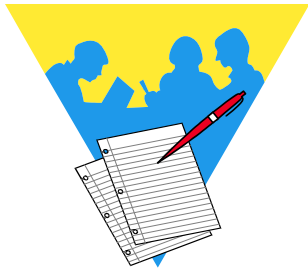


## Lesson 4: Data Modeling

### Lesson Overview

You will cover the following concepts in this chapter:

- ◆ Data Modeling
- ◆ Understanding Relationships
- ◆ Preparing the Tables
- ◆ Creating Relationships
- ◆ Managing the Data Model
- ◆ Creating PivotTables
- ◆ Working with a PivotTable
- ◆ Adding a Calculated Column



## Lesson Notes

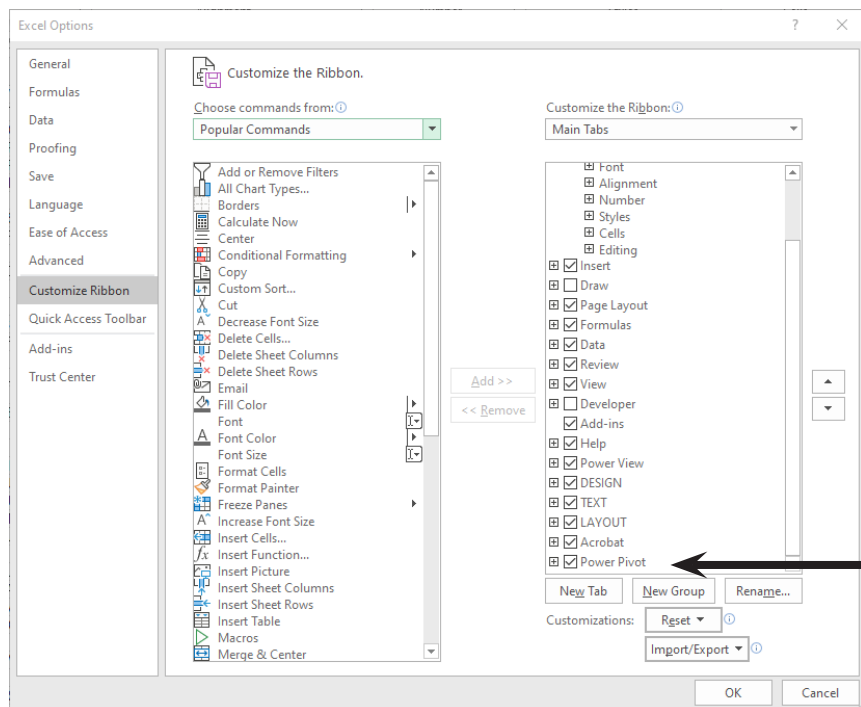
## Data Modeling

*Excel* has added data modeling as new feature, you no longer have to add the plug-in as in the previous version. This tool allows you to connect tables of data, creating a relational data structure within *Excel*. These related tables are used in Pivot Tables, Pivot Charts, and Power View reports greatly extending their functionality. The data used in can be in the *Excel* file or can be imported by using the Get External Data tools.

If the **Power Pivot Tab** is not displayed in the ribbon you may need to enable Power Pivot from the *Excel Options* dialog.

### Adding the Power Pivot Tab

- ❖ Click the *File Tab*.
- ❖ Click the *Options* option.
- ❖ The *Excel Options* dialog opens.
- ❖ Click the *Customize Ribbon* category on the left side of the dialog.
- ❖ Check the Power Pivot checkbox.

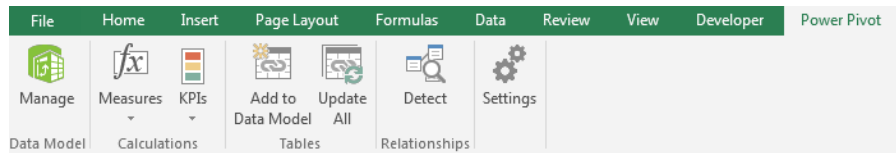


- ❖ Click the [OK] button.

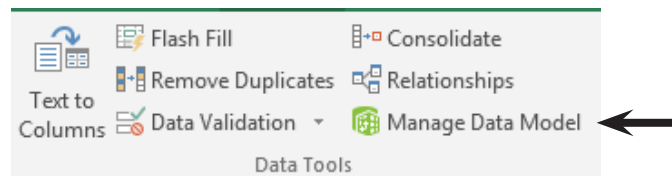


## Data Modeling, continued

- ◆ The *Power Pivot Tab* should now be displayed on the ribbon.



Data modeling tools are also found in the Data Tools Group on the Data Tab.



Although you can easily build huge data models in *Excel*, there are some considerations to keep in mind when working with Data Models.

- ◆ Large models containing many tables and columns are overkill for most analyses.
- ◆ *Excel* has a file size limit of 10MB, and having lots of large tables of data will reach the limit quickly.
  - ◆ As the file size grows, it will negatively affecting other applications and reports sharing the same system resources due to high demands of system memory.
- ◆ Avoid calculated columns, since they will need regular updating to keep current data in the Data Model. (Draws more system resources)
- ◆ Ensure that the data has a Primary key column of data to create relationship between the data tables.
- ◆ It is recommended to use a 64 bit version of the program with a minimum of 8GB of RAM, 16GB preferred.





## Data Modeling, continued

### Other Limitations

The table below lists other constraints within a Data Model

Object	Maximum Limit
Characters in a table or column name	100 characters
Number of tables in a model	2,147,483,647
Number of columns and calculated columns in a table	2,147,483,647
Concurrent requests per workbook	6
Number of connections	5
Number of distinct values in a column	1,999,999,997
Number of rows in a table	1,999,999,997





## Understanding Relationships

To create a **Data Model**, it is necessary to understand how *Excel* interprets data and values that contribute to the **Data Model** itself. We will begin by examining the **Relational Database** concepts to gain a better understanding of **Data Models'** foundational structure.

