ACCESSING GOVERNMENT API DATA USING POWER BI

RUSS LOSKI

INTRODUCTION

- Russ Loski
- Data Engineer
- Husband, dad and grandad
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- https://twitter.com/sqlmovers
- https://www.linkedin.com/in/russloski
- Slides and Code: https://bit.ly/43P3vxy
  - Presentations/Accessing Government API Data using Power BI at main · rloski-public/Presentations (github.com)

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Community Support

Name	Type	Frequency	Join
LA Data Platform	Virtual	Every 3rd Wednesday monthly @ 7PM PDT	
Southland Data Professionals	Virtual	Every 3rd Thursday each odd month @ 6.30PM PDT	
San Diego SQL Server User Group	Virtual	Every 3rd Thursday monthly @ 6.30PM PDT	

Find more Azure Data Tech Groups on Meetup

AGENDA

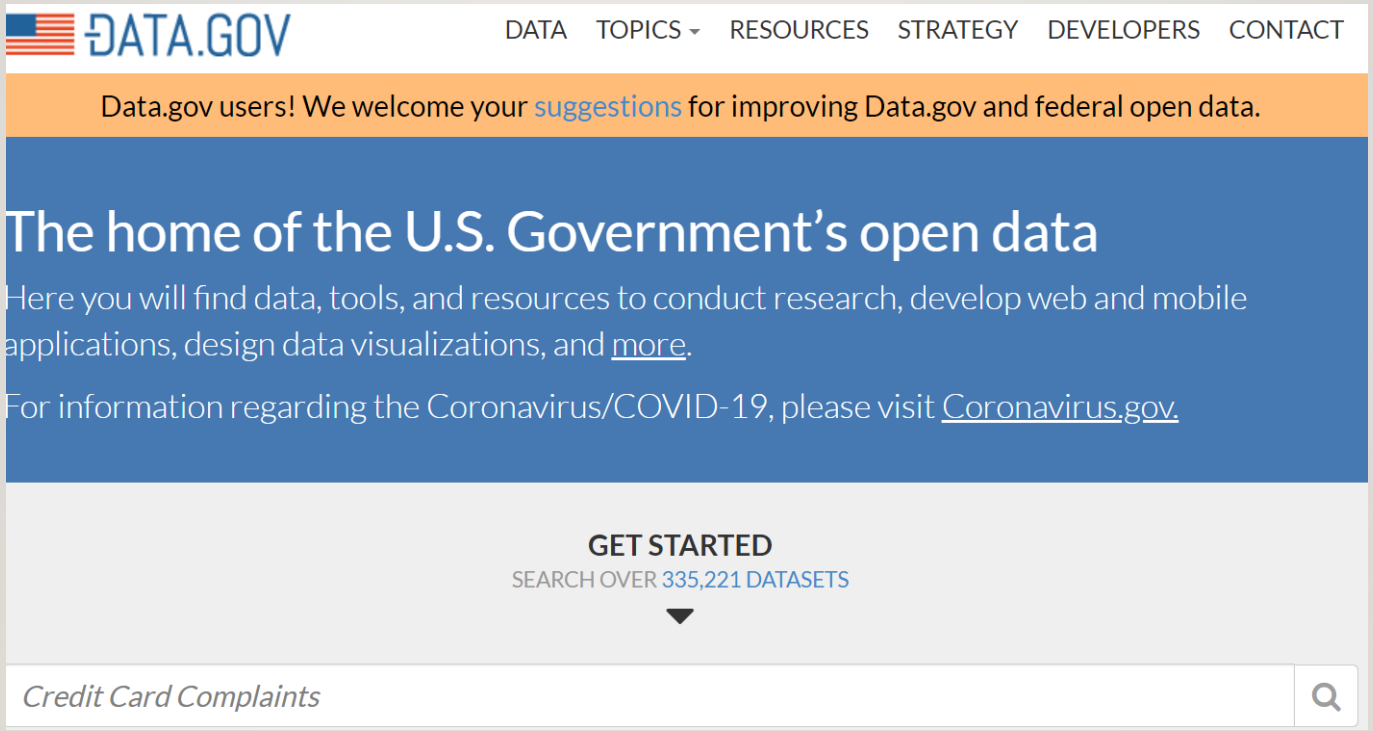
- Introduction to government data
- APIs
- PUMS API
- PUMS Metadata API
- CMS Marketplace API
- Weather API

AGENDA DETAILS

- Government Data
  - Public Microdata PUMS
  - CMS
  - NOAA Weather
- Power Query Concepts
  - Connect to API
    - Web.Contents
    - POSTing data
    - Headers
- Parsing JSON
  - Json.Document
  - Table.FromList
  - Record.ToTable
  - Record.FromList
  - Table.ExpandRecordColumn

GOVERNMENT DATA

- Data.gov



FINDING APIS

- Census Data API Discovery Tool

Title	Description	Vintage	Dataset Name	Dataset Type	Geography List	Variable List	Group List	SortList	Examples	Developer Document
1986 County Business Patterns: Business Patterns	County Business Patterns (CBP) is an annual series that provides economic data by industry at the U.S., State, County and Metropolitan Area levels. This series includes the number of establishments, employment during the week of March 12, first quarter payroll, and annual payroll. CBP provides statistics for businesses with paid employees for the U.S., Puerto Rico, and the Island Areas. Census Bureau staff identified a processing error that affects selected data from the 2014 County Business Patterns (CBP). As a result, we suppressed 2014 employment and payroll totals in the Health Care and Social Assistance sector (Sector 62) for the following geographies: U.S.; Michigan; Battle Creek, MI metro area; Calhoun County, MI; and the 3rd congressional district of Michigan. This processing error did not affect other sectors. While suppressed values can be derived by subtraction, we do not recommend using the derived values in any analyses. The Census Bureau plans to release revised statistics at a later date.	1986	cbp	Aggregate	geographies	variables	groups	sorts	examples	documenta

DATA SOURCES: ACS

- American Community Surveys (ACS)
  - American Community Survey (ACS) (census.gov)
- Public Use Microdata Sample (PUMS)
  - American Community Survey Microdata (census.gov)
- FTP Site
  - Index of /programs-surveys/acs/data/pums (census.gov)

DATA SOURCE: BLS CPS

- US Bureau of Labor Statistics Current Population Survey
- CPS Home : U.S. Bureau of Labor Statistics (bls.gov)

CPS TABLES

- CPS Tables : U.S. Bureau of Labor Statistics (bls.gov)
- Current Population Survey Datasets (census.gov)
- Basic Monthly CPS (census.gov)

WHY APIS?

WHY USE API?

- More immediate data; closer to streaming
- Targeted import of data
- Frequently better structure

ISSUES WITH API

- Parsing the data returned
- Authentication
  - **GET THE KEY**
- Posting data
- Understanding the requirements
- Understanding the restrictions

CENSUS MICRODATA API

- Census Microdata API:
  - https://www.census.gov/data/developers/data-sets/census-microdata-api.html
- Available APIs (census.gov)
  - https://www.census.gov/data/developers/data-sets.html

CENSUS MICRODATA API - DOCUMENTATION

- Guidance for Developers (census.gov)
  - https://www.census.gov/data/developers/guidance.html
- Census Data API User Guide
  - https://www.census.gov/data/developers/guidance/api-user-guide.html
- Census Microdata API User Guide
  - https://www.census.gov/data/developers/guidance/microdata-api-user-guide.html

CENSUS MICRODATA KEY REQUEST

- Request a key: Key Signup (census.gov): https://api.census.gov/data/key_signup.html

I found that a key is not required when you are only doing a small number of calls to the API. However, once you hit a certain limit your IP address will be blocked for the day.

