

DR. ALVIN'S PUBLICATIONS

# LEARNING POWER BI

## PART III

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RELATIONSHIPS  
DR. ALVIN ANG



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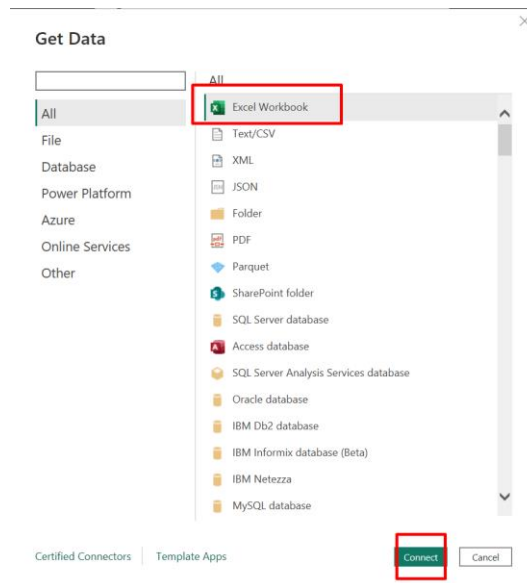
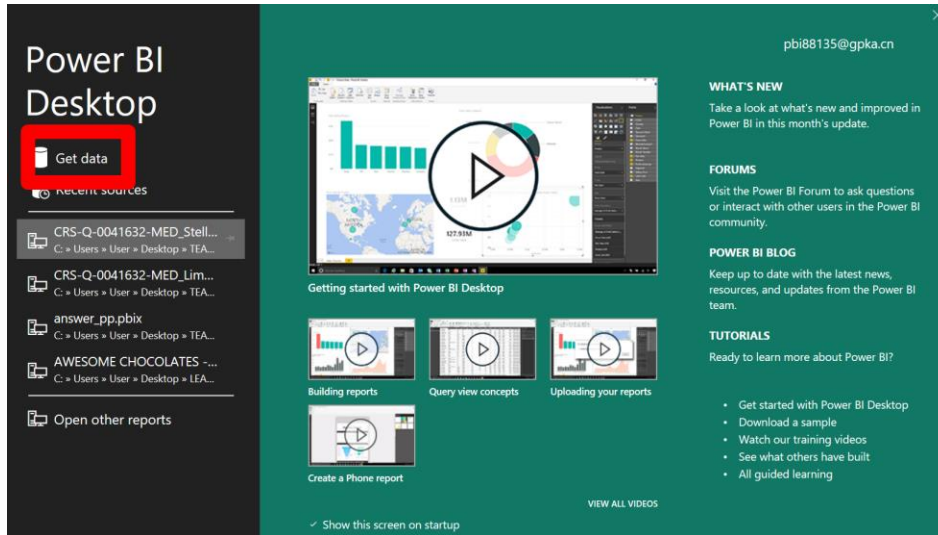
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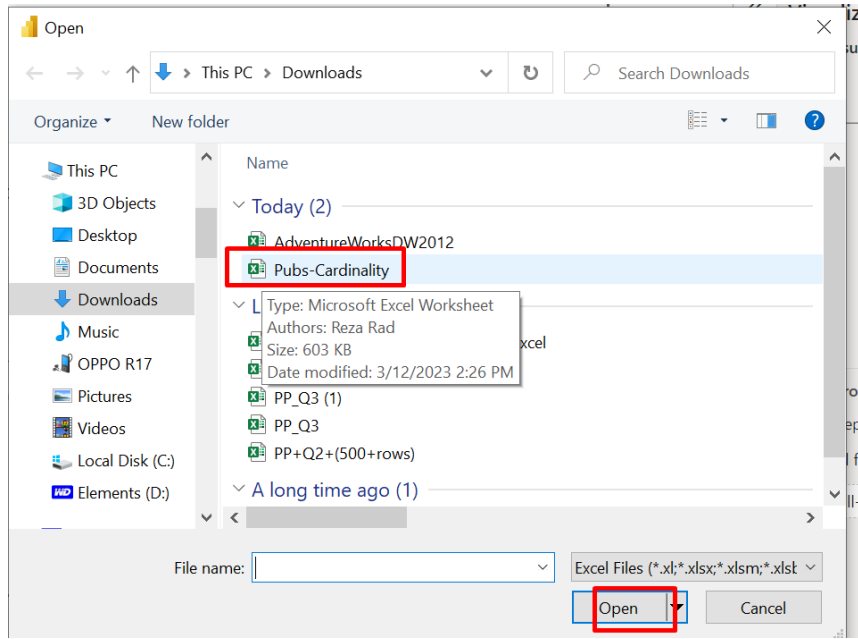
## I. RELATIONSHIP = FILTER

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<https://www.alvinang.sg/s/Pubs-Cardinality.xlsx>

