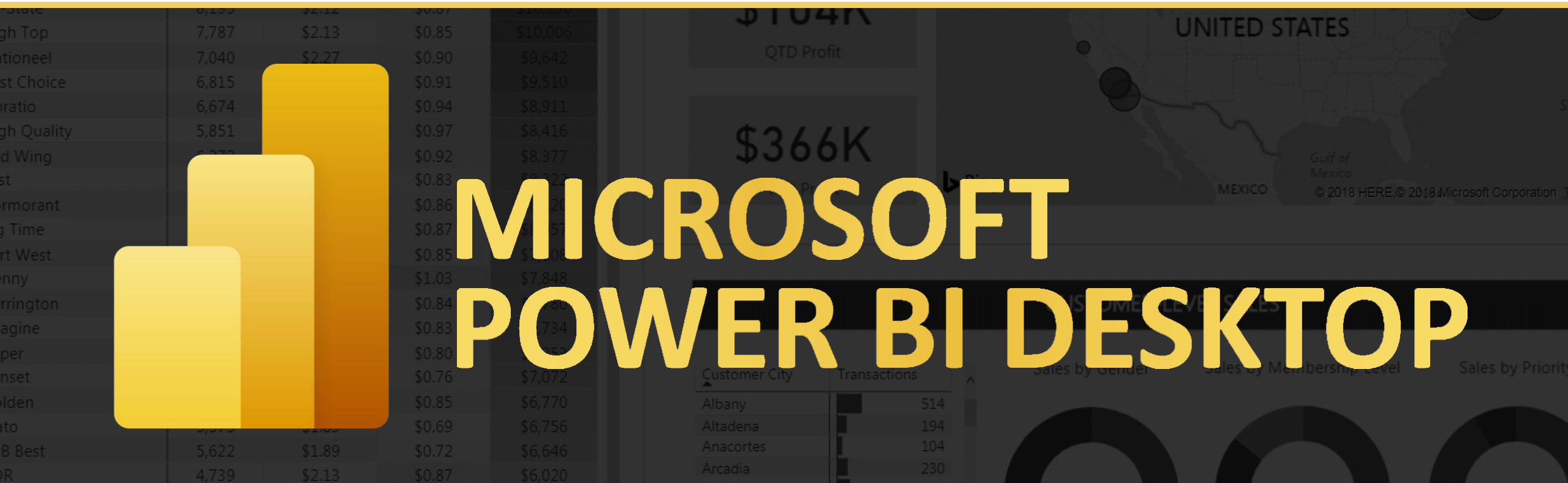




MICROSOFT POWER BI DESKTOP



ESTRUTURA DO CURSO

1	Introdução ao Power BI Desktop	<i>Instalação do Power BI Desktop, exploração do Power BI workflow, comparação Power BI vs. Excel, etc.</i>
2	Conectando e Transformando Dados	<i>Conexão de dados, transformação de tabelas, profiling tools, edição, merging & appending queries, etc.</i>
3	Criação do Modelo de Dados	<i>Construir modelos relacionais, criar relacionamentos de tabelas, entender cardinalidade e filter flow, etc.</i>
4	Calcular Measures com DAX	<i>Sintaxe DAX, adicionar colunas e medidas calculadas, formulas e funções, etc.</i>
5	Visualizar dados com Dashboards	<i>Inserir gráficos e visuals, customizar formats, editar interactions, aplicar filters and bookmarks, etc.</i>
6	Otimizar a performance do Power BI	<i>Explorar Power BI optimization tools com Optimize and External tools menus</i>

PROJETO DO CURSO

CONTEXTO

Você foi contratado como um Analista de BI pela **AdventureWorks***, uma empresa global que produz equipamentos e acessórios para ciclismo.

PROBLEMA

O time de gestão precisa uma maneira de **monitorar KPIs** (vendas, receita, lucro, devoluções), **comparar performance regional**, **analisar tendências de produtos** e **identificar clientes de alto valor**.

Foi disponibilizado um diretório de arquivos csv, que contém informações sobre transações, devoluções, produtos, clientes, vendas e territórios.

OBJETIVO

Utilizar Power BI Desktop para:

- Conectar e transformar os dados iniciais
- Construir um modelo de dados relacional
- Criar colunas e medidas calculadas com DAX
- Desenvolver um dashboard interativo para visualizar os dados



ALINHANDO EXPECTATIVAS

1 O que você vê na sua tela **pode nem sempre ser igual a minha**

- *Power BI Desktop features são atualizadas frequentemente, com novas versões lançadas mensalmente*
- **NOTA:** *Power BI é atualmente compatível apenas com PC/Windows (não disponível para Mac)*

2 Este curso é destinado para te ajudar com **foundational skills**

- *O objetivo é te auxiliar com fundamentos sólidos de Power BI desktop workflow; alguns tópicos são simplificados e não cobrirá advanced tools (M code, advanced DAX, R/Python visuals, etc.)*

3 Aprendizado **hands-on** e **project-based**

- *O valor do curso está em acompanhar e refazê-lo de forma prática; construiremos um workflow de BI para criar um dashboard de nível profissional a partir do 0*

4 Não cobriremos **Power BI Service**

- *O curso foca no Power BI Desktop , online sharing e collaboration features (app.powerbi.com) precisam de uma conta separada.*

INTRODUÇÃO AO POWER BI

CONHEÇA O POWER BI



Microsoft Power BI é um self-service business intelligence platform, que inclui tanto desktop e web-based applications para conectar, modelar e visualizar dados

Referência: powerbi.microsoft.com



Figure 1: Magic Quadrant for Analytics and Business Intelligence Platforms



POR QUE POWER BI?



Conecta, transforma e carrega milhões de linhas de dados

- *Acesso a dados a partir de qualquer origem (database tables, flat files, web, cloud services, folders, etc.), e cria workflows automáticos para extrair, transformar e carregar dados para análise.*



Constrói modelos relacionais para integrar dados de diversas origens

- *Relaciona tabelas para análise holística do modelo de dados relacional*



Define cálculos complexos utilizando Data Analysis Expressions (DAX)

