	1	Jan	10	2	7
20150111	11-01-2015	2015	Q1	1	Jan	11	3	1
20150112	12-01-2015	2015	Q1	1	Jan	12	3	2
20150113	13-01-2015	2015	Q1	1	Jan	13	3	3
20150114	14-01-2015	2015	Q1	1	Jan	14	3	4
20150115	15-01-2015	2015	Q1	1	Jan	15	3	5
20150116	16-01-2015	2015	Q1	1	Jan	16	3	6
20150117	17-01-2015	2015	Q1	1	Jan	17	3	7
20150118	18-01-2015	2015	Q1	1	Jan	18	4	1
20150119	19-01-2015	2015	Q1	1	Jan	19	4	2
20150120	20-01-2015	2015	Q1	1	Jan	20	4	3
20150121	21-01-2015	2015	Q1	1	Jan	21	4	4
20150122	22-01-2015	2015	Q1	1	Jan	22	4	5
20150123	23-01-2015	2015	Q1	1	Jan	23	4	6

Answer:

We use YEAR, QUARTER, MONTH, WEEKDAY, WEEKNUM, DAY and FORMAT functions to create the Calendar table as required.

The screenshot shows the PowerBI desktop interface. In the center, there is a table titled "DateTable" with columns: DateKey, Date, Year, Quarter, MonthNo, MonthName, Day, WeekNo, and WeekDay. The table contains data from January 2015. On the right side, the "Column tools" ribbon is selected, showing options like Summarization, Data category, Sort by column, Data groups, Manage relationships, and New column. Below the ribbon, there is a search bar and a list of filters for "DateTable" columns such as Date, DateKey, Day, MonthName, MonthNo, Quarter, WeekDay, WeekNo, and Year. The bottom right corner shows system status: ENG US, 307 AM, 2024-02-12, and 73% battery.

Achievement:

With this assignment, we learned various functions of M-Code that enabled me to understand how to add index columns, conditional columns, custom columns and adding increments to index columns. We also learn how to split columns by delimiters, append queries, merge queries, pivot-unpivot and transpose tables and add parameters. We also receive a thorough learning exercise to practice PowerBI DAX and understand various DAX functions like IF, NOT, CONCATENATE, ISFILTERED, LEFT, MID, RIGHT, SUMX, MAXX, various functions related to date. Although this assignment was lengthy, it was a good exercise to practice and improve my PowerBI skills. Especially, Q7 and Q9 from DAX were highly helpful in making me aware of new PowerBI functions.