Extending a Data Model with Budget Data

Lab Time: 45-60 minutes

Lab Folder: C:\Student\Modules\03_DataModeling\Lab\

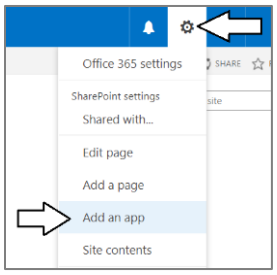
Lab Overview: In this lab, you continue working on the Power BI Desktop project named **Wingtip Expenses.pbix** that you created in an earlier lab exercise. Your goal is to integrate expense budget data into the project's data model so that the report you are designing can track actual expenses against pre-defined quarterly budgets for each expense category.

Lab Dependencies: This lab assumes you have completed the previous lab on query design in which you created a Power BI Desktop project named **Wingtip Expenses.pbix**. In the previous lab you should have imported data into the data model using data from the data files in the **Data** document library. To begin work on this lab without first completing the previous lab, copy the lab solution file named **Wingtip Expenses.pbix** located at **C:\Student\Modules\02_Queries\Lab\Solution** into the folder at **C:\Student\Projects**.

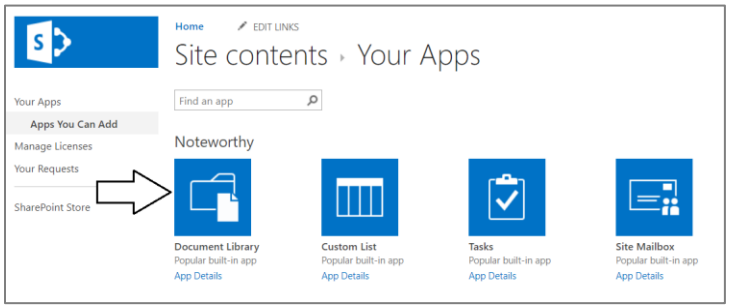
Exercise 1: Upload the Budgets.xslx Workbook File to SharePoint

In the following exercise, you will upload an Excel workbook file named **Budgets.xlsx** to your SharePoint site.

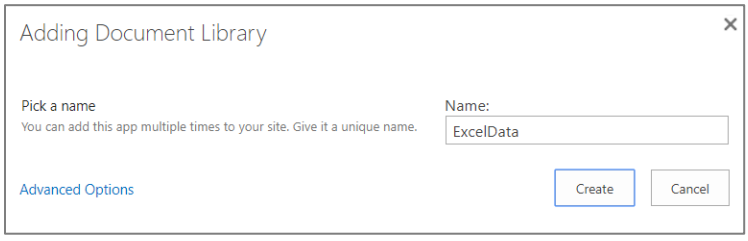
1. Navigate to your SharePoint site.
   a) You should use the same site that you used in the previous lab when you created the document library named **Data**.
2. Create new document library named **ExcelData**.
   a) Drop down the Site Actions menu and select **Add an app**.



   b) Select **Document Library** as the type of list to create.

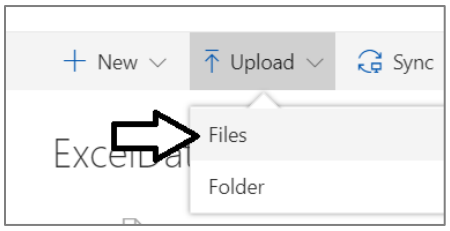


   c) In the **Adding Document Library** dialog, add a name of **ExcelData** and click **Create**.



   d) Once the **ExcelData** document library has been created, navigate to its default view.

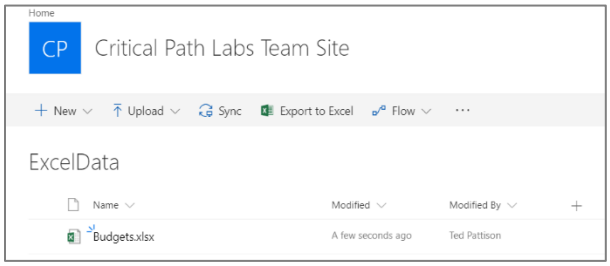
3. Upload the workbook file named **Budgets.xlsx** to the **ExcelData** document library.
   a) Click the **Upload > File** command from the SharePoint ribbon of the **ExcelData** document library to upload a document.



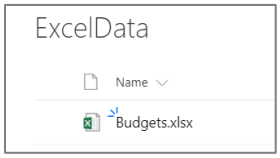
   b) Upload the workbook file named **Budgets.xlsx** which is located in the **Student** folder at the following path.

```
C:\Student\Modules\03_DataModeling\Lab\Budgets.xlsx
```

   c) Once the **Budgets.xlsx** workbook file has uploaded, you should see it in the default view of the **ExcelData** library.



4. Open the **Budgets.xlsx** workbook in Excel Online to inspect its contents.
   a) Click on the file link for **Budgets.xlsx** to open it in Excel Online.



