

13. What are the design issues for all iterative control statements?
14. What are the design issues for counter-controlled loop statements?
15. What is a pretest loop statement? What is a posttest loop statement?
16. Explain how a Fortran 95 Do statement works.
17. What is the difference between the **for** statement of C++ and that of Java?
18. In what way is C's **for** statement more flexible than that of many other languages?
19. What is the scope of a loop variable in Ada?
20. What does the **range** function in Python do?
21. What is one fundamental difference between Lua's numeric **for** and Fortran's Do?
22. What contemporary languages do not include a goto?
23. What are the design issues for logically controlled loop statements?
24. What is the main reason user-located loop control statements were invented?
25. What are the design issues for user-located loop control mechanisms?
26. What advantage does Java's **break** statement have over C's **break** statement?
27. What are the differences between the **break** statement of C++ and that of Java?
28. What is a user-defined iteration control?
29. What common programming language borrows part of its design from Dijkstra's guarded commands?

#### PROBLEM SET

1. Describe three situations where a combined counting and logical looping construct is needed.
2. Study the iterator feature of CLU in Liskov et al. (1981) and determine its advantages and disadvantages.
3. Compare the set of Ada control statements with those of C# and decide which are better and why.
4. What are the pros and cons of using unique closing reserved words on compound statements?
5. What are the arguments, pro and con, for Python's use of indentation to specify compound statements in control constructs?
6. Analyze the potential readability problems with using closure reserved words for control statements that are the reverse of the corresponding



initial reserved words, such as the **case-esac** reserved words of ALGOL 68. For example, consider common typing errors such as the reversal of two adjacent characters.

7. Use the *Science Citation Index* to find an article that refers to Knuth (1974). Read the article and Knuth's paper and write a paper that summarizes both sides of the goto issue.
8. In his paper on the goto issue, Knuth (1974) suggests a loop control construct that allows multiple exits. Read the paper and write an operational semantics description of the construct.
9. What are the arguments both for and against the exclusive use of Boolean expressions in the control statements in Java (as opposed to also allowing arithmetic expressions, as in C++)?
10. In Ada, the choice lists of the **case** construct must be exhaustive, so that there can be no unrepresented values in the control expression. In C++, unrepresented values can be caught at run time with the **default** selector. If there is no **default**, an unrepresented value causes the whole construct to be skipped. What are the pros and cons of these two designs (Ada and C++)?
11. Explain the advantages and disadvantages of the Java **for** statement, compared to Ada's **for**.
12. Describe a programming situation in which the else clause in Python's **for** statement would be convenient.
13. Describe three specific programming situations that require a posttest loop.
14. Speculate as to the reason control can be transferred into a C loop construct.

## PROGRAMMING EXERCISES

1. Rewrite the following pseudocode segment using a loop structure in the specified languages:

```

k = (j + 13) / 27
loop:
  if k > 10 then goto out
  k = k + 1
  i = 3 * k - 1
  goto loop
out: ...

```

- a. Fortran 95
- b. Ada