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1
2 package boundedwildcardgenerics;
3
4 // Bounded Wildcard arguments.
5 // Two-dimensional coordinates.
6 class TwoD {
7     int x, y;
8     TwoD(int a, int b) {
9         x = a;
10        y = b;
11    }
12 }
13
14 // Three-dimensional coordinates.
15 class ThreeD extends TwoD {
16     int z;
17     ThreeD(int a, int b, int c) {
18         super(a, b);
19         z = c;
20     }
21 }
22
23 // Four-dimensional coordinates.
24 class FourD extends ThreeD {
25     int t;
26     FourD(int a, int b, int c, int d) {
27         super(a, b, c);
28         t = d;
29     }
30 }
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29 }
30 }
31
32 // This class holds an array of coordinate objects.
33 class Coords<T extends TwoD> {
34     T[] coords;
35     Coords(T[] o) { coords = o; }
36 }
37
38 // Demonstrate a bounded wildcard.
39 public class BoundedWildcardGenerics {
40     static void showXY(Coords<?> c) {
41         System.out.println("X Y Coordinates:");
42         for(int i=0; i < c.coords.length; i++)
43             System.out.println(c.coords[i].x + " " +
44                               c.coords[i].y);
45         System.out.println();
46     }
47
48     static void showXYZ(Coords<? extends ThreeD> c) {
49         System.out.println("X Y Z Coordinates:");
50         for(int i=0; i < c.coords.length; i++)
51             System.out.println(c.coords[i].x + " " +
52                               c.coords[i].y + " " +
53                               c.coords[i].z);
54         System.out.println();
55     }
56 }
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57 static void showAll(Coords<? extends FourD> c) {
58     System.out.println("X Y Z T Coordinates:");
59     for(int i=0; i < c.coords.length; i++)
60         System.out.println(c.coords[i].x + " " +
61             c.coords[i].y + " " +
62             c.coords[i].z + " " +
63             c.coords[i].t);
64     System.out.println();
65 }
66
67 public static void main(String args[]) {
68     TwoD td[] = {
69         new TwoD(0, 0),
70         new TwoD(7, 9),
71         new TwoD(18, 4),
72         new TwoD(-1, -23)
73     };
74     Coords<TwoD> tdlocs = new Coords<TwoD>(td);
75     System.out.println("Contents of tdlocs.");
76     showXY(tdlocs); // OK, is a TwoD
77     // showXYZ(tdlocs); // Error, not a ThreeD
78     // showAll(tdlocs); // Error, not a FourD
79     // Now, create some FourD objects.
80     FourD fd[] = {
81         new FourD(1, 2, 3, 4),
82         new FourD(6, 8, 14, 8),
83         new FourD(22, 9, 4, 9),
84         new FourD(3, -2, -23, 17)
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85     };
86     Coords<FourD> fdlocs = new Coords<FourD>(fd);
87     System.out.println("Contents of fdlocs.");
88     // These are all OK.
89     showXY(fdlocs);
90     showXYZ(fdlocs);
91     showAll(fdlocs);
92 }
93 }
```