### Relational Databases

A relational database's structure inherently recognizes relationships among the data. These relationships let you quickly search and retrieve specific information, view the same dataset in multiple ways and reduce data errors and redundancy.

To avoid repeating all the master information in every detailed table, you create relationships using one unique field, then let *Excel* do the rest.

There are two basic types of relationships that will be established between **Tables**:

- ◆ One to one relationship - for every record in the master table, there is one matching record in the detail table.
- ◆ One to many relationship - for every record in the master table, there can be many records in the detail table that link back to the master table.

For example, you may have an Employee Table with ID numbers. In the Employee Table, the Employee ID Number is unique for each individual employee. This is considered a **Primary Key**. No two employees can have the same Employee ID Number.

In a related table, you may have accounts to which each employee is assigned. Because the field Employee ID Number appears in both tables, these tables can be related. However, in the second table with the accounts, each employee may be assigned multiple accounts. Therefore, this is a one to many relationship from the Employee Table to the Accounts Table. These tables are related because the Employee ID Number field appears in both tables, which makes this a **Relational Database**. The Employee ID Number in the Accounts Table is called a **Foreign Key** because it is not a unique identifier and, therefore, cannot be used as a **Primary Key**.



## Preparing the Tables

### Structuring the Data

First, you need to determine if the information can and should be related. When you have data in two or more Tables, it may be more efficient to combine the information from the Tables to draw a conclusion or extract more accurate data. If this is the case, don't waste time trying to physically combine the data on one spreadsheet, use *Excel's Data Modelling* tools to extract the information as needed.

### Convert the Data to a Table

- ◆ Select any cell in the dataset.
- ◆ On the *Home Tab*, in the **Style Group** click the **Format as Table** button.
- ◆ Choose any of the available formatting options.
- ◆ In the *Format as Table* dialog, check to ensure all the connected data are included in the **Where is your table:** field
- ◆ Click the **[OK]** button.
- ◆ Repeat these steps for each dataset to be used in the Data Model.

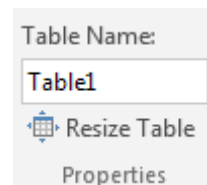
#### Note

By default tables are named numerically as they are created.

### Rename the Table

Once you have created the tables, you should rename the tables to make the process much simpler. While this is not necessary, it is extremely helpful.

- ◆ On the *Table Tools Design Tab*, click into the **Table Name:** field in the **Properties Group**.



#### Note

Table name can not include blank spaces or special characters.

- ◆ Type a new name for your **Table**.
- ◆ Tap the **[Enter]** key to apply the name.
- ◆ If the **[Enter]** key is not used and you click away from the field the name is not applied.

## Action 5.1 - Creating and Naming the Tables



### Instructions:

1. Open the **DataModel.xlsx** file.
2. Save the file as **ExcelClassAnalysis.xlsx**.
3. Activate the *Classes* worksheet.
4. Click into any cell containing a value.
5. On the *Home Tab*, in the **Styles Group**, click the **[Format as Table]** button.
6. Choose the first table option from the menu.
7. Check the **Where is the data for your Table:** field to see that it reads;  
**=\$A\$1:\$G\$980**
8. Check the *My table has headers* checkbox.
9. Click the **[OK]** button.
10. Click the *Table Tools Design Tab*.
11. In the **Properties Group**, click into the **Table Name:** field and type in:  
**< Classes >** then tap the **[Enter]** key to apply the name to the table.
12. Format the data on each of the other sheets as tables and name each table with the same name as the worksheet.
13. Save the file and leave it open.

### Results/ Comments:

It is located in the lessons folder.

**[F12]**.

The table styles are displayed.

The *Format As Table* dialog opens.

All the connected data should be listed as the data to be converted into a table.

This will set the row 1 as the header row of the table.

The formatting is applied to the data range and the *Table Tools Design Tab* is added to the ribbon.

The table tools are displayed.

You must tap the **[Enter]** key after entering a name in order for it to be applied. If you forget, the name will not be applied.

Repeat steps 4 through 11 on each worksheet. When naming tables you can not have blank spaces, so add underscores or camel case the names.

**[Ctrl+S]**.



## Creating Relationships

### Note

Relationships only exist between tables of data. If the data is not formatted as a table, apply table formatting to the data..

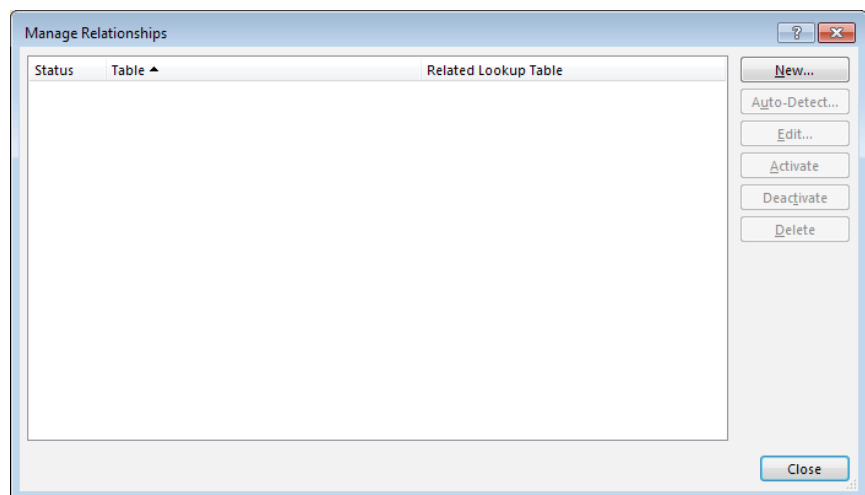
## Find the Related Data

Look at the data in the **Tables** you have created and determine which **Fields** can be used to connect one table to another. These matching fields are what are used to create the relationships.

