

# Introduction to Programming

*with Java, for Beginners*

## Arrays of Objects

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

```
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;
    ...
}
```

ESE112

1

What a Person could adopt lots of StudentGrades ?

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

ESE112

2

## Array of Primitives

```
int[] data;
```

data 

```
data = new int[3];
```

data  → 

```
data[0] = 5;
data[1] = 10;
```

data  → 

ESE112

3

## Array of Objects

```
Counter[] counters;
```

counters null

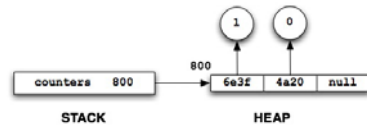
STACK HEAP

```
counters = new Counter[3];
```

- it has 3 *references* to Counters in it
- all of these references are initially **null**



```
> counters[0]= new Counter();
> counters[0].inc();
> counters[1]= new Counter();
> counters[0].getCount()
1
> counters[2].getCount()
NullPointerException
ESE112
```



4

## 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

## Person Array

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

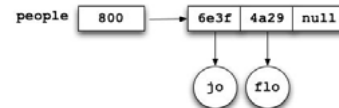
```
Person[] people;
```

people null

```
people = new Person[3];
```

people 800 → null null null

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



ESE112

## 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);
}
}
```

ESE112

8