

# Microsoft Power BI

## Download free copy (not necessary for class)

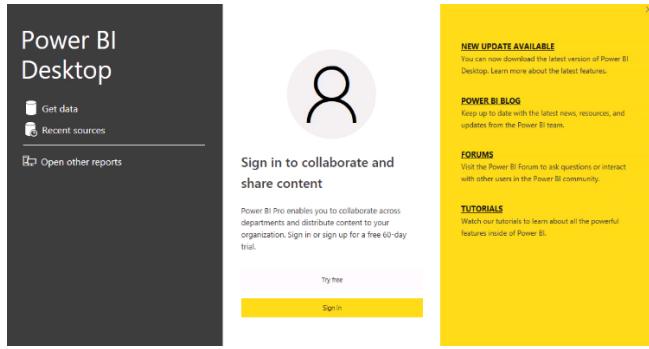
1. If you would like a free copy, go to the website:

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

2. Follow the download instructions

## Power BI

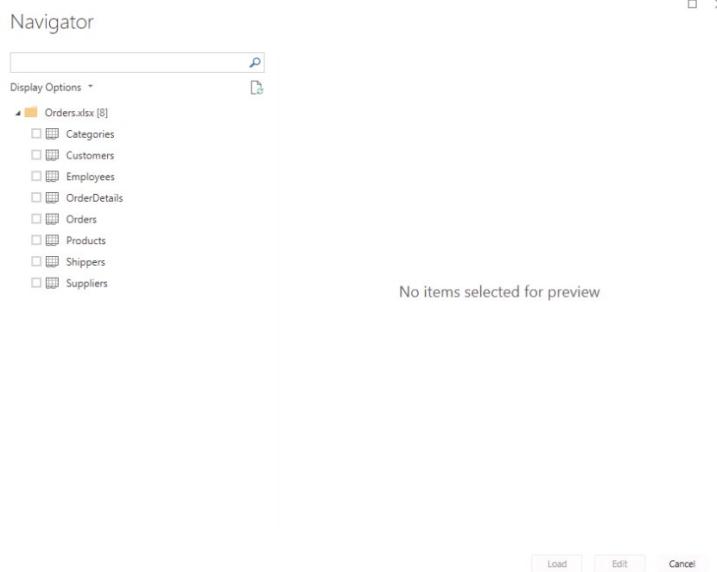
1. When the Power BI opens, you should see:



2. Do not sign in. Simply click on the X in the upper right corner of the image above to close the sign in screen

## Connecting to Data

1. For this exercise, we will connect to the Orders.xls spreadsheet. This example was used in the Access, Tableau, and Excel examples.
2. In the upper left corner of Power BI, click on Get Data, then Excel
3. Find the Orders.xls file on your desktop, then click Open



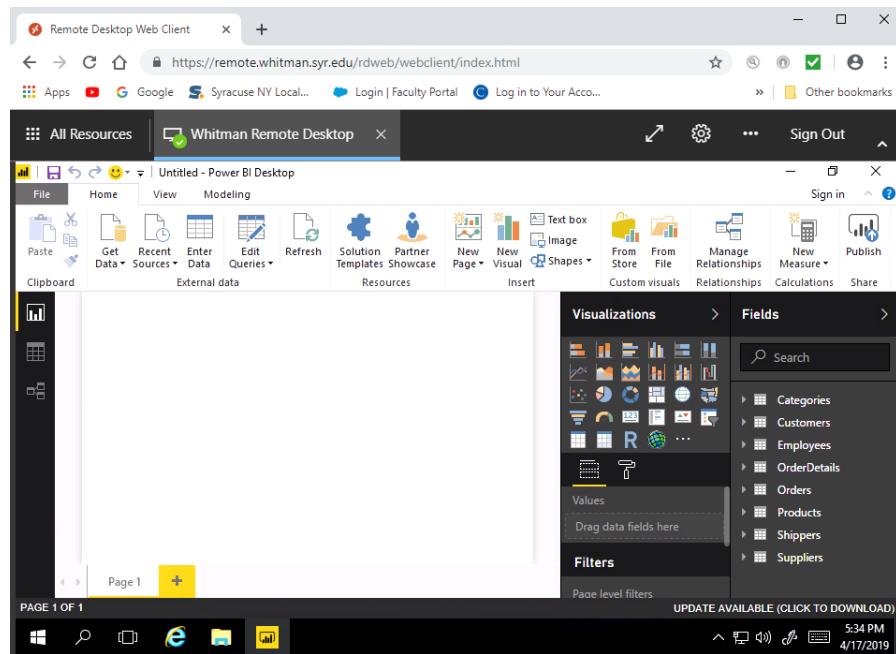
4. Note that this screen looks very similar to Tableau
5. Check each of the boxes

Navigator

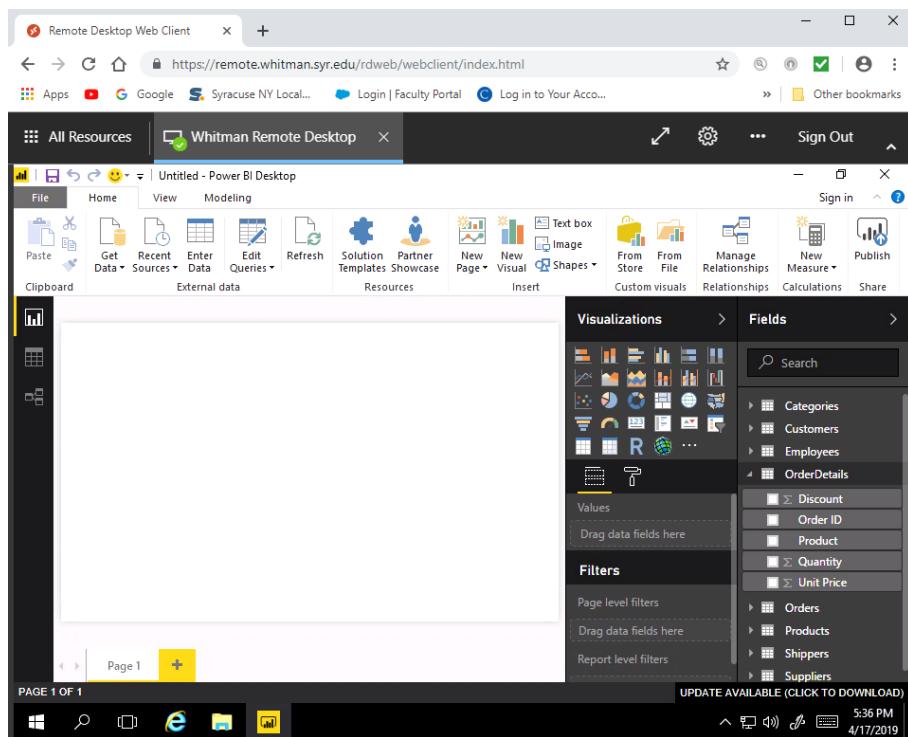
Suppliers		
Supplier ID	Supplier	Contact Name
1	Exotic Liquids	Charlotte Cooper
2	New Orleans Cajun Delights	Shelley Burke
3	Grandma Kelly's Homestead	Regina Murphy
4	Tokyo Traders	Yoshi Nagase
5	Cooperativa de Quesos 'Las Cabras'	Antonio del Valle Saavedra
6	Mayumi's	Mayumi Ohno
7	Pavlova, Ltd.	Ian Devling
8	Specialty Biscuits, Ltd.	Peter Wilson
9	PB Knäckebrot AB	Lars Petersen
10	Refrescos Americanas LTDA	Carlos Diaz
11	Heli Süßwaren GmbH & Co. KG	Petra Winkler
12	Plutzer Lebensmittelgroßmarkte AG	Martin Beil
13	Nord-Ost-Fisch Handelsgesellschaft mbH	Sven Petersen
14	Formaggi Fortini s.r.l.	Elio Rossi
15	Norske Meierier	Beate Vileild
16	Bigfoot Breweries	Cheryl Saylor
17	Vensk Sjöföda AB	Michael Björn
18	Aux joyeux ecclesiastiques	Guyène Nodier
19	New England Seafood Cannery	Rob Merchant
20	Leka Trading	Chandra Leka
21	Lynghbyn	Niels Petersen
22	Zaanse Snoepfabriek	Dirk Luchte
23	Karkki Oy	Anne Heikkinen

Load Edit Cancel

6. Click Load. Power BI will load and display the tables on the right.



7. Click on the arrow next to Order Details to expand the table and view the fields



## Correcting Labels

Click on the arrow to each table on the right. Do any of the tables look unusual?