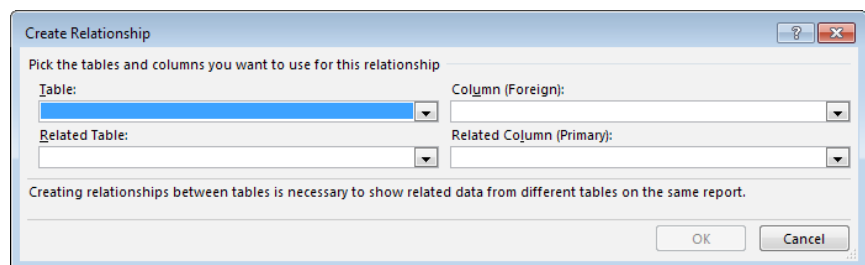
As mentioned earlier, if the two tables both have a column with the same type of data, that column can be used to connect the tables. An Emp\_ID column in the employee data table uniquely identifies each employee and that data can connect to the Emp\_ID column in the sales data tables.

## Creating Relationships

- ◆ Choose any table.
- ◆ On the *Data Tab*, click the **[Relationships]** button in the **Data Tools Group**.
- ◆ The *Manage Relationships* dialog opens.



- ◆ Since there are no existing relationships, the dialog is empty.
- ◆ Click the **[New]** button to open the *Create Relationship* dialog.





## Creating Relationships, continued

- ◆ In the *Create Relationship* dialog,
  - ◆ The **Table:** field drop-down, allows you to choose from any existing tables. This would be the many side of a one-to-many relationship. This table has many items that relate back to a single item in the other table.
  - ◆ The **Column (Foreign):** field drop-down, allows you to choose which column or field of data in the selected table will be used to connect to another table. This column may contain duplicate values.
  - ◆ The **Related Table:** field drop-down, allows you to choose what table will be connected to the selected table in the **Table:** field. This is the one side in a one-to-many relationship.
  - ◆ The **Related Column (Primary):** field drop-down, allows you to select which column will connect to the **Column (Foreign)** field. This column should contain unique values only.
- ◆ Click the **[OK]** button to establish the relationship.
- ◆ The relationship is now displayed in the *Manage Relationships* dialog.
- ◆ Continue creating all the necessary relationships.
- ◆ Click the **[Close]** button once all relationships have been made.



## Action 5.2 - Creating Relationships



### Instructions:

1. Click the **[Relationships]** button in the **Data Tools Group** on the *Data Tab*.
2. Click the **[New]** button.
3. In the **Table:** field choose *Companies* from the drop-down, then from the **Column (Foreign):** field drop-down choose *Sales\_Reps*.
4. In the **Related Table:** field choose *Sales\_Reps* from the drop-down, then from the **Related Column (Primary):** field drop-down choose *Emp-ID*.
5. Click the **[OK]** button.
6. Click the **[New]** button.
7. In the **Table:** field choose *Clients* from the drop-down, then from the **Column (Foreign):** field drop-down choose *Company\_ID*.
8. In the **Related Table:** field choose *Companies* from the drop-down, then from the **Related Column (Primary):** field drop-down choose *Company\_ID*.
9. Click the **[OK]** button.
10. Click the **[New]** button.
11. In the **Table:** field choose *Classes* from the drop-down, then from the **Column (Foreign):** field drop-down choose *Client\_ID*.

### Results/ Comments:

The *Manage Relationships* dialog opens.

The *Create Relationship* dialog opens.

In this case you are setting *Sales\_Reps* column in the *Companies* table as the data that will connect to another table. This is the many side of the one-to-many relationship

You are now setting *Emp-ID* as the column as the unique primary key in the *Sales\_Reps* table, this will be the one side of the one-to-many relationship between the *Sales\_Reps* and *Companies* tables.

The relationship is added in the *Manage Relationships* dialog.

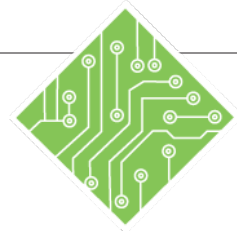
The *Create Relationship* dialog opens.

The many side in the relationship to the *companies* table, many clients work for the same company.

The one side in the relationship.

The relationship is added in the *Manage Relationships* dialog.

The *Create Relationship* dialog opens.



**Instructions:**

12. In the **Related Table:** field choose *Clients* from the drop-down, then from the **Related Column (Primary):** field drop-down choose *Client\_ID*.
13. Click the **[OK]** button.
14. Click the **[New]** button.
15. In the **Table:** field choose *Classes* from the drop-down, then from the **Column (Foreign):** field drop-down choose *Course\_ID*.
16. In the **Related Table:** field choose *Courses* from the drop-down, then from the **Related Column (Primary):** field drop-down choose *Course\_ID*.
17. Click the **[OK]** button.
18. Once all the relationships have been created, click the **[Close]** button.
19. Save the file and leave it open.

**Results/ Comments:**

The relationship is added in the *Manage Relationships* dialog.

The *Create Relationship* dialog opens

The relationship is added in the *Manage Relationships* dialog.

The *Manage Relationships* dialog is closed.

**[Ctrl+S]**.

## Managing the Data Model

### Note

This window will only show existing relations not just raw data tables.

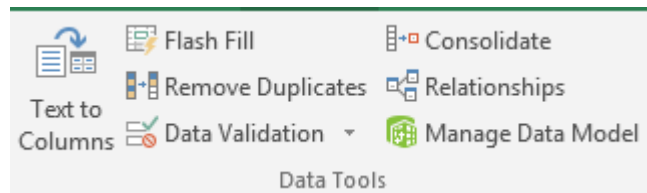
### Note

Tables do not have to be on separate worksheets to build data models.

