A Beginning Guide to the Excel 2007 Pivot Table

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I. What is a Pivot Table?

Excel’s Pivot Table is probably the most useful and time-saving tool for analyzing data that’s in table format. In the simplest Pivot Table, one identifies a row value, a column value, and a data value. The data value (usually a numeric value) in this simple Pivot Table is automatically summarized at each row and column intersection.

The illustration at right shows a small part of a table of data in Excel 2007.

The data can be organized into a Pivot Table where Region values are the Pivot Table’s row field, Product values are the column field, and Revenue values are summarized in the data field.

At each row/column intersection is the sum of Revenue for that combination of row and column value. For example:

- Total Revenue for A/C Capacitors in the East region is $152,500.
- Total Revenue for Overflow Switches in the West region is $211,875.
- Total Revenue for Service Valve Caps in the North region is $6,165.

The data can be presented as a Pivot Table, as a Pivot Chart, or as both at the same time.
The Pivot Table invites data exploration and analysis: “slicing and dicing” large amounts of data is easy. The example Pivot Table above shows revenues for only three of the 14 products in the data. The Pivot Table can help a user spot trends and patterns in the data and allows for easy comparisons. Using a Pivot Table one can zoom in on particular data or parts of the data for micro-analysis or zoom out for macro views.

Most of the features of the Pivot Table are intuitive for the user comfortable with the Windows/Office interface.¹ The Pivot Table invites experimentation. After a few sessions with Pivot Table basics you’ll feel comfortable exploring the more advanced features on your own.

**II. Basic Excel 2007 Pivot Table Creation**

**Source Data Requirements**
The most basic of Pivot Tables is created from source data that’s in a table or range in an Excel workbook. Data suitable for use in a Pivot Table must have these characteristics:

1. The top row of data contains column headers.
2. Each row of data is a record about a particular entity or transaction.
3. Each column of data holds the same kind of information.
4. There are no entirely blank rows in the data.
5. There are no entirely blank columns in the data.
6. If a column contains numbers, use a zero instead of a blank cell when you don’t have a value.

In Excel 2007 a range of data that has the characteristics above can be specifically designated as a **table**. A Pivot Table can still be constructed, however, even if the data has **not** been so designated. In this case, it’s simply called a **range**. If you generate a Pivot Table from a range, the range must have the characteristics named above. Below is an example of a range that meets all the characteristics but the first. This data range has no header row, making it unsuitable as the source data for a Pivot Table.

1  If you’re switching from the 2003 Pivot Table, however, you’ll probably find you spend a bit of time at first locating the old features in their new, 2007 locations.
Below left is a Pivot Table created from the range with no header row. Below right is the version when a header row is added.

<table>
<thead>
<tr>
<th>Sum of 5000</th>
<th>Column Labels</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Row Labels</td>
<td>A/C Capacitor</td>
<td></td>
</tr>
<tr>
<td>East</td>
<td>41000</td>
<td>41000</td>
</tr>
<tr>
<td>North</td>
<td>21000</td>
<td>21000</td>
</tr>
<tr>
<td>South</td>
<td>46500</td>
<td>46500</td>
</tr>
<tr>
<td>Grand Total</td>
<td>108500</td>
<td>108500</td>
</tr>
</tbody>
</table>

Created from invalid source data (no header row).

<table>
<thead>
<tr>
<th>Sum of Revenue</th>
<th>Column Labels</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Row Labels</td>
<td>A/C Capacitor</td>
<td></td>
</tr>
<tr>
<td>East</td>
<td>41000</td>
<td>41000</td>
</tr>
<tr>
<td>North</td>
<td>26000</td>
<td>26000</td>
</tr>
<tr>
<td>South</td>
<td>46500</td>
<td>46500</td>
</tr>
<tr>
<td>Grand Total</td>
<td>113500</td>
<td>113500</td>
</tr>
</tbody>
</table>

Created from valid source data.

Pivot Table Creation Steps
1. Make sure your table or range has the characteristics required for Pivot Table source data.
2. Click any single cell in the table or range and choose the “Insert” tab on the Excel ribbon.
3. Find the “Tables” group at left and click the PivotTable button to open the “Create PivotTable” dialog.

![Excel ribbon with PivotTable button highlighted](image)

4. Because a single cell in your source data is current, Excel completes the “Table/Range” identification for you by “looking” left, right, up, and down until it encounters a worksheet edge or a blank row or column. Excel identifies everything inside that area as the source data range.

