



Power BI

## ► Lab 04

# Preparing a Power Pivot Data Model for Power View Reporting in Excel 2013



[Jump to the Lab Overview](#)



# Terms of Use

© 2014 Microsoft Corporation. All rights reserved.

Information in this document, including URL and other Internet Web site references, is subject to change without notice. Unless otherwise noted, the companies, organizations, products, domain names, e-mail addresses, logos, people, places, and events depicted herein are fictitious, and no association with any real company, organization, product, domain name, e-mail address, logo, person, place, or event is intended or should be inferred. Complying with all applicable copyright laws is the responsibility of the user. Without limiting the rights under copyright, no part of this document may be reproduced, stored in or introduced into a retrieval system, or transmitted in any form or by any means (electronic, mechanical, photocopying, recording, or otherwise), or for any purpose, without the express written permission of Microsoft Corporation.

For more information, see **Microsoft Copyright Permissions** at <http://www.microsoft.com/permission>

Microsoft may have patents, patent applications, trademarks, copyrights, or other intellectual property rights covering subject matter in this document. Except as expressly provided in any written license agreement from Microsoft, the furnishing of this document does not give you any license to these patents, trademarks, copyrights, or other intellectual property.

The Microsoft company name and Microsoft products mentioned herein may be either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries. The names of actual companies and products mentioned herein may be the trademarks of their respective owners.

**This document reflects current views and assumptions as of the date of development and is subject to change. Actual and future results and trends may differ materially from any forward-looking statements. Microsoft assumes no responsibility for errors or omissions in the materials.**

**THIS DOCUMENT IS FOR INFORMATIONAL AND TRAINING PURPOSES ONLY AND IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, WHETHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND NON-INFRINGEMENT.**

# Contents

<b>TERMS OF USE .....</b>	<b>2</b>
<b>CONTENTS .....</b>	<b>3</b>
<b>ABOUT THE AUTHOR.....</b>	<b>4</b>
<b>DOCUMENT REVISIONS.....</b>	<b>4</b>
<b>LAB OVERVIEW .....</b>	<b>5</b>
<b>EXERCISE 1: REVIEWING THE DATA MODEL .....</b>	<b>6</b>
Task 1 – Opening and Exploring the Excel Workbook .....	6
Task 2 – Enabling the Power Pivot Add-in .....	7
Task 3 – Exploring the Power View Fields .....	8
<b>EXERCISE 2: PREPARING THE DATA MODEL.....</b>	<b>11</b>
Task 1 – Preparing the Product Table .....	11
Task 2 – Preparing the State Table.....	15
Task 3 – Preparing the Sales Table.....	17
<b>EXERCISE 3: ADDING AN IMAGE URL .....</b>	<b>20</b>
Task 1 – Exploring the Image Files .....	20
Task 2 – Defining the Image Column .....	20
<b>EXERCISE 4: EXPLORING THE PREPARED DATA MODEL.....</b>	<b>23</b>
Task 1 – Reviewing the Power View Fields.....	23
Task 2 – Creating a Power View Report .....	24
Task 3 – Finishing Up .....	25
<b>SUMMARY.....</b>	<b>25</b>

## About the Author

This lab was designed and written by [Peter Myers](#).



Peter Myers has worked with Microsoft database and development products since 1997. Today, he specializes in all Microsoft BI products and provides mentoring, technical training, and education content authoring for SQL Server, Office, and SharePoint. Peter has a broad business background supported by a bachelor's degree in applied economics and accounting, and he extends this with solid experience backed by current MCSE and MCT certifications. He has been a SQL Server MVP since 2007.

## Document Revisions

#	Date	Author	Comments
0	24-AUG-2014	Peter Myers	Initial release

# Lab Overview

## Introduction

**Note:** This lab is the fourth in a series of seven labs, which explore self-service BI with Excel 2013 and Office 365 Power BI. If you plan to complete all of the labs, we recommend that you complete them in the order in which they were designed, although the labs can be completed in any order you choose.

In this lab, you will prepare the workbook data model created in **Lab 01** for Power View reporting. This will involve adding descriptions, renaming columns, defining reporting properties, and removing certain calculated fields. You will also configure the data model to reference images by using web URLs.

