Arrays and Classes

Produced by: Dr. Siobhán Drohan
Mr. Colm Dunphy
Mr. Diarmuid O'Connor

Waterford Institute *of* Technology
INSTITIÚID TEICNEOLAÍOCHTA PHORT LÁIRGE

Department of Computing and Mathematics
http://www.wit.ie/

Let’s Look at arrays of different types

Arrays can store any type of data

Let’s look at some examples:

1. Array of primitives - **int**
2. Array of objects – **String**
3. Array of objects - **Spot**

An array can store any type of data.

Primitive Types

```
int numbers[] = new int[10];

byte smallNumbers[] = new byte[4];

char characters[] = new char[26];
```

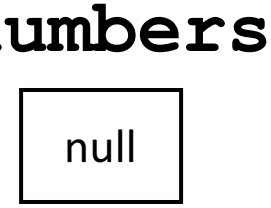
Object Types

```
String words = new String[4];

Spot spots[] = new Spot[10];
```

1) Array of **Primitives**
e.g. int

Structure of an **int** primitive array

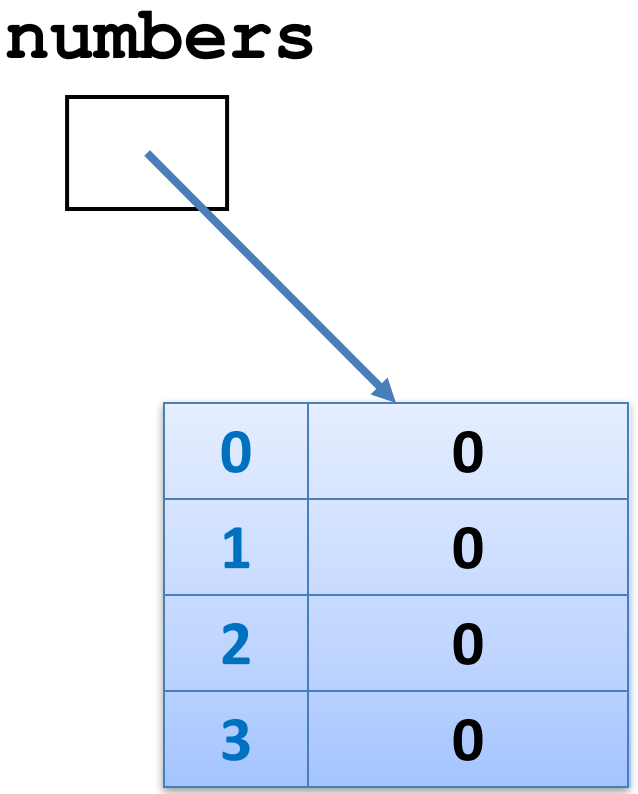
```
int[] numbers;
```



Structure of an **int** primitive array

```
int[]  numbers;
```

```
numbers = new int[4];
```



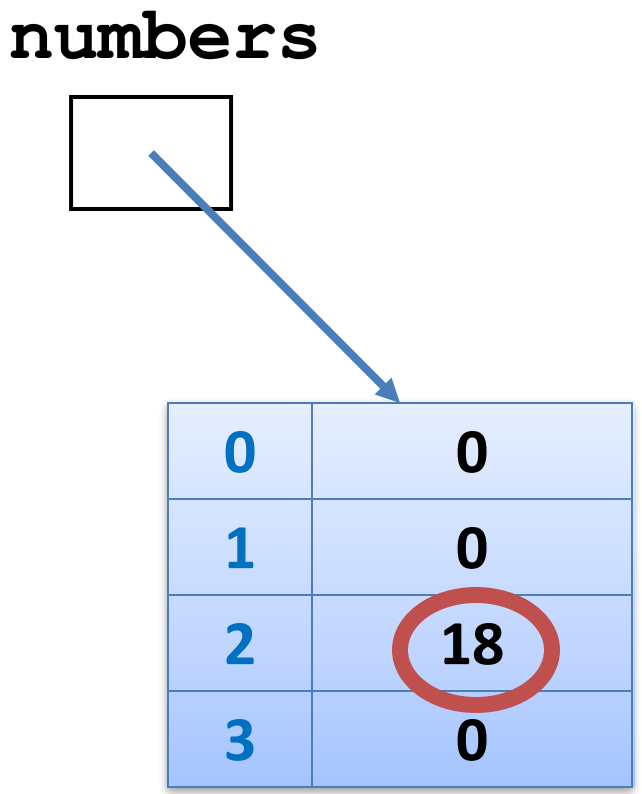
Structure of an **int** primitive array

```
int[]  numbers;
```

```
numbers = new int[4];
```

```
numbers[2] = 18;
```

We are directly accessing the element at index **2** and setting it to a value of **18**.