Once relationships are established you may need or want to manage the data model. When managing a data model, *Excel* will open the *Power Pivot for Excel-(File name)* window from within this environment you are able to see, edit, and create new relations.

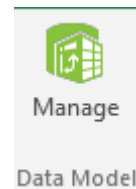
### To Open Excel's Power Pivot window

- On the **Data Tab**, click the **[Manage Data Model]** button in the **Data Tools Group**.

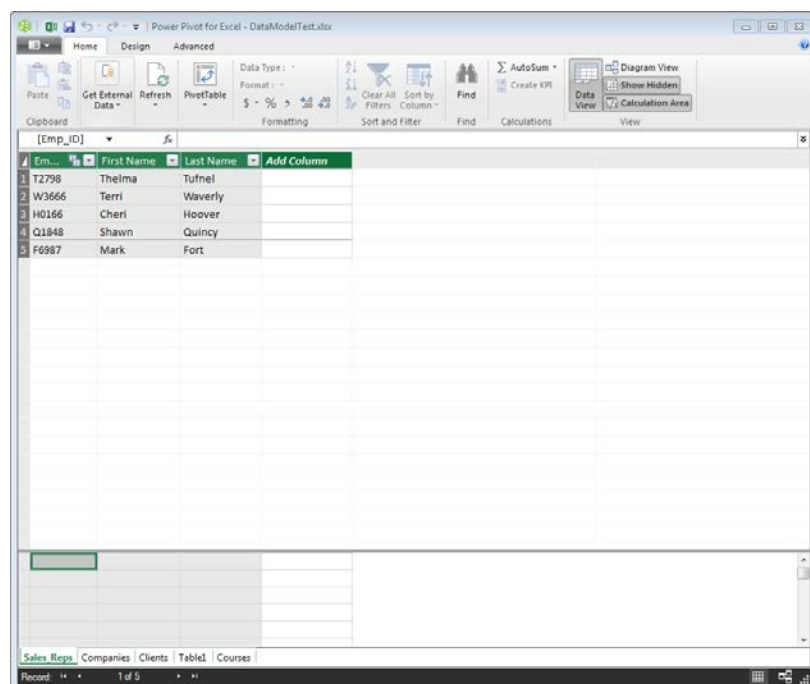


- OR -

- On the **Power Pivot Tab**, click the **[Manage]** button in the **Data Model Group**.



- The *Power Pivot for Excel* opens.



## Managing the Data Model, continued

### Note

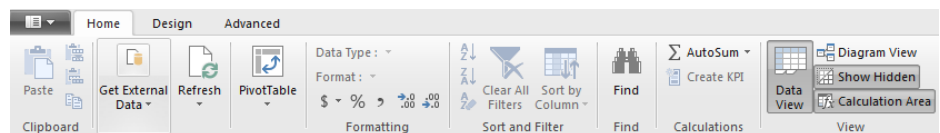
Table names can be changed by right clicking the table tab and choosing *Rename* or by double clicking the tab name. Remember to tap the **[Enter]** key when done to apply the change.

## Power Pivot Views

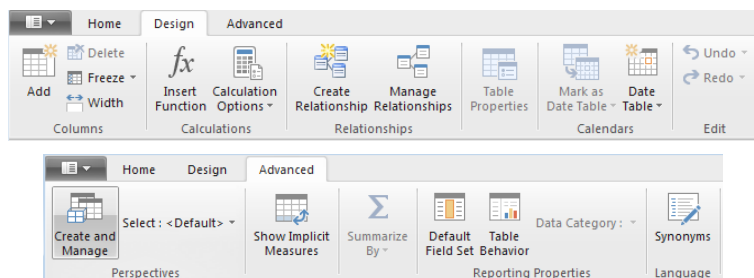
The initial view is of the tabular data, where any related tables are displayed in a similar fashion as worksheets in a workbook. You can change to a diagram view, which displays the tables as small boxes with the fields and lines to show the connections from one table to another.

## The Data View

Using the tools available on the *Home Tab* you are able to apply formatting, sort and filter the data, add new columns to a table, add in formulas, and get external data from outside of *Excel*.



The *Design* and *Advanced Tabs* offer other tools for functions, calculations, freezing, examining and creating relations, properties, as well as more features.

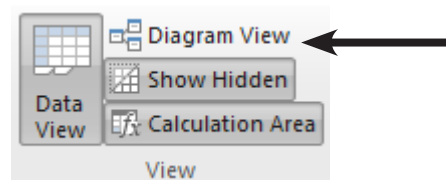


## Managing the Data Model, continued

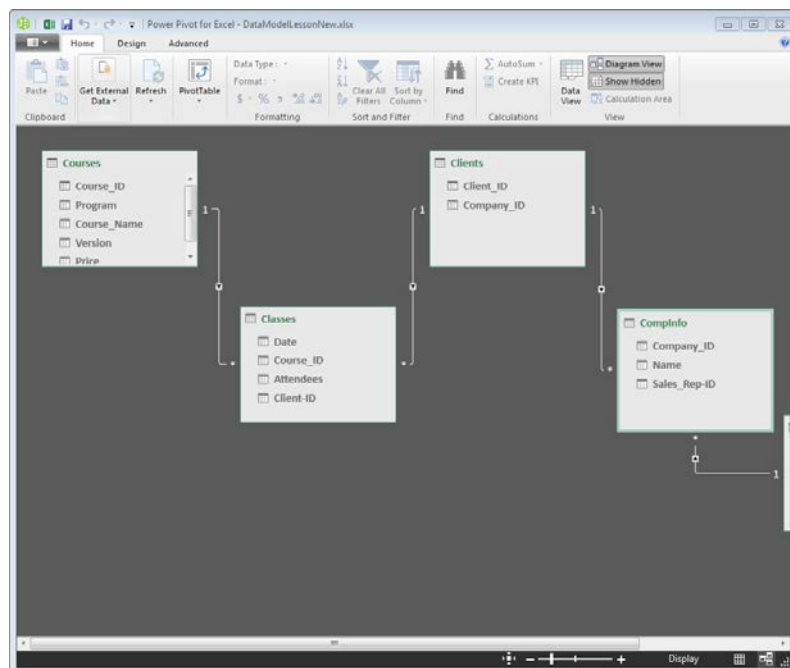
### The Diagram View

While the ribbon tabs are available and offer the same functionality is in the Data View, they would be much more difficult to see the changes being made in the Diagram View.

