



When you worked with algorithms in Chapter 2 you saw a flowchart that involved branching into different directions based on the answer to a question. In this chapter you will learn how branching is accomplished in C++ programs. You will learn the building blocks of computer decision making, and programming structures that cause different parts of a program to be executed based on a decision.

CHAPTER 7, SECTION 1

The Building Blocks of Decision Making



When you make a decision, your brain goes through a process of comparisons. For example, when you shop for clothes you compare the prices with those you previously paid. You compare the quality to other clothes you have seen or owned. You might even compare the clothes to what other people are wearing or what is in style. You might even compare the purchase of clothes to other possible uses for your available money.

Although your brain's method of decision making is much more complex than what a computer is capable of, decision making in computers is also based on comparing data. In this section, you will learn to use the basic tools of computer decision making.

DECISION MAKING IN PROGRAMS

Almost every program that is useful or user-friendly involves decision making. Although some algorithms progress sequentially from the first to the last instruction, most algorithms branch out into more than one path. At the point where the branching out takes place, a decision must be made as to which path to take.

The flowchart in Figure 7-1 is part of an algorithm in which the program is preparing to output a document to the printer. The user enters the number of copies he or she wants to print. To make sure the number is valid, the program verifies that the number of copies is not less than zero. If the user enters a negative number, a message is printed and the user is asked to reenter the value. If the user's input passes the test, the program simply goes on to whatever is next.

Decisions may also have to be made based on the wishes of the user. The flowchart in Figure 7-2 shows how the response to a question changes the path the program takes. If the user wants instructions printed on the screen, the program displays the instructions. Otherwise, that part of the program is bypassed.

The examples in Figures 7-1 and 7-2 are two common needs for decisions in programs. There are many other instances in which decisions must be made. As you do more and more programming, you will use decision making in countless situations.

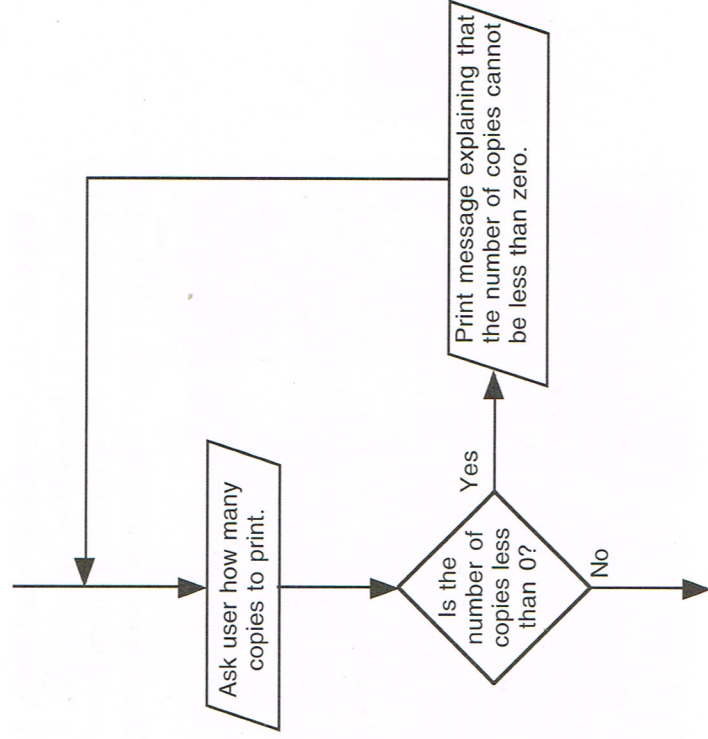


FIGURE 7-1 The decision-making part of this flowchart prevents the program from proceeding with invalid data.

REPRESENTING TRUE AND FALSE IN C++

True and false are represented in C++ as numbers just like everything else. You may be surprised, however, to learn how important the concept of true and false is to programming.

The way computers make decisions is very primitive. Even though computers make decisions in a way similar to the way the human brain does, computers don't have intuition or "gut" feelings. Decision making in a computer is based on doing simple comparisons. The microprocessor compares two values and "decides" if they are equivalent. Clever programming and the fact that computers can do millions of comparisons per second sometimes make computers appear to be "smart."

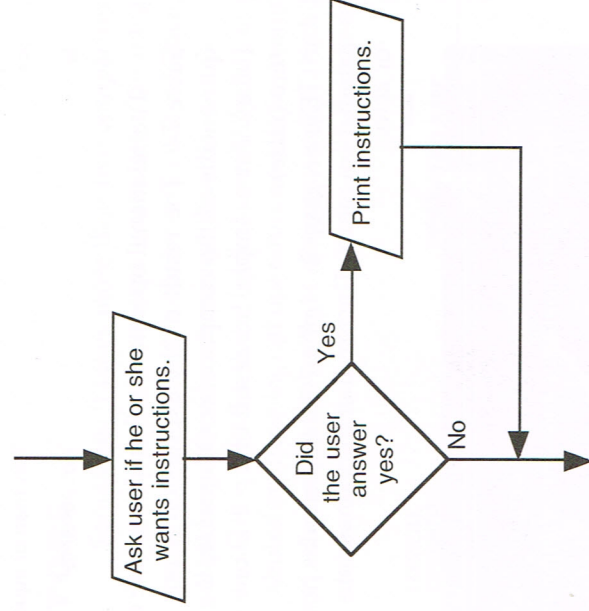


FIGURE 7-2 The path a program takes may be dictated by the user.