Foundations of Computer Science Laboratory

Karel the Robot - Part II

Today's lab consists of two Karel problems. I will give you an answer sheet which must be turned in before leaving lab today! However, it is unlikely that you will finish both problems in lab, and what is not finished in lab is your homework. It can easily take 4-6 hours to do these problems. Mail me the programs as attachments to email before the start of lab next week.

Please note: I have asked for very specific filenames for the files you send me by email. I expect to receive a couple of dozen files and if you don't use the filenames requested it is very possible that your files will be confused with someone else's files or that the two different problems will get mixed. If that happens, you won't get credit for your work. So ... please pay attention to the filenames requested in #1 and #2 below.

The goals of today's lab are to:
- develop your skills at "top down" and "bottom up" algorithmic discovery methods
- give you situations where using pre-conditions and post-conditions will help you solve problems
- expand your logical thinking skills
- write and test solutions to more advanced Karel problems

A Very Strong Suggestion ... Solve these problems before starting to write code.

Both problems are difficult and you need to use a careful "top down" approach, testing your ideas at every level of complexity. You might find it best to work with a partner, for sharing ideas and to test the program. For testing a program before all the details are done, one person can read the code and the other "walk through it". This way you can do some testing without wasting lots of time typing in (possibly incorrect) code.

1. Do problem #14 from the end of chapter 5 in the text. This is the "find your way home" problem as illustrated in Figure 5-29. Assume that Karel will always start on the corner of Second Street and Second Avenue and will face east. Karel must follow a path of beepers (similar but not identical to the one in the text) stopping when a corner that has two beepers is encountered. Name your program your_last_name-path.kp. Mail me the program with the filename your_last_name-path.kp.

2. Do problem #16 from the end of chapter 5 in the text and shown in Figure 5-30, the "maze" problem. Name the program your_last_name-maze.kp. Mail me the program with the filename your_last_name-maze.kp.

Your programs will be tested on a world which meets the specifications and is similar but not identical to the world diagrammed in the text. The solution will also be evaluated for efficiency. Robots that successfully move along the path or through the maze but do so with lots of extraneous, unnecessary moves won't get as much credit as robots that move smoothly and efficiently.

It does not matter in which order you do these problems. Some students find that the maze is easier than the path. Others find the opposite.