Structure of an **int** primitive array

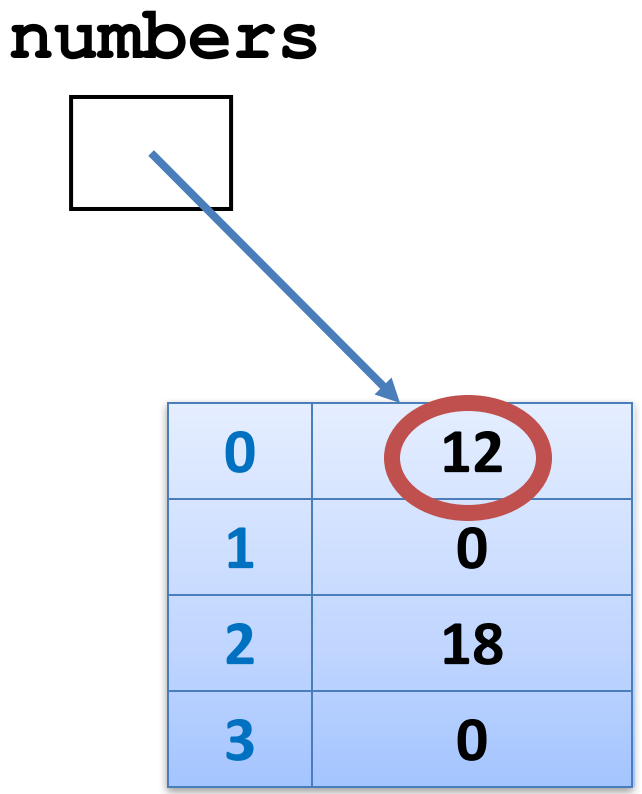
```
int[]  numbers;
```

```
numbers = new int[4];
```

```
numbers[2] = 18;
```

```
numbers[0] = 12;
```

We are setting the element at index **0** to a value of **12**.



Structure of an **int** primitive array

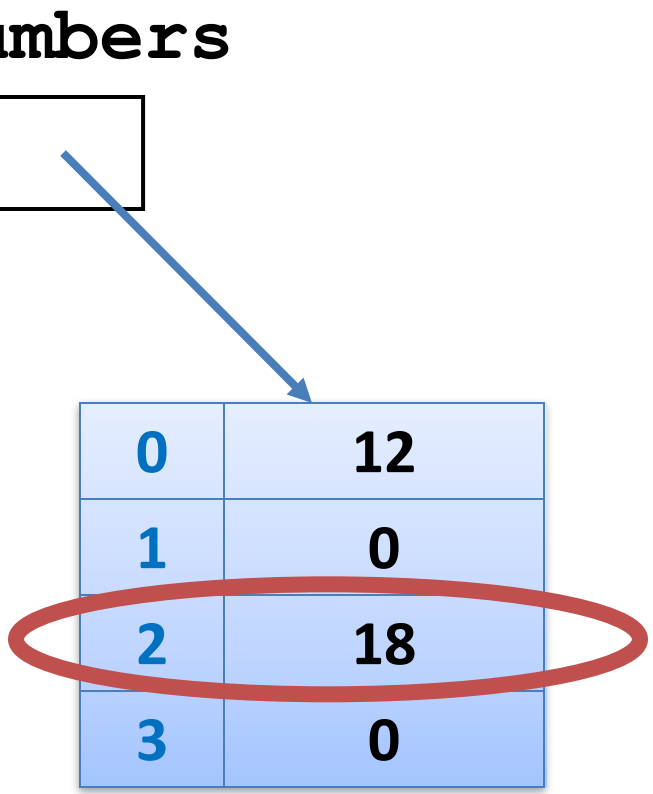
```
int[]  numbers;
```

```
numbers = new int[4];
```

```
numbers[2] = 18;
```

```
numbers[0] = 12;
```

```
print(numbers[2]);
```



Here we are printing the contents of index location 2
i.e. 18 will be printed to the console.

2) Array of **Objects**
e.g. String

An array can store any type of data.

Primitive Types

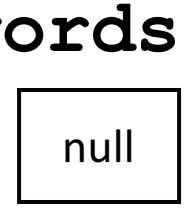
```
int numbers[] = new int[10];

byte smallNumbers[] = new byte[4];

char characters[] = new char[26];
```

Object Types

```
String words = new String[4];

Spot spots[] = new Spot[10];
```

Structure of a **String** object array

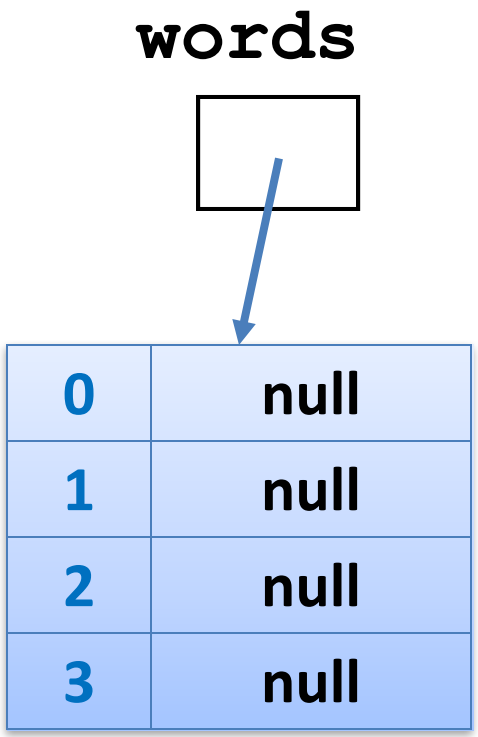
```
String[]  words;
```



Structure of a **String** object array

```
String[]  words;
```

```
words = new String[4];
```

