

Master : Traitement intelligent des systèmes

Reporting - Microsoft Power BI

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Année Universitaire: **2021/ 2022**



1. Power BI - Introduction et principes

2. Power BI Desktop

- Installation & configuration, Power BI Desktop Workflow, Data Model, Query Editor, etc

3. Query Editor

- Connexion aux sources de données, Opérations, Combinaison des requêtes, etc.

4. Data Model: Data & Relationship View

- Relations entre les sources de données, Langages DAX & M, etc.

5. Report View

- Visuels Power BI, Hiérarchies, Interactions, etc.

Power BI - Introduction et principes



Power BI



Collecter



Organiser



Analyser



Tableau de bord



Répondre aux questions



Mesurer le résultat de l'activité



Avoir des indicateurs



Aide à la décision



Qu'est ce que Power BI?

Power BI est un outil de Business Intelligence développé par Microsoft.

Il est spécifiquement destiné à :

- la visualisation de données
- la création de rapports
- l'aide au pilotage de l'entreprise
- la diffusion de l'information



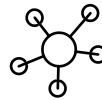
Power BI



Préparation et analyse des données



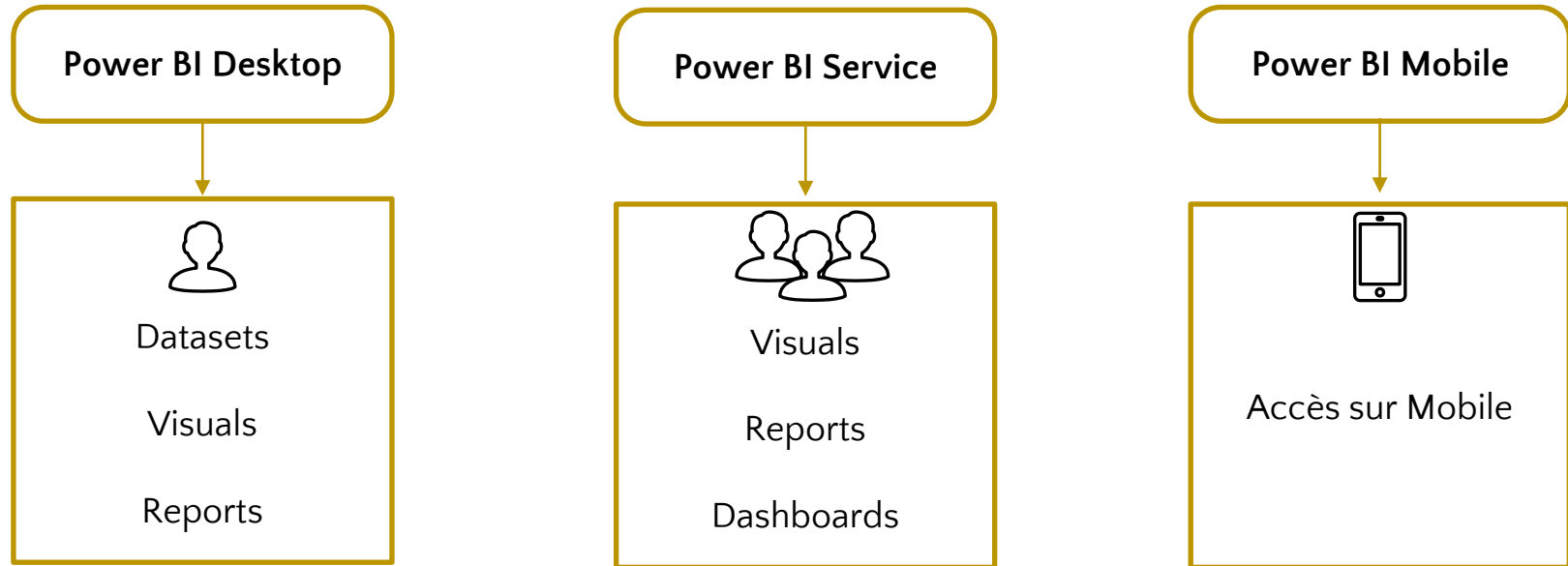
Visualisation des données



Collaboration et partage



Outils Power BI



Power BI Desktop

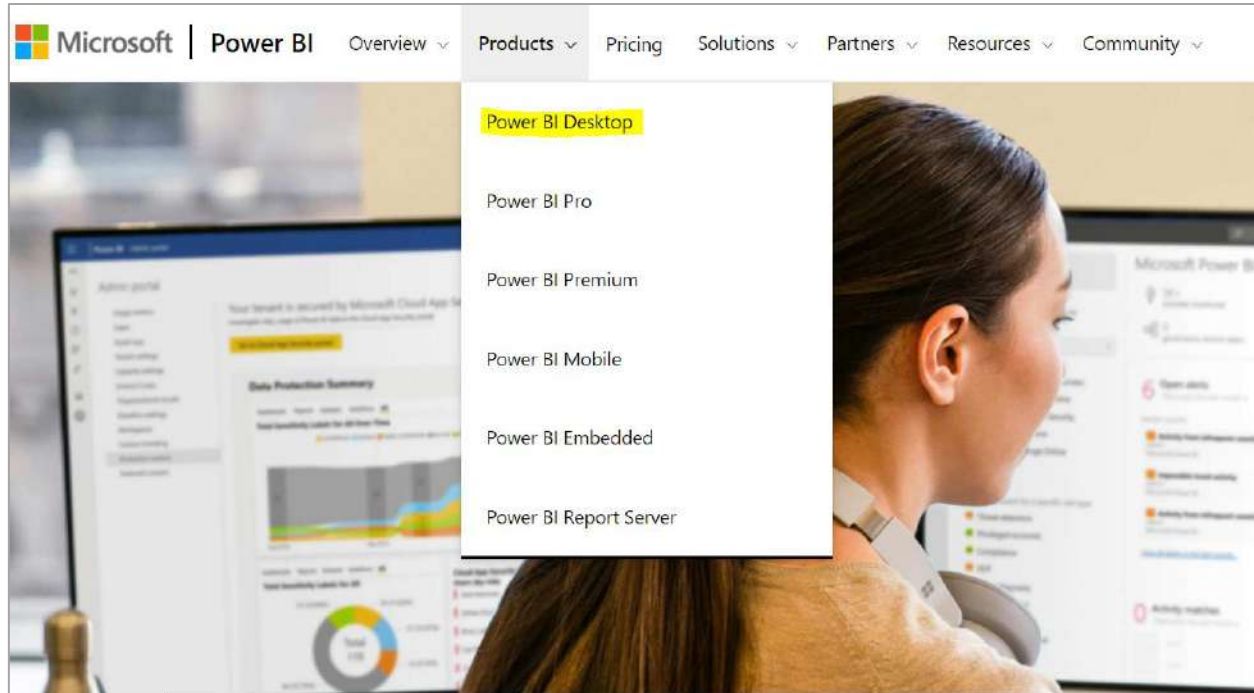


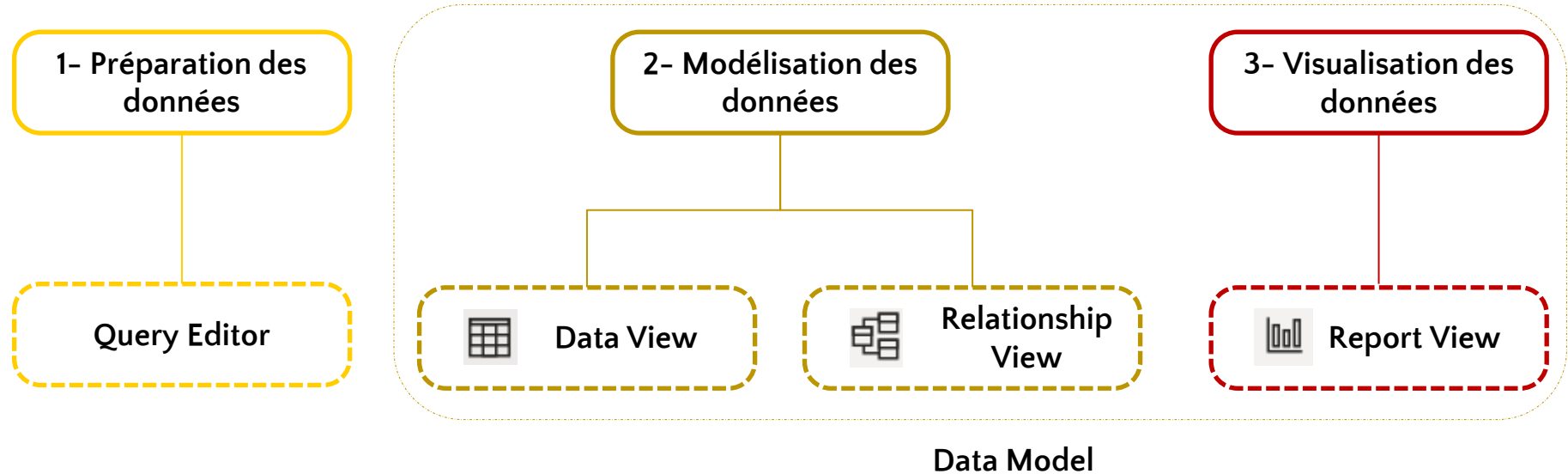


Aperçu

- Installation & configuration
- Power BI Desktop Workflow
- Data Model
- Query Editor
- Paramètres recommandés

<https://powerbi.microsoft.com/en-us/>

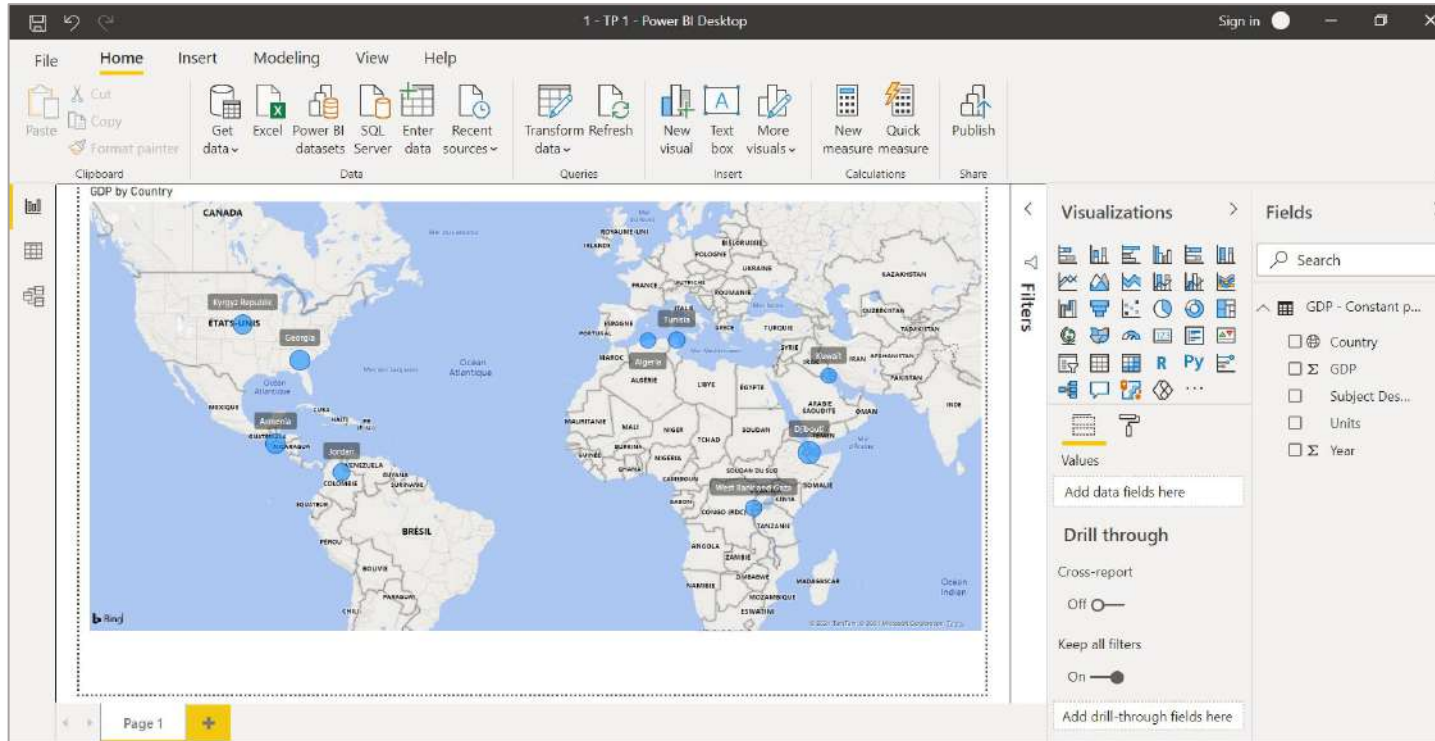




3

Data Model

[Link to the web datasource](#)



