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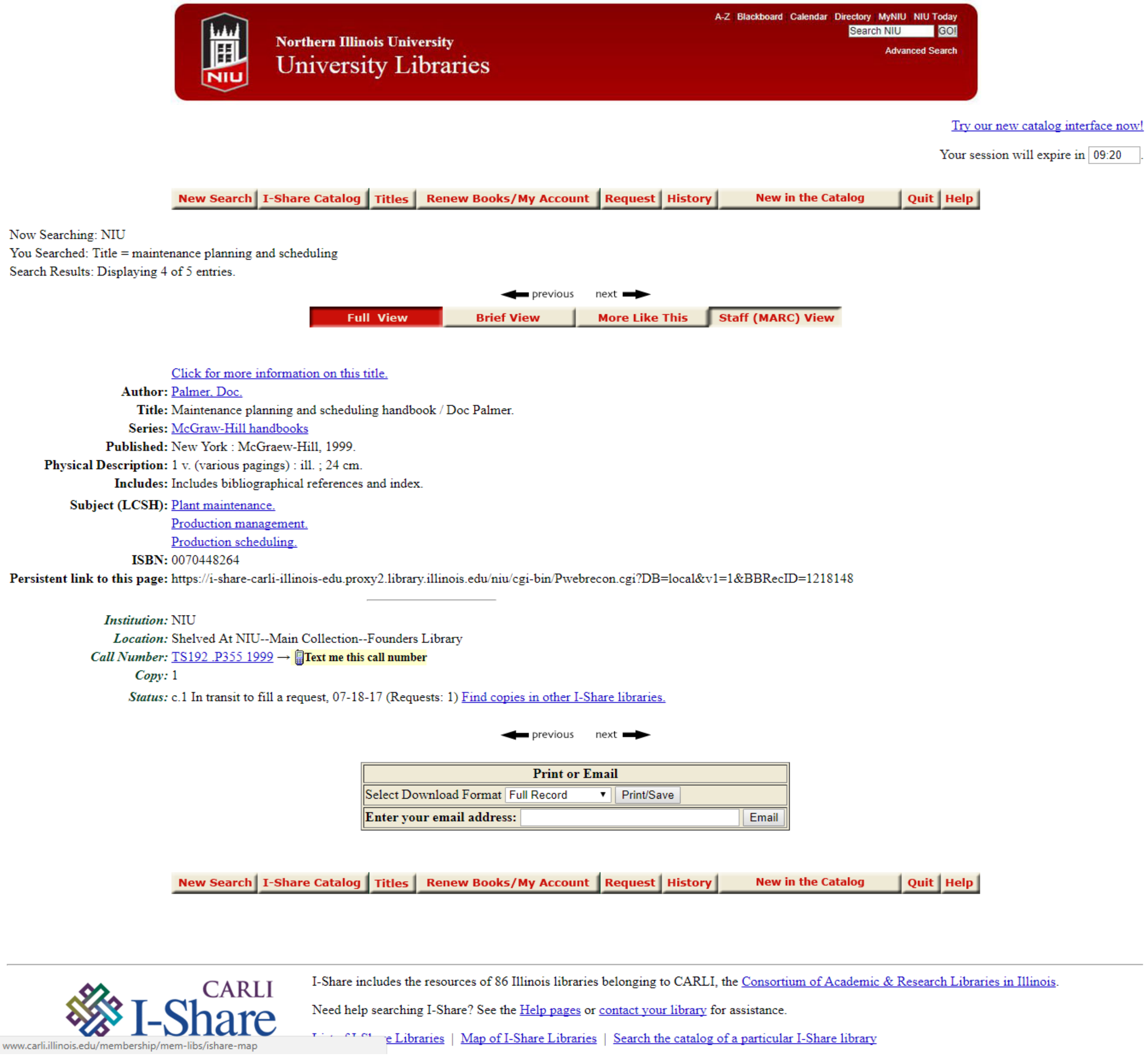
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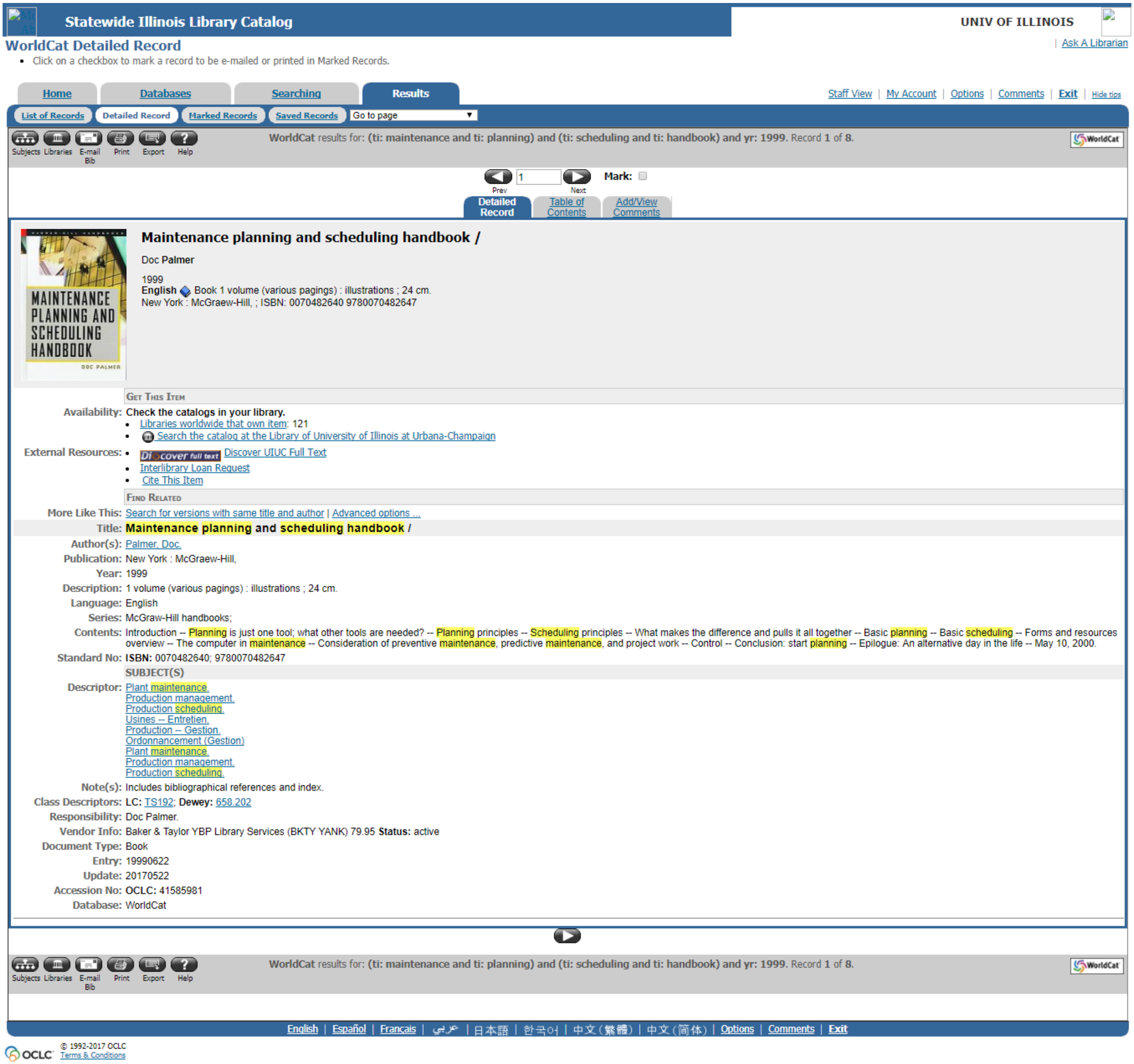
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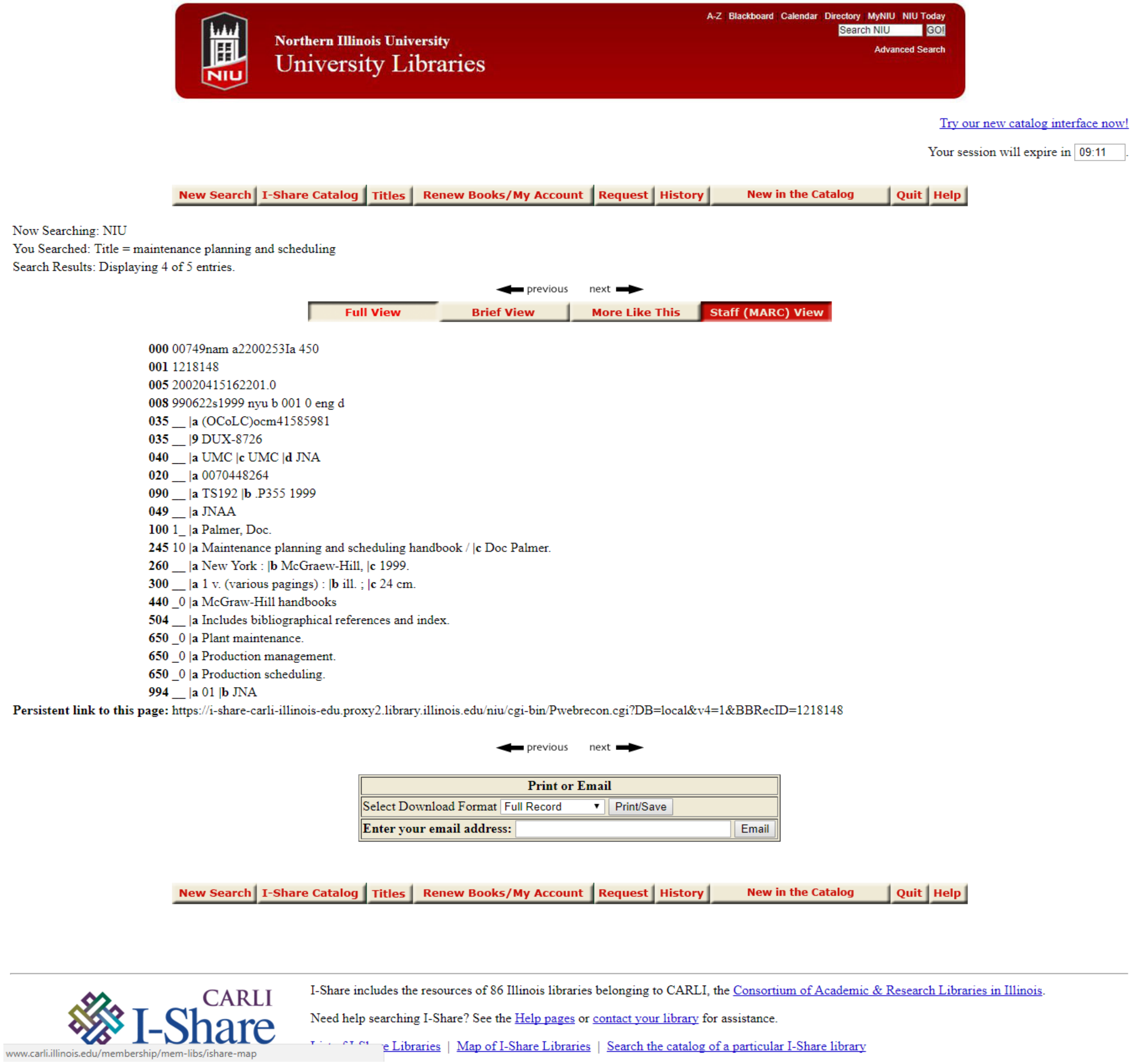
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How Big Is a Worksheet?

Consider how big a worksheet really is. It has 256 columns and 65,536 rows. Do the arithmetic and you'll find that this works out to 16,777,216 cells. Remember, this is in just one worksheet. A single workbook can hold more than one worksheet—hundreds, if necessary.

If you're using the standard SVGA video mode with the default row heights and column widths, you can see 12 columns and 27 rows (or 324 cells) at a time. This works out to less than 0.001 percent of the entire worksheet. Put another way, more than 100,000 full screens of information are in a single worksheet.

If you started entering a single digit into each cell at a relatively rapid clip of one cell per second, you would take about 194 days, nonstop, to fill a worksheet. Printing the results of your effort would require more than 36,000 sheets of paper.

By the way, don't even think about actually using all the cells in a worksheet. Unless your system is equipped with an unusually large amount of memory, things will slow to a crawl as Windows churns away, swapping information to disk.

Using the Keyboard

As you probably already know, you can use the standard navigational keys on your keyboard to move around a worksheet. These keys work just as you would expect: the down arrow moves the active cell down one row, the right arrow moves it one column to the right, and so on. PgUp and PgDn move the active cell up or down one full window (the actual number of rows moved depends on the number of rows displayed in the window).

Tip

When you turn on Scroll Lock, you can scroll through the worksheet without changing the active cell. This can be useful if you need to view another area of your worksheet and then quickly return to your original location. Just press Scroll Lock and then use the direction keys to scroll through the worksheet. When you want to return to the original position (the active cell), press Ctrl+Backspace. Then, press Scroll Lock again to turn it off. When Scroll Lock is turned on, Excel displays SCRL in the status bar at the bottom of the window.

The Num Lock key on your keyboard controls how the keys on the numeric keypad behave. When Num Lock is on, Excel displays NUM in the status bar, and the keys on your numeric keypad generate numbers. Most keyboards have a separate set of navigational keys located to the left of the numeric keypad. These keys are not affected by the state of the Num Lock key.

Table 4-2 summarizes all the worksheet movement keys available in Excel.

Attachment 2a

Cross-Reference Chapter 9 discusses more uses for AutoFill.

Copying a Range to Other Sheets

The copy procedures described previously also work to copy a cell or range to another worksheet, even if the worksheet is in a different workbook. You must, of course, activate the other worksheet before you select the location to which you want to copy.

Excel offers a quicker way to copy a cell or range and paste it to other worksheets in the same workbook. Start by selecting the range to copy. Then, press Ctrl and click the sheet tabs for the worksheets to which you want to copy the information (Excel displays [Group] in the workbook's title bar). Select Edit ➪ Fill ➪ Across Worksheets, and a dialog box appears that asks what you want to copy (All, Contents, or Formats). Make your choice and then click OK. Excel copies the selected range to the selected worksheets; the new copy will occupy the same cells in the selected worksheets as the original occupies in the initial worksheet.

Caution Be careful with this command, because Excel doesn't warn you if the destination cells contain information. You can quickly overwrite lots of information with this command and not even realize it.

Moving a Cell or Range

Copying a cell or range doesn't modify the cell or range that you copied. If you want to relocate a cell or range to another location, you'll find that Excel is also quite accommodating.

Recall that the Edit ➪ Copy command makes a copy of the selected cell or range and puts the copy on the Windows Clipboard and the Office Clipboard. The Edit ➪ Cut command also places the selection on both Clipboards, but the Edit ➪ Cut command also removes the contents of the selection from its original location. To move a cell or range, therefore, requires two steps:

1. Select the cell or range to cut (the source range) and "cut" it to both of the Clipboards.
2. Select the cell that will hold the moved cell or range (the destination range) and paste the contents of one of the Clipboards. The destination range can be on the same worksheet or in a different worksheet — or in a different workbook.

You also can move a cell or range by dragging it. Select the cell or range that you want to move and then slide the mouse pointer to any of the selection's four borders. The mouse pointer turns into an arrow pointing up and to the left. Drag the selection to its new location and release the mouse button. This option is similar to copying a cell, except that you don't press Ctrl while dragging; when you drag by moving, you don't place any information on either the Windows Clipboard or the Office Clipboard.

Other Cell and Range Operations

As you know, the Edit ⇨ Copy command and the Edit ⇨ Cut command place information on both Clipboards. Similarly, the Edit ⇨ Paste command transfers the contents of the Windows Clipboard to the selected location in your worksheet.

Excel contains two more versatile ways to paste information. You can use the Office Clipboard to copy and paste multiple items, or you can use the Paste Special dialog box to paste information in distinctive ways.

Using the Office 2000 Clipboard to Paste

As mentioned earlier in this chapter, Office 2000 presents a new clipboard, the Office Clipboard, which is available only in Office programs. Whenever you cut or copy information in an Office program, such as Excel, the program places the information on both the Windows Clipboard and the Office Clipboard. However, the program treats information on the Office Clipboard differently than it treats information on the Windows Clipboard. Instead of *replacing* information on the Office Clipboard, the program *appends* the information to the Office Clipboard. With multiple items stored on the Clipboard, you can then paste the items either individually or as a group.

So far in this chapter, you've seen many ways to copy and cut information to both clipboards. Each of these techniques, however, pastes information from the Windows Clipboard, not the Office Clipboard. When would you use the Office Clipboard? When you want to store multiple items on the Office Clipboard and selectively paste them. Or, when you want to store multiple items on the Office Clipboard and paste them all simultaneously.

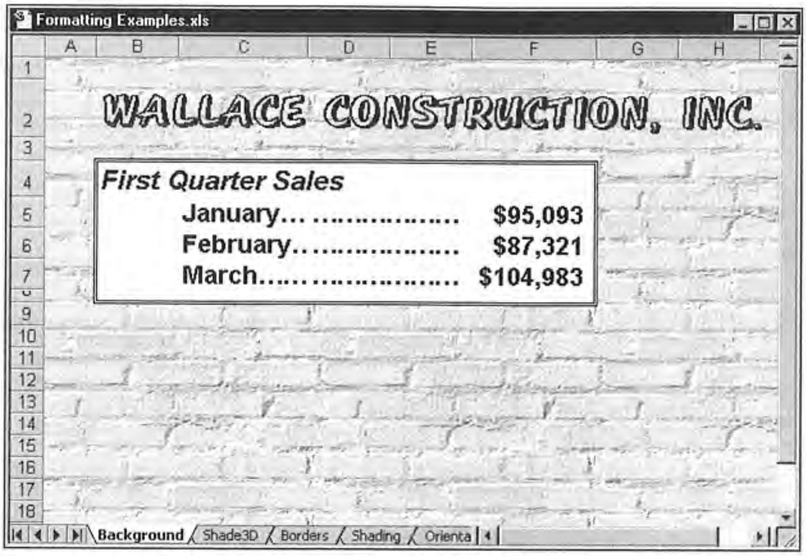
Note The Office toolbar is available in *all* Office programs. Suppose that you have stored some items from Excel, Access, Outlook, PowerPoint, and Word on the Office Clipboard. You can switch to Excel and paste some or all the items from Access. And, you can switch to Word and paste some or all the items from both PowerPoint and Excel.

Suppose that you've created a worksheet like the one shown in Figure 8-11. You have sales, expense, and net information for each individual city stored on the "city" sheets (Denver, San Diego, New York, and Chicago). You want to copy the information from the "city" sheets to the summary sheet, so that you can total the information. In earlier versions of Excel, this task would have been quite tedious. With the Office Clipboard, the task is easy.

Attachment 2a

To add a background to a worksheet, choose FormatSheet➪Background. Excel displays a dialog box that enables you to choose a graphics file. When you locate a file, click OK. Excel tiles your worksheet with the graphic. Some backgrounds make viewing text difficult, so you may want to use a solid background color for cells that contain text (see Figure 11-15). You'll also want to turn off the gridline display, because the gridlines show through the graphic.

Note The graphic background on a worksheet is for display only—it isn't printed when you print the worksheet.



WALLACE CONSTRUCTION, INC.

First Quarter Sales

January....................	$95,093
February..................	$87,321
March......................	$104,983

Figure 11-15: This worksheet has a graphic background, but cells that contain text use a white background, which overrides the graphic.

AutoFormatting

So far, this chapter has described the individual formatting commands and tools at your disposal. Excel also has an *AutoFormatting* feature that can automatically perform many types of formatting for you. Figure 11-16 shows an unformatted table in a worksheet (left side) and the same table formatted using one of Excel's AutoFormats.

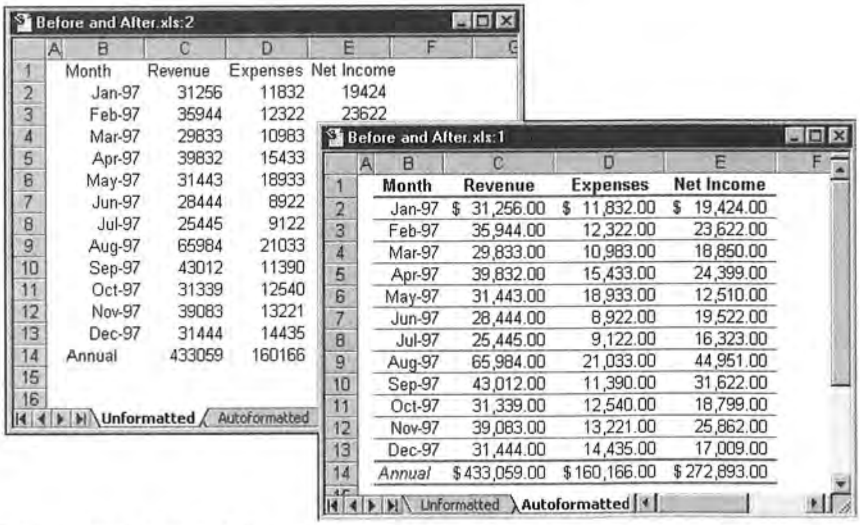
EXCEL 2000 You also can apply AutoFormatting to PivotTables; see Chapter 25.

Copying Formats by Painting

If you want to copy the formats from one cell to another cell or range, you can select Edit ⇨ Paste Special and then click the Formats option. Or, use the Format Painter button on the Standard toolbar (the button with the paintbrush image).

Start by selecting the cell or range that has the formatting attributes you want to copy. Then, click the Format Painter button. Notice that the mouse pointer changes to include a paintbrush. Next, select the cells to which you want to apply the formats. Release the mouse button, and Excel completes the painting (and you don't have to clean the brush).

If you double-click the Format Painter button, you can paint multiple areas of the worksheet with the same formats. Excel applies the formats that you copy to each cell or range that you select. To get out of paint mode, click the Format Painter button again (or press Esc).



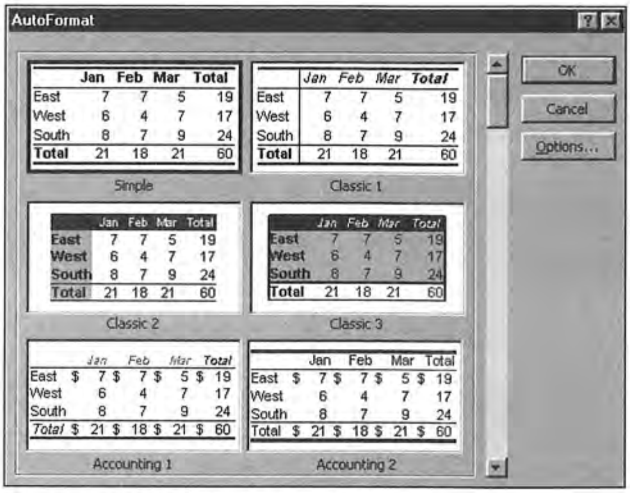
	A	B	C	D	E
1		Month	Revenue	Expenses	Net Income
2		Jan-97	31256	11832	19424
3		Feb-97	35944	12322	23622
4		Mar-97	29833	10983	
5		Apr-97	39832	15433	
6		May-97	31443	18933	
7		Jun-97	28444	8922	
8		Jul-97	25445	9122	
9		Aug-97	65984	21033	
10		Sep-97	43012	11390	
11		Oct-97	31339	12540	
12		Nov-97	39083	13221	
13		Dec-97	31444	14435	
14		Annual	433059	160166	
15					
16					

	A	B	C	D	E
1		**Month**	**Revenue**	**Expenses**	**Net Income**
2		Jan-97	$ 31,256.00	$ 11,832.00	$ 19,424.00
3		Feb-97	35,944.00	12,322.00	23,622.00
4		Mar-97	29,833.00	10,983.00	18,850.00
5		Apr-97	39,832.00	15,433.00	24,399.00
6		May-97	31,443.00	18,933.00	12,510.00
7		Jun-97	28,444.00	8,922.00	19,522.00
8		Jul-97	25,445.00	9,122.00	16,323.00
9		Aug-97	65,984.00	21,033.00	44,951.00
10		Sep-97	43,012.00	11,390.00	31,622.00
11		Oct-97	31,339.00	12,540.00	18,799.00
12		Nov-97	39,083.00	13,221.00	25,862.00
13		Dec-97	31,444.00	14,435.00	17,009.00
14		*Annual*	$ 433,059.00	$ 160,166.00	$ 272,893.00

Figure 11-16: A worksheet table before and after using AutoFormat.

