

## 14. Inheriting Class *protoBugZapper* to Make *BugZapper*

Class *BugZapper* is created by extending class *protoBugZapper*. A constructor is added to initialize the location and scale of the bug zapper. This would be all there is to class *BugZapper* were it not for the need in our example game to have a bug zapper that could collide with any type of bug. Method *impactBug* is created here to detect such collisions.

Notice that the class of the bug parameter passed to method *impactBug* is *protoBug*. Since both classes *Bug* and *evilBug* inherit all methods and instance variables used in method *impactBug* from *protoBug*, both types collisions involving either type of bug can be tested with this one method.

```
import java.awt.*;

public class BugZapper extends protoBugZapper {

    public BugZapper(int initX, int initY, int initScale) {
        super(initX, initY, initScale);
    }

    public boolean impactBug(protoBug p) {
        int halfscale = scale/2;
        if (p.returnx() > x & p.returnx() < x+halfscale &
            p.returny() > y & p.returny() < y+halfscale)
            return true;
        else return false;
    }
}
```

In truth, a method to detect impacts with bug zappers could have been created in each of the classes *Bug* and *evilBug*, instead of in *BugZapper*. It was created in *BugZapper* partly to illustrate one of the properties of inheritance, partly arbitrarily and partly as not to write it twice!

A method to detect impacts with *protoBugZapper* objects could have been created in *protoBug*, instead of in *BugZapper*. However, doing so would create a dependency of *protoBug* on *protoBugZapper*. That would mean that *protoBug* could only be used in the presence of *protoBugZapper*, which would create unnecessary additional complications if we chose to use *protoBug* class in another project.

### **Testing BugZapper**

By adding an object of class *BugZapper* to our existing *driver* class, along with calls to the *BugZapper* class method *impactBug* and some debugging output, we can verify that objects of class *BugZapper* will interact as expected with our other classes. Here is a listing of the modified *driver* class.

```
import java.awt.*;
import java.applet.Applet;

public class driver extends Applet {

    public void paint(Graphics g) {
        int temp;

        Background b = new Background(500,400);
        Bug p = new Bug(500,400,100,275);
        Bug q = new Bug(500,400,300,50);
        Bug r = new Bug(500,400,200,50);
        evilBug s = new evilBug(500,400,200,350,r);
        evilBug t = new evilBug(500,400,0,0,r);
        evilBug u = new evilBug(500,400,500,400,r);
        evilBug v = new evilBug(500,400,0,400,p);
        evilBug w = new evilBug(500,400,500,0,q);
        BugZapper abug_zapper = new BugZapper(180,150,50);

        p.setBugColor(0,0,255);
        q.setBugColor(255,0,0);
        r.setBugColor(0,255,255);
        s.setBugColor(255,255,0);
        t.setBugColor(127,127,127);
        u.setBugColor(127,127,127);
        v.setBugColor(127,127,127);
        w.setBugColor(127,127,127);

        b.paint(g); p.paint(g); q.paint(g); r.paint(g);
        s.paint(g); t.paint(g); u.paint(g); v.paint(g); w.paint(g);
        abug_zapper.paint(g);

        for (int j=0; j<8; j++) r.turnleft( );

        for (int i=0; i<200; i++) {
            temp = (int)(Math.random()*8);

            if (temp > 6) p.turnleft( );
            else if (temp < 2) p.turnright( );
```

```

        if (temp > 6) q.turnleft();
        else if (temp < 2) q.turnright( );

        p.go( ); q.go( ); r.go( );

        s.calcDirection();    s.go( );
        t.calcDirection();    t.go( );
        u.calcDirection();    u.go( );
        v.calcDirection();    v.go( );
        w.calcDirection();    w.go( );

        b.paint(g); p.paint(g); q.paint(g); r.paint(g);
        s.paint(g); t.paint(g); u.paint(g); v.paint(g); w.paint(g);
        abug_zapper.paint(g);

        if (s.impactBug(r)) System.out.print("Bug Crash!\t");
        if (abug_zapper.impactBug(p))
            System.out.print("BugZapper Crash\t");
        if (abug_zapper.impactBug(q))
            System.out.print("BugZapper Crash\t");
        if (abug_zapper.impactBug(r))
            System.out.print("BugZapper Crash\t");
        if (abug_zapper.impactBug(s))
            System.out.print("BugZapper Crash\t");
        if (abug_zapper.impactBug(t))
            System.out.print("BugZapper Crash\t");
        if (abug_zapper.impactBug(u))
            System.out.print("BugZapper Crash\t");
        if (abug_zapper.impactBug(v))
            System.out.print("BugZapper Crash\t");
        if (abug_zapper.impactBug(w))
            System.out.print("BugZapper Crash\t");

        pause(50);
    }
}

private void pause (int time) {
    try    { Thread.sleep(time); }
    catch (Exception e) {}
}
}

```

When all of the necessary Java files are compiled and the applet *driver.class* is run, the output will resemble the following:

```
C:\jdk1.3\projects\bugs>go
C:\jdk1.3\projects\bugs>del driver.class
File not found
C:\jdk1.3\projects\bugs>del BugZapper.class
C:\jdk1.3\projects\bugs>javac BugZapper.java
C:\jdk1.3\projects\bugs>pause
Press any key to continue . . .

C:\jdk1.3\projects\bugs>javac driver.java
C:\jdk1.3\projects\bugs>pause
Press any key to continue . . .

C:\jdk1.3\projects\bugs>appletviewer driver.html
BugZapper Crash BugZapper Crash BugZapper Crash BugZapper Crash Bug Crash!
Bug Crash!      BugZapper Crash BugZapper Crash BugZapper Crash BugZapper Crash
```