RESOURCES FOR THE MICRODATA

2021 ACS 1-Year Estimates - Public Use Microdata Sample

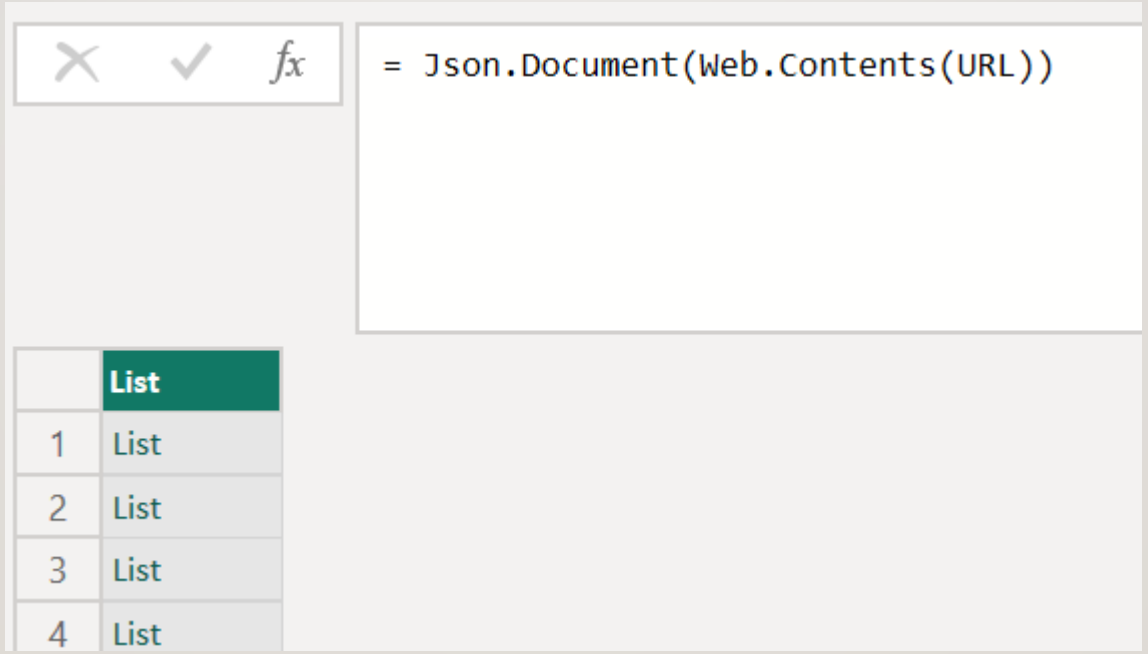
- **Example Call:** api.census.gov/data/2021/acs/acs1/pums?get=SEX,PWGTP,MAR&SCHL=24&key=YOUR_KEY_GOES_HERE
- 2021 ACS 1-Year Public Use Microdata Sample Variables [html | xml | json]
- Examples
- Supported Geography

2021 ACS 1-Year Estimates - Puerto Rico Public Use Microdata Sample

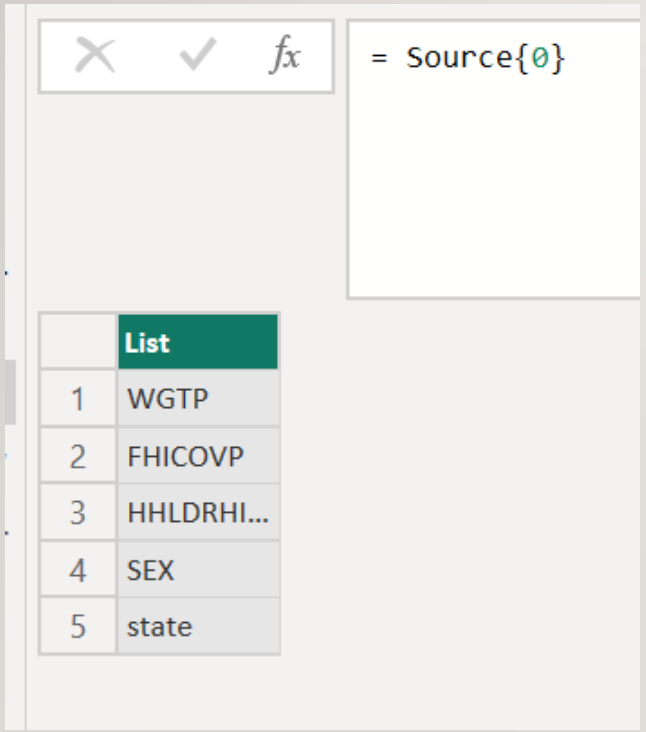
PUMS URL

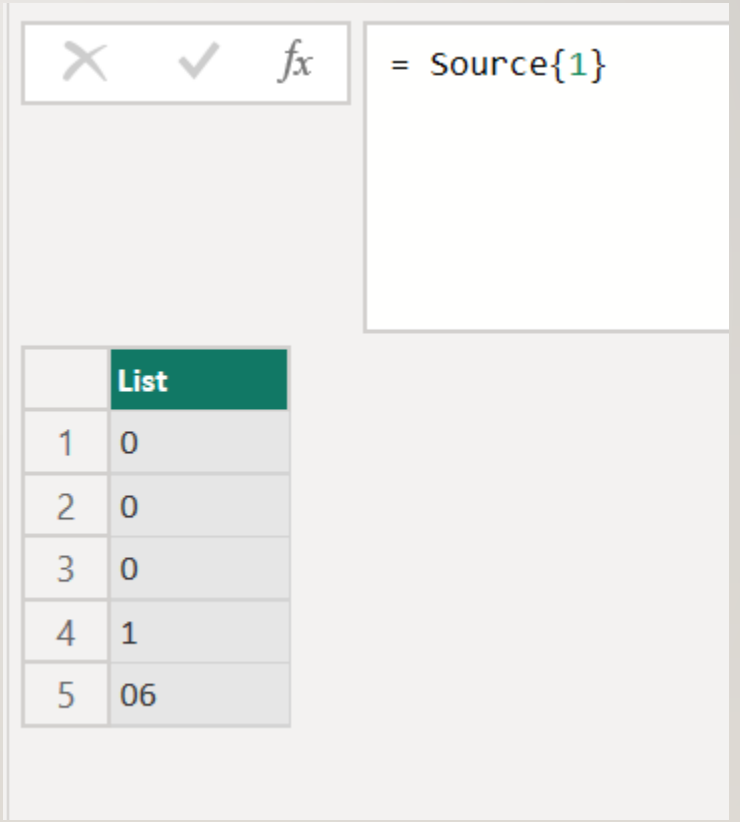
- `'https://api.census.gov/data/2021/acs/acs1/pums?get=WGTP,FHICOVP&HHLDRHISP=02:99&key='` + PUMSKey
  - Address: https://api.census.gov/
  - Path: data/2021/acs/acs1/pums
  - Query arguments:?get=WGTP,FHICOVP&HHLDRHISP=02:99&key=