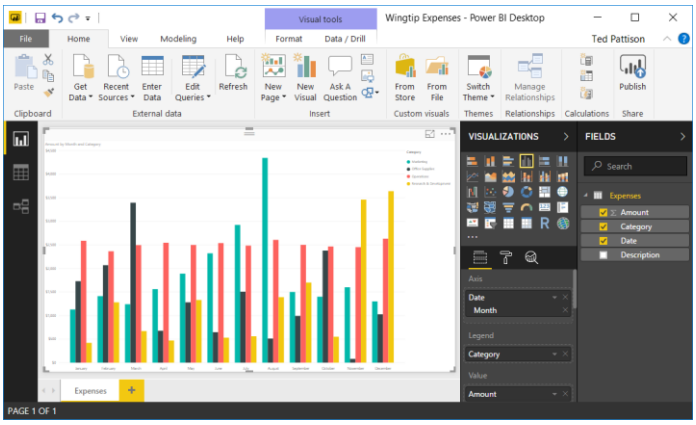
   b) You should see the workbook contains a single table with data for expense budget amounts by year, quarter and category.

	A	B	C	D
1	Year	Quarter	Category	Amount
2	2017	Q1	Marketing	$5,000
3	2017	Q1	Office Supplies	$8,000
4	2017	Q1	Operations	$8,000
5	2017	Q1	Research & Development	$5,000
6	2017	Q2	Marketing	$6,000
7	2017	Q2	Office Supplies	$4,000
8	2017	Q2	Operations	$7,000
9	2017	Q2	Research & Development	$5,000
10	2017	Q3	Marketing	$6,000
11	2017	Q3	Office Supplies	$4,000
12	2017	Q3	Operations	$7,000
13	2017	Q3	Research & Development	$5,000
14	2017	Q4	Marketing	$6,000
15	2017	Q4	Office Supplies	$4,000
16	2017	Q4	Operations	$7,000
17	2017	Q4	Research & Development	$5,000
18				

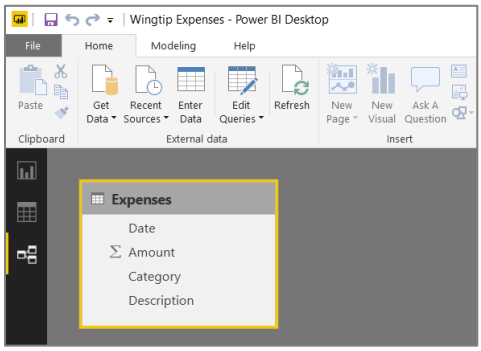
Exercise 2: Import the Data from Budgets.xslx into the Wingtip Expenses Project

In this exercise you will import budget data from the Excel workbook file named **Budgets.xlsx** into your Power BI desktop project.

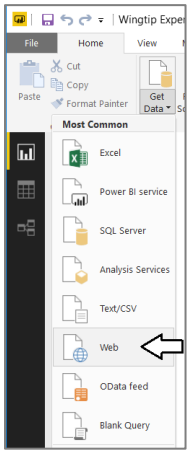
1. Open the Power BI Desktop project named **Wingtip Expenses.pbix**.
   a) Launch Power BI Desktop if it's not already running.
   b) Open the Power BI Desktop named **Wingtip Expenses.pbix** located in **Student** folder at **C:\Student\Projects**.
   c) Your project should be at the point where you finished in the lab exercises on query design.



   d) Examine the **Wingtip Expenses** project in Relationship view to confirm the project contains a single table named **Expenses**.



2. Create a new query to import the **Budgets** table from **Budgets.xlsx**.
   a) Drop down the **Get Data** menu and select the **Web** command.

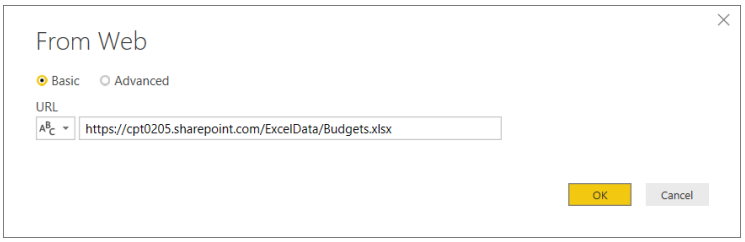


b) In the **From Web** dialog, add the path to **Budgets.xlsx**. The path should include the base URL of your SharePoint site along with the relative file path which is **/ExcelData/Budgets.xlsx**.

c) Your path should look something like the following URL

```
https://cpt0205.sharepoint.com/ExcelData/Budgets.xlsx
```

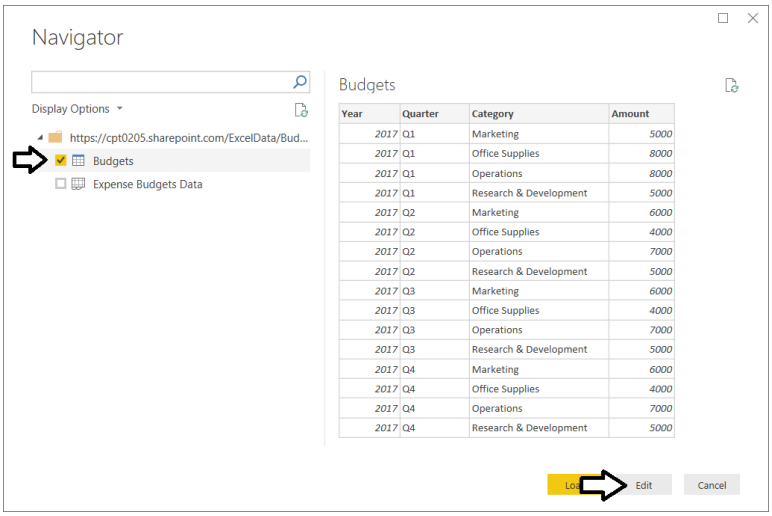
d) Once you have added the file path in the **From Web** dialog, click **OK**.



