CSE 8A Lecture 19

• Reading for Monday 11.6-8!

• Today’s goals:
  – More practice with designing classes
  – Tracing code and creating memory models

• CAPES: In lab
  – Why we need your feedback
public class Point
{
    private int x;
    private int y;
    
    public Point(int x_in, int y_in)
    {
        this.x = x_in;
        this.y = y_in;
    }
    
    public int getX(){ return this.x; } 
    public void setX( int x_in ){ this.x = x_in; } 
    
    public static void main( String[] args )
    {
        Point r = new Point(12, 52);
        Point q = r;
        Point r = new Point(3, r.getX());
        q.setX( q.getX() + r.getX() );
    }
}

What are the values of r and q when this code completes?

<table>
<thead>
<tr>
<th></th>
<th>r</th>
<th>q</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>(12, 52)</td>
<td>(12, 52)</td>
</tr>
<tr>
<td>B</td>
<td>(3, 12)</td>
<td>(12, 52)</td>
</tr>
<tr>
<td>C</td>
<td>(15, 52)</td>
<td>(15, 52)</td>
</tr>
<tr>
<td>D</td>
<td>(3, 12)</td>
<td>(15, 52)</td>
</tr>
<tr>
<td>E</td>
<td>None of these</td>
<td></td>
</tr>
</tbody>
</table>

What are the values of r and q at the end of this code (DRAW THE MEMORY MODEL!!)
public class Species {

    /////////// fields ///////////
    private String name;
    private int[] population;
    private double growthRate;

    ////////// constructors ///////////
    public Species(String name, int[] pop, double gr) {
        this.name = name;
        population = new int[pop.length];
        for (int i=0; i < this.population.length; i++)
            population[i] = pop[i];
        growthRate = gr;
    }

    ////////// methods ///////////
}
The Species class, continued

```
////////// methods /////////////////

public void setPopulation( int pop, int index )
{
    population[index] = pop;
}

public int getPopulation( int index )
{
    return population[index];
}
```

A redesign of the Species class

• This idea that the population array is just 7 entries, one per location is a bit “obscure”.
  – What are the names of the locations? Which entry is for North America? Which for Europe?

• Another, better approach: “parallel arrays”

• Declare and create two arrays of the same length
  – One for location names: String[] location;
  – One for population numbers: int[] population;
  – And write code so that for every index \(i\),

    population[\(i\)] is the population, in the location with name location[\(i\)]
Write a constructor for the new Species class

```java
public Species(String name, int[] pop, String[] location, double gr) {
    this.name = name;
    population = new int[pop.length];
    for (int i = 0; i < population.length; i++)
        population[i] = pop[i];

    /*<<INSERT CODE HERE>>*/
    growthRate = gr;
}
```

```java
location = new String[location.length];
for (int i=0; i < location.length; i++)
    location[i] = location[i];

this.location = location;
```

```java
this.location = new String[location.length];
for (int i=0; i < location.length; i++)
    this.location[i] = location[i];
```
public Species(String name, int[] pop, String[] location, double gr) {
    this.name = name;
    population = new int[pop.length];

    for (int i=0; i< population.length;i++)
        population[i] = pop[i];

    this.location = new String[location.length];

    for( int i = 0 ; i < location.length ; i++ )
        this.location[i] = location[i];

    growthRate = gr;
}
What is this code doing?

A) Making sure `pop` is an array of ints, `location` is an array of Strings
B) Making sure `pop` and `location` are of the same length
C) Setting `population` and `location` to null
D) This will not compile (return without value)
A possible setter method

```java
public boolean setPopulation( int pop, String loc )
{
    if( pop < 0 )
        return false;

    for( int i = 0 ; i < loc.length ; i++ )
    {
        if( location[i].equals( loc ) )
        {
            population[i] = pop;
            return true;
        }
    }
    return false;
}
```
TODO

• Start studying