1 - TP 1 - Power Query Editor

Fichier Home Transform Add Column View Tools Help

Close & Apply New Source Recent Sources Enter Data Data source settings Manage Parameters Refresh Preview Properties Advanced Editor Manage Choose Columns Remove Columns Keep Rows Remove Rows Sort Split Column Group By Data Type: Text Use First Row as Headers Replace Values Merge Queries Append Queries Combine Files Text Analytics Vision Azure Machine Learning

Queries [1] GDP - Constant prices

	Country	Subject Descriptor	Units	Year	GDP
1	Afghanistan	Gross domestic product, constant prices	Percent change	2018	
2	Afghanistan	Gross domestic product, constant prices	Percent change	2021	
3	Afghanistan	Gross domestic product, constant prices	Percent change	2019	
4	Afghanistan	Gross domestic product, constant prices	Percent change	2020	
5	Afghanistan	Gross domestic product, constant prices	Percent change	2022	
6	Afghanistan	Gross domestic product, constant prices	Percent change	2023	
7	Afghanistan	Gross domestic product, constant prices	Percent change	2024	
8	Afghanistan	Gross domestic product, constant prices	Percent change	2025	
9	Algeria	Gross domestic product, constant prices	Percent change	2018	
10	Algeria	Gross domestic product, constant prices	Percent change	2021	
11	Algeria	Gross domestic product, constant prices	Percent change	2019	
12	Algeria	Gross domestic product, constant prices	Percent change	2020	
13	Algeria	Gross domestic product, constant prices	Percent change	2022	
14	Algeria	Gross domestic product, constant prices	Percent change	2023	
15	Algeria	Gross domestic product, constant prices	Percent change	2024	
16	Algeria	Gross domestic product, constant prices	Percent change	2025	
17	Armenia	Gross domestic product, constant prices	Percent change	2018	
18	Armenia	Gross domestic product, constant prices	Percent change	2021	
19	Armenia	Gross domestic product, constant prices	Percent change	2019	
20	Armenia	Gross domestic product, constant prices	Percent change	2020	
21	Armenia	Gross domestic product, constant prices	Percent change	2022	
22	Armenia	Gross domestic product, constant prices	Percent change	2023	
23					

5 COLUMNS, 243 ROWS Column profiling based on top 1000 rows

Query Settings

PROPERTIES

Name
GDP - Constant prices

[All Properties](#)

APPLIED STEPS

- Source
- Extracted Table From Html
- Changed Type
- Promoted Headers
- Changed Type1
- Removed Columns
- Reordered Columns
- Unpivoted Columns
- Renamed Columns
- Filtered Rows
- Changed Type with Locale
- Changed Type2

PREVIEW DOWNLOADED AT 13:57

Options

GLOBAL

- Data Load
- Power Query Editor
- DirectQuery
- R scripting
- Python scripting
- Security
- Privacy
- Regional Settings**
- Updates
- Usage Data
- Diagnostics
- Preview features
- Auto recovery
- Report settings

CURRENT FILE

- Data Load
- Regional Settings
- Privacy
- Auto recovery

Application language
Language used in the Power BI Desktop user interface, such as the ribbon and dialog boxes.
English (United States) ▼

Model language
Language used when comparing strings in data and for creating internal date fields. This only applies when a report is first created, and can't be changed on existing reports.
English (United States) ▼

[Learn more](#)

OK Cancel

Options

GLOBAL

- Data Load
- Power Query Editor
- DirectQuery
- R scripting
- Python scripting
- Security
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CURRENT FILE

- Data Load**
- Regional Settings
- Privacy
- Auto recovery

Type Detection
☐ Detect column types and headers for unstructured sources

Relationships
☐ Import relationships from data sources on first load ⓘ
☐ Update or delete relationships when refreshing data ⓘ
☐ Autodetect new relationships after data is loaded ⓘ
[Learn more](#)

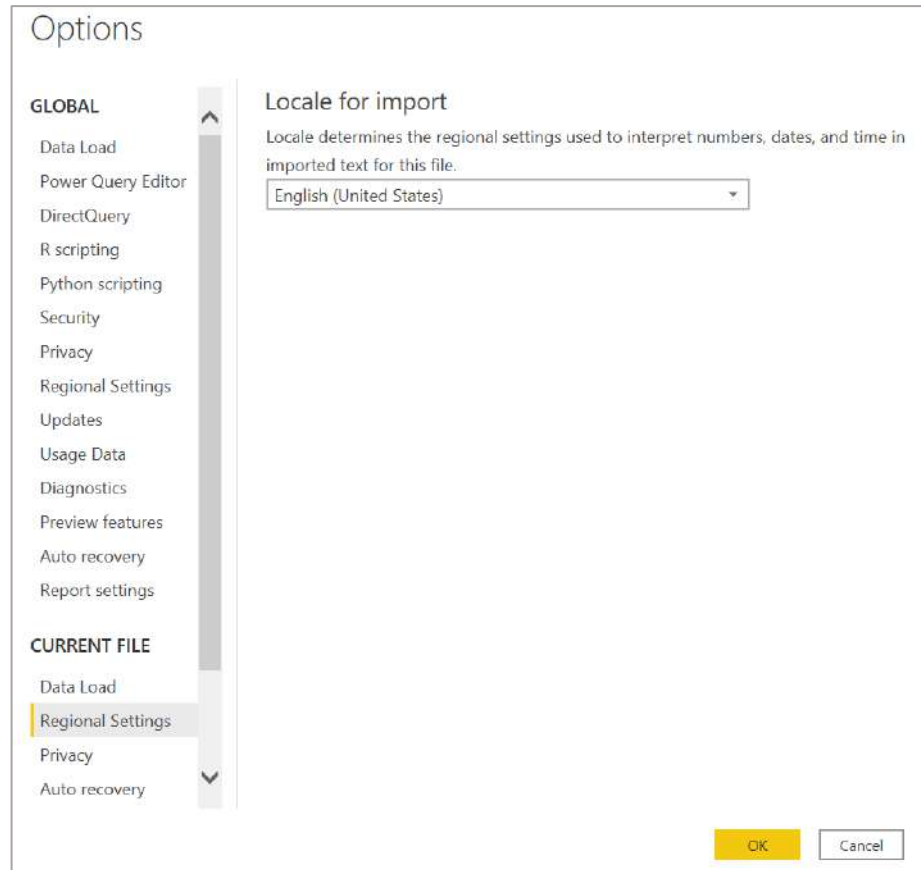
Time intelligence
☒ Auto date/time ⓘ [Learn more](#)