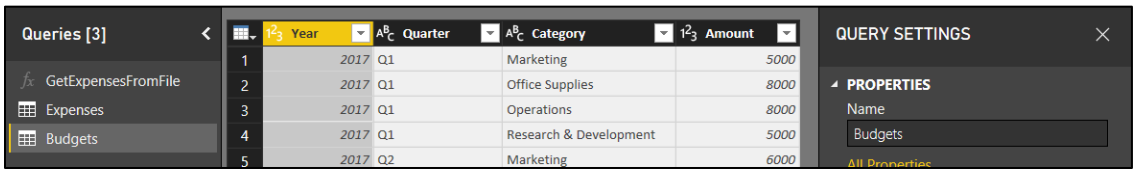
If you are prompted to login with the **Access Web content** dialog, select **Organizational account** and click **Sign in** to sign in with your credentials. Once you have signed in, click the **Connect** button.

e) You should now be prompted by the **Navigator** dialog as shown in the following screenshot.

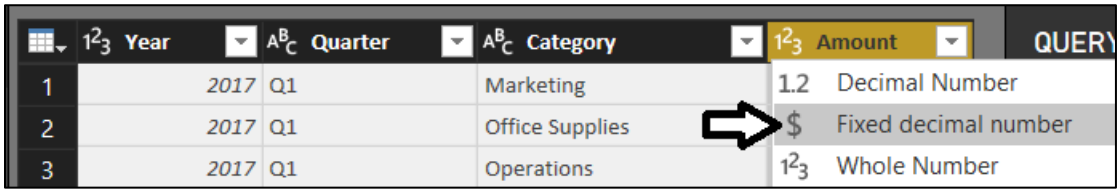
f) Select the **Budgets** table on the left and then click the **Edit** button to open the new query in the Query Editor window.



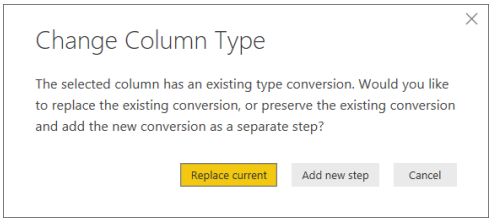
g) The query output for the new **Budgets** query should have four columns named **Year**, **Quarter**, **Category** and **Amount**.



h) Change the datatype of the **Amount** column to **Fixed Decimal number**.



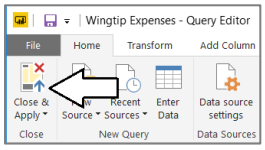
i) If you are promoted by the **Change Column Type** dialog, click the **Replace current** button to continue.



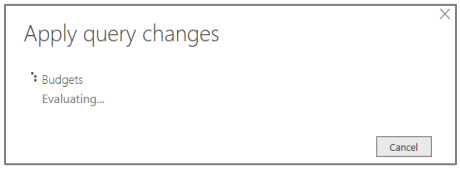
j) Verify that the **Amount** column shows a dollar sign indicating its type is **Fixed Decimal number**.

3. Execute the **Budgets** query to import the **Budgets** table into the project's data model.

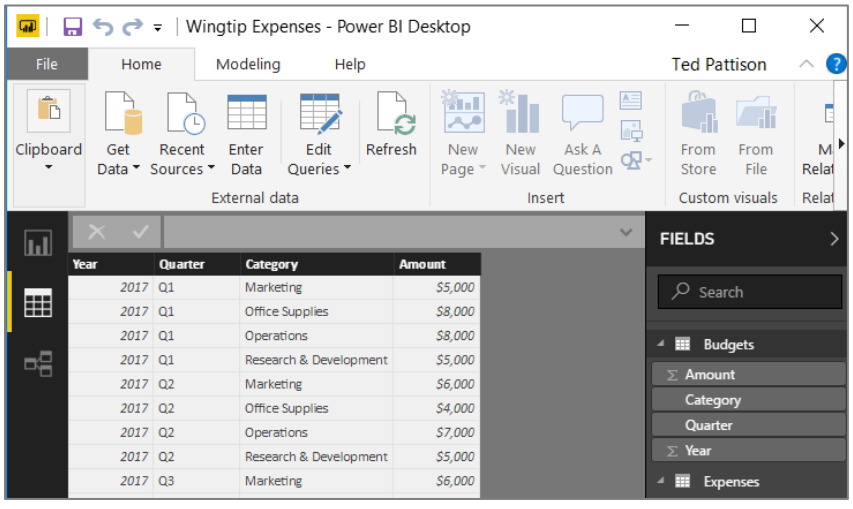
a) Click the **Close and Apply** button to close the Query Editor window and to execute the Budgets query.



b) Wait for the **Budgets** query to complete.



c) After the **Budgets** query executes successfully, you should be able to navigate to Data View and see the **Budgets** table data,

