Object-Oriented Programming (CS F213)

Module I: Object-Oriented and Java Basics

CS F213 RL 3.3: Role of Constructors in Java

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CS F213 RL 3.2 : Topics

- Constructors in Java
- Creating/Instantiating Objects
- Types of Constructors

Role of Constructor Method

- Constructor is a Method of a class having a name similar to the class itself
- Helps to Create and Initialize the Objects
- If no constructor is defined for the class then a default un-parameterized constructor will be provided by Java Runtime Environment.
- Constructor Method has no return type not even void.
- Code written inside constructor method is automatically executed for every object creation of that class.
- If a class has its own constructor then default constructor will not be available
- Constructor Method can have its own Access Modifier : public, protected, package-private and private

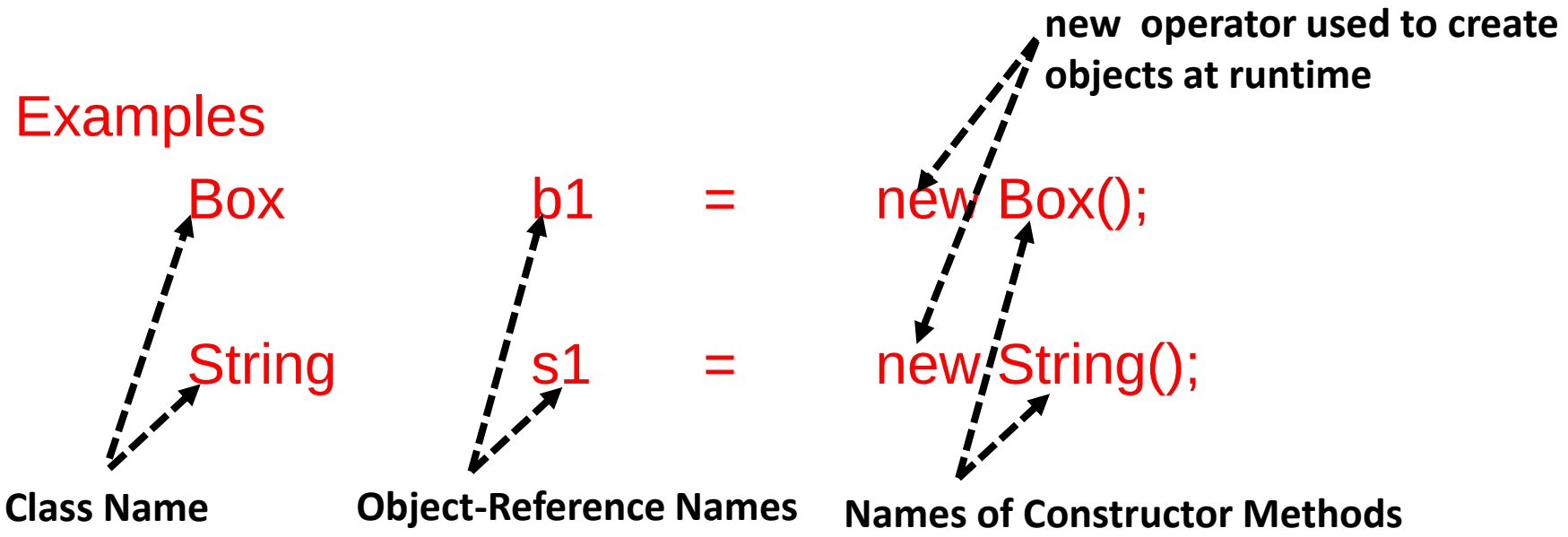
Object Creation Syntax

- Creating/Instantiating Objects

  <Class-Name> object-reference = new Constructor();

Examples

```
Box     b1  =  new Box();
String  s1  =  new String();
```



Note : Above Examples Use Unparametrized Constructor

Object Creation Example

```
/* File Name : Box.java */
class Box
{
        private   double   length;   // length of a Box
        private   double   width;    // width of a Box
        private   double   height;   // height of a Box

        /* Method to Compute the Area of Box */
        public    double   area()
        {
                return 2* (length * width + width * height + height * length);
        } // End of Method

        /* Method to Compute the Volume of Box */
        public    double   volume()
        {
                return length * width * height;
        } // End of Method
}// End of class Box

class BoxTest
{
        public    static   void   main (String [ ] args)
        {
                Box   b1   =   new   Box();
                Box   b2   =   new   Box();
        }// End of Method
}// End of class BoxTest
```