POWER QUERY


= Json.Document(Web.Contents(URL))
List
1 List
2 List
3 List
4 List

VIEWING DATA IN POWER QUERY

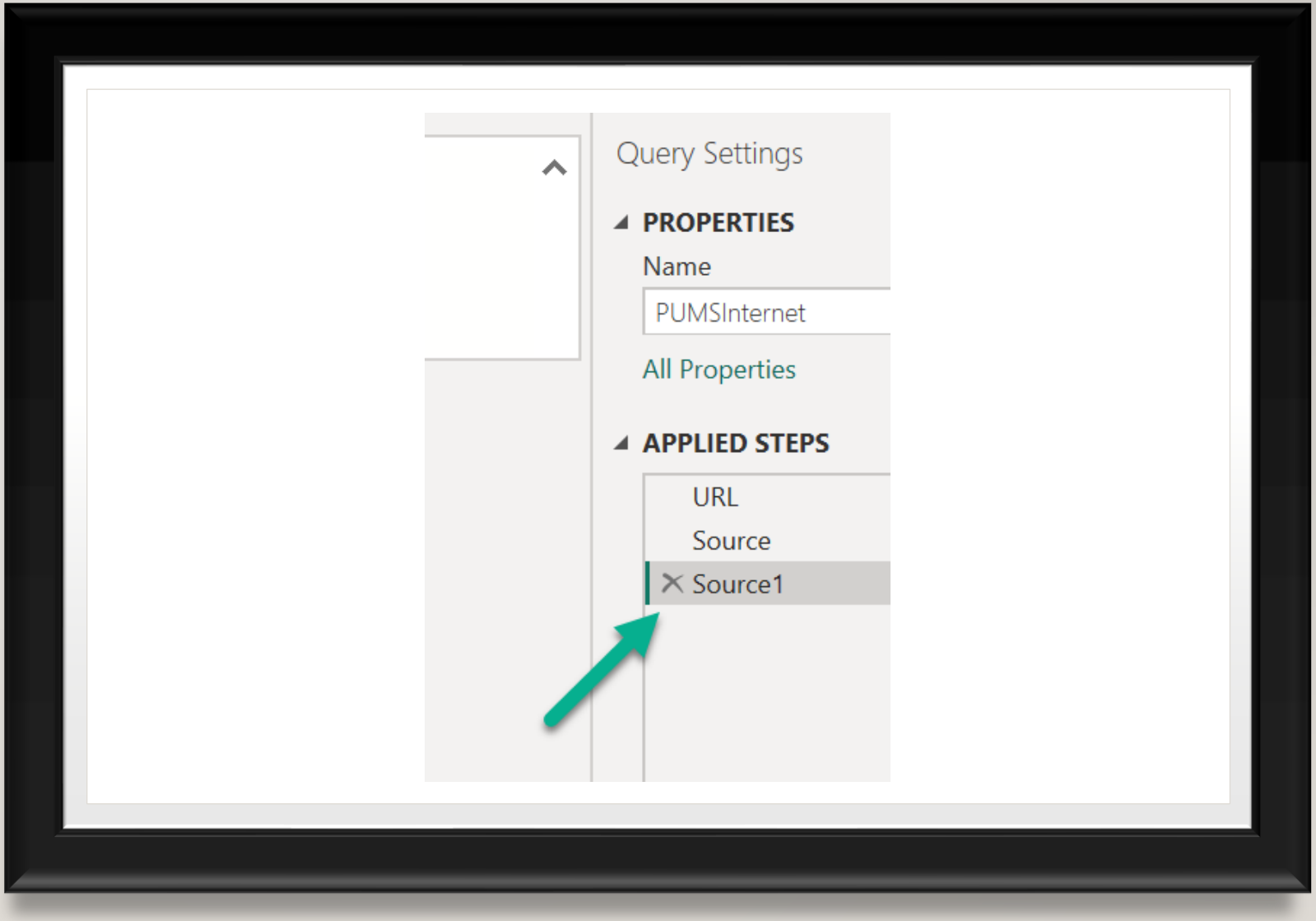




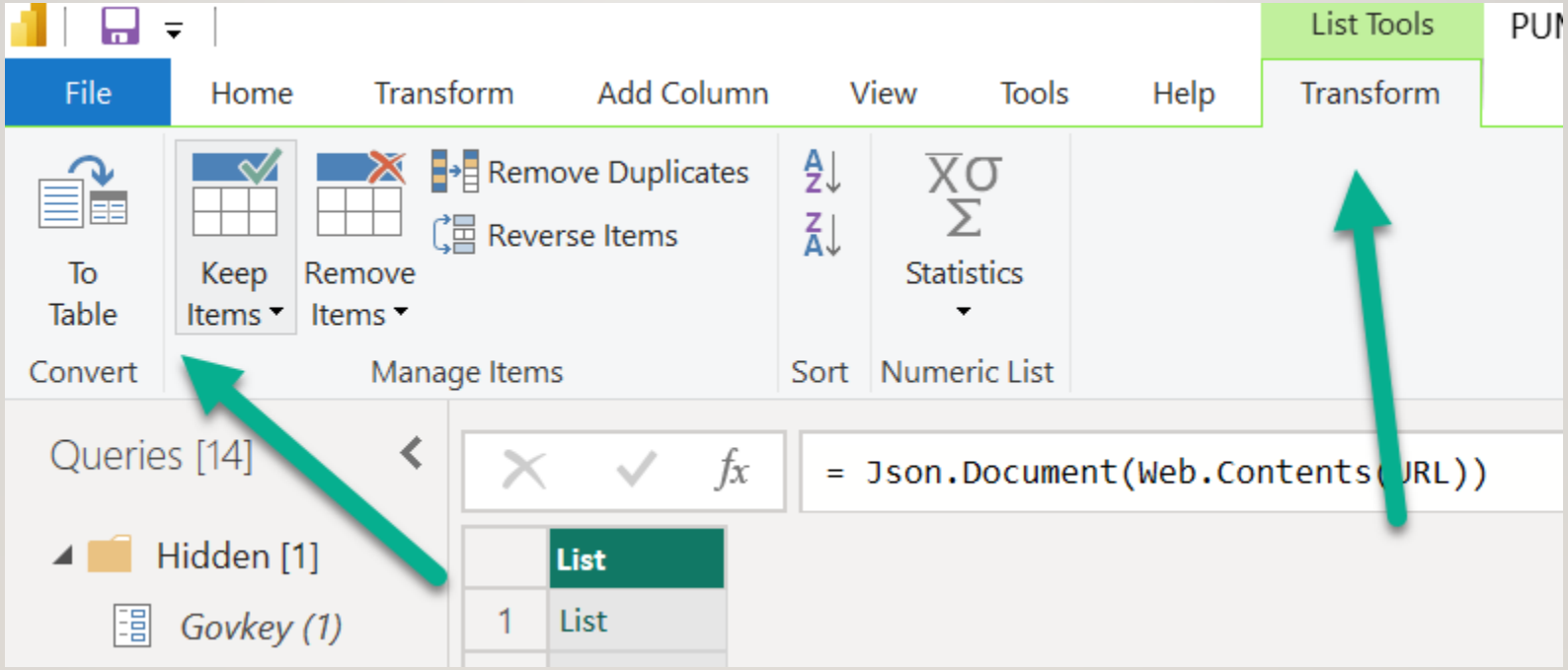
PUMS RESULTS

```
1   results
[5]  ✓ - Command executed in 211 ms on 7:47:40 PM, 3/1
[['WGTP', 'FHICOVP', 'HHLDRHISP'],
 ['283', '0', '3'],
 ['31', '0', '2'],
 ['31', '0', '2'],
 ['31', '0', '2'],
 ['82', '0', '2'],
 ['82', '0', '2'],
 ['170', '0', '2'],
 ['170', '1', '2'],
 ['170', '1', '2'],
 ['170', '1', '2'],
 ['170', '1', '2'],
 ['137', '0', '2'],
 ['137', '0', '2'],
 ['137', '0', '2'],
 ['137', '0', '2'],
```

