

Intermediate Microsoft Excel

Part 2: List and Data Management



Introduction:

Most organizations maintain data in the form of *lists*. Companies have lists of their employees. Magazines and newspapers keep lists of their subscribers. This section presents the fundamentals of list management as it is implemented in Excel. We begin with the definition of basic terms, such as *field* and *record*, then cover the commands to create a list, to add a new record, or to modify or delete an existing record.

Through the Hands-on Exercises, we will introduce the AutoFilter and Advanced Filter commands that display selected records in a list. We use the Sort command to rearrange the list. We also discuss database functions and the associated criteria range. This set of exercises will end with an application of the subtotals command and generation of a pivot table.

Learning Objectives:

When you have finished the second part of this course you will be able to:

1. Create a list within Excel; explain the importance of proper planning and design prior to creating the list;
2. Add, edit, and delete records in an existing list; explain the significance of data validation;
3. Describe the TODAY and NOW functions and explain the use of date arithmetic;
4. Use the SORT command; distinguish between an ascending and a descending sort, and among primary, secondary, and tertiary keys;
5. Use the DSUM, DAVERAGE, DMAX, DMIN, and DCOUNT functions;
6. Use the AutoFilter and Advanced Filter commands to display a subset of a list;
7. Create Subtotals in a list; and
8. Generate a pivot table and explain how it provides flexibility in data analysis.

Hands-on Exercise 1

Creating and Maintaining a List

Objectives: To add, edit, and delete records in an employee list; to introduce the Data Form and Data Sort commands, to use spell check to validate data.

Step 1: Open the Employee Workbook

- Start Excel. Open the **Employees.xls** workbook ...
- Save the workbook to a floppy disk or Datastore01\home if you want to keep a record of your changes.

Step 2: Add a Record Using *Data Form*

- Click in a single cell anywhere within the employee list (**cells A1 through D14**). Pull down the **Data menu**. Click **Form** to display a dialog box with data for the first record in the list (Adams). Click the **New command button** to clear the text box and begin entering a new record.
- Enter the data for **Elofson** as shown the Figure below, using the Tab key to move from field to field within the data form. Click the **Close command button** after entering the salary (the last field). Elofson has been added to the list and appears in row 15 of the worksheet.

The screenshot shows a dialog box titled "Sheet1" with a form for entering employee data. The form has four input fields: "Name:" with "Elofson", "Location:" with "Miami", "Title:" with "Account Rep", and "Salary:" with "47500". To the right of the form are several buttons: "New", "Delete", "Restore", "Find Prev", "Find Next", "Criteria", and "Close". A vertical scrollbar is located between the form fields and the buttons. The text "14 of 14" is displayed in the top right corner of the dialog box.

- Save the workbook.

Step 3: Add a Record Using the Insert Row(s) Command

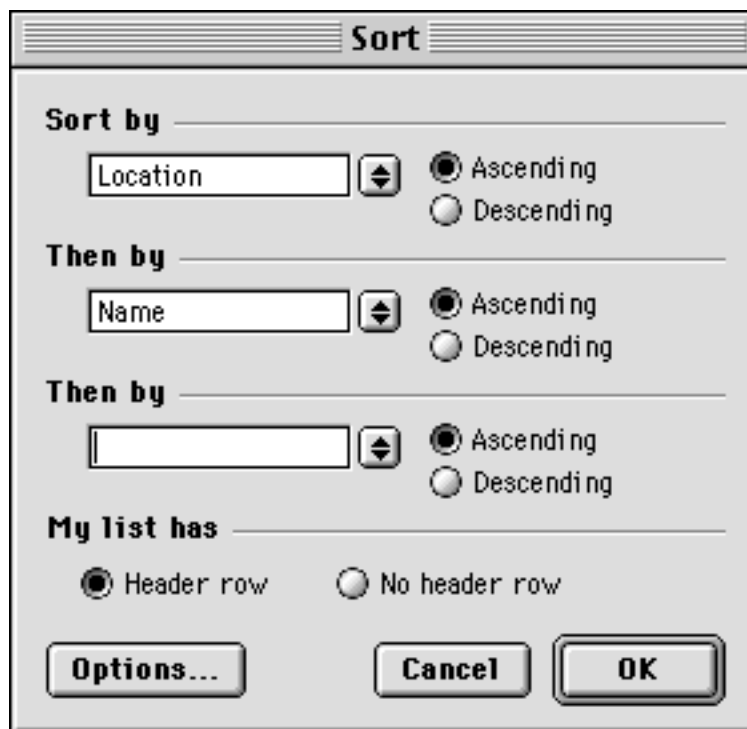
- Click in the **row heading** for **row 8**. Pull down the **Insert menu**. Click **Rows**. (You can also right click, to get the **shortcut menu**, and select **Insert**).
- Add the data for **Gillenson**, who works in **Miami** as an **Account Rep** with a salary of **\$55,000**.
- Save the workbook.