- ◆ In the **View Group**, click the **[Diagram View]** button.



- ◆ A diagram of the data relations replaces the *Data View*.



- ◆ In this view you are able to see all the data tables in the file as well as the connections between the tables.
- ◆ To move the tables, click and drag the **Title Bar** of the table.
- ◆ As you move the tables around the connection lines are maintained, so you are able to see the connections
- ◆ To resize the table, use the double headed arrow cursor that appears as you hover over the table border.

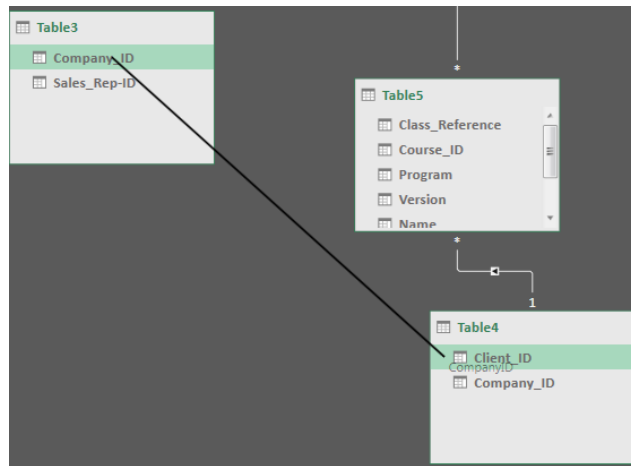


## Managing the Data Model, continued

### Adding a New Connection

You are able to create the connections from within the Diagram View.

- ◆ Select the first table of the connection.
- ◆ Click the field that can be used to relate to another table.
- ◆ Drag the field over the related field of the other table field.

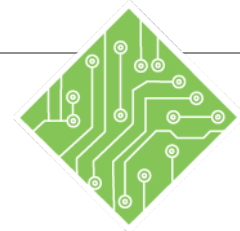


- ◆ As you drag the connection, a line appears that shows which two field are being used for the connection.
- ◆ When the connection is made the connection line is displayed between the tables.





## Action 5.3 - Managing the Data Model



### Instructions:

1. Click the **[Manage data Model]** button in the **Data Tools Group** on the *Data Tab*.
2. Click the **[Diagram View]** button in the **View Group** on the *Home Tab*.
3. Arrange the tables in so you can see them all and the connection lines.
4. Resize each table to see all the fields.
5. Notice all the tables are shown with their relations.
6. Close the *Power Pivot for Excel-ExcelClassAnalysis.xlsx* window and save the file

### Results/ Comments:

The *Power Pivot for Excel-ExcelClassAnalysis.xlsx* window opens. This window has a ribbon with tabs like the regular *Excel* window.

The diagram view of the existing named tables and the connections added is displayed.

Click and drag the **Title Bar** of the table to reposition it. You may also need to zoom out to see all the tables. If so, use the Zoom Slider in the lower right corner of the window.

Hover over the bottom of the table, when the double-headed arrow cursor appears, click and drag to resize the table.

Click the close button in the upper right corner of the window and **[Ctrl+S]**.



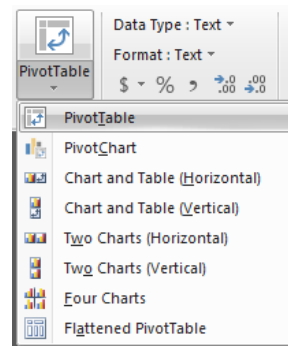
## Creating PivotTables

Once the Data Model is complete, it is time to put it to use. The best way to visualize the data is by using a PivotTable or PivotChart. This is done from within *Excel* or the *Power Pivot for Excel* window.

### Creating PivotTables

#### In the Power Pivot for Excel window

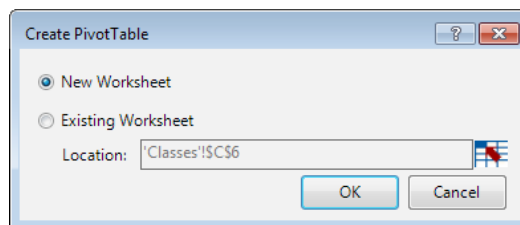
- ◆ Click the [PivotTable] button on the *Home Tab*.
- ◆ Clicking the drop-down arrow of the button offers more choices.



- ◆ Creating multiple PivotTables and Charts from this view allows each PivotTable and Chart to work independently from the other.
- ◆ The *Create PivotTable* dialog opens.

#### Note

It is easier to visualize the Pivot Table data in it's own worksheet than in an existing worksheet.



- ◆ In this dialog, you are able to set where the new PivotTable will be placed within the workbook.
- ◆ Choose where the new PivotTable will be placed and click the [OK] button.
- ◆ A blank PivotTable is added to a New Worksheet or on the existing worksheet you chose.