By default, the Pivot Table will be created on a new worksheet that Excel inserts into the workbook.
5. Leave the defaults in the “Create PivotTable” dialog and click OK. Excel adds a new worksheet to the workbook and displays the “PivotTable Field List” and a Pivot Table “build space”.

If you’re accustomed to creating Pivot Tables with the 2003 or earlier version of Excel, notice that Microsoft has redesigned the field list and revamped the “build space” entirely. In addition, the way you build a Pivot Table in 2007 is completely different. Unless you change 2007’s default setting back to “Classic PivotTable layout”, you can no longer drag items from the Field List and drop them onto the Pivot Table. In Excel 2007, you build a Pivot Table by clicking and/or dragging fields from the top of the Field List to value areas at the bottom of the Field List. Excel uses this information to build the Pivot Table in the build space.

6. You need at least two fields in a Pivot Table report (a row or column field and a data field), but three or more fields (a row field, a column field, and a data field) are the usual. Drag a field name from the top of the list at the top of the dialog to one of the “drop areas” at the bottom of the dialog. Each field has a check box to its left to allow you to easily add (or remove) that column data from the Pivot Table. If you turn on the check
mark for a text field, the Pivot Table automatically adds that field to the “Row Labels” drop area. If you turn on a check mark for a numeric field, the Pivot Table automatically adds that field to the “Values” drop area.

In the illustration above, when the boxes to the left of the text fields “Region” and “Product” are checked, these fields are automatically designated as “Row Labels” at the bottom of the Field List and appear that way in the Pivot Table build space. When the numeric field “Units Sold” is checked, it is automatically designated as a “Values” field at the bottom of the Field List and appears in the data area of the Pivot Table build space. Because the Pivot Table automatically summarizes anything dropped into the data area, the “Units Sold” label is changed to “Sum of Units Sold” and Excel applies a sum summary if possible.

**An Important 2003 ➔ 2007 Difference**

In an Excel 2003 Pivot Table you could drag fields from the Field List and drop them directly on the Pivot Table structure in the worksheet. In Excel 2007, you build the Pivot Table structure entirely within the Field List. Drag field names from the top of the Field List to the Field List drop zones for “Report Filter”, “Column Labels”, “Row Labels”, and “Values”. Or, turn on the check box to the left of a Field List field name and Excel will locate the field in the drop area that makes most sense. Fields that hold text automatically display in the “Row Labels” drop zone. Fields that hold numbers automatically display in the “Values” drop zone. Excel builds the Pivot Table based on the arrangement of fields in the Field List. You can drag and drop field names **within** the Field List, but not **from the Field List to the Pivot Table structure.**

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2 If you like the old drag-and-drop directly to the Pivot Table, open the 2007 PivotTable Options dialog and on the “Display” tab check “Classic PivotTable layout”.
7. Drag the “Product” field to from the “Row Labels” area to the “Column Labels” area to change the way the data is displayed and summarized.

When you click off the Pivot Table the field list is hidden. When you click back on the Pivot Table the field list redispplays. The field list dialog has an X icon in the upper-right-hand corner; you can turn off the display of the field list even if you’re working with the Pivot Table.

How the Cache is Used in Pivot Table Construction
At this point in your work with the Pivot Table, its behind-the-scenes operation isn’t critical. But it’s a good idea to understand right from the start that Excel creates the Pivot Table from a copy of the source table or range that it keeps in cache memory, not directly from the source itself. In this way, a Pivot Table is unlike a chart or a formula that uses worksheet data. With a chart or formula, when the underlying (source) data changes, the chart or formula result also changes automatically. Not so with the Pivot Table and its source data. Here are a couple of obvious reasons for this behavior:

- If your data were being updated often, it would be disconcerting to build and manipulate a Pivot Table while its values were constantly changing. The kind of data for which a Pivot Table is particularly useful is often data that’s updated or added to frequently.
- You decide when to update the Pivot Table from the data (that is, when to “renew” the cache and by extension the Pivot Table) and so capture all the updates at one time. This makes Pivot Table operations faster.