Step4: The Spell Check

- Select **cells B2:C16**. Pull down the **Tools menu** and click **Spelling** (or click on the **Spelling button** on the Standard Toolbar).
- ...
- Save the workbook.

Step 5: Sort the List

- Click in a single cell anywhere in the employee list (**cells A1 through D16**). Pull down the **Data menu**. Click **Sort** to display the dialog box below:



- Click the **drop-down arrow** in the *Sort by* list box. Click **Location** as the primary key.
- Click the **drop-down arrow** in the first *Then by* list box. Click **Name** as the secondary key.

- Be sure the **Header Row option button** is checked (so that the field names are not mixed in with the records in the list).
 - Check that the **Ascending option button** is selected for both the primary and secondary sort keys.
 - Click **OK** to sort the list and return to the worksheet.
- The employees are listed by location and alphabetically within location.
 - Save the workbook.

Step 6: Delete a Record Using *Data Form*

- Click a single cell within the employee list.
- Pull down the **Data menu**. Click **Form** to display the data form.
- Click the **down arrow** in the scroll bar until you come to the record for **Frank**.
- Click the **Delete command button**.
- Click **OK** in response to the warning message... [Note that the record cannot be undeleted when using the Data Form.]
- Click **Close** to close the Data Form.
- Save the workbook.

Step 7: Insert a Field

- Click the **column heading** in **column D**. Click the **right mouse button** to display a shortcut menu. Click **Insert**. The employee salaries have been moved to column E.
- Click **cell D1**. Type **Hire Date** and press **enter**. Adjust the column width if necessary.

Step 8: Enter the Hire Dates

- Dates may be entered in several formats.
 - Type **11/24/93** in **cell D2**. Press the **down arrow key**.
 - Type **Nov 24, 1993** in **cell D3**. Press the **down arrow key**.
 - Type **=Date(93,11,24)** in **cell D4**. Press the **down arrow key**.
 - Type **11-24-93** in **cell D5**. Press the **down arrow key**.
- Let's assume the next several employees were hired on the same day, 3/16/92.
 - Click in **cell D6**. Type **3/16/92**. Press **enter**.
 - Click in **cell D6**. Click the **Copy button** on the Standard toolbar, which produces a "crawling ants" border around cell D6. Drag the mouse over **cells D7 through D10**. Click the **Paste button** on the Standard toolbar to complete the copy operation.

- Press **Esc** to remove the “crawling ants” border around cell D6.
- Let’s assume the last five employees were hired one year apart, beginning October 31, 1989.
 - Click in **cell D11**. Type **10/31/89**.
 - Click in **cell D12** and type **10/31/90**.
 - Select **cells D11** and **D12**.
 - Drag the **fill handle** at the bottom of cell D12 over **cells D13, D14, and D15**. Release the mouse to complete the AutoFill operation.
- Save the workbook.

Step 9: Format the Date

- Click in the **column heading** for **column D** to select the column of dates.
- Click the **right mouse button** to display a shortcut menu. Click **Format cells**.
- Click the **Number tab** in the Format Cells dialog box. Click **Date** in the Category list box. Select (click) the date format you like.... Click **OK**.
- Click elsewhere in the workbook to deselect the dates. Reduce the width of column D as appropriate.
- Save the workbook.

Hands-on Exercise 2

Data Versus Information

Objectives: To sort a list on multiple keys; to demonstrate the AutoFilter and Advanced AutoFilter commands; to define a named range; to use the DSUM, DAVERAGE, DMAX, DMIN, and DCOUNT functions.

