



CHAPTER 3

CLASSES RELATIONSHIPS

- An association exists between two classes, say A and B, if class A , for example, contains an attribute myB, which is an object of class B.
- The attribute, myB, is actually a reference to class B.

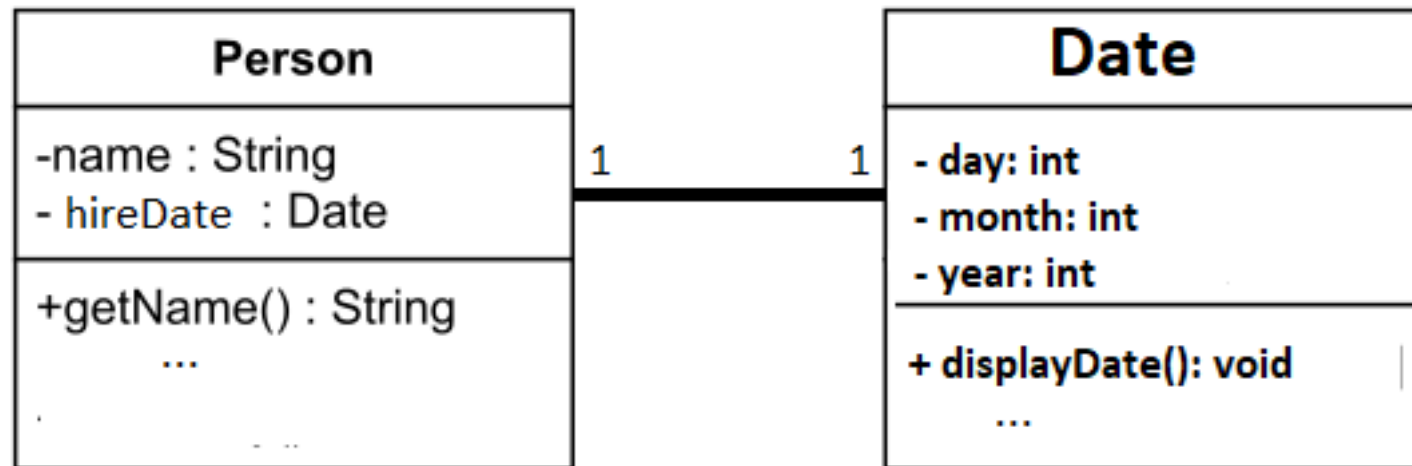
An Example

```
public class Date
{
    private int day, month, year;
    ... // some code here

}
```

```
public class Employee
{
    private String name;
    private Date hireDate;
    ... // some code here

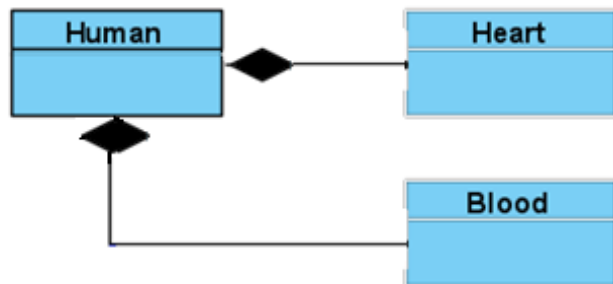
}
```



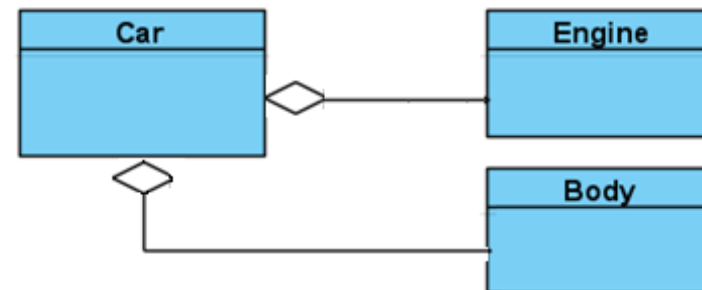
CLASSES RELATIONSHIPS

- If the association has a whole-part meaning, then it is said to be composition (or aggregation).

Composition



Aggregation



ARRAYS

- An array in java is an object that is used to hold elements of the same type.
- Arrays can be used to store primitives types(int, char, etc.) or non-primitive types like objects.
- To find out the length of an array, use the **Length** attribute.

