

Week 6, Lecture 2

Case Study: Catch Me if You Can



1

Announcements

- **Assignment 2** is due at the end of next week: deadline is **4pm Friday September 10th** (late assignments cannot be accepted).

2

Assignment 2 Submission

- prepare the **three** files
Pirate.java, **PlankStatistics.java** and **PercentSaved.java**
- ensure the top of **each** file contains the comments:

```
// Family name: DODGER  
// Given names: Roger The  
// Student number: 87654321
```
- follow the instructions for submission; in particular, **you must submit all three files together---if you resubmit you must resubmit all three files**
- keep a record of your **Submission Id**

3

This Week

Java Genesis:

–Ch7: Objects and classes

Lab Assessment 5 (deadline May 2)

Quick Quiz for Chapter 6

4



Problem

Catching Kangaroos

Kangaroos are placed at position 0 and hop around the circuit below. If they land on position 7 they are captured and can no longer hop.

1	2	3	4	5	6
0					7
13	12	11	10	9	8

5

1	2	3	4	5	6
0					7
13	12	11	10	9	8

- At each stage a kangaroo not at 7 hops a random distance of 1, 2, ..., 6 positions clockwise around the circuit.
- A kangaroo at position 7 cannot hop.

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The class **Kangaroo**

- three instance variables: integers **numHops** and **posn**, and boolean **caught**
- one (default) constructor method that sets **posn** to 0, **numHops** to 0 and **caught** to **false**.
- four instance methods:
 - **hop()** (kangaroo hops) and **toString()**
 - getter methods **isCaught()** to return **caught** and **getNumHops()** to return **numHops**

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```
public class Kangaroo {  
  
    // instance variables  
    private int numHops;  
    private boolean caught;  
    private int posn;  
  
    // constructor  
    public Kangaroo ( ) {  
        numHops = 0;  
        caught = false;  
        posn = 0;  
    }  
  
    public int getNumHops ( ) {  
        return numHops;  
    }  
  
    public boolean isCaught ( ) {  
        return caught;  
    }  
}
```

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```
public void hop ( ) {  
    if (!caught) {  
        numHops++;  
        int rand = (int)(6*Math.random())+1;  
        posn = (posn + rand)%14;  
        if (posn == 7) caught = true;  
    }  
}  
  
public String toString ( ) {  
    String s = "number of hops: "+numHops+"\t";  
    s = s+posn+"\t";  
    if (caught) s = s+"caught";  
    else s = s+"free";  
    return s;  
}  
}
```

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```
import genesis.*;  
  
public class TestKangaroo {  
  
    public static void main (String [ ] args) {  
        Kangaroo skippy = new Kangaroo ( );  
        Transcript.println(skippy);  
        while (!skippy.isCaught ( )) {  
            skippy.hop ( );  
            Transcript.println(skippy);  
        }  
    }  
}
```

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The class **KangarooPopulation**

- instance variables: integers **numCaught** and **numHopAll**, and array **kangas** of **Kangaroo** objects
- constructor method that sets the values of **numCaught** and **numHopAll** to 0 and initialises the array **kangas**
- four instance methods:
 - getter methods **getNumCaught()** and **getNumHopAll()**
 - **allHop()** whereby all free kangaroos **hop**
 - **toString()** to return information about the population

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```
public class KangarooPopulation {  
  
    // instance variables  
    private Kangaroo [ ] kangas;  
    private int numCaught;  
    private int numHopAll;  
  
    // constructor  
    public KangarooPopulation (int numKangas) {  
        kangas = new Kangaroo [numKangas];  
        numCaught = 0;  
        for (int i=0; i<kangas.length; i++) {  
            kangas[i] = new Kangaroo ( );  
        }  
        numHopAll = 0;  
    }  
  
    public int getNumCaught ( ) {  
        return numCaught;  
    }  
}
```

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```

public int getNumHopAll ( ) {
    return numHopAll;
}

public void allHop ( ) {
    if (numCaught < kangas.length) {
        numHopAll++;
        for (int i=0; i<kangas.length; i++)
            if (!kangas[i].isCaught( )) {
                kangas[i].hop( );
                if (kangas[i].isCaught( )) numCaught++;
            }
    }
}

public String toString ( ) {
    return "number times all hopped: "+numHopAll
        +"\tnumber caught: "+numCaught;
}
}

```

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```

import genesis.*;

public class TestKangarooPopulation {

    public static void main (String [ ] args) {
        int popSize =
            DialogBox.requestInt("population size:");
        KangarooPopulation k =
            new KangarooPopulation(popSize);
        Transcript.println(k);
        while (k.getNumCaught( ) < popSize) {
            k.allHop( );
            Transcript.println(k);
        }
    }
}

```

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```

import genesis.*;

public class CatchMeIfYouCan {

    public static void main (String [ ] args) {
        int popSize =
            DialogBox.requestInt("population size");
        KangarooPopulation k =
            new KangarooPopulation(popSize);
        while (k.getNumCaught( ) < 100) k.allHop( );
        Transcript.println(k.getNumHopAll( ));
    }
}

```

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