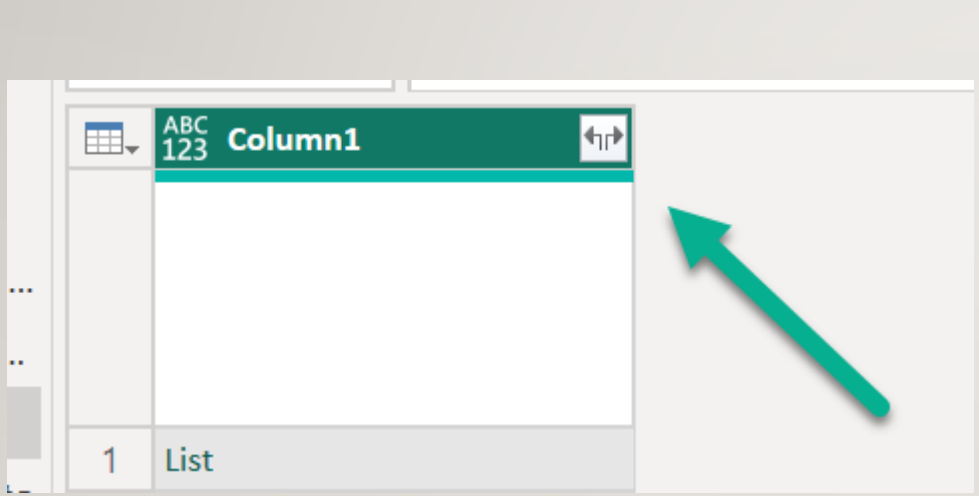
REMOVE STEP

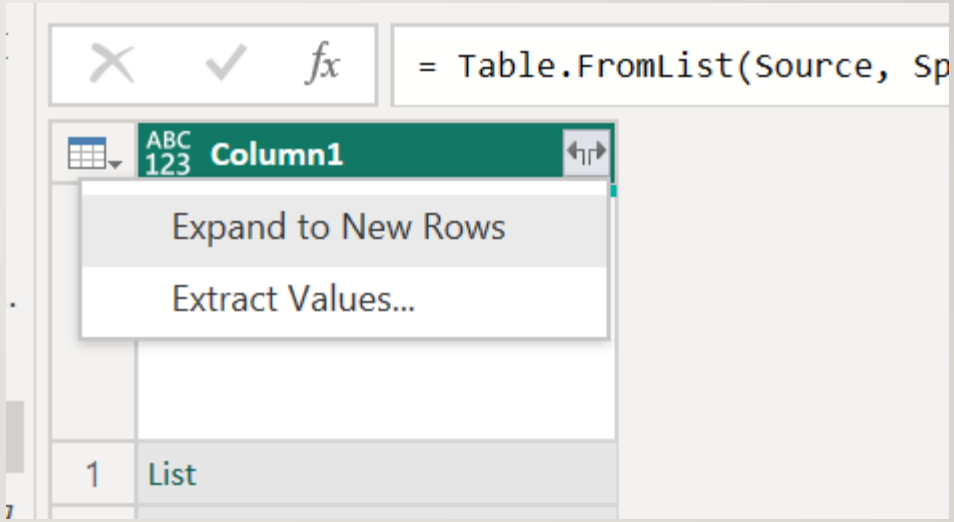

Query Settings
PROPERTIES
Name
PUMSInternet
All Properties
APPLIED STEPS
URL
Source
Source1

