



Object Oriented Programming with Java 8

PG-DAC

Rohan Paramane



Contents

- String
- String Buffer



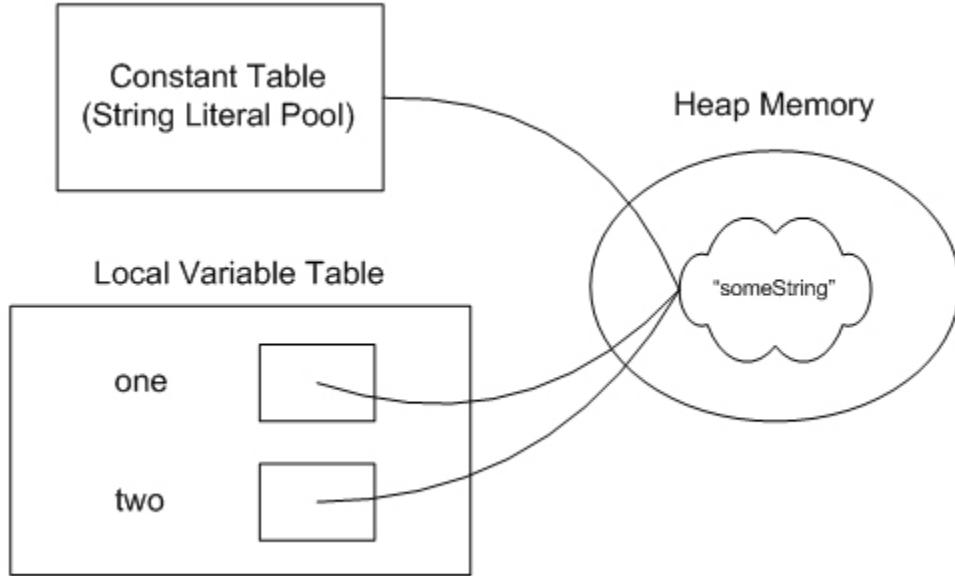
String Introduction

- Strings, which are widely used in Java programming, are a sequence of characters.
- In the Java programming language, strings are objects.
- We can use following classes to manipulate string
 - 1. **java.lang.String : immutable character sequence**
 - 2. **java.lang.StringBuffer : mutable**
 - 3. **java.lang.StringBuilder : mutable character sequence**
 - 4. **java.util.StringTokenizer**
 - 5. **java.util.regex.Pattern**
 - 6. **java.util.regex.Matcher**

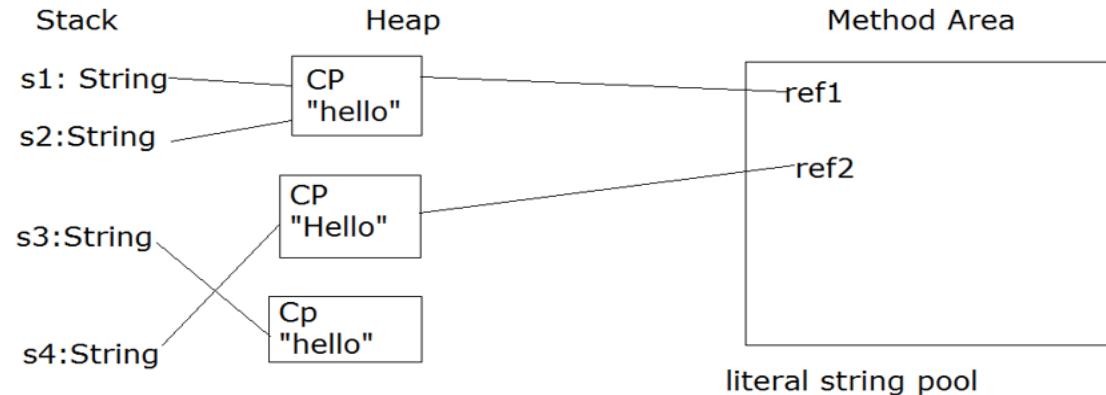


Literal Vs Non Literal

Two ways to create a String in Java which are String Literal and String Object. The main difference between String Literal and String Object is that String Literal is a String created using double quotes while String Object is a String created using the new() operator.



```
Eg. String s1="hello"; // Literal  
String s2="hello"; // Literal  
String s3=new String(s1); // Non Literal  
String s4="hello"; // Literal
```



Note: JVM Class loader will scan the literal string @class loading and create string objects on heap and its reference in literal/constant string pool (Memory allocated to method area).