- *Advanced analytics através de DAX expressions*



Traz dados vívidos através de interactive reports e dashboards

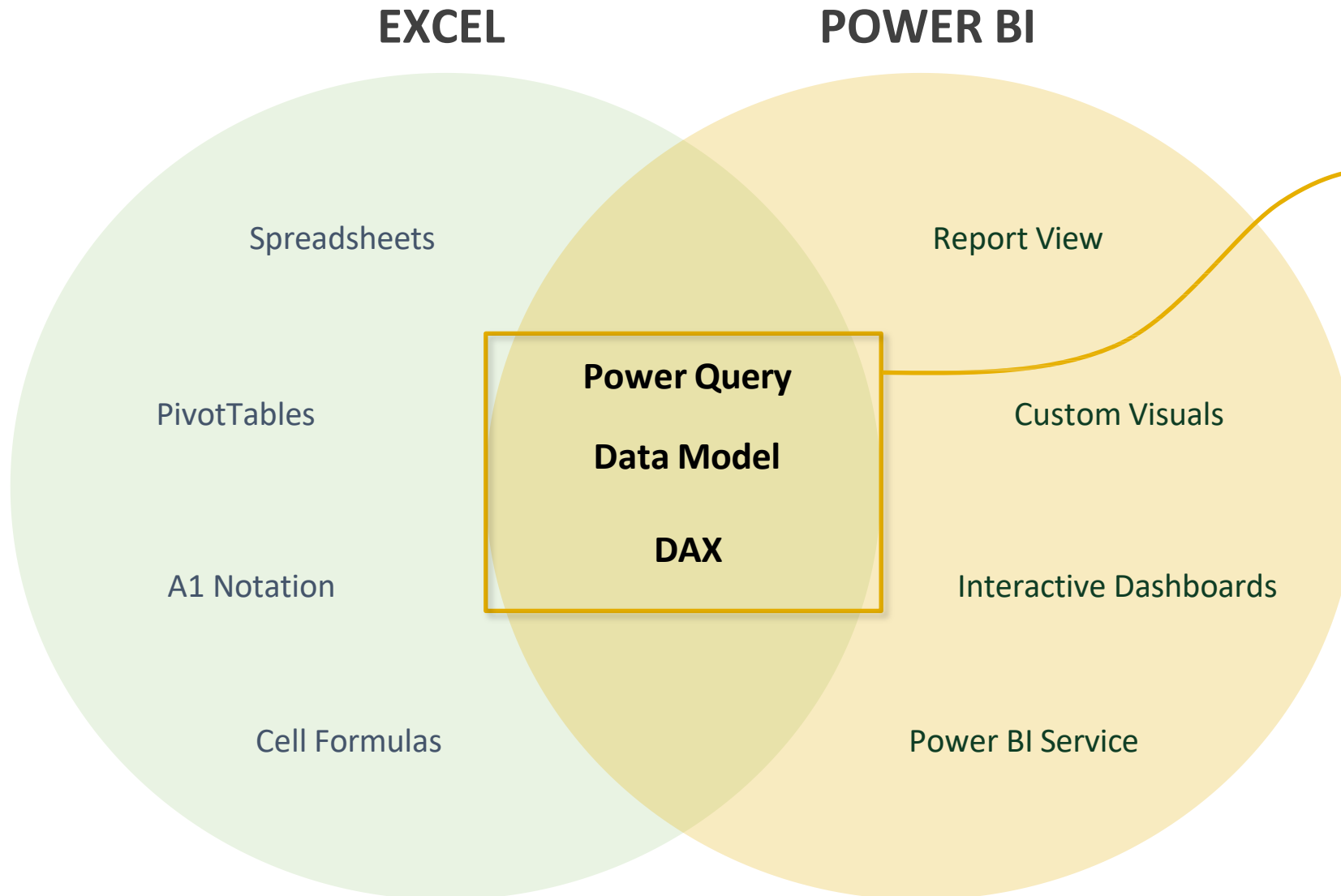
- *Reports e dashboards profissionais com as melhores ferramentas de visualização de dados*



Desenvolve habilidades versáteis e demandadas

- *Power BI é líder em self-service BI, e as habilidades construídas durante esse curso podem ser facilmente transferidas para outras ferramentas*

EXCEL VS. POWER BI

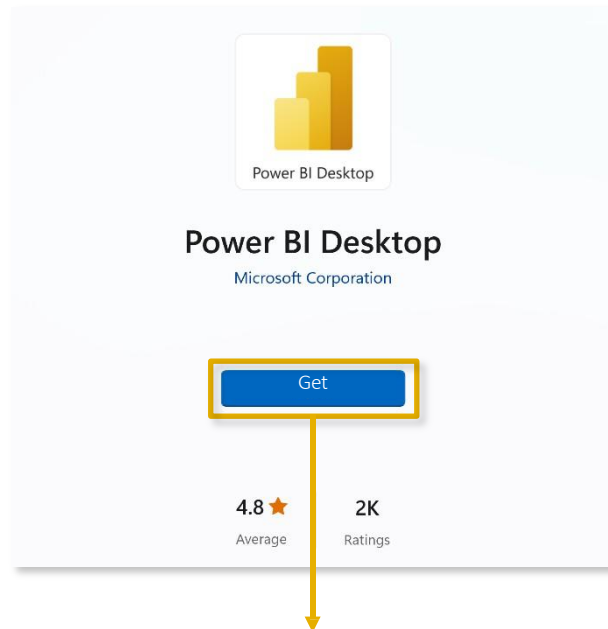


Excel e Power BI são construídos sob **as mesmas analytics engines**

- Power BI utiliza o mesmo conceito para data transformation e modeling e adiciona **visualizações poderosas e ferramentas para publicação**
- Transição fácil; é possível importar um **data model** direto do Excel!

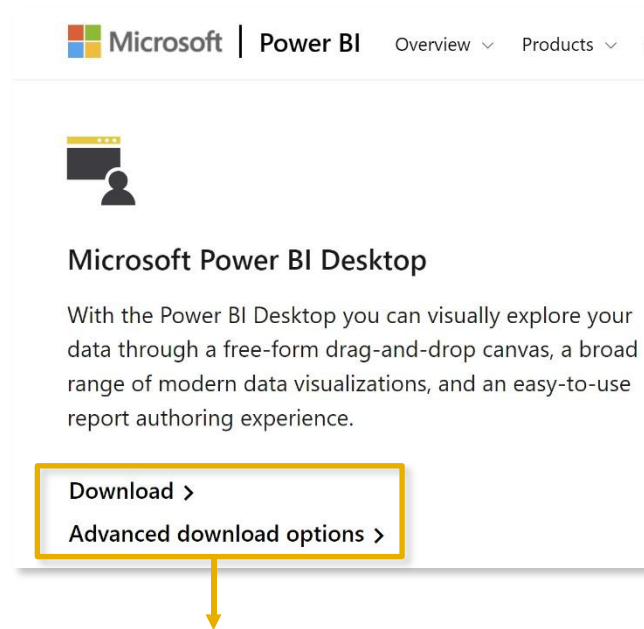
INSTALAÇÃO POWER BI DESKTOP

1) Download da **Microsoft store** *apps.microsoft.com*



- Windows gerencia **automatic updates**
- Updates somente em elementos que mudaram
- Não precisa de acesso de admin

2) Download **manual pela web** *powerbi.microsoft.com/downloads*



- **No automatic updates** (permite version control)
- Baixa um arquivo de instalação executável
- Acesso de admin pode ser necessário

3) Instalação pelo **Microsoft 365** *microsoft.com/en-us/microsoft-365*



- Power BI Desktop está incluso no enterprise Office/Microsoft 365 subscriptions
- Se a sua empresa utiliza o Microsoft 365, fale com um administrador para ter acesso ao Power BI

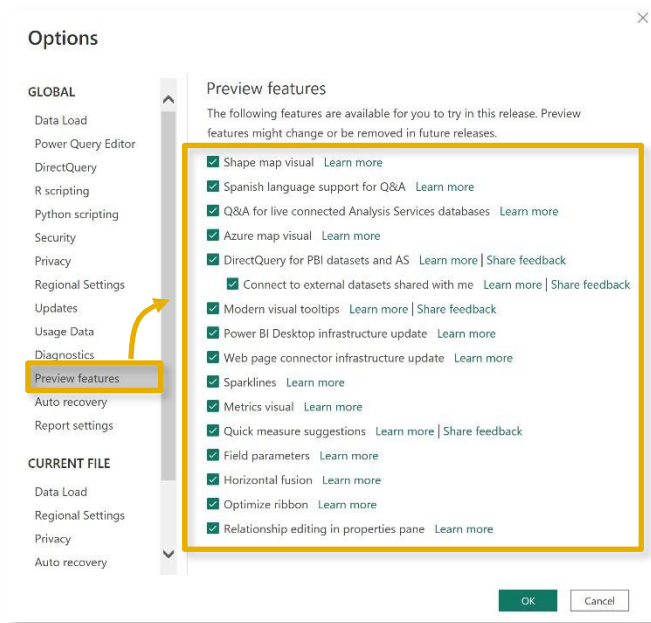


IMPORTANTE!