Step 1: Calculate the Years of Service

- Start Excel. Open the **Employees.xls** workbook from the previous exercise...
- Click the **column heading** in **column D**. Click the **right mouse button** to display a shortcut menu. Click **Insert**. The column of hire dates has been moved to column E.
- Click in **cell D1**. Type **Service** and press **enter**.
- Click in **cell D2** and enter the formula to compute the *years of service*: **=(TODAY()-E2)/365**. Press **enter**; the *years of service* for the first employee is displayed in cell D2 (it should equal 4.5).
 - Why not use the NOW() formula?
- Click in **cell D2**, then click the **Decrease Decimal button** and the Formatting toolbar several times to display the length of service with only one decimal place. Reduce the column width as appropriate.

- Drag the **fill handle** in cell D2 to the remaining cells in that column (**cells D3 through D15**) to compute the *years of service* for the remaining employees.

Step 2: The AutoFilter Command

- Click a single cell anywhere within the list. Pull down the **Data menu**. Click the **Filter** command.
- Click **AutoFilter** from the resulting cascade menu to display the drop-down arrows to the right of each field name.
- Click the **drop-down arrow** next to **Title** to display the list of titles; select **Account Rep**.
 - The display changes to show only those employees who meet the filter condition.
 - The worksheet is unchanged, but only those rows containing account reps are visible.
 - The row numbers for the visible records are blue.
 - The drop-down arrow for Title is also blue, indicating that it is part of the filter condition.
- Click the **drop-down arrow** next to **Location**. Click **Boston** to display only the employees in this city. The combination of the two filter conditions shows only the account reps in Boston.
- Click the **drop-down arrow** next to **Location** a second time. Scroll until you can click **All** to remove the filter condition on location. Only the account reps are displayed because the filter on Title is still in effect.
- Save the workbook.

Step 3: The Custom AutoFilter Command

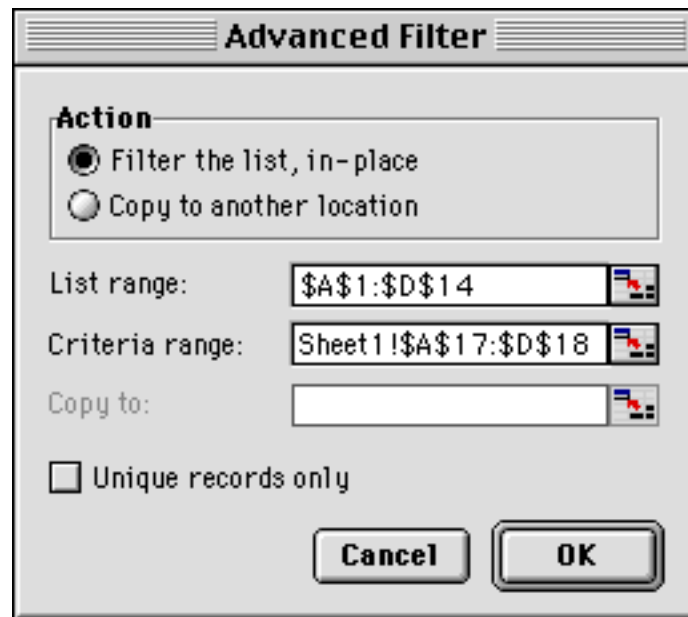
- Click the **drop-down arrow** next to **Salary** to display the list of salaries. Click **Custom** to display the Custom AutoFilter dialog box below:

- Click the **arrow** in the leftmost drop-down list box for Salary. Select the **is greater than** option from the drop-down list.

- Click in the text box for the salary amount. Type **45000** (or select \$45,000 from the drop-down list next to the text box). Click **OK**.
- The list changes to display only those employees whose title is account rep *and* who earn more than \$45,000 per year.
- Pull down the **Data menu**. Click **Filter**. Click **AutoFilter** to toggle the AutoFilter command off, which removes the arrows next to the field names and cancels all filter conditions. All of the records in the list are visible.