Using AutoFormats

To apply an AutoFormat, move the cell pointer anywhere within a table that you want to format; Excel determines the table's boundaries automatically. Then, choose Format ⇨ AutoFormat. Excel responds with the dialog box shown in Figure 11-17. Choose one of the 17 AutoFormats from the list and click OK. Excel formats the table for you.



Simple

	Jan	Feb	Mar	Total
East	7	7	5	19
West	6	4	7	17
South	8	7	9	24
Total	21	18	21	60

Classic 1

	Jan	*Feb*	*Mar*	***Total***
East	7	7	5	19
West	6	4	7	17
South	8	7	9	24
Total	21	18	21	60

Classic 2

	Jan	Feb	Mar	Total
East	7	7	5	19
West	6	4	7	17
South	8	7	9	24
Total	21	18	21	60

Classic 3

	Jan	*Feb*	*Mar*	*Total*
East	7	7	5	19
West	6	4	7	17
South	8	7	9	24
Total	21	18	21	60

Accounting 1

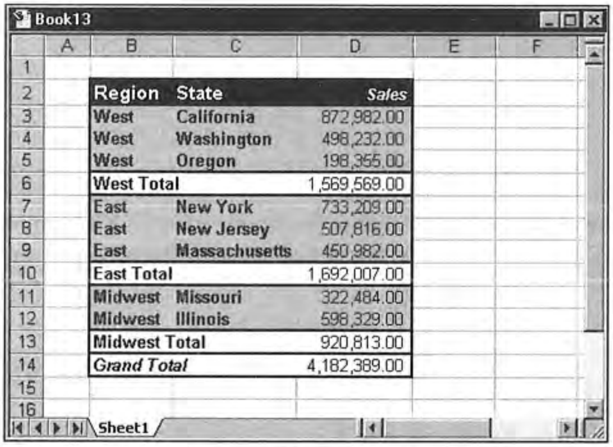
	Jan	*Feb*	*Mar*	*Total*
East	$ 7	$ 7	$ 5	$ 19
West	6	4	7	17
South	8	7	9	24
Total	$ 21	$ 18	$ 21	$ 60

Accounting 2

	Jan	Feb	Mar	Total
East	$ 7	$ 7	$ 5	$ 19
West	6	4	7	17
South	8	7	9	24
Total	$ 21	$ 18	$ 21	$ 60

Figure 11-17: The AutoFormat dialog box.

Excel applies AutoFormatting rather intelligently. For example, Excel analyzes the data contained in the table and then formats the table to handle items such as subtotals. Figure 11-18 shows an example of a table that contains a subtotal line for each department. When I applied an AutoFormat, Excel took these subtotals into account and produced an attractive table in about one second.



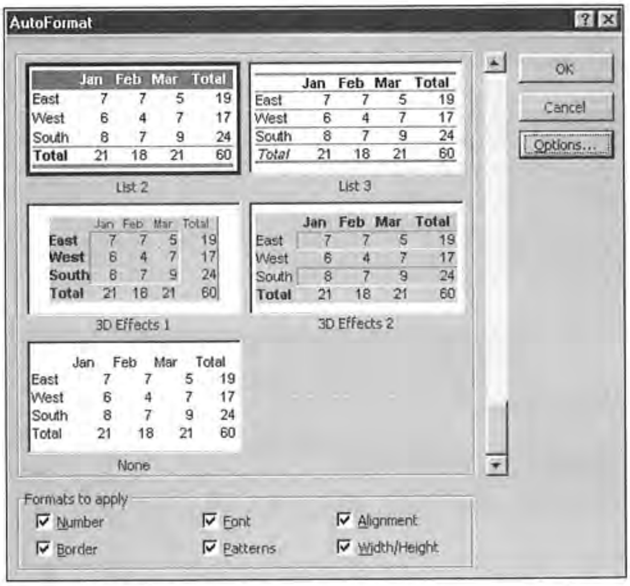
	A	B	C	D	E	F
1						
2		**Region**	**State**	***Sales***		
3		**West**	**California**	872,982.00		
4		**West**	**Washington**	498,232.00		
5		**West**	**Oregon**	198,355.00		
6		**West Total**		1,569,569.00		
7		East	**New York**	733,209.00		
8		East	**New Jersey**	507,816.00		
9		East	**Massachusetts**	450,982.00		
10		**East Total**		1,692,007.00		
11		**Midwest**	**Missouri**	322,484.00		
12		**Midwest**	**Illinois**	598,329.00		
13		**Midwest Total**		920,813.00		
14		***Grand Total***		4,182,389.00		
15						
16						

Figure 11-18: AutoFormatting even accommodates subtotals in a table.

Attachment 2a

Controlling AutoFormats

Although you can't define your own AutoFormats, you can control the type of formatting that is applied. When you click the Options button in the AutoFormat dialog box, the dialog box expands to show six options (see Figure 11-19).



List 2

	Jan	Feb	Mar	Total
East	7	7	5	19
West	6	4	7	17
South	8	7	9	24
Total	21	18	21	60

List 3

	Jan	Feb	Mar	Total
East	7	7	5	19
West	6	4	7	17
South	8	7	9	24
Total	21	18	21	60

3D Effects 1

	Jan	Feb	Mar	Total
East	7	7	5	19
West	6	4	7	17
South	8	7	9	24
Total	21	18	21	60

3D Effects 2

	Jan	Feb	Mar	Total
East	7	7	5	19
West	6	4	7	17
South	8	7	9	24
Total	21	18	21	60

None

	Jan	Feb	Mar	Total
East	7	7	5	19
West	6	4	7	17
South	8	7	9	24
Total	21	18	21	60

Formats to apply

☑ Number ☑ Font ☑ Alignment
☑ Border ☑ Patterns ☑ Width/Height

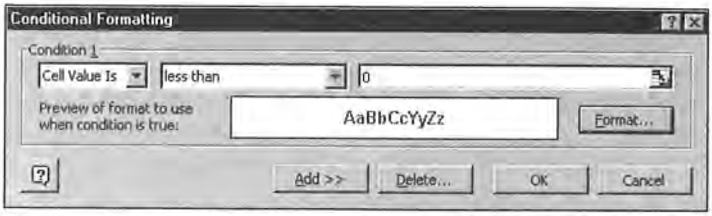
Figure 11-19: The AutoFormat dialog box, expanded to show its options.

Initially, the six check boxes are all checked — which means that Excel will apply formatting from all six categories. If you want it to skip one or more categories, just remove the check from the appropriate box before you click OK. For example, when I use AutoFormats, I hardly ever want Excel to change the column widths, so I turn off the Width/Height option. If you've already formatted the numbers, you may want to turn off the Number option.

Using Conditional Formatting

Excel's conditional formatting feature changes cell formats based on the contents of the cell. For example, if the cell contains a negative number, the cell appears bold with a red background. To apply conditional formatting to a cell or range, select the range and then choose Format ➪ Conditional Formatting. You'll see the dialog box shown in Figure 11-20, which enables you to specify up to three conditions for the selected cells.

Attachment 2a



Condition 1
Cell Value Is
less than
0

Figure 11-20: Excel enables you to specify formats based on the cell's value.

The condition can be based on either the cell's value or a formula that you specify (the formula must be a logical formula and return either True or False). Follow these steps to apply conditional formatting:

1. In the first drop-down list, choose either Cell Value Is or Formula Is.
2. If you chose Cell Value Is in Step 1, specify the conditions by using the controls in the dialog box. For example, you can specify between 0 and 100. You can enter values or cell references.
3. If you chose Formula Is in Step 1, specify a reference to the formula. Remember, the formula must return either True or False.
4. Click the Format button and specify the formatting that will be used when the condition is true.
5. If you want to specify another conditional format for the selection, click the Add button. The dialog box expands so that you can repeat Steps 1 through 4 for another condition.
6. When you finish, click OK.

Note

Conditional formatting is a great feature, but it's not foolproof. If you copy a value and paste it into a cell that has conditional formatting, the formatting will not be applied. In fact, copying a value to a cell that has conditional formatting wipes out the conditional formatting information. In other words, the feature works only for data that is entered into a cell manually or calculated by a formula.

Using Named Styles

The *named style* feature—borrowed from word processing—is, perhaps, one of the most underutilized features in Excel (named styles may also be the most underutilized feature in word processors).

If you find that you continually are applying the same combination of fonts, lines, and shading in your worksheets, you can save time and effort if you create and use named styles. Named styles apply, in a single step, the formats that you specify, helping you to apply consistent formats across your worksheets.

Attachment 2a

CHAPTER 12

Printing Your Work

◆ ◆ ◆ ◆

In This Chapter

One-Step Printing

Adjusting Your Print Settings

Settings in the Print Dialog Box

Settings in the Page Setup Dialog Box

Using Print Preview

Dealing with Page Breaks

Using Custom Views

More About Printing

◆ ◆ ◆ ◆

Many of the worksheets that you develop with Excel are designed to serve as printed reports. You'll find that printing from Excel is quite easy, and you can generate attractive, well-formatted reports with minimal effort. But, as you'll see, Excel has plenty of options that provide you with a great deal of control over the printed page. These options are explained in this chapter.

One-Step Printing

The Print button on the Standard toolbar is a quick way to print the current worksheet, using the default settings. Just click the button, and Excel sends the worksheet to the printer. If you've changed any of the default print settings, Excel uses the new settings; otherwise, it uses the following default settings:

- Prints the active worksheet (or all selected worksheets), including any embedded charts or drawing objects
- Prints one copy
- Prints the entire worksheet
- Prints in portrait mode
- Doesn't scale the printed output
- Uses 1-inch margins for the top and bottom and .75-inch margins for the left and right
- Prints with no headers or footers
- For wide worksheets that span multiple pages, it prints down and then across

As you might suspect, you can change any of these default print settings.

When you print a worksheet, Excel prints only the *active area* of the worksheet. In other words, it won't print all four million cells—just those that have data in them. If the worksheet contains any embedded charts or drawing objects, they also are printed (unless you have modified the Print Object property of the object).

Cross-Reference If you create a workbook based on a template, the template may contain different default print settings. Templates are discussed in Chapter 34.

Adjusting Your Print Settings

You adjust Excel's various print settings in two different dialog boxes:

- The Print dialog box (accessed either with the File ➪ Print command or Ctrl+P).
- The Page Setup dialog box (accessed with the File ➪ Page Setup command). This is a tabbed dialog box with four tabs.

Both of these dialog boxes have a Print Preview button that previews the printed output onscreen.

Settings in the Print Dialog Box

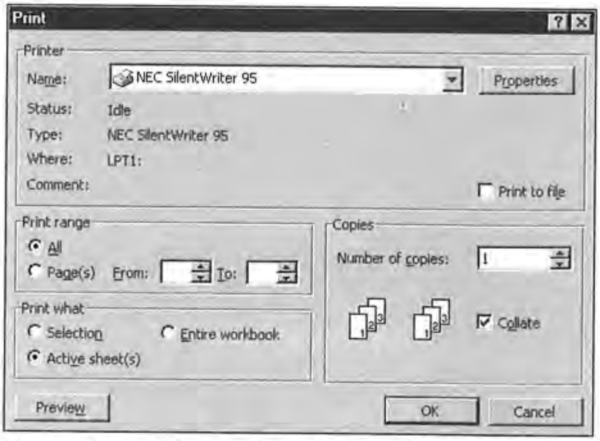
You actually start the printing process from the Print dialog box, unless you use the Print button on the Standard toolbar. After you select your print settings, click OK from the Print dialog box to print your work.

Selecting a Printer

Before printing, make sure that you have selected the correct printer (applicable only if you have access to more than one printer) by using the Print dialog box, shown in Figure 12-1. You can select the printer from the Printer drop-down list. This dialog box also lists information about the selected printer, such as its status and where it's connected.

Note Clicking the Properties button displays a property box for the selected printer. The exact dialog box that you see depends on the printer. The Properties dialog box lets you adjust printer-specific settings. In most cases, you won't have to change any of these settings, but you should be familiar with the settings that you can change.

Attachment 2a



Printer

Name: NEC SilentWriter 95

Status: Idle

Type: NEC SilentWriter 95

Where: LPT1:

Comment:

☐ Print to file

Print range

● All

○ Page(s) From: To:

Print what

○ Selection ○ Entire workbook

● Active sheet(s)

Copies

Number of copies: 1

☑ Collate

Figure 12-1: Select a printer in the Print dialog box.

If you check the Print to file check box, Excel stores the output in a file, prompting you for a filename before printing. The resulting file will *not* be a standard text file. Rather, it will include all the printer codes that are required to print your worksheet. Printing to a file is useful if you don't have immediate access to a printer. You can save the output to a file and then send this file to your printer at a later time.

Tip If you want to save your workbook as a text file, use the File ⇨ Save As command, and select one of the text file formats from the drop-down list labeled Save as type.

Before printing, you might want to view your worksheets in Page Break Preview mode. To enter this mode, choose the View ⇨ Page Break Preview command. The worksheet display changes, and you can see exactly what will be printed and where the page breaks occur. To change the print range, drag any of the dark borders. This feature is discussed in more detail later in this chapter.

After you print a worksheet (or view it in Page Break Preview mode), Excel displays dashed lines to indicate where the page breaks occur. This is a useful feature, because the display adjusts dynamically. For example, if you find that your printed output is too wide to fit on a single page, you can adjust the column widths (keeping an eye on the page-break display) until they are narrow enough to print on one page.

Tip If you don't want to see the page breaks displayed in your worksheet, open the Options dialog box, click the View tab, and remove the check mark from the Automatic Page Breaks check box.

Attachment 2a

Printing Selected Pages

If your printed output uses multiple pages, you can select which pages to print, in the Print dialog box. In the Page range section, indicate the number of the first and last pages to print. You can either use the spinner controls or type the page numbers in the edit boxes.

Specifying What to Print

The Print what section of the Print dialog box lets you specify what to print. You have three options:

- **Selection:** Prints only the range that you selected before issuing the File ⇨ Print command.
- **Selected sheet(s):** Prints the active sheet or sheets that you selected. You can select multiple sheets by pressing Ctrl and clicking the sheet tabs. If you select multiple sheets, Excel begins printing each sheet on a new page.
- **Entire workbook:** Prints the entire workbook, including chart sheets.

Tip You can also select File ⇨ Print Area ⇨ Set Print Area to specify the range or ranges to print. Before you choose this command, select the range or ranges that you want to print. To clear the print area, select File ⇨ Print Area ⇨ Clear Print Area.

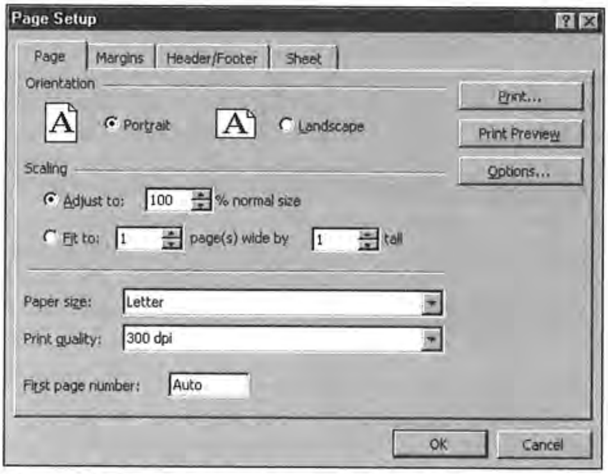
Printing Multiple Copies

The Print dialog box also enables you to select the number of copies to print. The upper limit is 32,767 copies — not that anyone would ever need that many. You also can specify that you want the copies collated. If you choose this option, Excel prints the pages in order for each set of output. If you're printing only one page, Excel ignores the Collate setting.

Settings in the Page Setup Dialog Box

Using the Page Setup dialog box, you can control page settings and margins, create headers and footers, and adjust sheet settings. Choose File ⇨ Page Setup to open the Page Setup dialog box; in Figure 12-2, you see the Page tab of the Page Setup dialog box.

Attachment 2a



Orientation

● Portrait ○ Landscape

Scaling

● Adjust to: 100 % normal size

○ Fit to: 1 page(s) wide by 1 tall

Paper size: Letter

Print quality: 300 dpi

First page number: Auto

Figure 12-2: You control page settings in the Page tab of the Page Setup dialog box.

Controlling Page Settings

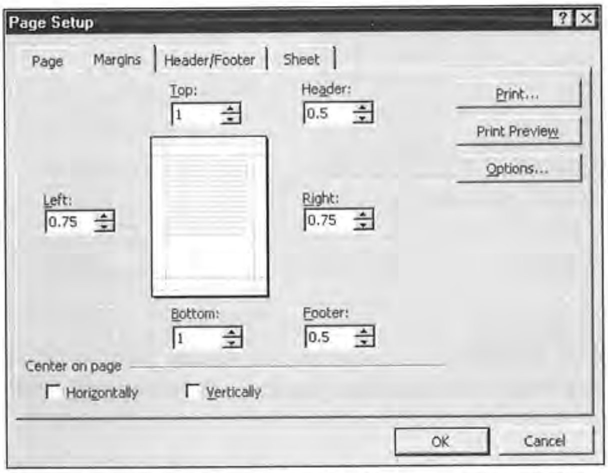
The Page tab of the Page Setup dialog box enables you to control the following settings:

- **Orientation:** Choose either Portrait (tall pages) or Landscape (wide pages). Landscape orientation might be useful if you have a wide range that doesn't fit on a vertically oriented page.
- **Scaling:** You can set a scaling factor manually or let Excel scale the output automatically to fit on the number of pages that you specify. Scaling can range from 10 percent to 400 percent of normal size. If you want to return to normal scaling, enter 100 in the box labeled % normal size.
- **Paper size:** This setting enables you to select the paper size that you're using. Click the box and see the choices.
- **Print quality:** If the installed printer supports it, you can change the printer's resolution—which is expressed in dots per inch (dpi). Higher numbers represent better print quality, but higher resolutions take longer to print.
- **First page number:** You can specify a page number for the first page. This is useful if the pages that you're printing will be part of a larger document and you want the page numbering to be consecutive. Use Auto if you want the beginning page number to be 1—or to correspond to the pages that you selected in the Print dialog box. If you're not printing page numbers in your header or footer, this setting is irrelevant.

Adjusting Margins

A margin is the blank space on the side of the page. Wider margins leave less space available for printing. You can control all four page margins from the Margins tab of the Page Setup dialog box, shown in Figure 12-3.

To change a margin, click the appropriate spinner (or you can enter a value directly).



Top: 1

Header: 0.5

Left: 0.75

Right: 0.75

Bottom: 1

Footer: 0.5

Center on page

☐ Horizontally ☐ Vertically

Figure 12-3: The Margins tab of the Page Setup dialog box.

Note The Preview box in the center of the dialog box is a bit deceiving, because it doesn't really show you how your changes look in relation to the page. Rather, it simply displays a darker line to let you know which margin you're adjusting.

In addition to the page margins, you can adjust the distance of the header from the top of the page and the distance of the footer from the bottom of the page. These settings should be less than the corresponding margin; otherwise, the header or footer may overlap with the printed output.

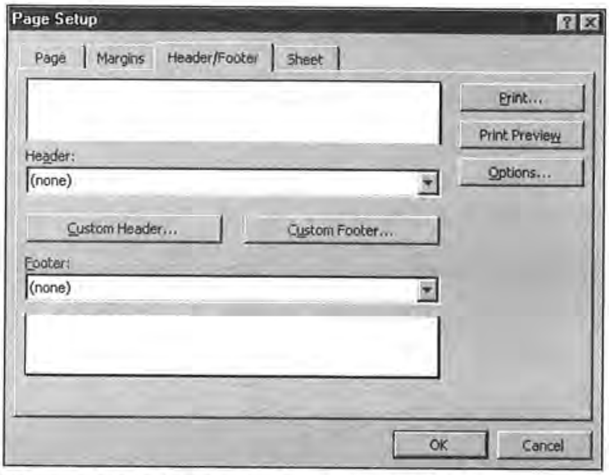
Normally, Excel aligns the printed page at the top and left margins. If you would like the output to be centered vertically or horizontally, check the appropriate check box.

You also can change the margins while you're previewing your output — ideal for last-minute adjustments before printing. Previewing is explained later in the chapter.

Changing the Header or Footer

A *header* is a line of information that appears at the top of each printed page. A *footer* is a line of information that appears at the bottom of each printed page. You can align information in headers and footers at the left margin, in the center of the header or footer, and at the right margin. For example, you can create a header that prints your name at the left margin, the worksheet name centered in the header, and the page number at the right margin. By default, new workbooks do not have any headers or footers.

The Header/Footer tab of the Page Setup dialog box appears in Figure 12-4. This dialog box displays the current header and footer and gives you other header and footer options in the drop-down lists labeled Header and Footer.



Header: (none)

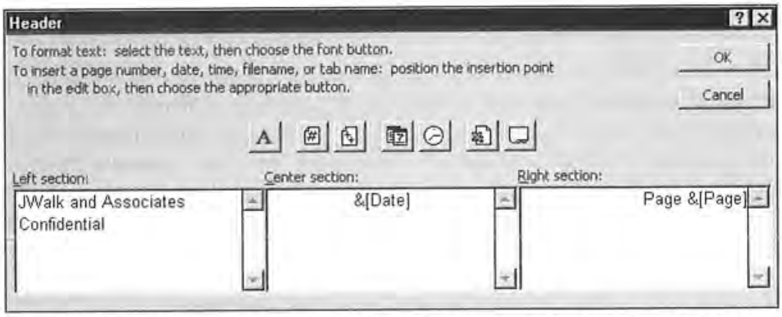
Footer: (none)

Figure 12-4: The Header/Footer tab of the Page Setup dialog box.

When you click the Header (or Footer) drop-down list, Excel displays a list of predefined headers (or footers). If you see one that you like, select it. You then can see how it looks in context—which part is left-justified, centered, or right-justified. If you don't want a header or footer, choose the option labeled (none) for both the Header and Footer drop-down list boxes.

If you don't find a predefined header or footer that is exactly what you want, you can define a custom header or footer. Start by selecting a header or footer that's similar to the one that you want to create (you'll use the selected header or footer as the basis for the customized one). Click the Custom Header or Custom Footer button, and Excel displays a dialog box like the one shown in Figure 12-5.

Attachment 2a



To format text: select the text, then choose the font button.
To insert a page number, date, time, filename, or tab name: position the insertion point in the edit box, then choose the appropriate button.

Left section:
JWalk and Associates
Confidential

Center section:
&[Date]

Right section:
Page &[Page]

Figure 12-5: If none of the predefined headers or footers is satisfactory, you can define a custom header or custom footer.

This dialog box enables you to enter text or codes in each of the three sections. To enter text, just click in the section and enter the text. To enter variable information, such as the current date or the page number, you can click one of the buttons. Clicking the button inserts a special code. The buttons and their functions are listed in Table 12-1.

Table 12-1
Custom Header/Footer Buttons and Their Functions

Button	***Code***	***Function***
Font	Not applicable	Lets you choose a font for the selected text
Page Number	&[Page]	Inserts the page number
Total Pages	&[Pages]	Inserts the total number of pages to be printed
Date	&[Date]	Inserts the current date
Time	&[Time]	Inserts the current time
File	&[File]	Inserts the workbook name
Sheet	&[Tab]	Inserts the sheet's name

You can combine text and codes and insert as many codes as you like into each section. If the text that you enter uses an ampersand (&), you must enter the ampersand twice (because Excel uses an ampersand to signal a code). For example, to enter the text *Research & Development* into a section of a header or footer, enter **Research && Development**.

You also can use different fonts and sizes in your headers and footers. Just select the text that you want to change and then click the Font button. Excel displays its Fonts dialog box so that you can make your choice. If you don't change the font, Excel uses the font defined for the Normal style.

Attachment 2a

Tip You can use as many lines as you like. Use Alt+Enter to force a line break for multiline headers or footers.