### A. GET DATA





### Navigator

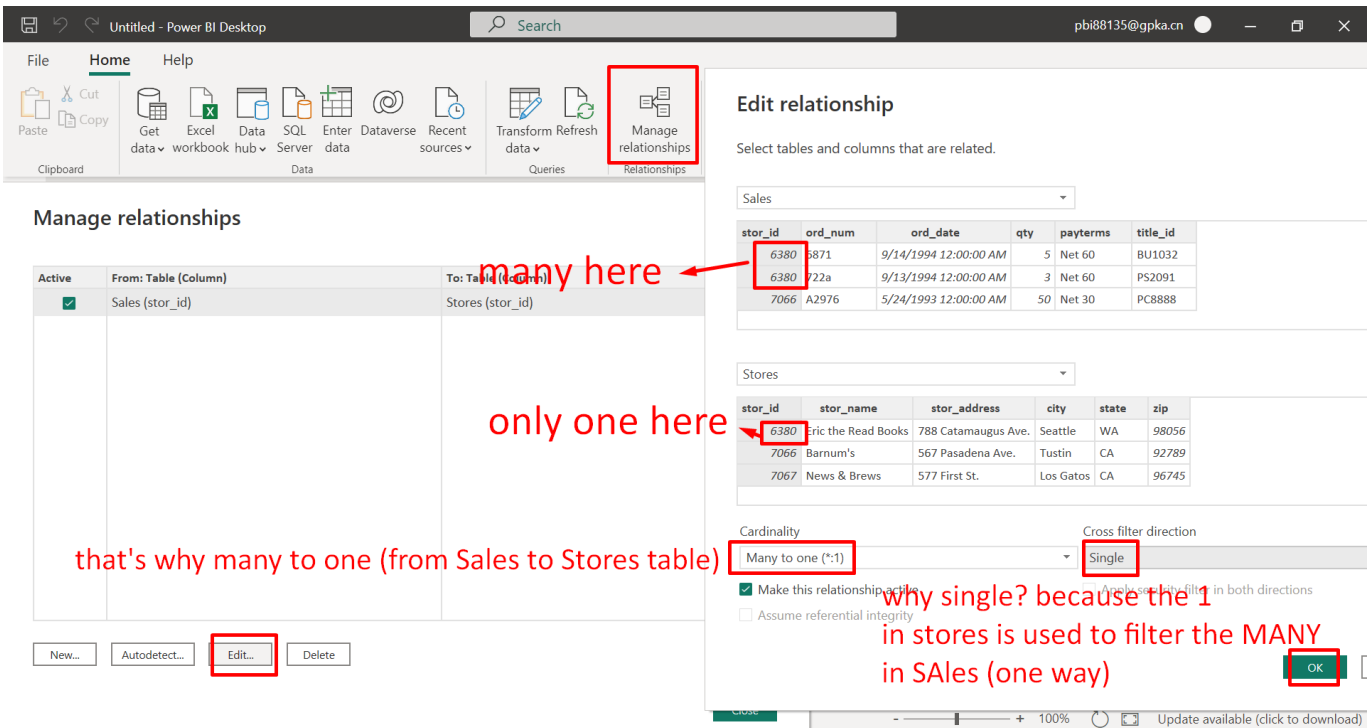
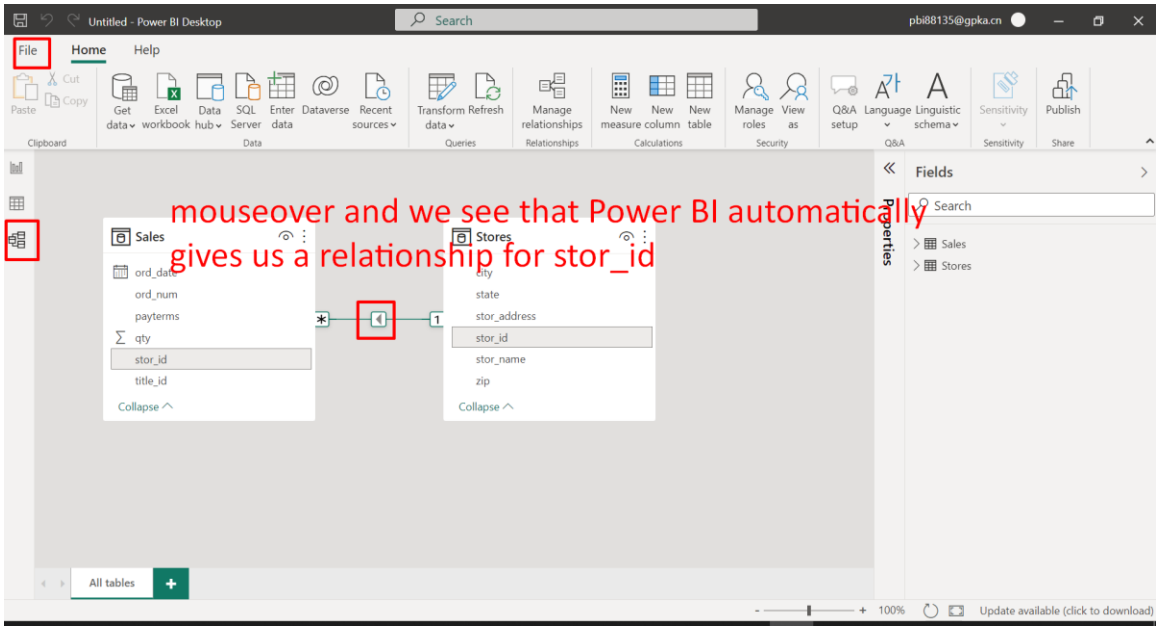
Display Options ▾