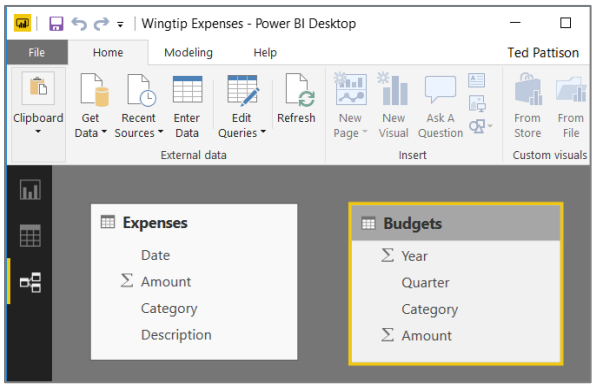


4. Save your work by clicking the **Save** icon in the upper, left-hand side of the Power BI Desktop application window.

Exercise 3: Creating a Relationship Between the Expenses Table and the Budgets Table

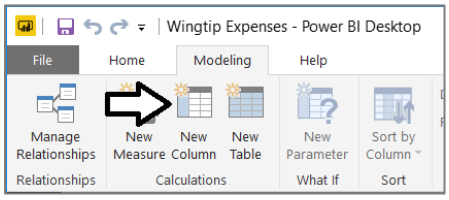
In this exercise you will create calculated columns that allow you to create a relationship between the two tables in the data model.

1. Examine the data model for the **Wingtip Expenses** project in Relationship view.
   a) Navigate to Relationship view.
   b) You should see the **Expenses** table and the **Budgets** table without any relationship between them.



Now that you have two tables in the data model, you must create a design which makes it possible to add a relationship between the **Expenses** table and the **Budgets** table. This will involve creating calculated columns in each of these tables to create key fields.

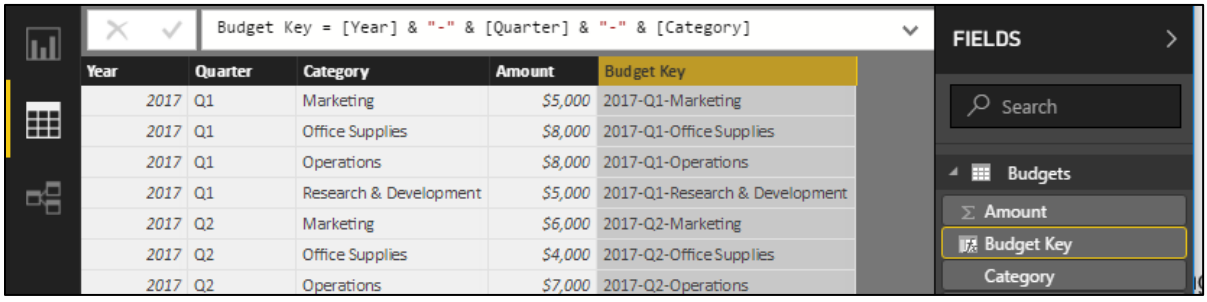
2. Extend the **Budgets** table by adding a new calculated column named **Budget Key**.
   a) Navigate to Data View and select the **Budgets** table in the **Fields** list on the right.
   b) Click the **New Column** button to create a new calculated column.



   c) Type in the following DAX expression to create a new calculated named of **Budget Year**.

```
Budget Key = [Year] & "-" & [Quarter] & "-" & [Category]
```

   d) Press the ENTER key to add the **Budget Key** calculated column to the **Budgets** table.



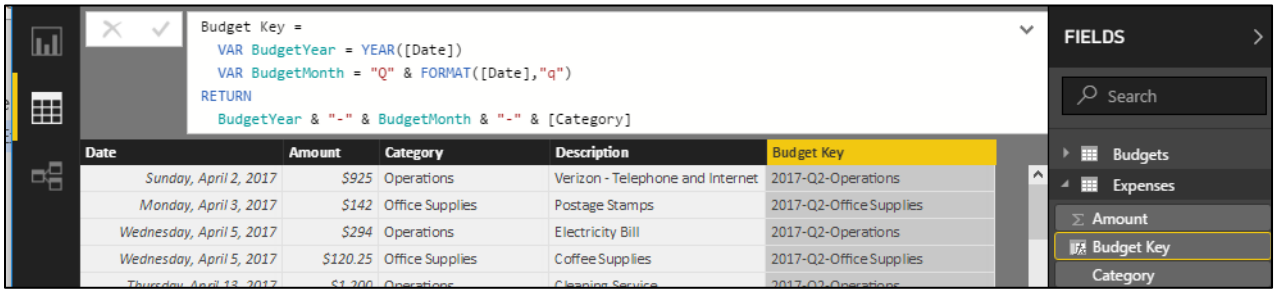
Year	Quarter	Category	Amount	Budget Key
2017	Q1	Marketing	$5,000	2017-Q1-Marketing
2017	Q1	Office Supplies	$8,000	2017-Q1-Office Supplies
2017	Q1	Operations	$8,000	2017-Q1-Operations
2017	Q1	Research & Development	$5,000	2017-Q1-Research & Development
2017	Q2	Marketing	$6,000	2017-Q2-Marketing
2017	Q2	Office Supplies	$4,000	2017-Q2-Office Supplies
2017	Q2	Operations	$7,000	2017-Q2-Operations

Now you have created a calculated column in the **Budgets** table named **Budget Key**. Your next step is to create a complimentary calculated column in the **Expenses** table which will also have the name **Budget Key**. However, you are going to get a little more involved with DAX by writing an expression that includes variables.