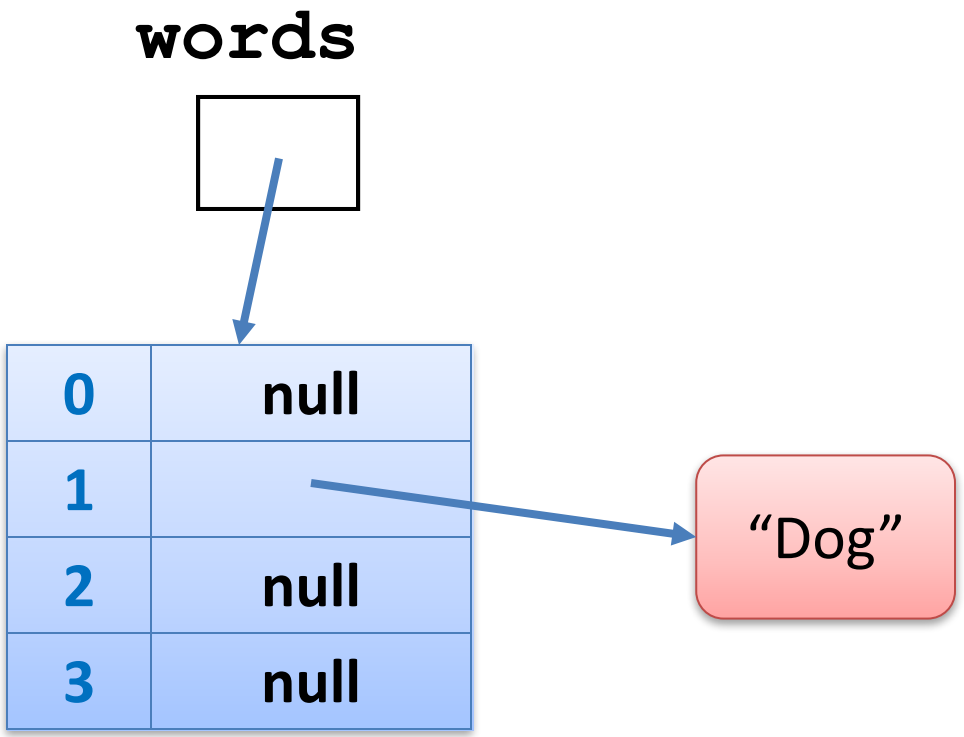


Structure of a **String** object array

```
String[]  words;
```

```
words = new String[4];
```

```
words[1] = "Dog";
```



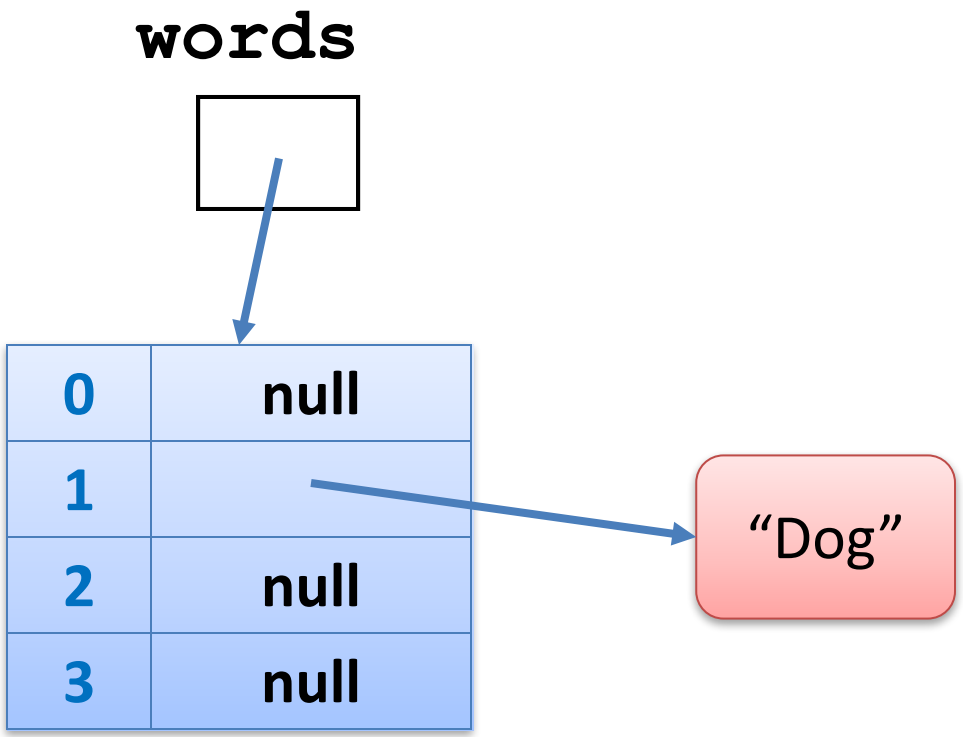
Structure of a **String** object array

```
String[]  words;
```

```
words = new String[4];
```

```
words[1] = "Dog";
```