Sometimes, Power BI does not load data correctly. Let's correct the Customers table. The Customers table has Column1, Column2, etc., for the labels. We need to correct this

1. Right click on the icon to the left of the Customers table, click on Edit query

	A <sub>1</sub> Column1	A <sub>2</sub> Column2	A <sub>3</sub> Column3	A <sub>4</sub> Column4	A <sub>5</sub> Column5	A <sub>6</sub> Column6	A <sub>7</sub> Column7	A <sub>8</sub> Column8	A <sub>9</sub> Column9	A <sub>10</sub> Column10	A <sub>11</sub> Column11
1	Customer ID	Customer	Contact Name	Contact Title	Address	City	Region	Postal Code	Country		
2	ALFKI	Alfredo Futterkiste	Maria Anders	Sales Representative	Oberseestr. 57	Berlin		12209			
3	ANATR	Ana Trujillo Emparedados y helados	Ana Trujillo	Owner	Avda de la Constitución 2222	México D.F.		05021	Mexico		
4	ANTON	Antonio Moreno Taquería	Antonio Moreno	Owner	Maderas 2312	México D.F.		05023	Mexico		
5	AROUT	Around the Horn	Thomas Hardy	Sales Representative	120 Hanover Sq.	London		WA1 1DP	UK		
6	BERGS	Berglunds snabbköp	Christina Berglund	Order Administrator	Berguvsgatan 8	Luleå		958 22	Sweden		
7	BLAUS	Blauer See Delicatessen	Hanna Moos	Sales Representative	Foersterstr. 57	Mannheim		68306	Germany		
8	BLONP	Blondel pâté et fils	Frédérique Citeaux	Marketing Manager	24, place Kléber	Strasbourg		67000	France		
9	BOLID	Bólido Comidas preparadas	Martin Sommer	Owner	C/ Arapita, 67	Madrid		28023	Spain		
10	BONAP	Bon app'	Laurence Lebihan	Owner	12, rue des Bouchers	Marseille		13008	France		
11	BOTTM	Bottom-Dollar Markets	Elizabeth Lincoln	Accounting Manager	23 Tswassen Blvd.	Tswassen	BC	T2F 8M4	Canada		
12	BSBEV	B's Beverages	Victoria Atkinson	Sales Representative	Fantenterg Círcus	London		EC2 SNT	UK		
13	CACTU	Cactus Comidas para llevar	Patricia Simpson	Sales Agent	Cerrito 333	Buenos Aires		1010	Argentina		
14	CENTC	Centro comercial Móvil	Francisco Chang	Marketing Manager	Sierras de Granada 9993	México D.F.		05022	Mexico		
15	CHOPS	Chop-suey Chinese	Yang Wang	Owner	Hauptstr. 29	Bern		3012	Switzerland		
16	COMMI	Comércio Mineiro	Pedro Afonso	Sales Associate	Av. dos Lusíadas, 23	São Paulo	SP	05432-043	Brazil		
17	CONSH	Consolidated Holdings	Elizabeth Brown	Sales Representative	Berkeley Gardens	London		WX1 6LT	UK		
18	DRAOD	Drachenblut Delikatessen	Sven Ottlieb	Order Administrator	Waisenweg 21	Aachen		52066	Germany		
19	DUMON	Du monde entier	Jeanne Labrune	Owner	67, rue des Cinquante Otages	Nantes		44000	France		
20	EASTC	Eastern Connection	Ann Devon	Sales Agent	35 King George	London		W1X 6FW	UK		
21	ERNSH	Ernst Handel	Roland Mendel	Sales Manager	Kirchgasse 6	Graz		8010	Austria		
22	FAMIA	Familia Arquillos	Aria Cruz	Marketing Assistant	Rua Orós, 92	São Paulo	SP	05442-030	Brazil		
23	FISFA	FÍSICA Fabrica Inter. Salchichas S.A.	Diego Roel	Accounting Manager	C/ Moratarral, 86	Madrid		28034	Spain		
24	FOULG	Folies gourmandes	Martine Rancé	Assistant Sales Agent	184, chaussée de Tournai	Lille		59000	France		
25	FOULK	Folk och fä HB	Maria Larsson	Owner	Älvängen 24	Brücke		5-844 67	Sweden		
26	FRANK	Fränkische Freudenverwandlung	Peter Franken	Marketing Manager	Berliner Platz 43	München		80805	Germany		
27	FRANR	France restauration	Carine Schmitt	Marketing Manager	54, rue Royale	Nantes		44000	France		
28	FRANS	Franchi S.p.A.	Paolo Accorti	Sales Representative	Via Monte Bianco 34	Torino		10100	Italy		
29	FURIB	Furia Bacalhau e Frutos do Mar	Lino Rodriguez	Sales Manager	Jardim das rosas n. 32	Lisboa		1675	Portugal		
30	GALED	Galeria del gastrónomo	Eduardo Saavedra	Marketing Manager	Rambla de Cataluña, 23	Barcelona		08022			

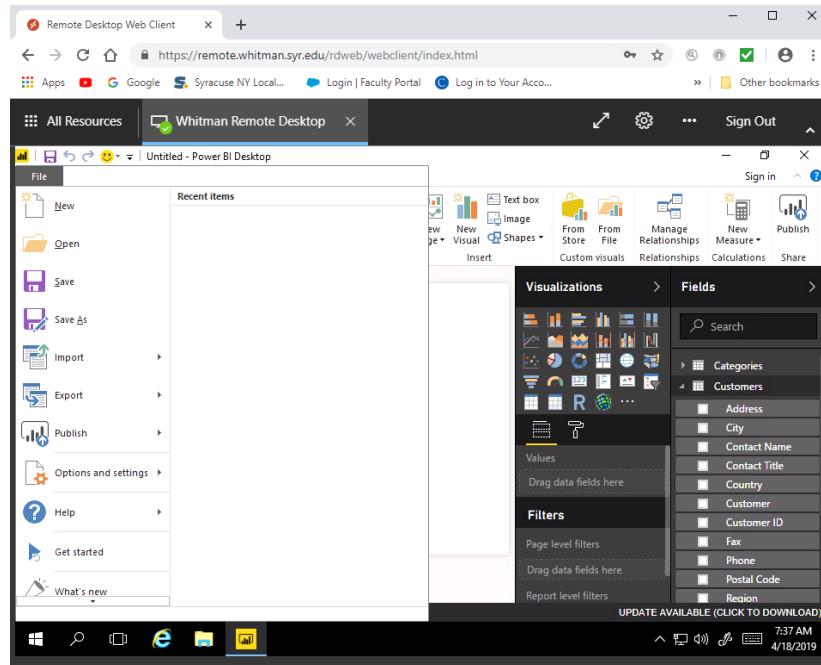
2. On the left side, click on the Customers Query (make sure it is highlighted)
3. In the upper right, click on Use First Row as Headers

