Random Fact 10.1

Scripting Languages

Suppose you work for an office where you must help with the bookkeeping. Suppose that every sales person sends in a weekly spreadsheet with sales figures. One of your jobs is to copy and paste the individual figures into a master spreadsheet and then copy and paste the totals into a word processor document that gets e-mailed to several managers. This kind of repetitive work can be intensely boring. Can you automate it?

It would be a real challenge to write a Java program that can help you—you'd have to know how to read a spreadsheet file, how to format a word processor document, and how to send e-mail.

Fortunately, many office software packages include **scripting languages**. These are programming languages that are integrated with the software for the purpose of automating repetitive tasks. The best-known of these scripting languages is Visual Basic Script, which is a part of the Microsoft Office suite. The Macintosh operating system has a language called AppleScript for the same purpose.

In addition, scripting languages are available for many other purposes. JavaScript is used for web pages. (There is no relationship between Java and JavaScript—the name JavaScript was chosen for marketing reasons.) Tcl (short for "tool control language" and pronounced "tickle") is an open source scripting language that has been ported to many platforms and is often used for scripting software test procedures. Shell scripts are used for automating software configuration, backup procedures, and other system administration tasks.

Scripting languages have two features that makes them easier to use than full-fledged programming languages such as Java. First, they are *interpreted.* The interpreter program reads each line of program code and executes it immediately without compiling it first. That makes experimenting much more fun—you get immediate feedback. Also, scripting languages are usually *loosely typed,* meaning you don't have to declare the types of variables. Every variable can hold values of any type. For example, the figure below shows a scripting session with the JavaScript implementation that is included in the Java Development Kit.

Scripting Java Classes with JavaScript

This version of JavaScript allows you to manipulate Java objects. The script stores frame and label objects in variables that are declared without types. It then calls methods that are executed immediately, without compilation. The frame pops up as soon as the line with the setVisible command is entered. In recent years, authors of computer viruses have discovered how scripting languages simplify their lives. The famous "love bug" is a Visual Basic Script program that is sent as an attachment to an e-mail. The e-mail has an enticing subject line "I love you" and asks the recipient to click on an attachment masquerading as a love letter. In fact, the attachment is a script file that is executed when the user clicks on it. The script creates some damage on the recipient's computer and then, through the power of the scripting language, uses the Outlook e-mail client to mail itself to all addresses found in the address book. Try programming that in Java! By the way, the person suspected of authoring that virus was a student who had submitted a proposal to write a thesis researching how to write such programs. Perhaps not surprisingly, the proposal was rejected by the faculty.

Why do we still need Java if scripting is easy and fun? Scripts often have poor error checking and are difficult to adapt to new circumstances. Scripting languages lack many of the structuring and safety mechanisms (such as classes and type checking by the compiler) that are important for building robust and scalable programs.