ARRAYS

- Since arrays are objects, they are created using the keyword **new**.
- The type and the size of the array must be specified.

Example: `int[ ] arr = new int[5];`

- It is possible to create an array and initialize its elements with an array initializer.

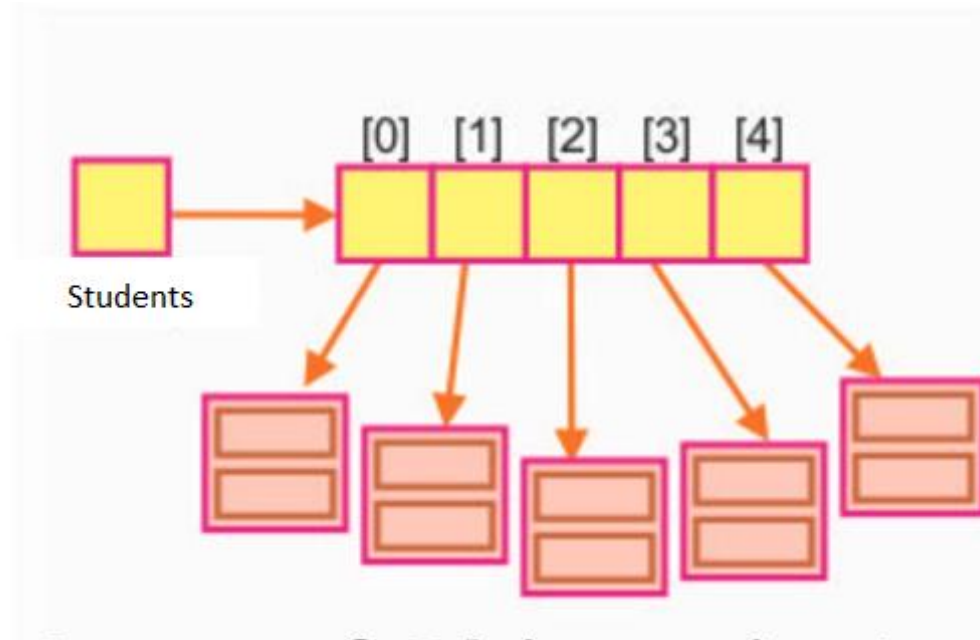
Example: `int[ ] arr = {1, 3, 5, 7, 9};`

An Example

```
public class ArrayApp
{
    private String[] colors;

    public ArrayApp()
    {
        colors = new String[3];
    }
    public void addColors()
    {
        Scanner n= new Scanner(System.in);
        for(int i=0; i<colors.length;i++)
        {
            colors[i]= n.next();
        }
    }
    public void printColors()
    {
        for(int i=0; i<colors.length;i++)
        {
            System.out.println(colors[i]);
        }
    }
    ...
}
```


ARRAY OF OBJECTS



Array of Objects in Java

ARRAY OF OBJECTS

- See next Example

An Example

```
package starray;

public class Student
{
    private String name;
    private int id;

    public Student(String n, int i)
    {
        name= n;
        id = i;
    }
    public void changeName(String n)
    {
        name= n;
    }
    public String getName()
    {
        return  name;
    }

    public String toString()
    {
        return name+ " " + id;
    }
}
```

THESE SLIDES ARE DESIGNED TO BE USED IN OOP COURSE AT PHILADELPHIA UNIVERSITY BY ENAS NAFFAR. SOME SLIDES ARE TAKEN FROM PEARSON EDUCATION, AND MARTY STEP

An Example

```
package starray;
import java.util.Scanner;

public class StArray {
    private Student[] sa;
    private int i = 0;
    Scanner n=new Scanner(System.in);

    public StArray()
    {
        sa= new Student[3];
    }

    public void addAll()
    {
        for(int i =0; i<sa.length; i++)
        {
            System.out.println("enter student name and ID");
            String na = n.next();
            int id = n.nextInt();
            Student myStudent = new Student(na, id);
            sa[i] = myStudent;
            System.out.println("an object is added");
        }
    }
}
```

```
public void addStudent(Student s1)
{
    if(i<sa.length)
    {
        sa[i]= s1;
        System.out.println("an object is added at " + i);
        i++;
    }
    else
        System.out.println("cannot add more elements");
}

public void printAll()
{
    for(int i =0; i<sa.length; i++)
    {
        System.out.println(sa[i]);
    }
}
```