We are directly accessing the element at index **1** and setting it to a value of **"Dog"**.



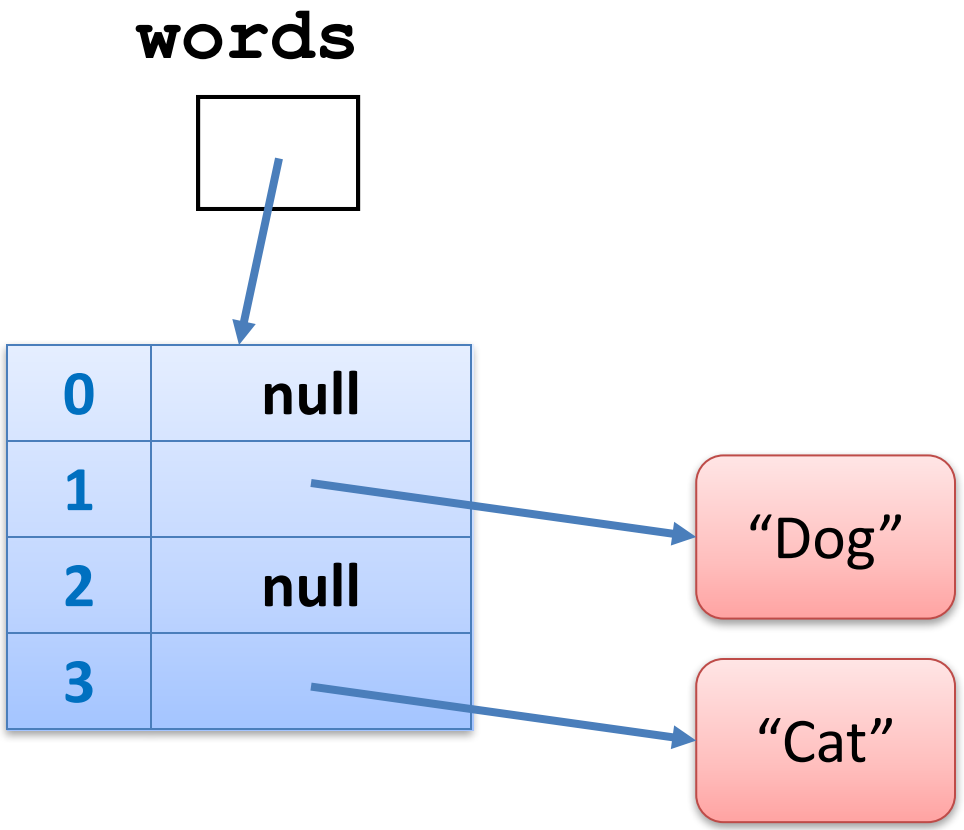
Structure of a **String** object array

```
String[]  words;
```

```
words = new String[4];
```

```
words[1] = "Dog";
```

```
words[3] = "Cat";
```