Class Box Has No Constructor

Constructor Provided by JRE

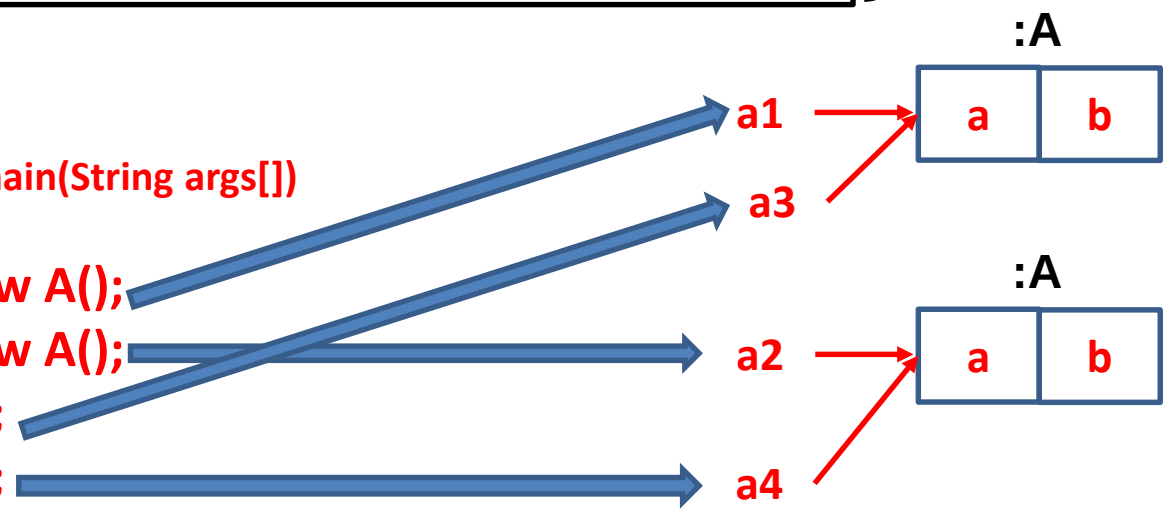
Types of Constructors

1. Un-parameterized Constructor
2. Parameterized Constructor
3. Overloaded Constructors

Class With Unparametrized Constructor

```
// File Name : Demo.java
class A
{
        private int a;
        private int b;
        A()
        {
                System.out.println("Hello Welcome");
        }
}// End of class A
class ConstructorDemo
{
  public static void     main(String args[])
  {
        A a1  = new A();
        A a2  = new A();
        A a3  = a1;
        A a4  = a2;
  } // End of Method
}// End of class ConstructorDemo
```

Un-parameterized Constructor



Only Two Objects are Created in This Example

Class With Unparametrized Constructor


```
// File Name : Demo.java
class A
{
        private int a;
        private int b;
        A()
        {
                System.out.println("Hello Welcome");
        }
}// End of class A
class ConstructorDemo
{
  public static void     main(String args[])
  {
        A a1  = new A();
        A a2  = new A();
        A a3  = a1;
        A a4  = a2;
  } // End of Method
}// End of class ConstructorDemo
```

Predict the O/P of This Code

Output

```
F:\>javac Demo.java
F:\>java ConstructorDemo
Hello Welcome
Hello Welcome
```

Class With Unparametrized Constructor


```
// File Name : Demo.java
class A
{
        private int a;
        private int b;
        A()
        {
                for(int i =0; i<10; i++)
                        System.out.println ("Hello");
        }
}// End of class A
class ConstructorDemo
{
  public static void     main(String args[])
  {
        A a1  = new A();
        A a2  = new A();
        A a3  = new A();
        A a4  = new A();
  } // End of Method
}// End of class ConstructorDemo
```

Predict The Output

Class With Parameterized Constructor

```
// File Name : Demo.java
class A
{
        private int a;
        private int b;

        A(int a, int b)
        {
                this.a = a;
                this.b = b;
                displayValues();
        } // End of Constructor Method

        /* Method to Display the Attribute Values */
        public void displayValues()
        {
                System.out.println(" a = " + a);
                System.out.println(" b = " + b);
        }// End of Method
}// End of class A

class ConstructorDemo
{
  public static void main(String args[])
  {
        A a1  = new A();

  } // End of Method
}// End of class ConstructorDemo
```

Parameterized Constructor

Compile-Time Error

```
F:\>javac Demo.java
Demo.java:27: cannot find symbol
symbol  : constructor A()
location: class A
        A a1  = new A();
              ^
1 error
```