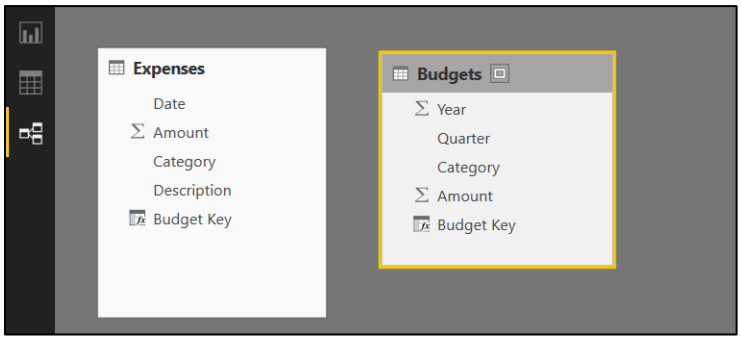
3. Create a calculated column in the **Expenses** table named **Budget Key**.
   a) Navigate to Data view and select the **Expense** table in the **Fields** list on the right.
   b) Click the **New Column** button to create a new calculated column.
   c) Enter the following DAX expression to create a new calculated column named **Budget Key**.

```
Budget Key =
  VAR BudgetYear = YEAR([Date])
  VAR BudgetMonth = "Q" & FORMAT([Date],"q")
RETURN
  BudgetYear & "-" & BudgetMonth & "-" & [Category]
```

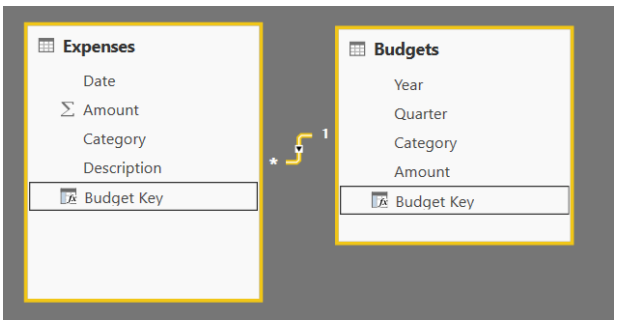
   d) Press the ENTER key to add the **Budget Key** calculated column to the **Expenses** table.



4. Create a relationship between the **Expenses** table and the **Budgets** table.
   a) Navigate to Relationship view.
   b) You should see that the **Expenses** table and the **Budgets** table now each contain a column named **Budget Key**.

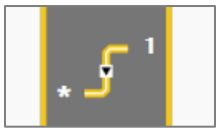


   c) Using the mouse, drag and drop the **Budget Key** column in **Expenses** on top of the **Budget Key** column in **Budgets**.
   d) You should see that you have created a relationship between these two tables as shown in the following screenshot.

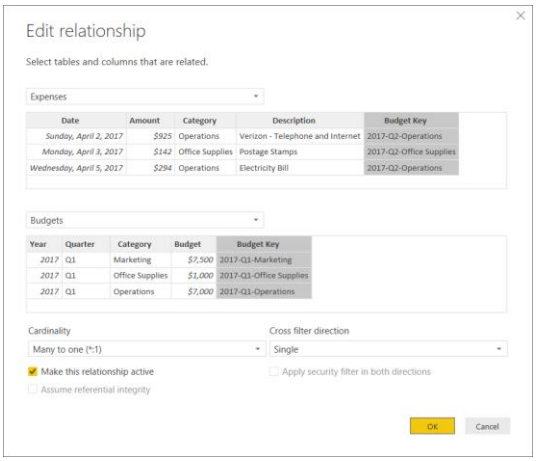


It actually doesn't matter from which table you choose to drag and drop the **Budget Key** field. It will work just fine if you do the reverse and drag and drop the **Budget Key** column in **Budgets** on top of the **Budget Key** column in **Expenses**.

5. Inspect the properties of the new relationship.
   a) Double click on the relationship line connecting the two tables to display the **Edit Relationship** dialog.



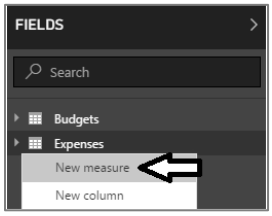
   b) Inspect the relationship properties by examining what's inside the **Edit Relationship**.



   c) There's no need to modify the relationship properties. Click **OK** close the **Edit Relationship** dialog.

Save your work clicking the **Save** icon in the upper, left-hand side of the Power BI Desktop application window.

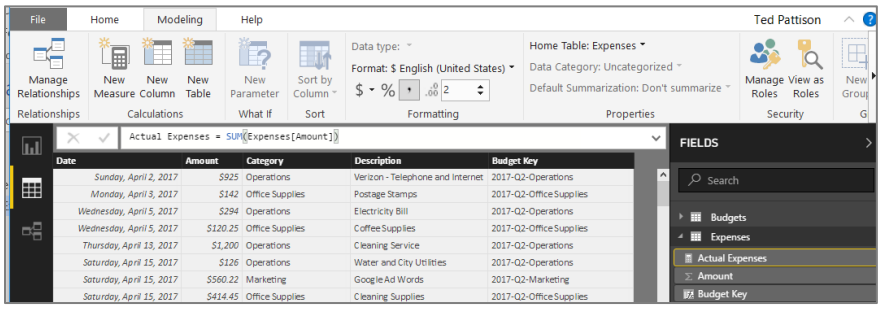
6. Add new measures to the **Expenses** table for calculating sums for expense and budget amounts.
   a) Add a new measure by right-clicking in the **Expenses** table in the **FIELDS** list and clicking **New measure**.



   b) Add a new measure named **Actual Expenses** using the following DAX expression.

```
Actual Expenses = SUM(Expenses[Amount])
```

   c) Once created, set the formatting for the named **Actual Expenses** measure for currency with 2 places after the decimal point.