Note that this lab does not cover working with Power View in detail. The data model prepared in this lab will be used in **Lab 05** to author Power View reports.

## Objectives

The objectives of this exercise are to:

- Prepare a workbook data model for Power View reporting
- Test the data model interface in Power View

## Exercises

This hands-on lab comprises the following exercise:

1. Reviewing the Data Model
2. Preparing the Data Model
3. Adding an Image URL
4. Exploring the Prepared Data Model

Estimated time to complete this lab: **30 minutes**

# Exercise 1: Reviewing the Data Model

In this exercise, you will open an existing Power Pivot workbook and explore the data model interface by using the **Power View Fields** pane.

## Task 1 – Opening and Exploring the Excel Workbook

In this task, you will open an existing Excel workbook (completed in **Lab 03**).

1. To open Excel, on the taskbar, click the **Excel** program shortcut.
2. In Excel, click **Open Other Workbooks** (located at the bottom of the left panel).



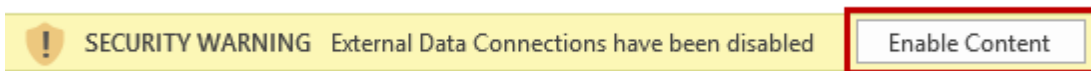
**Figure 1**

*Identifying the Open Other Workbooks Command*

3. Select **Computer**, and then click **Browse**.
4. In the **Open** window, navigate to the **D:\PowerBI\Lab04\Starter** folder.
5. Select the **Sales Analysis.xlsx** file, and then click **Open**.

**Note:** This is the workbook completed in **Lab 03**.

6. If prompted with a security warning, click **Enable Content**.



**Figure 2**

*Enabling the Workbook Content*

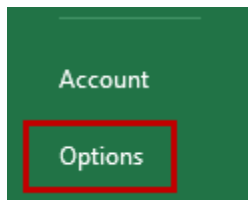
7. On the **File** ribbon tab (also known as the backstage view), select **Save As**, select **Computer**, and then click **Browse**.
8. In the **Save As** window, navigate to the **D:\PowerBI\Lab04** folder.
9. Click **Save**.

## Task 2 – Enabling the Power Pivot Add-in

In this task, if necessary, you will enable the Power Pivot Add-in. In Excel 2013, by default, the Power Pivot Add-in is disabled.

1. If the **PowerPivot** ribbon tab is not available, on the **File** ribbon tab, select **Options**.

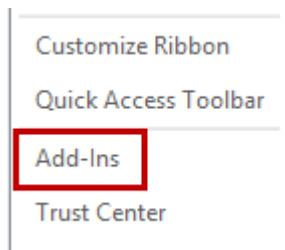
**Note:** If the **PowerPivot** ribbon tab is available, there is no need to complete the steps in this task; continue the lab from **Task 3**.



**Figure 3**

*Locating the Options Option*

2. In the **Excel Options** window, select the **Add-Ins** page.



**Figure 4**

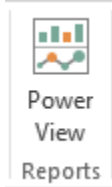
*Locating the Add-Ins Page*

3. In the **Manage** dropdown list, select **COM Add-Ins**, and then click **Go**.
4. In the **COM Add-Ins** window, select the **Microsoft Office PowerPivot for Excel 2013** add-in, and then click **OK**.
5. Notice the addition of the **PowerPivot** ribbon tab.

### Task 3 – Exploring the Power View Fields

In this task, you will explore the **Power View Fields** pane.

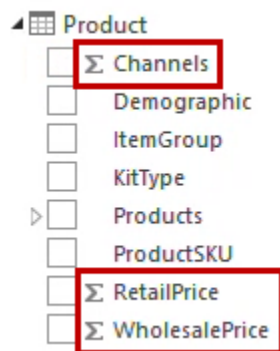
1. To insert a new Power View report, on the **Insert** ribbon tab, click **Power View**.



**Figure 5**


*Inserting a Power View Report*

2. If prompted to enable the add-in, click **Enable**.
3. In the **Power View Fields** pane (located at the right), expand the **Product** table.
4. Notice that all visible columns of the **Product** table are listed, as is the **Products** hierarchy. The first and last two fields decorated with the sigma symbol ( $\Sigma$ ) are “automatic” calculated fields. These are not calculated fields defined explicitly in the data model. Power View automatically surfaces any numeric column, that is not included in a relationship, as a calculated field. An advantage of such fields is that when they are used in the report layout, the user can modify the aggregation logic to any of the supported aggregation functions (Sum, Average, Minimum, Maximum, Count or DistinctCount).



