semicolon with a statement, which has its own semicolon. What this boils down to is that C++ programmers want to be able to declare and initialize a variable in a for loop initialization, and they'll do whatever is necessary to C++ syntax and to the English language to make it possible.

There's a practical aspect to declaring a variable in a for-init-statement about which you should know. Such a variable exists only within the for statement. That is, after the program leaves the loop, the variable is eliminated:

```cpp
for (int i = 0; i < 5; i++)
    cout << "C++ knows loops.\n";
```

Another thing you should know is that some C++ implementations follow an earlier rule and treat the preceding loop as if i were declared before the loop, thus making it available after the loop terminates. Use of this new option for declaring a variable in a for loop initialization results, at least at this time, in different behaviors on different systems.

Caution

At the time of writing, not all compilers have caught up with the current rule that a variable declared in a for loop control section expires when the loop terminates.

Back to the for Loop

Let's be a bit more ambitious with loops. Listing 5.4 uses a loop to calculate and store the first 16 factorials. Factorials, which are handy for computing odds, are calculated the following way. Zero factorial, written as 0!, is defined to be 1. Then, 1! is 1 * 0!, or 1. Next, 2! is 2 * 1!, or 2. Then, 3! is 3 * 2!, or 6, and so on, with the factorial of each integer being the product of that integer with the preceding factorial. (One of the pianist Victor Borge's best-known monologues features phonetic punctuation, in which the exclamation mark is pronounced something like phfftt pptz, with a moist accent. However, in this case, "!" is pronounced "factorial." ) The program uses one loop to calculate the values of successive factorials, storing them in an array. Then, it uses a second loop to display the results. Also, the program introduces the use of external declarations for values.