Lecture – 12

Polymorphism

Polymorphism

- Poly means many and morphs means forms. Altogether **Polymorphism means many forms**.
- **Polymorphism** is an occurrence where an entity can have a single name and many forms which acts differently in different situations or circumstances.

- **Polymorphism can only be achieved through methods**

- Real life example: Human

Types of Polymorphism

There are two types of polymorphism:

1. Compile time/Static Polymorphism
   Ex: Method Overloading, Constructor Overloading

2. Runtime/Dynamic Polymorphism
   Ex: Method Overriding

Method Overloading

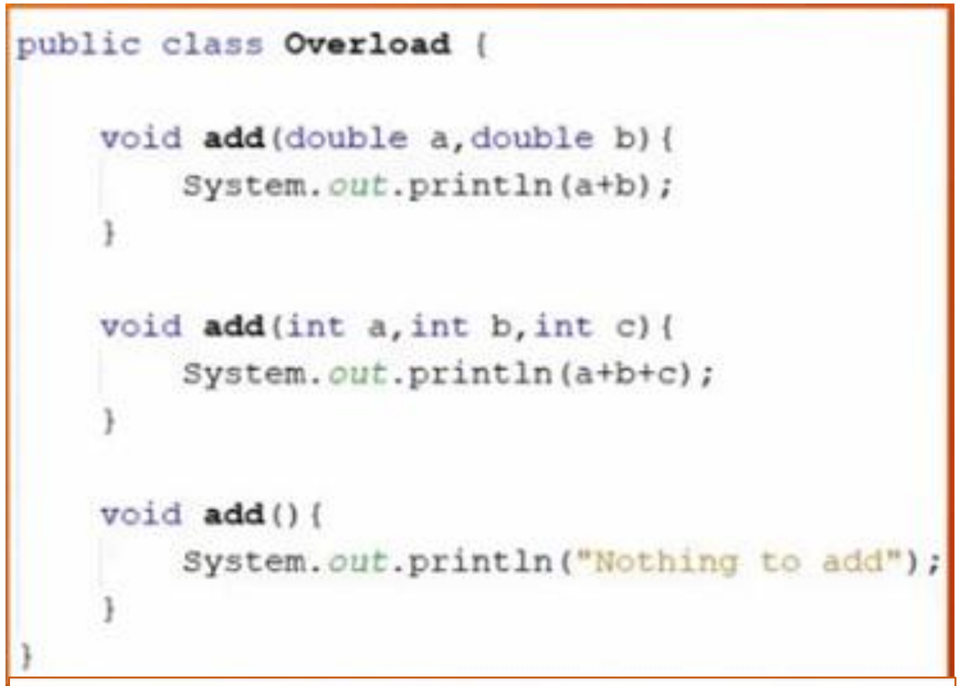
- a class have multiple methods by same name but different parameters, it is known as **Method Overloading**.

- **Argument lists could differ in –**
  1. Number of parameters.
  2. Data type of parameters.
  3. Sequence of Data type of parameters.

- **In java, Method Overloading is not possible by changing the return type of the method.**

Compile time/Static Polymorphism

In below example there are 3 version of add methods. The compiler looks at the method signature and decides which method to call at the compile time.

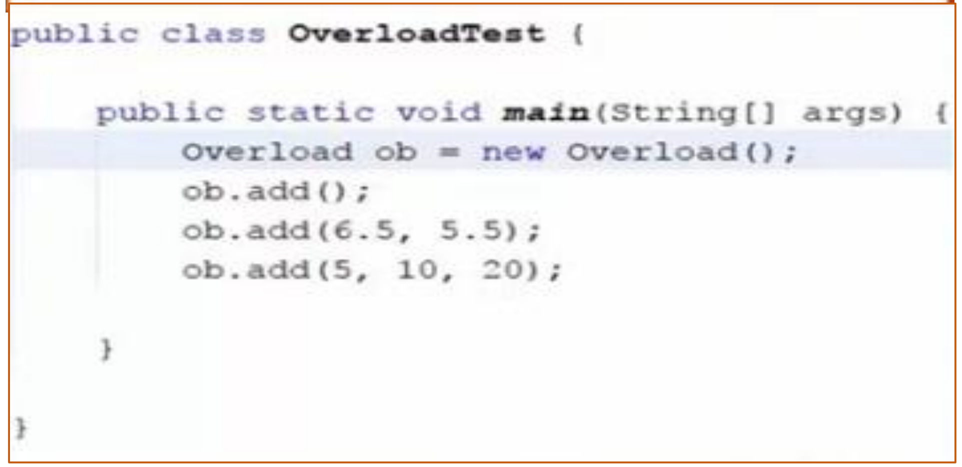


```
public class Overload {

    void add(double a,double b){
        System.out.println(a+b);
    }

    void add(int a,int b,int c){
        System.out.println(a+b+c);
    }

    void add(){
        System.out.println("Nothing to add");
    }
}
```



```
public class OverloadTest {

    public static void main(String[] args) {
        Overload ob = new Overload();
        ob.add();
        ob.add(6.5, 5.5);
        ob.add(5, 10, 20);

    }

}
```