Refreshing the Pivot Table from Source Data
When you’re ready to refresh the Pivot Table from the cache and source data (as described above):
1. Click any cell in the Pivot Table to make the Pivot Table active.
2. A special PivotTable Tools tab displays and contains an “Options” tab.
3. Find the “Data” group and click the “Refresh” button. Excel updates the Pivot Table you created with any changes, additions, or deletions made to the underlying worksheet data.

Building a New Pivot Table Based on an Existing One
In previous versions of Excel, if you began creating a new Pivot Table using the same data with which you’d already created a Pivot Table, a prompt appeared asking if you wanted to base the new Pivot Table on the existing one. With Excel 2007, that option is no longer available. You can reproduce an existing Pivot Table by selecting it and copying it to a new location, but the “original” and the “copy” remain separate Pivot Tables. Changes you make to one do not affect the other.

III. Basic Excel 2007 Pivot Table Modifications

Expand Information
Use the PivotTable Field List to add additional fields to a Pivot Table. In the example below, all eight fields in the source data are used. Notice the filter icons in the field list to the right of the “Product” and “Customer” field names. The filter icons are a reminder that these fields are showing only some and not all of the data.

All the fields in the source data cache are used in this Pivot Table. All the field list fields are checked on.

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3 In earlier versions of Excel the Refresh icon was a red exclamation mark.
**Restrict Information**

Restrict the information shown in the Pivot Table either by removing fields (uncheck any field list field) or by filtering a field to show particular instances.

At right the “Column Labels” drop down is clicked to display the sort and filter dialog for this field. A simple way to limit the amount of data displayed is to uncheck the “Customer” names you don’t want to see in the Pivot Table. Here, only one “Customer” is checked.

(If you don’t see a drop-down to the right of a Pivot Table label, click that field in the field list to turn on a drop-down, and use that drop-down icon.)

**Change the Pivot Table View**

With a Pivot Table selected and the context-specific “PivotTable Tools” tab visible, select the “Design” tab and find the “Layout” group. The Layout group is divided into options for subtotals and grand totals (at left) and report layouts (at right). Click the “Report Layout” button to see the three possible 2007 Pivot Table layouts: Compact, Outline, and Tabular. The illustrations below show the differences between these layouts.
Compact layout (new default for Excel 2007)

In this new view, inner row items are shown in the same column as outer row items. This permits “rolling up” detail by clicking the minus icon to hide inner row information.

Outline layout

If you used the Pivot Table in a previous version of Excel, this is the layout with which you’re familiar. If a row field contains two variables (here, “Region” and “Date of Sale”), each variable has its own column. Region occupies Column A and Date of Sale occupies Column B. This remains true even if the “Date of Sale” data is hidden. In this case, Column B retains the header “Date of Sale” and appears empty.

Tabular layout

Tabular layout adds an automatic subtotal after each outer row field.
The New Report Filter
The pre-2007 Pivot Table had an optional Page Field that allowed the Pivot Table user to see all the data in the page field or to limit the view of data by slicing through the data by a single Page Field selection.

![The 2003 Page Field. Selection options are (All) or a single item.](image)

The Excel 2007 Pivot Table has replaced the 2003 Page Field with a “Report Filter” field. The Report Filter also is optional and is located in the same position in the Pivot Table (in the upper left-hand corner).

![The 2007 Report Filter. Selection options are (All), a single item, or multiple items.](image)

Set Pivot Table Options
The Excel 2003 Pivot Table had options bundled together in a single “PivotTable Options” dialog box. The Excel 2007 Pivot Table organizes options in a ribbon and in a multi-tabbed dialog.

![Set Pivot Table Options](image)
With a 2007 Pivot Table selected, the “PivotTable Tools” context ribbon item has its own “Options” tab. With the “Options” tab selected, these groups are visible: “Active Field”, “Group”, “Sort”, “Data”, “Actions”, “Tools”, and “Show/Hide”.

To open the multi-tabbed “Options” dialog, choose the drop-down on the “PivotTable” button at the far left of the “Options” tab and select Options from the context menu that displays.

Most of the options from the single-tab 2003 “PivotTable Options” dialog (plus some new options) are rearranged on this multi-tabbed 2007 “PivotTable Options” dialog.
Examples of especially useful option settings:

On the **Layout & Format** tab choose what to display for empty Pivot Table cells.

![Format options](image)

On the **Totals & Filters** tab, turn on and off grand totals for rows and columns.