Pool : Sharing of resources, so multiple references for the same content string will not be kept.



Example Literal Vs Non Literal

Literal

`String s1 = "Hello World";`

Here, the s1 is referring to “Hello World” in the String pool.

If there is another statement as follows.

`String s2 = "Hello World";`

As “Hello World” already exists in the String pool, the s2 reference variable will also point to the already existing “Hello World” in the String pool. In other words, now both s1 and s2 refer to the same “Hello World” in the String pool. Therefore, if the programmer writes a statement as follows, it will display true.

`System.out.println(s1==s2);`

if you create an object using String literal it may return an existing object from String pool (a cache of String object in which is now moved to heap space in recent Java release).

Non Literal

`String s1 = new ("Hello World");`

`String s2 = new ("Hello World");`

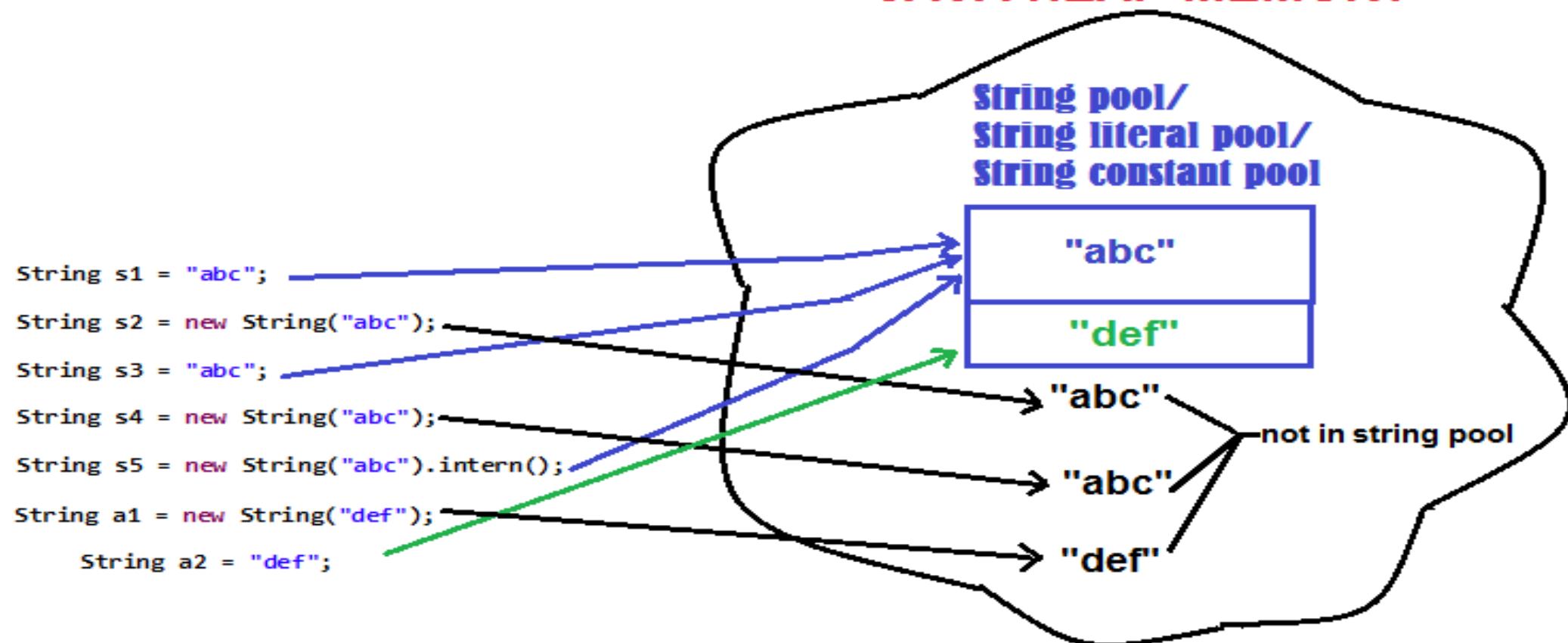
Unlike with String literals, in this case, there are two separate objects. In other words, s1 refers to one “Hello World” while s2 refers to another “Hello World”. Here, the s1 and s2 are reference variables that refer to separate String objects. Therefore, if the programmer writes a statement as follows, it will display false.