	A <sub>1</sub> Customer ID	A <sub>2</sub> Customer	A <sub>3</sub> Contact Name	A <sub>4</sub> Contact Title	A <sub>5</sub> Address	A <sub>6</sub> City	A <sub>7</sub> Region	A <sub>8</sub> Postal Code	A <sub>9</sub> Country	A <sub>10</sub> Column10	A <sub>11</sub> Column11
1	ALFKI	Alfredo Futterkiste	Maria Anders	Sales Representative	Oberseestr. 57	Berlin		12209			
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16	CONSH	Consolidated Holdings	Elizabeth Brown	Sales Representative	Berkeley Gardens	London		WX1 6LT	UK		
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18	DUMON	Du monde entier	Jeanne Labrune	Owner	67, rue des Cincuenta Otages	Nantes		44000	France		
19	EASTC	Eastern Connection	Ann Devon	Sales Agent	35 King George	London		W1X 6FW	UK		
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21	FAMIA	Familia Arquillos	Aria Cruz	Marketing Assistant	Rua Orós, 92	São Paulo	SP	05442-030	Brazil		
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23	FOULG	Folies gourmandes	Martine Rancé	Assistant Sales Agent	184, chaussée de Tournai	Lille		59000	France		
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27	FRANS	Franchi S.p.A.	Paolo Accorti	Sales Representative	Via Monte Bianco 34	Torino		10100	Italy		
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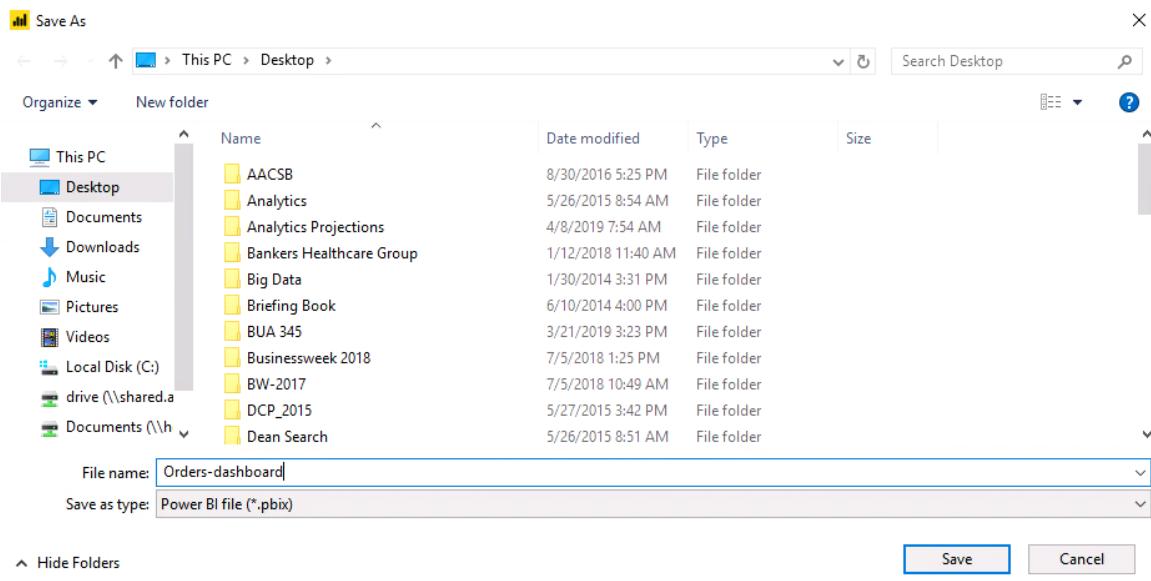
4. Click on the X in the upper right corner of Query Editor
5. When prompted "Do you want to apply your changes now?", click Yes
6. Click on Customers to confirm the correction was made

## Saving your work

### 1. Click on File, Save As

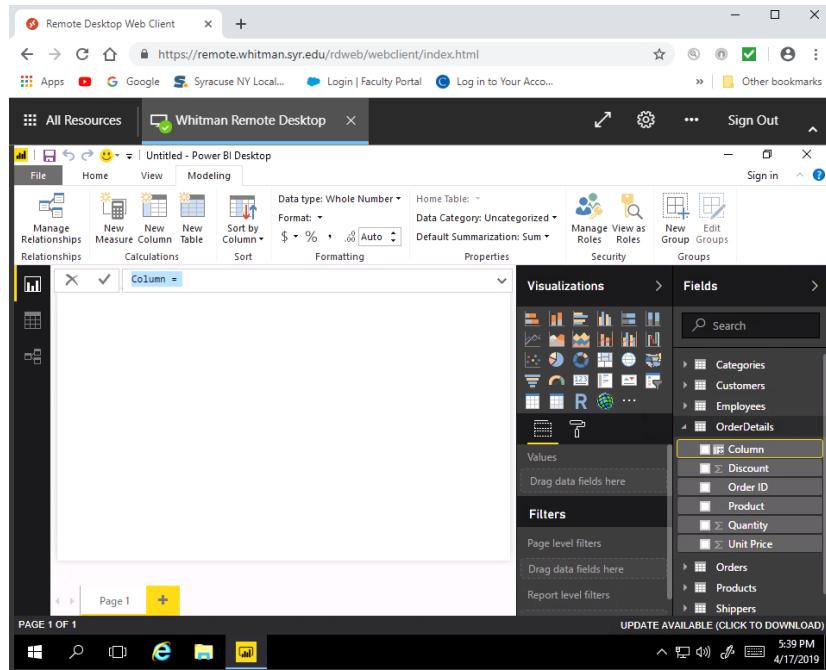


### 2. Enter Orders-dashboard as the name of the file and click Save to save to your desktop

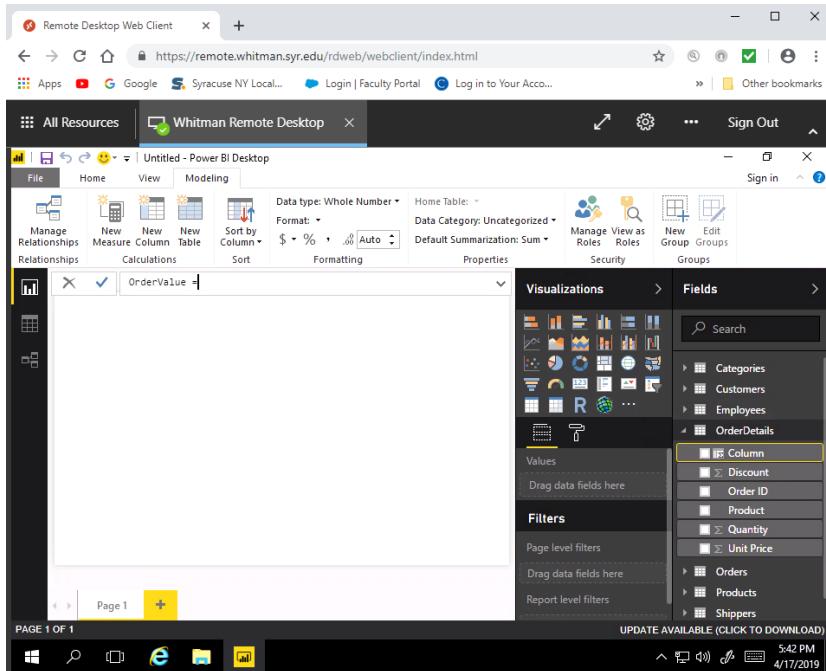


## Adding a calculated field

1. Let's next add a new column. As we did in Tableau and Excel Dashboards, let's add  $\text{OrderValue} = \text{Quantity} * \text{UnitPrice} * (1 - \text{Discount})$
2. While still clicked on OrderDetails, in the upper left of Power BI, click on Modeling
3. Next click on New Column
4. Note that it creates a new field in OrderDetails called Column