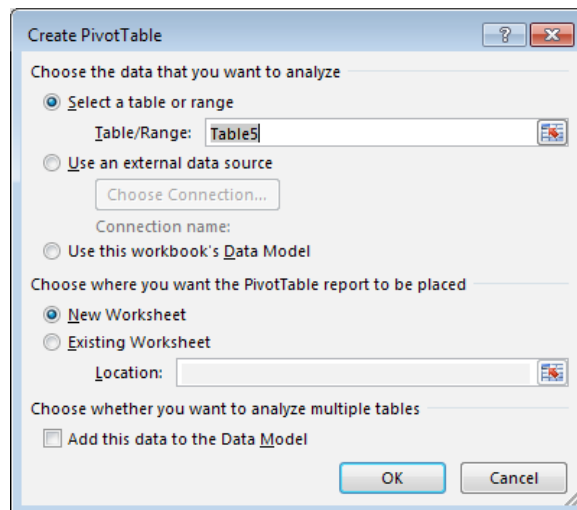


## Creating PivotTables, continued

### In Excel

If the *Power Pivot for Excel* window was closed and you are back in an *Excel* window, it is still possible to create a PivotTable from the established Data Model.

- ◆ Select any table of data included within the Data Model.
- ◆ Click the **[PivotTable]** button in the **Tables Group** on the *Insert Tab*.
- ◆ The *Create PivotTables* dialog opens.

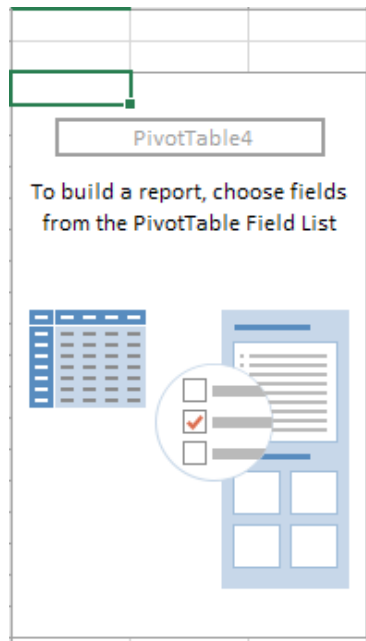


- ◆ In the dialog, you are able to determine source of the PivotTable data, where the PivotTable will be added, and whether or not to add this to the Data Model.
- ◆ If the **Add this data to the Data Model** checkbox is checked: all the related tables in the Data Model are displayed in the **PivotTable Fields** pane.
- ◆ If the **Add this data to the Data Model** checkbox is not checked: only the selected table fields are displayed in the **PivotTable Fields** pane. Although, you are still able to access the other tables from within the **PivotTable Fields** pane.
- ◆ Click the **[OK]** button when finished defining the PivotTable attributes.
- ◆ A blank PivotTable is added to a New Worksheet or on the existing worksheet you chose.

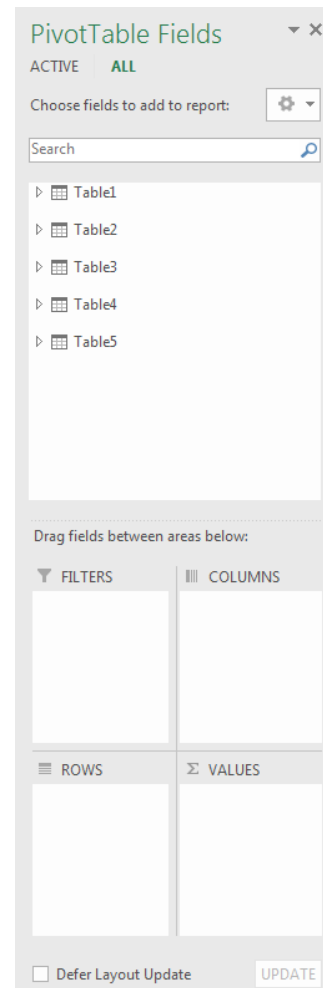


## Working with a PivotTable

Once the PivotTable is created, it will be empty of content until fields are added. The blank table is located on the worksheet and the PivotTable Field pane is displayed on the right side of the *Excel* window.



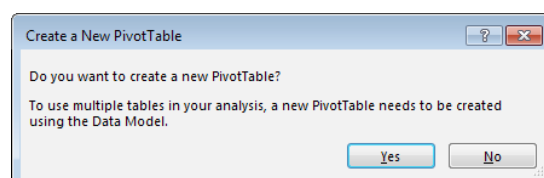
Blank PivotTable



PivotTable Field pane

If all the Tables are not displayed in the PivotTable Field pane, click the **[All]** button at the top of the pane.

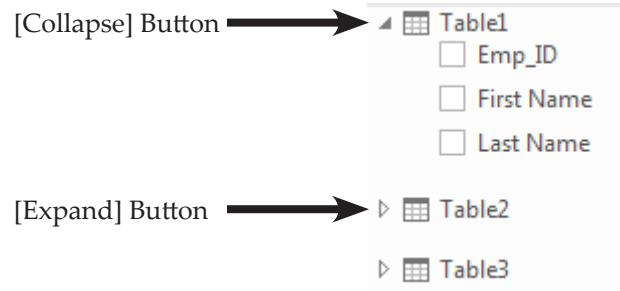
Should the **Add this data to the Data Model** checkbox not have been checked, a **[More Tables]** button is shown below the list of fields in the current table. Clicking that button will open a dialog asking if you want to create a new PivotTable. You must click the **[Yes]** button to continue.



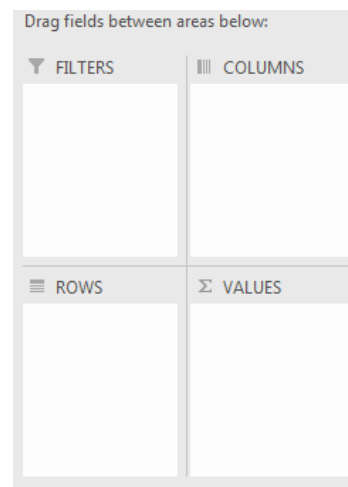
## Working with a PivotTable, continued

### Adding Data to a PivotTable

Once all the tables are listed in the PivotTable Fields pane, you can expand any given table by clicking the [Expand/Collapse] buttons to the left of the table name.