Step 4: The Advanced Filter Command

- The field names in the criteria range must be spelled exactly the same way as in the associated list. The best way to ensure that the names are identical is to copy the entries from the list to the criteria range.
 - Click and drag to select **cells A1 through F1**.
 - Click the **Copy button** on the Standard toolbar. A crawling ants border appears around the selected cells.
 - Click in **cell A17**. Click the **Paste button** on the Standard toolbar to complete the copy operation. Press **Esc** to cancel the crawling ants border.
- Click in **cell C18**. Enter **Manager** (be sure you spell it correctly!).
- Click in a single cell anywhere within the employee list. Pull down the **Data menu**. Click **Filter**. Click **Advanced Filter** from the resulting cascade menu to display the dialog box below. (The range is already entered because you had selected a cell in the list prior to executing the command.)



- Click in the **Criteria Range** text box. Click in **cell A17** in the worksheet and drag the mouse to **cell F18**. Release the mouse. A crawling ants border appears around these cells in the worksheet and the corresponding cell reference is entered in the dialog box.
- Check that the **option button** to Filter the List, in-place is selected. Click **OK**. The display changes to show just the managers; that is, only rows 4, 8, and 10 are visible.

- Click in **cell B18**. Type **Atlanta**. Press **enter**.
- Pull down the **Data menu**. Click **Filter**. Click **Advanced Filter**. The advanced Filter dialog box already has the cell references for the List and Criteria ranges (which were the last entries made).
- Click **OK**. The display changes to show just the manager in Atlanta; that is, only row 4 is visible.
- Pull down the **Data menu**. Click **Filter**. Click **Show All** to remove the filter conditions. The entire list is now visible.

Step 5: The Insert Name Command

- Click and drag to select **cells A1** through **F15**.
- Pull down the **Insert menu**. Click **Name**. Click **Define**. Type **Database** in the Define Name dialog box. Click **OK**. [Alternatively, click in the **Name box** and type **Database**. Press **enter**.]
- Click on the drop-down list in the **Name box**. There are two names in the list: Database, which you just defined, and Criteria, which was defined automatically when you specified the criteria range in step 4.
- Select Criteria from the drop-down list to select the range (**cells A17** through **F18**). Click elsewhere in the worksheet to deselect the cells.
- Save the workbook.

Step 6: Database Functions

- Click in **cell A21**. Type **Summary Statistics**. Select **cells A21** through **F21**, then click the **Center Across Columns** button on the Formatting toolbar to center the heading over the selected cells.
- Enter the following labels for **cells A22** through **A26**:
 - A22: Average Salary
 - A23: Maximum Salary
 - A24: Minimum Salary
 - A25: Total Salary
 - A26: Number of Employees
- Click in **cell B18**. Press the **Del key**. The criteria range is now set to select only Managers.
- Click in **cell F22**. Click the **Paste Function button** on the Standard toolbar to display the Paste Function dialog box.
- Select **Database** from the Function Category list box. Select **DAVERAGE** as the Function Name, then click **OK**. The DAVERAGE function dialog box appears as shown below:

DAVERAGE

Database Database = {"Name","Location"
Field "Salary" = "Salary"
Criteria Criteria =

= 71125

Averages the values in a column in a list or database that match conditions you specify. For more information see Help.

Criteria is the range of cells that contains the conditions you specify. The range includes a column label and one cell below the label for a condition.

Formula result = 71125

Cancel OK

- Click in the **Database** text box in the function dialog box. Type **Database** (the range name defined in Step 5), which references the employee list.
- Click in the **Field** text box in the function dialog box. Type **"Salary"**, the name of the field within the list that you want to average.
- Click in the **Criteria** text box in the function dialog box. Type **Criteria** (the range name defined during the Advanced Filter operation). The result is shown in two places: just below the text boxes as = 69833, and at the bottom of the function dialog box as "Formula result = 69833".
- Click the **OK button** to enter the DAVERAGE function into the worksheet.
- Save the workbook.

Step 7: The DMAX, DMIN, DSUM, and DCOUNT Functions

- Enter the DMAX, DMIN, DSUM, and DCOUNT functions in cells F23 through F26. You can use the Paste Function button to enter each function individually, *or* you can copy the DAVERAGE function and edit appropriately:
 - = DMAX(Database, "Salary", Criteria)
 - = DMIN(Database, "Salary", Criteria)
 - = DSUM(Database, "Salary", Criteria)
 - = DCOUNT(Database, "Salary", Criteria)
- Select **cells F22 through F25** and format these cells to currency with no decimals. Widen the column if necessary.
- Save the workbook.

