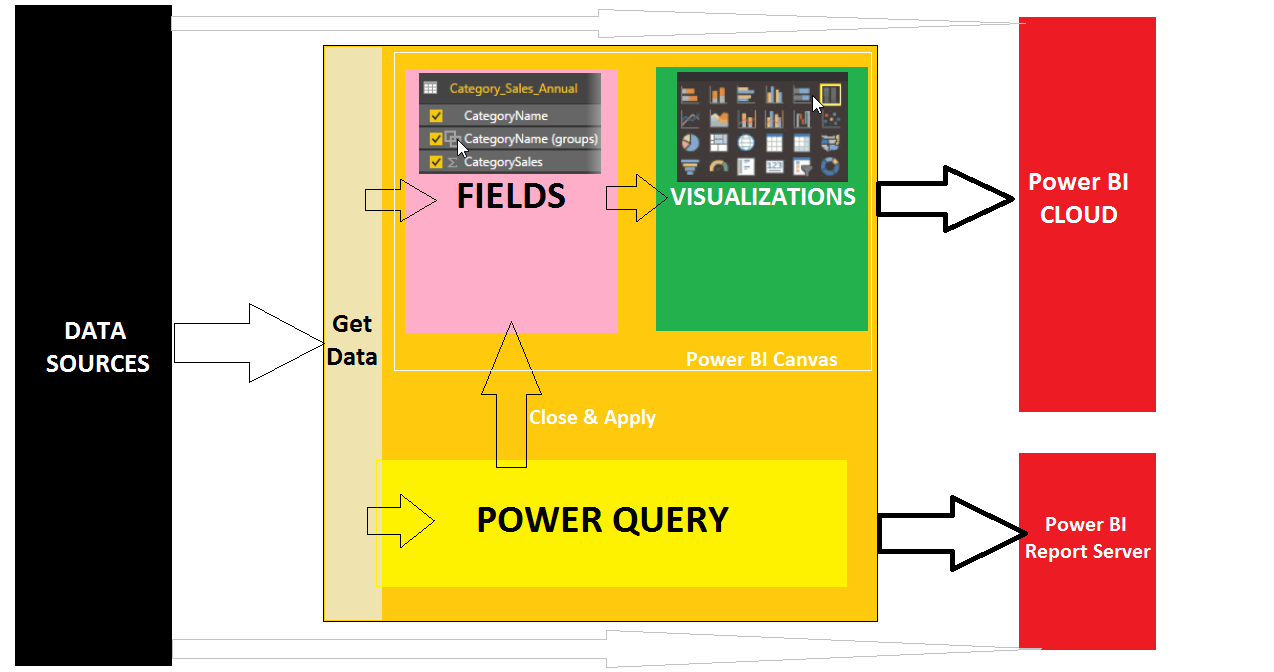
**POWER QUERY - LEVEL 1**

**ITEM #1: WHAT IS POWER QUERY?**

**Power Query** is a platform to READ (Extract), OPERATE (Transform) and LOAD any data into Power BI. Using Power Query we can perform Union, Merge, Sort, Search, Pivot, Group By, Replace, Filter, etc...



**ITEM #2: WHAT OPERATIONS WE CAN PEFORM USING POWER QUERY?**

**OPERATION 1: "GET DATA" [STATIC or DYNAMIC]**

**OPERATION 2: TRANSFORMATIONS [Operations, Calculations]**

**OPERATION 3: LOAD DATA INTO POWER BI CANVAS FOR REPORTING**

**ITEM #3: WHAT ARE THE TYPES OF QUERIES IN POWER QUERY ?**

|  |  |  |  |
| --- | --- | --- | --- |
| **1** | **TABLE QUERIES** | **4** | **RECORD QUERIES [JSON]** |
| **2** | **LIST QUERIES** | **5** | **PARAMETER QUERIES** |
| **3** | **FUNCTION QUERIES** |  |  |