- ▾ Pubs-Cardinality.xlsx [6]
  - Authors
  - Sales
  - Stores
  - Title Details
  - TitleAuthor
  - Titles

Stores

stor_id	stor_name	stor_address	city
6380	Eric the Read Books	788 Catamaugus Ave.	Seattle
7066	Barnum's	567 Pasadena Ave.	Tustin
7067	News & Brews	577 First St.	Los Gatos
7131	Doc-U-Mat: Quality Laundry and Books	24-A Avogadro Way	Remulade
7896	Fricative Bookshop	89 Madison St.	Fremont
8042	Bookbeat	679 Carson St.	Portland

we only want these 2 sheets



we see that the filter direction is from STORES to SALES because there's only 1 store id in STORES.. and MANY in SALES

stor_id	stor_name	stor_address	city	state	zip
6380	Eric the Read Books	788 Catamaugus Ave.	Seattle	WA	98056
7066	Barnum's	567 Pasadena Ave.	Tustin	CA	92789
7067	News & Brews	577 First St.	Los Gatos	CA	96745
7131	Doc-U-Mat: Quality Laundry and Books	24-A Avogadro Way	Remulade	WA	98014
7896	Fricative Bookshop	89 Madison St.	Fremont	CA	90019
8042	Bookbeat	679 Carson St.	Portland	OR	89076

STORE

SALES

stor_id	ord_num	ord_date	qty	payterms	title_id
6380	6871	14/09/1994 12:00:00 AM	5	Net 60	BU1032
6380	722a	13/09/1994 12:00:00 AM	3	Net 60	PS2091
7066	A2976	24/05/1993 12:00:00 AM	50	Net 30	PC8888
7066	QA7442.3	18/09/1994 12:00:00 AM	75	ON invoice	PS2091
7067	D4482	14/09/1994 12:00:00 AM	10	Net 60	PS2091
7067	P2121	15/06/1992 12:00:00 AM	40	Net 30	TC3218
7067	P2121	15/06/1992 12:00:00 AM	20	Net 30	TC4203
7067	P2121	15/06/1992 12:00:00 AM	20	Net 30	TC7777
7131	N914008	14/09/1994 12:00:00 AM	20	Net 30	PS2091
7131	N914014	14/09/1994 12:00:00 AM	25	Net 30	MC3021
7131	P3087a	29/05/1993 12:00:00 AM	20	Net 60	PS1372
7131	P3087a	29/05/1993 12:00:00 AM	25	Net 60	PS2106
7131	P3087a	29/05/1993 12:00:00 AM	15	Net 60	PS3333
7131	P3087a	29/05/1993 12:00:00 AM	25	Net 60	PS7777
7896	QO2299	28/10/1993 12:00:00 AM	15	Net 60	BU7832
7896	TQ456	12/12/1993 12:00:00 AM	10	Net 60	MC2222
7896	X999	21/02/1993 12:00:00 AM	35	ON invoice	BU2075
8042	423L1922	14/09/1994 12:00:00 AM	15	ON invoice	MC3021
8042	423L1930	14/09/1994 12:00:00 AM	10	ON invoice	BU1032
8042	P723	11/03/1993 12:00:00 AM	25	Net 30	BU1111
8042	QA879.1	22/05/1993 12:00:00 AM	30	Net 30	PC1035

The screenshot shows the Power BI Desktop interface. The main report area displays a table with the following data:

state	Sum of qty
CA	275
OR	80
WA	138
<b>Total</b>	<b>493</b>

Red boxes highlight the table and the 'state' field in the Fields pane. Red arrows point from the 'state' field in the Fields pane to the 'state' column in the table. Another red arrow points from the 'state' field in the Fields pane to the 'Sum of qty' column in the table. The Fields pane shows the following configuration:

- Columns: state, Sum of qty
- Filters: (empty)
- Drill through: (empty)
- Cross-report: Off
- Keep all filters: On

