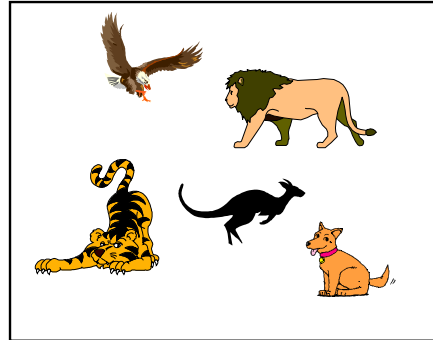


Week 8, Lecture 2

Case Study: a day at the Zoo



1



2

```
import java.awt.*;  
  
public abstract class Animal {  
  
    // instance variables  
    protected int xPosn, yPosn;  
    protected Color colour;  
  
    // constructor methods  
    public Animal (int x, int y) {  
        xPosn = x;  
        yPosn = y;  
    }  
}
```

3

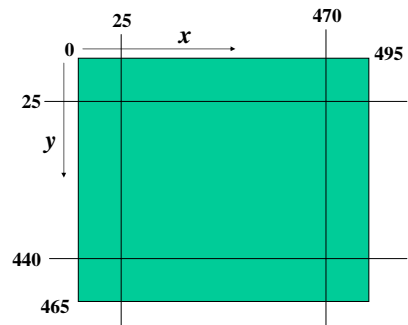
```
// instance methods  
public int getX () {  
    return xPosn;  
}  
  
public int getY () {  
    return yPosn;  
}  
  
public Color getColour () {  
    return colour;  
}  
  
public abstract void move ();  
}
```

4

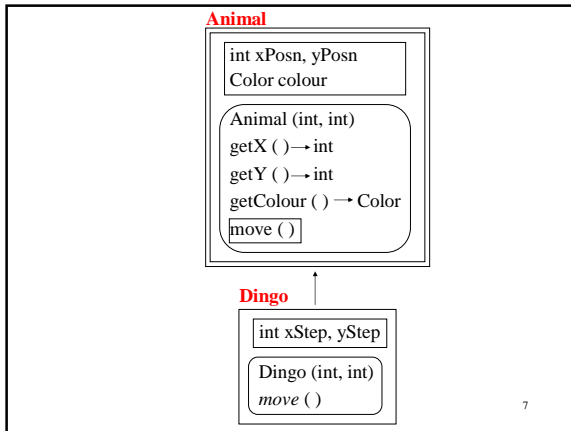
Animal

```
int xPosn, yPosn  
Color colour  
  
Animal (int, int)  
getX () → int  
getY () → int  
getColour () → Color  
move ()
```

5



6



```

import java.awt.*;
public class Dingo extends Animal {

    protected int xStep, yStep; // instance vars

    public Dingo (int x, int y) { // constructor
        super(x, y);
        colour = Color.red;
        xStep = 5;
        yStep = 5;
    }

    public void move () {
        if (xPosn > 470 || xPosn < 25)xStep = -xStep;
        xPosn = xPosn + xStep;
        if (yPosn > 440 || yPosn < 25)yStep = -yStep;
        yPosn = yPosn + yStep;
    }
}
  
```

8

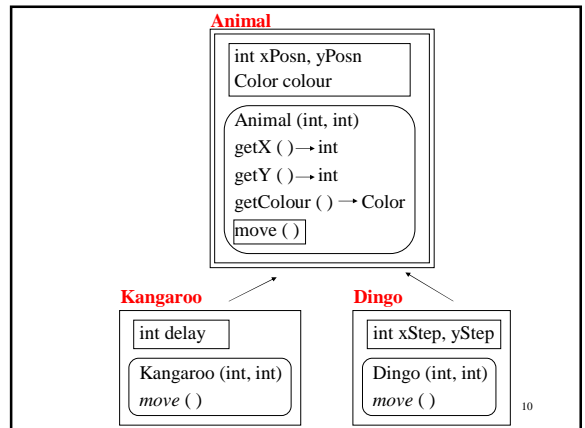
```

import genesis.*;

public class Zoo {

    public static void main (String [] args) {
        int animalNums = 1;
        Animal [] zoo = new Animal [animalNums];
        zoo[0] = new Dingo(400, 200);
        while (true) {
            for (int i=0; i<animalNums; i++) {
                zoo[i].move();
            }
            ZooWindow.display(zoo);
            Delay.milliseconds(20);
        }
    }
}
  
