
Lesson 9 Using Databases

Lesson Topics

- Sorting Data
- Filtering Data
- Data Forms

Lesson Objectives

At the end of the lesson, you will be able to:

- Describe the structure of an Excel database;
- Sort database records based on one or more fields;
- Define the database range and the criteria range;
- Use criteria to filter records in a database;
- Use wildcard characters and operators to set filter criteria;
- Use the Data Forms feature to manage an Excel database.

Student Files Used

You will use the following files from your student folder:

- Sort
- People 1

Sorting Data

Up to now, your workbooks have been created to perform calculations on numbers. This is Excel's *spreadsheet* capability. Excel can also be used to manage and analyze information. This is its *database* capability. In this lesson you will begin to explore Excel's database feature.

At the simplest level, a *database* is a list, usually in the form of a table. Since a database can contain a lot of information, it is important to have tools that allow you to manage the information. Such database management tools might include the ability to sort the list, find information in it, and "pull out" (*extract*) information from it. You will start with sorting, which is putting information in alphabetical or numerical order. You can sort in ascending order (A-Z or 1-10) or in descending order (Z-A or 10-1).

You are going to sort information in a workbook named *Sort*.

1. Open Sort.

Notice the list of six people with their phone numbers and salaries. Excel considers this list a database.

| | A | B | C |
|---|-------------|--------------|---------------|
| 1 | Name | Phone | Salary |
| 2 | Green | 306-543-1212 | \$65,000 |
| 3 | Smith | 212-333-2344 | \$65,000 |
| 4 | Jones | 717-881-1212 | \$30,000 |
| 5 | Adams | 808-998-7654 | \$80,000 |
| 6 | Fenton | 203-222-3333 | \$50,000 |
| 7 | Avery | 617-444-1234 | \$65,000 |

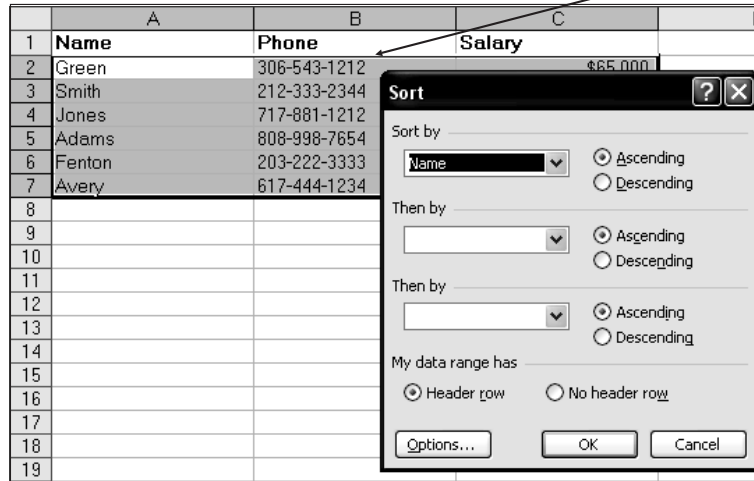
The rows are called *records*, and the columns are called *fields*. The top row, called the *header row*, contains the names for the fields. Notice that this workbook consists of six records and that each record contains three fields.

- You are going to put the names in alphabetical order. No matter how you sort a database, Excel will keep the information in each record together – it will not mix someone's phone number with another person's salary, for example. You are going to put the names in alphabetical order. To perform the sort, the active cell should be somewhere in the database.

Go to A2. The active cell has to be somewhere in the database.

- On the Data menu, choose Sort.**

The Sort dialog box appears. In the workbook, notice that Excel has highlighted the database range.



4. In the Sort by drop-down list box, notice *Name*.

Click the Sort by drop-down list box.

Notice the list includes *Phone* and *Salary*. Excel has recognized that row 1 contains the header row and it uses the contents of the header row as the field names.

In the *My data range has* section at the bottom of the dialog box, notice that the *Header row* has been chosen. If *No header row* were chosen, Excel would use the column headings as field names.

5. Click **Name** to close the Sort by drop-down list box.
6. Verify that the *Ascending* option is selected below Sort by.
7. Click **OK**.