CONVERT LIST TO TABLE



EXPAND COLUMNS



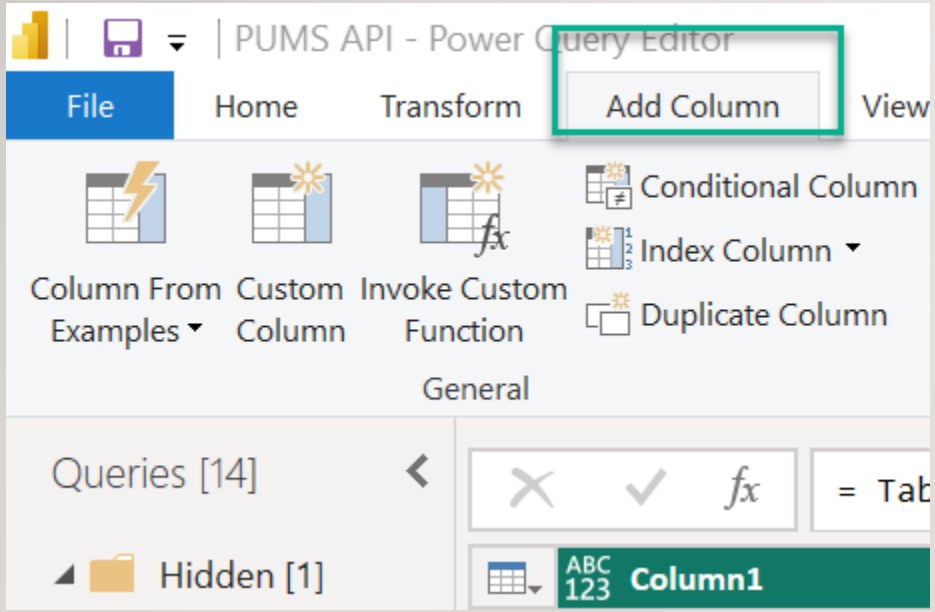


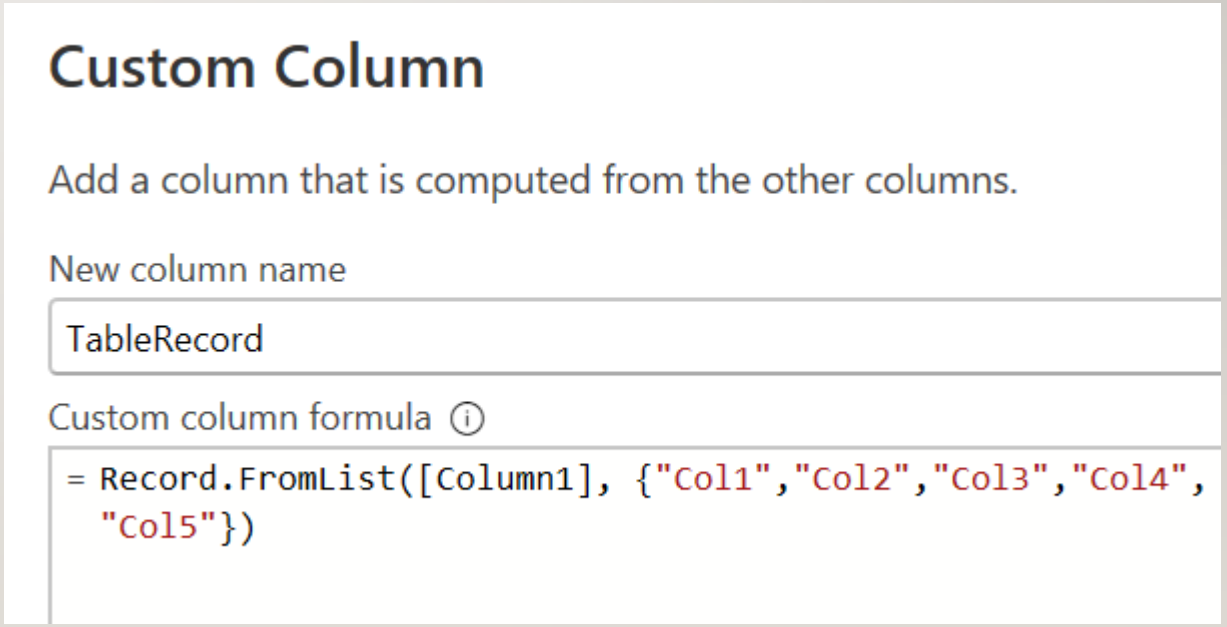
1	WGTP
2	FHICOVP
3	HHLDRHISP
4	SEX

1	WGTP:FHICOVP:HHLDRHISP:...
2	0:0:0:1:06
3	0:1:0:2:06

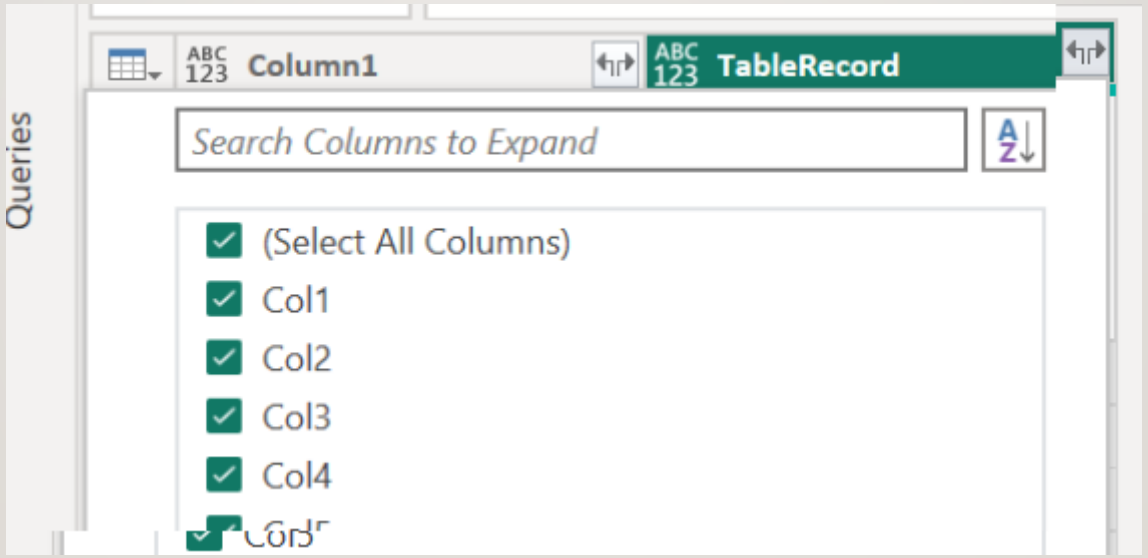
ADD CUSTOM COLUMN – RECORD.FROMLIST

Record.FromList - PowerQuery M | Microsoft Learn: https://learn.microsoft.com/en-us/powerquery-m/record-fromlist