Você **NÃO** precisa se registrar no Power BI Pro account para acessar Power BI Desktop

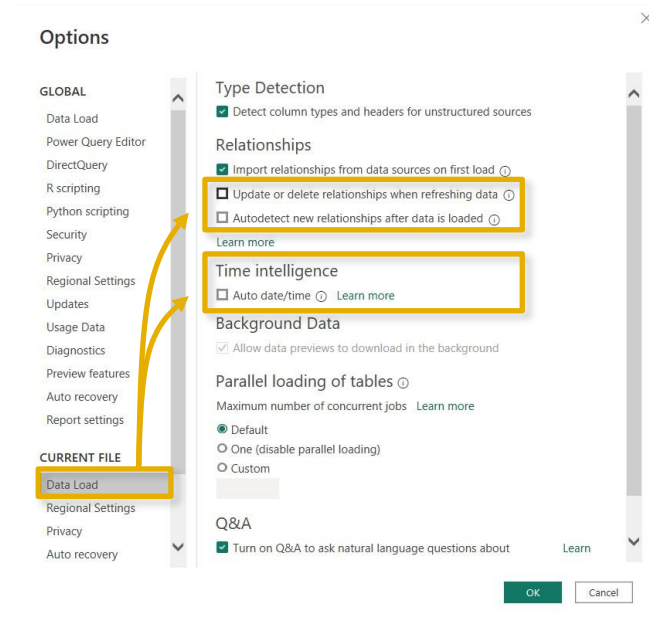
POWER BI SETTINGS

Global > **Preview Features**



Selecione **todas available preview features** por default

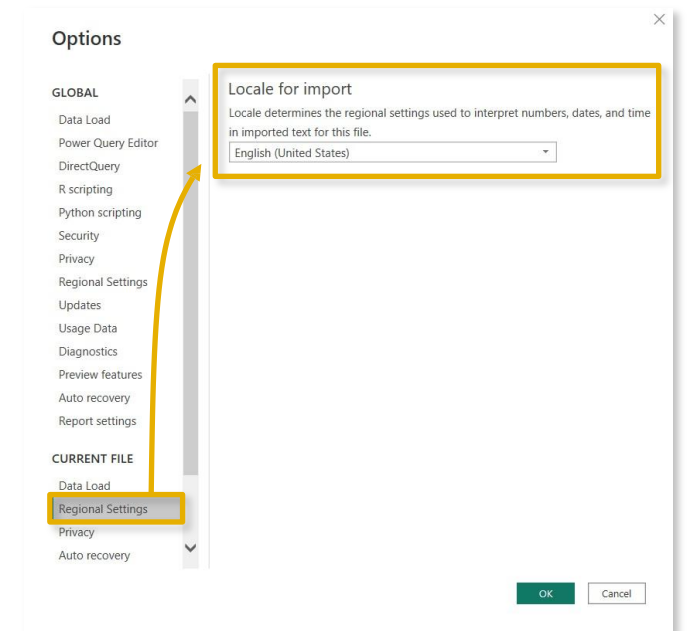
Current File > **Data Load**



Certifique-se de que as opções a seguir **NÃO estão selecionadas**:

- **Update or delete relationships when refreshing data**
- **Autodetect new relationships after data is loaded**
- **Time Intelligence > Auto date/time**

Current File > **Regional Settings**



Selecione **“English (United States)”** através do dropdown menu

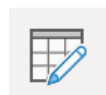
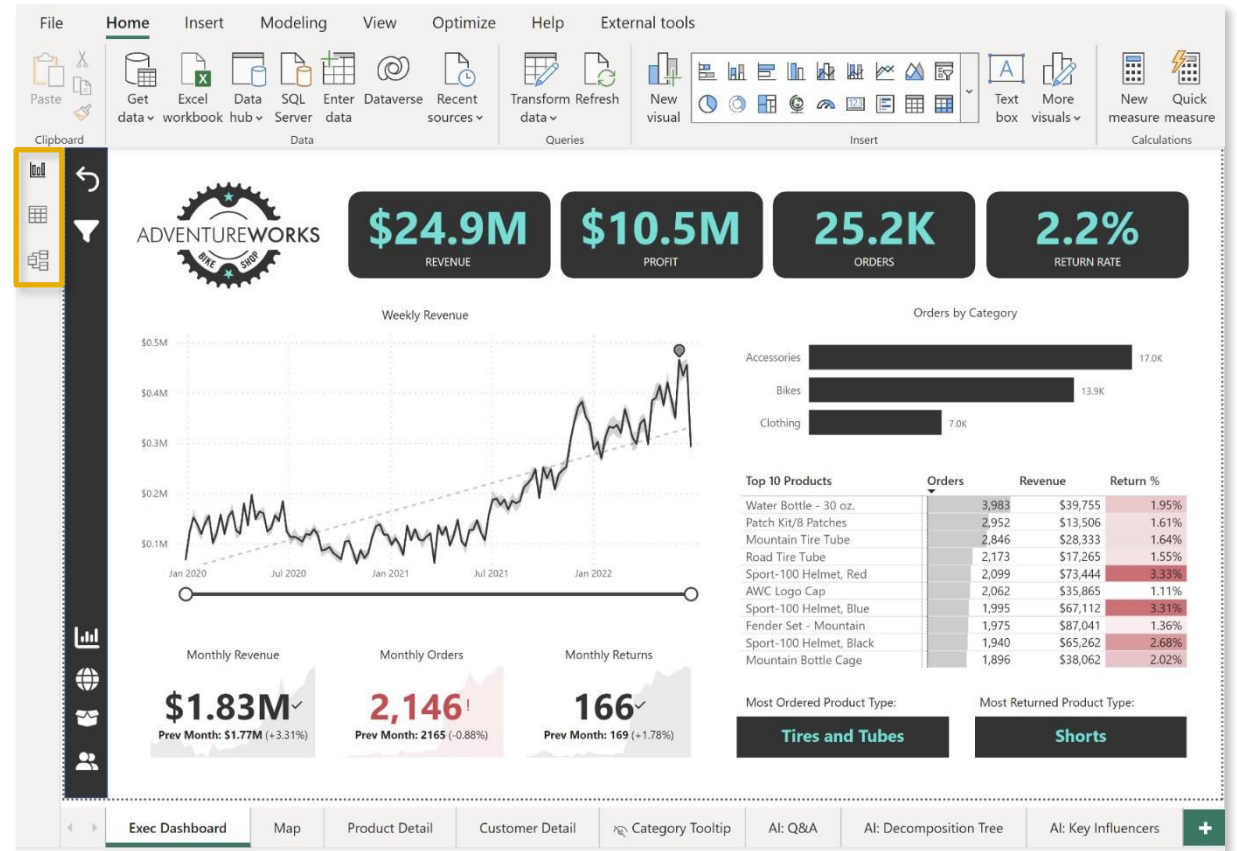
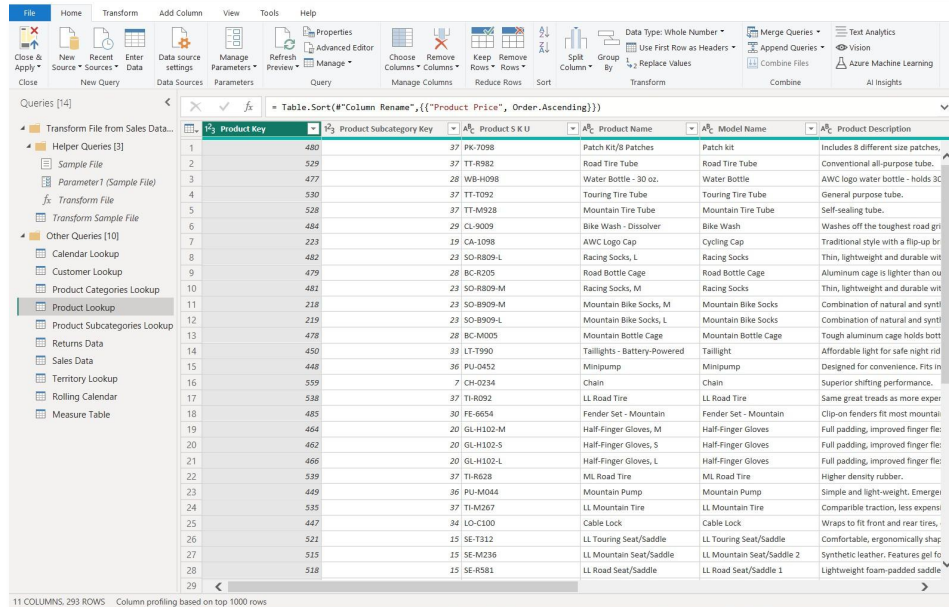


IMPORTANTE!