- ◆ Expand the table fields.
- ◆ Select the field to include in the PivotTable and drag it into the appropriate PivotTable area at the bottom of the PivotTable Filed pane.



- ◆ **Filters** area: allows you to filter, based on one or more fields that would isolate the focus of the PivotTable.
- ◆ **Columns** area: set the fields to use as column headings.
- ◆ **Rows** area: set the fields to use as the rows of data in the PivotTable. Typically this area has at least one field, although it's possible to have no fields.
- ◆ **Values** area: is used to calculate and/or count data that you want to measure.



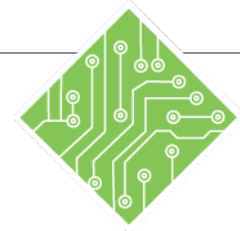
## Working with a PivotTable, continued

The power of a PivotTable is that you can rearrange the fields to see your data from different perspectives. With the Filter, Columns, and Rows areas field, it is easy to filter the data to look at specific subsets that would otherwise be difficult to see within the raw data sets.

After dragging a field to an area, it's data is added to the PivotTable.



## Action 5.4 - Creating the PivotTable



### Instructions:

1. The **ExcelClassAnalysis.xlsx** file should still be open.
2. On the **Data Tab**, in the **Data Tools Group**, click the **[Data Model]** button.
3. In the *Power Pivot for Excel* window, on the **Home Tab**, click the **[PivotTable]** button.
4. In the *Create PivotTable* dialog, choose *New Worksheet* option and click the **[OK]** button.
5. Examine the *PivotTable Field* pane.
6. Click the **[Expand]** arrow button to the left of the *Sales\_Reps* table.
7. Drag the **Last Name** field down into the **Filters** field at the bottom of the *PivotTable Field* pane.
8. Click the **[Collapse]** arrow button for the *Sales\_Reps* table.
9. Click the **[Expand]** arrow button to the left of the *Classes* table.
10. Drag the **Date** field down into the **Rows** field.
11. Right click any date in the worksheet and choose *Group* from the menu.

### Results/ Comments:

If not, reopen it.

The *Power Pivot for Excel* window opens.

The *Create PivotTable* dialog opens.

*New Worksheet* is the default choice, so simply ensure that is the active option.

All the tables in the data model should be listed in the upper field of the *PivotTable Filed* pane.

The list of fields ( these are the columns in that table) in this table are displayed.

The **Last Name** field is added to the **Filters** field. You will be able to filter the data based on individual sales reps.

The table's fields are collapsed. Since this is the only field needed in the PivotTable from the *Sales\_Reps* table, there is no need to leave the table field list expanded.

The list of fields in this table are displayed.

The dates are added in the **Rows** field and displayed in the PivotTable. Every date is listed.

The *Grouping* dialog opens. You can choose how to group the dates by a single or multiple choice.



#### Instructions:

12. Select Months from the list and click the [OK] button.
13. Right click any *Month* on the worksheet and from the *Expand/Collapse* options choose *Expand Entire Field*.
14. In the **Rows** field of the PivotTable field, drag the Dates field out.
15. Drag the **Name** field down below the **Date(Month)** field in the **Rows** field.
16. Drag the **Version** field down below the **Name** field in the **Rows** field.
17. Drag the **Client\_ID** field down into the **Values** field.
18. Collapse the *Classes* table field list.
19. Save the file.
20. Expand the *Courses* table.
21. Drag the **Price** field to the **Values** field.
22. Drag the **Price** field out of the **Values** field.
23. Save the file.

#### Results/ Comments:

The dates are now grouped by months that can be expanded as needed to see a more detailed view of the data. A new Date(Month) filed is added to the field list and the Rows field.

All the dates within the months are shown.

The individual dates are removed from the PivotTable while the Months are still displayed.

Now all the Names of the classes taught that month are displayed. If not then repeat step 13 to display the data.

The Version of the class is added to the PivotTable.

A count of the clients who took that given class is added in the second column of the PivotTable.

In the PivotTable field pane click the [Collapse] button beside the *Classes* table.

[Ctrl+S].

The list of fields in the *Course* table is displayed.

The **Price** field is added as a new column in the PivotTable. The data is not coming in correctly, you will need to add a new calculated column in the Data Model.

The data is removed from the PivotTable.

[Ctrl+S].



## Adding a Calculated Column

### Note

Columns added in the data model do not show in the normal view of the table on worksheets.

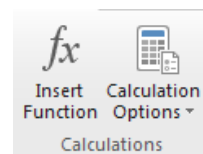
In a regular PivotTable, you are able to add calculated field or items. When working in a Power Pivot PivotTable this feature is not available. In the exercise you just completed, the price column of data did not have a robust enough connection to allow you to see a total for each class taught based on the number of students. While the tables do have a connection, the information does not come across as needed. In cases such as these, it may be necessary to add a calculated column into the Data Model itself to combine the data from two tables.

Since the connection exists between the tables in the model, *Excel* is able to use functions to generate desired data from the separate table.