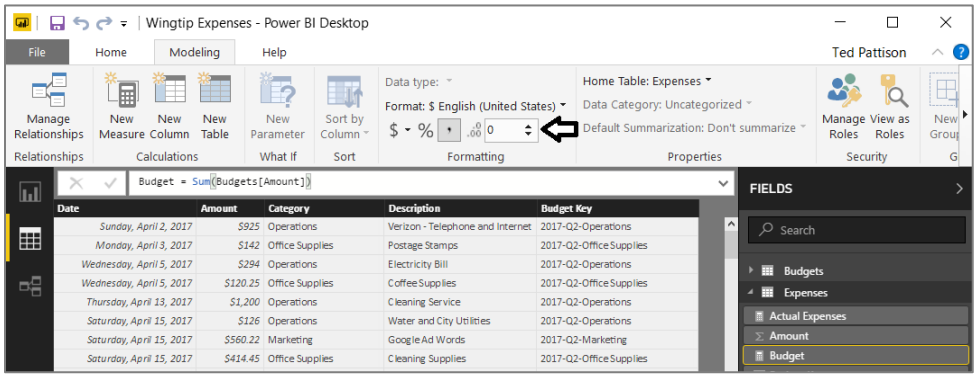


d) Add a second measure by right-clicking in the **Expenses** table in the **FIELDS** list and clicking **New measure**.

e) Create the new measure named **Budget** using the following DAX expression.

```
Budget = Sum(Budgets[Amount])
```

f) Once created, set the formatting for the named **Budget** measure for currency with **0** places after the decimal point.

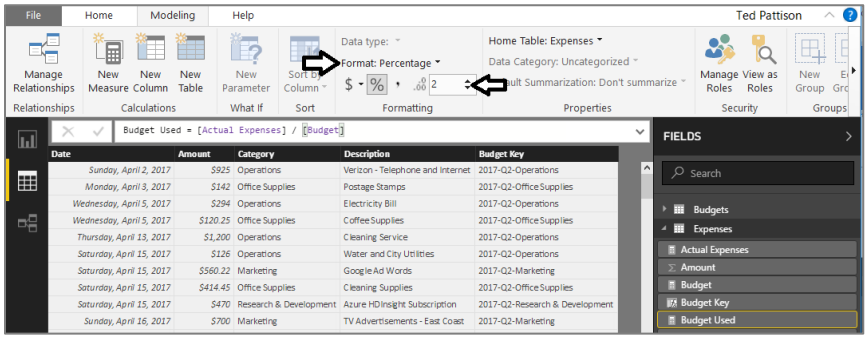


g) Add a third measure by right-clicking in the **Expenses** table in the **FIELDS** list and clicking **New measure**.

h) Create the new measure named **Budget Used** using the following DAX expression.

```
Budget Used = [Actual Expenses] / [Budget]
```

i) Once created, set the formatting for the named **Budget Used** measure for **Percentage** with **2** places of precision.



j) Add a fourth measure by right-clicking in the **Expenses** table in the **FIELDS** list and clicking **New measure**.

k) Create the new measure named **Status** using the following DAX expression.

```
Status =
IF(
    [Budget Used] > 1,
    UNICHAR(9940),
    UNICHAR(9989)
)
```

l) Press the ENTER key to add the **Status** measure to the **Expenses** table.

The **Status** measure returns a text value which means that, unlike the other measures, there's no need to format it.

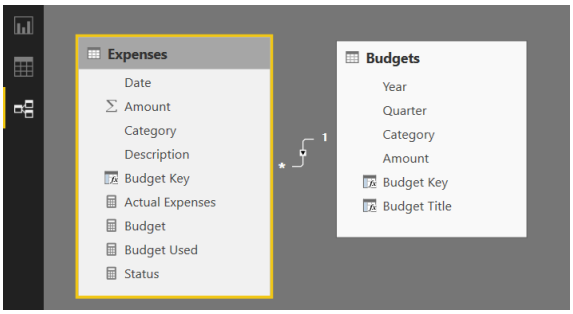
7. Add a new calculated column named **Budget Title** to the **Budgets** table.
   a) Add a new measure by right-clicking in the **Budgets** table in the **FIELDS** list and clicking **New measure**.
   b) Create a new calculated column named **Budget Title** using the following DAX expression.

```
Budget Title = [Category] & " Budget for " & [Quarter] & " of " & [Year]
```

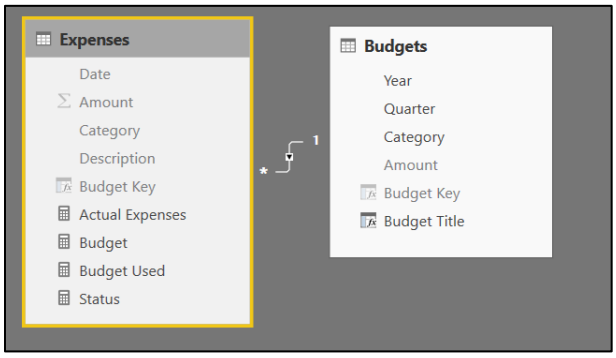
   c) Press the ENTER key to add the **Budget Title** column to the **Budgets** table.