![Totals & Filters options](image)

On the **Display** tab, turn on the Classic Pivot Table layout. With the classic layout restored you can drag and drop fields from the field list directly onto the Pivot Table in the worksheet. (This is the way the 2003 Pivot Table worked.)

![Display options](image)

On the **Printing** tab, print or don’t print the expand/collapse buttons that Excel displays when you work with a Pivot Table in the default “Compact View”.

![Printing options](image)

On the **Data** tab, options to control the source data.

![Data options](image)

2003’s drill down option
**Sorting: “External” and “Internal”**

Like the 2003 Pivot Table, the 2007 Pivot Table can be manipulated by some Excel features (“external”) but has duplicate “internal” features as well. The sort is an example of this kind of feature.

In the (classic view) Pivot Table illustrated below, the “external” Excel sort button on the “Data” tab in the “Sort & Filter” group has been used to sort Customer in descending order. There’s nothing wrong with this sort, but it has a downside. That is that if you modify the Pivot Table (add fields, remove fields, change the layout) Excel isn’t likely to remember that you want Customers sorted descending.

The alternative to an “external” Excel sort is an “internal” Pivot Table sort. Get to this sort by clicking the Customer field label drop-down. Along with offering various selection options, the context dialog that displays also includes sort options.

Choosing More Sort Options… from this list opens this additional “Sort (Customer)” dialog.
**Formatting, Including Styles and Themes**

You may want to format a single element of a Pivot Table (Teknik Engineers’ data below left) or an entire structural element (the Customer column, below right). The Excel 2007 Pivot Table allows you to use “regular” Excel formatting tools.  

In addition to these specific formatting tools, the 2007 Office applications have style and theme-based formatting options. Make a cell in the Pivot Table current, choose the “Design” tab from the special “PivotTable Tools” tab, and choose the “PivotTable Styles” group. Hover the mouse over a style to see how that style looks applied to your Pivot Table.

Styles types are “Custom”, “Light”, “Medium”, and “Dark”.

If you don’t like any of the available color schemes in the styles group available to you, change to one of the other 19 Office “document themes”.
Change to a new document theme by clicking the “Page Layout” tab and choosing the “Themes” group. Change colors, fonts, and effects individually, or select from predefined themes that control colors, fonts, and effects.

Right-click the label for a field and choose either Format Cells… (or if the field holds numbers either Format Cells… or Number Format…) to open the familiar “Format Cells” dialog at left.
IV. 2007 Pivot Table Filters: New and Repackaged

Anyone familiar with the pre-2007 Pivot Table is familiar with the filter tool represented by the drop-down icon to the right of a row field, a column field, or a page field (in 2007 renamed the report filter and refashioned).

Select the drop-down icon and choose one or more entries from that field.

The Excel 2007 Pivot Table makes some new filter options available. Some of these options are reminiscent of filter options available in the 2003 Autofilter. There are several ways to reach these filter options:

1) Left-click the drop-down icon to the right of a Pivot Table field name to display the filter options.
2) Right-click a row or column label, choose Filter from the context menu that displays, and choose a filter type from the context submenu that displays.
3) Click a field name in the Field List and click the down icon that appears to the right of that field name. (A drop-down icon displays only when a field is selected.)

This field list illustration shows that Customer, Product, and Region are fields in the Pivot Table since their check boxes are checked. Filters are currently applied to Product and Region. The Customer field is selected and a drop-down icon displays to its right. None of the other fields show this drop-down icon at present.

Shown at left are some of the Label Filter options, or filters that apply to fields that contain text.

The 2007 Pivot Table label filters offer multiple ways to limit a displayed field.
For example, use the “Greater Than…” option to display Product names that are alphabetically past the single letter “E”. The filtered list includes Evaporator Fin Comb, Freezestat, Freon Leak Repair Kit, etc. but not A/C Capacitor, A/C Condensate Pump, Compressor Crankcase Heater, etc.

Shown at left is a display of Value Filter options for the “Customer” field. In the illustration the “Greater Than…” filter has been selected as a value filter for the “Units Sold” field. The filter is set to show only Customers whose sum of units sold for a product is greater than 40.

Before the Value Filter is applied.

After the Value Filter is applied.
Clicking the drop-down icon for a date field in the Field List gives access to what are called **Date Filters**.

**Selection options for dates**

A submenu also provides a selection of grouping options for dates. A special dialog described below expands these options.