**Figure 6**

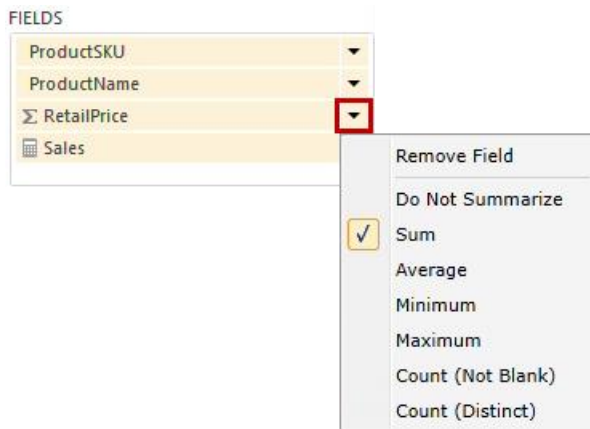
*Reviewing the Product Table Automatic Calculated Fields*

5. Expand the **Sales** table.
6. Notice that all calculated fields defined in the data model are available. The calculator icon () used to decorate these fields means that these are explicitly defined in the data



model. Unlike automatic calculated fields added by Power View, you will learn that it is not possible for the user to modify the calculation logic, including the aggregation function.

7. Expand the **State** table.
8. Notice that all visible columns of the **State** table are listed, as is the **States** hierarchy. The globe icon (🌐) is used to decorate geographic fields that can be used in a map layout.
9. Click the **Product** table. If any columns or calculated fields in this table have been added to the default field set, a table would automatically be added to the Power View sheet consisting of those fields. You will configure this convenient behavior in the next exercise.
10. In the **Product** table, check the following three fields: **ProductSKU**, **Products | ProductName** (expand the **Products** hierarchy to check the level) and **RetailPrice** fields.
11. In the **Sales** table, check the **Sales** field.
12. Notice that the table report is based on the four fields.
13. In the layout area (located beneath the field list), inside the **Fields** drop zone, click the arrow for the **RetailPrice** field, and then notice the ability to modify the aggregate function. Do not change the aggregate function.



**Figure 7**

*Reviewing the RetailPrice Field Aggregation Options*

14. Repeat the last step for the **Sales** field. Notice that the ability to change the aggregate function is not available. This is because the calculated field has been explicitly defined in the data model.

15. On the **Design** ribbon tab, from inside the **Switch Visualization** group, select **Table | Matrix**.
16. Notice that the matrix has grouped by the **ProductSKU** field and then by the **ProductName** field. There is in fact a one-to-one relationship between the values in each field (i.e. each product name has a single SKU), however Power View is not aware of this. Power View has grouped by each field and created a subtotal. You will define this one-to-one relationship in the model using the **Keep Unique Rows** property in the next exercise.

ProductSKU	ProductName	RetailPrice	Sales
1010-GL120-3C	Trainer - Tailspin GL-120	\$65.00	\$304,395.00
	<b>Total</b>	<b>\$65.00</b>	<b>\$304,395.00</b>
1010-GL155-4C	Trainer - Tailspin GL-155	\$179.00	\$382,702.00
	<b>Total</b>	<b>\$179.00</b>	<b>\$382,702.00</b>

**Figure 8**

*Reviewing the Matrix Grouping*

17. To remove the matrix, press the **Delete** key.
18. Right-click the **Sales Performance Monitoring** worksheet, and then select **Delete**.
19. When prompted to confirm the deletion, click **Delete**.
20. Repeat the last two steps to delete the **Sales per Capita** and **Profitability Monitoring** worksheets also.

**Note:** The data preparation tasks in the next exercise will involve renaming columns and calculated fields. The reason you deleted the three worksheets (consisting of PivotTable reports) is that they will produce errors when the interface to the data model changes.

As a best practice, you should not create reports based on a data model until you have completed developing it. The PivotTable reports will be replaced with Power View reports in **Lab 05**.