Step 8: Changing the Criteria Range

- Click in the **Name box**. Type **B18** and press **enter** to make cell B18 the active cell. Type **Chicago** to change the criteria to Chicago managers. Press **enter**.

The values displayed by the DAVERAGE, DMAX, DMIN, and DSUM functions change to \$52,000, reflecting the one employee (Adamson) who meets the current criteria (a manager in Chicago). The value displayed by the DCOUNT function changes to 1 to indicate one employee.

- Click in **cell C18**. Press the **Del** key.
- The average salary changes to \$45,125, reflecting all employees in Chicago.
- Click in **cell B18**. Press the **Del** key.
- The Criteria range is now empty. The DAVERAGE function displays \$48,429, which is the average salary of all employees in the database.
- Click in **cell C18**. Type **Manager** and press the **enter** key. The average salary is \$69,833, the average salary for all managers.
- Save the workbook.

Hands-on Exercise 3

Subtotals and Pivot Tables

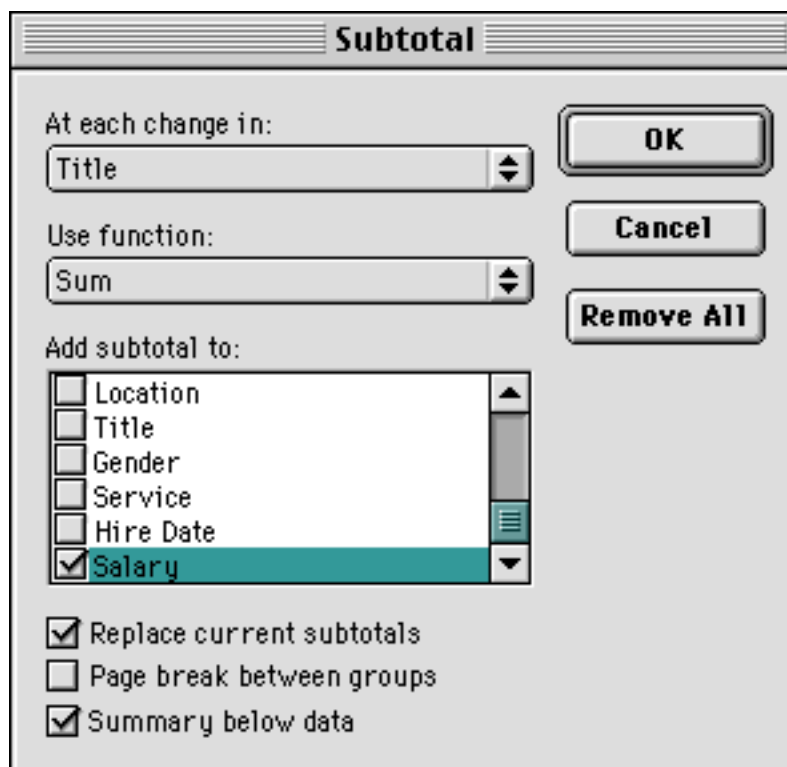
Objectives: To display and modify subtotals within a list; to use the PivotTable Wizard to create and modify a pivot table.

Step 1: Open and Set Up the Workbook

- Open the **Employees.xls** workbook from the previous exercise...
- Click any cell in **column C**, the column containing the employee titles. Click the **Sort ascending button** on the Standard toolbar. The employees should be arranged according to title within the worksheet. [This is the field in which subtotals will be grouped.]
- Point to the **column heading in column D**, which presently contains the length of service. Press the **right mouse button** to display a shortcut menu, Click **Insert** to insert a new column.
- Click in **cell D1**. Type **Gender** (the field name). Press the **down arrow key** to move to **cell D2**. Type **M**. In the remaining cells in the **range D3:D15**, type M, F, F, F, M, F, F, M, M, M, F, M, F.
- Narrow the column width as appropriate... and center the elements within the column.
- Save the workbook.