**ITEM #4: WHAT ARE THE DATA TYPES FOR ABOVE VALUES IN POWER QUERY ?**

|  |  |  |
| --- | --- | --- |
|  |  |  |
| Decimal Number | Date and Time | Text |
| Fixed Decimal Number | Date | True / False |
| Whole Number | Time | Binary |
| Percentage | Date / Time / TimeZone | **Any** [default data type] |

**ITEM #6: WHAT ARE THE TYPES OF TRANSFORMATIONS IN POWER QUERY?**

|  |  |  |
| --- | --- | --- |
| **1** | **TABLE TRANSFORMATIONS** | COMBINE; GROUP BY; TRANSPOSE; REVERSE ROWS; COUNT ROWS; |
| **2** | **ANY COLUMN TRANSFORMATIONS** | DATA TYPE CONVERSIONS ; RENAME; REPLACE; FILL UP; FILL DOWN; |
| **3** | **TEXT TRANSFORMATIONS** | PROPER; SPLIT; FORMAT; MERGE; EXTRACT; PARSE; UPPERCASE; |
| **4** | **NUMBER TRANSFORMATIONS** | STATISTICAL, MATHEMATICAL, EXPONENTIAL, TRIGNOMETRIC.. |
| **5** | **DATE** & **TIME TRANSFORMATIONS** | DATE; TIME; DURATION; |
| **6** | **STRUCTURED COLUMN TRANSFORMATIONS** | ALTERNATE LIST; DUPLICATE LIST; KEEP TOP ROWS; KEEP BOTTOM ROWS; RANGE OF ROWS; REMOVE DUPLICATES; REMOVE ERRORS; |

**ITEM #7: WHAT IS THE FORMAT FOR POWER QUERY SCRIPT**?

**FORMAT 1: E (T) L**

let source=XXXXXXXXXXXXXXXXXXXX -- FOR DATA **E**XTRACTION, OPTIONAL TRANSFORMATION

in source -- FOR DATA **L**OADING

**FORMAT 2: E T L**

let source=XXXXXXXXXXXXXXXXXXXX -- FOR DATA **E**XTRACTION

STEP1=yyyyyyyyyyyyyyyyyyyyyyyyy -- **T**RANSFORMATION 1

STEP2=zzzzzzzzzzzzzzzzzzzzzzzzz -- **T**RANSFORMATION 2

................................ -- **T**RANSFORMATION n

in STEPn -- FOR **L**OADING OUTPUT OF TRANSFORMATION

**ITEM #8: WHAT IS STEP?**

Step is an operation. Every operation we perform in Power Query results in a "STEP".

We can EDIT an Step; DELETE a Step; INSERT a Step; REORDER a Step;

All steps are organized, visible in "SETTINGS" View inside Power Query Editor Interface.

**PRACTICE EXAMPLES**

**ITEM #9: HOW TO IMPORT EXCEL (OR ANY OTHER) DATA SOURCE INTO POWER QUERY?**

**LAUNCH POWER BI > GET DATA >** EXCEL > BROWSE FOR THE GIVEN SALES DATA >

IMPORT > SELECT THE THREE SHEETS FROM THE FILE. FOR EVERY SHEET, ONE TABLE (ENTITY) IS AUTO DEFINED IN "IN-MEMORY XVELOCITY VERTIPAQ DATABASE".

**CUSTOMER REQUIREMENT:**

**TO REPORT COUNTRY WISE TOTAL SALES 2016**

ISSUE: SELECT A TABLE VISUAL > INCLUDE FEW COLUMNS FROM GERMANY TABLE. THEN TRY TO INCLUDE FIELDS FROM INDIA TABLE. THEN WE SEE AN ERROR. **REASON: NO RELATION**