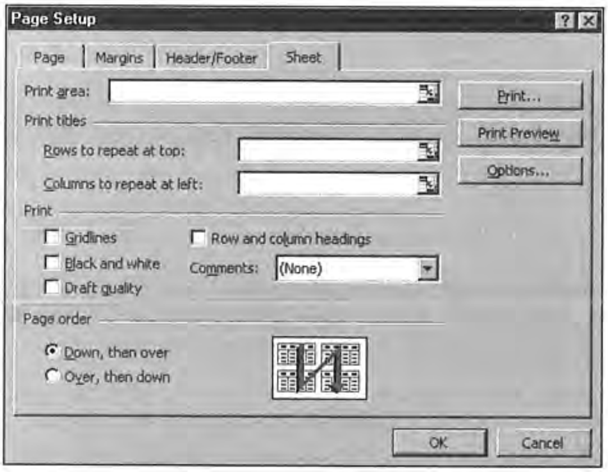
After you define a custom header or footer, it appears at the bottom of the appropriate drop-down list on the Header/Footer tab of the Page Setup dialog box. You can have only one custom header and one custom footer in a workbook. So, if you edit a custom header, for example, it replaces the existing custom header in the drop-down list.

Unfortunately, you can't print the contents of a specific cell in a header or footer. For example, you might want Excel to use the contents of cell A1 as part of a header. To do so, you need to enter the cell's contents manually—or write a macro to perform this operation.

On the CD-ROM Excel 2000 still doesn't implement one of the most requested features: the ability to print a workbook's full path and filename in a header or footer. You can print the file name, but you find an option to print the path. The companion CD-ROM contains an add-in that I developed that adds this feature to Excel.

Controlling Sheet Options

The Sheet tab of the Page Setup dialog box (shown in Figure 12-6) contains several additional options. Each is described in the sections that follow.


Page Setup
Page
Margins
Header/Footer
Sheet
Print area:
Print titles
Rows to repeat at top:
Columns to repeat at left:
Print
Gridlines
Black and white
Draft quality
Row and column headings
Comments:
Page order
Down, then over
Over, then down
Print...
Print Preview
Options...
OK
Cancel

☐ Gridlines
☐ Black and white
☐ Draft quality
☐ Row and column headings
Comments: (None)
● Down, then over
○ Over, then down

Figure 12-6: The Sheet tab of the Page Setup dialog box.

Print area

The Print area box lists the range defined as the print area. If you select a range of cells and choose the Selection option in the Print dialog box, the selected range address appears in this box. Excel also defines this as the reference for the Print_Area name.

If the Print area box is blank, Excel prints the entire worksheet. You can activate this box and select a range (Excel will modify its definition of Print_Area), or you can enter a previously defined range name into the box.

Print titles

Many worksheets are set up with titles in the first row and descriptive names in the first column. If such a worksheet requires more than one page, reading subsequent pages may be difficult, because the text in the first row and first column won't be printed on subsequent pages. Excel offers a simple solution: *print titles*.

Caution Don't confuse print titles with headers; these are two different concepts. Headers appear at the top of each page and contain information such as the worksheet name, date, or page number. Print titles describe the data being printed, such as field names in a database table or list.

You can specify particular rows to repeat at the top of every printed page, or particular columns to repeat at the left of every printed page. To do so, just activate the appropriate box and select the rows or columns in the worksheet. Or, you can enter these references manually. For example, to specify rows 1 and 2 as repeating rows, enter **1:2**.

In the old days, users often were surprised to discover that print titles appeared twice on the first page of their printouts. This occurred because they defined a print area that included the print titles. Excel now handles this automatically, however, and doesn't print titles twice if they are part of the print area.

Tip You can specify different print titles for each worksheet in the workbook. Excel remembers print titles by creating sheet-level names (Print_Titles).

Print

The section labeled Print contains five check boxes:

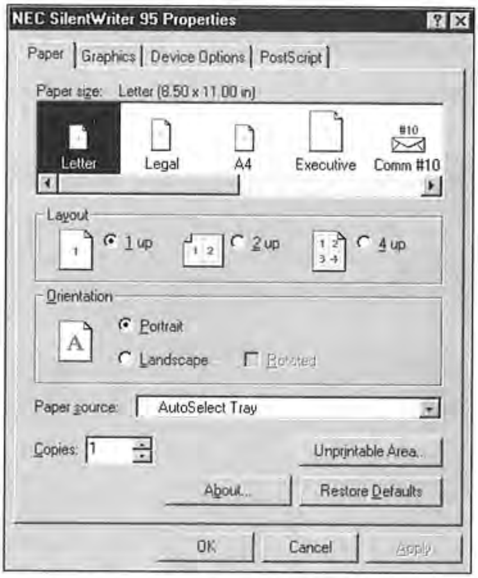
- **Gridlines:** If checked, Excel prints the gridlines to delineate cells. If you turn off the gridline display in the worksheet (in the View tab of the Options dialog box), Excel automatically removes the check from this box for you. In other words, the default setting for this option is determined by the gridline display in your worksheet.
- **Black and white:** If checked, Excel ignores any colors in the worksheet and prints everything in black and white. By taking advantage of this option, you can format your worksheet for viewing on your monitor and still get readable print output.
- **Draft quality:** If checked, Excel prints in draft mode. In draft mode, Excel doesn't print embedded charts or drawing objects, cell gridlines, or borders, which reduces the printing time.
- **Row and column headings:** If checked, Excel prints the row and column headings on the printout, enabling you to identify easily specific cells from a printout.

Attachment 2a

- **Comments:** If checked, Excel prints cell notes by using the option that you specify: either At the end of the sheet or As displayed on sheet.

Printer-Specific Options

The Print dialog box has a button labeled Options (refer to Figure 2-2). Clicking this button displays another dialog box that enables you to adjust properties that are specific to the selected printer. See Figure 12-7 for an example. You can also open this dialog box from the Page Setup dialog box (click the Options button).


NEC SilentWriter 95 Properties
Paper
Graphics
Device Options
PostScript
Letter
Legal
A4
Executive
#10
Comm #10
Layout
2 up
4 up
Orientation
Landscape
Rotated
Unprintable Area...
About...
Restore Defaults
OK
Cancel
Apply

Paper size: Letter (8.50 x 11.00 in)

Layout: ● 1 up

Orientation: ● Portrait

Paper source: AutoSelect Tray

Copies: 1

Figure 12-7: The Page Setup dialog box lets you set printer-specific options.

Some of the printer settings can be set directly from Excel. Other settings may not be accessible from Excel, and you can change them in this dialog box. For example, if your printer uses multiple paper trays, you can select which tray to use.

Using Print Preview

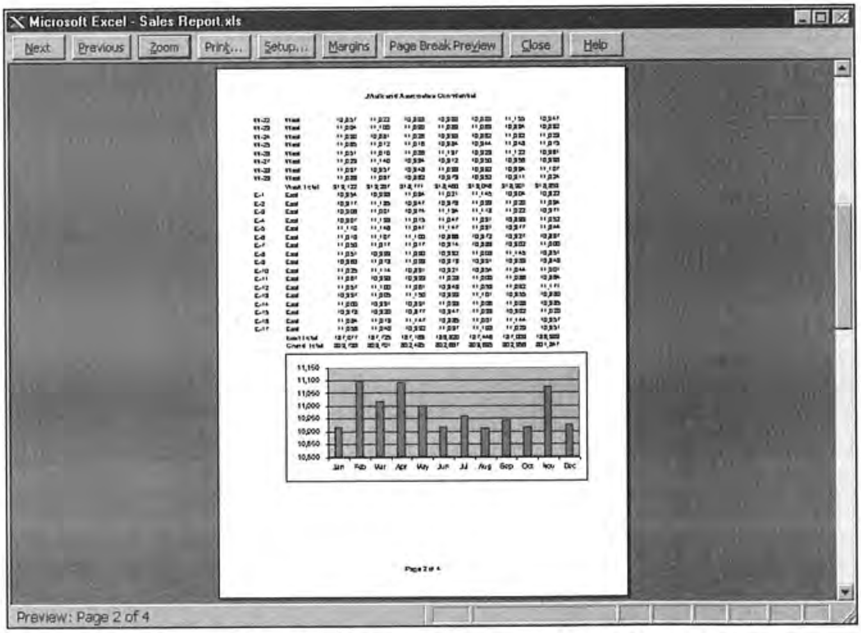
Excel's print preview feature displays an image of the printed output on your screen. This is a handy feature that enables you to see the result of the options that you set, before you actually send the job to the printer. It'll save you lots of time—not to mention printing supplies.

Accessing Print Preview

Several ways exist to preview your document:

- Select the File ➪ Print Preview command.
- Click the Print Preview button on the Standard toolbar. Or, you can press Shift and click the Print button on the Standard toolbar (the Print button serves a dual purpose).
- Click the Print Preview button in the Print dialog box.
- Click the Print Preview button in the Page Setup dialog box.

Any one of these methods changes Excel's window to a preview window, as shown in Figure 12-8.


Microsoft Excel - Sales Report.xls
Next
Previous
Zoom
Print...
Setup...
Margins
Page Break Preview
Close
Help
Jan
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May
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Jul
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Oct
Nov
Dec
Preview: Page 2 of 4

Figure 12-8: The print preview feature enables you to see the printed output before you send it to the printer.

The preview window has several buttons along the top:

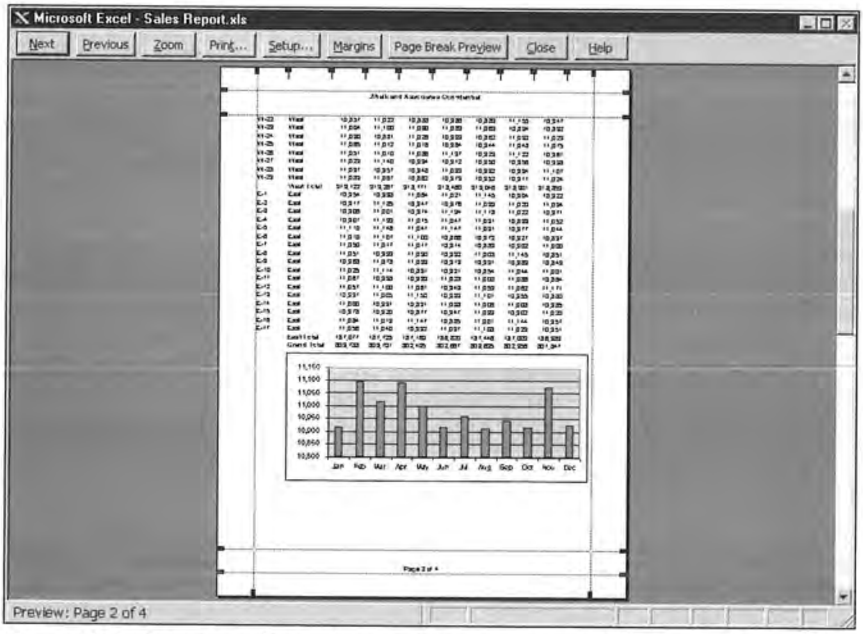
- **Next:** Displays an image of the next page.
- **Previous:** Displays an image of the previous page.

Attachment 2a

- **Zoom:** Zooms the display in or out. This button toggles between the two levels of zooming that are available. You also can simply click the preview image to toggle between zoom modes.
- **Print:** Sends the job to the printer.
- **Setup:** Displays the Page Setup dialog box, so that you can adjust some settings. When you close the dialog box, you return to the preview screen, so that you can see the effects of your changes.
- **Margins:** Displays adjustable columns and margins, described in the next section.
- **Page Break Preview:** Displays the worksheet in Page Break Preview mode.
- **Close:** Closes the preview window.
- **Help:** Displays help for the preview window.

Making Changes While Previewing

When you click the Margins button in the preview window, Excel adds markers to the preview that indicate column borders and margins (see Figure 12-9). You can drag the column or margin markers to make changes that appear onscreen.


Microsoft Excel - Sales Report.xls
Next
Previous
Zoom
Print...
Setup...
Margins
Page Break Preview
Close
Help
11,150
11,100
11,050
11,000
10,950
10,900
10,850
10,800
Jan
Feb
Mar
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May
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Jul
Aug
Sep
Oct
Nov
Dec
Page 2 of 4
Preview: Page 2 of 4

Figure 12-9: You can adjust column widths or margins directly from the print preview window.

For example, if you print a worksheet and discover that Excel is printing the last column on a second page, you can adjust the column widths or margins in the preview window to force all the columns to print on a single page. After you drag one of these markers, Excel updates the display so that you can see what effect it had.

When you make changes to the column widths in the preview window, these changes also are made to your worksheet. Similarly, changing the margins in the preview window changes the settings that appear in the Margins tab of the Page Setup dialog box.

Dealing with Page Breaks

If you print lengthy reports, you know that it's often important to have control over the page breaks. For example, you normally wouldn't want a row to print on a page by itself. Fortunately, Excel gives you superb control over page breaks.

As you may have discovered, Excel handles page breaks automatically. After you print or preview your worksheet, it even displays dashed lines to indicate where page breaks occur. Sometimes, however, you'll want to force a page break — either a vertical or a horizontal one. For example, if your worksheet consists of several distinct areas, you may want to print each area on a separate sheet of paper.

Inserting a Page Break

To insert a vertical manual page break, move the cell pointer to the cell that will begin the new page, but make sure that you place the pointer in column A; otherwise, you'll insert a vertical page break and a horizontal page break. For example, if you want row 14 to be the first row of a new page, select cell A14. Then, choose Insert ⇨ Page Break. Excel displays a dashed line to indicate the page break. The dashed line for manual page breaks is slightly thinner than the lines for natural page breaks.

To insert a horizontal page break, move the cell pointer to the cell that will begin the new page, but in this case, make sure that you place the pointer in row one. Select Insert ⇨ Page Break to create the page break.

Removing a Page Break

To remove a vertical manual page break, move the cell pointer anywhere in the first row beneath the manual page break and then select Insert ⇨ Remove Page Break (this command appears only when you place the cell pointer in the first row following a manual page break).

To remove a horizontal manual page break, perform the same procedure, but position the cell pointer anywhere in the first column following a horizontal page break.

Attachment 2a

Tip To remove all manual page breaks in the worksheet, click the Select All button (or press Ctrl+A); then, choose Insert ➪ Remove Page Break.

Using Page Break Preview

Page Break Preview mode makes dealing with page breaks easy. To use Page Break Preview, choose View ➪ Page Break Preview. The screen changes, as shown in Figure 12-10.

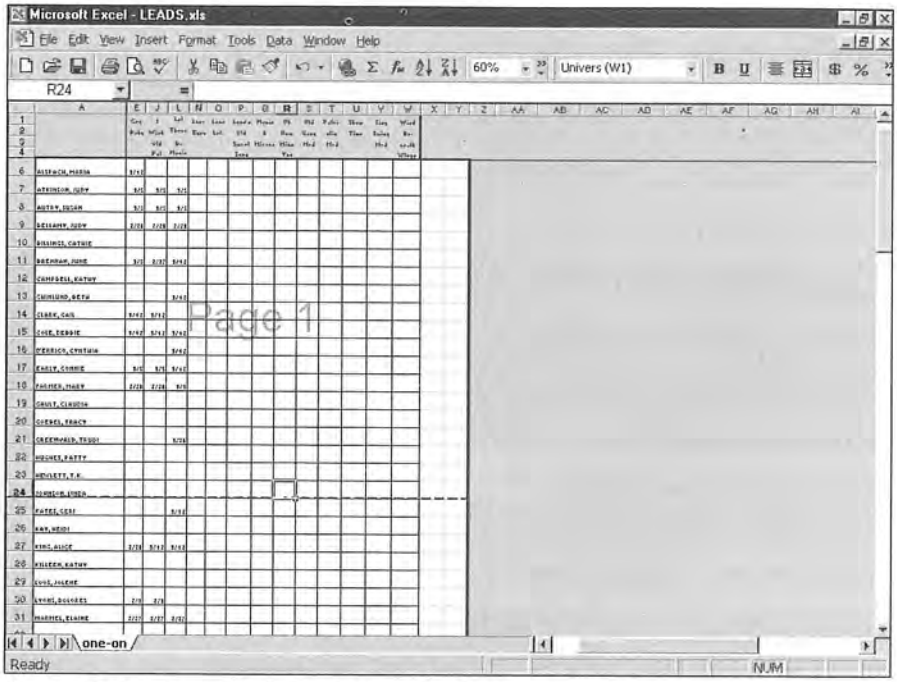
Microsoft Excel - LEADS.xls
File
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Figure 12-10: Page Break Preview mode gives you a bird's-eye view of your worksheet and shows exactly where the page breaks occur.

When you enter Page Break Preview mode, Excel does the following:

- ✦ Changes the zoom factor so that you can see more of the worksheet
- ✦ Displays the page numbers overlaid on the pages
- ✦ Displays the current print range with a white background; nonprinting data appears with a gray background
- ✦ Displays all page breaks

When you're in Page Break Preview mode, you can drag the borders to change the print range or the page breaks. When you change the page breaks, Excel automatically adjusts the scaling so that the information fits on the pages, per your specifications.

Note In Page Break Preview mode, you still have access to all of Excel's commands. You can change the zoom factor if you find the text to be too small.

To return to normal viewing, select the View ⇨ Normal command.

Using Custom Views

Workbooks commonly are used to store a variety of information, and often, several different reports are printed from such workbooks. If this sounds familiar, you need to know about Excel's custom views feature.

The custom views feature enables you to give names to various views of your worksheet, and you can quickly switch among these named views. A view includes settings for the following:

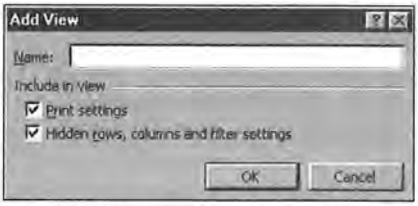
- Print settings, as specified in the Page Setup dialog box (optional)
- Hidden rows and columns (optional)
- Display settings, as specified in the Options Display dialog box
- Selected cells and ranges
- The active cell
- Window sizes and positions
- Frozen panes

For example, you might define a view that hides a few columns of numbers, another view with a print range defined as a summary range only, another view with the page setup set to landscape, and so on.

To create a named custom view, first set up your worksheet with the settings that you want to include in the view. These settings can include any of the settings listed previously. For example, you might create a view that has a specific range of cells defined as the print range. Then, select View ⇨ Custom Views, and Excel displays a dialog box that lists all named views. Initially, this list is empty, but you can click the Add button to add a view in the Add View dialog box, shown in Figure 12-11.

Enter a name for the view and make any adjustments to the check boxes. Click OK, and Excel saves the view. You can add as many views as you want and easily switch among them — just highlight the custom view that you want to display from the Custom Views dialog box and then click the Show button.

Attachment 2a



☑ Print settings

☑ Hidden rows, columns and filter settings

Figure 12-11: Use the Add View dialog box to supply a name for a new custom view.

More About Printing

A few issues related to printing just don't fit anywhere other than a "miscellaneous" section. This section serves as that "miscellaneous" section and provides some additional information regarding printing.

Problems with Fonts (When WYS Isn't WYG)

Sometimes, you may find that the printed output doesn't match what you see onscreen. You almost always can trace this problem to the fonts that you use. If your printer doesn't have a font that you use to display your worksheet, Windows attempts to match the font as best as it can. Often, the match just isn't good enough.

Simply using TrueType fonts almost always solves this problem; these scalable fonts are designed for both screen viewing and printing.

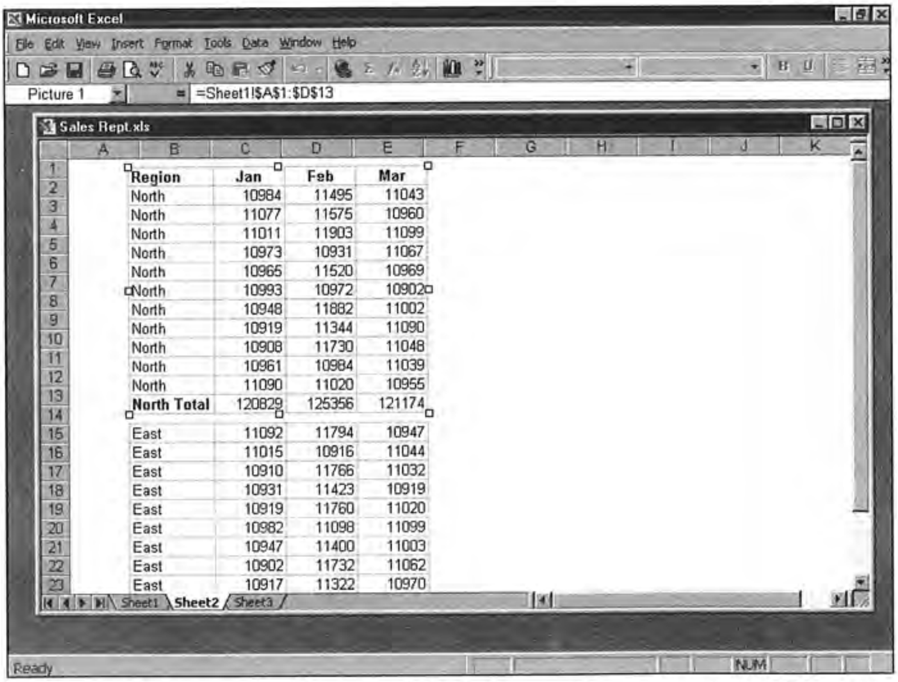
Printing Noncontiguous Ranges on a Single Page

You may have discovered that Excel lets you specify a print area that consists of noncontiguous ranges (a multiple selection). For example, if you need to print, say, A1:C50, D20:F24, and M11:P16, you can press Ctrl while you select these ranges and then issue the File ⇨ Print command and choose the Selection option. Better yet, give this multiple selection a range name so that you can quickly choose the same ranges the next time.

Printing multiple ranges is a handy feature, but you may not like the fact that Excel prints each range on a new sheet of paper — and this behavior can't be changed.

You might consider creating live *snapshots* of the three ranges and pasting these snapshots to an empty area of the worksheet. Then, you can print this new area that consists of the snapshots, and Excel won't skip to a new page for each range.

To create a live snapshot of a range, select the range and copy it to the Clipboard. Then, to paste a live link (see the Note that follows), select the cell in which you want to paste the snapshot (an empty worksheet is a good choice), press and hold the Shift key, and choose Edit ➪ Paste Picture Link. Repeat this procedure for the other ranges. After you paste them, you can rearrange the snapshots any way you like. Notice that these are truly live links: change a cell in the original range and the change appears in the linked picture. Figure 12-12 shows an example of snapshots made from several ranges.



=Sheet1!$A$1:$D$13

	A	B	C	D	E
1		**Region**	**Jan**	**Feb**	**Mar**
2		North	10984	11495	11043
3		North	11077	11575	10960
4		North	11011	11903	11099
5		North	10973	10931	11067
6		North	10965	11520	10969
7		North	10993	10972	10902
8		North	10948	11882	11002
9		North	10919	11344	11090
10		North	10908	11730	11048
11		North	10961	10984	11039
12		North	11090	11020	10955
13		**North Total**	120829	125356	121174
14					
15		East	11092	11794	10947
16		East	11015	10916	11044
17		East	10910	11766	11032
18		East	10931	11423	10919
19		East	10919	11760	11020
20		East	10982	11098	11099
21		East	10947	11400	11003
22		East	10902	11732	11062
23		East	10917	11322	10970

Figure 12-12: These two objects are linked pictures of ranges that exist elsewhere in the workbook, which enables you to print nonadjacent ranges on a single sheet.

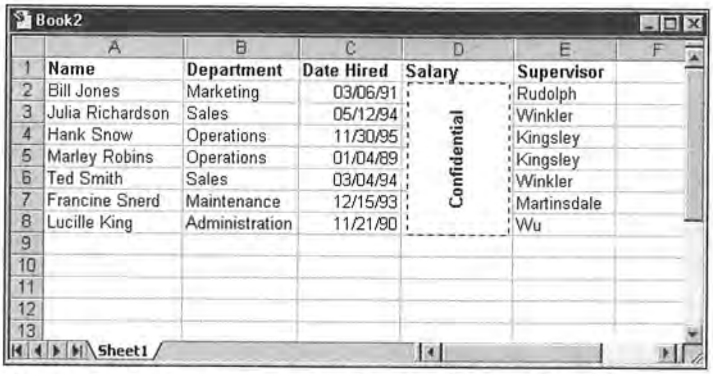
Hiding Cells Before Printing

You may have a worksheet that contains confidential information. You may want to print the worksheet, but not the confidential parts. Several techniques prevent certain parts of a worksheet from printing:

- When you hide rows or columns, the hidden rows aren't printed.
- You can effectively hide cells or ranges by making the text color the same color as the background color.