`System.out.println(s1==s2);`

When you create a String object using the new() operator, it always creates a new object in heap memory.



JAVA HEAP MEMORY



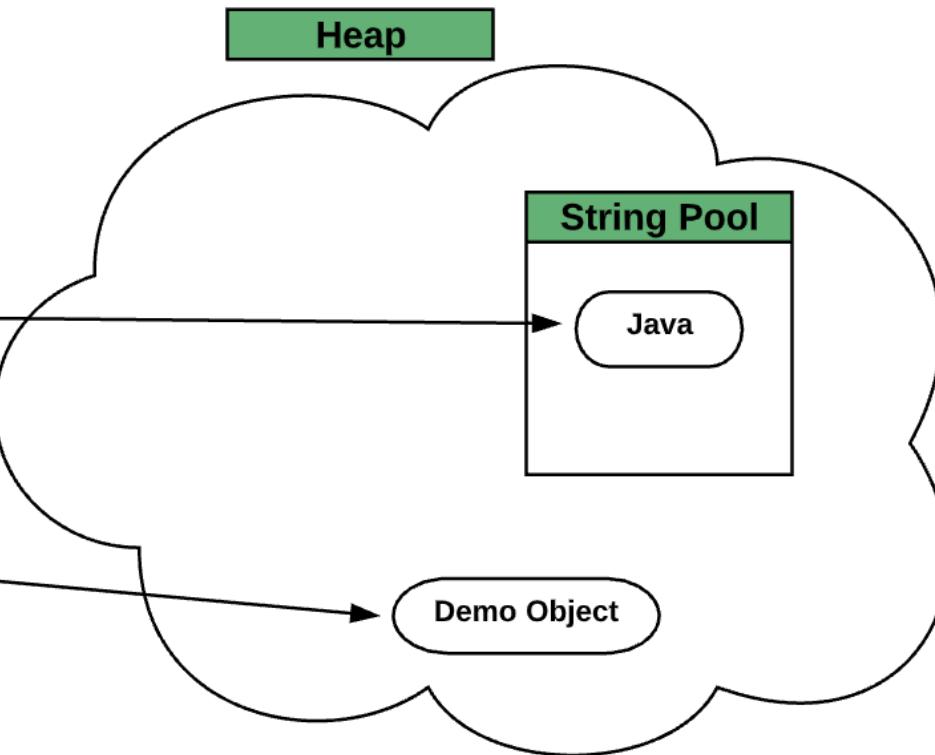
Code

```
{  
    int num = 50;  
    String name = "Java";  
    Demo d = new Demo();  
}
```

Stack

num = 50
name

d



Literal Vs Non Literal example

```
String s="Hello";//literal string
s.toUpperCase();//non literal object
s.concat("12345");//non literal object ---> Hello12345 , literal string obj : "12345"
sop(s);//Hello
String s1="testing strings";//literal string
String s2=new String(s1);//non literal s2 ----> heap ("testing strings")
sop(s1==s2);//false
sop(s1.equals(s2));//true
String s3="He"+"llo";//literal strings : He , llo : two strings , s3 is a literal string
String s4="He".concat("llo");//s4 ---> non literal
String s5="hello";//adds new literal string s5----> literal string
sop(s==s3);//true
sop(s==s4);//false
sop(s==s5);//false
```