SOLUTION: COMBINE DATA USING POWER QUERY AND DERIVE A NEW TABLE

**ITEM #10: HOW TO "COMBINE" ABOVE THREE QUERIES (TABLES) USING POWER QUERY?**

**OPTION 1: UNION OR APPEND [ONE BELOW THE OTHER]**

**OPTION 2: MERGE [ONE BESIDE THE OTHER = JOIN]**

**UNION OR APPEND :** RIGHT CLICK GERMANY > EDIT QUERY > THEN WE SEE "POWER QUERY" WINDOW.SELECT "GERMANY" QUERY > TOP : RIGHT > COMBINE > APPEND QUERIES > APPEND AS NEW [MEANS : NEW TABLE QUERY IS CREATED] > THREE OR MORE TABLES > ADD INDIA & USA TABLES > OK. RIGHT CLICK THE RESULTED QUERY > RENAME.

**MERGE:** SELECT "GERMANY" QUERY> TOP : RIGHT > COMBINE > MERGE QUERIES > MERGE QUERIES AS NEW >SELECT "INDIA" QUERY > SELECT COMPARABLE COLUMN(S) :

COMPANY >INNER JOIN >OK. THIS RESULTS A NEW TABLE : GERMANY, INDIA DATA SIDE BY SIDE. SELECT ABOVE MERGE OUTPUT > COMBINE > MERGE QUERIES > MERGE QUERIES >

SELECT "USA" QUERY >> SELECT COMPARABLE COLUMN(S) : COMPANY >INNER JOIN >OK

RIGHT CLICK THE RESULTED QUERY > RENAME.

**ITEM #11: HOW TO VERIFY AUTO GENERATED POWER QUERY SCRIPT FOR ABOVE QUERIES?**

RIGHT CLICK THE QUERY > ADVANCED EDITOR > WE SEE THE POWER QUERY.

**ITEM #12: HOW TO LOAD POWER QUERY RESULTS INTO POWER BI CANVAS FOR REPORTING?**

FROM POWER QUERY WINDOW > HOME PAGE > CLOSE & APPLY.

THIS RESULTS IN EXTRA TABLES AND FIELDS IN POWER BI REPORT DESIGN ENVIRONMENT.

**ITEM #13: HOW TO REPORT FROM ABOVE NEW QUERY TABLES? EX: APPENDED TABLE**

FROM VISUALIZATIONS > SELECT TABLE VISUAL. EXPAND "ALL COUNTRY" TABLE OR ANY OTHER ABOVE RESULT > SELECT FIELDS (COUNTRY, COMPANY, SALES 2016, SALES 2017.. ) > SAVE PBIX.

**-----**

**ITEM #14 HOW TO "DUPLICATE" THE POWER QUERY TABLES? XEROX COPY**

DUPLICATING THE QUERY WILL RESULT IN ONE ADDITIONAL, ISOLATED (INDEPENDANT) COPY OF THE SOURCE QUERY. COMPLETE QUERY STRUCTURE AND DATA ARE DUPLICATED.

USED FOR FASTER TRANSFORMATIONS ON EXISTING POWER QUERY TABLES.

RIGHT CLICK ANY OF THE ABOVE TABLES FROM THE CANVAS > EDIT QUERY > THIS BRINGS US POWER QUERY WINDOW. RIGHT CLICK AllCountry QUERY TABLE > DUPLICATE. RENAME

**ITEM #15: HOW TO "REFERENCE" THE POWER QUERY TABLES? MIRROR COPY [LIVE]**

REFERENCING THE QUERY WILL RESULT IN ONE ADDITIONAL, AUTO SYNC (DEPENDANT) COPY OF THE SOURCE QUERY. NO DATA IS DUPLICATED. ONLY STRUCTURE IS DUPLICATED.

MEANS : IF WE PERFORM ANY CHANGES TO THE SOURCE QUERY THEN REFERENCE QUERY ALSO GETS THE SAME CHANGE AUTOMATICALLY. USED FOR LIVE DATA SOURCES OF BIGGER SIZE.