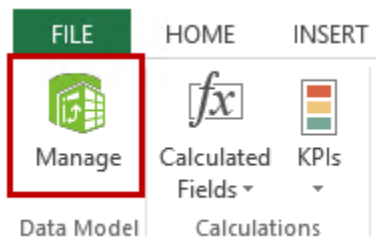
## Exercise 2: Preparing the Data Model

In this exercise, you prepare each table in the data model by setting the appropriate reporting properties. You will also delete some explicit calculated fields to allow them to automatically surface as calculated fields in Power View.

### Task 1 – Preparing the Product Table

In this task, you will configure the reporting properties for the **Product** table.

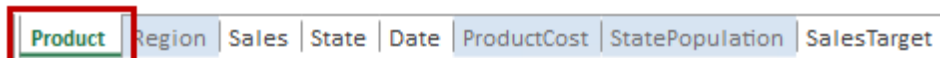
1. On the **PowerPivot** ribbon tab, click **Manage**.



**Figure 9**

*Launching the Power Pivot Window*

2. If necessary, maximize the Power Pivot window.
3. Select the **Product** table.



**Figure 10**

*Selecting the Product Table*

4. Right-click the **Product** table tab, and then select **Description**.
5. In the **Table Description** window, in the box, enter **Products defined by marketing**, and then click **OK**.
6. Right-click the **ProductSKU** column header (the second column), and then select **Description**.
7. In the **Column Description** window, in the box, enter **Stock-Keeping Unit**, and then click **OK**.
8. Right-click the **ProductSKU** column header, and then select **Rename Column**.

9. Replace the column header text with **SKU**, and then press **Enter**.

Power View automatically places field names in the report as column headers and filter labels. Field names cannot be changed in a Power View report, and so it is suggested to keep them as concise, descriptive and user-friendly as possible. When appropriate, add spaces between words to make the report captions more presentable and easier to read.

10. Repeat the last two steps to rename the following columns.

Column Name	New Column Name
ProductName	Product
ProductCategory	Category
ItemGroup	Item Group
KitType	Kit Type
RetailPrice	Retail Price
WholesalePrice	Wholesale Price

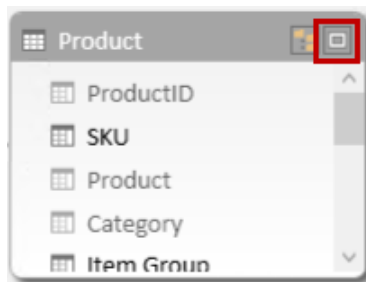
11. To switch to Diagram View, click the **Diagram View** button located in the bottom right corner of the window.



**Figure 11**

*Switching to Diagram View*

12. Locate the **Product** table, then hover over the top right corner of the table, and then click the **Maximize** button.



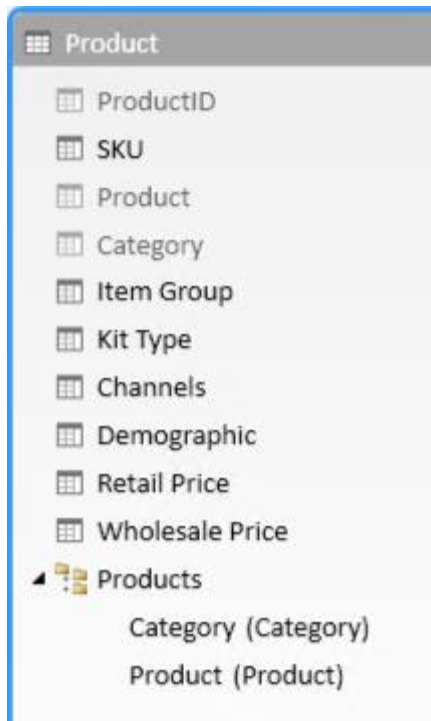
**Figure 12**

*Maximizing the Data Table*

13. In the **Products** hierarchy, right-click the **ProductCategory** level, and then select **Rename**.
14. Replace the level name with **Category**, and then press **Enter**.
15. Repeat the last two steps to rename the second level to **Product**.