5. It also creates a formula under New Column with "Column ="



6. Change the word Column to OrderValue
7. After “OrderValue =”, slowly type Quantity, then backspace one character
8. A list of fields should appear

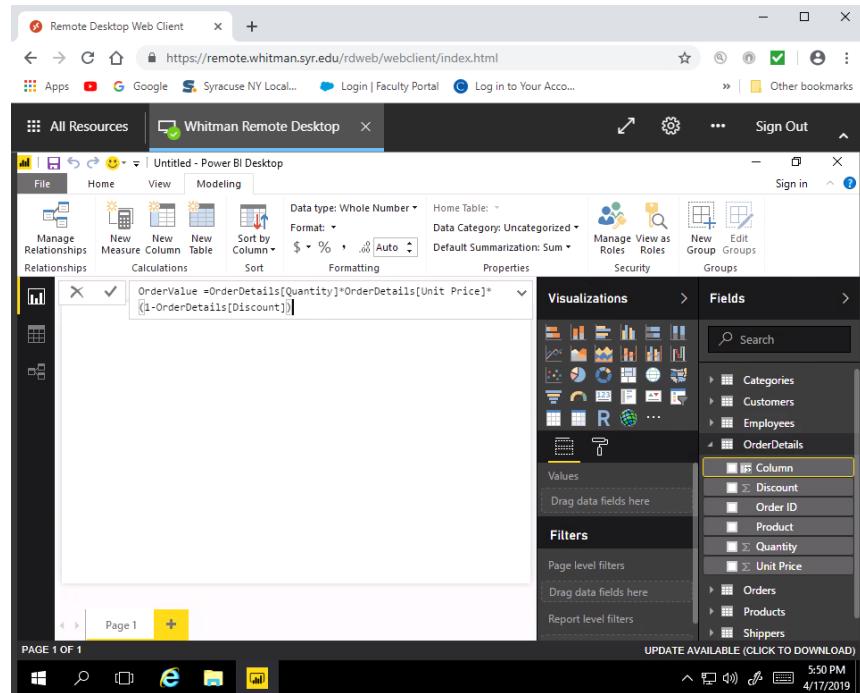
The screenshot shows the Power BI Desktop interface. In the top navigation bar, 'Whitman Remote Desktop' is selected. The main workspace shows a query editor with the formula 'OrderValue=OrderDetails[Quantity]'. On the left, the 'Modeling' tab is active, showing options like 'Manage Relationships', 'New Measure', 'New Column', etc. On the right, the 'Fields' pane is open, displaying a tree view of fields from the 'OrderDetails' table. The field 'Quantity' is highlighted under the 'Column' category.

9. Double click on OrderDetails[Quantity]
10. Enter \* for multiplication
11. Slowly type Unit Price, then backspace one character
12. A list of fields should appear again
13. Double click on OrderDetails[Unit Price]

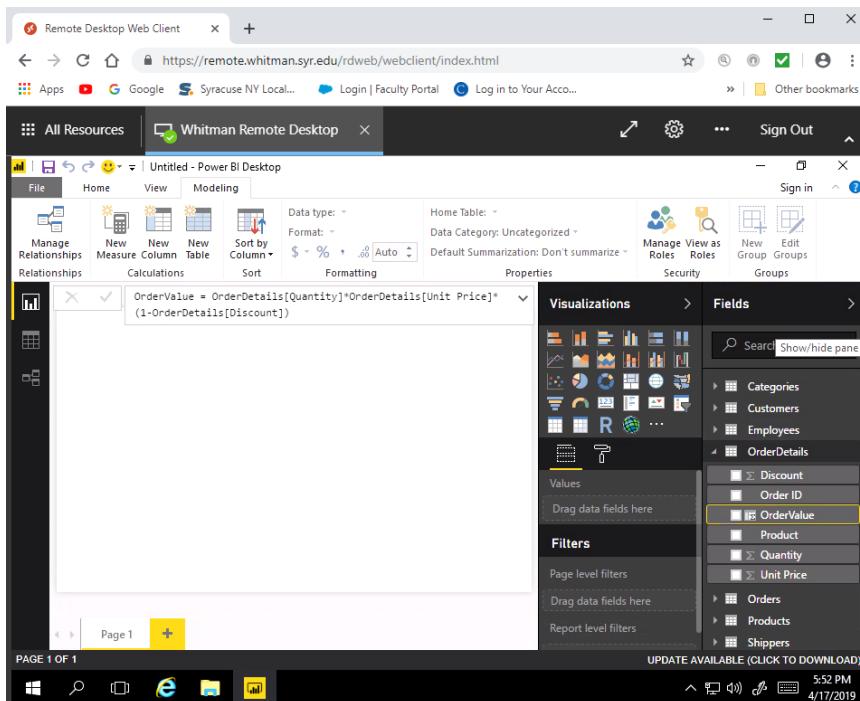
This screenshot is similar to the previous one, showing the Power BI Desktop interface with the 'Modeling' tab selected. The formula in the workspace is now 'OrderValue=OrderDetails[Quantity]\*OrderDetails[Unit Price]'. The 'Fields' pane on the right shows the 'OrderDetails' table structure again, with 'Unit Price' being the selected field under the 'Column' category.

14. Enter \* for multiplication

15. For discount, we will need (1-Discount)
16. Enter (1 –
17. Slowly type Discount, then backspace one character
18. Type ) to close the equation