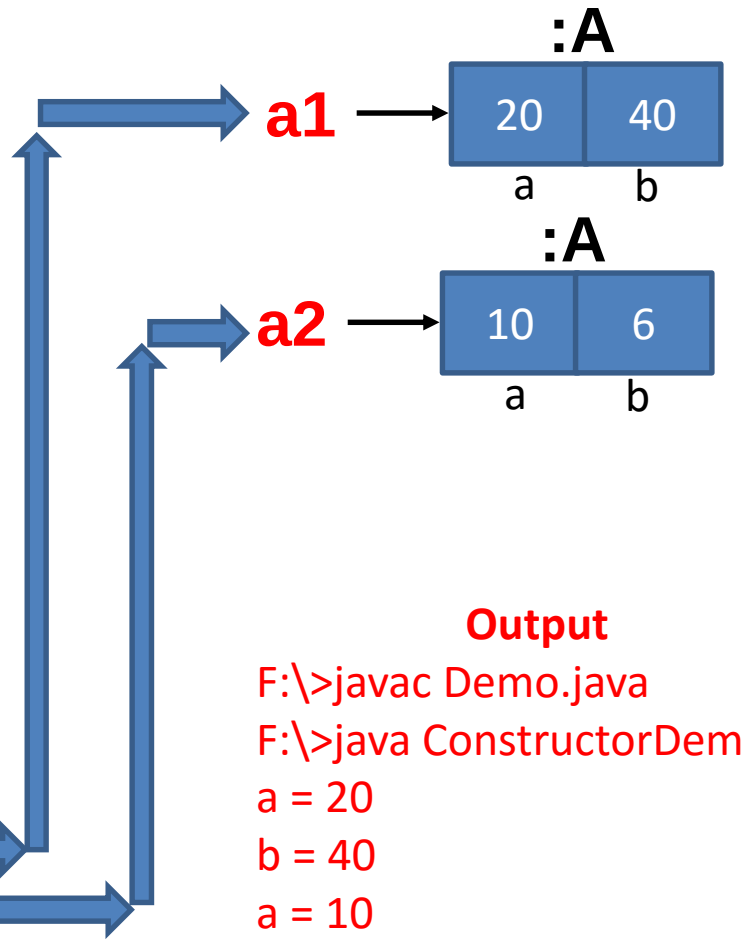
Class With Parameterized Constructor

```
// File Name : Demo.java
class A
{
        private int a;
        private int b;

        A(int a, int b)
        {
                this.a = a;
                this.b = b;
                displayValues();
        } // End of Constructor Method

        /* Method to Display the Attribute Values */
        public void displayValues()
        {
                System.out.println(" a = " + a);
                System.out.println(" b = " + b);
        }// End of Method
}// End of class A

class ConstructorDemo
{
  public static void main(String args[])
  {
        A a1  = new A(20,40);
        A a2 = new A(10,6);
    } // End of Method
}// End of class ConstructorDemo
```



Output

```
F:\>javac Demo.java
F:\>java ConstructorDemo
a = 20
b = 40
a = 10
b = 6
```

Class with Overloaded Constructors

- **Constructor Methods are Overloaded if they have same name but different signatures**

```
// File Name : Demo.java
class Triangle
{
 private double          a;          // Side 1 of Triangle
 private double          b;          // Side 2 of Triangle
 private double          c;          // Side 2 of Triangle

 // Constructor Method - 1 Used to Create Equilateral Triangle
 Triangle(double side)
 {
            a = b = c = side;
            displaySides();
 }// End of Constructor
 // Constructor Method - 1 Used to Create Isosceles Triangle
 Triangle(double side1, double side2)
 {
             a = b = side1;    c = side2;
            displaySides();
 }// End of Constructor
  // Constructor Method - 3 Used to Create Scalene Triangle
  Triangle(double side1, double side2, double side3)
  {
            a = side1;   b = side2;   c = side3;
            displaySides();
  }// End of Constructor
```

```
// Method to print the sides of Triangle
  public        void          displaySides()
  {
    System.out.println("Side 1:" + a);
    System.out.println("Side 2:" + b);
     System.out.println("Side 3:" + c);
   }// End of Method
}// End of Class

/* Driver Class */
class ConstructorDemo
{
   public static void main(String args[])
   {

      Triangle T1 = new Triangle(10);
      Triangle T2 = new Triangle(20, 30);
      Triangle T3 = new Triangle(10,6,8);

   } // End of Method
}// End of class ConstructorDemo
```

Class with Overloaded Constructors

- Output of the Java Program of Previous Slide

```
F:\>javac Demo.java

F:\>java ConstructorDemo
Side 1:10.0
Side 2:10.0
Side 3:10.0
Side 1:20.0
Side 2:20.0
Side 3:30.0
Side 1:10.0
Side 2:6.0
Side 3:8.0
```

Constructors With Access Modifiers

```
// File Name : Demo.java
class XYZ
{
        private int x, y, z;

        // Constructor with 'private' Modifier
        private XYZ (int a)
        {
                x = a;
        }

        // Constructor with public Modifier
        public XYZ (int y, int z)
        {
                this.y = y;
                this.z = z;
        }
}// End of class XYZ
// Driver Class
class Test
{
        // Driver Method
        public static void main(String args[])
        {
                A a1 = new A(10);
                A a2 = new A(10,40);
        } // End of Method
} // End of class Test
```

Output

```
F:\>javac Demo.java
Demo.java:25: cannot find symbol
symbol  : constructor A(int)
location: class A
        A a1 = new A(10);
                   ^
1 error
```

Compile-Time Error

Constructor Summary

- Method of a class having same name as class
- No return type for constructor methods
- Can have access specifiers

Thank You