Year	Quarter	Category	Amount	Budget Key	Budget Title
2017	Q1	Marketing	$5,000	2017-Q1-Marketing	Marketing Budget for Q1 of 2017
2017	Q1	Office Supplies	$8,000	2017-Q1-Office Supplies	Office Supplies Budget for Q1 of 2017
2017	Q1	Operations	$8,000	2017-Q1-Operations	Operations Budget for Q1 of 2017
2017	Q1	Research & Development	$5,000	2017-Q1-Research & Development	Research & Development Budget for Q1 of 2017
2017	Q2	Marketing	$6,000	2017-Q2-Marketing	Marketing Budget for Q2 of 2017
2017	Q2	Office Supplies	$4,000	2017-Q2-Office Supplies	Office Supplies Budget for Q2 of 2017
2017	Q2	Operations	$7,000	2017-Q2-Operations	Operations Budget for Q2 of 2017

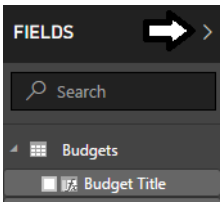
8. Hide the fields in the data model that do not need to be shown in Report view.
   a) Navigate to relationship view.
   b) Note that all the fields in both tables are visible in Report view.



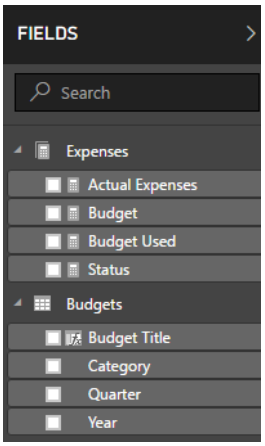
   c) Right-click on each of the following fields in the **Expenses** table and enable the **Hide in report view** setting.
      i) **Date**
      ii) **Amount**
      iii) **Category**
      iv) **Description**
      v) **Budget Key**
   d) Right-click on each of the following fields in the **Budgets** table and enable the **Hide in report view** setting.
      i) **Amount**
      ii) **Budget Key**
   e) You should be able to verify the fields that are not visible in Report view because they are greyed out in Relationship view..



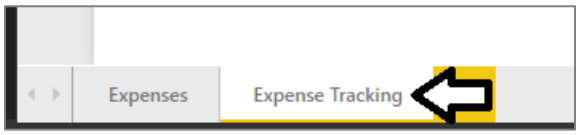
9. Inspect view of the data model in Report view.
   a) Navigate to Report view and inspect the **FIELDS** list.
   b) Refresh the view of the **FIELDS** list by clicking the button on the right with the arrow icon twice to toggle the view off and on.



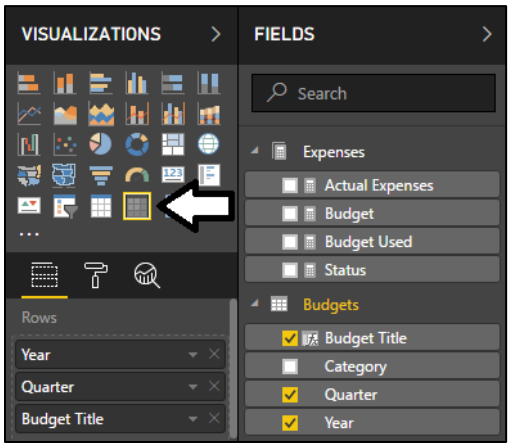
   c) After the **FIELDS** list has been refreshed, the **Expenses** table is on top because it is recognized as a Fact table.



10. Create a new report page named **Expense Tracking** that shows actual expenses compared to expense budgets.
   a) Add a new page to the report and name it **Expense Tracking**.



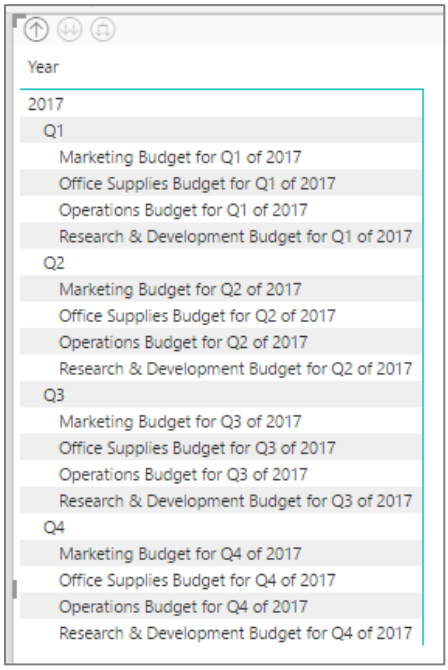
   b) Add a new **Matrix** visual to the page.
   c) Add the columns from **Budgets** table named **Year**, **Quarter** and **Budget Title** into the **Rows** well.



d) By default, the Matrix visual will only show rows for the field at the top of the **Rows** well named **Year**.