Notice that the records are in ascending alphabetical order by name. Below is an example.

| | A | B | C |
|---|-------------|--------------|---------------|
| 1 | Name | Phone | Salary |
| 2 | Adams | 808-998-7654 | \$80,000 |
| 3 | Avery | 617-444-1234 | \$65,000 |
| 4 | Fenton | 203-222-3333 | \$50,000 |
| 5 | Green | 306-543-1212 | \$65,000 |
| 6 | Jones | 717-881-1212 | \$30,000 |
| 7 | Smith | 212-333-2344 | \$65,000 |

You are going to sort the records in ascending order by phone numbers.

1. Remember that the active cell has to be somewhere in the database.

Verify that the active cell is in the database.

2. **On the Data menu, choose *Sort*.**
3. **Click the *Sort by* drop-down list box.**
4. **Choose *Phone*.**
5. **Verify that *Ascending* is chosen.**
6. **Click *OK*.**

Notice that the records have been sorted by phone number in ascending order.

| | A | B | C |
|---|--------|--------------|----------|
| 1 | Name | Phone | Salary |
| 2 | Fenton | 203-222-3333 | \$50,000 |
| 3 | Smith | 212-333-2344 | \$65,000 |
| 4 | Green | 306-543-1212 | \$65,000 |
| 5 | Avery | 617-444-1234 | \$65,000 |
| 6 | Jones | 717-881-1212 | \$30,000 |
| 7 | Adams | 808-998-7654 | \$80,000 |

You are going to sort the records by salary. The salaries will be in descending order, with the highest on top and the lowest at the bottom.

1. **Verify that the active cell is in the database.**
2. **On the Data menu, choose *Sort*.**
3. **Click the *Sort by* drop-down list box and choose *Salary*.**
4. **In the *Sort by* box, choose *Descending*.**
5. **Click *OK*.**

The records are in order by salary. The highest salary is on top and the lowest is at the bottom.

| | A | B | C |
|---|--------|--------------|----------|
| 1 | Name | Phone | Salary |
| 2 | Adams | 808-998-7654 | \$80,000 |
| 3 | Smith | 212-333-2344 | \$65,000 |
| 4 | Green | 306-543-1212 | \$65,000 |
| 5 | Avery | 617-444-1234 | \$65,000 |
| 6 | Fenton | 203-222-3333 | \$50,000 |
| 7 | Jones | 717-881-1212 | \$30,000 |

Sorting Duplicates

There are records on your screen with identical salaries (\$65,000). They are in no particular order, but it might be useful to have these three records in alphabetical order by name. The *Then By* boxes on the Sort dialog box allow you to do this.

1. **Verify that the active cell is in the database.**
2. **On the Data menu, choose Sort.**
3. **In the Sort by box, verify that Salary and Descending are chosen.**
4. **Click the first Then by drop-down list box.**

Notice that the same fields are listed as those in the Sort by drop-down list box.

5. **Choose Name.**
6. **In the first Then by box, verify that Ascending is chosen.**
7. **Click OK.**

Excel has performed two sorts — one on the salaries and one on the names. Notice that the duplicate salaries are in alphabetical order by name.

| | A | B | C |
|---|-------------|--------------|---------------|
| 1 | Name | Phone | Salary |
| 2 | Adams | 808-998-7654 | \$80,000 |
| 3 | Avery | 617-444-1234 | \$65,000 |
| 4 | Green | 306-543-1212 | \$65,000 |
| 5 | Smith | 212-333-2344 | \$65,000 |
| 6 | Fenton | 203-222-3333 | \$50,000 |
| 7 | Jones | 717-881-1212 | \$30,000 |

duplicate salaries

For more practice, you are going to add two more rows and then Sort by the salary field again.

1. **Go to A8.**
2. **Beginning in A8, type the following two records. Do not worry if the salaries are not formatted properly.**

| | | |
|---------|--------------|-------|
| Zeller | 312-555-7777 | 30000 |
| Carlton | 212-777-2222 | 30000 |

The Sort Buttons

The *Sort Ascending* and *Sort Descending* buttons on the Standard toolbar let you sort one field in ascending or descending order.