**EX:**

RIGHT CLICK AllCountry QUERY TABLE > REFERENCE. RENAME

RENAME COLUMN IN THE SOURCE (AllCountry). VERIFY THE SAME CHANGE IN THE REFERENCE.

**TABLE TRANSFORMATIONS**

**ITEM #16: HOW TO PERFORM GROUP BY OPERATIONS ?**

FROM POWER QUERY WINDOW >RIGHT CLICK THE DUPLICATED QUERY :

SELECT COUNTRY, COMPANY > REMOVE.

SELECT MONTH > TRANSFORM RIBBON > GROUP BY > ADVANCED > ADD AGGREGATIONS.

FOR EACH AGGREGATION : NAME, AGGREGATION OPERATION (SUM), SALE 2016 / 17 / 18 >OK.

**ITEM #17: WHAT IS TRANSPOSE?**

A MECHANISM TO CONVERT ROWS INTO COLUMNS AND COLUMN INTO ROWS.

USED IN SCENARIOS TO REPORT MORE AMOUNT OF VERTICAL DATA INTO HORIZONTAL DATA.

**SELECT MONTH : TRANSFORM TAB > CLICK @ TRANSPOSE BUTTON.**

**ITEM #18: HOW TO USE FIRST ROW AS HEADER?**

SELECT 1ST ROW OF THE ABOVE QUERY > CLICK @ "USE FIRST ROW AS HEADERS" BUTTON.

WE HAVE TWO OPTIONS IN THIS BUTTON:

1. PROMOTE HEADERS : TO GET THE 1ST ROW OF THE TABLE AS HEADER

2. DEMOTE HEADERS : TO GET THE HEADER AS 1ST ROW OF THE TABLE

**ITEM #19: WHAT IS REVERSE ROWS?**

A MECHANISM TO REVERSE THE ROW POSITIONS. LAST ROW OF TABLE IS MOVED TO FIRST ROW AND VICE VERSA.

FROM POWER QUERY EDITOR > TRANSFORM > CLICK @ REVERSE ROWS

**ITEM #20: HOW TO USE COUNT TRANSFORMATION IN POWER QUERY?**

*THIS TRANSFORMATION IS USED TO COUNT NUMBER OF ROWS IN THE TABLE.*

SELECT THE QUERY > CLICK @ "COUNT ROWS". THIS REPORTS THE ROW NUMBER VALUE.

CLICK @ INTO MARK TO THE LEFT SIDE OF THE STEP TO REMOVE THIS TRANSFORMATION.

ANY COLUMN TRANSFORMATIONS

**ITEM #21: HOW TO CHANGE DATA TYPES OF EXISTING COLUMNS?**

RIGHT CLICK ALLCOUNTRYSALES QUERY > DUPLICATE.

REQUIREMENT: HOW TO REMOVE THE DECIMAL VALUES IN SALES 2016

SELECT 2016 > CLICK @ > DATA TYPE > WE SEE A DROPDOWN WITH LIST OF ALL AVAILABLE DATA TYPES > SELECT THE REQURIED DATA TYPE {WHOLE NUMBER}

**ITEM #22: HOW TO DETECT THE DATA TYPE?**

SELECT REQUIRED COLUMN(S) [SALE 2015, SALE 2016] > CLICK @ "DETECT DATA TYPE".

THIS IS USEFUL FOR SUCH SCENARIOS IN WHICH WE REPLACE OR MASHUP THE COLUMN DATA.

**ITEM #20: HOW TO REPLACE COLUMN VALUES?**

SELECT REQUIRED COLUMN > CLICK @ **REPLACE** FROM MASHUP RIBBON [TRANSFORMATION CATEGORY] > SPECIFY SOURCE VALUE & REPLACEMENT VALUE. Ex: Replace Sale 2016 null >>> 0

**ITEM #21: HOW TO REPLACE THE NULL VALUES WITH THEIR ADJACENT (next or previous) VALUES?**

SELECT A COLUMN > CLICK @ "**FILL**" > FILL UP OR FILL DOWN.