Opções em **CURRENT FILE** precisam ser ajustadas **todas as vezes que você abrir um novo Power BI workbook**

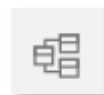
POWER BI WORKFLOW

Dados originais são extraídos e transformados pelo **Power Query editor**, e então carregados no Power BI “front-end”

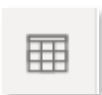


Power Query Editor

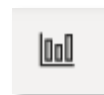
Power BI “Back-End”



Model View



Data View



Report View

Power BI “Front-End”

POWER BI WORKFLOW



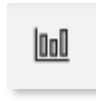
Power Query Editor



Model View



Data View



Report View

1

Dados são extraídos e transformados no
Power Query Editor

File 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 Query Choose Remove Columns Keep Remove Rows Sort Split Column Group By Data Type: Whole Number Use First Row as Headers Replace Values Merge Queries Append Queries Combine Files Text Analytics Vision Azure Machine Learning AI Insights

Queries [14]

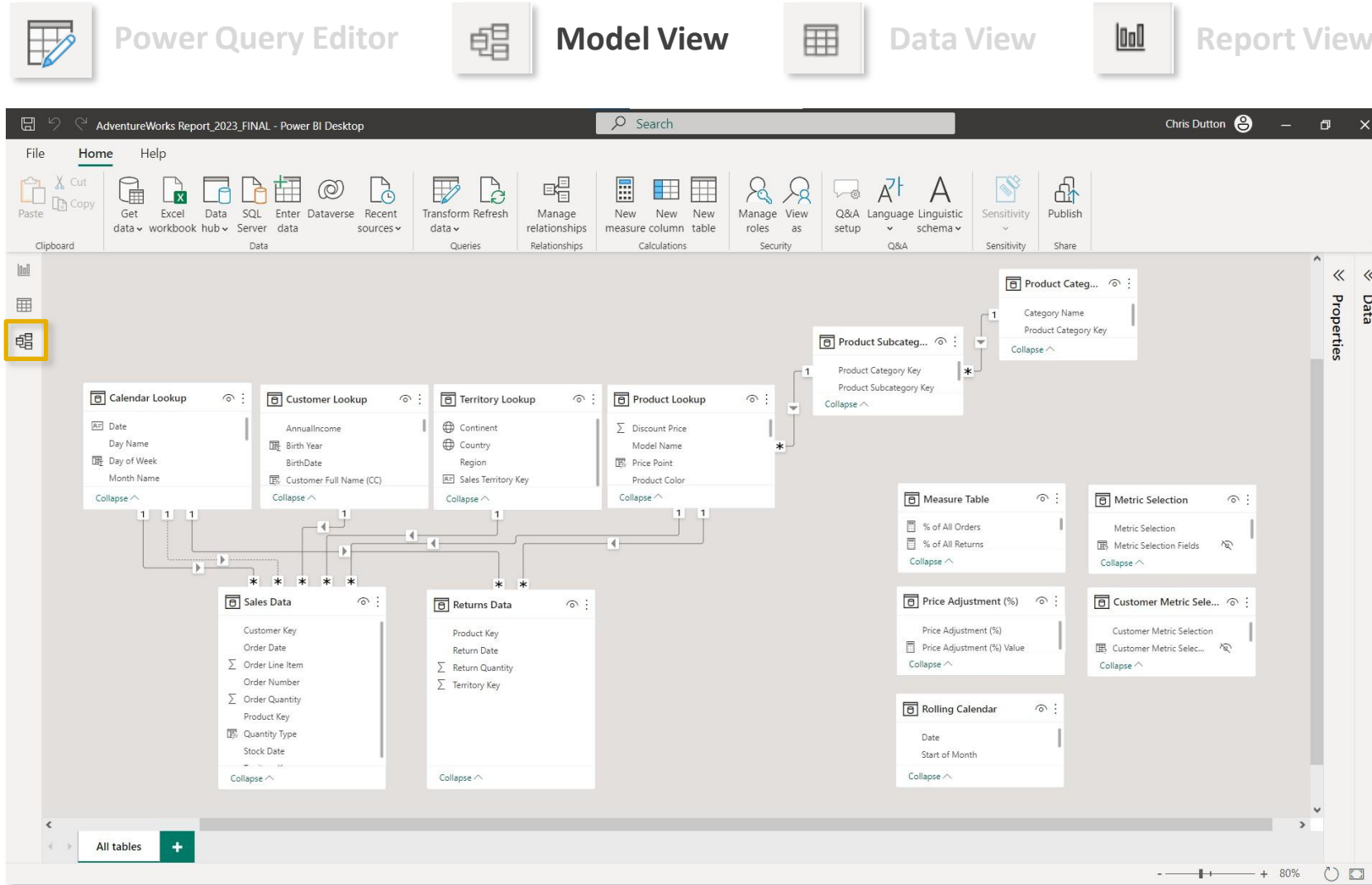
- Transform File from Sales Data...
- Helper Queries [3]
 - Sample File
 - Parameter1 (Sample File)
 - Transform File
 - Transform Sample File
- Other Queries [10]
 - Calendar Lookup
 - Customer Lookup
 - Product Categories Lookup
 - Product Lookup
 - Product Subcategories Lookup
 - Returns Data
 - Sales Data
 - Territory Lookup
 - Rolling Calendar
 - Measure Table

fx = Table.Sort(#"Column Rename",{{"Product Price", Order.Ascending}})

	Product Key	Product Subcategory Key	Product S K U	Product Name	Model Name	Product Description
1	480	37	PK-7098	Patch Kit/8 Patches	Patch kit	Includes 8 different size patches,
2	529	37	TT-R982	Road Tire Tube	Road Tire Tube	Conventional all-purpose tube.
3	477	28	WB-H098	Water Bottle - 30 oz.	Water Bottle	AWC logo water bottle - holds 30
4	530	37	TT-T092	Touring Tire Tube	Touring Tire Tube	General purpose tube.
5	528	37	TT-M928	Mountain Tire Tube	Mountain Tire Tube	Self-sealing tube.
6	484	29	CL-9009	Bike Wash - Dissolver	Bike Wash	Washes off the toughest road gri
7	223	19	CA-1098	AWC Logo Cap	Cycling Cap	Traditional style with a flip-up br
8	482	23	SO-R809-L	Racing Socks, L	Racing Socks	Thin, lightweight and durable wit
9	479	28	BC-R205	Road Bottle Cage	Road Bottle Cage	Aluminum cage is lighter than ou
10	481	23	SO-R809-M	Racing Socks, M	Racing Socks	Thin, lightweight and durable wit
11	218	23	SO-B909-M	Mountain Bike Socks, M	Mountain Bike Socks	Combination of natural and syntl
12	219	23	SO-B909-L	Mountain Bike Socks, L	Mountain Bike Socks	Combination of natural and syntl
13	478	28	BC-M005	Mountain Bottle Cage	Mountain Bottle Cage	Tough aluminum cage holds bott
14	450	33	LT-T990	Taillights - Battery-Powered	Taillight	Affordable light for safe night rid
15	448	36	PU-0452	Minipump	Minipump	Designed for convenience. Fits in
16	559	7	CH-0234	Chain	Chain	Superior shifting performance.
17	538	37	TI-R092	LL Road Tire	LL Road Tire	Same great treads as more exper
18	485	30	FE-6654	Fender Set - Mountain	Fender Set - Mountain	Clip-on fenders fit most mountai
19	464	20	GL-H102-M	Half-Finger Gloves, M	Half-Finger Gloves	Full padding, improved finger fle
20	462	20	GL-H102-S	Half-Finger Gloves, S	Half-Finger Gloves	Full padding, improved finger fle
21	466	20	GL-H102-L	Half-Finger Gloves, L	Half-Finger Gloves	Full padding, improved finger fle
22	539	37	TI-R628	ML Road Tire	ML Road Tire	Higher density rubber.
23	449	36	PU-M044	Mountain Pump	Mountain Pump	Simple and light-weight. Emergei
24	535	37	TI-M267	LL Mountain Tire	LL Mountain Tire	Comparable traction, less expens
25	447	34	LO-C100	Cable Lock	Cable Lock	Wraps to fit front and rear tires,
26	521	15	SE-T312	LL Touring Seat/Saddle	LL Touring Seat/Saddle	Comfortable, ergonomically shap
27	515	15	SE-M236	LL Mountain Seat/Saddle	LL Mountain Seat/Saddle 2	Synthetic leather. Features gel fo
28	518	15	SE-R581	LL Road Seat/Saddle	LL Road Seat/Saddle 1	Lightweight foam-padded saddle
29						