1. To sort on just one field, the active cell must be in the field to be sorted.

Go to A3.

2. **On the Standard toolbar, click the Sort Ascending button.** 

Notice that the records are sorted by names in ascending order.

3. **On the Standard toolbar, click the Sort Descending button.** 


Notice the names in descending order.

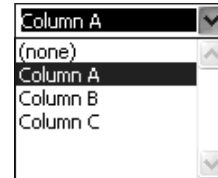
4. **Click somewhere in column C and use both buttons to sort the salaries.**

Sorting a Selected Range

You can also select a range to be sorted — you do not have to sort the entire database.

1. **Select A4:C6.**
2. **On the Data menu, choose *Sort*.**
3. **Click the *Sort by* drop-down list box.**

Notice that in place of the header row, Excel lists *Column A*, *Column B*, and *Column C*.  It lists the header row only when it is directly above the first row to be sorted.



4. **Choose *Ascending* and click OK.**

Notice that only the records in the selected range were sorted.

| | A | B | C |
|---|-------------|--------------|---------------|
| 1 | Name | Phone | Salary |
| 2 | Adams | 808-998-7654 | \$80,000 |
| 3 | Smith | 212-333-2344 | \$65,000 |
| 4 | Avery | 617-444-1234 | \$65,000 |
| 5 | Fenton | 203-222-3333 | \$50,000 |
| 6 | Green | 306-543-1212 | \$65,000 |
| 7 | Zeller | 312-555-7777 | \$30,000 |
| 8 | Jones | 717-881-1212 | \$30,000 |
| 9 | Carlton | 212-777-2222 | \$30,000 |

- Be careful when using the Sort buttons with a selected range. If you select only part of each record, only the cells in the selected range are sorted – Excel does not keep the information in each record together. However, Excel warns you what will happen.

You are going to see what happens when you use the Sort buttons on a partially selected range.

Select B3:B7.

- On the Standard toolbar, click the Sort Ascending button.

The Sort Warning dialog box appears. If you choose *Continue with the current selection* and click the Sort button, Excel will not keep the record information together.



- Click Cancel.
- Close Sort. You will not be using it again.

Filtering Data

The *Filter* command is used to locate records in the database that fit conditions that you have specified. For example, if you have a class grade book list, you could use the filter command to list all students who have an average above 75%.

- Open *People 1*.

You would probably not use the *Filter* command on such a small database. When learning the feature, however, a small database makes it is easier to see how the command works.

| | A | B | C | D |
|---|-------------|--------------|------------|---------------|
| 1 | Name | Phone | Job | Salary |
| 2 | Smith | 333-353-1234 | Actor | \$30,000 |
| 3 | Hankins | 222-576-4321 | Actor | \$40,000 |
| 4 | Martin | 333-444-1234 | Teacher | \$25,000 |
| 5 | Smith | 555-978-4321 | Lawyer | \$100,000 |
| 6 | Shimkin | 654-826-4321 | Actor | \$75,000 |
| 7 | Wilson | 333-692-6543 | Teacher | \$30,000 |

Creating the Ranges

To use the *Filter* command, two ranges have to be defined — the *database range* (where the search is to occur), and the *criteria range* (the information that Excel should retrieve). Because there is an empty column to the right of the database and an empty row below it, it is not necessary to define the database range for this particular list.

1. You are going to define the *criteria range*. The first row of a criteria range contains the field names. The information to be searched for is typed below this. You are going to copy the field names in row 1 to row 9.

Select A1:D1.

2. **On the Standard toolbar, click the Copy button.**
3. **Go to A9 and tap the ENTER key to paste the range.**

The field names have been copied to row 9.

Note: Field names can consist of any characters, including spaces. It is wise to avoid numbers, however. The names have to be an exact match (except for capitalization), so to avoid making mistakes, it is best to copy them as you have done.

4. You are going to type the criteria, which is the information to be searched for. You are going to look for people who are teachers.

Go to C10.