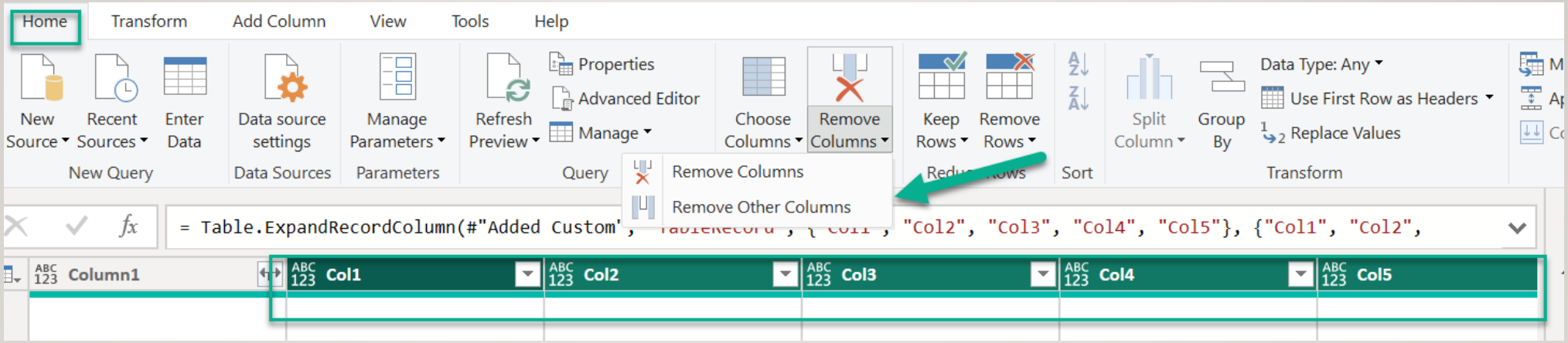




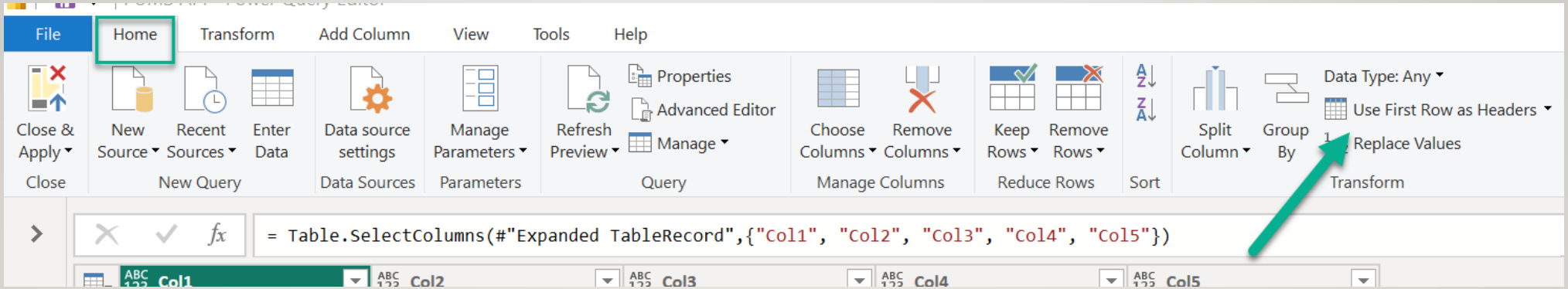
EXPAND THE RECORDS



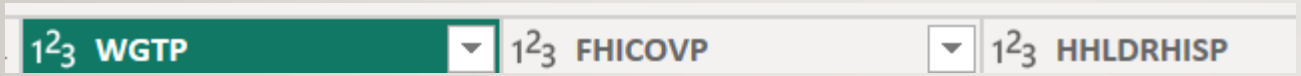
REMOVE EXTRA COLUMN

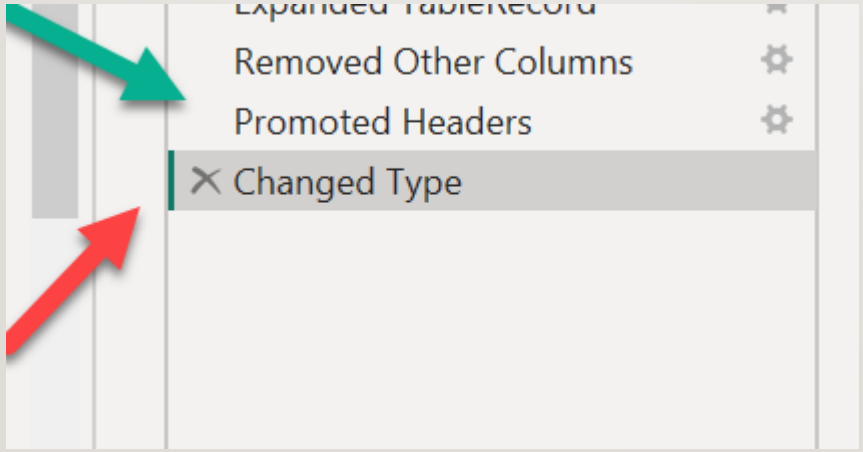


PROMOTE HEADER

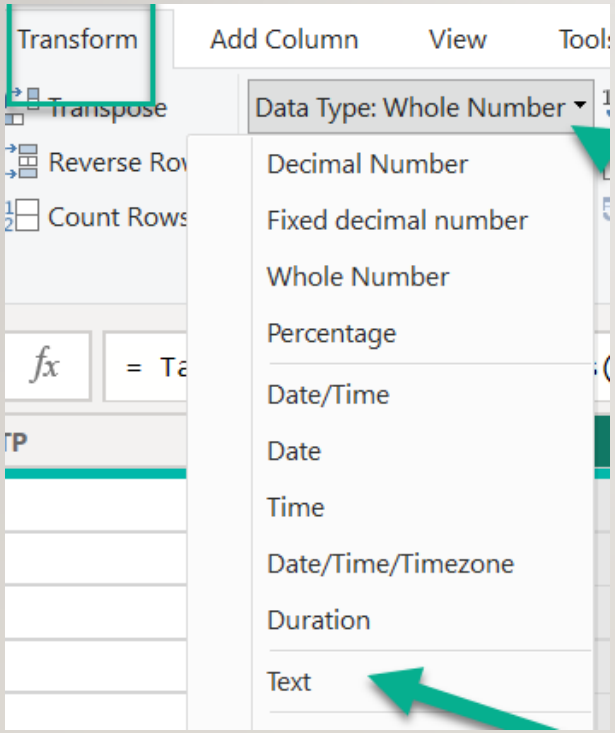


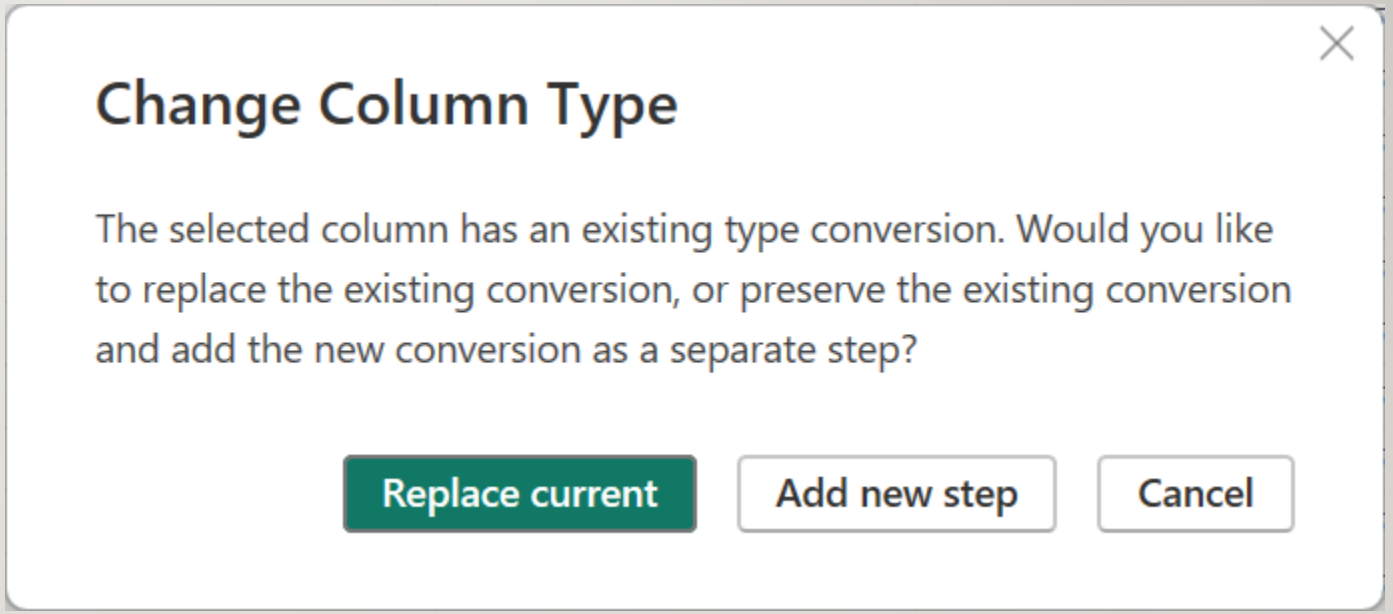
WRONG DATA TYPES





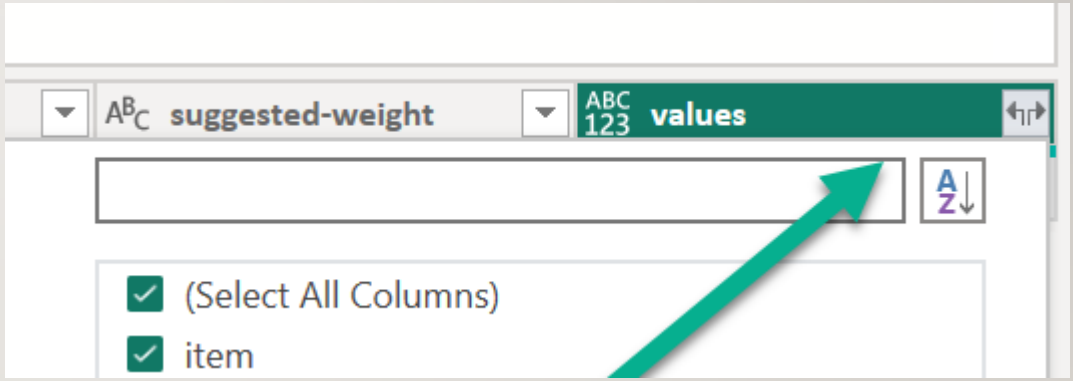
FIX DATA TYPES – SELECT COLUMNS

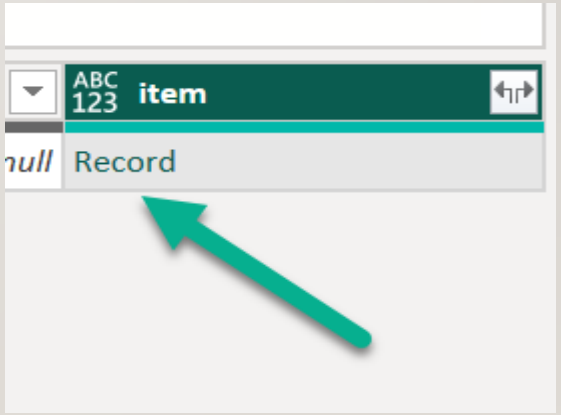




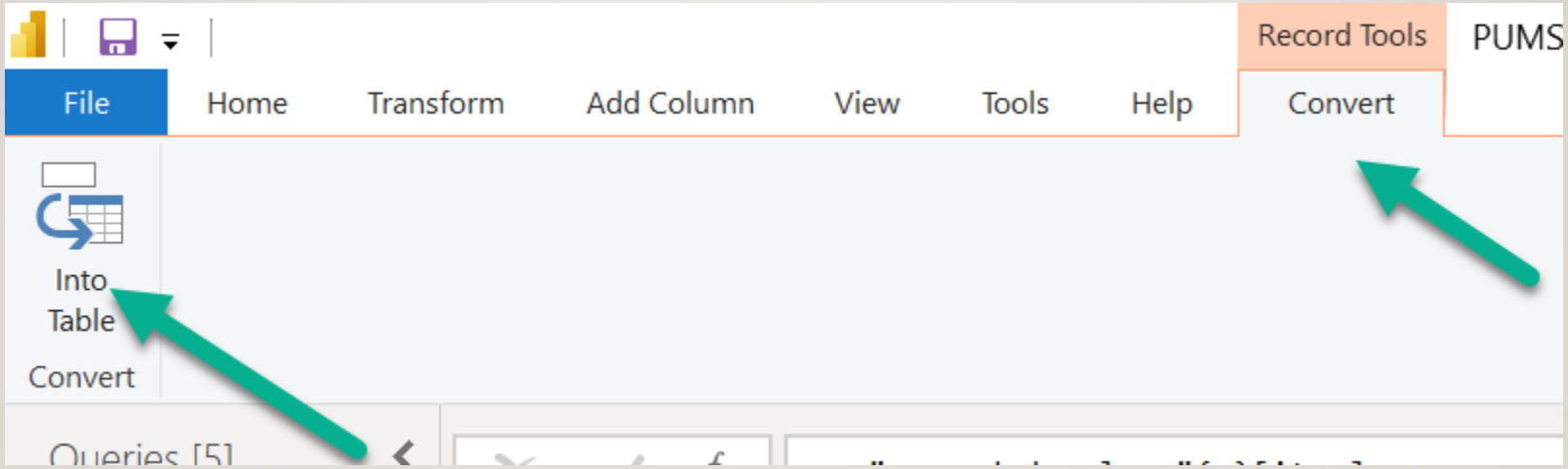
EXPAND THE VALUES

- Click the icon in values column
- But click record in item





CONVERT RECORD TO TABLE



PUMS FILTER AND SUMMARY

FILTERING

- Use the column name as the parameter. The equals values are the filters
  - &HHLDRHISP=01:99
  - This is read "Where HHLDRHISP is between 01 and 99
- Geography filters are different
  - $for=state:06,48
  - This is read: where the state (ST) is in 06 and 48.

SUMMARIZED DATA

- To summarize you add tabulate query parameter
  - &tabulate=weight(

PUMS METADATA API

- 'https://api.census.gov/data/2021/acs/acs1/pums/variables.json'

```
1    results
[10] ✓ - Command executed in 736 ms on 8:40:13 PM, 3/14/23