Step 2: Create the Subtotals

- Click anywhere in the employee list. Pull down the **Data menu**. Click **Subtotals** to display the Subtotal dialog box shown below:



- Click the **double-arrow** in the “At Each Change in:” list box. Click **Title** to create a subtotal whenever there is a change in title.
- Set the other options to match the dialog box shown above. The “Use function:” list box should be set to **Sum**; the “Add subtotal to:” list box should be set to **Salary**; the “Replace current subtotals” and “Summary below data” boxes should be checked. Click **OK** to create the subtotals.

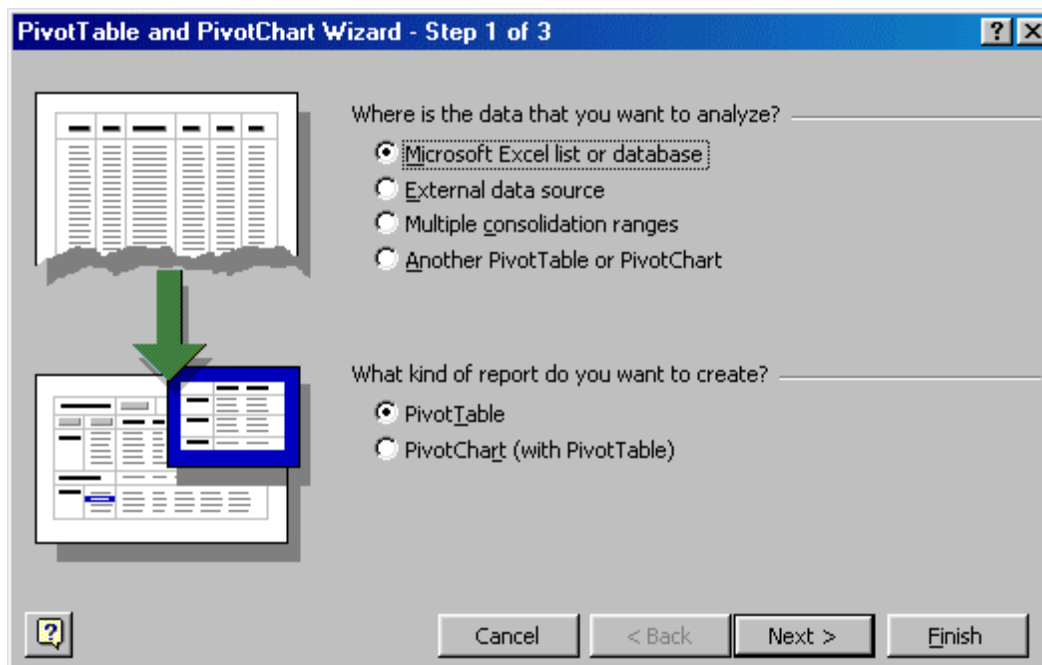
Step 3: Examine the Subtotals

- Your worksheet should display subtotals in rows 11, 15, 18, and 19 (which contains a Grand Total).
- Click in **cell G11**, the cell containing the Account Rep subtotal. The formula bar displays **=SUBTOTAL(9,G12:G14)**, which computes the sum for cells G2 through G10. (The number 9 within the argument of the function indicates a sum).
- Click the **level 2 button** (just under the Name box) to suppress the detail lines. The list collapses to display the subtotals and grand total.
- Click the **level 1 button** to suppress the subtotals. The list collapses further to display only the grand total.
- Click the **level 3 button** to restore the detail lines and subtotals. The list expands to display the employee records, subtotals, and grand total.

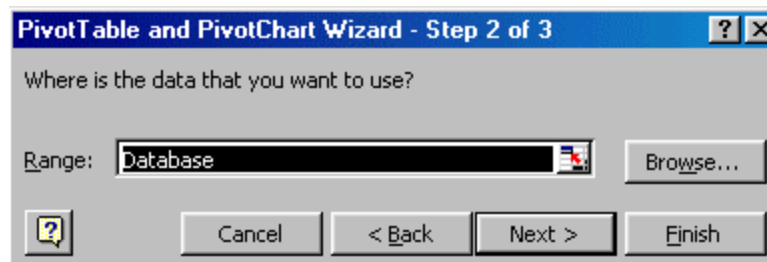
Step 4: The PivotTable Wizard

A *pivot table* extends the capability of individual database functions by presenting data in summary form. It divides the records in a list into categories, then computes summary statistics for those categories.