**FILL UP** : USED TO REPLACE A NULL VALUE WITH NEXT NON NULL VALUE.

**FILL DOWN** : USED TO REPLACE A NULL VALUE WITH PREVIOUS NON NULL VALUE.

Select Sale2017 > FillUp

Select Sale 2018 > Filldown.

**ITEM #22: HOW TO PIVOT THE COLUMNS?**

**PIVOT IS A MECHANISM TO IDENTIFY UNIQUE VALUES OF A COLUMN AND DEFINE NEW COLUMNS. VALUES OF THESE COLUMNS WILL BE AGGREGATION FROM ANY OTHER COLUMN.**

SELECT MONTH & SALE 2015 > RIGHT CLICK > REMOVE OTHER COLUMNS.

TRANSFORM : ANY COLUMN > SELECT MONTH > CLICK @ **PIVOT**.

**NOTE**: PIVOT = GROUP BY + AGGREGATE + TRANSPOSE + PROMOTE HEADER.

Task 1: How to Pivot the same above Sales Data and report Monthly Sales for 2015, 2016 & 2017

Task 2: What is the relation between Group By and Pivot?

Your answer would be in this format:

Pivot = Group By + ?? + ??

Task 3: What are the pre-conditions or precautions to consider when working with PIVOT ?

**ITEM #23: HOW TO UNPIVOT THE COLUMNS?**

FROM POWER QUERY EDITOR> SELECT ALL COLUMNS > TRANSFORM > CLICK @ UNPIVOT

**ITEM #24: HOW TO MOVE A COLUMN FROM ONE POSITION TO ANOTHER?**

SELECT A COLUMN > CLICK @ "MOVE" > SELECT ONE OF THE OPTIONS:

1. LEFT 2. RIGHT 3.TO BEGINNING 4. TO END

-----

**ITEM #25: HOW TO SPLIT COLUMN VALUES?**

SELECT COLUMN > CLICK SPLIT COLUMN > OPTIONS TO SPLIT NUMERICAL or CHARACTER DATA:

1. BY DELIMETER

2. BY NUMBER OF CHARACTERS

SELECT MONTH > SPLIT > BY NUMBER OF CHARACTERS (3) > OK. THIS RESULTS IN TWO COLUMNS. 1ST COLUMN HAS 3 CHARACTERS. 2ND COLUMN HAS REMAINING CHARACTERS

**ITEM #26: HOW TO MERGE COLUMN VALUES?**

SELECT ABOVE TWO SPLIT COLUMNS > MERGE. THIS RESULTS IN A SINGLE COLUMN.

**ITEM #27: HOW TO EXTRACT COLUMNS?**

SELECT A COLUMN > CLICK @ "EXTRACT" > SELECT REQUIRED OPERATION.

SELECT MONTH > EXTRACT > FIRST 3 CHARACTERS > OK.

**ITEM #28: HOW TO USE FORMAT OPTIONS?**

SELECT A COLUMN > CLICK @ "FORMAT" > WE SEE STRING OPERATIONS :

1. LOWERCASE 2. UPPERCASE 3. CAPATALIZE EACH WORD

4. TRIM 5. CLEAN 6. ADD PREFIX 7. ADD SUFFIX

SELECT MONTH > UPERCASE.

**ITEM #29: HOW TO GET STANDARD CALCULATIONS AND SCIENTIFIC CALCULATIONS?**

SELECT AN WHOLE NUMBER OR DECIMAL COLUMN > CLICK @ "FORMAT" > WE SEE STANDARD CALCUALTIONS AND SCIENTIFIC CALCULATIONS.

**ITEM #30: HOW TO PERFORM NUMBER TRANSFORMATIONS**

SELECT COLUMN > SPECIFY ONE OF THE REQUIRED CALCULATIONS:.

**ITEM #31: DATE & TIME TRANSFORMATIONS**

RIGHT CLICK QUERIES > NEW QUERY > EXCEL > SELECT GIVEN FINANCIAL EXCEL FILE > LOAD.

