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?

	r	q
A.	(12, 52)	(12, 52)
B.	(3, 12)	(12, 52)
C.	(15, 52)	(15, 52)
D.	(3, 12)	(15, 52)
E.	None of these	

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

The Species class, review

```
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**]

1) Solo: (30 sec)
2) Discuss/Group: (2 min)

Write a constructor for the new Species class

```
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;
}
```

```
location = location;
```

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

```
this.location = location;
```

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

1) Solo: (30 sec)
2) Discuss/Group: (2 min)

Write a constructor for the new Species class

```
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;
}
```

Still has some “bad software design issues…”

1) Solo: (30 sec)
2) Discuss/Group: (2 min)

What is this code doing?

```
public Species(String name, int[] pop, String[] location, double gr)
{
  name = newName;
  growthRate = gr;
  if (pop.length != location.length)
  {
    System.out.println("Error constructing Species.  " +
    "Population array and location array must be same length.");
    population = null; location = null;
    return;
  }
  population = new int[pop.length];
  this.location = new String[location.length];

  for(int i=0; i < location.length; i++)
  { this.location[i] = location[i];
    this.population[i] = pop[i];
  }
}
```

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

```
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