5. **Type Teacher and tap the ENTER key.**

Your screen should look like the following:

| | A | B | C | D |
|----|-------------|--------------|------------|---------------|
| 1 | Name | Phone | Job | Salary |
| 2 | Smith | 333-353-1234 | Actor | \$30,000 |
| 3 | Hankins | 222-576-4321 | Actor | \$40,000 |
| 4 | Martin | 333-444-1234 | Teacher | \$25,000 |
| 5 | Smith | 555-978-4321 | Lawyer | \$100,000 |
| 6 | Shimkin | 654-826-4321 | Actor | \$75,000 |
| 7 | Wilson | 333-692-6543 | Teacher | \$30,000 |
| 8 | | | | |
| 9 | Name | Phone | Job | Salary |
| 10 | | | Teacher | |

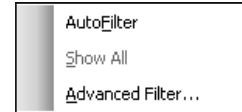
6. **Click in any cell of the database range A1:D7 to identify the database.**

7. On the Data menu, point to *Filter*.

Notice the submenu that appears. →

It can be easier to learn the *Advanced Filter* feature first.

You will learn the *AutoFilter* feature at the end of the next lesson.



8. Choose *Advanced Filter*.

The *Advanced Filter* dialog box appears. Excel highlights and places a marquee around the range.



Notice that you can *Filter the list, in-place* (i.e., display the filtered records within the database range) or you can *Copy to another location* (i.e., copy the filtered records to another part of the workbook). Also notice that *\$A\$1:\$D\$7* is shown in the *List range* text box, which is the range that is highlighted in the worksheet. When Excel displays a range in these text boxes, it displays them as absolute references.

9. You are going to define the criteria range, which is the row of field names in row 9 and the row below it.

Click an insertion point in the *Criteria range* text box.

10. In the worksheet, select A9:D10. (Move the dialog box out of the way if it is covering the range.)

The range appears with absolute cell references. (The worksheet name, *People!*, also appears.)

11. Click OK.

Notice that the records that have *Teacher* in the Job

field are displayed. The row heading of each record is in blue, indicating that these are filtered records.

| | A | B | C | D |
|----|-------------|--------------|------------|---------------|
| 1 | Name | Phone | Job | Salary |
| 4 | Martin | 333-444-1234 | Teacher | \$25,000 |
| 7 | Wilson | 333-692-6543 | Teacher | \$30,000 |
| 8 | | | | |
| 9 | Name | Phone | Job | Salary |
| 10 | | | Teacher | |

The other records of the database are temporarily hidden because you are in *Filter Mode*. Notice *Filter Mode* on the Status bar.

12. You are going to exit *Filter Mode* and re-display the other records.

On the Data menu, point to *Filter* and then choose *Show All*.

The other records reappear, and *Ready* is displayed on the Status bar.

You are going to filter the records with *Actor* as the job.

1. **Replace the contents of C10 with *Actor*.**
2. **Click anywhere in the database range (A1:D7).**

If you did not do this, you would have to type the database range in the *List range* text box.

3. **On the Data menu, point to *Filter* and then choose *Advanced Filter*.**
4. **Verify that $\$A\$1:\$D\7 is in the *List range* text box.**

Excel always remembers the last range indicated in a text box. If it is incorrect, merely type it correctly or drag through the range in the worksheet.

5. **Verify that $\$A\$9:\$D\10 is in the *Criteria range* text box.**

Once again, correct this, if necessary.

6. **Click OK.**

Notice the records with *Actor* in the Job field. If there is a thick bottom border under a cell in the database, it is the hidden active cell. It will disappear when you click somewhere else.

- 7. On the Data menu, point to *Filter* and then choose *Show All*.**

All of the records reappear, and *Ready* is on the Status bar.

You are going to find all names with *Smith*.

- 1. Delete the contents of C10 (*Actor*).**
- 2. In A10, type *Smith* and tap the ENTER key.**
- 3. Click somewhere in A1:D7.**
- 4. On the Data menu, point to *Filter* and then choose *Advanced Filter*.**
- 5. Verify that $\$A\$1:\$D\7 is in the *List range* text box.**
- 6. Verify that $\$A\$9:\$D\10 is in the *Criteria range* text box.**
- 7. Click OK.**

Notice the records with *Smith* in the Name field.