SELECT DATE COLUMN > DUPLICATE (TWICE).

SELECT 1ST DUPLCIATED COLUMN > NAME (YEAR). **TRANSFORM** TAB: DATE > YEAR.

SELECT 2ND DUPLCIATED COLUMN > NAME (NEWDAY). **TRANSFORM** TAB: DATE > DAY.

SELECT MONTH > TRANSFORM : ANY COLUMN > MOVE RIGHT

**ITEM #32: HOW TO FORMAT A CUSTOM DATE?**

SELECT YEAR, MONTH, DAY COLUMNS > ANY COLUMN TRANSFORMATION : DATA TYPE (TEXT)

GO TO "ADD COLUMN" RIBBON > CUSTOM COLUMN > SPECIFY A NAME TO THE NEW COLUMN.

DEFINE THE REQUIRED EXPRESSION.

EXAMPLE: [YEAR] & " - " & [MONTH] & " - " & [NEWDAY]

**ITEM #33: HOW TO ROLLBACK A STEP?**

GO TO QUERY SETTINGS PANE [RIGHT OF CANVAS] > APPLIED STEPS > SELECT THE REQUIRED STEP [EX COUNTED ROWS] > CLICK @ **DELETE** MARK YOU SEE TOWARDS LEFT SIDE OF THE STEP.

**ITEM #34: WHAT ARE STEPS?**

IN POWER QUERY, EVERY OPERATION WE PERFORM ON THE EXTRACTED DATA SOURCE IS CALLED A "STEP". THESE STEPS ARE AUTO CREATED AND AUTO NAMED AS PER THE SEQUENCE AND TYPE OF OPERATION = **MASHUP OPERATION**.

**ITEM #35: HOW TO VERIFY THE STEP DETIALS?**

FROM THE APPLIED STEPS > SELECT REQUIRED STEP >(EX: GROUP BY) > CLICK @ CIRCLE BUTTON TO RIGHT SIDE OF THE STEP > WE SEE THE STEP DEFINITION (TRANSFORMATION)

WE CAN MODIFY THE DEFINITION BUT ENSURE IT DOES NOT IMPACT REMAINING STEPS.

**ITEM #36: HOW TO INSERT A STEP IN BETWEEN OTHER STEPS?**

FROM THE APPLIED STEPS > SELECT REQUIRED STEP > THEN GO TO "TRANSFORM" RIBBON > CLICK @ REQUIRED TRANSFORMATION BUTTON >

THIS PROMPTS FOR A WARNING > CLICK OK > STEP GETS INSERTED.

EXAMPLE :HIGHLIGHT GROUPED ROWS >TRANSFORM > "**DETECT DATA TYPE"** BUTTON

**POWER QUERY – LEVEL 3**

**ITEM #39: WHAT ARE PARAMETERS?**

THESE ARE INPUT VALUES SUPPLIED AT DATA SOURCE FOR EASY ACCESS OF BIG DATA WITH

GIVEN CONDITIONS.

**ITEM #40: LAUNCH POWER BI > GET DATA > FINANCIAL SHEET DATA > LOAD. EDIT QUERY.**

**ITEM #41: HOW TO CREATE NEW PARAMETERS WITH STATIC DROP-DOWN VALUES?**

FROM POWER QUERY : HOME RIBBON > MANAGE PRAMETERS > NEW PARAMETER >

SPECIFY NAME (COUNTRY\_PARAM).

SUGGESTED VALUES : LIST OF VALUES > SPECIFY VALUES [France, Mexico, Germany]

SPECIFY DEFAULT VALUE [FOR PBIX FILE], CURRENT VALUE [FOR POWER QUERY] > OK.

**ITEM #42: HOW TO CREATE NEW PARAMETERS WITH DYNAMIC DROP-DOWN VALUES?**

STEP 1: FROM POWER QUERY > HOME RIBBON > RIGHT CLICLK THE QUERY FROM ITEM #40 > DUPLICATE.