11 COLUMNS, 293 ROWS Column profiling based on top 1000 rows

POWER BI WORKFLOW



1 Dados são extraídos e transformados no **Power Query Editor**



2 Data models são configurados no **Model View**

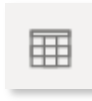
POWER BI WORKFLOW



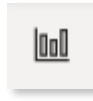
Power Query Editor



Model View



Data View



Report View

AdventureWorks Report_2023_FINAL - Power BI Desktop

File Home Help Table tools

Name Customer Lookup

Structure

Mark as date table
Calendars

Manage relationships
Relationships

New measure
measure column

Quick
calculations

New table

New table

Table: Customer Lookup (18,148 rows)

Prefix	Gender	Occupation	CustomerKey	FirstName	LastName	BirthDate	MaritalStatus	EmailAddress	AnnualIncome	TotalChildren	EducationalAttainment
Mr.	M	Professional	11206	Blake	Flores	Friday, September 24, 1948	M	blake60@adventure-works.com	\$60,000	2	Partial
Mr.	M	Professional	12093	Levi	Chandra	Monday, November 08, 1948	M	levi1@adventure-works.com	\$60,000	2	Partial
Mr.	M	Professional	12108	James	Walker	Thursday, February 23, 1950	M	james96@adventure-works.com	\$60,000	2	Partial
Mr.	M	Professional	12117	Cameron	Yang	Friday, August 03, 1951	M	cameron23@adventure-works.com	\$60,000	2	Partial
Mr.	M	Professional	13233	Richard	Coleman	Sunday, December 05, 1948	M	richard61@adventure-works.com	\$60,000	2	Partial
Mr.	M	Professional	13235	Jonathan	Robinson	Wednesday, September 22, 1948	M	jonathan72@adventure-works.com	\$60,000	2	Partial
Mr.	M	Professional	13236	Robert	Wang	Tuesday, May 25, 1948	M	robert36@adventure-works.com	\$60,000	2	Partial
Mr.	M	Professional	13370	Blake	Ross	Monday, March 22, 1948	M	blake51@adventure-works.com	\$60,000	2	Partial
Mr.	M	Professional	13372	Isaac	Edwards	Sunday, November 28, 1948	M	isaac24@adventure-works.com	\$60,000	2	Partial
Mr.	M	Professional	13375	Jason	Kumar	Sunday, April 11, 1948	M	jason26@adventure-works.com	\$60,000	2	Partial
Mr.	M	Professional	13376	Jerry	Rai	Friday, September 03, 1948	M	jerry19@adventure-works.com	\$60,000	2	Partial
Mr.	M	Professional	13397	Adam	Mitchell	Sunday, April 08, 1951	M	adam41@adventure-works.com	\$60,000	2	Partial
Mr.	M	Professional	14405	Dylan	Walker	Thursday, June 01, 1950	M	dylan53@adventure-works.com	\$60,000	2	Partial
Mr.	M	Professional	14407	Thomas	Bryant	Sunday, June 04, 1950	M	thomas20@adventure-works.com	\$60,000	2	Partial
Mr.	M	Professional	14415	William	Davis	Friday, November 16, 1951	M	william21@adventure-works.com	\$60,000	2	Partial
Mr.	M	Professional	15325	Elijah	Hayes	Thursday, May 20, 1948	M	elijah24@adventure-works.com	\$60,000	2	Partial
Mr.	M	Professional	15331	Jacob	Taylor	Friday, August 26, 1949	M	jacob8@adventure-works.com	\$60,000	2	Partial
Mr.	M	Professional	15332	Jason	Sharma	Friday, April 08, 1949	M	jason27@adventure-works.com	\$60,000	2	Partial
Mr.	M	Professional	15336	Marco	Garcia	Thursday, September 21, 1950	M	marco15@adventure-works.com	\$60,000	2	Partial
Mr.	M	Professional	15339	Noah	Zhang	Saturday, July 01, 1950	M	noah21@adventure-works.com	\$60,000	2	Partial
Mr.	M	Professional	15343	Carson	Barnes	Friday, September 07, 1951	M	carson2@adventure-works.com	\$60,000	2	Partial
Mr.	M	Professional	15902	Robert	Diaz	Tuesday, April 25, 1950	M	robert33@adventure-works.com	\$60,000	2	Partial
Mr.	M	Professional	15908	David	Wilson	Thursday, September 20, 1951	M	david65@adventure-works.com	\$60,000	2	Partial
Mr.	M	Professional	16806	Louis	Zhao	Friday, August 04, 1950	M	louis4@adventure-works.com	\$60,000	2	Partial
Mr.	M	Professional	16811	Luis	Zhang	Thursday, April 19, 1951	M	luis23@adventure-works.com	\$60,000	2	Partial
Mr.	M	Professional	16813	Carson	Diaz	Saturday, April 14, 1951	M	carson21@adventure-works.com	\$60,000	2	Partial
Mr.	M	Professional	17144	Luis	Griffin	Friday, February 20, 1948	M	luis20@adventure-works.com	\$60,000	2	Partial
Mr.	M	Professional	17149	Steven	Richardson	Friday, April 22, 1949	M	steven19@adventure-works.com	\$60,000	2	Partial
Mr.	M	Professional	17155	Samuel	Lewis	Thursday, April 21, 1949	M	samuel71@adventure-works.com	\$60,000	2	Partial