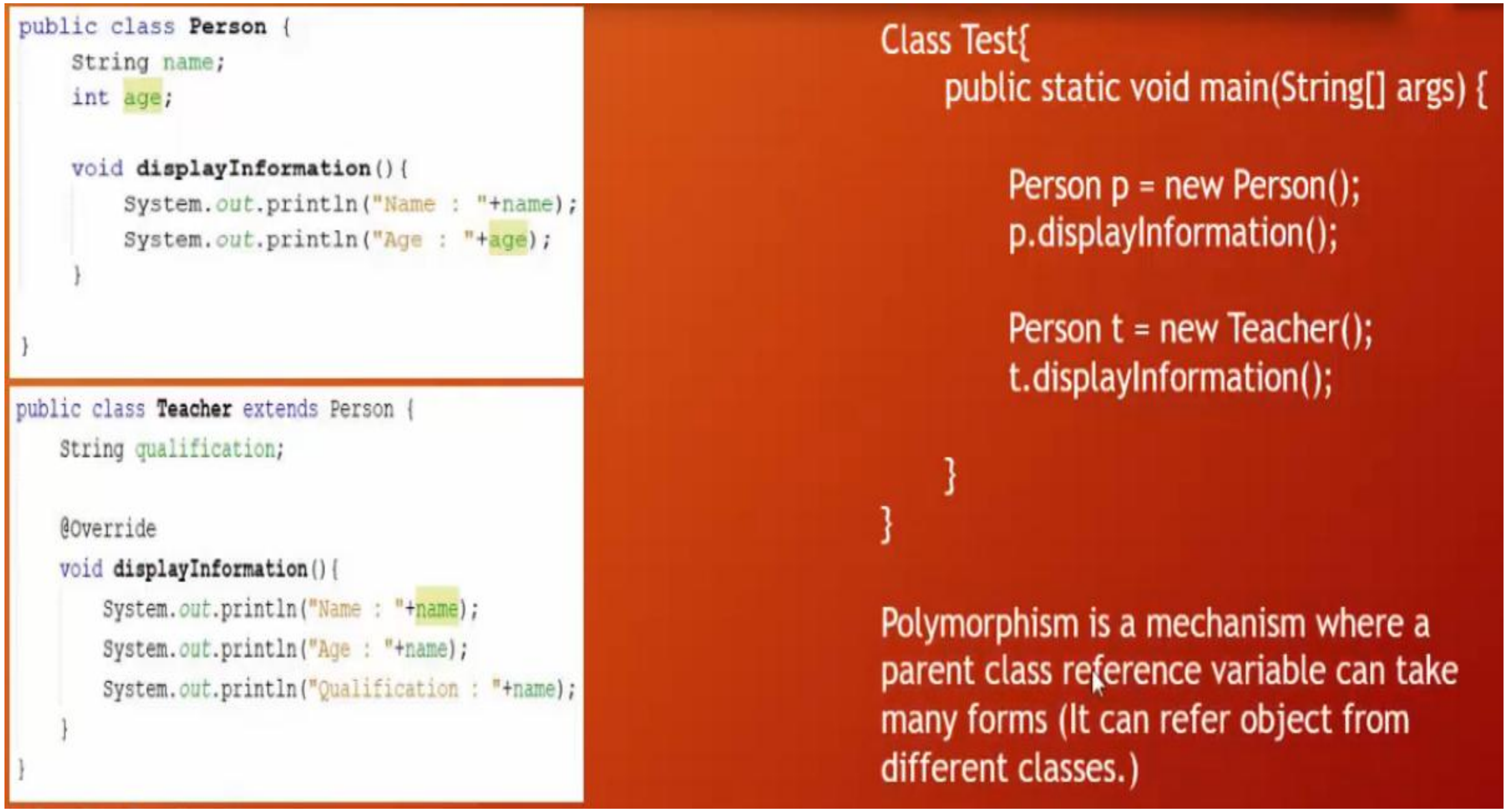
Method Overriding

If subclass provides the *specific implementation* of the method that has been provided by one *of its parent class*, it is known as method overriding. Only inherited methods can be overridden.

Some Common Restrictions of Method Overriding:

- If the overridden method has default access, then the overriding one must be default, protected or public.
- If the overridden method is protected, then the overriding one must be protected or public.
- If the overridden method is public, then the overriding one must be only public.

Run time/Dynamic Polymorphism



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

    void displayInformation(){
        System.out.println("Name : "+name);
        System.out.println("Age : "+age);
    }

}
```

```
public class Teacher extends Person {
    String qualification;

    @Override
    void displayInformation(){
        System.out.println("Name : "+name);
        System.out.println("Age : "+name);
        System.out.println("Qualification : "+name);
    }
}
```

```
Class Test{
    public static void main(String[] args) {

        Person p = new Person();
        p.displayInformation();

        Person t = new Teacher();
        t.displayInformation();

    }
}
```

Polymorphism is a mechanism where a parent class reference variable can take many forms (It can refer object from different classes.)

Exercise

Yearly Income	Tax rate
0 – 200000	0%
200000 - 500000	10%
500000 -1000000	15%

Employee	Bonus
Manager	10% of salary
Officer	5% of salary
Stuff	2% of salary

Thank You