Background Data
☒ Allow data previews to download in the background

Parallel loading of tables
☒ Enable parallel loading of tables ⓘ

Q&A
☒ Turn on Q&A to ask natural language questions about your data ⓘ [Learn more](#)

OK Cancel



Query Editor :

Préparation du DataSet





Aperçu

- Connexion aux sources de données
- Transformation des données
- Combinaison des requêtes : Append – Merge
- Query Duplicate vs Reference
- Création d'un modèle de données (Schéma en Etoile)

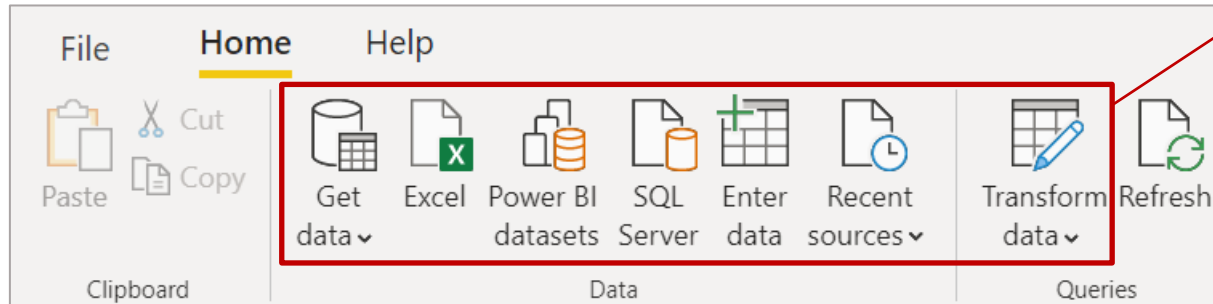
1

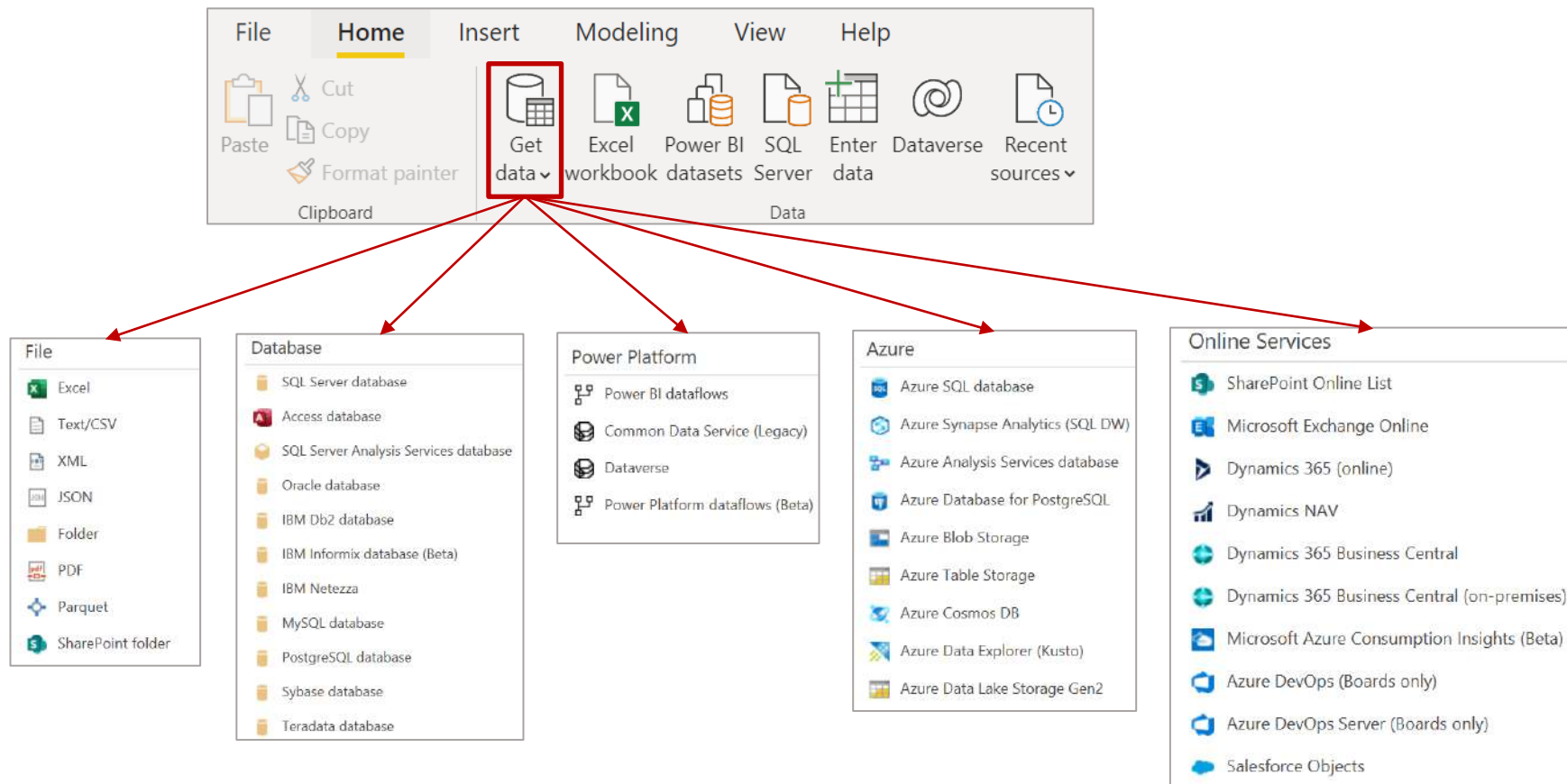
Power Query

Power Query permet de:

