Introduction to Programming

with Java, for Beginners

Arrays of Objects

What if our Frog (from lab) could say 10 different things?

```java
public class Frog{
    private boolean formerPrince;
    private String phrase1;
    private String phrase2;
    private String phrase3;
    private String phrase4;
    private String phrase5;
    private String phrase6;
    private String phrase7;
    private String phrase8;
    private String phrase9;
    private String phrase10;
    ...
}
```

What a Person could adopt lots of StudentGrades?

```java
public class StudentGradeDB{
    private String name;
    private StudentGrade StudentGrade1;
    private StudentGrade StudentGrade2;
    private StudentGrade StudentGrade3;
    private StudentGrade StudentGrade4;
    private StudentGrade StudentGrade5;
    private StudentGrade StudentGrade6;
    private StudentGrade StudentGrade7;
    private StudentGrade StudentGrade8;
    private StudentGrade StudentGrade9;
    private StudentGrade StudentGrade10;
    private StudentGrade StudentGrade11;
    private StudentGrade StudentGrade12;
    private StudentGrade StudentGrade13;
    private StudentGrade StudentGrade14;
    private StudentGrade StudentGrade15;
    ...
}
```

Array of Primitives

```java
int[] data;

data = new int[3];
data[0] = 5;
data[1] = 10;
```
Array of Objects

Counter[] counters;

counters = new Counter[3];
- it has 3 references to Counters in it
- all of these references are initially null

> counters[0] = new Counter();
> counters[1] = new Counter();
> counters[2].getCount();

NullPointerException

ESE112 4

Person Array

Person[] people = {new Person("jo"), new Person("flo")};
Person[] people = new Person[] {
    new Person("jo"),
    new Person("flo")};

Person[] people;

people = new Person[3];

people[0] = new Person("jo");
people[1] = new Person("flo");

ESE112

E.g. Person Database

public class Person{
    private String name;
    private int age;

    Person(String name, int age){
        this.name = name;
        this.age = age;
    }

    public int getAge() { return age; }
    public String getName() { return name; }
}

ESE112 5

E.g. Person Database (contd..)

public class PersonDB{
    private Person[] people;
    public PersonDB(){
        people = new Person[] {
            new Person("jo",25),
            new Person("flo",18),
            new Person("mo", 19)};
    }

    /** Calculates and returns the average age. */
    public double getAverageAge(){
        double sum = 0.0;
        for(int i = 0; i < people.length ; i++){
            sum = sum + people[i].getAge();
        }
        return (sum/people.length);
    }
}

ESE112 7
Error Checking – To avoid runtime errors

/** Calculates and returns the average age. */
public double getAverageAge(){
    double sum = 0.0;
    int numOfEntries = 0;
    if(people == null || people.length == 0) {
        return sum;
    }
    for(int i = 0; i < people.length ; i++){
        if(people[i] != null){
            sum = sum + people[i].getAge();
            numOfEntries++;
        }
    }
    return (sum/numOfEntries);
}