Attachment 2a

- You can hide cells by using a custom number format that consists of three semicolons (;;;).
- You can mask off a confidential area of a worksheet by covering it with a rectangle object. Click the Rectangle tool on the Drawing toolbar and drag the rectangle to the proper size. For best results, you can make the rectangle white with no border.
- You can use a text box object, available by using the Text Box tool on the Drawing toolbar, to mask off a range. The advantage to using a text box is that you can add text to it with information about the concealed data (see Figure 12-13).



	A	B	C	D	E	F
1	Name	Department	Date Hired	Salary	Supervisor	
2	Bill Jones	Marketing	03/06/91	Confidential	Rudolph	
3	Julia Richardson	Sales	05/12/94		Winkler	
4	Hank Snow	Operations	11/30/95		Kingsley	
5	Marley Robins	Operations	01/04/89		Kingsley	
6	Ted Smith	Sales	03/04/94		Winkler	
7	Francine Snerd	Maintenance	12/15/93		Martinsdale	
8	Lucille King	Administration	11/21/90		Wu	
9						
10						
11						
12						
13						

Figure 12-13: You can use a text box to hide confidential data so that it won't print.

If you find that you must regularly hide data before you print certain reports, consider using the custom views feature to create a named view that doesn't show the confidential information.

Using a Template to Change Printing Defaults

If you are never satisfied with Excel's default print settings, you may want to create a template with the print settings that you use most often. After doing so, you can create a new workbook based on the template, and the workbook will have your own print settings for defaults.

Cross-Reference

Chapter 34 discusses template files.

Summary

This chapter presents the basics — and some finer points — of printing in Excel. You learn how to use the Print dialog box and the Page Setup dialog box to control what gets printed and how it is printed. You also learn about the print preview feature that shows how the printed output will look before it hits the paper. The chapter covers features such as manual page breaks, custom views, Page Break Preview mode, tips on printing noncontiguous ranges on a single sheet, and hiding cells that contain confidential information.

✦ ✦ ✦

Attachment 2a

3. Activate the chart and paste the Clipboard contents. You'll probably have to resize the Plot Area to accommodate the pasted image.
4. The image that is pasted is a picture, but not a linked picture. To convert the image to a linked picture, select it and then enter the range reference in the formula bar (or simply point it out). For this example, I entered **=Sheet1!A1:E5**.

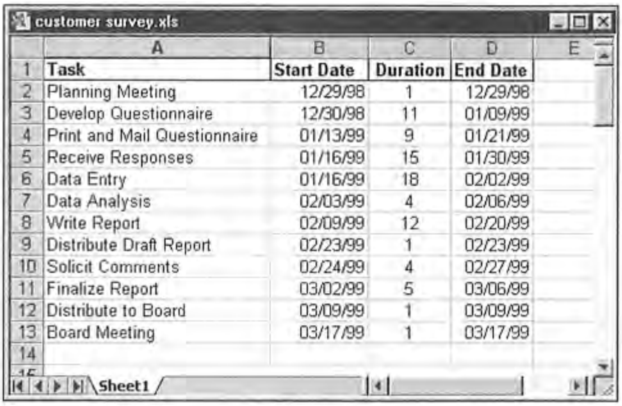
The picture is now a linked picture. Changing any of the cells that are used in the chart's SERIES formula is reflected immediately in the linked picture.

Simple Gantt Charts

Creating a simple Gantt chart isn't difficult when using Excel, but it does require some setup work. *Gantt charts* are used to represent the time required to perform each task in a project. Figure 16-33 shows data that was used to create the Gantt chart in Figure 16-34.

On the CD-ROM

A workbook that demonstrates this technique is available on the companion CD-ROM.



	A	B	C	D	E
1	**Task**	**Start Date**	**Duration**	**End Date**	
2	Planning Meeting	12/29/98	1	12/29/98	
3	Develop Questionnaire	12/30/98	11	01/09/99	
4	Print and Mail Questionnaire	01/13/99	9	01/21/99	
5	Receive Responses	01/16/99	15	01/30/99	
6	Data Entry	01/16/99	18	02/02/99	
7	Data Analysis	02/03/99	4	02/06/99	
8	Write Report	02/09/99	12	02/20/99	
9	Distribute Draft Report	02/23/99	1	02/23/99	
10	Solicit Comments	02/24/99	4	02/27/99	
11	Finalize Report	03/02/99	5	03/06/99	
12	Distribute to Board	03/09/99	1	03/09/99	
13	Board Meeting	03/17/99	1	03/17/99	
14					

Figure 16-33: Data used in the Gantt chart.

Here are the steps to create this chart:

1. Enter the data as shown in Figure 16-33. The formula in cell D2, which was copied to the rows below it, is **=B2+C2-1**.
2. Use the Chart Wizard to create a stacked bar chart from the range **A2:C13**. Use the second subtype, which is labeled Stacked Bar.

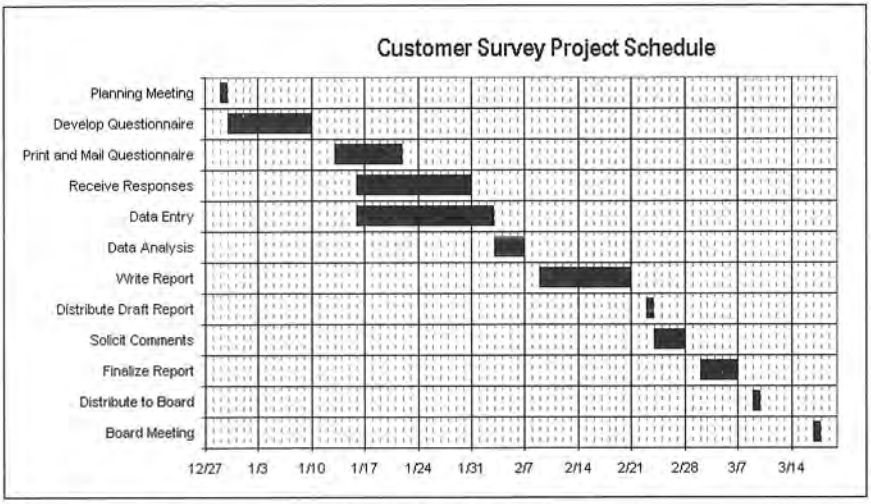


Figure 16-34: You can create a Gantt chart from a bar chart.

3. In Step 2 of the Chart Wizard, select the Columns option. Also, notice that Excel incorrectly uses the first two columns as the Category axis labels.
4. In Step 2 of the Chart Wizard, click the Series tab and add a new data series. Then, set the chart's series to the following:

   Series 1: **B2:B13**

   Series 2: **C2:C13**

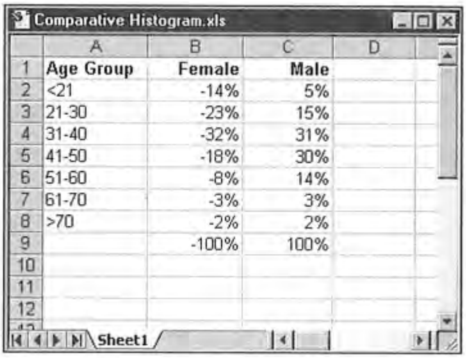
   Category (*x*) axis labels: **A2:A13**
5. In Step 3 of the Chart Wizard, remove the legend and then click Finish to create an embedded chart.
6. Adjust the height of the chart so that all the axis labels are visible. You can also accomplish this by using a smaller font size.
7. Access the Format Axis dialog box for the horizontal axis. Adjust the horizontal axis Minimum and Maximum scale values to correspond to the earliest and latest dates in the data (note that you can enter a date into the Minimum or Maximum edit box). You might also want to change the date format for the axis labels.
8. Access the Format Axis dialog box for the vertical axis. In the Scale tab, select the option labeled Categories in reverse order, and also set the option labeled Value (*y*) axis crosses at maximum category.

Attachment 2a

9. Select the first data series and access the Format Data Series dialog box. In the Patterns tab, set Border to None and Area to None. This makes the first data series invisible.
10. Apply other formatting, as desired.

Comparative Histograms

With a bit of creativity, you can create charts that you may have considered impossible with Excel. For example, Figure 16-35 shows data that was used to create the comparative histogram chart shown in Figure 16-36. Such charts often display population data.



	A	B	C	D
1	Age Group	Female	Male	
2	<21	-14%	5%	
3	21-30	-23%	15%	
4	31-40	-32%	31%	
5	41-50	-18%	30%	
6	51-60	-8%	14%	
7	61-70	-3%	3%	
8	>70	-2%	2%	
9		-100%	100%	
10				
11				
12				

Figure 16-35: Data used in the comparative histogram chart.

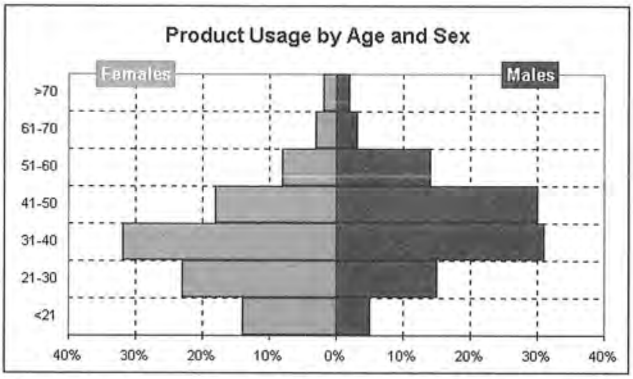
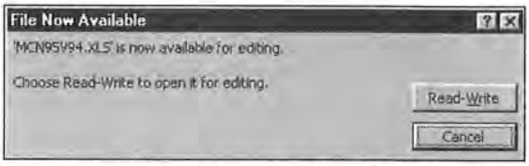


Figure 16-36: Producing this comparative histogram chart requires a few tricks.

Albert has these three choices:

- ✦ **Select Cancel, wait a while, and try again.** He may call Elaine and ask her when she expects to be finished.
- ✦ **Select Read Only.** This lets him open the file to read it, but doesn't let him save changes to the same filename.
- ✦ **Select Notify, which opens the file as read-only.** Excel pops up a message when Elaine is finished using the file.

Figure 21-2 shows the message that Albert receives when the file is available.



File Now Available

'MCN95V94.XLS' is now available for editing.

Choose Read-Write to open it for editing.

Figure 21-2: The File Now Available dialog box pops up with a new message when the file is available for editing.

Shared Workbooks

Although Excel isn't a multiuser application, it does support a feature known as *shared workbooks,* which enables multiple users to work on the same workbook simultaneously. Excel keeps track of the changes and provides appropriate prompts to handle conflict.

Appropriate Workbooks for Sharing

Although you can designate any workbook as a shared list, only certain workbooks contain information that is appropriate for sharing. The following are examples of workbooks that work well as shared lists:

- ✦ **Project tracking:** You may have a workbook that contains status information for projects. If multiple people are involved in the project, they can make changes and updates to the parts that are relevant.
- ✦ **Customer lists:** With customer lists, changes usually occur infrequently, but records are added and deleted.
- ✦ **Consolidations:** You may create a budget workbook in which each department manager is responsible for his or her department's budget. Usually, each department's budget appears on a separate sheet, with one sheet serving as the consolidation sheet.

Limitations of Shared Workbooks

If you plan to designate a workbook as shared, be aware that you cannot perform any of the following actions while sharing the workbook:

- Delete worksheets or chart sheets.
- Insert or delete a block of cells. However, you can insert or delete entire rows and columns.
- Merge cells.
- Define or apply conditional formats.
- Set up or change data-validation restrictions and messages.
- Insert or change charts, pictures, drawings, objects, or hyperlinks.
- Assign or modify a password to protect individual worksheets or the entire workbook.
- Create or modify pivot tables, scenarios, outlines, or data tables.
- Insert automatic subtotals.
- Make changes to dialog boxes or menus.
- Write, change, view, record, or assign macros. However, you can record a macro in a shared workbook that you store in another, unshared workbook.

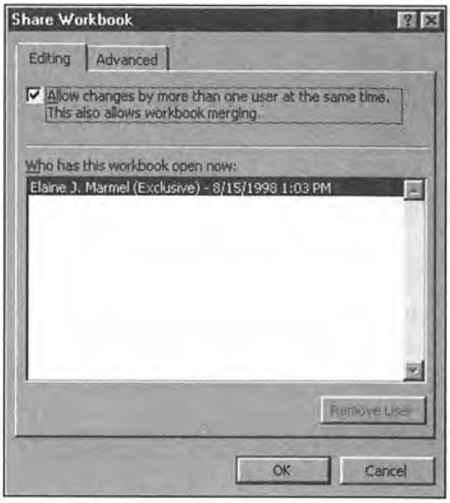
Designating a Workbook As a Shared Workbook

To designate a workbook as a shared workbook, select Tools ⇨ Share Workbook. Excel displays the dialog box that is shown in Figure 21-3. This dialog box has two tabs: Editing and Advanced. In the Editing tab, select the check box to allow changes by multiple users and then click OK. Excel then prompts you to save the workbook.

When you open a shared workbook, the window's title bar displays [Shared]. If you no longer want other users to be able to use the workbook, remove the check mark from the Share Workbook dialog box and save the workbook.

Whenever you're working with a shared workbook, you can find out whether any other users are working on the workbook. Choose Tools ⇨ Share Workbook, and the Share Workbook dialog box lists the names of the other users who have the file open, as well as the time that each user opened the workbook.

Attachment 2a



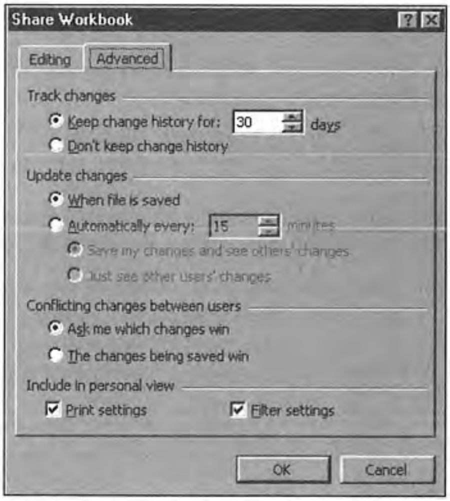
☑ Allow changes by more than one user at the same time. This also allows workbook merging.

Who has this workbook open now:
Elaine J. Marmel (Exclusive) - 8/15/1998 1:03 PM

Figure 21-3: The Share Workbook dialog box lets you specify a workbook as a shared workbook.

Advanced Settings

Excel allows you to set options for shared workbooks. Select Tools ➪ Share Workbook and click the Advanced tab to access these options (see Figure 21-4).



Track changes
● Keep change history for: 30 days
○ Don't keep change history

Update changes
● When file is saved
○ Automatically every: 15 minutes
● Save my changes and see others' changes
○ Just see other users' changes

Conflicting changes between users
● Ask me which changes win
○ The changes being saved win

Include in personal view
☑ Print settings ☑ Filter settings

Figure 21-4: The Advanced tab of the Share Workbook dialog box.

Tracking changes

Excel can keep track of the workbook's changes—something known as *change history.* When you designate a workbook as a shared workbook, Excel automatically turns on the change history option, enabling you to view information about previous (and perhaps conflicting) changes to the workbook. You can turn off change history by selecting the option labeled Don't keep change history. You can also specify the number of days for which Excel tracks change history.

Updating changes

While you're working on a shared workbook, you can use the standard File⇨Save command to update the workbook with your changes. The Update changes settings determine what happens when you save a shared workbook:

- **When file is saved:** You receive updates from other users when you save your copy of the shared workbook.
- **Automatically every:** Lets you specify a time period for receiving updates from other users of the workbook. You can also specify whether Excel should save your changes automatically, too, or just show you the changes made by other users.

Conflicting changes between users

As you may expect, multiple users working on the same file can result in some conflicts. For example, assume that you're working on a shared customer database workbook, and another user also has the workbook open. If you and the other user both make a change to the same cell, a conflict occurs. You can specify the manner in which Excel resolves the conflicts by selecting one of two options in the Advanced tab of the Share Workbook dialog box:

- **Ask me which changes win:** If you select this option, Excel displays a dialog box to let you determine how to settle the conflict.
- **The changes being saved win:** If you select this option, your changes always take precedence.

Include in personal view

The final section of the Advanced tab of the Share Workbook dialog box enables you to specify settings that are specific to your view of the shared workbook. You can choose to use your own print settings and your own data-filtering settings. If you don't place checks in these check boxes, you can't save your own print and filter settings.

Mailing and Routing Workbooks

Excel provides a few additional workgroup features. To use these features, your system must have one of the following items installed:

- Office 2000
- Microsoft Exchange
- A mail system that is compatible with MAPI (Messaging Application Programming Interface)
- Lotus cc:Mail
- A mail system that is compatible with VIM (Vendor Independent Messaging)

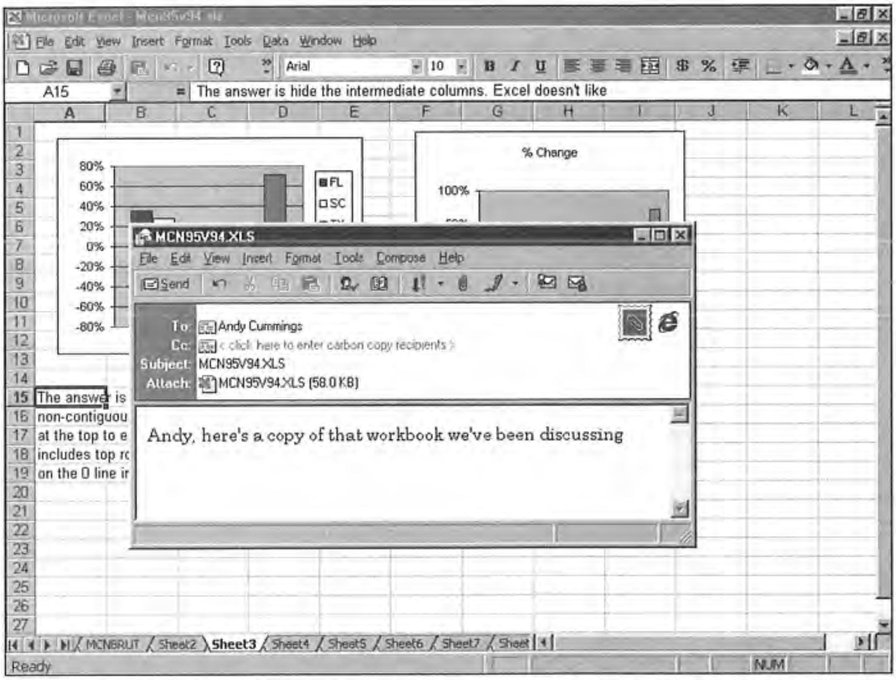
The procedures vary, depending on the mail system that you have installed; for this reason, discussions in the following sections are general in nature. For specific questions, consult your network administrator.

Mailing a Workbook As an E-mail Attachment

Electronic mail, or *e-mail*, is commonplace in most offices, and is an extremely efficient means of communication. Unlike a telephone, e-mail doesn't rely on the recipient of the message being available when you want to send the message.

In addition to sending messages by e-mail, you can send complete files — including Excel workbooks. Like a growing number of software applications, Excel is *mail-enabled*, which means that you don't have to leave Excel to send a worksheet to someone by e-mail.

To send a copy of your workbook to someone on your network, select File ⇨ Send To ⇨ Mail Recipient (as Attachment). Excel creates an e-mail message with a copy of the workbook attached, using your default e-mail program; in Figure 21-5, Excel opened Outlook Express to send the workbook. You send this e-mail message the same way that you send any message — from your e-mail program. You also can send the message to multiple recipients, the same way that you send any e-mail message to multiple recipients.


Microsoft Excel - Mcn95v94.xls
File Edit View Insert Format Tools Data Window Help
Arial
10
A15
80%
60%
40%
20%
0%
-20%
-40%
-60%
-80%
FL
SC
% Change
100%
MCN95V94.XLS
File Edit View Insert Format Tools Compose Help
Send
To:
Cc:
Subject:
Attach:
MCNBRUT
Sheet2
Sheet3
Sheet4
Sheet5
Sheet6
Sheet7
Ready
NUM

A15 = The answer is hide the intermediate columns. Excel doesn't like

The answer is
non-contiguou
at the top to e
includes top r
on the 0 line ir

To: Andy Cummings
Cc: < click here to enter carbon copy recipients >
Subject: MCN95V94.XLS
Attach: MCN95V94.XLS (58.0 KB)

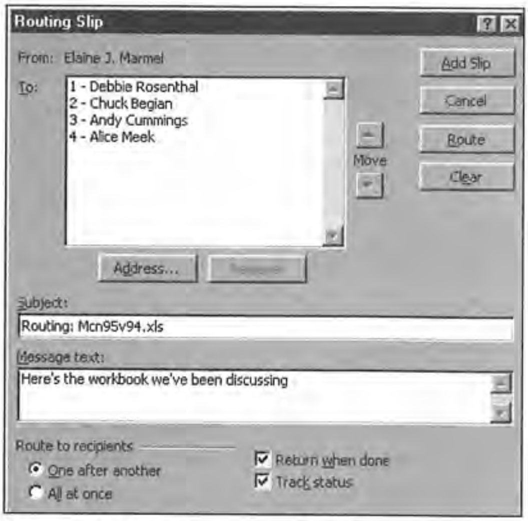
Andy, here's a copy of that workbook we've been discussing

Figure 21-5: Sending a workbook as an attachment to an e-mail message.

Note When you send any file by using an e-mail program, you send a *copy* of the file. If the recipient makes changes to the notebook, the changes do not appear in your copy of the workbook.

Routing a Workbook to Others

If you choose File ➪ Send To ➪ Routing Recipient, Excel enables you to attach a routing slip to a workbook, similar to the one you see in Figure 21-6. Routing a workbook is most useful when you want the first person in the group to review (and possibly edit) the workbook and then send it to the next person on the list. For example, if you're responsible for your department's budget, you may need input from Alice—and her input may depend on Andy's input. You can set up the workbook and then route it to the others so that they can make their respective additions. When you set up the routing slip, you can tell Excel to return the workbook to you when the routing is finished.



From: Elaine J. Marmel

To:
1 - Debbie Rosenthal
2 - Chuck Begian
3 - Andy Cummings
4 - Alice Meek

Subject: Routing: Mcn95v94.xls

Message text: Here's the workbook we've been discussing

Route to recipients
● One after another
○ All at once

☑ Return when done
☑ Track status

Figure 21-6: Routing a workbook.

When you route a workbook, you have the following two options:

- **Sequential routing:** Enables you to route the workbook sequentially to workgroup members. When the first recipient is finished, the workbook goes to the second recipient. When the second recipient is finished, the workbook goes to the third, and so on. When all recipients have received the workbook, it can be returned to you. Choose One after another at the bottom of the Routing Slip dialog box for this type of routing.
- **Simultaneous routing:** Enables you to route the workbook to all recipients at once. You receive a copy of the workbook from each recipient (not just one copy). This type of routing is useful if you want to solicit comments from a group of coworkers, and you want the responses back quickly (you don't want to wait until a single worksheet makes the circuit). Choose All at once at the bottom of the Routing Slip dialog box for this type of routing.

Click Route to route the workbook immediately. If you don't want to route immediately, click Add Slip. Later, when you're ready to route, choose File ➪ Send To ➪ Next Routing Recipient. Either choice places the workbook in the outgoing mail folder of your e-mail program. To actually route the workbook, open your e-mail program to send the message.

Note Whether you route or attach a workbook to an e-mail message, Excel uses your e-mail program. Since you can send a workbook to a number of people, either as an e-mail attachment or by using a routing slip, the distinction between the two methods lies in the distinction between sequential and simultaneous routing. If you choose simultaneous routing and you *don't* place a check in the Return when done check box, routing and attaching are identical, because you can't guarantee a reply to e-mail.

Summary

This chapter presents a basic overview of using Excel in a network environment. It explains how the concept of a file reservation prevents two users from modifying a workbook simultaneously. Excel's shared workbook feature, however, lets multiple users work on a single workbook at the same time. The chapter concludes with a discussion of mailing and routing workbooks.

✦ ✦ ✦

Attachment 2a

CHAPTER 23

Working with Lists

✦ ✦ ✦ ✦

In This Chapter

What Is a List?

What Can You Do with a List?