Structure of a **String** object array

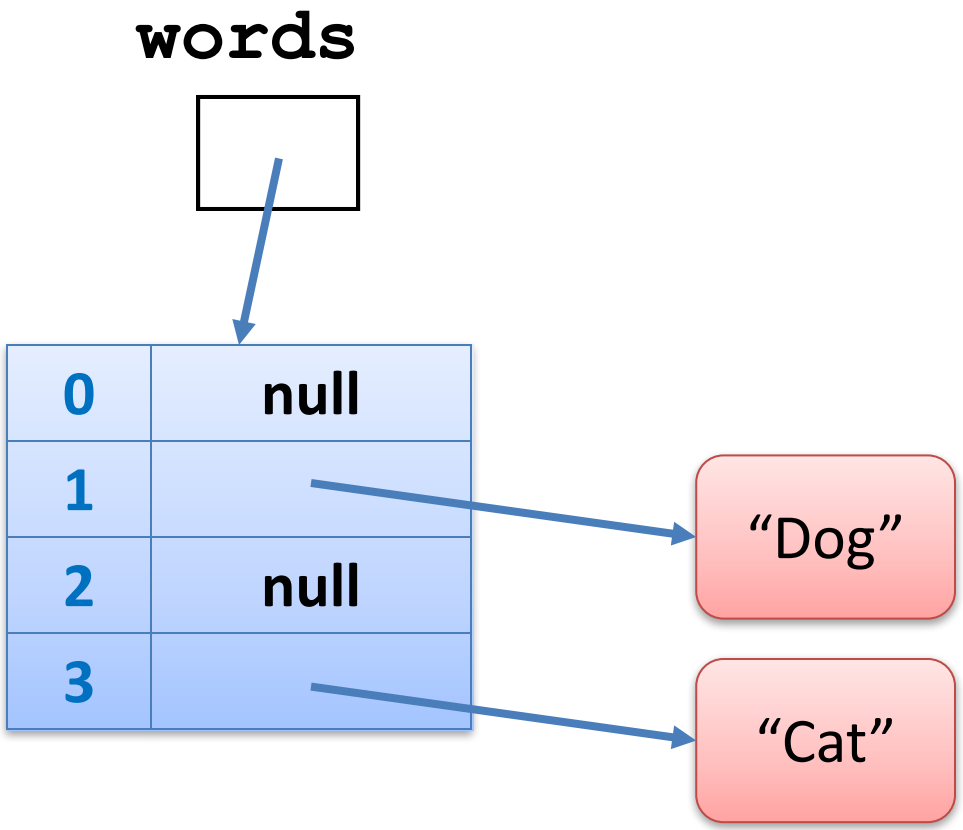
```
String[]  words;
```

```
words = new String[4];
```

```
words[1] = "Dog";
```

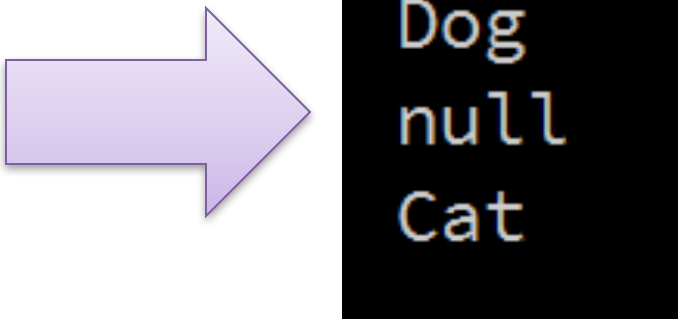
```
words[3] = "Cat";
```

The element at index **3** is set to **"Cat"**.



Structure of a **String** object array

```
String words[];

words = new String[4];

words[1] = "Dog";
words[3] = "Cat";

for (int i=0; i < words.length; i++)
{
   println(words[i]);
}
```



3) Array of **Objects**
e.g. Spot

An array can store any type of data.

Primitive Types

```
int numbers[] = new int[10];

byte smallNumbers[] = new byte[4];

char characters[] = new char[26];
```

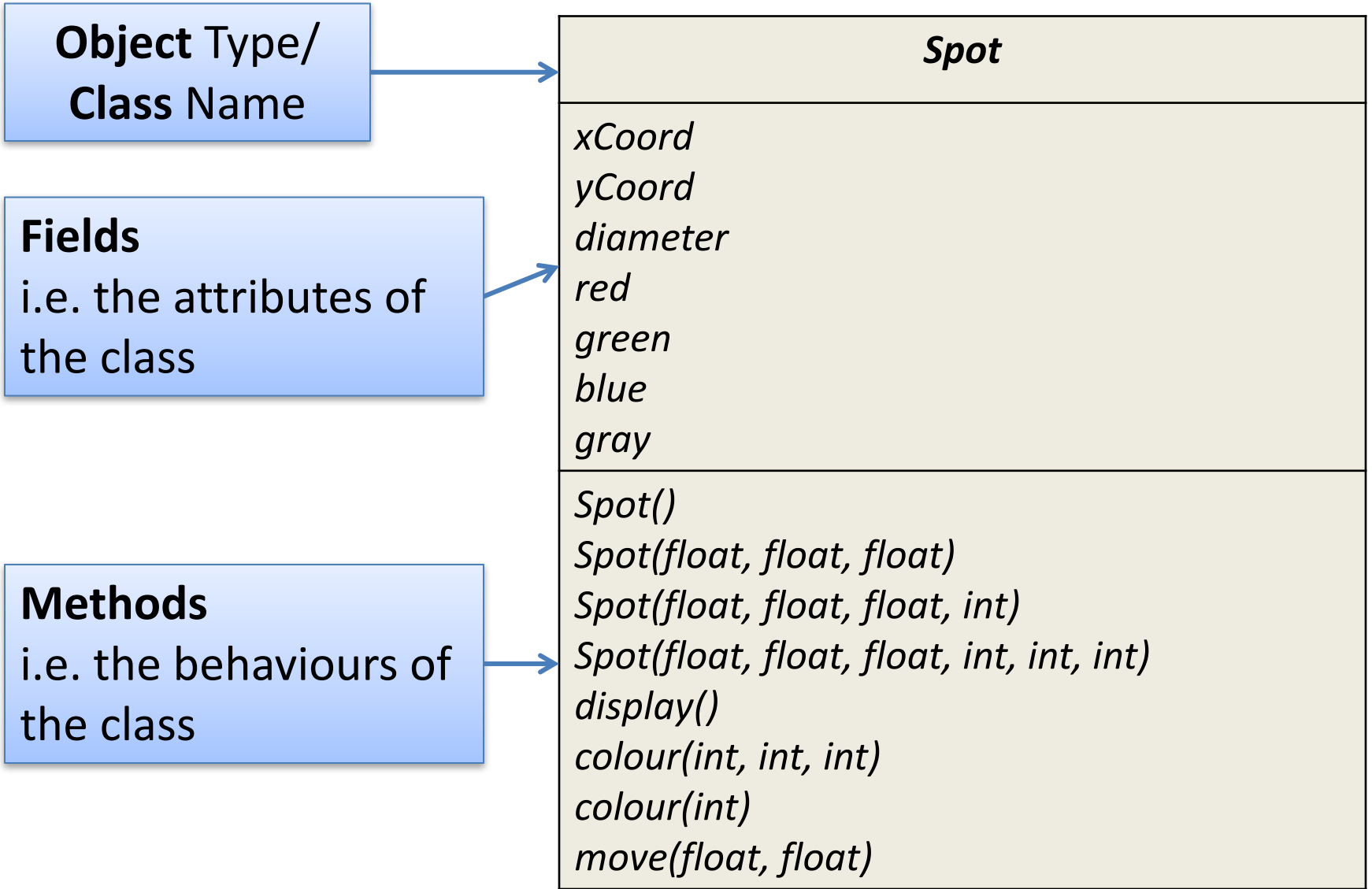
Object Types

```
String words = new String[4];

Spot spots[] = new Spot[10];
```