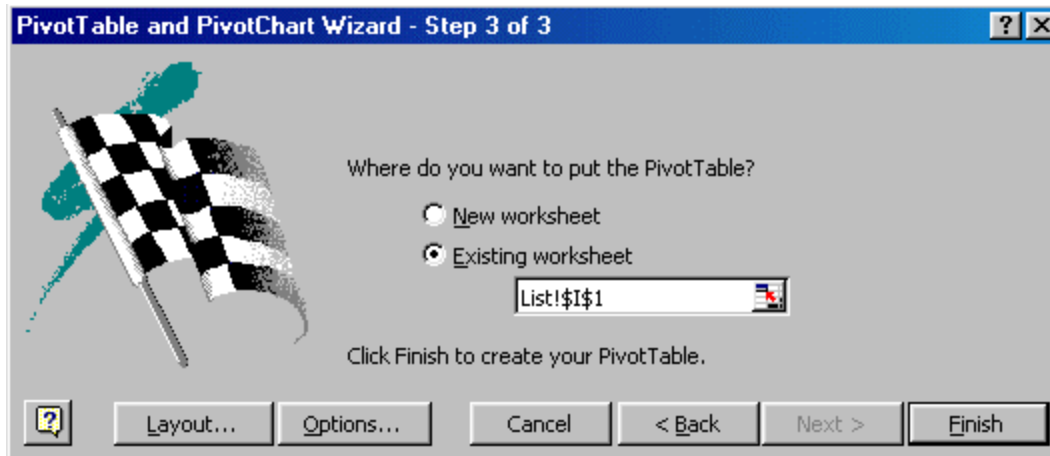
- The subtotals must be cleared in order to create a pivot table. Click anywhere within the employee list or subtotals. Pull down the **Data menu**. Click **Subtotals**. Click the **Remove All** command button.
- Rename the worksheet within the workbook:
 - Double-click on the **Sheet 1 tab** and type **List**. Press **enter**.
- Pull down the **Data menu**. Click **PivotTable Report...** to produce Step 1 of the PivotTable and Pivot Chart Wizard. The pre-selected radio buttons indicate that the pivot table will be created from data in a Microsoft Excel list or database, and only a Pivot Table will be created (not a Pivot Table and Pivot Chart).



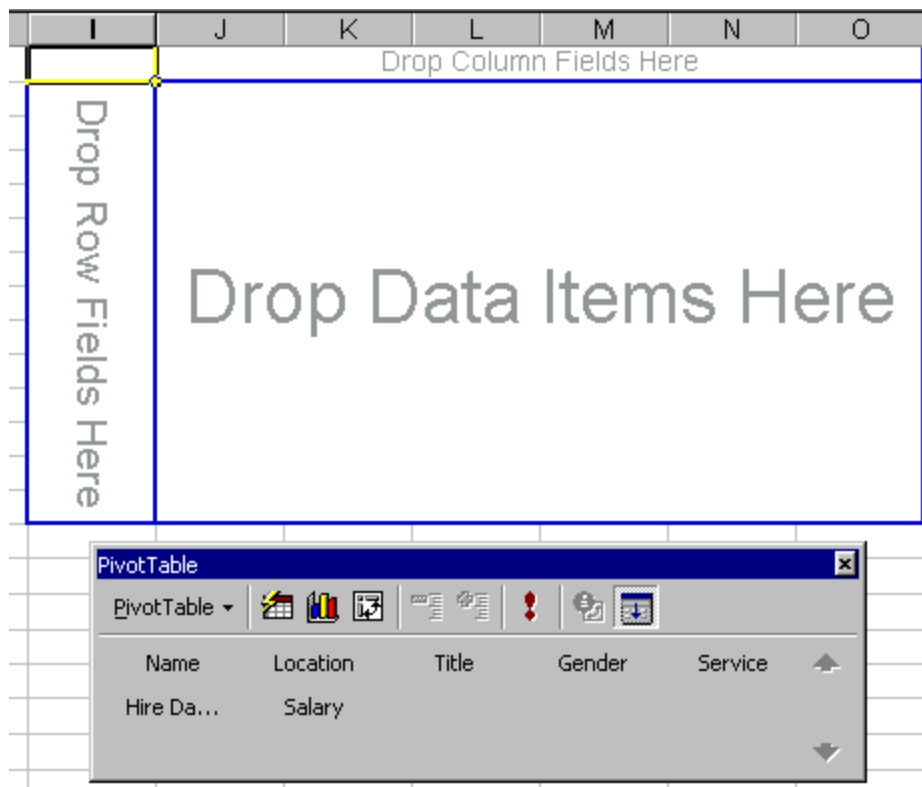
- Click the **Next** command button to move to step 2 of the PivotTable Wizard. You will see a dialog box where **Database** (the name assigned to the employee list in Hands-on Exercise 2) has already been entered in the Range text box.