### Inserting a Function column

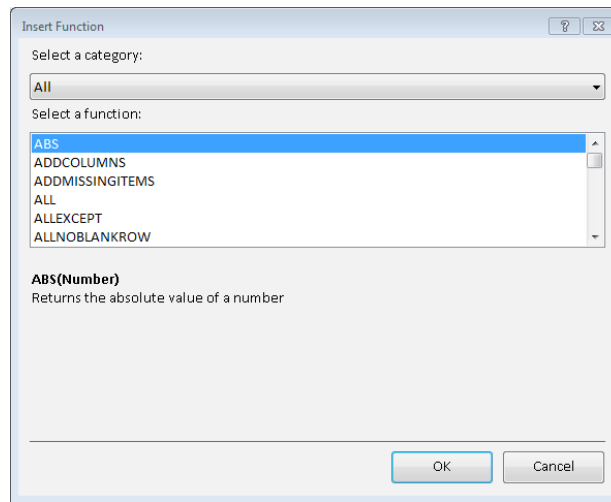
In this example: the price for each class in the *Courses Table* needs to be added to the *Classes Table*. The **Related** function will enter the price based on the connection of the **Course\_ID** fields.

- ◆ Open the *Power Pivot for Excel* window by click the **[Data Model]** button on the *Data Tab*.
- ◆ In the *Data View*, select the table that requires the new column of data.
- ◆ Activate the *Design Tab*.
- ◆ Click into the empty cell below the **Add Column** header in the table.
- ◆ Click the **[Insert Function]** button in the **Calculations Group**.

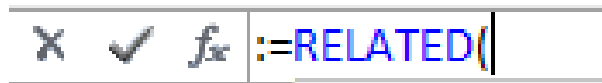


## Adding a Calculated Column, continued

- ◆ The Insert Function dialog opens.



- ◆ Use the **Select a category:** field drop-down to narrow the list of functions listed in the **Select a function:** field.
- ◆ Select *All* from the **Select a category:** field
- ◆ Select *Related* in the **Select a function:** field.
- ◆ Click the [OK] button.
- ◆ The *Insert Function* dialog closes and the function is added in the formula Bar.



- ◆ Select the table that contains the data to find.
  - ◆ In this case, select the *Courses* table.
- ◆ Click the Column header containing the required data.
  - ◆ In this case, **Price** is the necessary column.
  - ◆ *Excel* will compare the data in the related column (**Course\_ID**) to determine the correct price to attribute to the records in the *Classes* table.
- ◆ Tap the [Enter] key to apply the function.
- ◆ Close the *Power Pivot for Excel* window.
- ◆ The new column can be used within the PivotTable.

## Action 5.5 - Adding a Calculated Column to a Table



### Instructions:

1. The **ExcelClassAnalysis.xlsx** file should still be open.
2. On the **Data Tab**, in the **Data Tools Group**, click the **[Data Model]** button.
3. Select the **Classes Table** tab.
4. Click into the blank cell below the **Add Column** header.
5. Activate the **Design Tab**.
6. Click the **[Insert Function]** button in the **Calculations Group**.
7. Leave the **Select a category:** field set to *All*.
8. From the **Select a Function:** field list choose *Related* and click **[OK]**.
9. Select the **Course Tab**, then select the *Price* column header and tap the **[Enter]** key.
10. Double click the column header and type in;  
**< Cost\_Per >**  
and tap the **[Enter]** key.
11. Close the *Power Pivot for Excel* window.

### Results/ Comments:

If not, reopen it.

The *Power Pivot for Excel* window opens to the Data View.

The table tabs are listed at the lower left of the window.

This will add a new column as you enter data or in this case a calculated column.

Click the **Design Tab** in the ribbon.

The *Insert Function* dialog opens.

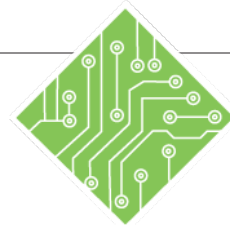
All available functions are listed in the **Select a Function:** field.

The *Insert Function* dialog closes and the function is added in the Formula Bar.

Since these tables have a connection based on the *Course\_ID*, the **Classes** table will now compare the *Course\_ID* columns and return the price of each class. The ata can now be used to see how much revenue was earned from each class in the PivotTable.

To apply a name to the column.

Click the **[Close]** button in the upper right corner of the window. The *Power Pivot for Excel* window closes and you are back in the PivotTable worksheet.



**Instructions:**

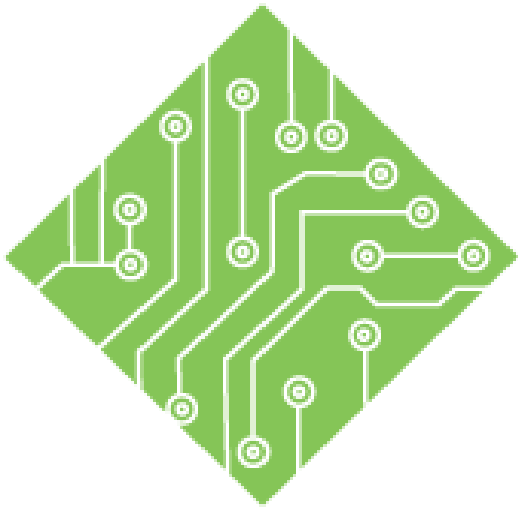
12. Expand the *Classes* table in the *PivotTable Field* pane list.
13. Drag the new **Cost\_Per** field into the **Values** field.
14. Save and close the file.

**Results/ Comments:**

Click the **[Expand]** button beside the *Classes* table. All the fields in the table are displayed, including the newly added column.

The price data is calculated and displayed in the PivotTable.

**[Ctrl+S]** and **[Ctrl+W]**.

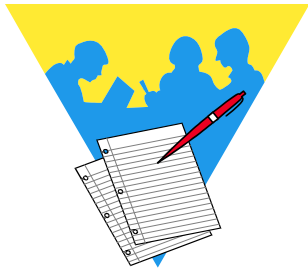


## **Appendix A: Excel 2013 Adding the Power Pivot Add-in**

### **Lesson Overview**

You will cover the following concepts in this chapter:

- ◆ Adding the Add-In



## Lesson Notes