- Se connecter aux données
- Mettre en forme, agréger, transformer et combiner des données
- Regrouper des lignes
- Créer des colonnes personnalisées
- Utiliser des formules de requête

Accès à *Power Query*





Outils
d'édition de
requêtes

Requêtes

Aperçu des
données

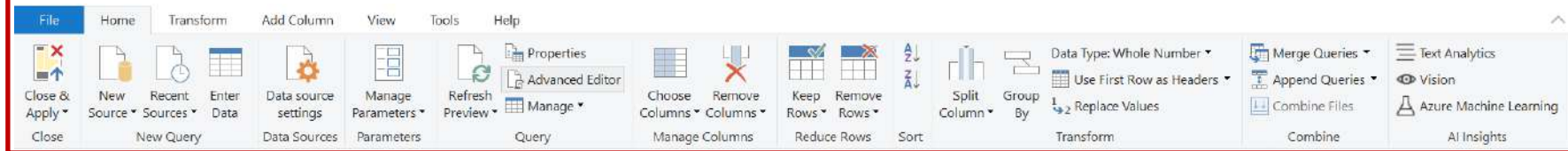
The screenshot shows the Power Query Editor window titled "2 - TP2 - Power Query Editor". The interface includes a ribbon with tabs: File, Home, Transform, Add Column, View, Tools, and Help. The Formula Bar at the top displays the M code: `= Table.AddColumn(#"Renamed Columns1", "Age-Category", each if [#"Age-Group-Max"] <= 4 then "Baby"`. The left sidebar shows a list of queries, including "Dim-Age", "Dim-Region", "Fact-Population", and "Merge Group [3]". The main area displays a table with columns: Age-Group-ID, Age-Group, Age-Group-Max, and Age-Category. The right sidebar shows the "Query Settings" pane with "PROPERTIES" (Name: Dim-Age) and "APPLIED STEPS" (Source, Removed Other Columns, Removed Duplicates, Added Index, Changed Type, Reordered Columns, Renamed Columns, Inserted Text After Delimiter, Replaced Value, Changed Type1, Renamed Columns1, and Added Conditional Column).

Annotations:

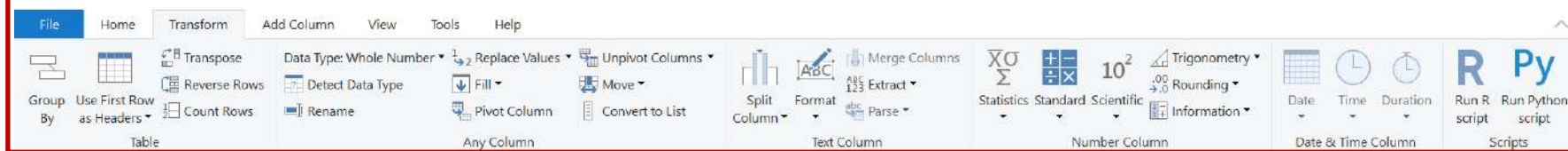
- Outils d'édition de requêtes:** Points to the ribbon and Formula Bar.
- Requêtes:** Points to the left sidebar query list.
- Aperçu des données:** Points to the main data table.
- Barre de formule:** Points to the Formula Bar.
- Étapes appliquées:** Points to the "APPLIED STEPS" list in the right sidebar.

Age-Group-ID	Age-Group	Age-Group-Max	Age-Category
1	0-4	4	Baby
2	5-9	9	Child
3	10-14	14	Child
4	15-19	19	Teenager
5	20-24	24	Teenager
6	25-29	29	Young Adult
7	30-34	34	Young Adult
8	35-39	39	Adult
9	40-44	44	Adult
10	45-49	49	Adult
11	50-54	54	Adult
12	55-59	59	Adult
13	60-64	64	Adult
14	65-69	69	Senior
15	70-74	74	Senior
16	75-79	79	Senior
17	80-84	84	Senior
18	85-89	89	Senior
19	90-94	94	Senior
20	95-99	99	Senior
21	100+	100	Senior