Designing a List

Entering Data into a List

Filtering a List

Using Database Functions with Lists

Sorting a List

Creating Subtotals

✦ ✦ ✦ ✦

Research conducted by Microsoft indicates that Excel is frequently used to manage lists, or *worksheet databases.* This chapter covers list management and demonstrates useful techniques that involve lists.

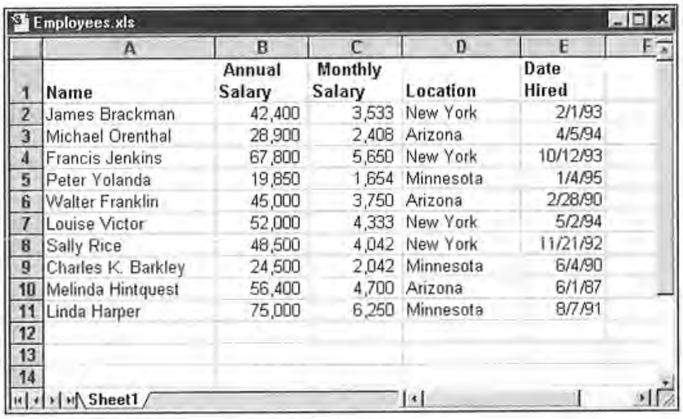
What Is a List?

A list is essentially an organized collection of information. More specifically, a list consists of a row of headers (descriptive text), followed by additional rows of data, which can be values or text. You may recognize this as a database table—which is exactly what it is. Beginning with Excel 5, Microsoft uses the term *list* to refer to a database stored in a worksheet and the term *database* to refer to a table of information stored in an external file. To avoid confusion, I adhere to Microsoft's terminology.

Cross-Reference I cover external database files in Chapter 24.

Figure 23-1 shows an example of a list in a worksheet. This particular list has its headers in row 1 and has 10 rows of data. The list occupies four columns. Notice that the data consists of several different types: text, values, and dates. Column C contains a formula that calculates the monthly salary from the value in column B.

Attachment 2a



	A	B	C	D	E	F
1	Name	Annual Salary	Monthly Salary	Location	Date Hired	
2	James Brackman	42,400	3,533	New York	2/1/93	
3	Michael Orenthal	28,900	2,408	Arizona	4/5/94	
4	Francis Jenkins	67,800	5,650	New York	10/12/93	
5	Peter Yolanda	19,850	1,654	Minnesota	1/4/95	
6	Walter Franklin	45,000	3,750	Arizona	2/28/90	
7	Louise Victor	52,000	4,333	New York	5/2/94	
8	Sally Rice	48,500	4,042	New York	11/21/92	
9	Charles K. Barkley	24,500	2,042	Minnesota	6/4/90	
10	Melinda Hintquest	56,400	4,700	Arizona	6/1/87	
11	Linda Harper	75,000	6,250	Minnesota	8/7/91	
12						
13						
14						

Figure 23-1: An example of a list.

People often refer to the columns in a list as *fields* and to the rows as *records*. Using this terminology, the list shown in the figure has five fields (Name, Annual Salary, Monthly Salary, Location, and Date Hired) and ten records.

The size of the lists that you develop in Excel is limited by the size of a single worksheet. In other words, a list can have no more than 256 fields and can consist of no more than 65,535 records (one row contains the field names). A list of this size would require a great deal of memory and even then may not be possible. At the other extreme, a list can consist of a single cell—not very useful, but it's still considered a list.

Note In versions of Excel prior to Excel 97, a list was limited to 16,383 records.

What Can You Do with a List?

Excel provides several tools to help you manage and manipulate lists. Consequently, people use lists for a wide variety of purposes. For some users, a list is simply a method to keep track of information (for example, customer lists); others use lists to store data that ultimately will appear in a report. Common list operations include:

- Entering data into the list
- Filtering the list to display only the rows that meet certain criteria
- Sorting the list
- Inserting formulas to calculate subtotals
- Creating formulas to calculate results on the list filtered by certain criteria
- Creating a summary table of the data in the list (this is done using a pivot table; see Chapter 25).

With the exception of the last item, these operations are covered in this chapter.

Designing a List

Although Excel is quite accommodating when it comes to the information that is stored in a list, planning the organization of your list information will pay off. The following are some guidelines to keep in mind when creating lists:

- Insert descriptive labels (one for each column) in the first row of the list, called the *header row*. If you use lengthy labels, consider using the Wrap Text format so that you don't have to widen the columns.

Cross-Reference See Chapter 11 for information on the Wrap Text format.

- Make sure each column contains the same type of information. For example, don't mix dates and text in a single column.
- You can use formulas that perform calculations on other fields in the same record. If you use formulas that refer to cells outside the list, make these absolute references; otherwise, you get unexpected results when you sort the list.
- Don't leave any empty rows within the list. For list operations, Excel determines the list boundaries automatically, and an empty row signals the end of the list.
- For best results, try to keep the list on a worksheet by itself. If you must place other information on the same worksheet as the list, place the information above or below the list. In other words, don't use the cells to the left or the right of a list.
- Select Window ➪ Freeze Panes to make sure that you can see the headings when you scroll the list.
- You can preformat entire columns to ensure that the data has the same format. For example, if a column contains dates, format the entire column with the desired date format.

Many people find working in spreadsheets most appealing because changing the layout is relatively easy. Lists behave no differently than any other kind of data in Excel; changing a list's layout is also easy. For example, you may create a list and then decide that it needs another column (field). No problem. Just insert a new column, give it a field name, and Excel expands your list. If you've ever used a database management program, you can appreciate the simplicity of this layout change.

Entering Data into a List

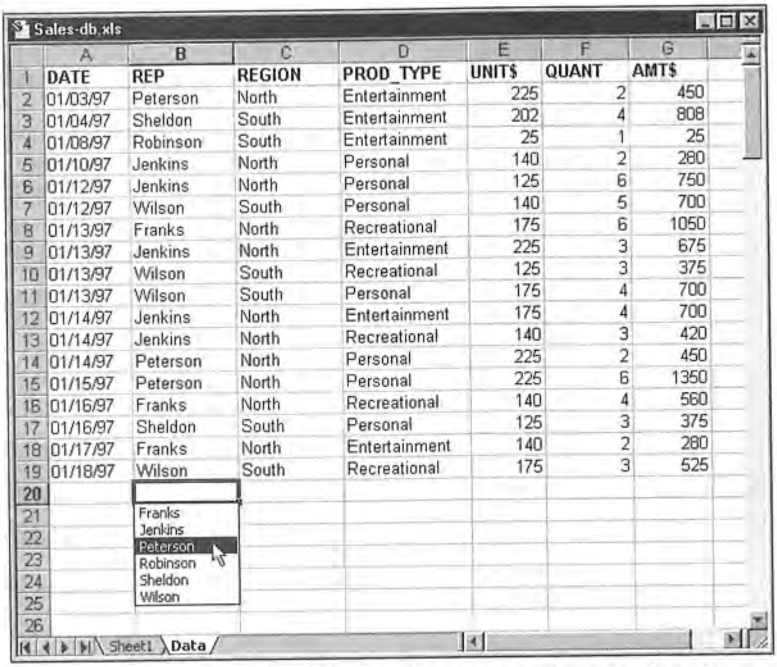
You can enter data into a list in three ways:

- ✦ Manually, using all standard data entry techniques
- ✦ By importing it or copying it from another file
- ✦ By using a dialog box

There's really nothing special about entering data into a list. You just navigate through the worksheet and enter the data into the appropriate cells.

Excel has two features that assist with repetitive data entry:

- ✦ **AutoComplete.** When you begin to type in a cell, Excel scans up and down the column for entries that match what you're typing. If it finds a match, Excel fills in the rest of the text automatically. Press Enter to make the entry. You can turn this feature on or off in the Edit tab of the Options dialog box.
- ✦ **Pick Lists.** You can right-click on a cell and select Pick from list from the shortcut menu. Excel displays a list box that shows all entries in the column (see Figure 23-2). Click on the one that you want to enter into the cell (no typing is required).

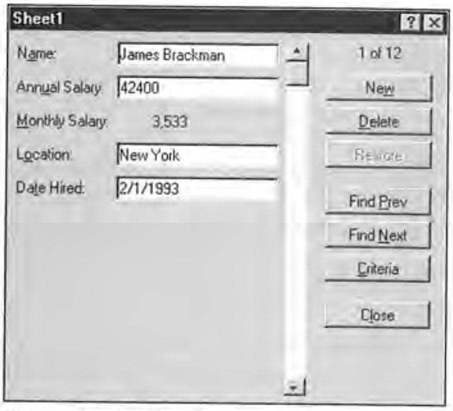


	A	B	C	D	E	F	G
1	DATE	REP	REGION	PROD_TYPE	UNIT$	QUANT	AMT$
2	01/03/97	Peterson	North	Entertainment	225	2	450
3	01/04/97	Sheldon	South	Entertainment	202	4	808
4	01/08/97	Robinson	South	Entertainment	25	1	25
5	01/10/97	Jenkins	North	Personal	140	2	280
6	01/12/97	Jenkins	North	Personal	125	6	750
7	01/12/97	Wilson	South	Personal	140	5	700
8	01/13/97	Franks	North	Recreational	175	6	1050
9	01/13/97	Jenkins	North	Entertainment	225	3	675
10	01/13/97	Wilson	South	Recreational	125	3	375
11	01/13/97	Wilson	South	Personal	175	4	700
12	01/14/97	Jenkins	North	Entertainment	175	4	700
13	01/14/97	Jenkins	North	Recreational	140	3	420
14	01/14/97	Peterson	North	Personal	225	2	450
15	01/15/97	Peterson	North	Personal	225	6	1350
16	01/16/97	Franks	North	Recreational	140	4	560
17	01/16/97	Sheldon	South	Personal	125	3	375
18	01/17/97	Franks	North	Entertainment	140	2	280
19	01/18/97	Wilson	South	Recreational	175	3	525
20							
21							
22							
23							
24							
25							
26							

Figure 23-2: Choosing the Pick from list command on the shortcut menu gives you a list of all items in the current column.

Attachment 2a

If you prefer to use a dialog box for your data entry, Excel accommodates you. To display a data entry dialog box, move the cell pointer anywhere within the list and choose Data ➪ Form. Excel determines the boundaries of your list and displays a dialog box showing each field in the list. Figure 23-3 depicts an example of such a dialog box. Fields that have a formula don't have an edit box.



Name: James Brackman
Annual Salary: 42400
Monthly Salary: 3,533
Location: New York
Date Hired: 2/1/1993

Figure 23-3: The Data ➪ Form command gives you a handy data entry dialog box.

Note If the number of fields exceeds the limit of your display, the dialog box contains two columns of field names. If your list consists of more than 32 fields, however, the Data ➪ Form command doesn't work. You must forego this method of data entry and enter the information directly into the cells.

Entering Data with the Data Form Dialog Box

When the data form dialog box appears, Excel displays the first record in the list. Notice the indicator in the upper-right corner of the dialog box that tells you the number of the selected record and the total number of records in the list.

To enter a new record, click on the New button to clear the fields. Then you can enter the new information into the appropriate fields. Use Tab or Shift+Tab to move among the fields. When you click on New (or Close), Excel appends the data that you entered to the bottom of the list. You also can press Enter, which is equivalent to clicking on the New button. If the list contains any formulas, Excel enters them for you automatically into the new record.

Tip If you named the range of your list Database, Excel automatically extends the range definition to include the new row(s) that you add to the list using the data form dialog box. Note that this works only if you name the list Database; any other name doesn't work.

Other Uses for the Data Form Dialog Box

You can use the data form dialog box for more than just data entry. You can edit existing data in the list, view data one record at a time, delete records, and display records that meet certain criteria.

The dialog box contains a number of additional buttons, which are described as follows:

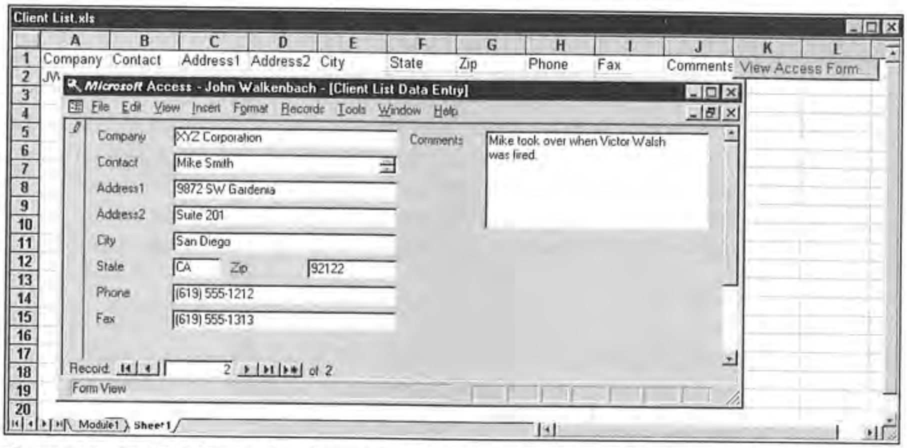
- **Delete:** Deletes the displayed record.
- **Restore:** Restores any information that you edited. You must click on this button before you click on the New button.
- **Find Prev:** Displays the previous record in the list. If you entered a criterion, this button displays the previous record that matches the criterion.
- **Find Next:** Displays the next record in the list. If you entered a criterion, this button displays the next record that matches the criterion.
- **Criteria:** Clears the fields and lets you enter a criterion upon which to search for records. For example, to locate records that have a salary greater than $50,000, enter **>50000** into the Salary field. Then you can use the Find Next and Find Prev buttons to display the qualifying records.
- **Close:** Closes the dialog box (and enters the data that you were entering, if any).

Using Microsoft Access Forms for Data Entry

If you have Microsoft Access installed on your system, you can use its form creation tools to develop a data entry form for an Excel worksheet. This feature uses the Access Links add-in, which must be loaded. When the add-in is loaded, you have a new command: Data ⇨ Access Form.

Choosing this command starts Access (if it's not already running) and begins its Form Wizard. Use the Form Wizard to create the data entry form. You can then use this form to add data to your Excel worksheet. Access's Form Wizard places a button on your worksheet that contains the text View Access Form. Click on this button to use the form. Figure 23-4 shows an Access form being used to enter data into an Excel worksheet.

Attachment 2a


Client List.xls
A
B
C
D
E
F
G
H
I
J
K
L
Company
Contact
Address1
Address2
City
State
Zip
Phone
Fax
Comments
View Access Form...
JW
Microsoft Access - John Walkenbach - [Client List Data Entry]
File
Edit
View
Insert
Format
Records
Tools
Window
Help
Record: 2 of 2
Form View
Module1
Sheet1

Company: XYZ Corporation
Contact: Mike Smith
Address1: 9872 SW Gardenia
Address2: Suite 201
City: San Diego
State: CA Zip: 92122
Phone: (619) 555-1212
Fax: (619) 555-1313
Comments: Mike took over when Victor Walsh was fired.

Figure 23-4: This form, developed in Microsoft Access, is being used to enter data into an Excel worksheet.

Filtering a List

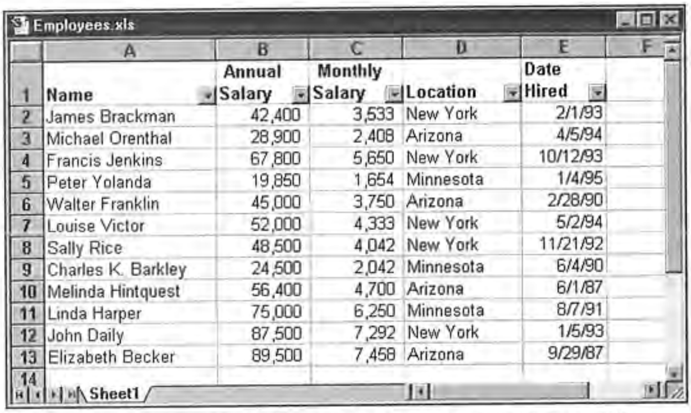
Filtering a list is the process of hiding all rows in the list except those that meet some criteria that you specify. For example, if you have a list of customers, you can filter the list to show only those who live in New Jersey. Filtering is a common (and very useful) technique. Excel provides two ways to filter a list:

- ✦ AutoFilter, for simple filtering criteria
- ✦ Advance Filter, for more complex filtering

AutoFiltering

To use Excel's AutoFilter feature to filter a list, place the cell pointer anywhere within the list and then choose Data ➪ Filter ➪ AutoFilter. Excel analyzes your list and adds drop-down arrows to the field names in the header row, as shown in Figure 23-5.

Attachment 2a



Name	Annual Salary	Monthly Salary	Location	Date Hired
James Brackman	42,400	3,533	New York	2/1/93
Michael Orenthal	28,900	2,408	Arizona	4/5/94
Francis Jenkins	67,800	5,650	New York	10/12/93
Peter Yolanda	19,850	1,654	Minnesota	1/4/95
Walter Franklin	45,000	3,750	Arizona	2/28/90
Louise Victor	52,000	4,333	New York	5/2/94
Sally Rice	48,500	4,042	New York	11/21/92
Charles K. Barkley	24,500	2,042	Minnesota	6/4/90
Melinda Hintquest	56,400	4,700	Arizona	6/1/87
Linda Harper	75,000	6,250	Minnesota	8/7/91
John Daily	87,500	7,292	New York	1/5/93
Elizabeth Becker	89,500	7,458	Arizona	9/29/87

Figure 23-5: When you choose the Data ➪ Filter ➪ AutoFilter command, Excel adds drop-down arrows to the field names in the header row.

When you click on the arrow in one of these drop-down lists, the list expands to show the unique items in that column. Select an item, and Excel hides all rows except those that include the selected item. In other words, Excel filters the list by the item that you selected.

After you filter the list, the status bar displays a message that tells you how many rows qualified. In addition, the drop-down arrow changes color to remind you that you filtered the list by a value in that column.

AutoFiltering has a limit. Only the first 999 unique items in the column appear in the drop-down list. If your list exceeds this limit, you can use advanced filtering, which is described later.

Besides showing every item in the column, the drop-down list includes five other items:

- **All:** Displays all items in the column. Use this to remove filtering for a column.
- **Top 10:** Filters to display the "top 10" items in the list; this is discussed later.
- **Custom:** Lets you filter the list by multiple items; this is discussed later.
- **Blanks:** Filters the list by showing rows that contain blanks in this column.
- **NonBlanks:** Filters the list by showing rows that contain non-blanks in this column.

To display the entire list again, click on the arrow and choose All — the first item in the drop-down list. Or, you can select Data ➪ Filter ➪ Show All.

Attachment 2a

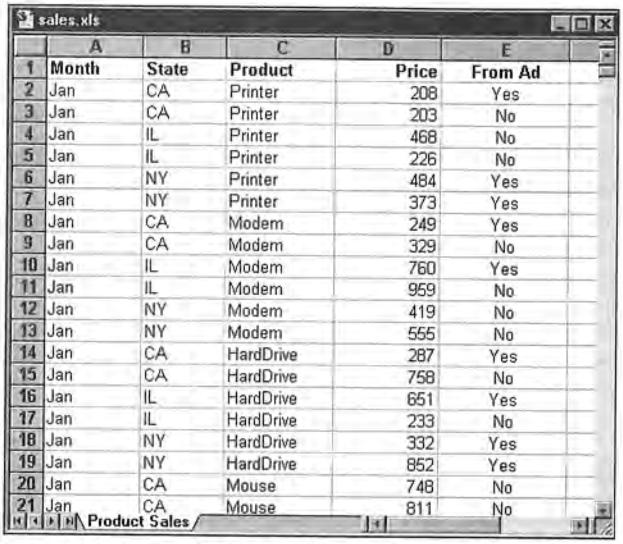
To move out of Autofilter mode and remove the drop-down arrows from the field names, choose Data ➪ Filter ➪ AutoFilter again to remove the check mark from the AutoFilter menu item and restore the list to its normal state.

Caution

If you have any formulas that refer to data in a filtered list, be aware that the formulas don't adjust to use only the visible cells. For example, if a cell contains a formula that sums values in column C, the formula continues to show the sum for *all* the values in column C—not just those in the visible rows. To solve this problem, use database functions, which I describe later in this chapter.

Multicolumn AutoFiltering

Sometimes you may need to filter a list by values in more than one column. Figure 23-6 shows a list comprised of several fields.

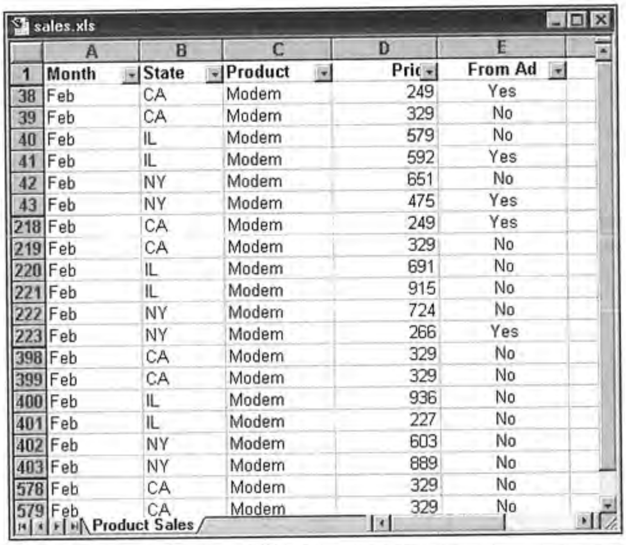


	A	B	C	D	E
1	Month	State	Product	Price	From Ad
2	Jan	CA	Printer	208	Yes
3	Jan	CA	Printer	203	No
4	Jan	IL	Printer	468	No
5	Jan	IL	Printer	226	No
6	Jan	NY	Printer	484	Yes
7	Jan	NY	Printer	373	Yes
8	Jan	CA	Modem	249	Yes
9	Jan	CA	Modem	329	No
10	Jan	IL	Modem	760	Yes
11	Jan	IL	Modem	959	No
12	Jan	NY	Modem	419	No
13	Jan	NY	Modem	555	No
14	Jan	CA	HardDrive	287	Yes
15	Jan	CA	HardDrive	758	No
16	Jan	IL	HardDrive	651	Yes
17	Jan	IL	HardDrive	233	No
18	Jan	NY	HardDrive	332	Yes
19	Jan	NY	HardDrive	852	Yes
20	Jan	CA	Mouse	748	No
21	Jan	CA	Mouse	811	No

Figure 23-6: The list before filtering by multiple columns.

Assume that you want to see the records that show modems sold in February. In other words, you want to filter out all records except those in which the Month field is *Feb* and the Product field is *Modem*.

First, get into Autofilter mode. Then click on the drop-down arrow in the Month field and select *Feb* to filter the list to show only records with *Feb* in the Month field. Then click on the drop-down arrow in the Product field and select *Modem*, filtering the filtered list to show only records that contain *Modem* in the Product column—resulting in a list filtered by values in two columns. Figure 23-7 shows the result.



sales.xls

	A	B	C	D	E
1	Month	State	Product	Pric	From Ad
38	Feb	CA	Modem	249	Yes
39	Feb	CA	Modem	329	No
40	Feb	IL	Modem	579	No
41	Feb	IL	Modem	592	Yes
42	Feb	NY	Modem	651	No
43	Feb	NY	Modem	475	Yes
218	Feb	CA	Modem	249	Yes
219	Feb	CA	Modem	329	No
220	Feb	IL	Modem	691	No
221	Feb	IL	Modem	915	No
222	Feb	NY	Modem	724	No
223	Feb	NY	Modem	266	Yes
398	Feb	CA	Modem	329	No
399	Feb	CA	Modem	329	No
400	Feb	IL	Modem	936	No
401	Feb	IL	Modem	227	No
402	Feb	NY	Modem	603	No
403	Feb	NY	Modem	889	No
578	Feb	CA	Modem	329	No
579	Feb	CA	Modem	329	No

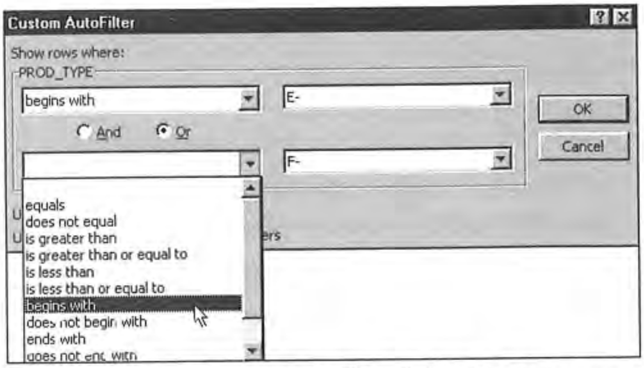
Product Sales

Figure 23-7: The same list filtered by values in two columns.