**Note:** The text in the parentheses that follows the level name is the name of the column that the level is based on.

16. Verify that the table looks like the following.

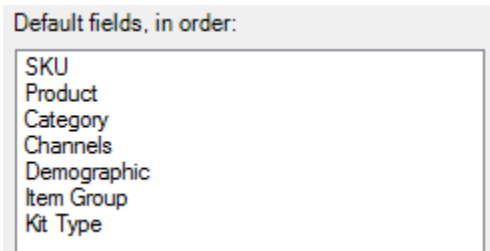


**Figure 13**

*Reviewing the Product Table Design*

17. To select the entire table, click the header of the **Product** table.
18. On the **Advanced** ribbon tab, from inside the **Reporting Properties** group, click **Default Field Set**.
19. In the **Default Field Set** window, in the **Fields in the Table** list, double-click the **SKU** field.

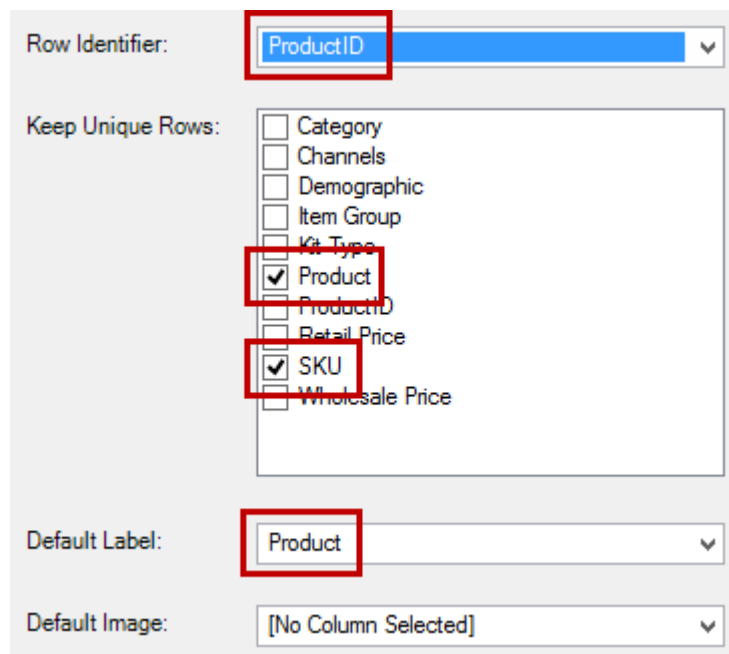
20. Repeat the last step to add the following six columns (in this order): **Product**, **Category**, **Channels**, **Demographic**, **Item Group** and **Kit Type**.



**Figure 14**

*Reviewing the Product Table Default Fields*

21. Click **OK**.
22. On the **Advanced** ribbon tab, from inside the **Reporting Properties** group, click **Table Behavior**.
23. In the **Table Behavior** window, complete the configuration based on the following.



**Figure 15**

*Configuring the Product Table Behavior*

The **Row Identifier** property can apply to only one column in the table and the column cannot be a calculated column. The column should represent the unique identifier (like a primary key) that identifies each row in the table.

The **Keep Unique Rows** property is used to describe that there is a one-to-one relationship between the column and the table identifier (**ProductID**). This configuration will ensure the matrix groupings behave appropriately.

The **Default Label** property sets the column that contains the display name or label for each row of data in the table.

24. Click **OK**.
25. In the **Product** table, select the **Channels** column.
26. On the **Advanced** ribbon tab, click **Summarize By**, and then select **Do Not Summarize**.  
  
Recall that numeric columns will be automatically be surfaced as calculated fields. Recall also that the **Channels** field was expressed in the **Power View Fields** pane as an automatic calculated field. Configuring the column to not summarize will ensure that it is no longer expressed as a calculated field. Product channel values should not be aggregated.
27. Select the **Retail Price** column, and then on the **Advanced** ribbon tab, click **Summarize By**, and then select **Average**.

The configuration made in this step will ensure that the column will surface as a calculated field and that it will use the **Average** aggregate function by default. A user can modify the aggregation function if they want to.

28. To minimize the table, in the top right corner, click **Restore**.



**Figure 16**

*Restoring the Product Table*

## Task 2 – Preparing the State Table

In this task, you will review some column categories of the **State** table.