- 8. On the Data menu, point to *Filter* and then choose *Show All*.**

Tip: When you enter criteria, be sure that the spelling and case are exactly like your data. Otherwise, the filter will not work. (As stated before, it is best to copy the criteria rather than type them.)

Wildcard Characters

You can use the two wildcard characters in your filter criteria — an asterisk (*), which represents one or more characters, and a question mark (?), which represents one character.

You are going to filter all of the records within the 333 telephone area code.

- 1. Delete the contents of A10 (*Smith*).**
- 2. Go to B10.**
- 3. Type *333** and tap the ENTER key.**
- 4. Click somewhere in A1:D7.**
- 5. On the Data menu, point to *Filter* and then choose *Advanced Filter*.**

6. **Verify that $A\$1:D\7 is in the *List range text box*.**
7. **Verify that $A\$9:D\10 is in the *Criteria range text box*.**
8. **Click OK.**

Notice the records with a 333 area code. Notice that they appear with their row numbers in blue.

You are going to find records with 333 as the area code and 1234 as the final four digits. You can do this by filtering the records already selected.

1. **Change the contents of B10 to: 333-???-1234**
2. **Position the active cell somewhere in A1:D7.**
3. **On the Data menu, point to *Filter* and then choose *Advanced Filter*.**
4. **Verify that $A\$1:D\7 is in the *List range text box*.**
5. **Verify that $A\$9:D\10 is in the *Criteria range text box*.**
6. **Click OK to continue.**

Notice that two records have been found.

7. **On the Data menu, point to *Filter* and then choose *Show All*.**

You are going to find all of the records for people whose last names begin with the letter S.

1. **Delete the contents of B10.**
2. **In A10, type S* and tap the ENTER key.**
3. **Click somewhere in A1:D7.**
4. **On the Data menu, point to *Filter* and then choose *Advanced Filter*.**
5. **Verify that $A\$1:D\7 is in the *List range text box*.**
6. **Verify that $A\$9:D\10 is in the *Criteria range text box*.**
7. **Click OK.**

Notice the records.

- 8. On the Data menu, point to *Filter* and then choose *Show All*.**

Tip: If your filter needs to include an actual question mark or asterisk (not as a wild character, but as a text character), precede the character with a tilde (~).

Using Operators

You can use the same operators for filter criteria that you used for IF tests in Lesson 6.

You are going to use the <>(not equal to) operator to find all records *except* those containing *Teacher*.

- 1. Delete the contents of A10.**
- 2. In C10, type <>Teacher and tap the ENTER key.**
- 3. Click somewhere in A1:D7.**
- 4. On the Data menu, point to *Filter* and then choose *Advanced Filter*.**
- 5. Verify that \$A\$1:\$D\$7 is in the *List range* text box.**
- 6. Verify that \$A\$9:\$D\$10 is in the *Criteria range* text box.**
- 7. Click OK.**

Notice the records that do not have *Teacher* in the Job field.

- 8. On the Data menu, choose *Filter* and then choose *Show All*.**

You are going to find the records of people whose name is not *Smith*.

- 1. Delete the contents of C10.**
- 2. In A10, type: <>Smith**
- 3. Position the active cell somewhere in A1:D7.**
- 4. On the Data menu, point to *Filter* and then choose *Advanced Filter*.**
- 5. Verify that \$A\$1:\$D\$7 is in the *List range* text box.**
- 6. Verify that \$A\$9:\$D\$10 is in the *Criteria range* text box.**

7. Click OK.

Notice the records that do not have *Smith* in the Name field.

8. On the Data menu, point to *Filter* and then choose *Show All*.

You are going to use the >(greater than) operator to find people who make over \$50,000 a year.

1. Delete the contents of A10.**2. In D10, type >50000 and tap the ENTER key.****3. Click somewhere in A1:D7.****4. On the Data menu, point to *Filter* and then choose *Advanced Filter*.****5. Verify that $A\$1:D\7 is in the *List range* text box.****6. Verify that $A\$9:D\10 is in the *Criteria range* text box.****7. Click OK.**

Notice the records that match the criteria.