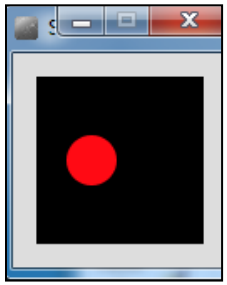
Remember our **Spot** class?

Lets look at one of the versions we worked on.

Class Diagram for Spot Version 6.1



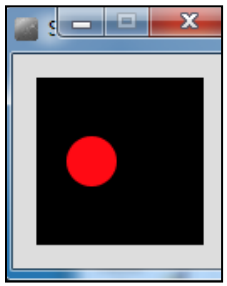
Spot Class – Version 6.1



```
class Spot{
  float xCoord, yCoord;
  float diameter;
  int red, green, blue;

 Spot()
  {
  }

 Spot(float xCoord, float yCoord, float diameter)
 {
    this.xCoord = xCoord;
    this.yCoord = yCoord;
    this.diameter = diameter;
  }

  // colour methods…
  // display method…
  // move method…
}
```

Source: Reas & Fry (2014)

Spot Class – Version 6.1

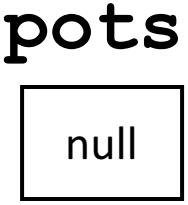


```
class Spot{
// fields and constructors…

 void display()
  {
    ellipse(xCoord, yCoord, diameter, diameter);
  }

 void colour(int red, int green, int blue)
  {
    this.red = red;
    this.green = green;
    this.blue = blue;
    fill (red, green, blue);
  }

  void colour(int gray){
    this.gray = gray;
    fill (this.gray);
  }
}
```

Source: Reas & Fry (2014)