Home: Paramètres généraux et outils de transformation de table courants

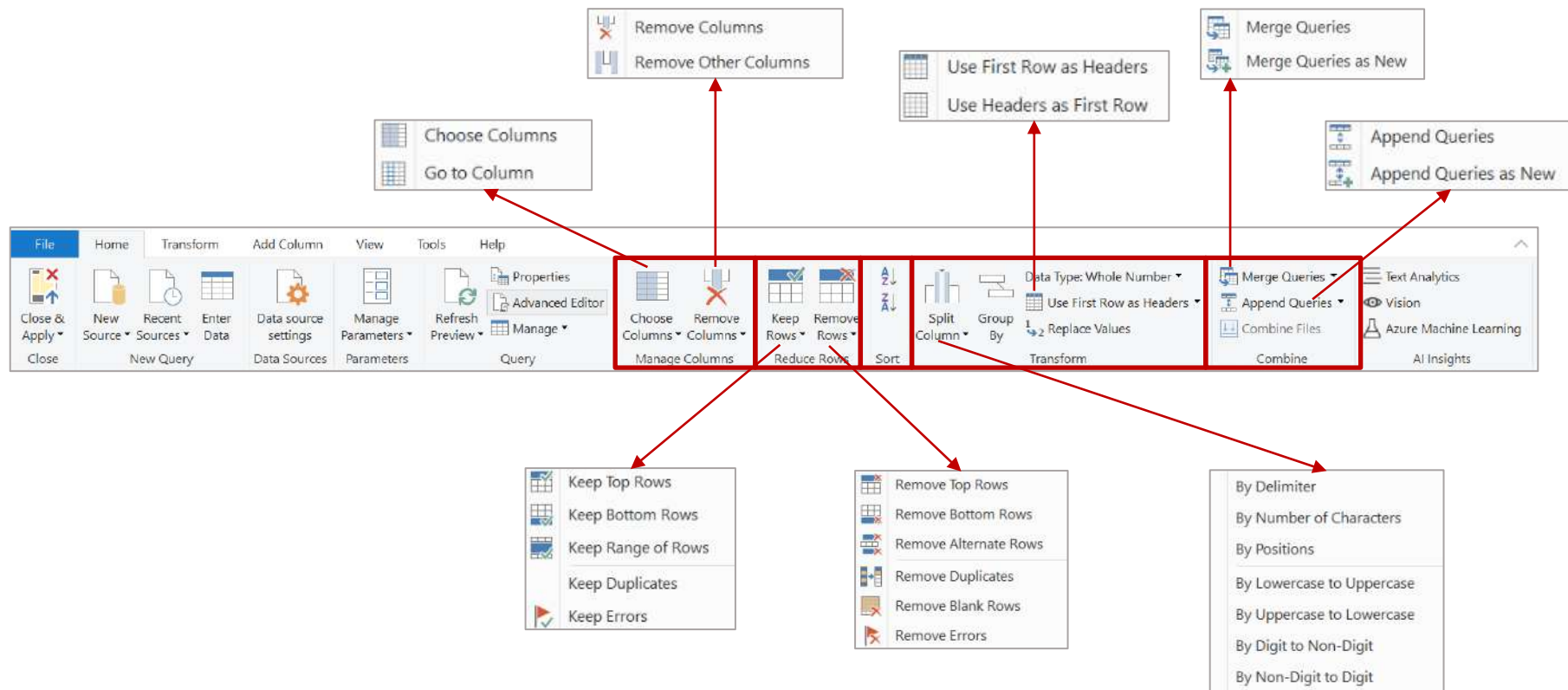


Transform: Modifier les colonnes (Transposer, Changer le type, Extraire du texte, Fractionner, etc.)



Add Column: Créer de nouvelles colonnes se basant sur des conditions, opérations sur des textes, dates, etc.





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Combinaison des requêtes - Append

Query 1 ⇒

Queries [3]	1 ² ₃ LocID	A ^B _C Location	1 ² ₃ Time	A ^B _C AgeGrp	1 ² ₃ AgeGrpStart
population-2000-2049	1	4 Afghanistan		2000 0-4	0
population-2050-2100	2	8 Albania		2000 0-4	0
Append Pop-2000-2100	3	12 Algeria		2000 0-4	0
	4	24 Angola		2000 0-4	0

Query 2 ⇒

Queries [3]	1 ² ₃ LocID	A ^B _C Location	1 ² ₃ Time	A ^B _C AgeGrp	1 ² ₃ AgeGrpStart
population-2000-2049	1	4 Afghanistan		2050 0-4	0
population-2050-2100	2	8 Albania		2050 0-4	0
Append Pop-2000-2100	3	12 Algeria		2050 0-4	0
	4	24 Angola		2050 0-4	0

Query 3 ⇒

Queries [3]	1 ² ₃ LocID	A ^B _C Location	1 ² ₃ Time	A ^B _C AgeGrp	1 ² ₃ AgeGrpStart
population-2000-2049	1	4 Afghanistan		2000 0-4	0
population-2050-2100	2	8 Albania		2000 0-4	0
Append Pop-2000-2100	3	12 Algeria		2000 0-4	0
	4	24 Angola		2000 0-4	0
	5	4 Afghanistan		2050 0-4	0
	6	8 Albania		2050 0-4	0
	7	12 Algeria		2050 0-4	0
	8	24 Angola		2050 0-4	0

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Combinaison des requêtes - Merge

1^2_3 Country-ID	A^B_C Country
4	Afghanistan
8	Albania
12	Algeria
24	Angola
28	Antigua and Barbuda

1^2_3 Country-ID	A^B_C Region-Code
4	AS
8	EU
10	AN
12	AF
16	OC
20	EU
24	AF
28	NA

Merge

1^2_3 Country-ID	A^B_C Country	A^B_C Region-Code
4	Afghanistan	AS
8	Albania	EU
12	Algeria	AF
24	Angola	AF
28	Antigua and Barbuda	NA

8

Types de jointures

LEFT QUERY	
ID	Sales
A	10
B	50
C	20

RIGHT QUERY	
ID	Region
A	USA
BB	Europe
C	Asia

Outer

LEFT		
ID	Sales	Region
A	10	USA
B	50	n/a
C	20	Asia

FULL		
ID	Sales	Region
A	10	USA
B	50	n/a
C	20	Asia
BB	n/a	Europe

RIGHT		
ID	Region	Sales
A	USA	10
BB	Europe	n/a
C	Asia	20

Anti

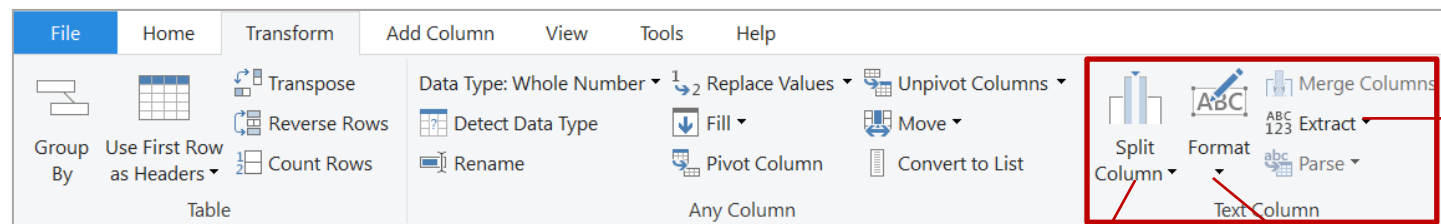
LEFT		
ID	Sales	Region
B	50	n/a

RIGHT		
ID	Region	Sales
BB	Europe	n/a

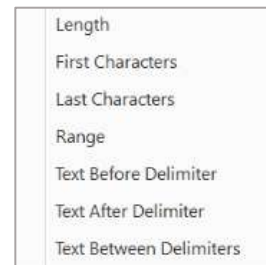
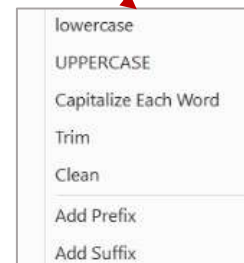
INNER		
ID	Sales	Region
A	10	USA
C	20	Asia

7

Transformations : Colonnes de type Texte



Les mêmes fonctionnalités sont aussi disponibles sur l'onglet **Add Column**. Cependant, il faut choisir l'onglet selon si vous voulez ajouter une nouvelle colonne ou effectuer des changements sur une colonne existante.