You can filter a list by any number of columns. Excel applies a different color to the drop-down arrows in the columns that have a filter applied.

Custom AutoFiltering

Usually, AutoFiltering involves selecting a single value for one or more columns. If you choose the Custom option in a drop-down list, you gain a bit more flexibility in filtering the list; Excel displays a dialog box like the one shown in Figure 23-8.



Custom AutoFilter

Show rows where:

PROD_TYPE

begins with: E-

○ And ● Or

F-

equals
does not equal
is greater than
is greater than or equal to
is less than
is less than or equal to
begins with
does not begin with
ends with
does not end with
OK
Cancel

Figure 23-8: The Custom AutoFilter dialog box gives you more filtering options.

Attachment 2a

The Custom AutoFilter dialog box lets you filter in several ways:

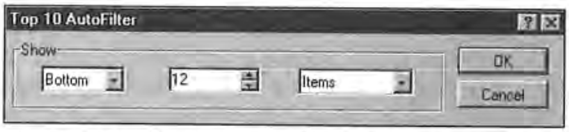
- **Values above or below a specified value.** For example, sales amounts greater than 10,000.
- **Values within a range.** For example, sales amounts greater than 10,000 AND sales amounts less than 50,000.
- **Two discrete values.** For example, state equal to *New York* OR state equal to *New Jersey*.
- **Approximate matches.** You can use the * and ? wildcards to filter in a number of other ways. For example, to display only those customers whose last name begins with *B*, use **B***.

Custom AutoFiltering can be useful, but it definitely has limitations. For example, if you want to filter the list to show only three values in a field (such as New York or New Jersey or Connecticut), you can't do it by AutoFiltering. Such filtering tasks require the advanced filtering feature, which I discuss later in this chapter.

Top 10 AutoFiltering

Sometimes you may want to use a filter on numerical fields to show only the highest or lowest values in the list. For example, if you have a list of employees, you may want to identify the 12 employees with the longest tenure. You could use the custom AutoFilter option, but then you must supply a cutoff date (which you may not know). The solution is to use Top 10 AutoFiltering.

Top 10 AutoFiltering is a generic term; it doesn't limit you to the top *10* items. In fact, it doesn't even limit you to the *top* items. When you choose the Top 10 option from a drop-down list, you see dialog box that is shown in Figure 23-9.



Show: Bottom 12 Items

Figure 23-9: The Top 10 AutoFilter gives you more AutoFilter options.

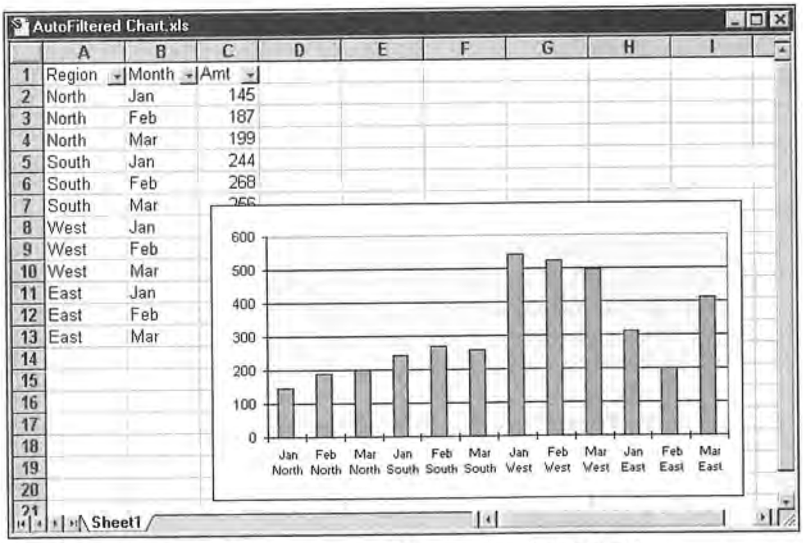
You can choose either Top or Bottom and specify any number. Suppose, for example, that you want to see the 12 employees with the longest tenure. Choose Bottom and 12 to filter the list and show the 12 rows with the smallest values in the Date Hired field. You also can choose Percent or Value in this dialog box. For example, you can filter the list to show the Bottom 5 percent of the records.

Charting filtered list data

You can create some interesting multipurpose charts that use data in a filtered list. The technique is useful because only the visible data appears in the chart. When you change the AutoFilter criteria, the chart updates itself to show only the visible cells.

Note For this technique to work, select the chart and make sure that the Plot Visible Cells Only option is enabled on the Chart tab of the Options dialog box.

Figure 23-10 shows an example of a chart created with an unfiltered list. It shows sales data for three months for each of four sales regions.



	A	B	C
1	Region	Month	Amt
2	North	Jan	145
3	North	Feb	187
4	North	Mar	199
5	South	Jan	244
6	South	Feb	268
7	South	Mar	266
8	West	Jan	
9	West	Feb	
10	West	Mar	
11	East	Jan	
12	East	Feb	
13	East	Mar	

Figure 23-10: This chart was created from an unfiltered list.

Figure 23-11 shows the same chart, but the list was filtered to show only the North sales region. You can apply other filters, and the chart updates automatically. This technique lets a single chart show several different views of the data.

Advanced Filtering

In many cases, AutoFiltering does the job. But if you run up against its limitations, you need to use advanced filtering. Advanced filtering is much more flexible than AutoFiltering, but it takes a bit of up-front work to use it. Advanced filtering provides you with the following capabilities:

- ✦ You can specify more complex filtering criteria.
- ✦ You can specify computed filtering criteria.
- ✦ You can extract a copy of the rows that meet the criteria to another location.

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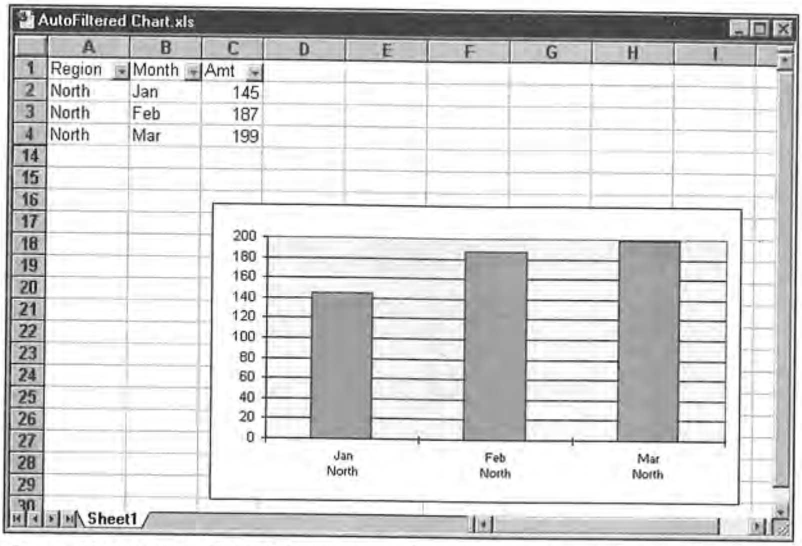


Region	Month	Amt
North	Jan	145
North	Feb	187
North	Mar	199

Figure 23-11: The chart from the previous figure, after filtering the list.

Setting up a criteria range

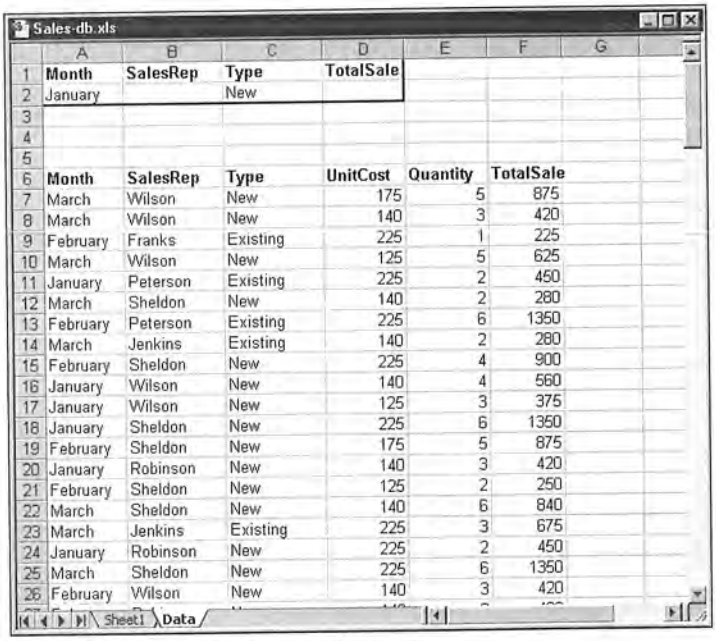
Before you can use the advanced filtering feature, you must set up a *criteria range*, a designated range on a worksheet that conforms to certain requirements. The criteria range holds the information that Excel uses to filter the list. It must conform to the following specifications:

- It must consist of at least two rows, and the first row must contain some or all field names from the list.
- The other rows of the criteria range must consist of your filtering criteria.

Although you can put the criteria range anywhere in the worksheet, it's a good idea not to put it in rows where you placed the list. Because Excel hides some of these rows when filtering the list, you may find that your criteria range is no longer visible after filtering. Therefore, you should generally place the criteria range above or below the list.

Figure 23-12 shows a criteria range, located in A1:D2, above the list that it uses. Only some field names appear in the criteria range. You don't need to include, in the criteria range, field names for fields that you don't use in the selection criteria.

Attachment 2a

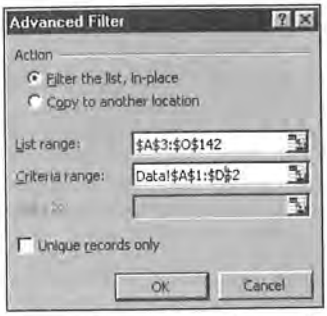


	A	B	C	D	E	F	G
1	**Month**	**SalesRep**	**Type**	**TotalSale**			
2	January		New				
3							
4							
5							
6	**Month**	**SalesRep**	**Type**	**UnitCost**	**Quantity**	**TotalSale**	
7	March	Wilson	New	175	5	875	
8	March	Wilson	New	140	3	420	
9	February	Franks	Existing	225	1	225	
10	March	Wilson	New	125	5	625	
11	January	Peterson	Existing	225	2	450	
12	March	Sheldon	New	140	2	280	
13	February	Peterson	Existing	225	6	1350	
14	March	Jenkins	Existing	140	2	280	
15	February	Sheldon	New	225	4	900	
16	January	Wilson	New	140	4	560	
17	January	Wilson	New	125	3	375	
18	January	Sheldon	New	225	6	1350	
19	February	Sheldon	New	175	5	875	
20	January	Robinson	New	140	3	420	
21	February	Sheldon	New	125	2	250	
22	March	Sheldon	New	140	6	840	
23	March	Jenkins	Existing	225	3	675	
24	January	Robinson	New	225	2	450	
25	March	Sheldon	New	225	6	1350	
26	February	Wilson	New	140	3	420	

Figure 23-12: A criteria range for a list.

In this example, the criteria range has only one row of criteria. The fields in each row of the criteria range (except for the header row) are joined with an AND operator. Therefore, the filtered list shows rows in which the Month column equals *January* AND the Type column equals *New*. In other words, the list displays only sales to new customers made in January.

To perform the filtering, choose Data ⇨ Filter ⇨ Advanced filter. Excel displays the dialog box that is shown in Figure 23-13. Specify the list range and the criteria range, and make sure that you select the option labeled Filter the List in-place. Click on OK, and Excel filters the list by the criteria that you specified.



Action

● Filter the list, in-place

○ Copy to another location

List range: $A$3:$O$142

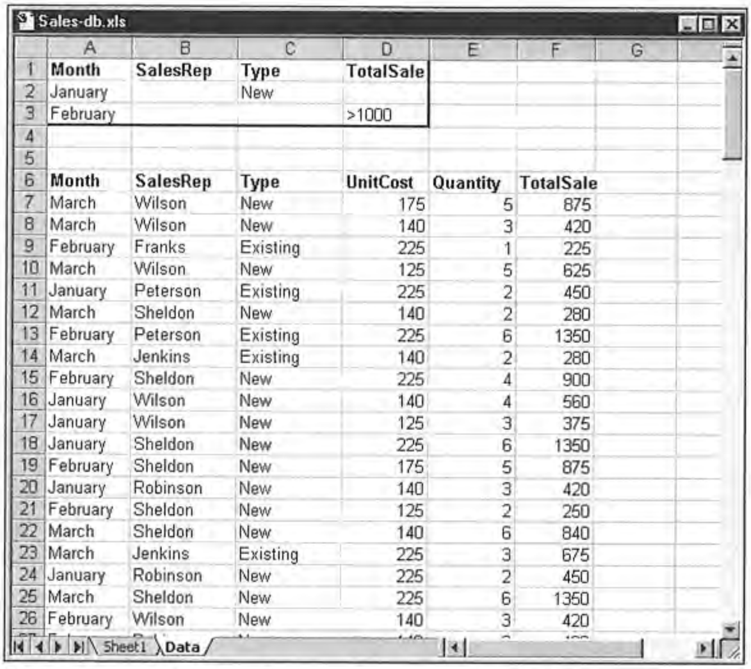
Criteria range: Data!$A$1:$D$2

☐ Unique records only

Figure 23-13: The Advanced Filter dialog box.

Multiple criteria

If you use more than one row in the criteria range, the criteria in each row are joined with an OR operator. A criteria range can have any number of rows, each of which is joined to the others with an OR operator. Figure 23-14 shows a criteria range (A1:D3) with two rows of criteria.



	A	B	C	D	E	F	G
1	**Month**	**SalesRep**	**Type**	**TotalSale**			
2	January		New				
3	February			>1000			
4							
5							
6	**Month**	**SalesRep**	**Type**	**UnitCost**	**Quantity**	**TotalSale**	
7	March	Wilson	New	175	5	875	
8	March	Wilson	New	140	3	420	
9	February	Franks	Existing	225	1	225	
10	March	Wilson	New	125	5	625	
11	January	Peterson	Existing	225	2	450	
12	March	Sheldon	New	140	2	280	
13	February	Peterson	Existing	225	6	1350	
14	March	Jenkins	Existing	140	2	280	
15	February	Sheldon	New	225	4	900	
16	January	Wilson	New	140	4	560	
17	January	Wilson	New	125	3	375	
18	January	Sheldon	New	225	6	1350	
19	February	Sheldon	New	175	5	875	
20	January	Robinson	New	140	3	420	
21	February	Sheldon	New	125	2	250	
22	March	Sheldon	New	140	6	840	
23	March	Jenkins	Existing	225	3	675	
24	January	Robinson	New	225	2	450	
25	March	Sheldon	New	225	6	1350	
26	February	Wilson	New	140	3	420	

Figure 23-14: This criteria range has two sets of criteria.

In this example, the filtered list shows rows in either of the following:

- ✦ *The Month field is January AND the Type field is New.*
- ✦ The Month field is *February* AND the Total Sale field is greater than 1000.

You cannot filter this way with AutoFiltering.

Types of criteria

The entries that you make in the criteria range can be either of the following:

- ✦ Text or value criteria. The filtering involves comparisons to a value or string, using operators such as equal (=), greater than (>), not equal to (<>), and so on.
- ✦ **Computed criteria.** The filtering involves a computation of some sort.

Text or value criteria

Table 23-1 lists the comparison operators that you can use with text or value criteria.

Table 23-1
Comparison Operators

Operator	*Comparison Type*
=	Equal to
>	Greater than
>=	Greater than or equal to
<	Less than
<=	Less than or equal to
<>	Not equal to

Table 23-2 shows examples of criteria that use strings.

Table 23-2
Examples of String Criteria

Criteria	*Effect*
>K	Text that begins with *L* through *Z*
<>C	All text, except text that begins with C
="January"	Text that matches January
Sm*	Text that begins with Sm
s*s	Text that begins with s and ends with s
s?s	Three-letter text that begins with *s* and ends with *s*

Note The text comparisons are not case sensitive. For example, si* matches *Simpson* as well as *sick*.

Computed criteria

Using computed criteria can make filtering even more powerful. Computed criteria filter the list based one or more calculations. Figure 23-15 shows a simple list that consists of project numbers, start dates, end dates, and resources. Above the list, in range A1:A2, is the criteria range. Notice, however, that this criteria range does

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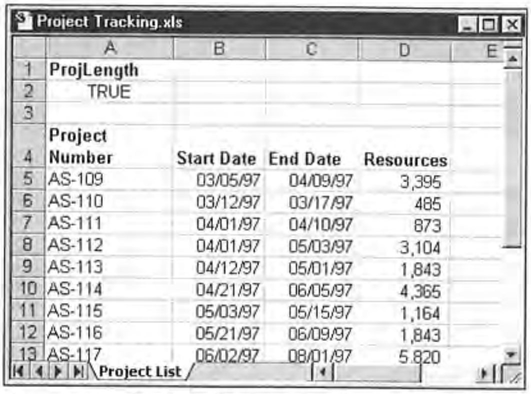
not use a field header from the list — it uses a new field header. A computed criteria essentially computes a new field for the list. Therefore, you must supply new field names in the first row of the criteria range.



	A	B	C	D	E
1	**ProjLength**				
2	TRUE				
3					
4	**Project Number**	**Start Date**	**End Date**	**Resources**	
5	AS-109	03/05/97	04/09/97	3,395	
6	AS-110	03/12/97	03/17/97	485	
7	AS-111	04/01/97	04/10/97	873	
8	AS-112	04/01/97	05/03/97	3,104	
9	AS-113	04/12/97	05/01/97	1,843	
10	AS-114	04/21/97	06/05/97	4,365	
11	AS-115	05/03/97	05/15/97	1,164	
12	AS-116	05/21/97	06/09/97	1,843	
13	AS-117	06/02/97	08/01/97	5,820	

Figure 23-15: This list is to be filtered using computed criteria.

Cell A2 contains the following formula:

```
=C5-B5+1>=30
```

This formula returns a logical value of either *True* or *False*. The result of the formula refers to cells in the first row of data in the list; it does *not* refer to the header row. When you filter the list by this criterion, the list shows only rows in which the project length (End Date–Start Date+1) is greater than or equal to 30 days. In other words, Excel bases the comparison on a computation.

Note You could accomplish the same effect, without using a computed criterion, by adding a new column to the list that contains a formula to calculate the project length. Using a computed criterion, however, eliminates the need to add a new column.

To filter the list to show only the projects that use above average resources, you could use the following computed criteria formula:

```
=D5>AVERAGE(D:D)
```

This filters the list to show only the rows in which the value of the Resources field is greater than the average of the Resources field.

Keep in mind the following items when using computed criteria:

- Don't use a field name in the criteria range that appears in the list. Create a new field name or just leave the cell blank.

- You can use any number of computed criteria and mix and match them with noncomputed criteria.
- Don't pay attention to the values returned by formulas in the criteria range. These refer to the first row of the list.
- If your computed formula refers to a value outside the list, use an absolute reference rather than a relative reference. For example, use $C$1 rather than C1.
- Create your computed criteria formulas using the first row of data in the list (not the field names). Make these references relative, not absolute. For example, use C5 rather than $C$5.

Other advanced filtering operations

The Advanced Filter dialog box gives you two other options:

- Copy to Another Location
- Unique Records Only

Both of these advanced filtering options are discussed below.

Copying qualifying rows

If you choose the Copy to Another Location option in the Advanced Filter dialog box, Excel copies the qualifying rows to another location in the worksheet or a different worksheet. You specify the location for the copied rows in the Copy to edit box. Note that the list itself is not filtered when you use this option.

Displaying only unique rows

Choosing the option labeled Unique records only hides all duplicate rows that meet the criteria that you specify. If you don't specify a criteria range, this option hides all duplicate rows in the list.

Using Database Functions with Lists

It's important to understand that Excel's worksheet functions don't ignore hidden cells. Therefore, if you have a SUM formula that calculates the total of the values in a column of a list, the formula returns the same value when you filter the list.

To create formulas that return results based on filtering criteria, you need to use Excel's database worksheet functions. For example, you can create a formula that calculates the sum of values in a list that meets certain criteria. Set up a criteria range as described previously. Then enter a formula such as the following:

```
=DSUM(ListRange,FieldName,Criteria)
```

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In this case, ListRange refers to the list, FieldName refers to the field name cell of the column that you are summing, and Criteria refers to the criteria range.

Excel's database functions are listed in Table 23-3.

Table 23-3
Excel's Database Worksheet Functions

Function	*Description*
DAVERAGE	Returns the average of selected database entries
DCOUNT	Counts the cells containing numbers from a specified database and criteria
DCOUNTA	Counts nonblank cells from a specified database and criteria
DGET	Extracts from a database a single record that matches the specified criteria
DMAX	Returns the maximum value from selected database entries
DMIN	Returns the minimum value from selected database entries
DPRODUCT	Multiplies the values in a particular field of records that match the criteria in a database
DSTDEV	Estimates the standard deviation based on a sample of selected database entries
DSTDEVP	Calculates the standard deviation based on the entire population of selected database entries
DSUM	Adds the numbers in the field column of records in the database that match the criteria
DVAR	Estimates variance based on a sample from selected database entries
DVARP	Calculates variance based on the entire population of selected database entries

Cross-Reference Refer to Chapter 10 for general information about using worksheet functions.

Sorting a List

In some cases, the order of the rows in your list doesn't matter. But in other cases, you want the rows to appear in a specific order. For example, in a price list, you may want the rows to appear in alphabetical order by product name. This makes the products easier to locate in the list. Or, if you have a list of accounts receivable information, you may want to sort the list so that the higher amounts appear at the top of the list (in descending order).

Rearranging the order of the rows in a list is called *sorting*. Excel is quite flexible when it comes to sorting lists, and you can often accomplish this task with the click of a mouse button.

Simple Sorting

To quickly sort a list in ascending order, move the cell pointer into the column that you want to sort. Then click on the Sort Ascending button the Standard toolbar. The Sort Descending button works the same way, but it sorts the list in descending order. In both cases, Excel determines the extent of your list and sorts all the rows in the list.

When you sort a filtered list, Excel sorts only the visible rows. When you remove the filtering from the list, the list is no longer sorted.

Be careful if you sort a list that contains formulas. If the formulas refer to cells in the list that are in the same row, you don't have any problems. But if the formulas refer to cells in other rows in the list or to cells outside the list, the formulas will not be correct after you sort the list. If formulas in your list refer to cells outside the list, make sure that the formulas use an absolute cell reference.

More Complex Sorting

Sometimes, you may want to sort by two or more columns. This is relevant to break ties. A tie occurs when rows with duplicate data remain unsorted. Figure 23-16 shows an example of an unsorted list. If you sort this list by Month, Excel places the rows for each month together. But you may also want to show the Sales Reps in ascending order within each month. In this case, you would need to sort by two columns (Month and Sales Rep). Figure 23-17 shows the list after sorting by these two columns.

You can use the Sort Ascending and Sort Descending buttons to do this — but you need to do two sorts. First, sort by the Sales Reps column, and then sort by the Month column. As I explain in the next section, Excel provides a way to accomplish multicolumn sorting with a single command.

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data that meets certain criteria. In other words, you want to *query* the database and load into your worksheet a subset of the external database that meets the criteria. Excel makes this type of operation relatively easy.

Note To perform queries using external databases, Microsoft Query must be installed on your system. If Query is not installed, you will be prompted to install it when you select the Data ➪ Get External Data ➪ Create New Query command. You must rerun the Excel (or Microsoft Office) setup program and install Query.

In previous versions of Excel, using Microsoft Query required that you load an add-in. That is no longer necessary, starting with Excel 97, although the add-in is still included for compatibility purposes.

To work with an external database file from Excel, use the Query application that is included with Excel. The general procedure is as follows:

1. Activate a worksheet.
2. Choose Data ➪ Get External Data ➪ New Database Query. This starts Query.
3. Specify whether you want to use Query directly or use Query Wizard.
4. Specify the database that you want to use and then create a *query*—a list of criteria that specifies which records you want.
5. Specify how you want the data returned that passes your query—either to a worksheet or as a pivot table.