STEP 2: IDENTIFY COLUMN FOR WHICH WE NEED TO HAVE DYNAMIC DROP DOWN (Segment) RIGHT CLICK THE SEGMENT COLUMN> REMOVE OTHER COLUMNS.

RIGHT CLICK THE SEGMENT COLUMN> REMOVE DUPLICATES .

STEP 3: FROM POWER QUERY > TRANSFORM TAB : ANY COLUMN : **CONVERT TO LIST**.

STEP 4: FROM POWER QUERY > HOME: MANAGE PRAMETERS > NEW PARAMETER >

SPECIFY NAME (SEGMENT\_PARAM), QUERY > SELECT ABOVE LIST QUERY > SPECIFY CURRENT > OK.

**ITEM #43: HOW TO LINK ABOVE PARAMETERS TO THE ACTUAL POWER QUERY TABLE?**

IDENTIFY THE DATA SOURCE QUERY> SELECT RIGHTSIDE OF THE COLUMN (COUNTRY)> DROP DOWN ARROW > TEXT FILTER > EQUALS > PARMATER OPTION : SELECT REQUIRED OPERATOR > SELECT "ADVANCED" > SELECT COUNTRY = PARAMETER1. SELECT COMPANY = PARAMETER2 > OK.

**ITEM #44: HOW TO TEST ABOVE PARAMETER?**

CLICK @ PARAMETER QUERY > SELECT A VALUE. VERIFY THAT THE DATA IS FILTERED

**ITEM #45: HOW TO MANAGE PARAMETERS IN POWER BI CANVAS?**

FROM POWER BI CANVAS > EDIT QUERIES > EDIT PARAMETERS > SELECT VALUE > APPLY.

**ITEM #46: HOW TO WORK WITH DYNAMIC CONNECTIONS IN POWER BI?**

LAUNCH POWER BI DESKTOP > GET DATA > WEB > INPUT > OK

[https://www.transfermarkt.co.uk/premierleague/tabelle/wettbewerb/GB1?saison\_id=2017](https://www.transfermarkt.co.uk/premierleague/tabelle/wettbewerb/GB1?saison_id=2016)

SELECT ANY TABLE (EX: TABLE 4) > LOAD. RIGHT CLICK TABLE > EDIT QUERY.

RIGHT CLICK QUERY > ADVANCED EDITOR >

(Year as number) as table =>

let

Source = Web.Page(Web.Contents("https://www.transfermarkt.co.uk/premierleague/tabelle/wettbewerb/GB1?saison\_id=" &Number.ToText(Year))),

Data4 = Source{4}[Data],

#"Changed Type" = Table.TransformColumnTypes(Data4,{{"#", Int64.Type}, {"Club", type text}, {"Club2", type text}, {"Matches", Int64.Type}, {"+/-", Int64.Type}, {"Pts", Int64.Type}})

in

#"Changed Type"

RIGHT CLICK ABOVE QUERY > RENAME > "EPL\_QUERY"

TO TEST THIS QUERY: SPECIFY A YEAR VALUE > INVOKE.

RIGHT CLICK QUERY > BLANK QUERY > PASTE EXPRESSION: ={2012..2019}

THIS RESULTS IN A LIST OF VALUES FROM 2012 TO 2019. SELECT LIST COLUMN > CONVERT TO TABLE.

FROM "ADD COLUMN" RIBBON > INVOKE CUSTOM FUNCTION > NEW COLUMN NAME, LINK FUNCTION QUERY CREATED ABOVE. SPECIFY YEAR PARAMETER > OK.

CLICK @ DOUBLE HEADED ARROW WE SEE ON TOP RIGHT CORNER OF THE COLUMN TO EXPAND THE TABLE. SET THE DATA TYPE. CLOSE & APPLY. DESIGN REQUIRED REPORT IN POWER BI.