- Click the **Next** command button to move to step 3 as shown in the Figure below:



- Choose **New Worksheet** if you want the pivot table to be created on a new worksheet in this workbook,
 - We'll choose **Existing Worksheet** to build the pivot table on the worksheet that contains the data. You must specify the cell in which the pivot table starts. With the cursor in that field, click on cell I1.
- Click the **Finish** command button to create the pivot table and exit the PivotTable Wizard. Excel creates a “scaffold” onto which you can build a pivot table. (See screen shot below.)



- In the Pivot Table Toolbar, click the **Title** field text and drag it to the area labeled *Drop Row Fields Here*.
 - Click the **Location** field text and drag it to the area labeled *Drop Column Fields Here*.

- Click the **Salary** field text and drag it to the area labeled *Drop Data Items Here*. You will see “Sum of Salary” because Sum is the default computation for a numeric field, such as Salary. (Count is the default computation for a text field, such as Name.)

➤ Save the workbook.

Step 5: Modify the Pivot Table

- The finished pivot table should look like the one shown in the Figure below. It displays the sum of the salaries by job title at each location. It also calculates a Grand Total of salaries paid by job title and a Grand Total of salaries paid at each location.

	I	J	K	L	M	N
	Sum of Salary	Location				
	Title	Atlanta	Boston	Chicago	Miami	Grand Total
	Account Rep	65000	134500	128500	47500	375500
	Manager	100000	57500	52000	55000	264500
	Trainee	38000				38000
	Grand Total	203000	192000	180500	102500	678000

- Now let’s change the data analyzed by the pivot table.
- Click and drag the **Name** field text from the PivotTable toolbar to the *Data Items* area. The button displays “Count of Name” (count is the default function for a text field).
 - Click and drag the **Gender** field text to the *page* area (just above the “Sum of Salary” button).
 - Click on the drop down list next to the Data button and **uncheck** “Sum of Salary”.
- The pivot table changes to display the number of employees for each location-title combination. Note that there are two Account Reps and no Managers or Trainees in Miami.

Step 6: Modify the Employee List

- Scroll to the left to return to the list of employees.
- Click in **cell C10**. Type **Manager**. Press **enter** to change Gillenson’s title from Account Rep to Manager. Note that Gillenson works in Miami.
- Click the **Pivot Table** to return to the pivot table. There are still two Account Reps and no Managers or Trainees in Miami because Gillenson’s change is not yet reflected in the pivot table.

- Click on the **Refresh Data button** () on the Pivot toolbar to update the pivot table.
- Miami now has one manager and one Account Rep ...
- Save the workbook.

Step 7: Pivot the Table

- The pivot table should match the one shown above, with Gender, Title, and Location as the page, row, and column fields, respectively.
- Click and drag the **Gender button** next to the Location button. The page field disappears and there are now two column fields, Gender and Location.
- Click and drag the **Location button** to the previous location of the Gender field (cell I1) to make Location a page field. You have changed the orientation of the table and have a completely different analysis.
- The new, modified pivot table is shown below. Location is now the page field and Gender is now the column field. This arrangement of the table makes it easy to see the number of male and female employees in each job classification.

I	J	K	L
Location	(All) ▼		
Count of Name	Gender ▼		
Title ▼	F	M	Grand Total
Account Rep	5	3	8
Manager	1	3	4
Trainee	1	1	2
Grand Total	7	7	14

- Save the workbook. Exit Excel.