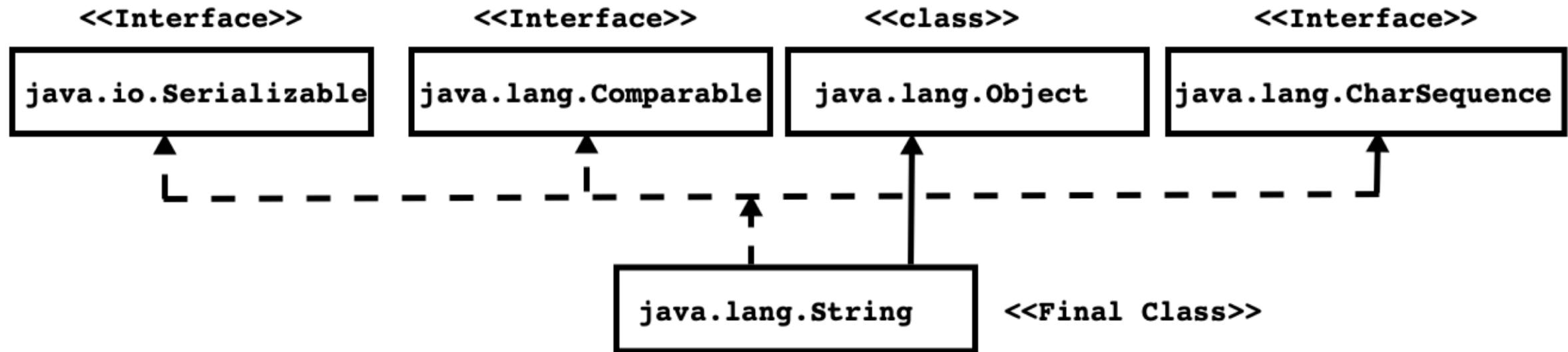


Literal Vs Non Literal example

```
String s1="hello";//s1 --> literal
String s2="hello";//nothing
String s3=new String(s1);//non literal
String s4=s3.intern();//won't add any new literal string : since "hello" alrdy exists
String s5="he"+"llo";//won't add any new literal string : since "hello" alrdy exists
String s6="he".concat("llo");//new non literal
System.out.println(s1==s2);//t
System.out.println(s1==s3);//f
System.out.println(s1==s4);//t
System.out.println(s1==s5);//t
System.out.println(s1==s6);//f
String s7=new String("Hello");//how many string objects are created in this line? : 2
String s8=new String("hello");//how many string objects are created in this line? : 1
```



String Class Hierarchy



String Introduction

- String is not a built-in or primitive type. It is a class, hence considered as non primitive/reference type.
- We can create instance of String with and W/o new operator.
 - `String str = new String("Akshita"); //String Instance`
 - `String str = "SunBeam";`
- `String str = "SunBeam"`, is equivalent to:
 - `char[] data = new char[]{ 'S', 'u', 'n', 'B', 'e', 'a', 'm' };`
 - `String str = new String(data);`



String concatenation

- If we want to concatenate Strings then we should use concat() method:

➤ "public String concat(String str)"

- Consider following Example:

```
String s1 = "SunBeam";  
String s2 = "Pune/Karad";  
String s3 = s1.concat( s2 );
```

- The Java language provides special support for the string concatenation operator (+), and for conversion of other objects to strings.

```
String s1 = "SunBeam";  
String s2 = s1 +" Pune/Karad";
```

-
-
- int pinCode = 411057;
- String str = "Pune,"+pinCode;