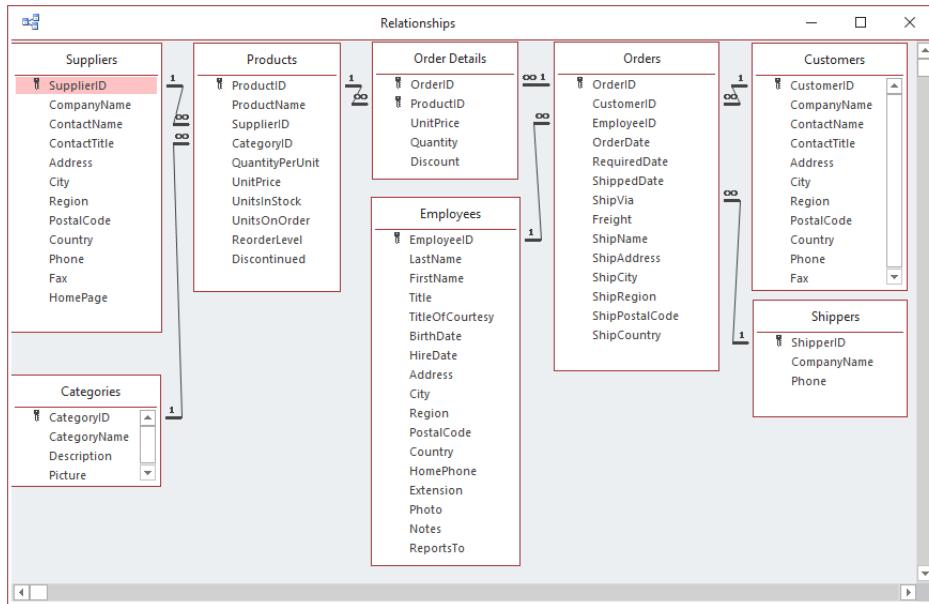


19. Click on the enter key to add OrderValue to the OrderDetails table.



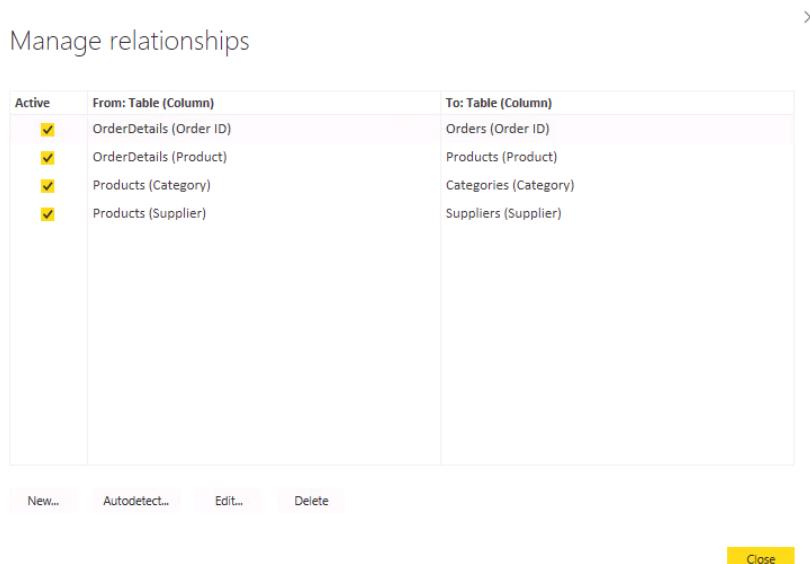
## Creating Relationships

The Orders Access database that we used earlier had the following relationships. There are a total of seven relationships



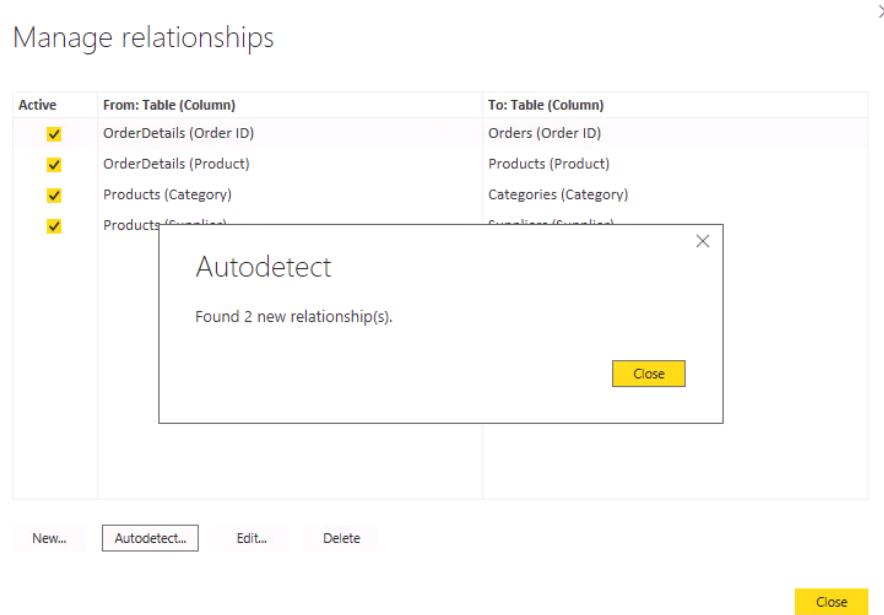
Power BI has the ability to detect some relationships between tables upon loading, can be forced to auto-detect relationships, and you can add relationships manually.

1. On the Modeling tab, click on Manage Relationships
2. When Power BI loaded the data, it created some of the relationships

