```java
/*
 * AP(r) Computer Science GridWorld Case Study:
 * Copyright(c) 2005-2006 Cay S. Horstmann (http://horstmann.com)
 *
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 *
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 */

package info.gridworld.actor;

import info.gridworld.grid.Grid;
import info.gridworld.grid.Location;

import java.awt.Color;

/**
 * A <code>Bug</code> is an actor that can move and turn. It drops flowers as
 * it moves. <br />
 * The implementation of this class is testable on the AP CS A and AB exams.
 */
public class Bug extends Actor
{
    /**
     * Constructs a red bug.
     */
    public Bug()
    {
        setColor(Color.RED);
    }

    /**
     * Constructs a bug of a given color.
     * @param bugColor the color for this bug
     */
    public Bug(Color bugColor)
    {
        setColor(bugColor);
    }

    /**
     * Moves if it can move, turns otherwise.
     */
    public void act()
    {
        if (canMove())
            move();
        else
            turn();
    }

    /**
     * Turns the bug 45 degrees to the right without changing its location.
     */
    public void turn()
    {
        setDirection(getDirection() + Location.HALF_RIGHT);
    }

    /**
     * Moves the bug forward, putting a flower into the location it previously
     * occupied.
     */
    public void move()
    {
        Grid<Actor> gr = getGrid();
        if (gr == null)
            return;
        Location loc = getLocation();
```

```
77          Location next = loc.getAdjacentLocation(getDirection());
78          if (gr.isValid(next))
79              moveTo(next);
80          else
81              removeSelfFromGrid();
82          Flower flower = new Flower(getColor());
83          flower.putSelfInGrid(gr, loc);
84      }
85
86      /**
87       * Tests whether this bug can move forward into a location that is empty or
88       * contains a flower.
89       * @return true if this bug can move.
90       */
91      public boolean canMove()
92      {
93          Grid<Actor> gr = getGrid();
94          if (gr == null)
95              return false;
96          Location loc = getLocation();
97          Location next = loc.getAdjacentLocation(getDirection());
98          if (!gr.isValid(next))
99              return false;
100         Actor neighbor = gr.get(next);
101         return (neighbor == null) || (neighbor instanceof Flower);
102         // ok to move into empty location or onto flower
103         // not ok to move onto any other actor
104     }
105 }
106
```