You can choose to save the query in a file so that you can reuse it later. This means that modifying the query or *refreshing* it (updating it with any changed values) is a simple matter. This is particularly useful when the data resides in a shared database that is continually being updated.

Cross-Reference The next chapter discusses pivot tables. You can create a pivot table using data in an external file, and use Query to retrieve data.

Using Query: An Example

The best way to become familiar with Query is to walk through an example.

The Database File

The file that is used in this example is named Budget.dbf.

On the CD-ROM If you want to try this example, you can find it on this book's CD-ROM.

This database file is a dBASE IV database with a single table that consists of 15,840 records. This file contains the following fields:

- **Sort:** A numeric field that holds record sequence numbers.
- **Division:** A text field that specifies the company division (Asia, Europe, N. America, Pacific Rim, or S. America).
- **Department:** A text field that specifies the department within the division. Each division is organized into the following departments: Accounting, Advertising, Data Processing, Human Resources, Operations, Public Relations, R&D, Sales, Security, Shipping, and Training.
- **Category:** A text field that specifies the budget category. The four categories are Compensation, Equipment, Facility, and Supplies & Services.
- **Item:** A text field that specifies the budget item. Each budget category has different budget items. For example, the Compensation category includes the following items: Benefits, Bonuses, Commissions, Conferences, Entertainment, Payroll Taxes, Salaries, and Training.
- **Month:** A text field that specifies the month (abbreviated as Jan, Feb, and so on).
- **Budget:** A numeric field that stores the budgeted amount.
- **Actual:** A numeric field that stores the actual amount spent.
- **Variance:** A numeric field that stores the difference between the Budget and Actual fields.

The Task

The objective of this exercise is to develop a report that shows the first quarter (January through March) actual compensation expenditures of the training department in the North American division. In other words, the query will extract records for which the following applies:

- The Division is N. America
- The Department is Training
- The Category is Compensation
- The Month is Jan, Feb, or Mar

Using Query to Get the Data

You *could* import the entire dBASE file into a worksheet and then choose Data ⇨ Filter ⇨ AutoFilter to filter the data as required. This approach would work, because the file has fewer than 65,535 records, which isn't always the case. Using Query, however, you import only the data that's required.

Some Database Terminology

People who spend their days working with databases seem to have their own special language. The following terms can help you hold your own among a group of database experts:

External database: A collection of data that is stored in one or more files (not Excel files). Each file of a database holds a single table, and tables are comprised of records and fields.

Field: In a database table, an element of a record that corresponds to a column.

ODBC: An acronym for Open DataBase Connectivity, a standard developed by Microsoft that uses drivers to access database files in different formats. Microsoft Query comes with drivers for Access, dBASE, FoxPro, Paradox, SQL Server, Excel workbooks, and ASCII text files. ODBC drivers for other databases are available from Microsoft and third-party providers.

Query: To search a database for records that meet specific criteria. This term is also used as a noun; you can write a query, for example.

Record: In a database table, a single element that corresponds to a row.

Refresh: To rerun a query to get the latest data. This is applicable when the database contains information that is subject to change, as in a multiuser environment.

Relational database: A database that is stored in more than one table or file. At least one common field (sometimes called the *key field*) connects the tables.

Result set: The data that is returned by a query, usually a subset of the original database. Query returns the result set to your Excel workbook or to a pivot table.

SQL: An acronym for Structured Query Language (usually pronounced *sequel*). Query uses SQL to query data that is stored in ODBC databases.

Table: A record- and field-oriented collection of data. A database consists of one or more tables.

Starting query

Begin with an empty worksheet. Select Data ⇨ Get External Data ⇨ New Database Query; this action launches and activates Microsoft Query, a separate application. Excel continues to run, and you can switch back and forth between Query and Excel, as needed.

Selecting a data source

When Query starts, it displays the Choose Data Source dialog box, shown in Figure 24-1. This dialog box contains three tabs:

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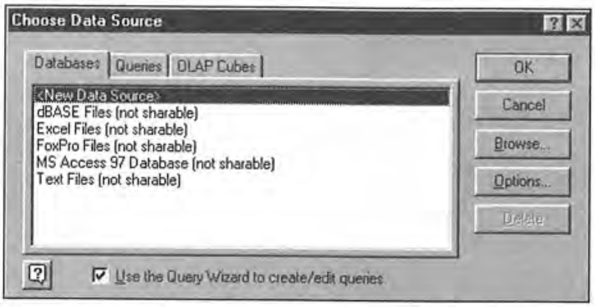
- Databases: Lists the data sources that are known to Query—this tab may be empty, depending on which data sources are defined on your system.
- Queries: Contains a list of stored queries. Again, this may or may not be empty.
- OLAP Cubes: Lists OLAP databases (see sidebar) that are available for Query.



<New Data Source>
dBASE Files (not sharable)
Excel Files (not sharable)
FoxPro Files (not sharable)
MS Access 97 Database (not sharable)
Text Files (not sharable)

☑ Use the Query Wizard to create/edit queries

Figure 24-1: The Choose Data Source dialog box.

OLAP Databases

OLAP is an acronym for *online analytical processing*; OLAP presents a new way to organize large databases to suit the way that you analyze and manage information. In an OLAP database, data is organized by level of detail. In a business database, for example, you might want to track sales around the world for the products of a particular company. In an OLAP organization of this information, you would need to consider where and when each product was sold, as well as which product was sold. Each of these aspects of the OLAP database is called a *dimension*, and each dimension is comprised of several fields that can be organized hierarchically, by level of detail. You might call the "where" dimension the Location dimension, and it might contain, for example, fields for country, region, and city. The Time dimension, containing information about when the product was sold, might contain fields for month, date, day, and year.

Dimensions in an OLAP database combine to provide information about the intersecting points; because you can combine several dimensions, OLAP databases are called *cubes*.

You can connect Excel to an OLAP data source created with either the Microsoft DSS (Decision Support Services) Analysis server or other third-party OLAP products that provide data source drivers that are compatible with OLD-DB for OLAP. You connect to an OLAP cube the same way that you connect to other external data sources. Excel can display data that you retrieve from an OLAP cube as either a PivotTable or a PivotChart. You cannot display OLAP data as an external data range of the type discussed in this chapter.

Running Microsoft Query by Itself

Normally, you run Query from Excel. But because Query is a standalone application, you also can run it directly. The executable file is named msqry32.exe and its location can vary (use the Windows Find File feature to locate this program on your system).

If you run Query by itself, you can't return the data to Excel automatically. You can, however, use the Clipboard to copy data from the data pane to any application that you want (including Excel).

Using Multiple Database Tables

The example in this chapter uses only one database table. Some databases, however, use multiple tables. These databases are known as *relational databases*, because a common field links the tables. Query lets you use any number of tables in your queries. To see an example of a relational database, load the sample database (called Northwind Traders) that's provided with Microsoft Query. This particular database has six tables.

Adding and Editing Records in External Database Tables

To add, delete, and edit data when you are using Query, make sure that a check appears next to the Records ➪ Allow Editing command. Of course, you can't edit a database file that's set up as read-only. In any case, you need to be careful with this feature, because your changes are saved to disk as soon as you move the cell pointer out of the record that you're editing (you do not need to choose File ➪ Save).

Formatting Data

If you don't like the data's appearance in the data pane, you can change the font used, by selecting Format ➪ Font. Be aware that selective formatting isn't allowed (unlike in Excel); changing the font affects all the data in the data pane.

Sorting Data

If you need to view the data in the data pane in a different order, choose Records ➪ Sort (or click the Sort Ascending or Sort Descending toolbar icon).

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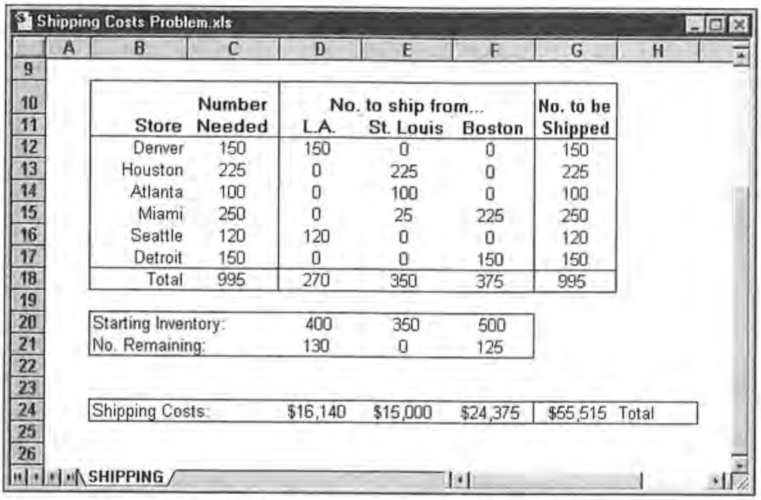
Setting up the problem is the difficult part. For example, you must enter 27 constraints. When you have specified all the necessary information, click the Solve button to put Solver to work. This process takes a while (Solver's speed depends on the speed of your computer and the amount of memory installed on your computer), but eventually Solver displays the solution that is shown in Figure 27-13.



	Number	No. to ship from...			No. to be
Store	Needed	L.A.	St. Louis	Boston	Shipped
Denver	150	150	0	0	150
Houston	225	0	225	0	225
Atlanta	100	0	100	0	100
Miami	250	0	25	225	250
Seattle	120	120	0	0	120
Detroit	150	0	0	150	150
Total	995	270	350	375	995

Starting Inventory:	400	350	500
No. Remaining:	130	0	125

Shipping Costs:	$16,140	$15,000	$24,375	$55,515 Total

Figure 27-13: The solution that was created by Solver.

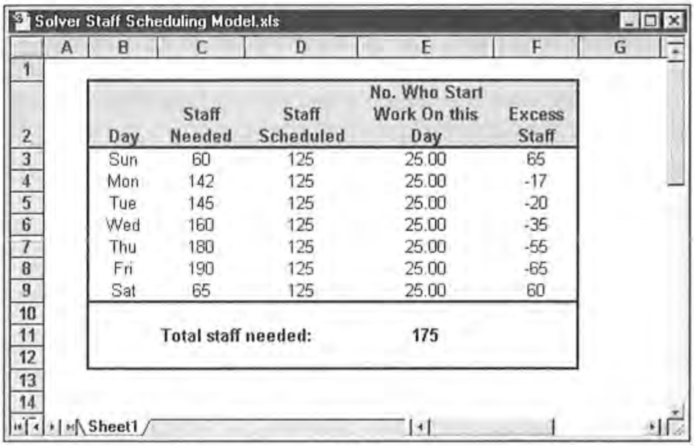
The total shipping cost is $55,515, and all the constraints are met. Notice that shipments to Miami come from both St. Louis and Boston.

Scheduling Staff

This example deals with staff scheduling. Such problems usually involve determining the minimum number of people that satisfy staffing needs on certain days or times of the day. The constraints typically involve such details as the number of consecutive days or hours that a person can work.

Figure 27-14 shows a worksheet that is set up to analyze a simple staffing problem. The question is, "What is the minimum number of employees required to meet daily staffing needs?" At this company, each person works five consecutive days. As a result, employees begin their five-day workweek on different days of the week.

Attachment 2a



Day	Staff Needed	Staff Scheduled	No. Who Start Work On this Day	Excess Staff
Sun	60	125	25.00	65
Mon	142	125	25.00	-17
Tue	145	125	25.00	-20
Wed	160	125	25.00	-35
Thu	180	125	25.00	-55
Fri	190	125	25.00	-65
Sat	65	125	25.00	60

Total staff needed: 175

Figure 27-14: This staffing model determines the minimum number of staff members required to meet daily staffing needs.

The key to this problem, as with most Solver problems, is figuring out how to set up the worksheet. This example makes it clear that setting up your worksheet properly is critical to Solver. This worksheet is laid out as follows:

- **Day:** Column B consists of plain text for the days of the week.
- **Staff Needed:** The values in column C represent the number of employees needed on each day of the week. As you see, staffing needs vary quite a bit by the day of the week.
- **Staff Scheduled:** Column D holds formulas that use the values in column E. Each formula adds the number of people who start on that day to the number of people who started on the preceding four days. Because the week wraps around, you can't use a single formula and copy it. Consequently, each formula in column D is different:

```
D3:   =E3+E9+E8+E7+E6
D4:   =E4+E3+E9+E8+E7
D5:   =E5+E4+E10+E9+E8
D6:   =E6+E5+E4+E10+E9
D7:   =E7+E6+E5+E4+E10
D8:   =E8+E7+E6+E5+E4
D9:   =E9+E8+E7+E6+E5
```

- **Adjustable cells:** Column E holds the adjustable cells — the numbers to be determined by Solver. These cells are initialized with a value of 25, to give Solver a starting value. Generally, you should initialize the changing cells to values that are as close as possible to the anticipated answer.

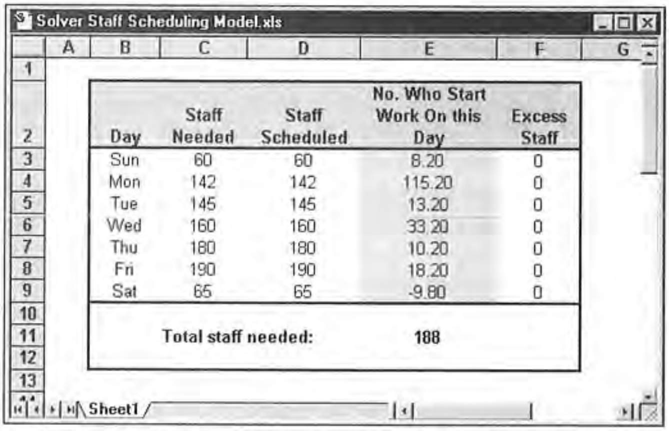
- ✦ **Excess Staff:** Column F contains formulas that subtract the number of staff members needed from the number of staff members scheduled, to determine excess staff. Cell F3 contains =D3 – C3, which was copied to the six cells below it.
- ✦ **Total staff needed:** Cell E11 contains a formula that sums the number of people who start on each day. The formula is =SUM(E3:E9). This is the value that Solver minimizes.

This problem, of course, has constraints. The number of people scheduled each day must be greater than or equal to the number of people required. If each value in column F is greater than or equal to 0, the constraints are satisfied.

After the worksheet is set up, select Tools ➪ Solver and specify that you want to minimize cell E11 by changing cells E3:E9. Next, click the Add button to begin adding the following constraints:

```
F3>=0
F4>=0
F5>=0
F6>=0
F7>=0
F8>=0
F9>=0
```

Click Solve to start the process. The solution that Solver finds, shown in Figure 27-15, indicates that a staff of 188 meets the staffing needs and that no excess staffing exists on any day.



Day	Staff Needed	Staff Scheduled	No. Who Start Work On this Day	Excess Staff
Sun	60	60	8.20	0
Mon	142	142	115.20	0
Tue	145	145	13.20	0
Wed	160	160	33.20	0
Thu	180	180	10.20	0
Fri	190	190	18.20	0
Sat	65	65	-9.80	0

Total staff needed: 188

Figure 27-15: This solution offered by Solver isn't quite right – you have to add more constraints.

Attachment 2a

CHAPTER 34

Using and Creating Templates

◆ ◆ ◆ ◆

In This Chapter

An Overview of Templates

The Default Worksheet Template

Custom Workbook Templates

Creating Custom Templates

Ideas for Creating Templates

◆ ◆ ◆ ◆

This chapter covers one of the most potentially useful features in Excel — template files. Templates can be used for a variety of purposes, ranging from custom "fill-in-the-blanks" workbooks to a way to change Excel's defaults for new workbooks or new worksheets.

An Overview of Templates

A *template* is essentially a model that serves as the basis for something else. An Excel template is a workbook that's used to create other workbooks. If you understand this concept, you may save yourself a lot of work. For example, you may always use a particular header on your printouts. Consequently, every time that you print a worksheet, you need to select File ⇨ Page Setup to add your page header. The solution is to create a new workbook by modifying the template that Excel uses. In this case, you modify the template file by inserting your header into the template. Save the template file, and then every new workbook that you create has your customized page header.

Excel supports three types of templates:

- **The default workbook template:** Used as the basis for new workbooks.
- **The default worksheet template:** Used as the basis for new worksheets that are inserted into a workbook.
- **Custom workbook templates:** Usually, ready-to-run workbooks that include formulas. Typically, these templates are set up so that a user can simply plug in values and get immediate results. The Spreadsheet Solutions templates (included with Excel) are examples of this type of template.

Each template type is discussed in the following sections.

The Default Workbook Template

Every new workbook that you create starts out with some default settings. For example, the workbook's worksheets have gridlines, text appears in Arial 10-point font, values that are entered display in the General number format, and so on. If you're not happy with any of the default workbook settings, you can change them.

Changing the Workbook Defaults

Making changes to Excel's default workbook is fairly easy to do, and it can save you lots of time in the long run. Take the following steps to change Excel's workbook defaults:

1. Start with a new workbook.
2. Add or delete sheets to give the workbook the number of worksheets that you want.
3. Make any other changes that you want to make, which can include column widths, named styles, page setup options, and many of the settings that are available in the Options dialog box.

Tip To change the default formatting for cells, choose Format⇨Style, and then modify the settings for the Normal style. For example, you can change the default font, size, or number format. Refer to "Using Named Styles" in Chapter 11 for details.

4. When your workbook is set up to your liking, select File⇨Save As.
5. In the Save As dialog box, select Template (*.xlt) from the Save as type box.
6. Enter **book.xlt** for the filename.
7. Save the file in your \XLStart folder. This folder is probably located within your c:\Program Files\Microsoft Office\Office folder.

   You can also save your book.xlt template file in the folder that is specified as an alternate startup folder. You specify an alternate startup folder in the General tab of the Options dialog box.
8. Close the file.

After you perform the preceding steps, the new default workbook is based on the book.xlt workbook template. You can create a workbook based on your template by using any of the following methods:

- Click the New button on the Standard toolbar
- Press Ctrl+N
- Choose File⇨New and then select the Workbook icon in the General tab of the New dialog box (see Figure 34-1)

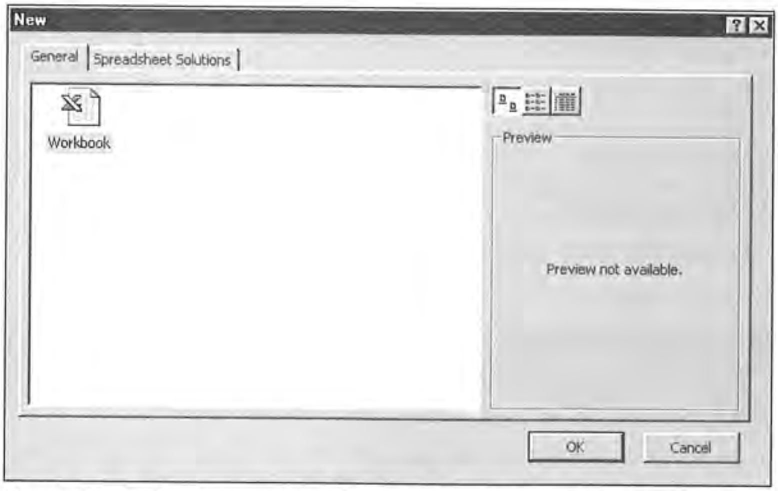


Figure 34-1: After you create a book.xlt template, clicking the Workbook icon creates a new workbook that is based on your template.

Note Normally, the Xlstart folder does not contain a file named book.xlt. If a file with this name is not present, Excel creates new workbooks using built-in default settings.

Editing the book.xlt Template

After you create your book.xlt template, you may discover that you need to change it. You can open the book.xlt template file and edit it just like any other workbook. After you finish with your edits, save the workbook and close it.

Resetting the Default Workbook

If you create a book.xlt file and then decide that you would rather use the standard default workbook settings, simply delete the book.xlt template file from the Xlstart folder. Excel then resorts to its built-in default settings for new workbooks.

The Default Worksheet Template

When you insert a new worksheet into a workbook, Excel uses its built-in worksheet defaults for the worksheet. This includes items such as column width, row height, and so on.

Note Versions of Excel prior to Excel 97 also use other sheet templates (dialog.xlt and macro.xlt). These templates are not used in Excel 97 or later versions.

If you don't like the default settings for a new worksheet, you can change them by using the following procedure:

1. Start with a new workbook, deleting all the sheets except one.
2. Make any changes that you want to make, which can include column widths, named styles, page setup options, and many of the settings that are available in the Options dialog box.
3. When your workbook is set up to your liking, select File➪Save As.
4. In the Save As dialog box, select Template (*.xlt) from the Save as type box.
5. Enter **sheet.xlt** for the filename.
6. Save the file in your \XLStart folder. This folder is probably located within your c:\Program Files\Microsoft Office\Office folder.

   You can also save your book.xlt template file in the folder that is specified as an alternate startup folder. You specify an alternate startup folder in the General tab of the Options dialog box.
7. Close the file.

After performing this procedure, all new sheets that you insert with the Insert➪Worksheet command are formatted like your sheet.xlt template.

When you right-click a sheet tab and choose Insert from the shortcut menu, Excel displays its Insert dialog box (which looks just like the New dialog box). If you've created a template named sheet.xlt, you can select it by clicking the icon labeled Worksheet.

Editing the sheet.xlt Template

After you create your sheet.xlt template, you may discover that you need to change it. You can open the sheet.xlt template file and edit it just like any other workbook. After you make your changes, save the file and close it.

Resetting the Default New Worksheet

If you create a sheet.xlt template and then decide that you would rather use the standard default new worksheet settings, simply delete the sheet.xlt template file from the Xlstart folder. Excel then resorts to its built-in default settings for new worksheets.

Custom Workbook Templates

The book.xlt and sheet.xlt templates discussed in the previous section are two special types of templates that determine default settings for new workbooks and new worksheets. This section discusses other types of templates, referred to as *workbook templates,* which are simply workbooks that are set up to be used as the basis for new workbooks.

Why use a workbook template? The simple answer is that it saves you from repeating work. Assume that you create a monthly sales report that consists of your company's sales by region, plus several summary calculations and charts. You can create a template file that consists of everything except the input values. Then, when it's time to create your report, you can open a workbook based on the template, fill in the blanks, and you're finished.

You could, of course, just use the previous month's workbook and save it with a different name. This is prone to errors, however, because you easily can forget to use the Save As command and accidentally overwrite the previous month's file.

How Templates Work

When you create a workbook that is based on a template, Excel creates a copy of the template in memory so that the original template remains intact. The default workbook name is the template name with a number appended. For example, if you create a new workbook based on a template named Sales Report.xlt, the workbook's default name is Sales Report1.xls. The first time that you save a workbook that is created from a template, Excel displays its Save As dialog box, so that you can give the template a new name if you want to.

Templates That Are Included with Excel

Excel ships with three workbook templates (called Spreadsheet Solutions templates), which were developed by Village Software. When you select File⇨New, you can select one of these templates from the New dialog box. Click the tab labeled Spreadsheet Solutions to choose one of the following templates upon which to base your new workbook (see Figure 34-2).

EXCEL 2000 These templates are included with Excel 2000.

- **Expense Statement:** Helps you to create expense report forms and a log to track them
- **Invoice:** Helps you to create invoices
- **Purchase Order:** Helps you to create purchase orders to send to vendors

Note A fourth template, named Village Software.xlt, describes additional templates that you can obtain from Village Software.

Tip You can also download some additional templates from Microsoft's Web site: `http://www.microsoft.com/excel`.

Attachment 2a

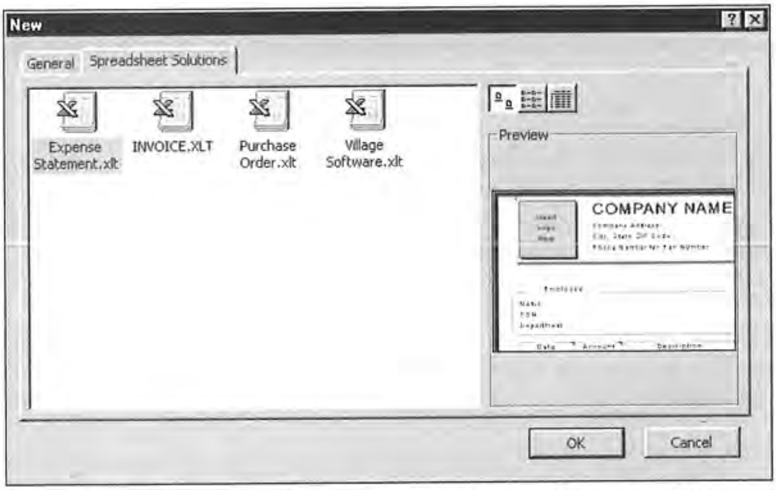


Figure 34-2: You can create a new workbook based on one of the Spreadsheet Solutions templates.