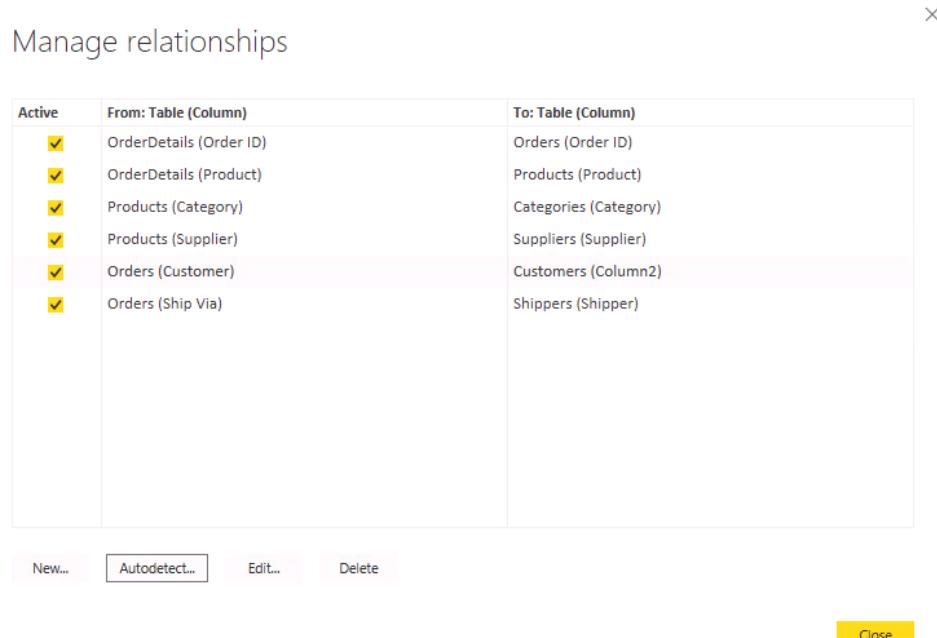


3. Note that it only detected some relationships

4. Let's now force Power BI to detect more relationships
5. In the Manage Relationships window, click on Autodetect

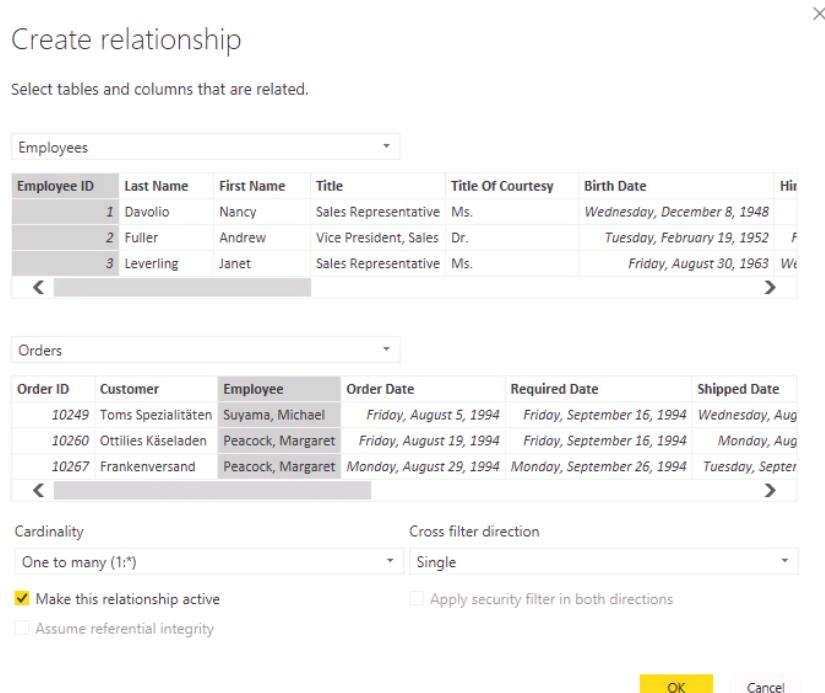


6. Autodetect found new relationships. Click on Close in the Autodetect window

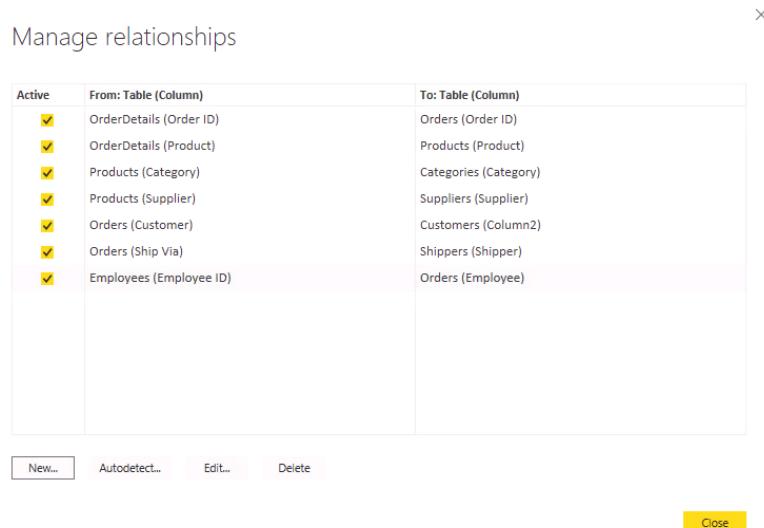


7. We are still missing the seventh relationship. Reviewing the Access relationship diagram, it appears that Employees to Orders is missing

8. In the Manage relationship window, click on New to add the last relationship
9. In the first box, click on the drop down menu and select the Employees table
10. In the second box, click on the drop down menu and select the Orders table
11. To identify the fields that form the join, click on Employee ID in the Employees table
12. Then click on Employee in the Orders table



13. Finally click OK

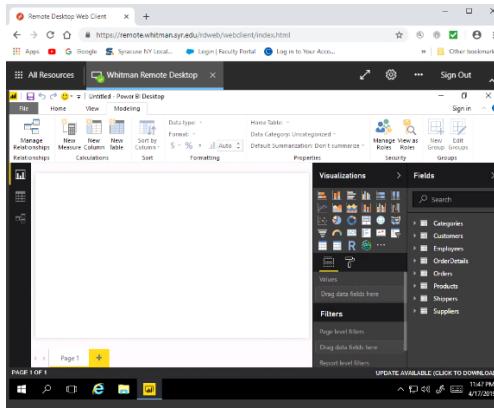


14. Now all relationships have been created
15. Click Close to close the Manage relationships window

## Viewing Options

On the left side of the screen are three viewing options: Report, Data, and Relationships.

1. Click on Report for the default screen

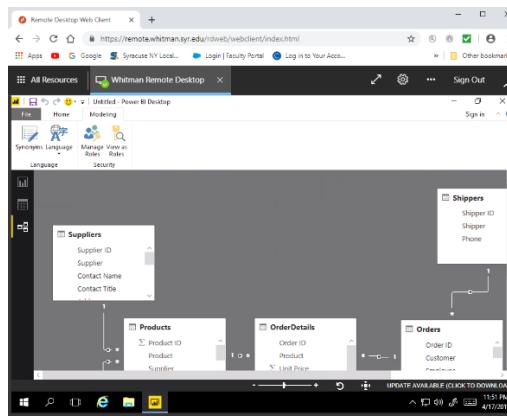


2. Click on Data to see data in the table

A screenshot of the Microsoft Edge browser window titled "Whitman Remote Desktop". The address bar shows the URL https://remote.whitman.syr.edu/rweb/webclient/index.html. The main interface is the Power BI Desktop application. On the left, there's a ribbon with tabs like File, Home, View, Modeling, etc. Below the ribbon are buttons for Manage Relationships, Calculations, and Relationships. The central area displays a table titled "TABLE: Categories (9 rows)". The table has columns: CategoryID, Category, and Description. The data is as follows:

CategoryID	Category	Description
1	Beverages	Soft or non-alcoholic beers, wines, and ales
2	Condiments	Sweet and savory sauces, condiments, spreads, and seasonings
3	Deli Meats	Cold cuts and cold prepared meats
4	Dairy Products	Cheeses
5	Grains/Cereals	Breads, cereals, pasta, and rice
6	Miscellany	Prepared meals and side dishes
7	Pantry	Dried fruits and beans
8	Seafood	Frozen fish and seafood

3. Click on Relationships for the relationships between tables

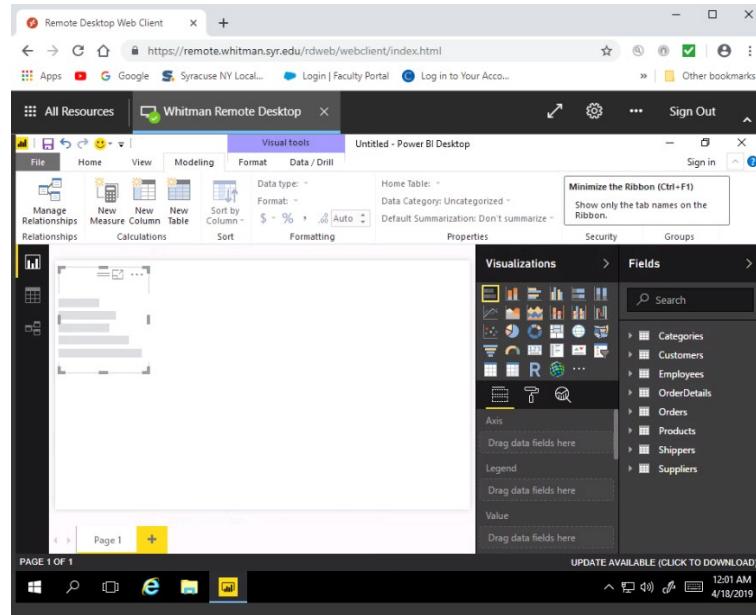


4. Click on Report to return to the default.

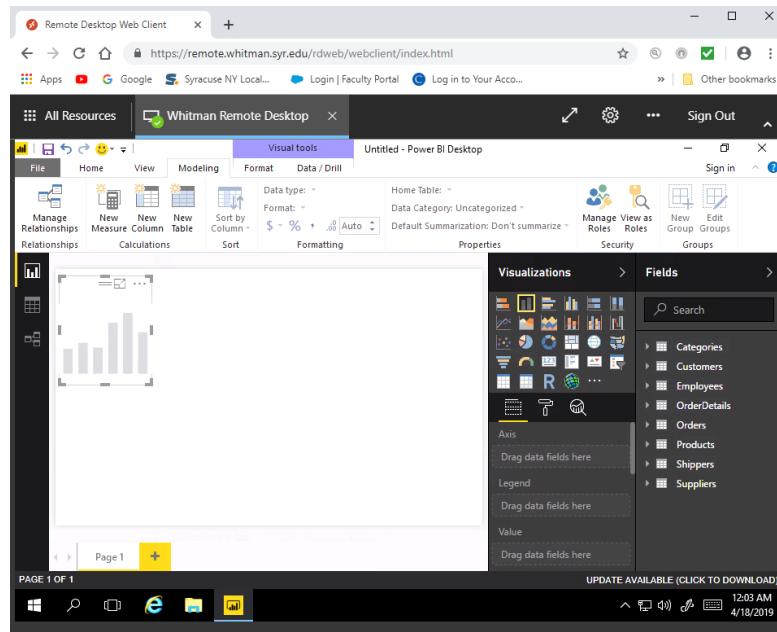
## Visualizations – adding a chart

In Tableau, we first created Pivot Tables, then selected a chart format. In Power BI, you select a chart, then drag and drop into fields.