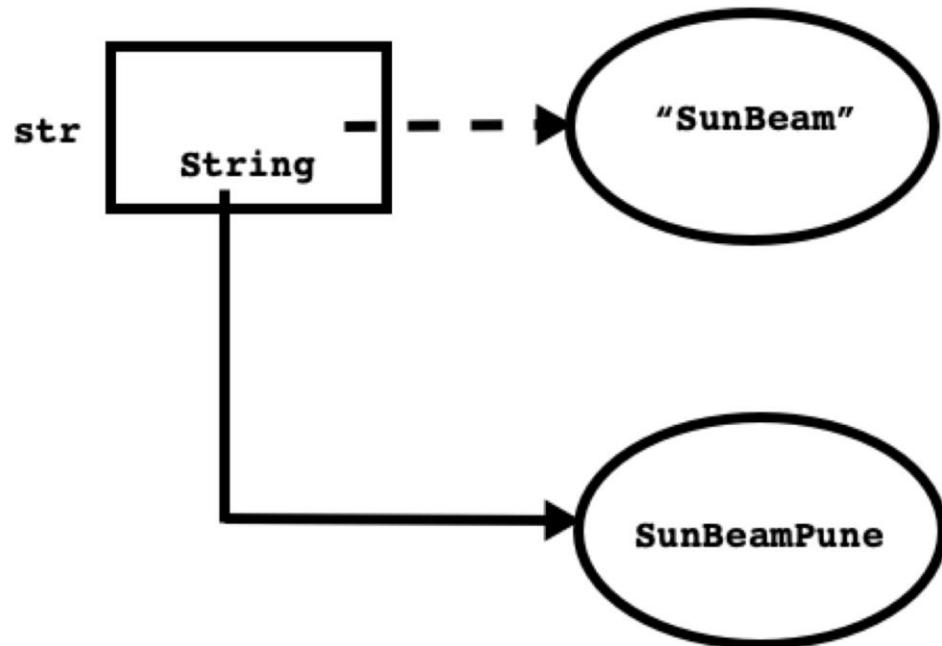


Immutable Strings

- Strings are constant; their values cannot be changed after they are created.
- Because String objects are immutable they can be shared.

```
String str = "SunBeam";
```

```
str = str + "Pune";
```



String Class Constructors

1. public String()

2. public String(byte[] bytes)

3. public String(char[] value)

4. public String(String original)

5. public String(StringBuffer buffer)

6. public String(StringBuilder builder)



String Class Methods

1. public char charAt(int index)
2. public int compareTo(String anotherString)
3. public String concat(String str)
4. public boolean equalsIgnoreCase(String anotherString)
5. public boolean startsWith(String prefix)
6. public boolean endsWith(String suffix)
7. public static String format(String format, Object... args)
8. public byte[] getBytes()
9. public int indexOf(int ch)
10. public int indexOf(String str)
11. public String intern()
12. public boolean isEmpty()
13. public int length()
14. public boolean matches(String regex)



String Class Methods

```
15. public String[] split(String regex)  
16. public String substring(int beginIndex)  
17. public String substring(int beginIndex, int endIndex)  
18. public char[] toCharArray()  
19. public String toLowerCase()  
20. public String toUpperCase()  
21. public String trim()  
22. public static String valueOf(Object obj)
```