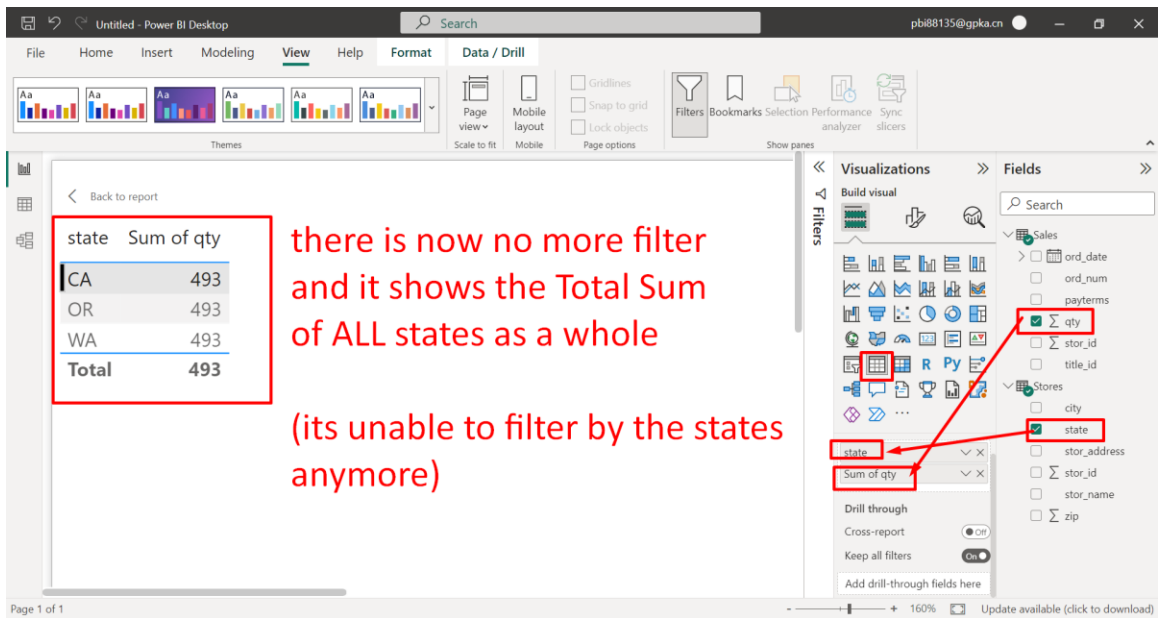
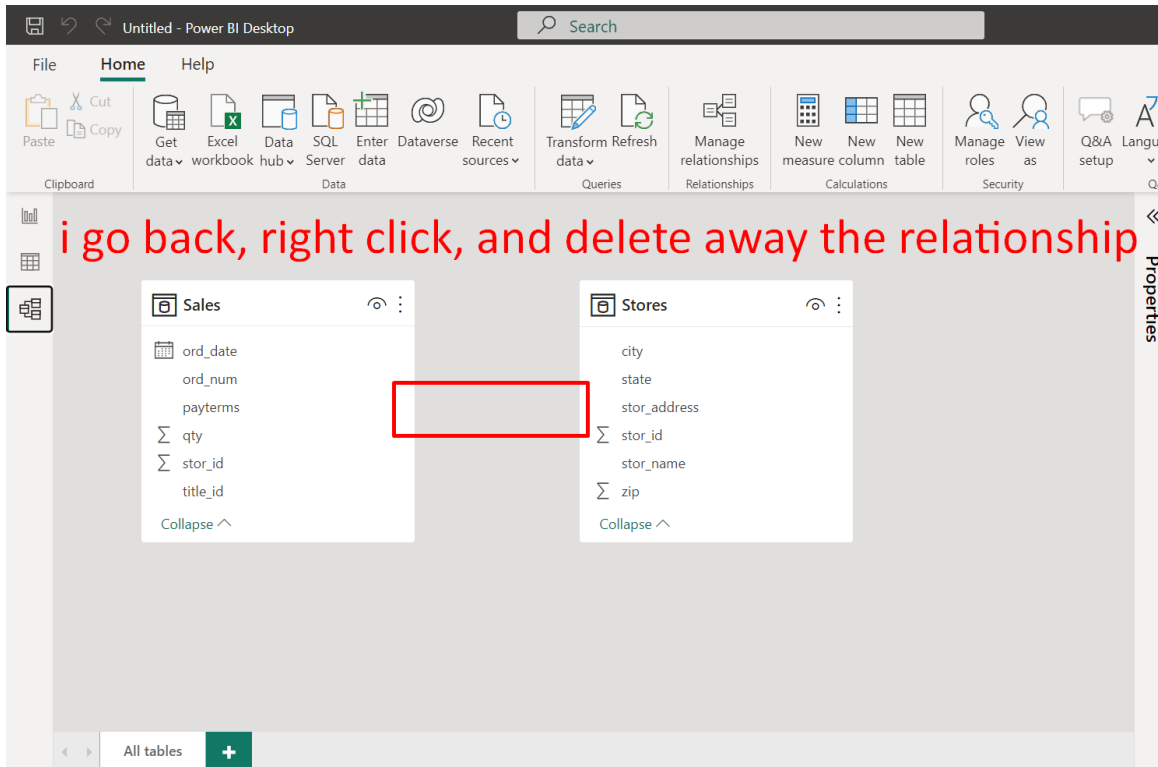
The Fields pane also shows the following fields:

- Sales: ord\_date, ord\_num, payterms, qty, stor\_id, title\_id
- Stores: city, stor\_address, stor\_id, stor\_name, zip

Red boxes highlight the 'qty' field in the Sales group and the 'state' field in the Stores group. Red arrows point from these fields to the 'Sum of qty' and 'state' columns in the table, respectively.