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Transformations : Colonnes de type Nombre

The screenshot shows the 'Transform' ribbon in Excel. The 'Number Column' group is highlighted with a red box. Below it, five sub-groups are shown with their respective functions:

- Statistics:** Sum, Minimum, Maximum, Median, Average, Standard Deviation, Count Values, Count Distinct Values.
- Standard:** Add, Multiply, Subtract, Divide, Integer-Divide, Modulo, Percentage, Percent Of.
- Scientific:** Absolute Value, Power, Square Root, Exponent, Logarithm, Factorial.
- Trigonometry:** Sine, Cosine, Tangent, Arcsine, Arccosine, Arctangent.
- Rounding:** Round Up, Round Down, Round...
- Information:** Is Even, Is Odd, Sign.

Fonctions statistiques permettant d'évaluer les statistiques de base pour la colonne sélectionnée (somme, min / max, moyenne, count, etc.)



Les fonctions **Statistics** retournent une valeur scalaire, Ils sont utilisés pour explorer la table.



Contrairement aux fonctions **Statistics**, les autres fonctions s'appliquent à toutes les lignes de notre table

	AB _C Age-Group	1 ² ₃ AgeGrpSpan	1.2 Population-Male	1.2 Population-Female
1	0-4	5	630.044	661.578
2	0-4	5	93.94	86.84

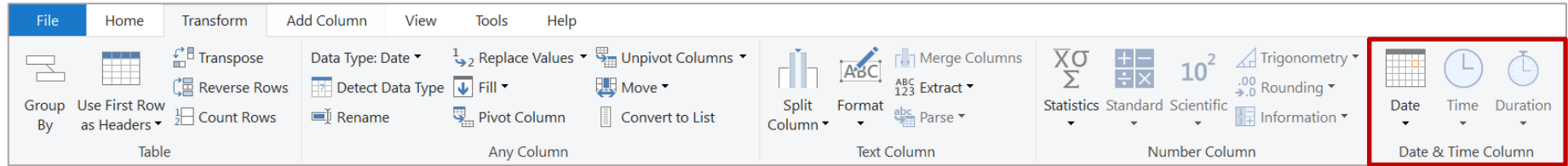
Unpivot

Possible avec une
ou plusieurs
colonnes

	AB _C Age-Group	1 ² ₃ AgeGrpSpan	AB _C Attribute	1.2 Value
1	0-4	5	Population-Male	630.044
2	0-4	5	Population-Female	661.578
3	0-4	5	Population-Male	93.94
4	0-4	5	Population-Female	86.84

Pivot

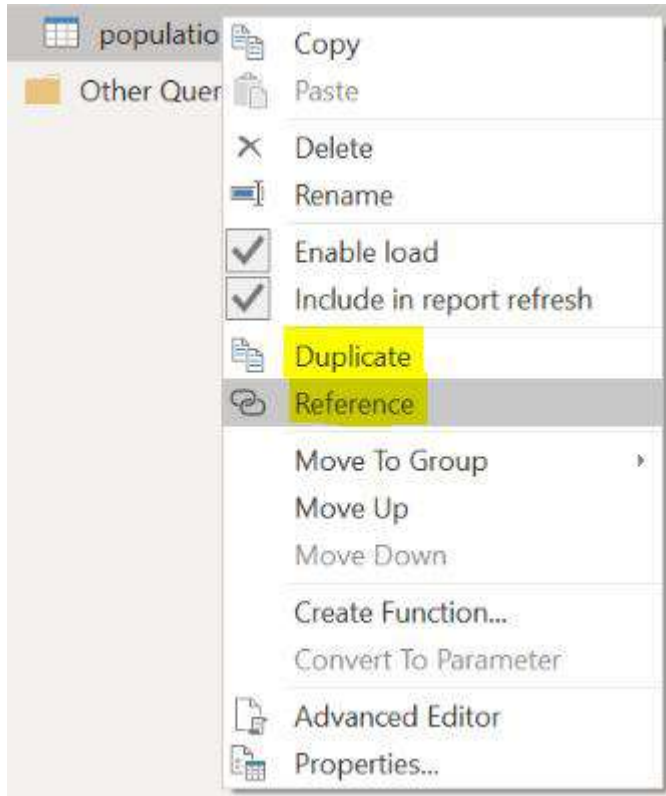
Possible avec une
seule colonne



Les fonctionnalités Date & Time incluent les options suivantes:

- **Age:** Différence entre la date actuelle et la date dans chaque enregistrement
- **Date Only:** Elimine la composante time d'une colonne de type date/time
- **Year/Month/Quarter/Week/Day:** Extrait des composantes spécifiques de la colonne (Heure, Minute, Seconde, etc.)
- **Earliest/Latest:** évalue les dates les plus anciennes et récentes dans une colonne.