1. Maximize the **State** table.
2. Right-click the **StateCode** column, and then select **Rename**.
3. Replace the column name text with **State Code**, and then press **Enter**.

- Rename the following column and hierarchy levels.

Column / Level	New Name
StateName	State
States   RegionName	Region
States   StateName	State

- Select the **State Code** column.
- On the **Advanced** ribbon tab, from inside the **Reporting Properties** group, notice that the **Data Category** is set to **State or Province**.

Data categories allow for describing the type of data stored in a column. For geographic columns it may be important to correctly assign a spatial categorization so that the data is correctly communicated to the Bing Maps service for the purpose of geocoding (the process of translating text geographic data to latitude and longitude coordinates).

A default Power Pivot setting has automatically detected and suggested the correct categories for the two state columns.

- Select the **State** column and verify that it is also categorized as **State or Province**.
- Notice the warning icons to the far right of the **CensusPopulation** column and the **Population** calculated field.

The **StateName** column is used in **CensusPopulation** calculated column expression. The expression must be updated to use the new name.

- Right-click the **CensusPopulation** column, and then select **Go To**.
- In the formula bar (located above the table grid), update the expression to change the **[StateName]** reference to **[State]**.

**Note:** For convenience, the calculated column expression can be copied from the **D:\PowerBI\Lab04\Assets\Snippets.txt** file.

- Verify that the formula is the same as the following.

#### DAX

```
=LOOKUPVALUE(StatePopulation[CensusPopulation], StatePopulation[State], [State])
```

- Press **Enter**.



13. Switch to Diagram View.
14. Notice that the two warning icons in the **State** table have disappeared.
15. Minimize the **State** table.

### Task 3 – Preparing the Sales Table

In this task, you will remove several calculated fields from the **Sales** table, and then unhide the columns that these fields were based on.

1. Right-click the **Sales** table, and then select **Go To**.
2. To unhide the three measure columns, first select the **Quantity** column header, and then while pressing the **Shift** key, select the **COGS** column header.
3. Right-click the selection, and then select **Unhide From Client Tools**.
4. To refactor the **Sales per Capita** calculated field to be based on the table column (rather than the calculated field), in the **Calculations Grid**, select the **Sales per Capita** calculated field, and then in the formula bar, replace the DAX expression with the following.

Product Count: 16,370	Units: 172,...	Sales: \$41,000,301.00	Cost: \$33,029,820.00
		Sales per Capita: \$0.13	Profit: \$7,970,481.00
			Profitability: 19.44 %

**Figure 17**

*Selecting the Sales per Capita Calculated Field*

**Note:** For convenience, the calculated field expression can be copied from the **D:\PowerBI\Lab04\Assets\Snippets.txt** file.

#### DAX

```
Sales per Capita:=DIVIDE(SUM([Revenue]), [Population])
```

5. Press **Enter**.

- Similarly update the DAX for the following calculated fields.

**Note:** For convenience, the calculated field expressions can be copied from the **D:\PowerBI\Lab04\Assets\Snippets.txt** file.

Calculated Field	New DAX Expression
Profit	Profit:=SUM([Revenue]) - SUM([COGS])
Profitability	Profitability:=DIVIDE([Profit], SUM([Revenue]))

- Switch to the **SalesTarget** table.
- Update the **Variance** calculated field expression with the following.

**Note:** For convenience, the calculated field expression can be copied from the **D:\PowerBI\Lab04\Assets\Snippets.txt** file.

#### DAX

Variance:=SUM(Sales[Revenue]) - [Sales Target]

- Switch to the **Sales** table.
- To remove existing calculated fields, first select the **Units** calculated field, and then while pressing the **Shift** key, select the **Cost** calculated field.

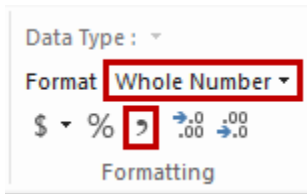
Product Count: 16,370	Units: 172,564	Sales: \$41,000,301.00	Cost: \$33,029,820.00
		Sales per Capita: \$0.13	Profit: \$7,970,481.00
			Profitability: 19.44%

**Figure 18**

*Selecting Multiple Calculated Fields*

- Right-click the selection, and then select **Delete**.
- When prompted to confirm the deletion, click **Delete From Model**.