Choosing a **Value Filter** for a field and then selecting the *Top Ten*... option displays the familiar 2003 “Top 10 Filter” dialog.

*This example shows a top 10 filter for a field named Product.*
V. 2007 Pivot Table Grouping Options

Group (and Select) by Dates
If your source data has many individual dates, grouping by date can be critical in order to make a useful Pivot Table.

The 2007 Pivot Table has expanded date selection and grouping options.

Right-click a date field label and choose Group…to open the 2003 “Grouping” dialog. This dialog is specific for dates.
A Pivot Table that’s overly detailed with date data can be quickly summarized by dates. In the illustration below, data that appears in the data source with day by day records have been grouped by date month and date year.

<table>
<thead>
<tr>
<th>Sum of Units Sold</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Condenser Fan Blades</td>
</tr>
<tr>
<td><strong>Years</strong></td>
<td><strong>Date of Sale</strong></td>
</tr>
<tr>
<td>2007</td>
<td>Jan</td>
</tr>
<tr>
<td></td>
<td>Feb</td>
</tr>
<tr>
<td></td>
<td>Mar</td>
</tr>
<tr>
<td></td>
<td>Apr</td>
</tr>
<tr>
<td></td>
<td>May</td>
</tr>
<tr>
<td></td>
<td>Jun</td>
</tr>
<tr>
<td></td>
<td>Jul</td>
</tr>
<tr>
<td></td>
<td>Aug</td>
</tr>
<tr>
<td></td>
<td>Sep</td>
</tr>
<tr>
<td></td>
<td>Oct</td>
</tr>
<tr>
<td></td>
<td>Nov</td>
</tr>
<tr>
<td></td>
<td>Dec</td>
</tr>
<tr>
<td>2008</td>
<td>Jan</td>
</tr>
<tr>
<td></td>
<td>Feb</td>
</tr>
<tr>
<td></td>
<td>Mar</td>
</tr>
<tr>
<td></td>
<td>Apr</td>
</tr>
<tr>
<td></td>
<td>May</td>
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<tr>
<td></td>
<td>Jun</td>
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<td></td>
<td>Jul</td>
</tr>
<tr>
<td></td>
<td>Aug</td>
</tr>
<tr>
<td></td>
<td>Sep</td>
</tr>
<tr>
<td></td>
<td>Oct</td>
</tr>
<tr>
<td></td>
<td>Nov</td>
</tr>
<tr>
<td></td>
<td>Dec</td>
</tr>
</tbody>
</table>

**Group by Text Fields**

Grouping by text labels in the 2007 Pivot Table works the same way it did in the 2003 Pivot Table.

In the illustration at right, the first five entries under the “Customer” label were selected. The selection was right-clicked, and the Group option was selected. The same process was applied to the 6th through 13th entries.

A “virtual” column (here renamed “Type”) is added. Each new grouping is assigned a generic name unless you replace it with your own name. To remove virtual groupings, select a group, right-click, and choose Ungroup.
VI. 2007 Pivot Table Calculations

Default Summary Calculations
The summary calculation defaults for the 2007 Pivot Table are:

1) If an item designated as a Pivot Table value field is a *number*, it’s summarized by a SUM operation.
2) If an item designated as a Pivot Table value field is *text*, it’s summarized by the COUNT operation.
3) If an item designated as a Pivot Table value field contains all numbers except for *one* or more blank cells, Excel treats the field as a text field and summarizes with a COUNT. (You can override this default and change the summary from COUNT to SUM.)

Basic Summary Calculations
Along with the default summary operations SUM and COUNT, the Pivot Table has a variety of other summary operations. To see the list of these additional operations, right-click the label for a value field and choose the *Value Field Settings…* option from the context menu that displays. Excel opens the “Value Field Settings” dialog for the selected value field.

On the “Summarize by” tab in this dialog are the summary options available: Sum, Count, Average, Max, Min, Product, Count Numbers, StdDev, StdDevp, Var, and Varp.
**Intermediate Summary Calculations**

In the same dialog but on the “Show values as” tab, the Pivot Table displays more advanced summary options such as “Difference From”, “% Of”, “% Difference From”, etc.

Depending on the option you select you may or may not have to provide more information to the Pivot Table so it can perform the operation you selected. For example, if you choose to show values as “Difference From”, you’re prompted to designate a “Base field” and a “Base item”.

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*End of Beginning Guide to the Excel 2007 Pivot Table*