1

Dados são extraídos e transformados no **Power Query Editor**



2

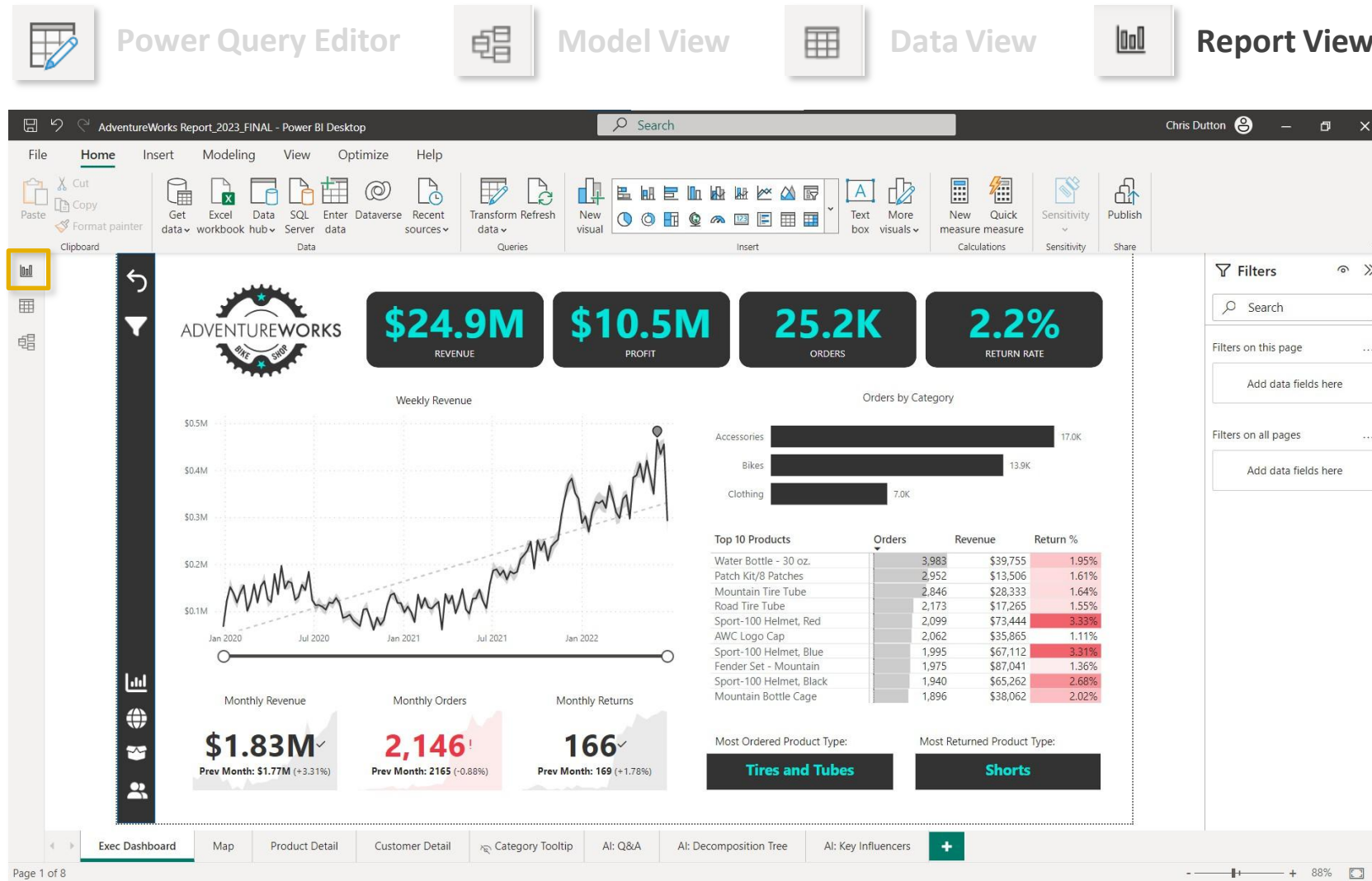
Data models são configurados no **Model View**



3

Table features & calculations são adicionados no **Data View**

POWER BI WORKFLOW



1 Dados são extraídos e transformados no **Power Query Editor**



2 Data models são configurados no **Model View**

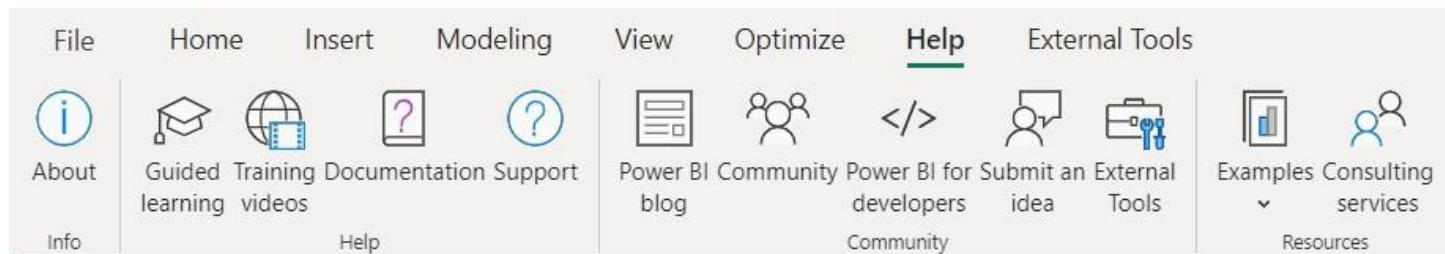


3 Table features & calculations são adicionados no **Data View**



4 Visuals & reports são plotados no **Report View**

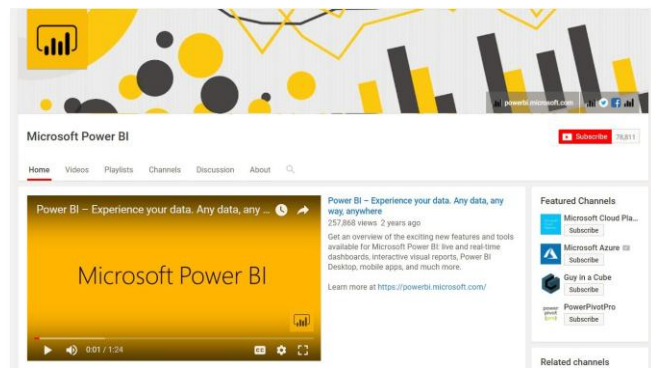
HELPFUL RESOURCES



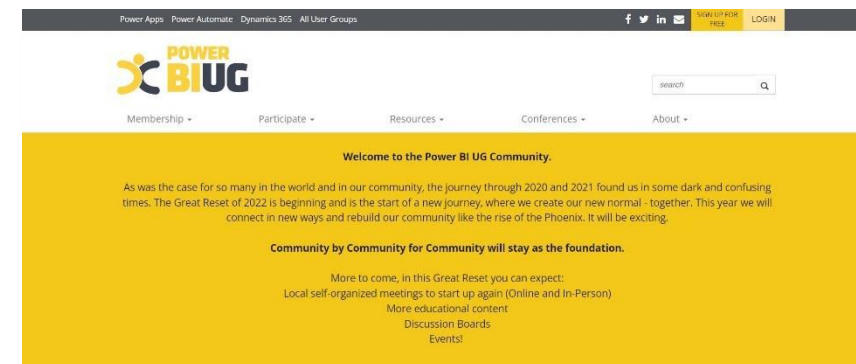
A tab **Help** inclui documentação, training videos, sample files, templates e links para support blogs e communities



Microsoft Power BI blog (powerbi.microsoft.com/blog) publica artigos mensais para apresentar novas features



Microsoft Power BI YouTube Channel publica demos, feature summaries e advanced tutorials (siga “**Guy in a Cube**” também!)