1. Under Visualizations, click on the first picture in the upper left (Stacked Bar Chart).

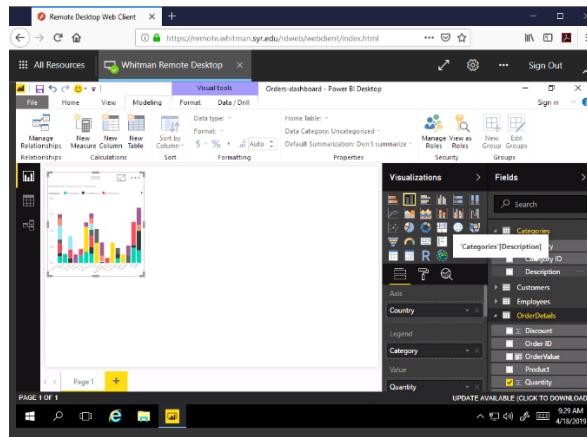


2. Power BI will show a sample chart in the left side of the Reports area
3. Click on the Stacked Column Chart (top row, second from left)



4. Note that the sample diagram changes on the left portion of the Reports area.
5. The list of chart requirements appears under the Visualization section.
6. Click through all of the other options in Visualization.

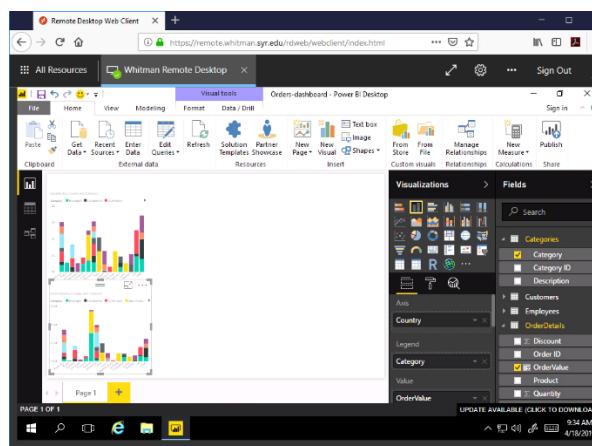
7. Click on the Stacked Column chart
8. Click on the arrow next to Suppliers table to display the fields
9. Drag Country to the Axis box
10. Click on the arrow next to Categories table to display the fields
11. Drag Category to the Legend box
12. Click on the arrow next to Order Details table to display the fields
13. Drag Quantity to the Value box
14. Click on the lower right corner of the chart and drag it to expand the size of the chart



### Visualizations – adding a second chart to the same dashboard

To add a second chart:

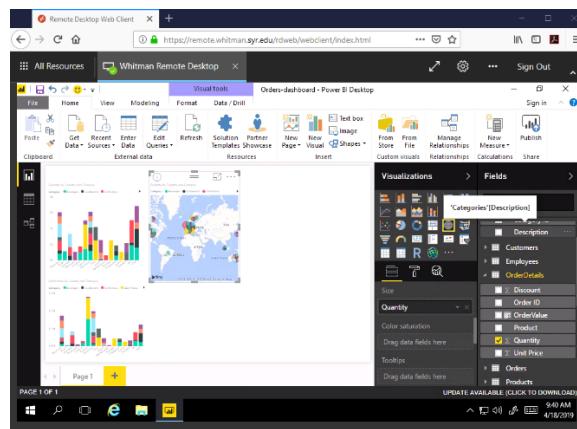
1. Click on the Home tab
2. Click on New Visual
3. Use the Stacked Bar Chart again
4. Drag Suppliers: Country to Axis
5. Drag Categories: Category to Legend
6. Drag OrderDetails: OrderValue to Value
7. Click on the lower right corner of the chart and drag it to expand the size of the chart



## Visualizations – adding a third chart to the same dashboard - Maps

To add a third chart:

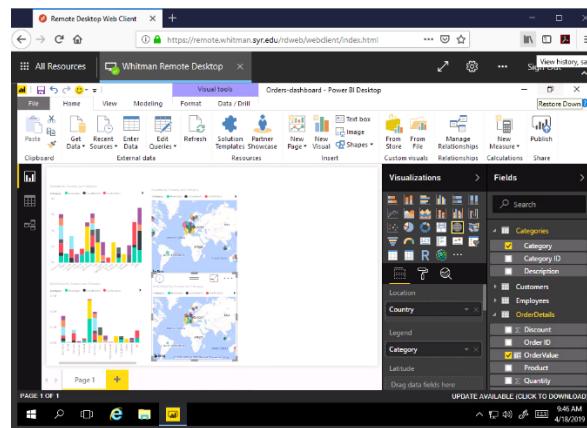
1. Click on the Home tab
2. Click on New Visual
3. Click on Map
4. Drag Suppliers: Country to Location
5. Drag Categories: Category to Legend
15. Drag OrderDetails: Quantity to Size
16. Click on the lower right corner of the chart and drag it to expand the size of the chart



## Visualizations – adding a fourth chart to the same dashboard - Maps

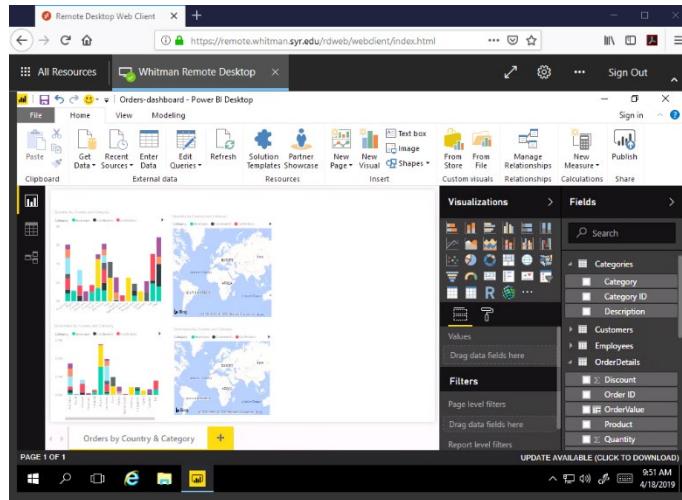
To add a fourth chart:

6. Click on the Home tab
7. Click on New Visual
8. Click on Map
9. Drag Suppliers: Country to Location
10. Drag Categories: Category to Legend
17. Drag OrderDetails: OrderValue to Size
18. Click on the lower right corner of the chart and drag it to expand the size of the chart