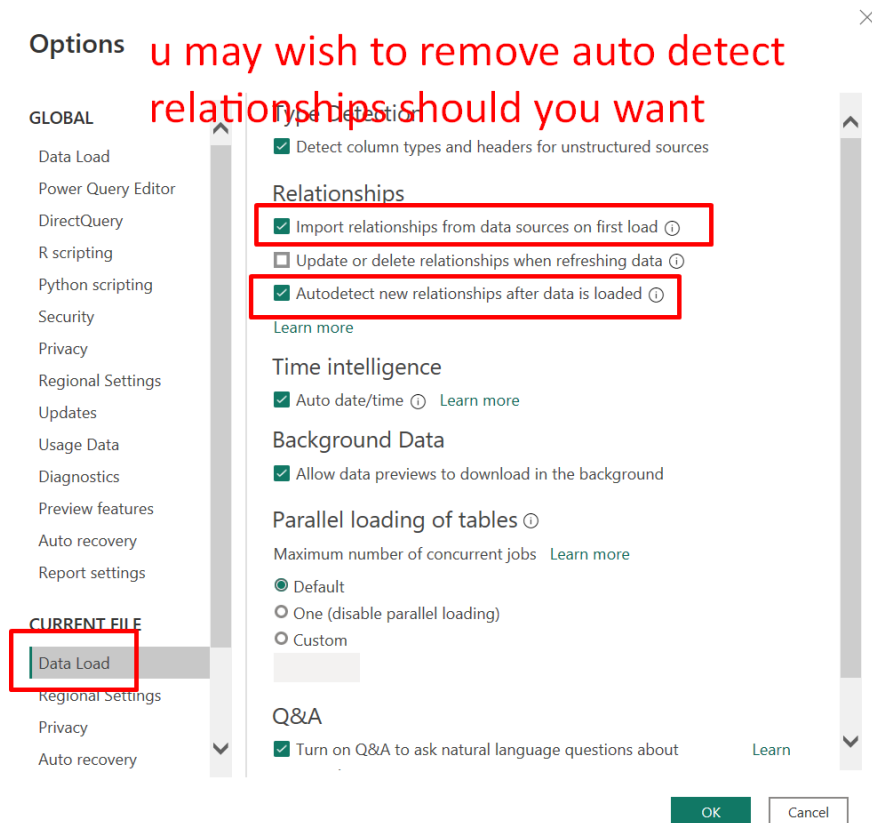
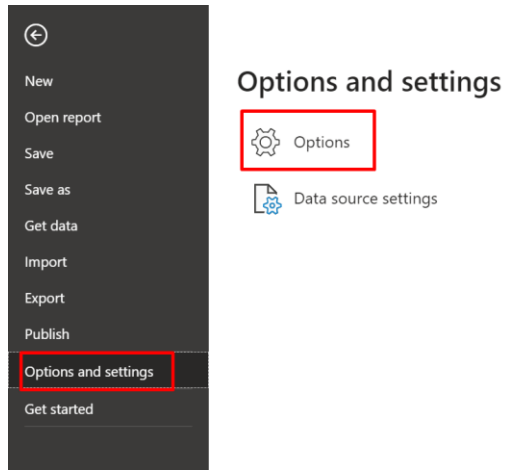
the STORES: state is filtering the SALES:qty