Power BI User Groups (Power BIUG) são comunidades de usuários, que inclui tanto local meet-ups e online forums (pbusergroup.com)

MONTHLY UPDATES

Power BI é atualizado mensalmente, você pode verificar atualizações novas em settings, options, tools, etc. Os links abaixo são referências para product updates e new feature releases:



Power BI Desktop

<https://docs.microsoft.com/en-us/power-bi/fundamentals/desktop-latest-update>



Power BI Service

Power BI Service

<https://docs.microsoft.com/en-us/power-bi/fundamentals/service-whats-new>



Power Platform

<https://learn.microsoft.com/en-us/dynamics365/release-plans/>



CONECTANDO E TRANSFORMANDO DADOS

CONNECTING & SHAPING DATA



Nessa seção iremos conectar os dados das fontes and cobrir algumas das principais técnicas para: **extrair**, **limpar**, and **transformar data** para prepará-los para modelagem e análise

TÓPICOS:

Intro ao Power Query

Data Connectors

The Query Editor

Connection Modes

Data QA & Profiling

Table Transformations

Calendar Tools

Combining Queries

OBJETIVOS:

- Explorar Power BI's query editor e entender o papel do Power Query no BI workflow
- Introduzir diferentes tipos de connectors e connectivity modes disponíveis para trazer dados ao Power BI
- Review tools para validar data quality e key profiling metrics como column distribution, empty values, errors e outliers
- Transformar tabelas usando text, numerical e date/time tools, pivot e group records e create new conditional columns
- Praticar combining, modifying e refreshing queries

FRONT-END VS. BACK-END



Power BI Desktop essencialmente tem dois ambientes distintos: um **front-end** e um **back-end**

- O **front-end** inclui **Data, Model & Report** views, onde a maior parte de modelagem, análise e visualização acontecem
- O **back-end** inclui **Power Query Editor**, onde dados “crús” são extraídos, transformados e carregados para o front-end (ETL)

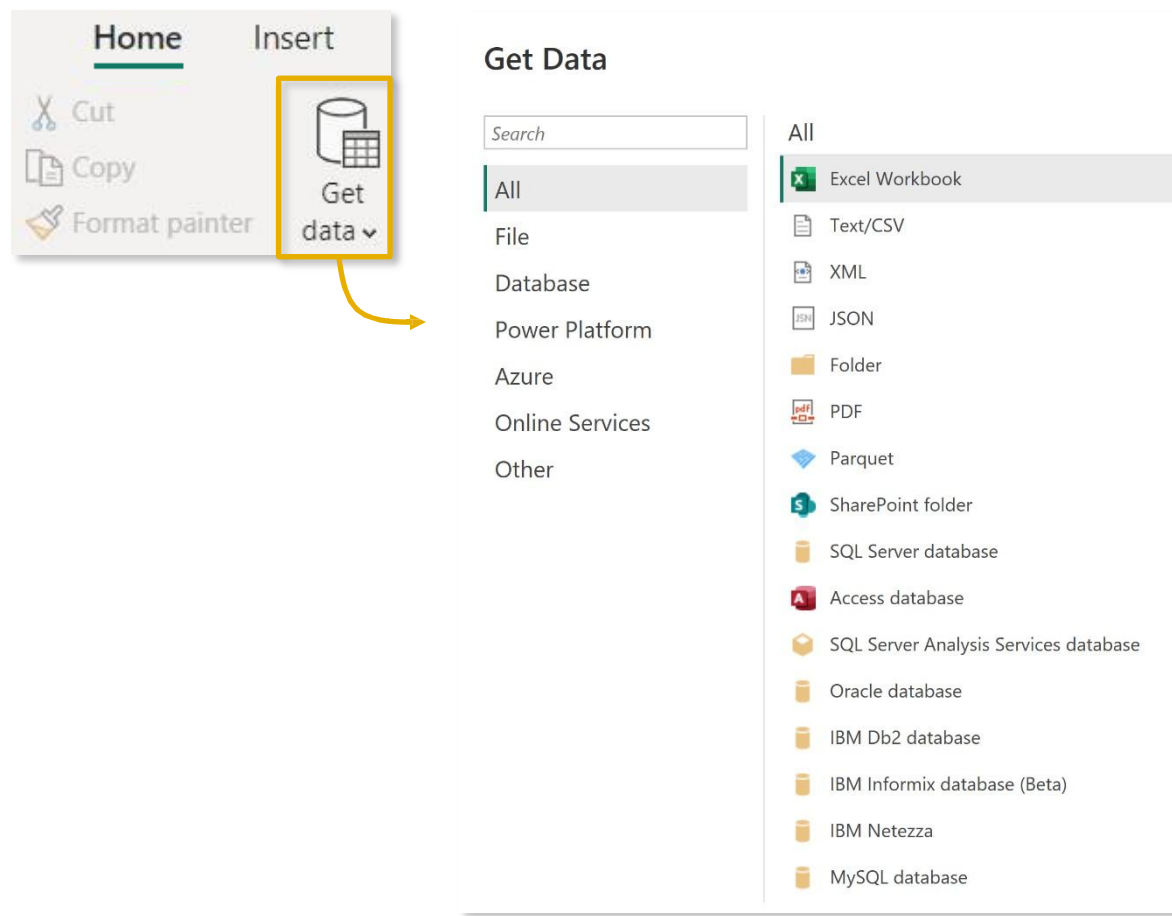
BACK-END

- **Connect & extract** data utilizando pre-built connectors
- **Profile & QA** the data para explorar, limpar e preparar para modelagem e análise
- **Transform & shape** tables para adicionar new features, modify values, group records, or sort and filter columns
- **Merge** or **append** queries para realizar join e combiná-los antes de carregar ao front-end
- Perform **advanced transformations** utilizando custom M code (não será abordado no curso)

FRONT-END

- **Build data models** a partir de table relationships entre primary and foreign keys
- **Add calculated measures & columns** utilizando Data Analysis Expressions (DAX)
- **Design reports** para visualizar e criar interactive, dynamic dashboards
- **Publish & share** o seu Power BI workbooks utilizando Power BI Service (cloud application)

TYPES OF DATA CONNECTORS



Power BI pode se conectar à praticamente **qualquer** tipo de source data, incluindo *(mas não limitado)*:

- **Flat files & Folders** (*csv, text, xls/x, etc.*)
- **Databases** (*SQL, Access, Oracle, IBM, etc.*)
- **Power Platform** (*Datasets, Datamarts, Dataflows, Dataverse, etc.*)
- **Azure** (*Azure SQL, Analysis Services, Databricks, etc.*)
- **Online Services** (*SharePoint, GitHub, Dynamics 365, Google Analytics, Salesforce, Power BI Service, etc.*)
- **Outros** (*Web feeds, R scripts, Spark, Hadoop, etc.*)



POWER QUERY EDITOR

Query Editing Tools (Table transformations, calculated columns, etc.)

Formula Bar (this is "M" code)

Queries Pane (list of all queries)

Table Name & Properties

Applied Steps (like a macro)

Table Preview

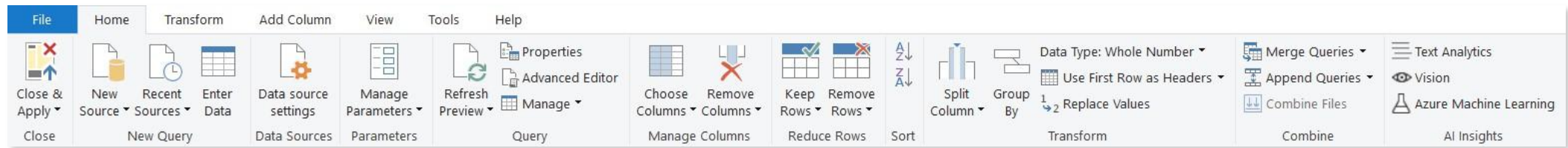
Customer Key	Prefix	First Name	Last Name	Birth Date	Marital Status	Gender
11000	Mr.	Jon	Yang	4/8/1966	M	M
11001	Mr.	Eugene	Huang	5/14/1965	S	M
11002	Mr.	Ruben	Torres	8/12/1965	M	M
11003	Ms.	Christy	Zhu	2/15/1968	S	F
11004	Mrs.	Elizabeth	Johnson	8/8/1968	S	F
11005	Mr.	Julio	Ruiz	8/5/1965	S	M
11007	Mr.	Marco	Mehta	5/9/1964	M	M
11008	Mrs.	Robin	Verhoff	7/7/1964	S	F
11009	Mr.	Shannon	Carlson	4/1/1964	S	M
11010	Ms.	Jacquelyn	Suarez	2/6/1964	S	F
11011	Mr.	Curtis	Lu	11/4/1963	M	M
11012	Mrs.	Lauren	Walker	1/18/1968	M	F
11013	Mr.	Ian	Jenkins	8/6/1968	M	M
11014	Mrs.	Sydney	Bennett	5/9/1968	S	F
11015	Ms.	Chloe	Young	2/27/1979	S	F
11016	Mr.	Wyatt	Hill	4/28/1979	M	M
11017	Mrs.	Shannon	Wang	6/26/1944	S	F
11018	Mr.	Clarence	Rai	10/9/1944	S	M
11019	Mr.	Luke	Lai	3/7/1978	S	M
11020	Mr.	Jordan	King	9/20/1978	S	M
11021	Ms.	Destiny	Wilson	9/3/1978	S	F
11022	Mr.	Ethan	Zhang	10/12/1978	M	M
11023	Mr.	Seth	Edwards	10/11/1978	M	M
11024	Mr.	Russell	Xie	9/17/1978	M	M
11025		Alejandro	Beck	12/23/1945	M	NA
11026	Mr.	Harold	Sai	4/3/1946	S	M
11027	Mr.	Jessie	Zhao	12/7/1946	M	M
11028	Mrs.	Jill	Jimenez	4/11/1946	M	F