```

9



```

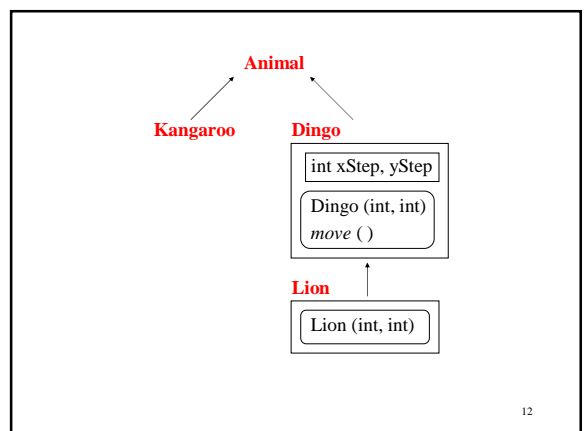
import java.awt.*;
public class Kangaroo extends Animal {

    protected int delay = 1; // instance variable

    public Kangaroo (int x, int y) { // constructor
        super(x, y);
        colour = Color.green;
    }

    public void move () {
        delay++;
        if (delay > 40) {
            xPosn = (int)(446*Math.random()+25);
            yPosn = (int)(416*Math.random()+25);
            delay = 1;
        }
    }
}
  
```

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```

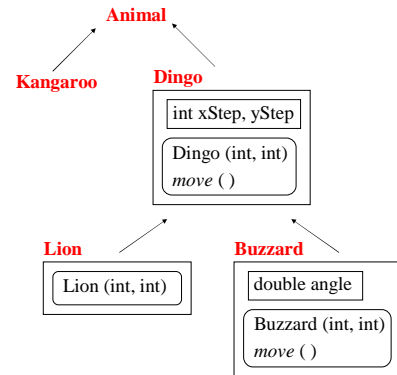
import java.awt.*;

public class Lion extends Dingo {

    // constructor
    public Lion (int x, int y) {
        super(x, y);
        colour = Color.magenta;
        xStep = 4;
        yStep = 0;
    }
}

```

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14

```

import java.awt.*;
public class Buzzard extends Dingo {

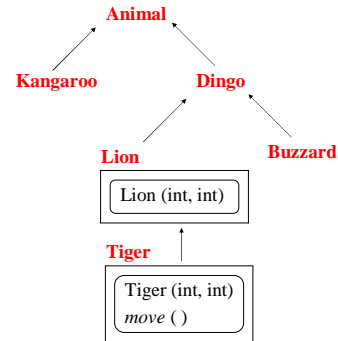
    // instance variables
    protected double angle = 0;

    // constructor
    public Buzzard (int x, int y) {
        super(x, y);
        colour = Color.gray;
    }

    public void move ( ) {
        xPosn = xPosn + (int)(xStep*Math.sin(angle));
        yPosn = yPosn + (int)(yStep*Math.cos(angle));
        angle = angle + 0.025;
    }
}

```

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16

```

import java.awt.*;

public class Tiger extends Lion {

    // constructor
    public Tiger (int x, int y) {
        super(x, y);
        colour = Color.orange;
    }

    public void move ( ) {
        super.move();
        super.move();
    }
}

```

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```

import genesis.*;
public class Zoo {

    public static void main (String [ ] args) {
        int animalNums = 5;
        Animal [ ] zoo = new Animal [animalNums];
        zoo[0] = new Dingo(400, 200);
        zoo[1] = new Kangaroo(300, 300);
        zoo[2] = new Lion(100, 100);
        zoo[3] = new Buzzard(100, 220);
        zoo[4] = new Tiger(200, 400);
        while (true) {
            for (int i=0; i<animalNums; i++)
                zoo[i].move();
            ZooWindow.display(zoo);
            Delay.milliseconds(20);
        }
    }
}

```

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