Structure of a **Spot** primitive array

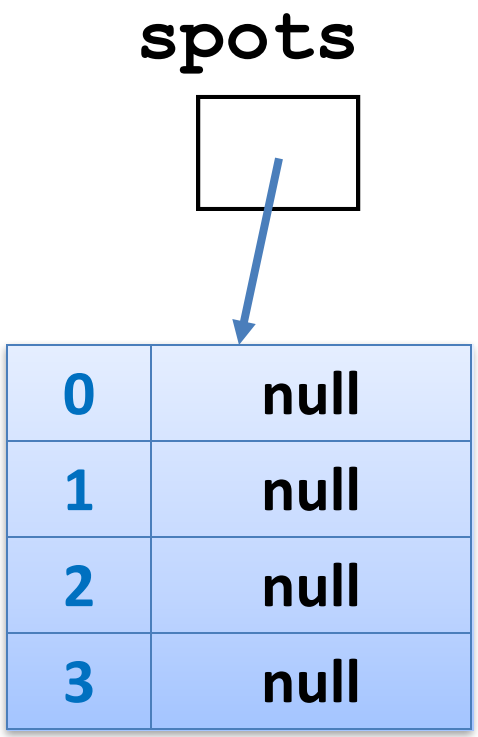
```
Spot[] spots;
```



Structure of a **Spot** primitive array

```
Spot[]  spots;
```

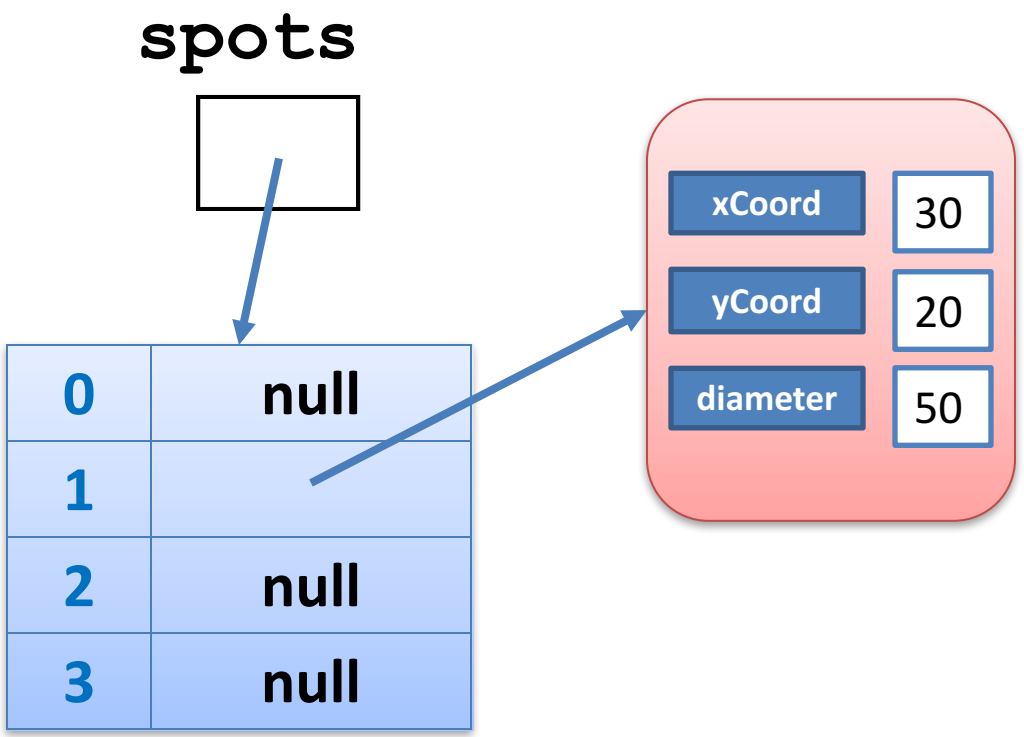
```
spots = new Spot[4];
```



Structure of a **Spot** primitive array

```
Spot[]  spots;
```

```
spots = new Spot[4];
```

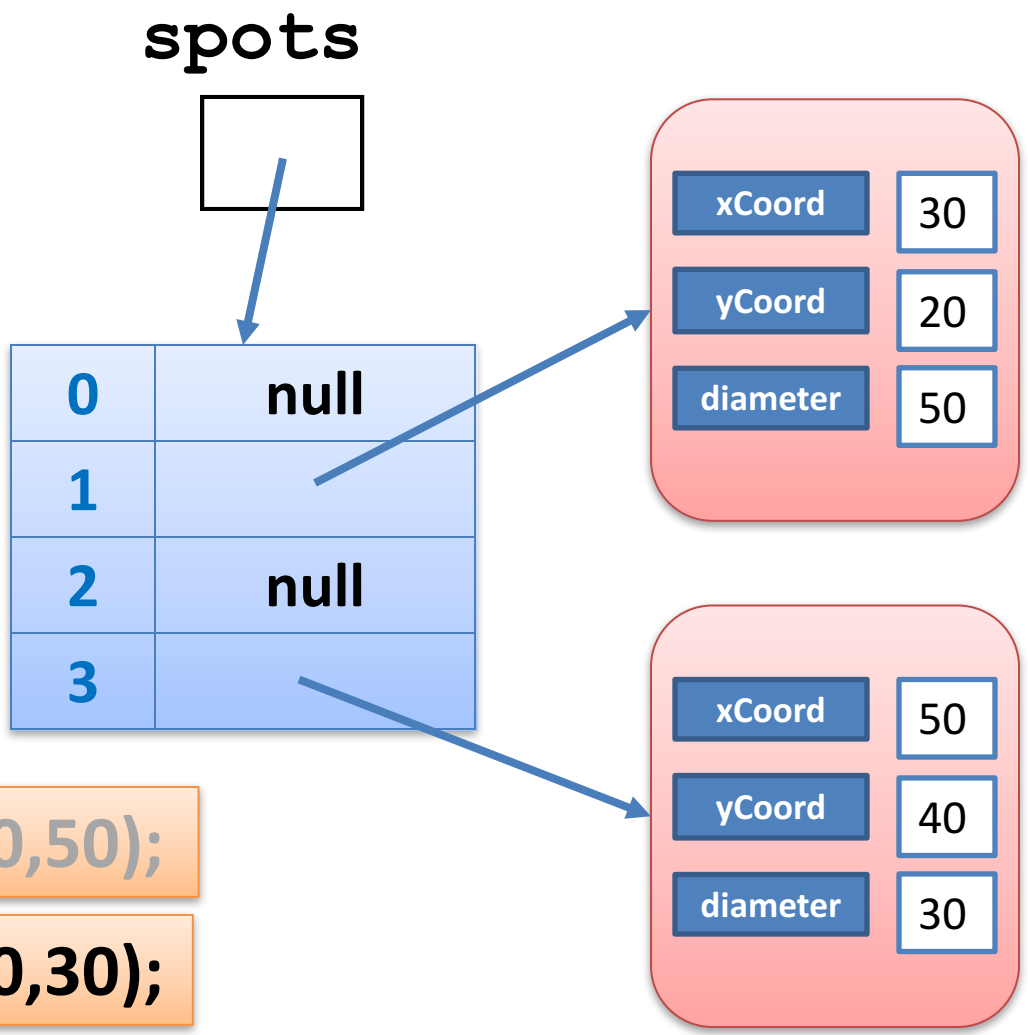



```
spots[1] =  new Spot(30,20,50);
```