13. Select the **Quantity** column header, and then on the **Home** ribbon tab, from inside the **Formatting** group, set the **Format** property to **Whole Number**, and then click the **Thousands Separator** button.



**Figure 19**

*Formatting the Quantity Column*

## Exercise 3: Adding an Image URL

In this exercise, you will create a calculated column to produce a URL that can retrieve an external image for each products in the **Product** table.

### Task 1 – Exploring the Image Files

In this task, you will explore the product images.

1. To open Internet Explorer, on the taskbar, click the **Internet Explorer** program shortcut.
2. Click the **Favorites** icon (located at the top right corner), and then select **TailspinToys Product Images**.



**Figure 20**

*Locating the Favorites Icon*

3. To view the image, click any of the file links (e.g. **0001.png**).
4. Review the image URL in the **URL** box.

**Note:** If the workbook is published to an Office 365 Power BI site, referenced external images will not be supported. In this case, image data must be loaded into the column of a table.

### Task 2 – Defining the Image Column

In this task, you will create a calculated column in the **Product** table to generate the URL for each product image.

1. Switch to the Power Pivot window.
2. Switch to the **Product** table.
3. On the **Design** ribbon tab, from inside the **Columns** group, click **Add**.

4. In the formula bar, enter the following expression.

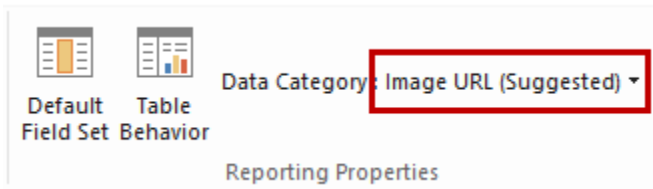
**Note:** For convenience, the expression can be copied from the **D:\PowerBI\Lab04\Assets\Snippets.txt** file.

#### DAX

```
= "http://localhost/TailspinToys/Images/Products/" & FORMAT([ProductID],  
"0000") & ".png"
```

5. Press **Enter**.
6. Rename the new column to **Photo**.
7. Ensure the **Photo** column is selected, and then on the **Advanced** ribbon tab, from inside the **Reporting Properties** group, notice that the **Data Category** property was automatically set to **Image URL**.

**Note:** Sometimes the property does not automatically set, in which case, in the **Data Category** dropdown list, select **Image URL**.

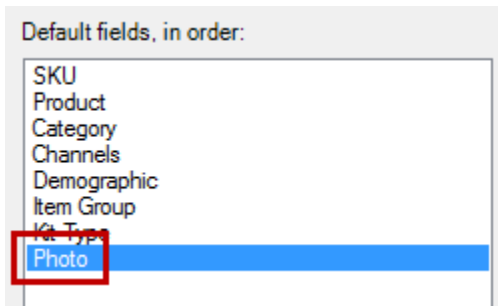


**Figure 21**

*Locating the Data Category Property*

8. On the **Advanced** ribbon tab, click **Default Field Set**.

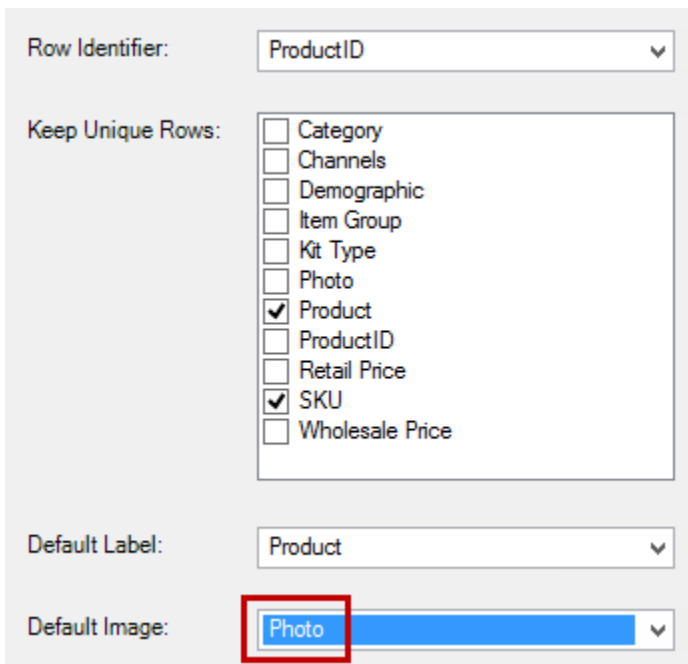
- Double-click the **Photo** field to add it to the end of the default field list.