···  {'variables': {'for': {'label': "Census API FIPS 'for' clause",
       'concept': 'Census API Geography Specification',
       'predicateType': 'fips-for',
       'group': 'N/A',
       'limit': 0,
       'predicateOnly': True},
      'in': {'label': "Census API FIPS 'in' clause",
       'concept': 'Census API Geography Specification',
       'predicateType': 'fips-in',
       'group': 'N/A',
       'limit': 0,
       'predicateOnly': True},
      'ucgid': {'label': 'Uniform Census Geography Identifier clause',
       'concept': 'Census API Geography Specification',
```

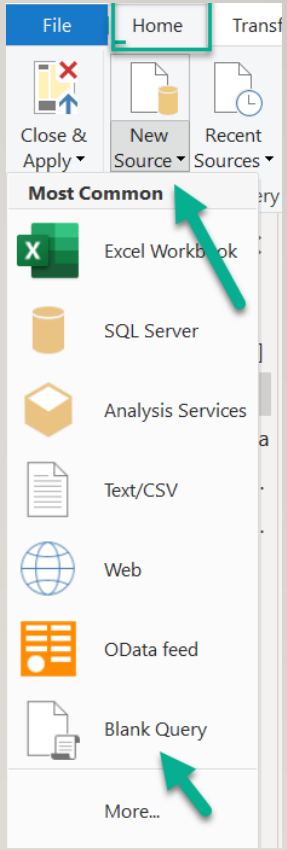
PUMS METADATA POWER QUERY

```
let
    Source = Json.Document(Web.Contents("https://api.census.gov/data/"
                        & "2021"
                        & "/acs/acs1/pums/variables.json")),
    variables = Record.ToTable(Source[variables]),
    #"Expanded Value" = Table.ExpandRecordColumn(variables, "Value", {"label", "concept", "predicateType", "group", "limit", "predicateOnly"}, {"label", "concept", "predicateType", "group", "limit", "predicateOnly"})
in
    #"Expanded Value"
```