Structure of a **Spot** primitive array

```
Spot[]  spots;
```

```
spots = new Spot[4];
```

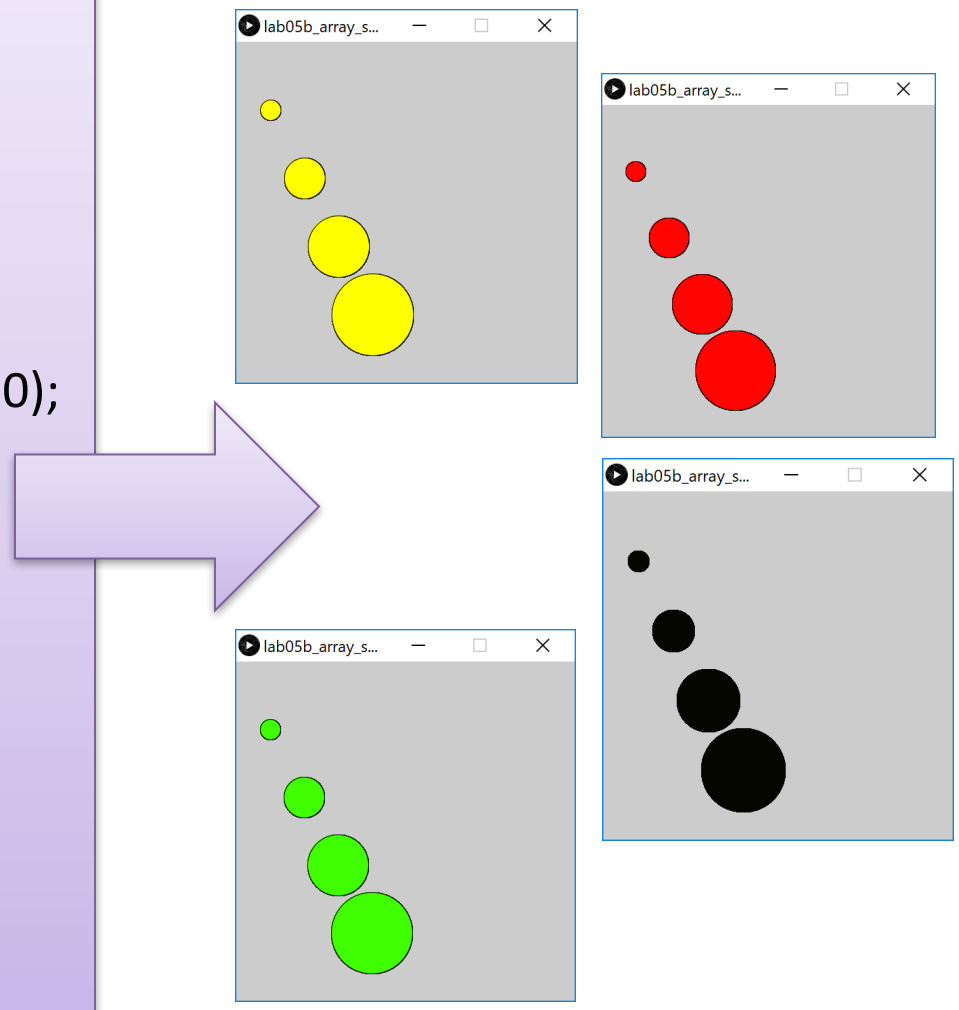



```
spots[1] =  new Spot(30,20,50);
```

```
spots[3] =  new Spot(50,40,30);
```

Example using a **Spot** object array

```
Spot[] spots;

void setup(){
  size(500,500);
  spots = new Spot[4];

  for(int i = 1; i <= spots.length; i++){
    spots[i-1] = new Spot(i*50, i*100, i*30);
  }
}

void draw(){
  for (int i=0; i < spots.length; i++){
    spots[i].display();
    spots[i].colour(mouseX, mouseY, 0);
  }
}
```



Questions?