## B. WHAT IF I REMOVE THE RELATIONSHIP AWAY?





### C. HOW TO SWITCH OFF AUTOMATIC RELATIONSHIPS



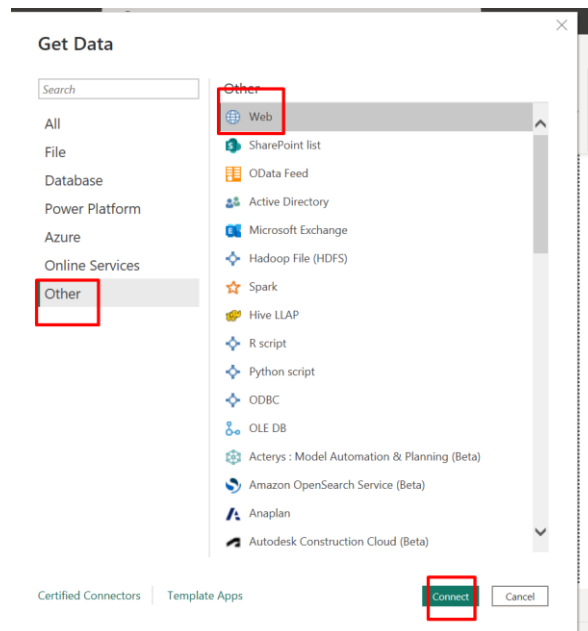
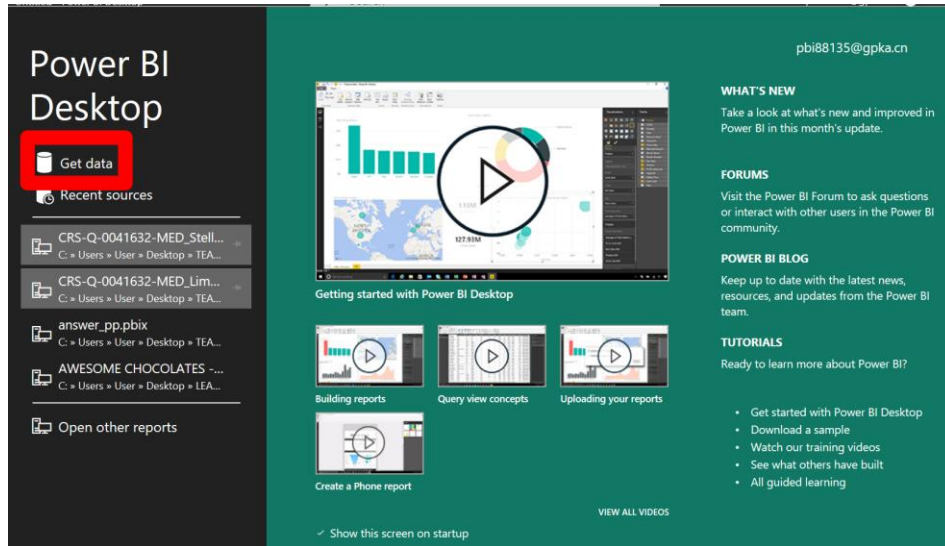
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## II. MEANING OF FACT TABLE VS DIMENSION TABLE

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<https://www.alvinang.sg/s/AdventureWorks.xlsx>

### A. GET DATA



### From Web

Basic
  Advanced

URI

### Access Web content

Anonymous
  Windows
  Basic
  Web API
  Organizational account

https://www.alvinang.sg/s/AdventureWorks.xlsx

Use anonymous access for this Web content.

Select which level to apply these settings to

### Navigator

- Display Options
- https://www.alvinang.sg/s/AdventureWorks.xls...
    - DimCustomer2
    - DimProduct3
    - FactInternetSales1
    - DimCustomer
    - DimProduct
    - FactInternetSales

### DimCustomer

CustomerKey	GeographyKey	CustomerAlternateKey	Title	FirstName
11000	26	AW00011000	null	Jon
11001	37	AW00011001	null	Eugene
11002	31	AW00011002	null	Ruben
11003	11	AW00011003	null	Christy
11004	19	AW00011004	null	Elizabeth
11005	22	AW00011005	null	Julio
11006	8	AW00011006	null	Janet
11007	40	AW00011007	null	Marco
11008	32	AW00011008	null	Rob
11009	25	AW00011009	null	Shannon
11010	22	AW00011010	null	Jacquelyn
11011	22	AW00011011	null	Curtis
11012	611	AW00011012	null	Lauren
11013	543	AW00011013	null	Ian
11014	634	AW00011014	null	Sydney
11015	301	AW00011015	null	Chloe

The data in the preview has been truncated due to size limits.

## B. DIFFERENCE BETWEEN FACT VS DIMENSION TABLES

Power BI Desktop interface showing a data model with three tables: **DimCustomer**, **FactInternetSales**, and **DimProduct**.

**DimCustomer** (Dimension table):

- EnglishOccupation
- FirstName
- FrenchEducation
- FrenchOccupation
- FullName
- Gender
- GeographyKey
- HouseOwnerFlag
- LastName
- MaritalStatus
- Collapse ^

**FactInternetSales** (Fact table):

- PromotionKey
- RevisionNumber
- SalesAmount
- SalesOrderLineNumber
- SalesOrderNumber
- SalesTerritoryKey
- ShipDate
- ShipDateKey
- TaxAmt
- Collapse ^

**DimProduct** (Dimension table):

- EnglishProductName
- FinishedGoodsFlag
- FrenchDescription
- FrenchProductName
- GermanDescription
- HebrewDescription
- JapaneseDescription
- ListPrice
- ModelName
- Collapse ^

Relationships: DimCustomer (1) to FactInternetSales (\*), and FactInternetSales (\*) to DimProduct (1).

Annotations:

- Blue text: "this is a Fact (Quantitative) table because they have mainly numbers stored" with a blue arrow pointing to the **FactInternetSales** table.
- Red text: "these are Dimension (Qualitative) tables because they have alot of text description" with red arrows pointing to the **DimCustomer** and **DimProduct** tables.