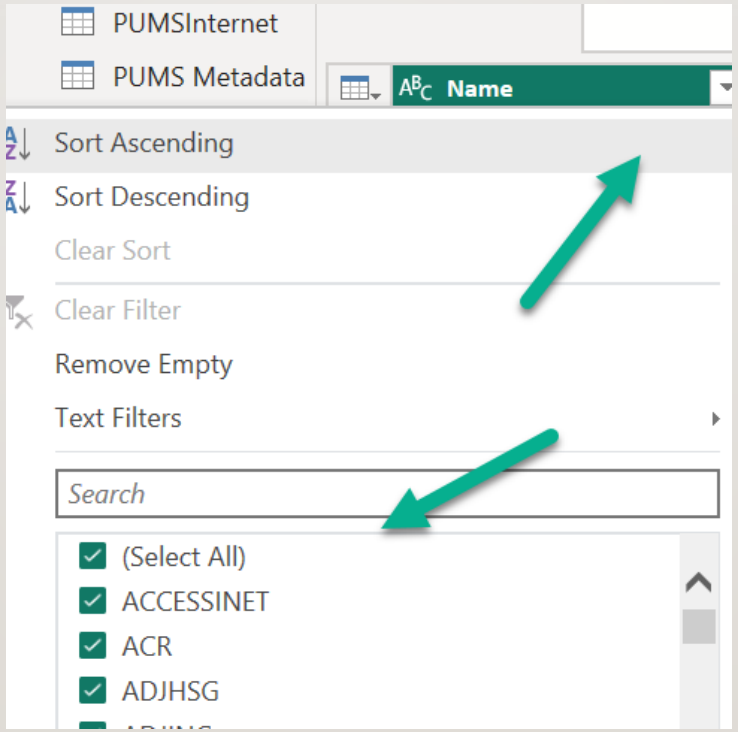
BUILD NEW QUERIES FROM OLD

- Add blank query
- For the source, type in the name of the old query

```
= #"PUMS Metadata"
```



SELECT COLUMN NAME



CMS MARKETPLACE

- CMS Developer Tools
  - https://developer.cms.gov/
- Documentation: API Specifications - Marketplace API (cms.gov)

CMS GET KEY

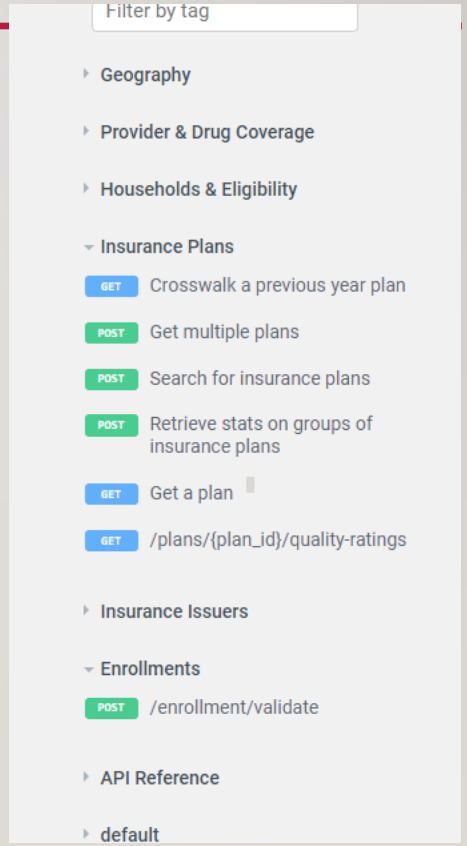
- Marketplace API Key Request (cms.gov)
- https://developer.cms.gov/marketplace-api/key-request.html

SAMPLES TO TRY

- API Specifications - Marketplace API (cms.gov)

SAMPLE TO TRY

- API Specifications - Marketplace API (cms.gov)
  - https://developer.cms.gov/marketplace-api/api-spec#/Insurance%20Plans/post_plans_search



REQUEST COMPONENTS

- https://
- marketplace.api.healthcar e.gov/
- api/v1/plans/search?apikey=


```
 {
"household": {
  "income": 52000,
  "people": [
    {
      "age": 27,
      "aptc_eligible": True,
      "gender": "Female",
      "uses_tobacco": False}},…
```

RESULTS

```
1    results
```

✓ - Command executed in 194 ms on 8:36:31 PM, 3/16/23


```
{'plans': [{'id': '19636LA0230006',
   'name': 'Community Blue 70/50 $4500',
   'premium': 263.91,
   'premium_w_credit': 263.91,
   'ehb_premium': 263.91,
   'pediatric_ehb_premium': 0,
   'aptc_eligible_premium': 263.91,
   'metal_level': 'Bronze',
   'type': 'POS',
   'state': 'LA',
   'benefits': [{'name': 'Primary Care Visit to Treat an Injury or Illness',
     'covered': True,
```

NOAA WEATHER

WEATHER API

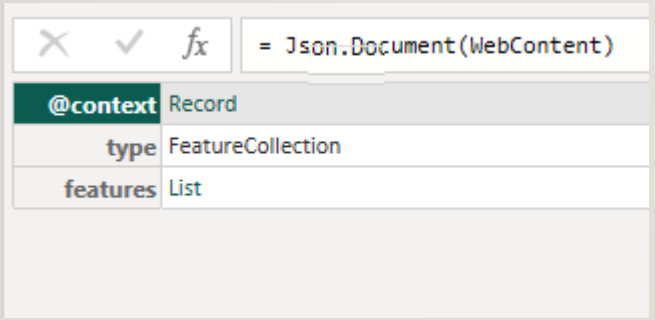
- API Web Service (weather.gov)
  - https://www.weather.gov/documentation/services-web-api
- Try it out: API Web Service (weather.gov)
- https://www.weather.gov/documentation/services-web-api
- NOAA National Weather Service
  - https://www.weather.gov/documentation/services

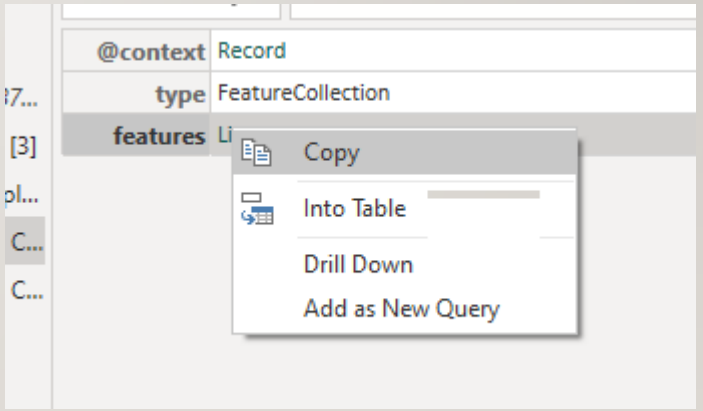
WEATHER API KEY

- No key is required. However, you need to add User-Agent header.
- User-Agent: {your name}

BASIC STRUCTURE

- @context: This describes the structure of the rest of the document
- features is a list of the records.
- Right click the list and click Drill Down





OTHER GOVERNMENT DATA

CURRENT POPULATION SURVEY BASIC MONTHLY

- CPS Basic Monthly (census.gov)

CPS API

- Getting Started : U.S. Bureau of Labor Statistics (bls.gov)

AMERICA TIME USE SURVEY

- ATUS home : U.S. Bureau of Labor Statistics (bls.gov)
- Obtaining ATUS Data : U.S. Bureau of Labor Statistics (bls.gov)

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- https://www.linkedin.com/in/russloski
- Slides and Code: https://bit.ly/43P3vxy
  - Presentations/Accessing Government API Data using Power BI at main · rloski-public/Presentations (github.com)