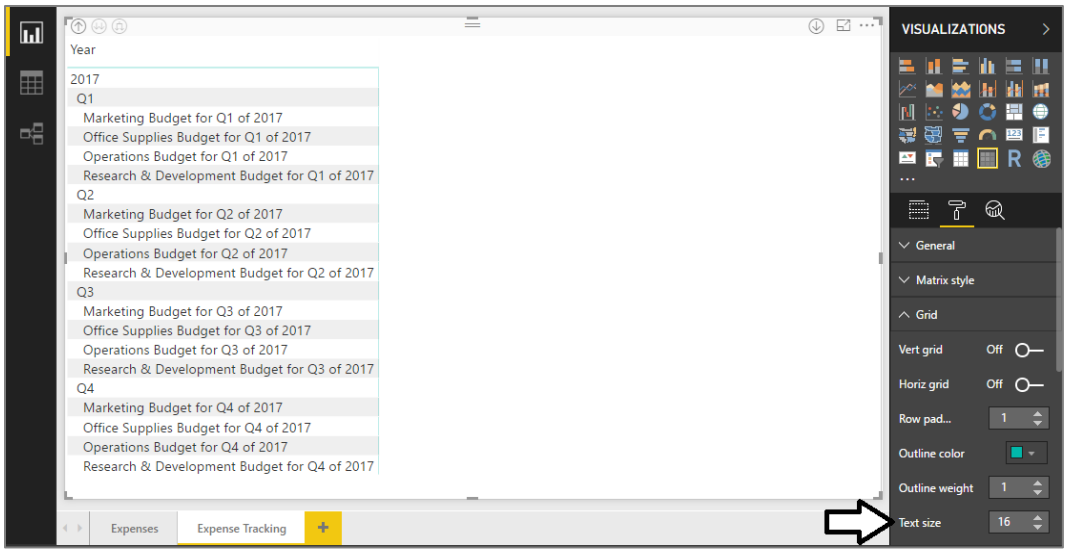
e) Click the **Expand Down** in the toolbar of the matric visual button twice to display rows for **Quarter** and **Budget Title**.

f) Your Matrix visual should now match the following screenshot.



g) Resize the Matrix visual so it takes up the entire page.

h) Update the **Text size** property in the **Grid** section to change the font size value of **16**.



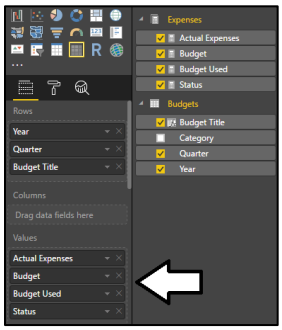
i) Add the following four fields from the **Expenses** table into the **Values** well of the **Matrix** visual.

i) **Actual Expenses**

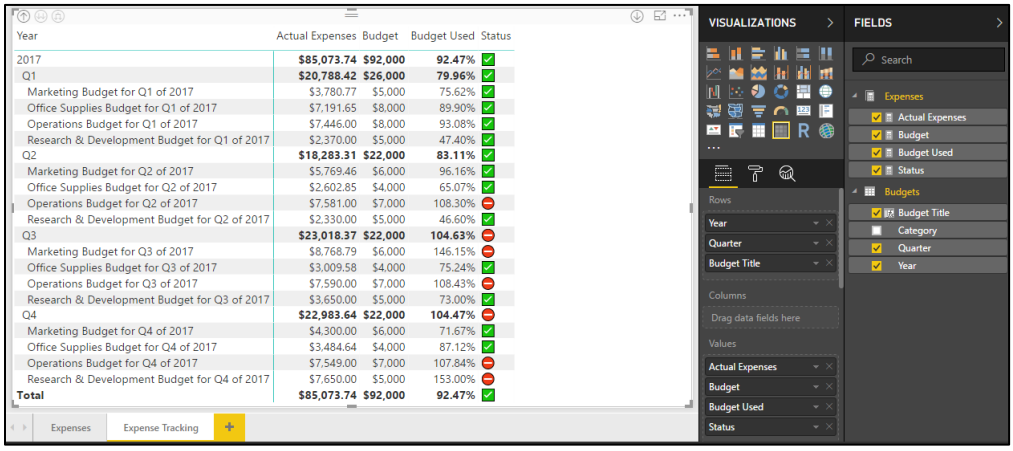
ii) **Budget**

iii) **Budget Used**

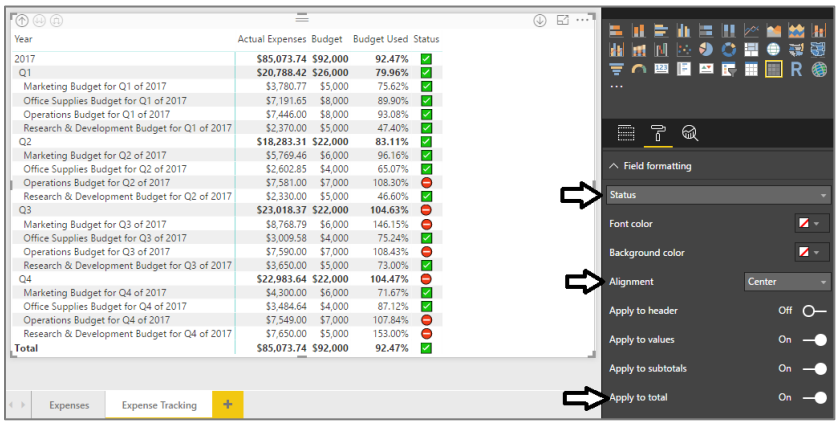
iv) **Status**



j) Your report should now match the following screenshot.



k) Adjust the **Field formatting** of the **Status** column to the UNICHAR symbol character is centered.



11. Save your work clicking the **Save** icon in the upper, left-hand side of the Power BI Desktop application window.

Congratulations. You have now finished this lab exercise.