Creating Custom Templates

This section describes how to create workbook templates, which is really quite simple.

A *custom template* is essentially a normal workbook, and it can use any of Excel's features, such as charts, formulas, and macros. Usually, a template is set up so that the user can enter values and get immediate results. In other words, most templates include everything but the data — which is entered by the user.

If the template is going to be used by novices, you may consider locking all the cells except the input cells (use the Protection panel of the Format Cells dialog box for this). Then, protect the worksheet by choosing Tools ➪ Protection ➪ Protect Sheet.

To save the workbook as a template, choose File ➪ Save As and select Template (*.xlt) from the drop-down list labeled Save as type. Save the template in your Microsoft Office\Templates folder (or a folder within that Templates folder).

Before you save the template, you may want to specify that the file be saved with a preview image. Select File ➪ Properties, and check the box that is labeled Save Preview Picture. That way, the New dialog box displays the preview when the template's icon is selected.

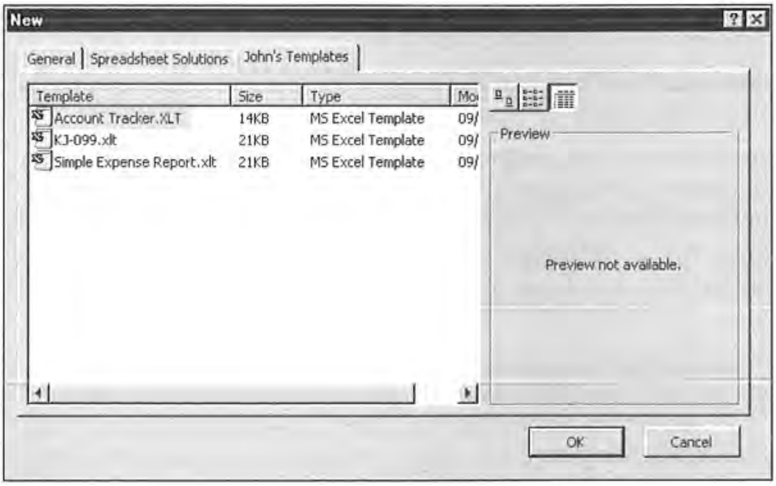
Attachment 2a

Where to Store Your Templates

Template files can be stored anywhere. When you open a template file (by selecting File ⇨ New), you don't actually open the template. Rather, Excel creates a new workbook that's based on the template that you specify. However, your templates are easier to access if you store them in one of the following locations:

- **Your \XLStart folder:** This is probably located within c:\Program Files\Microsoft Office\Office. If you create a default workbook template (book.xlt) or a default worksheet template (sheet.xlt), you store these templates in this folder.
- **Your \Templates folder:** This is probably located within your c:\Program Files\Microsoft Office\Office folder. Custom templates that are stored here appear in the New dialog box.
- **A folder located in your \Templates folder:** If you create a new folder within this folder, its name appears as a tab in the New dialog box. Clicking the tab displays the templates that are stored in that folder. The accompanying figure shows how the New dialog box looks when a new folder (named John's Templates) is in the Templates folder.

If you've specified an alternate startup folder (using the General panel of the Options dialog box), templates that are stored in that location also appear in the New dialog box.



Template	Size	Type	Mo
Account Tracker.XLT	14KB	MS Excel Template	09/
KJ-099.xlt	21KB	MS Excel Template	09/
Simple Expense Report.xlt	21KB	MS Excel Template	09/

If you later discover that you want to modify the template, choose File ⇨ Open to open and edit the template (don't use the File ⇨ New command, which creates a workbook that is based on the template).

Ideas for Creating Templates

This section provides a few ideas that may spark your imagination for creating templates. A partial list of the settings that you can adjust and use in your custom templates is as follows:

- **Multiple formatted worksheets:** You can, for example, create a workbook template that has two worksheets: one formatted to print in landscape mode and one formatted to print in portrait mode.
- **Workbook properties:** You can set one or more workbook properties. For example, Excel doesn't store a preview picture of your workbook. Select File ⇨ Properties and then change the Save Preview Picture option in the Summary panel.
- **Several settings in the View panel of the Options dialog box:** For example, you may not like to see sheet tabs, so you can turn off this setting.
- **Color palette:** Use the Color panel of the Options dialog box to create a custom color palette for a workbook.
- **Style:** The best approach is to choose Format ⇨ Style and modify the attributes of the Normal style. For example, you can change the font or size, the alignment, and so on.
- **Custom number formats:** If you create number formats that you use frequently, these can be stored in a template.
- **Column widths and row heights:** You may prefer that columns be wider or narrower, or you may want the rows to be taller.
- **Print settings:** Change these settings in the Page Setup dialog box. You can adjust the page orientation, paper size, margins, header and footer, and several other attributes.
- **Sheet settings:** These are options in the Options dialog box. They include gridlines, automatic page break display, and row and column headers.

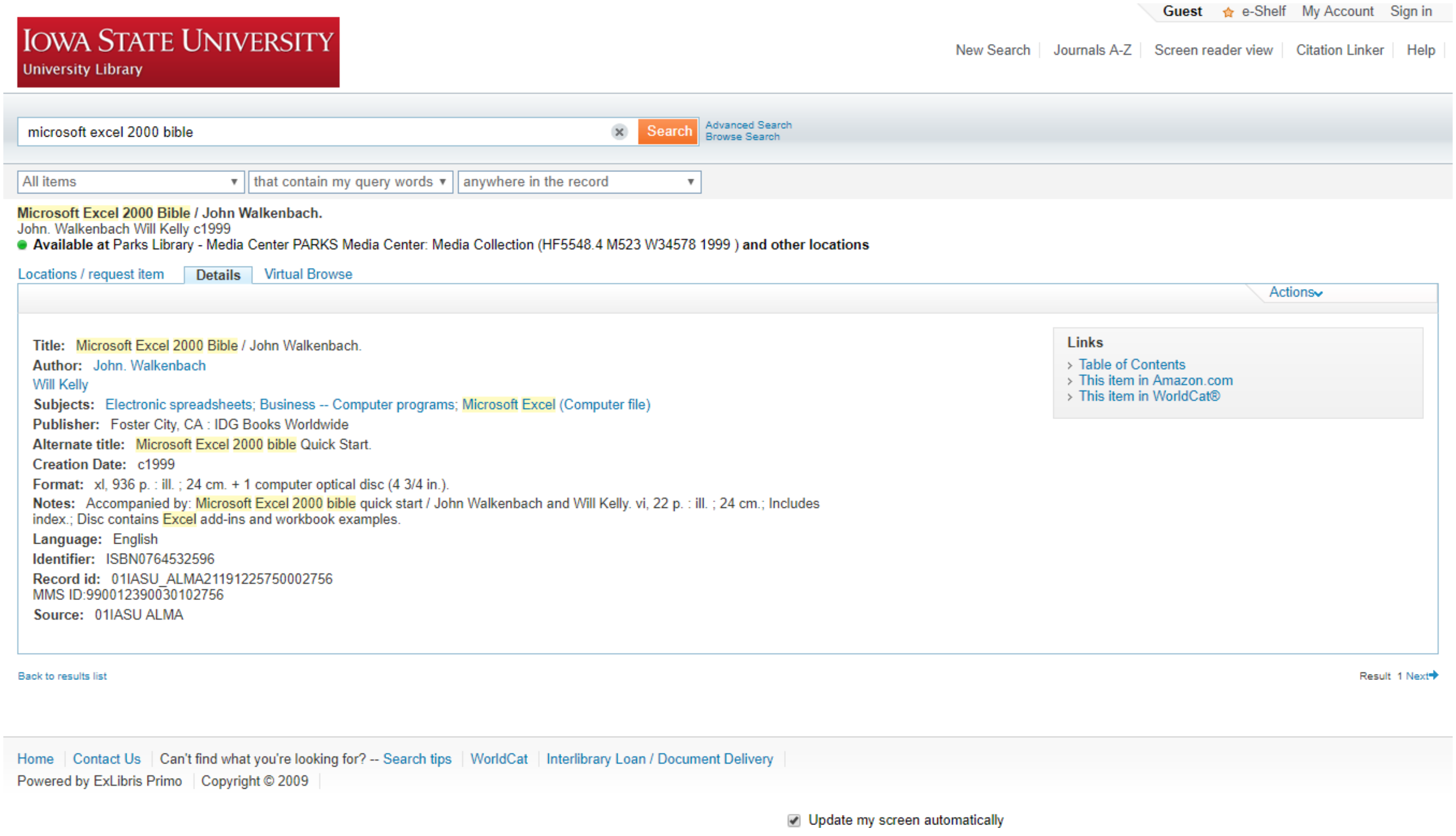
Summary

This chapter introduces the concept of templates. Excel supports three template types: a default workbook template, a default worksheet template, and custom workbook templates. This chapter describes how to create such templates and where to store them. It also discusses the Template Wizard, a tool that helps you to create templates that can store data in a central database.

✦ ✦ ✦

Attachment 2b

Attachment 2b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Will Kelly
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Publisher: Foster City, CA : IDG Books Worldwide
Alternate title: Microsoft Excel 2000 bible Quick Start.
Creation Date: c1999
Format: xl, 936 p. : ill. ; 24 cm. + 1 computer optical disc (4 3/4 in.).
Notes: Accompanied by: Microsoft Excel 2000 bible quick start / John Walkenbach and Will Kelly. vi, 22 p. : ill. ; 24 cm.; Includes index.; Disc contains Excel add-ins and workbook examples.
Language: English
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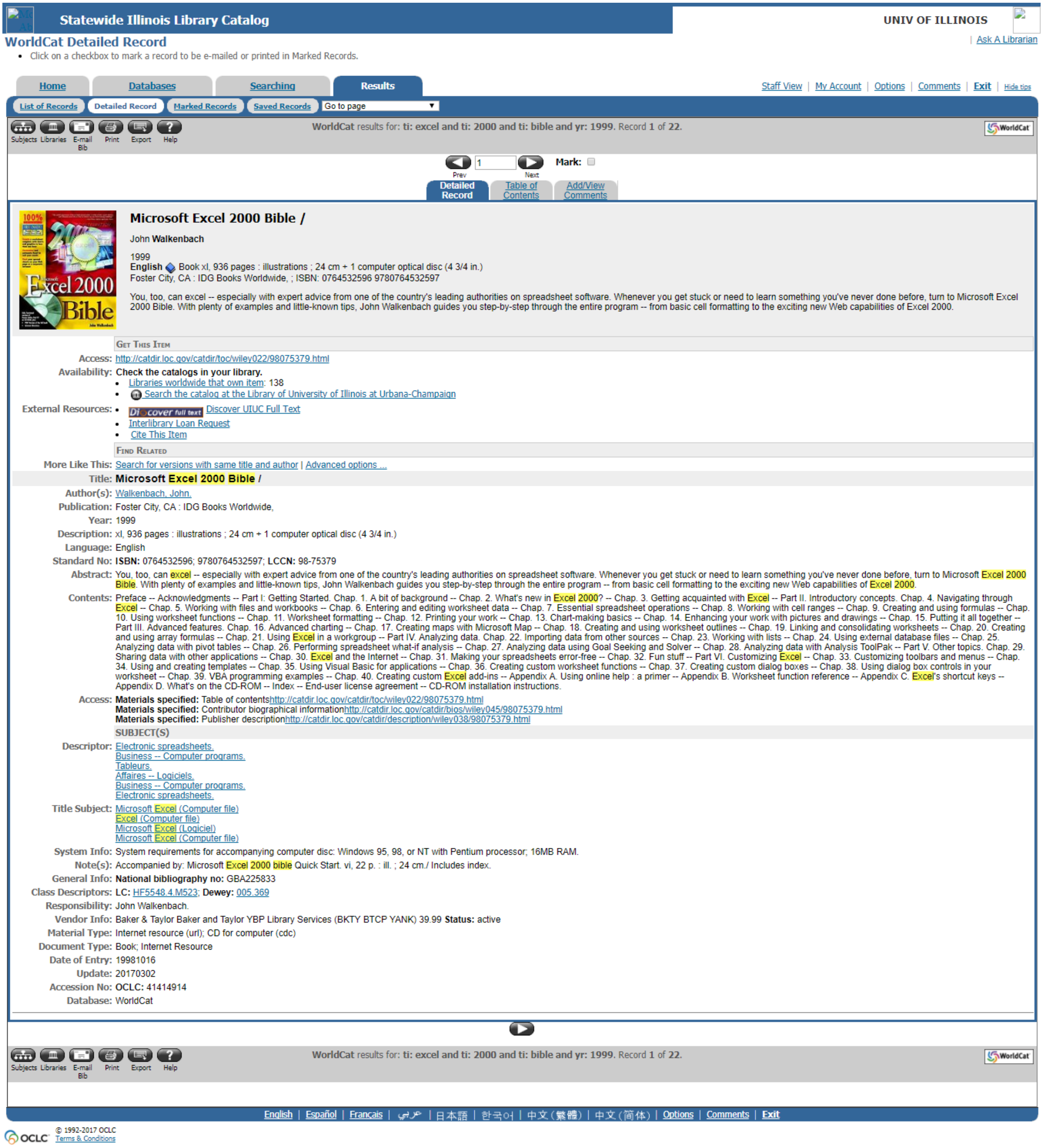

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Microsoft Excel 2000 Bible /

John **Walkenbach**

1999
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Foster City, CA : IDG Books Worldwide, ; ISBN: 0764532596 9780764532597

You, too, can excel -- especially with expert advice from one of the country's leading authorities on spreadsheet software. Whenever you get stuck or need to learn something you've never done before, turn to Microsoft Excel 2000 Bible. With plenty of examples and little-known tips, John Walkenbach guides you step-by-step through the entire program -- from basic cell formatting to the exciting new Web capabilities of Excel 2000.

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Description: xl, 936 pages : illustrations ; 24 cm + 1 computer optical disc (4 3/4 in.)

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Abstract: You, too, can excel -- especially with expert advice from one of the country's leading authorities on spreadsheet software. Whenever you get stuck or need to learn something you've never done before, turn to Microsoft Excel 2000 Bible. With plenty of examples and little-known tips, John Walkenbach guides you step-by-step through the entire program -- from basic cell formatting to the exciting new Web capabilities of Excel 2000.

Contents: Preface -- Acknowledgments -- Part I: Getting Started. Chap. 1. A bit of background -- Chap. 2. What's new in Excel 2000? -- Chap. 3. Getting acquainted with Excel -- Part II. Introductory concepts. Chap. 4. Navigating through Excel -- Chap. 5. Working with files and workbooks -- Chap. 6. Entering and editing worksheet data -- Chap. 7. Essential spreadsheet operations -- Chap. 8. Working with cell ranges -- Chap. 9. Creating and using formulas -- Chap. 10. Using worksheet functions -- Chap. 11. Worksheet formatting -- Chap. 12. Printing your work -- Chap. 13. Chart-making basics -- Chap. 14. Enhancing your work with pictures and drawings -- Chap. 15. Putting it all together -- Part III. Advanced features. Chap. 16. Advanced charting -- Chap. 17. Creating maps with Microsoft Map -- Chap. 18. Creating and using worksheet outlines -- Chap. 19. Linking and consolidating worksheets -- Chap. 20. Creating and using array formulas -- Chap. 21. Using Excel in a workgroup -- Part IV. Analyzing data. Chap. 22. Importing data from other sources -- Chap. 23. Working with lists -- Chap. 24. Using external database files -- Chap. 25. Analyzing data with pivot tables -- Chap. 26. Performing spreadsheet what-if analysis -- Chap. 27. Analyzing data using Goal Seeking and Solver -- Chap. 28. Analyzing data with Analysis ToolPak -- Part V. Other topics. Chap. 29. Sharing data with other applications -- Chap. 30. Excel and the Internet -- Chap. 31. Making your spreadsheets error-free -- Chap. 32. Fun stuff -- Part VI. Customizing Excel -- Chap. 33. Customizing toolbars and menus -- Chap. 34. Using and creating templates -- Chap. 35. Using Visual Basic for applications -- Chap. 36. Creating custom worksheet functions -- Chap. 37. Creating custom dialog boxes -- Chap. 38. Using dialog box controls in your worksheet -- Chap. 39. VBA programming examples -- Chap. 40. Creating custom Excel add-ins -- Appendix A. Using online help : a primer -- Appendix B. Worksheet function reference -- Appendix C. Excel's shortcut keys -- Appendix D. What's on the CD-ROM -- Index -- End-user license agreement -- CD-ROM installation instructions.

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SUBJECT(S)

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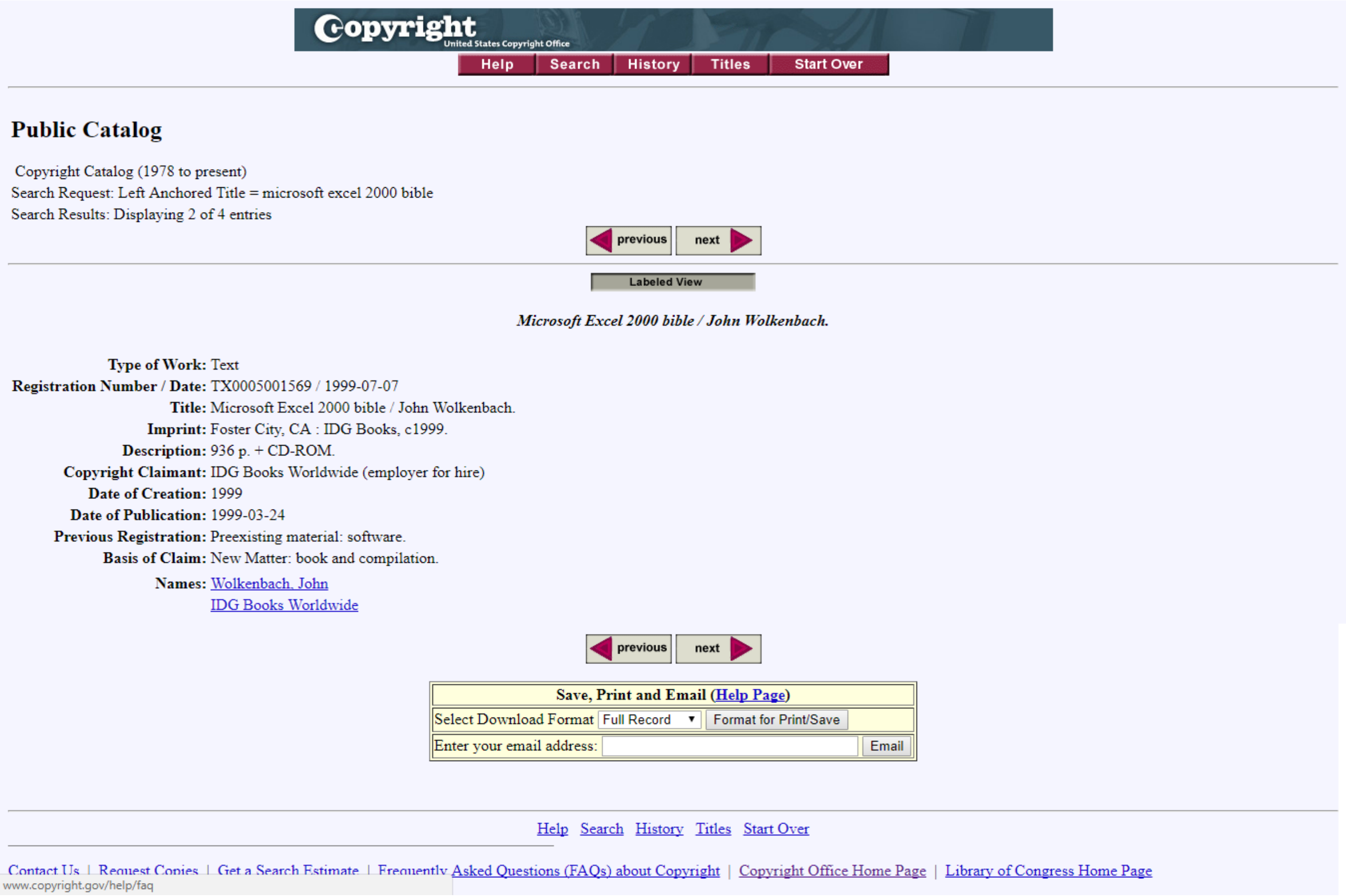
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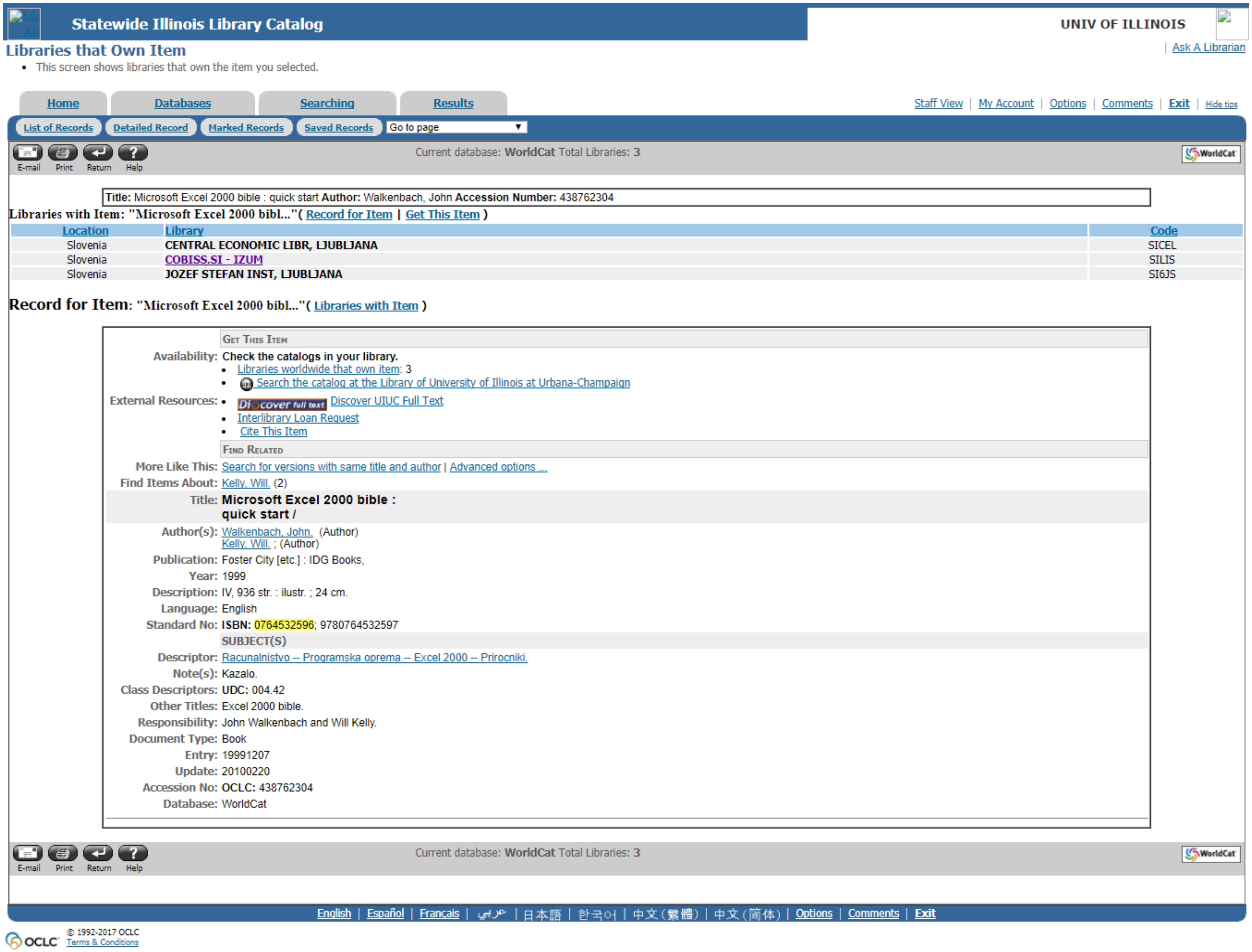

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