### III. MEANING OF RELATIONSHIP DIRECTION

<https://www.alvinang.sg/s/AdventureWorks.xlsx>

we continue off from previous section...

#### A. ONE TO MANY: SINGLE DIRECTION

automatically, relationships have been formed

only 1 CustomerKey in 'DimCustomer'  
to MANY customer keys in 'FactInternetSales' thus its filtering this direction

EnglishEducation	Sum of SalesAmount
Bachelors	9,900,142.76
Graduate Degree	5,460,560.25
High School	4,638,026.07
Partial College	7,723,542.88
Partial High School	1,636,405.26
<b>Total</b>	<b>29,358,677.22</b>

Customer table filters Internet Sales table  
'EnglishEducation' column --> 'Sales' column  
thus the table is showing up correctly!

## B. ONE TO MANY: SINGLE DIRECTION

many product keys here ← only 1 product key here

filtering in this direction... only 1 way...

filter direction

'Product' table filters 'InternetSales' table  
'ModelName' column filters out 'Sales' column  
thus the result is displayed correctly!

ModelName	Sum of SalesAmount
All-Purpose Bike Stand	39,591.00
Bike Wash	7,218.60
Classic Vest	35,687.00
Cycling Cap	19,688.10
Fender Set - Mountain	46,619.58
Half-Finger Gloves	35,020.70
Hitch Rack - 4-Bike	39,360.00
HL Mountain Tire	48,860.00
HL Road Tire	27,970.80
Hydration Pack	40,307.67
LL Mountain Tire	21,541.38
LL Road Tire	22,435.56
<b>Total</b>	<b>29,358,677.22</b>

### C. ONE TO MANY: BOTH DIRECTIONS

u can filter this direction

u can also filter this direction

because this goes against the direction of filter

but u will face issues when u try to filter this complete direction  
e.g. Customer table filter Product table  
e.g. 'education' column filter 'productKey' column

EnglishEducation	Count of ProductKey
Bachelors	606
Graduate Degree	606
High School	606
Partial College	606
Partial High School	606
Total	606

the values here are wrong!

from Customer table to Product table  
unable to filter correctly because the direction  
is set to single  
(and is against the direction flow)

**Relationship**

select tables and columns that are related.

FactInternetSales

ProductKey	OrderDateKey	DueDateKey	ShipDateKey	CustomerKey	PromotionKey	CurrencyKey	SalesAmount
528	20070801	20070813	20070808	14870	1	100	100
528	20070802	20070814	20070809	15319	1	100	100
528	20070804	20070816	20070811	16384	1	100	100

DimProduct

ProductKey	ProductAlternateKey	ProductSubcategoryKey	WeightUnitMeasureCode	SizeUnitMeasureCode
1	AR-5381		null	null
2	BA-8327		null	null
12	CR-9981		null	null

Cardinality: Many to one (\*:1)

Cross filter direction: **Both**

Make this relationship active:  Apply security filter in both directions

Assume referential integrity:

**change to both**

**double click this**

Untitled - Power BI Desktop

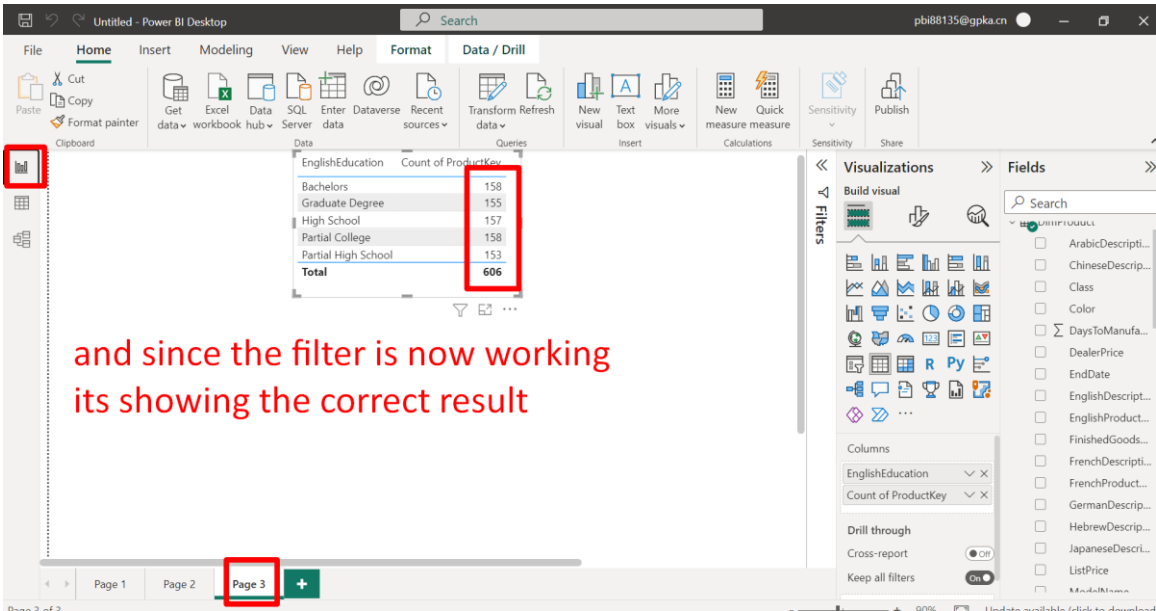
DimCustomer

FactInternetSales

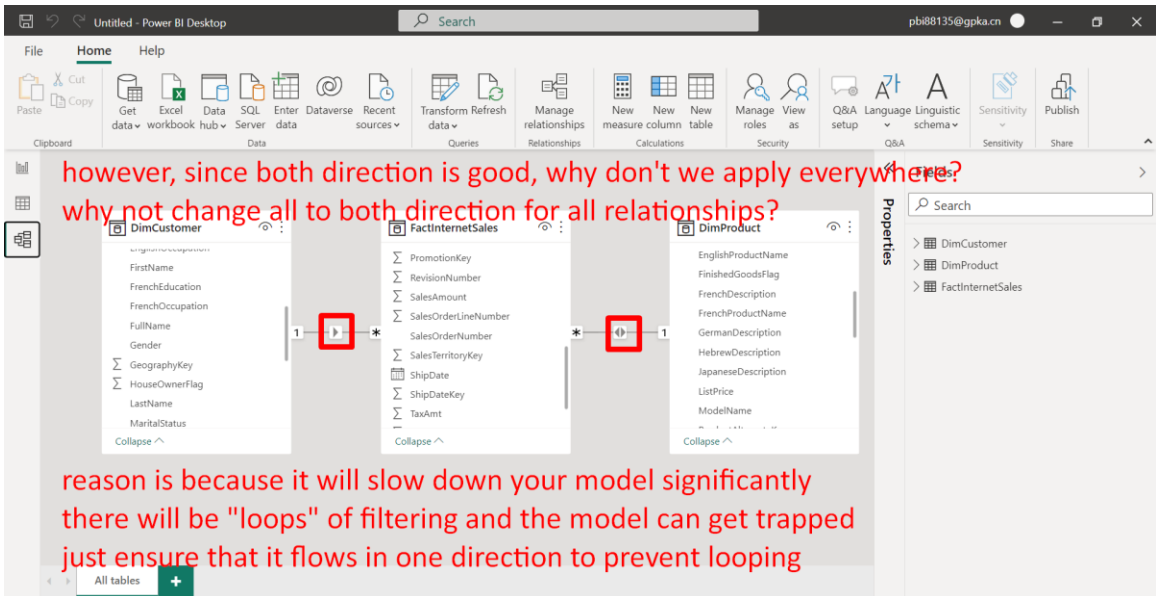
DimProduct

now the filter is able to go through all the way from left to right





and since the filter is now working its showing the correct result



reason is because it will slow down your model significantly there will be "loops" of filtering and the model can get trapped just ensure that it flows in one direction to prevent looping

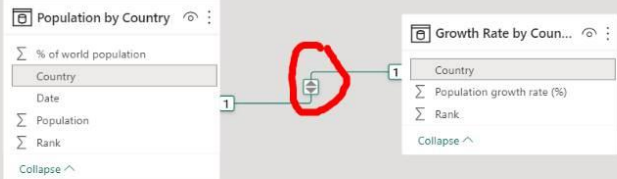
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## WORD OF ADVICE

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- Never use Many to Many relationships because is too complicated.
- Always use only 1 to 1 or 1 to Many.
- If its 1 to 1 relationship, its advisable to connect them using Inner Join / Union, meaning, combine both tables into 1.

**a 1 to 1 relationship will always be BOTH direction**



**it cannot be set to SINGLE direction because 1 table can always filter the other one**

### Edit relationship

Select tables and columns that are related.

Growth Rate by Country

Rank	Country	Population growth rate (%)
1	Libya	4.85
2	Zimbabwe	4.38
3	South Sudan	4.23

Population by Country

Rank	Country	Population	Date	% of world population
178	Bahamas	351461	5/3/2010	0
179	Iceland	325010	10/1/2013	0
180	Maldives	317280	7/1/2010	0

Cardinality: One to one (1:1) | Cross filter direction: Single

Make this relationship active

Assume referential integrity

u see? this happens....

The filter direction you selected isn't valid for this relationship.

OK Cancel

- A 1 to Many relationship can have either SINGLE or BOTH direction.
- But by default, it will be set to SINGLE and it will always be the 1 filtering the Many.

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## ABOUT DR. ALVIN ANG

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Dr. Alvin Ang earned his Ph.D., Masters and Bachelor degrees from NTU, Singapore. He is a scientist, entrepreneur, as well as a personal/business advisor. More about him at [www.AlvinAng.sg](http://www.AlvinAng.sg).