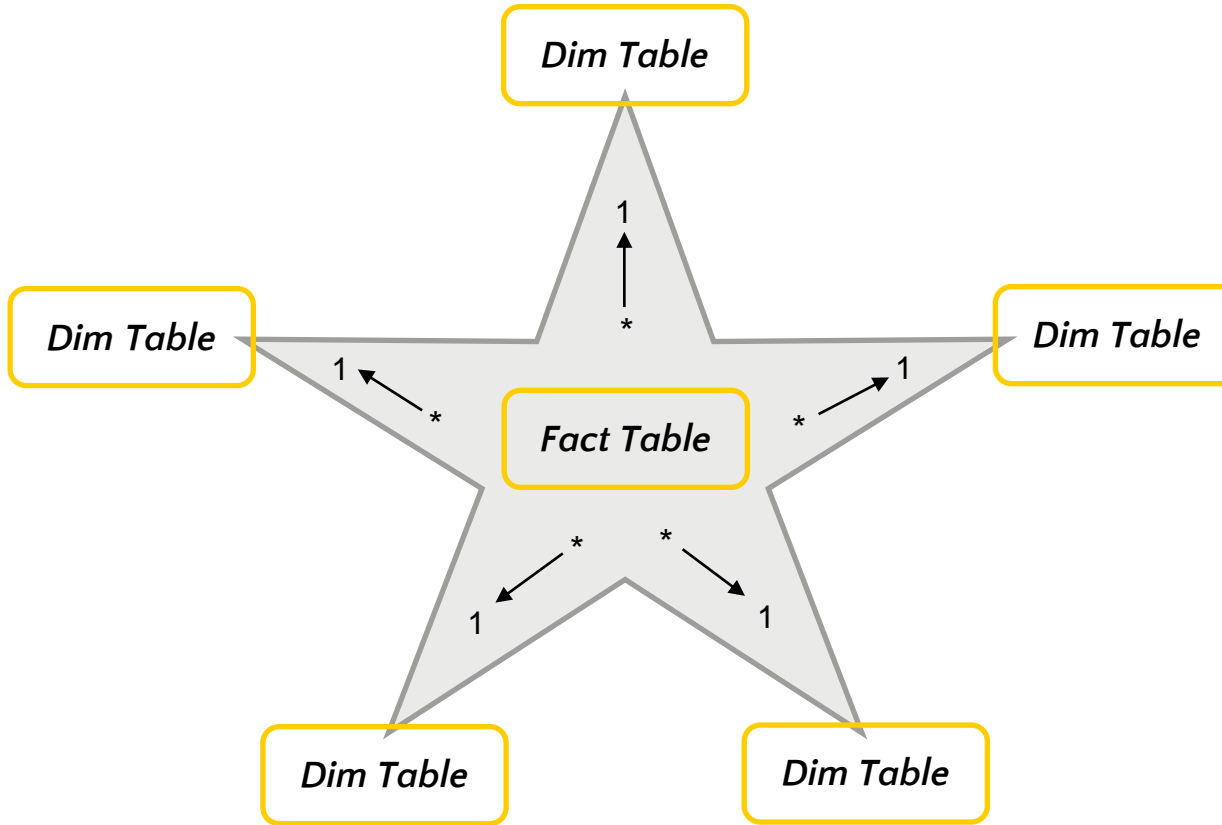


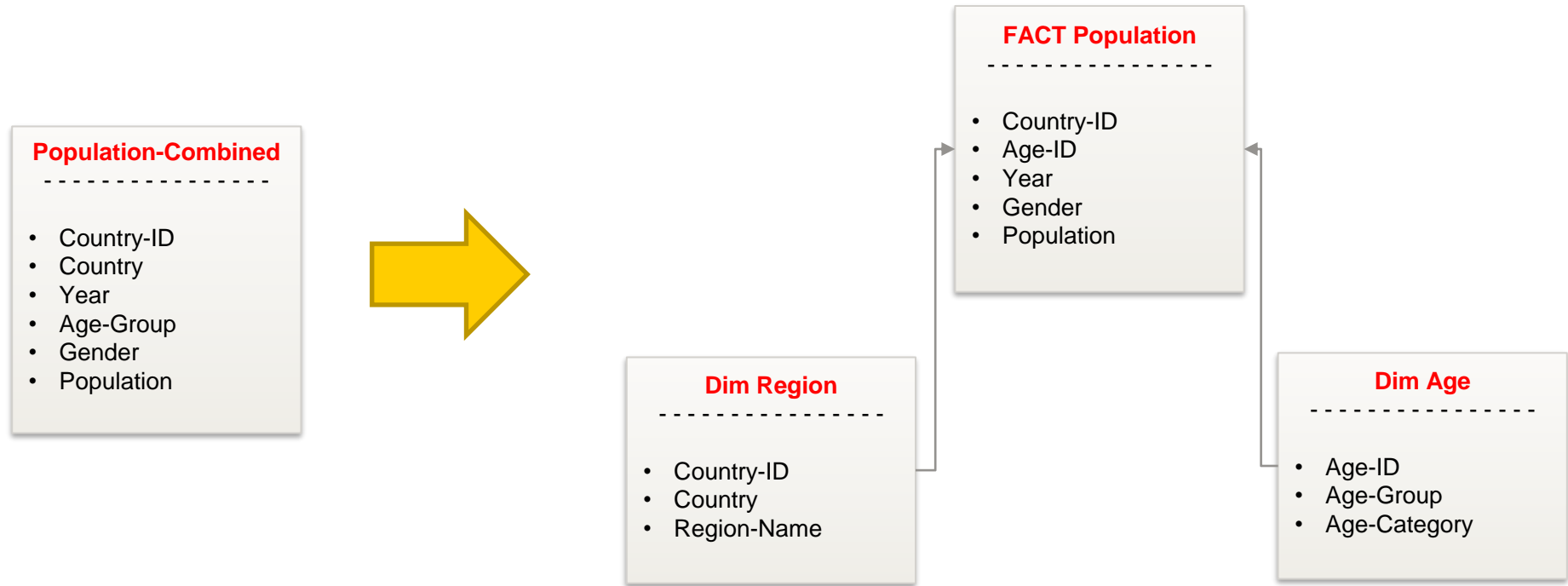
Duplicate

Copie une requête avec toutes les étapes appliquées en tant que nouvelle requête; une copie exacte => à choisir lorsque vous souhaitez copier une requête, mais effectuer une configuration différente par étapes.

Reference

Crée une nouvelle requête qui n'a qu'une seule étape: obtenir les données de la requête d'origine. (Append / Merge : Référencent indirectement les requêtes)





Merci pour votre attention 😊

END