

JAC444 - Lecture 4

Segment 2 - clone Method

clone() Method

In this lesson you will be learning about:

- Object method - clone
- Cloneable Interface
- How to override the clone method
- Shallow versus deep cloning
- Copy constructor versus clone

What is clone()?

- **Definition**: `clone()` is a method in the Java programming language for object duplication
- **Examples**: the assignment operator duplicates the reference, not the object

```
Student s1 = new Student("John", 3.5f);  
Student s2 = s1;
```

s1 and s2 are two references to the same object

- **Java solution**: The Object `clone()` method creates a copy of an object.
- `java.lang.Cloneable` interface must be implemented by the class whose object `clone` we want to create.

Subtleties of clone() method

clone() method is protected in Object class

1. Each class that wants to use clone method must override it and upgrade its visibility to public.
2. The class must implement the Cloneable interface
 - The Cloneable interface is a marker interface (does not have any methods)
 - If your class does not implement the interface Cloneable, then a CloneNotSupportedException is thrown

How to override clone() method

1. Implement the `Cloneable` interface
2. Override the `clone` method with public access privileges
3. Call `super.clone()`- as the first statement
4. Handle `CloneNotSupportedException`

Deep vs Shallow clone

- The shallow clone of an object will have exact copy of all the fields of original object.

If there are references to other objects as fields, then only references of those objects are copied into clone object, copy of those objects are not created.

- The deep copy will copy all fields, but if the field is a reference to an object, the clone method will be invoked on the internal objects.

If the object to be cloned has only primitive type fields or *Immutable* objects then there is no difference between shallow and deep copy in Java.

Copy Constructor vs Clone

- `Object.clone()` is protected; you need to implement `clone()` with public access
- All its superclasses of your class should define `clone()` method in them or inherit it
- Copy constructors are in general better than `clone()`