8. On the Data menu, point to *Filter* and then choose *Show All*.

For practice using operators, type the Salary criteria on the next page and find all occurrences.

| |
|--|
| <p><50000 to find all salaries less than \$50,000 >=75000 to find all salaries greater than or equal to \$75,000 <=75000 to find all salaries less than or equal to \$75,000 <>30000 to find all salaries not equal to \$30,000</p> |
|--|

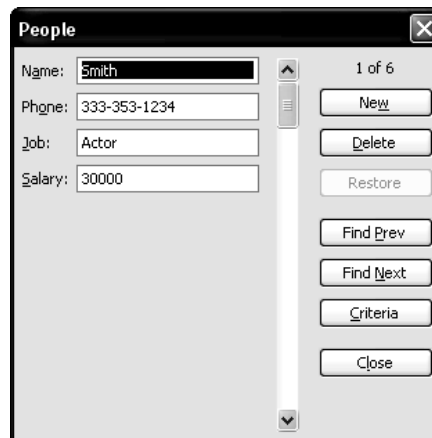
9. When you are finished, point to *Filter* on the Data menu and then choose *Show All*.

Data Forms

A data form is another way of viewing, modifying, and filtering the information in an Excel database. When you use the *Data Form* command, Excel displays the database one record at a time. Any change you make on a data form will be made in the corresponding database.

1. **Open a fresh copy of *People 1*.**
2. **Click somewhere in A1:D7 to define the database range.**
3. **On the Data menu, choose *Form*.**

The Data Form dialog box appears with the name of the worksheet on the title bar. The four field names appear next to text boxes. Excel knows the field names because of the header row. In the top right corner, notice *1 of 6*, indicating that the first record of a total of six records is displayed.



4. **Click the Find Next button two times and notice how the next two records are displayed.**

Also notice that there is a scroll bar in the dialog box that you can use to scroll through the records. You can also use the UP and DOWN ARROW keys.

5. **Click the Find Prev button until the first record, *Smith*, is displayed again.**
6. You are going to make a change.
In the *Name* text box, change the contents to: Smith, A.
7. **Tap the ENTER key.**

Notice that you are taken to the second record. The content of the *Name* text box is highlighted because Excel assumes that you want to make a change to the Name field of this record as well. In the database on the worksheet, notice that the first record is now *Smith, A.* (You might need to move the Data Form dialog box.)

Tip: If you have made a change and have yet to tap the ENTER key, you can click the Restore button to return the field to the original entry.

8. You can add a record to the end of a database by clicking the New button or by using the scroll bars to go to the end of the database.

In the dialog box, click the down scroll arrow until a blank record appears.

Notice that *New Record* is displayed in the upper right hand corner of the dialog box.

Note: Of course, you can always add and delete records by inserting or deleting cells in the worksheet.

9. **In the *Name* text box, type: Johnson**
10. **Tap the TAB key to go to the *Phone* text box and type: 555-234-6543**
11. **Tap the TAB key to go to the *Job* text box and type: Teacher**
12. **Tap the TAB key to go to the *Salary* text box and type: 45000**
13. **Tap the ENTER key.**

A new blank page appears for you to add another record. In the workbook, notice the record in row 8.

Note: When you add a new record from the Data Form dialog box, Excel automatically redefines the database range to include the new record.

14. **In the dialog box, use the scroll bar to scroll back to the first record.**
15. The Criteria button lets you find specific records.

Click the Criteria button.

Notice that the word *Criteria* appears in the top right corner of the dialog box and that the text boxes are blank.

- 16. In the *Job* text box, type Teacher and tap the ENTER key.**

Notice that you are taken to the first *Teacher* record in the data form. Notice *3 of 7* in the upper right corner of the dialog box.

- 17. Use the Find Next button to go to the other *Teacher* records. When there are no more *Teacher* records to find, Excel will stop displaying records.**

- 18.** You are going to delete the new *Johnson* record.

If the *Johnson* record is not on the screen, click the Find Next button until it is displayed.

- 19. Click the Delete button.**

An alert box appears.



- 20. Click OK.**

Notice that the *Johnson* record in row 8 has been deleted and that there is a blank page in the data form.

- 21. Click the Close button to return to the workbook.**

- 22. Close *People 1* without saving changes.**