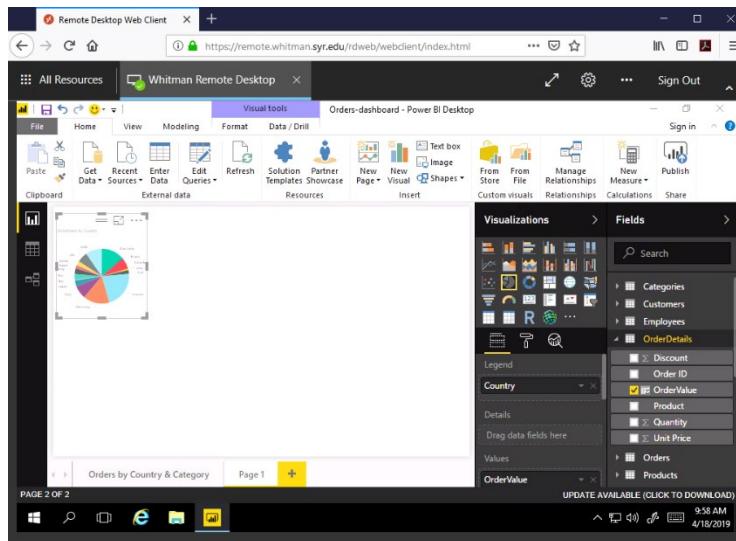
## Naming the Dashboard

1. Double click on the Page 1 at the lower left of the screen
2. Rename Page 1 to Orders by Country & Category

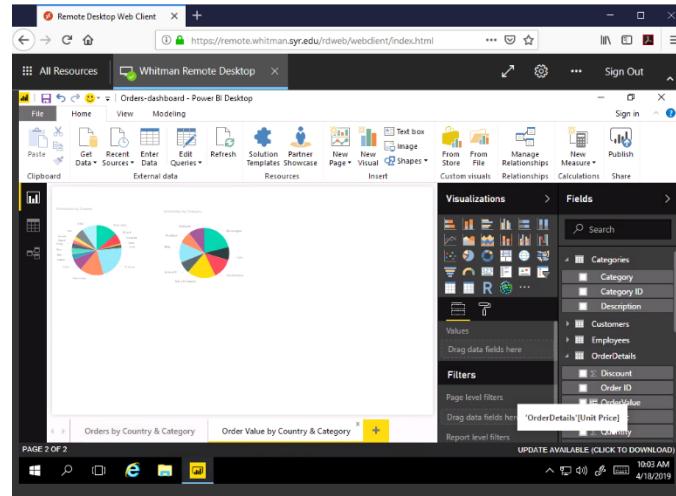


## Adding more Dashboard Pages – Pie Charts

1. To add another Dashboard, in the Home tab, click on the down arrow for New Page
2. You have the option of a Blank Page or Duplicate Page
3. Click on Blank Page
4. Click on the Pie Chart
5. Drag Suppliers: Country to Legend
6. Drag OrderDetails: OrderValue to Values

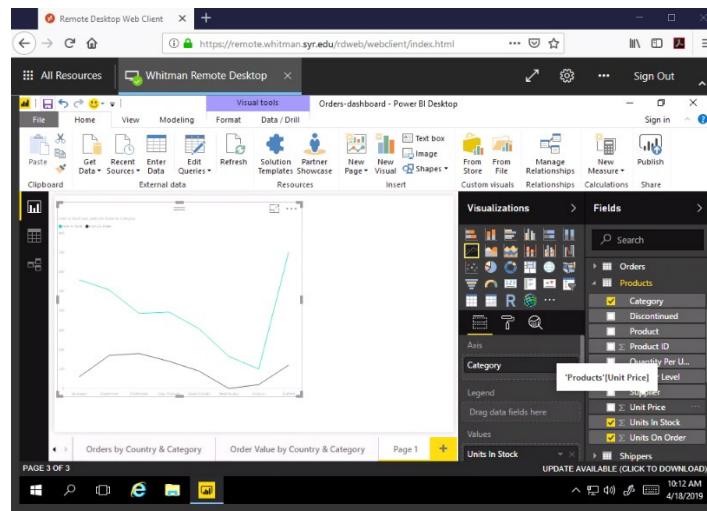


7. Add a second pie chart by clicking on New Visual
8. Change it to Pie Chart
9. Drag Categories: Category to Legend
10. Drag OrderDetails: OrderValue to Values
11. Move the second pie chart to the right of the first by clicking on the second chart, hold the mouse button down, and drag
12. Rename the page Order Value by Country & Category by double clicking on the page number at the bottom of the screen

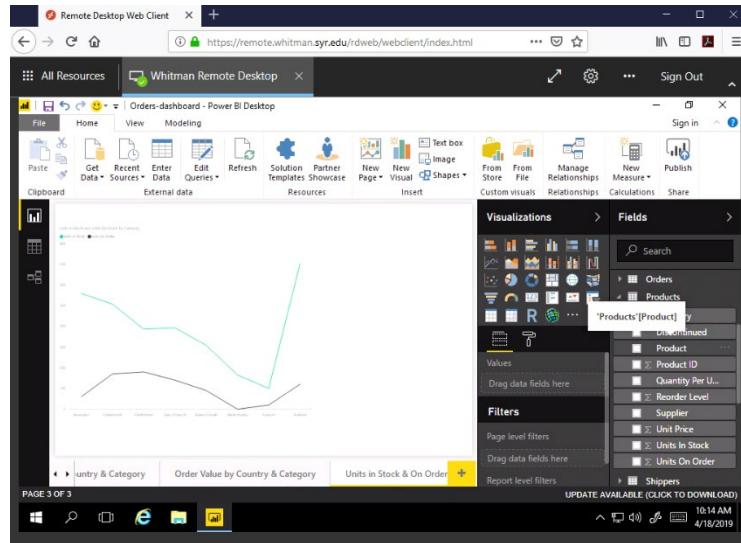


### Adding more Dashboard Pages –Line Graphs with Multiple Data Fields

1. You can add more pages by clicking on the + button at the bottom of the screen
2. Click on the Line chart (second row, chart on left)
3. Drag Products: Category to Axis
4. Note that for Values, it now says “Drag data fields here”, plural for more than one
5. Drag Products: Units in Stock to Values
6. Drag Products: Units on Order to Values
7. Expand the graph by dragging the lower right corner

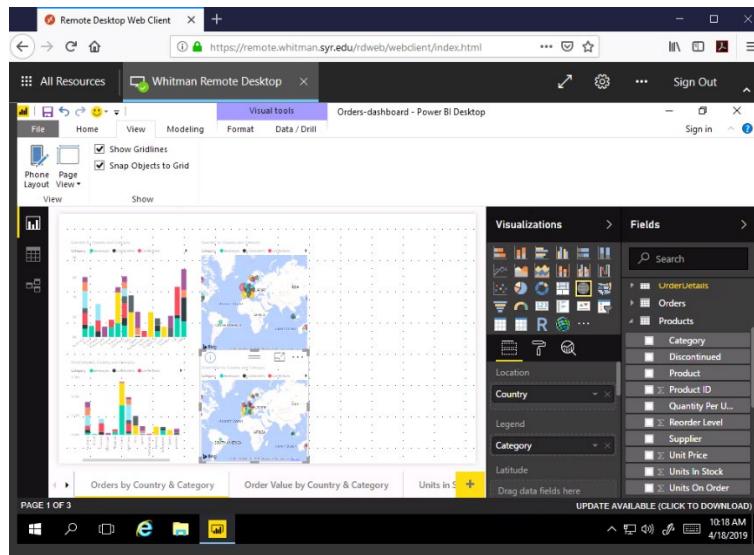


## 8. Rename the page Units In Stock & On Order



## Cleaning up Alignment

1. Click on the first dashboard page, Orders by Country & Category
2. Often, the graphs will not be perfectly aligned
3. To fix this problem, click on the View tab
4. Check the box Show Gridlines
5. Check the box Snap Objects to Grid
6. Move the charts until they look aligned
7. Uncheck Show Gridlines



## Refreshing Data

1. To refresh the data, click on the Home tab, then Refresh