**Figure 22**

*Reviewing the Default Field Set*

- Click **OK**.
- On the **Advanced** ribbon tab, click **Table Behavior**.
- In the **Default Image** dropdown list, select **Photo**.



**Figure 23**

*Reviewing the Product Table Behavior*

- Click **OK**.


## Exercise 4: Exploring the Prepared Data Model

In this exercise, you will return to Excel to explore the **Power View Fields** pane and the Power View report design experience based on the prepared data model.

### Task 1 – Reviewing the Power View Fields

In this task, you will explore the fields available in the **Power View Fields** pane.

1. Switch to Excel.
2. If prompted to apply the data model changes in Power View, click **OK**.
3. Right-click the **Power View1** sheet tab, and then select **Rename**.
4. Replace the text with **Average Product Revenue**, and then press **Enter**.
5. In the **Power View Fields** pane, hover over the **Product** table, and notice the description that appears in the tooltip.
6. Expand the **Product** table, and then expand the **Products** hierarchy.
7. Notice the friendly field and hierarchy level names.
8. Hover over the **SKU** field, and notice the description that appears in the tooltip.
9. Notice that the **Channels** field is no longer expressed as an automatic calculated field.
10. Notice the addition of the icons that decorate the **Photo**, **Product** and **SKU** fields.

The  icon indicates that these fields are grouped on the row identifier (set with the **Keep Unique Rows** property).

## Task 2 – Creating a Power View Report







In this task, you will create a simple Power View report based on the prepared data model.

1. In the report canvas, click the **Click Here to Add a Title** text, and then enter **Average Product Revenue**.
2. To create a table based on the default field set, simply click the **Product** table.

When prompted with a security warning, click **Enable Content**.

**Note:** References to external images are blocked. You will need to approve that Excel can retrieve the external images the first time they are retrieved. You will be prompted each time you re-open the workbook and refresh the reports.

3. In the **Power View Fields** pane, in the **Product** table, check **Retail Price**.
4. Notice that the **Average of Retail Price** field is added to the table.
5. In the **Power View Fields** pane, expand the **Sales** table.
6. Notice that three of the calculated field (**COGS**, **Quantity** and **Revenue**) are automatically surfaced by Power View. The remaining three (**Product Count**, **Profit** and **Profitability**) are explicitly defined in the data model.
7. Check the **Revenue** field.
8. In the layout area, modify the aggregation function for the **Revenue** field to **Average**.
9. Verify that the report table looks like the following.

SKU	Channels	Demographic	Item Group	Kit Type	Photo	Average of Retail Price	Average of Revenue
1010-GL120-3C	3	Novice	Airplane	RTF		\$65.00	\$313.49
1010-GL155-4C	4	Intermediate	Airplane	RTF		\$179.00	\$529.57
2030-PCUB-3C	3	Beginner	Airplane	RTF		\$70.00	\$595.70
2030-PCUB-4C	4	Intermediate	Airplane	RTF		\$160.00	\$2,054.34
2050-P47-4C	4	Intermediate	Airplane	RTF		\$100.00	\$483.43
2050-P47-5C	5	Advanced	Airplane	RTF		\$259.00	\$2,031.38

**Figure 24**

*Reviewing the Power View Report*



**Note:** The data model produced in this lab will be used in **Lab 05** to explore how to author reports in Power View.

### Task 3 – Finishing Up

In this task, you will finish up by closing all opened applications.

1. To save the workbook, on the **File** ribbon tab, click **Save**.
2. To close Excel, click the X button in the top right corner.
3. Close the Internet Explorer window.

## Summary

In this lab, you prepared the workbook data model created in **Lab 01** for Power View reporting. This involved adding descriptions, renaming columns, defining reporting properties, and removing certain calculated fields. You also configured the data model to reference images from a web site by using their URL.