*In older versions of Power BI, the Transform Data option may be named "Edit Queries"

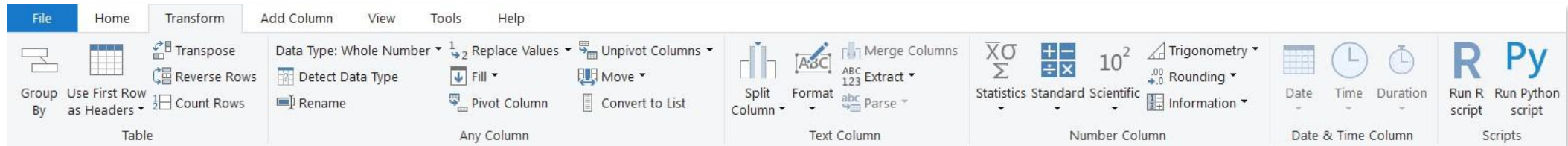


QUERY EDITING TOOLS

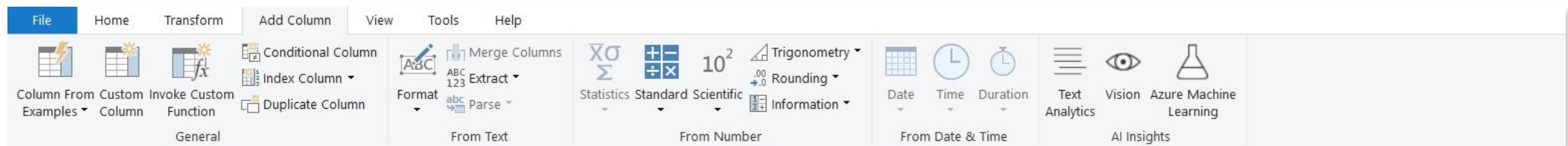
HOME tab inclui **general settings** e **common table transformation tools**



TRANSFORM tab inclui tools para **modificar existing columns** (splitting/grouping, transposing, extracting text, etc.)



ADD COLUMN tools **cria new columns** (baseado em conditional rules, text operations, calculations, dates, etc.)

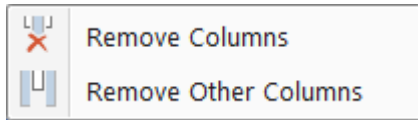
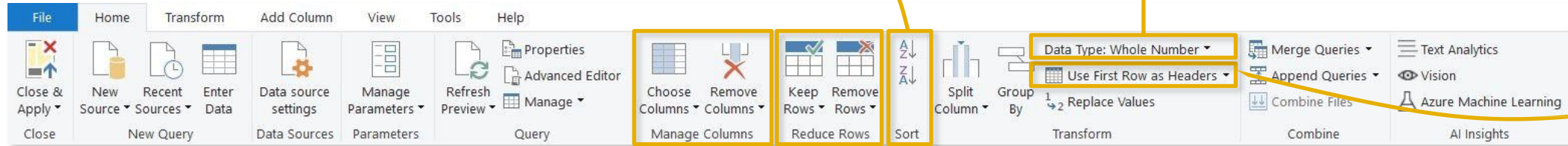


BASIC TABLE TRANSFORMATIONS



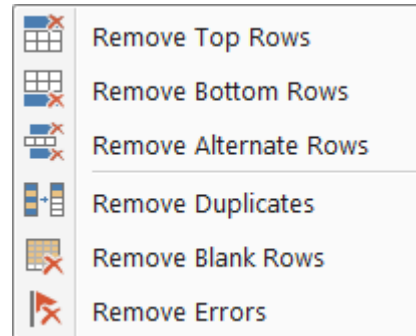
Sort values (A-Z, Low-High, etc.)

Change data type (date, \$, %, text, etc.)



Choose or remove columns

Tip: use the “Remove Other Columns” option if you always want a specific set

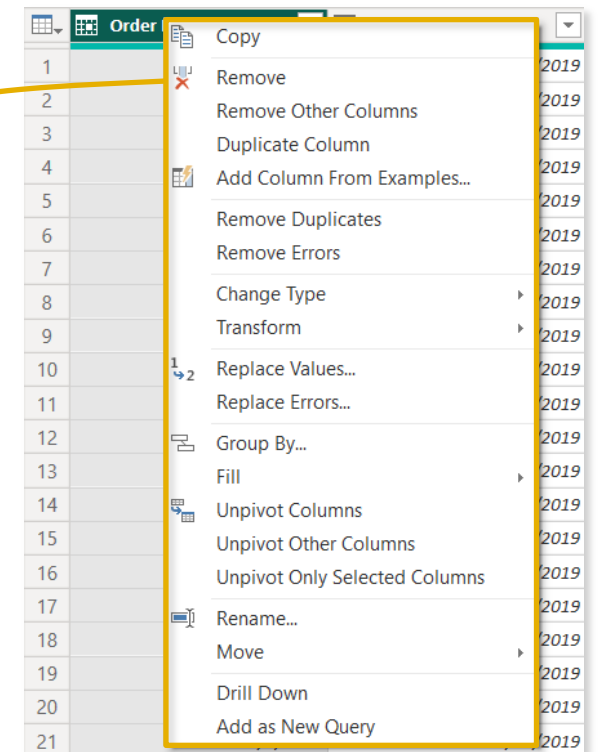


Keep or remove rows

Tip: use “Remove Duplicates” to create new lookup tables from scratch

Duplicate, move or rename columns

Tip: Right-click column headers to access common tools



TAREFA: TABLE TRANSFORMATIONS



NEW MESSAGE

From: **Ethan T. Langer** (*Analytics Manager*)

Subject: **Welcome aboard!**

Olá, e bem-vindo ao time!

Estamos felizes por você nos ajudar a desenvolver nossos relatórios internos no Power BI. Parece que você já começou, mas temos novos dados para serem adicionados ao modelo.

Você poderia, por favor, criar duas novas queries para conectar os arquivos **Product Category Lookup** e **Product Subcategory Lookup** em anexo, e ajudar com algumas modificações na tabela de produto?

Obrigado!
-ETL



Product Category Lookup
Product Subcategory Lookup

← Reply

➡ Forward

Key Objectives

1. Criar queries para conectar os dois arquivos .csv novos
2. Nomeie as queries **Product Category Lookup** e **Product Subcategory Lookup**
3. Confirme que column headers foi selecionado e que todos os data types estão corretos
4. Adicione uma new column para extrair todos os caracteres anteriores ao dash ("-") na coluna **Product SKU**, e nomeie como **"SKU Type"**
5. Update o **SKU Type** calculation acima para retornar todos os caracteres anteriores ao *segundo* dash, ao invés do primeiro
6. Substitua zeros (**0**) na coluna **Product Style** por **"NA"**
7. Feche and carregue para o seu data model