Karel The Robot

In the beginning... software
Karel the Robot

- All robots are controlled by software
- Artificially intelligent robots that can “think” minimally by themselves is still an infant science.
- Even the most functional of industrial arm robots, or devices we think of as robots, require software and the human programmer to work.
- There are some very sophisticated “robots”
  - Robots that perform surgery
  - Robots that walk on the moon
  - Robotic like limbs (arms and legs)
- All of these require human written software and often have human controllers.
Karel the Robot

- Robot Games – Robot Olympics?

http://www.youtube.com/watch?v=R8HrM7kleQI&eurl=http://www.robogames.net/
Karel the Robot

- Karel is a software agent that you as the programmer move around a grid.
- Karel can only perform a handful of tasks.
  - Karel’s only “understands” five (5) words
    - move
    - turnleft
    - putbeeper
    - pickbeeper
    - turnoff
  - Karel uses this limited vocabulary to move around its world.
Karel the Robot – Initial World View

Karel is an arrow shaped “cursor”!
Karel the Robot – Initial World View Tour

Initial World is the starting place.
- Into this World we enter Walls and Beepers
- Using Walls and Beepers we develop tasks we want Karel to accomplish

What do the buttons mean?
- Shortcuts and About buttons
- Load World
- Save World
- Clear World
- Compass Directions
- Number of Beepers and Beepers in Bag
Karel the Robot – World View

- Putting Walls and Beepers in Karel’s World
  - The easiest way to remember what to do is to click on *Shortcuts*

To move the cursor to a corner, click on that corner.
To add a wall, click midway between corners.
To remove a wall, click on it.
To place beepers, right-click on the corner and select the quantity.
To place Karel, right-click where he should be and select Place Karel.
Karel the Robot – World View

- Create a “World”
- Give Karel a task to complete
- Command Karel to complete this task.

- Task = Write a Program
Karel the Robot – Program View

- Open Program
- New Program
- Edit Program
- Save Program
- Compile
- Save As
- Print Program
- Abort Changes
Karel the Robot – New Program

☐ Pick a name, pick one that makes sense in context.
Once your program has a name you can begin to **COMMAND** Karel to do things.
What is a Program?

A program is a step-by-step set of instructions that solve a problem.

What’s the problem we want Karel to solve?

Go out into the “World” and retrieve the Beeper.

There is no single way to write any program

There are simple ways

There are efficient ways

There are very S L O W and inefficient ways

As long as it solves the problem it is a program.
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Karel the Robot
Enter the COMMANDs from Karel’s limited vocabulary
- move
- turnleft
- pickbeeper
- putbeeper
- turnoff

Every statement in Karel’s language ends in a semicolon ;;;;;;;;;
Karel the Robot – Writing a Program

beginning-of-program
  beginning-of-execution
    move;
    move;
    turnleft;
    turnleft;
    turnleft;
    move;
    move;
    turnoff;
  end-of-execution
end-of-program
Karel the Robot – syntax errors

- Karel tries to tell you where your error is located.
- All you know for sure is that Karel got confused somewhere around the line it is showing you.
Karel the Robot

- This shows that the program will be processed in order from top to bottom.
- Just because it Compiled does not mean it will work.
- To Compile a program is to translate it from “English” into the 0s and 1s that the computer understands.
Karel the Robot

1. Create a “World”
2. Write a program to solve a problem
3. Compile the program and remove all syntax errors (errors in spelling and grammar)
4. EXECUTE the program
   - Click the Execute button
   - Load the “World” by hitting the Initialize button
   - Click Run and see what happens.
Karel the Robot

- When Karel stops because the program told it to stop, the words “turned-off” appear in the little window.

- When Karel stops because the program asked Karel to do something it cannot do, the words “error-shutoff” appear in the little window.

- An error-shutoff means Karel has refused to follow the instructions because it has been asked to do something unconscionable.