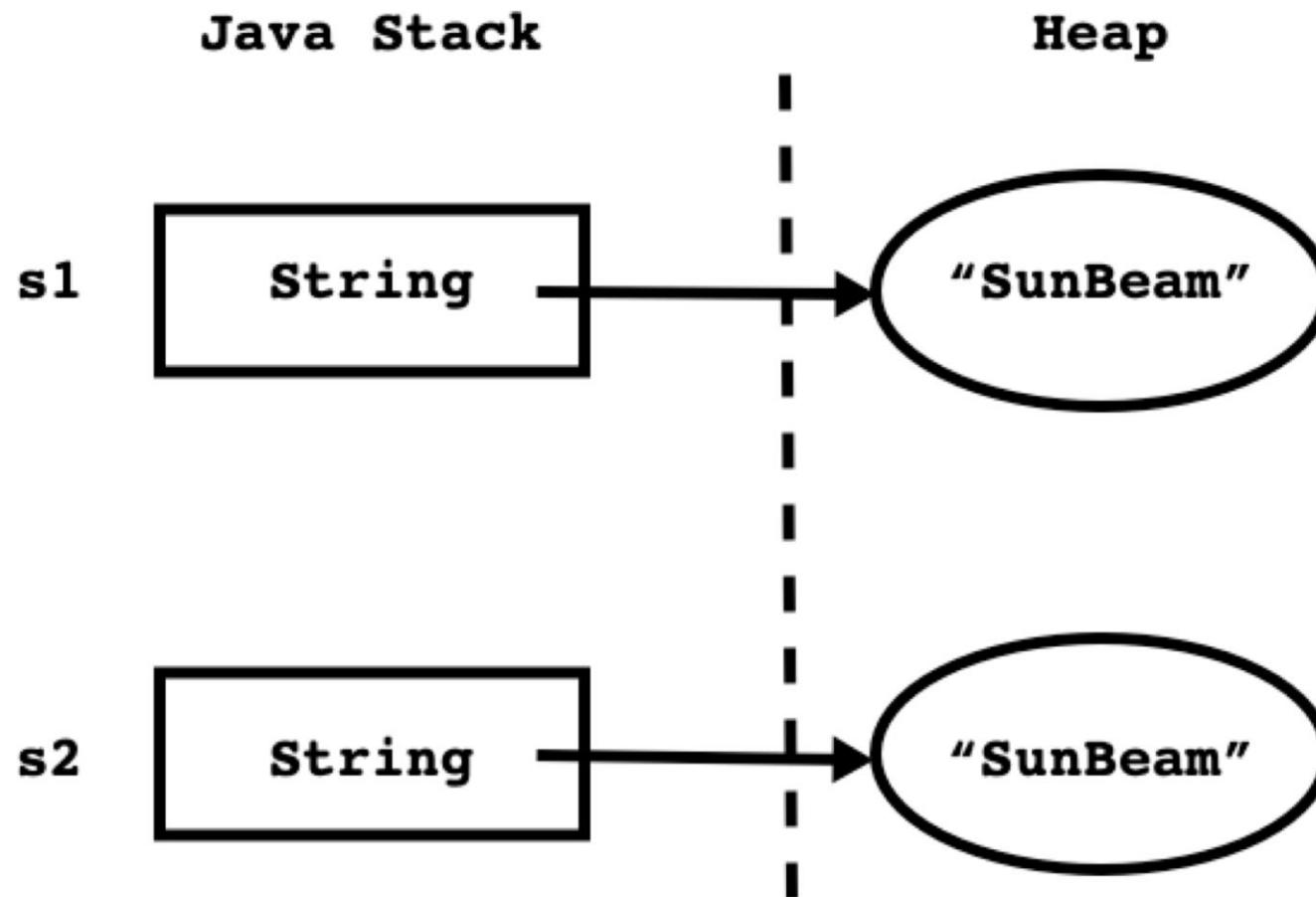


String Twister

```
public class Program {  
    public static void main(String[] args) {  
        String s1 = new String("SunBeam");  
        String s2 = new String("SunBeam");  
        if( s1 == s2 )  
            System.out.println("Equal");  
        else  
            System.out.println("Not Equal");  
        //Output : Not Equal  
    }  
}
```



String Twister



String Twister

```
public class Program {  
    public static void main(String[] args) {  
        String s1 = new String("SunBeam");  
        String s2 = new String("SunBeam");  
        if( s1.equals(s2) )  
            System.out.println("Equal");  
        else  
            System.out.println("Not Equal");  
        //Output : Equal  
    }  
}
```

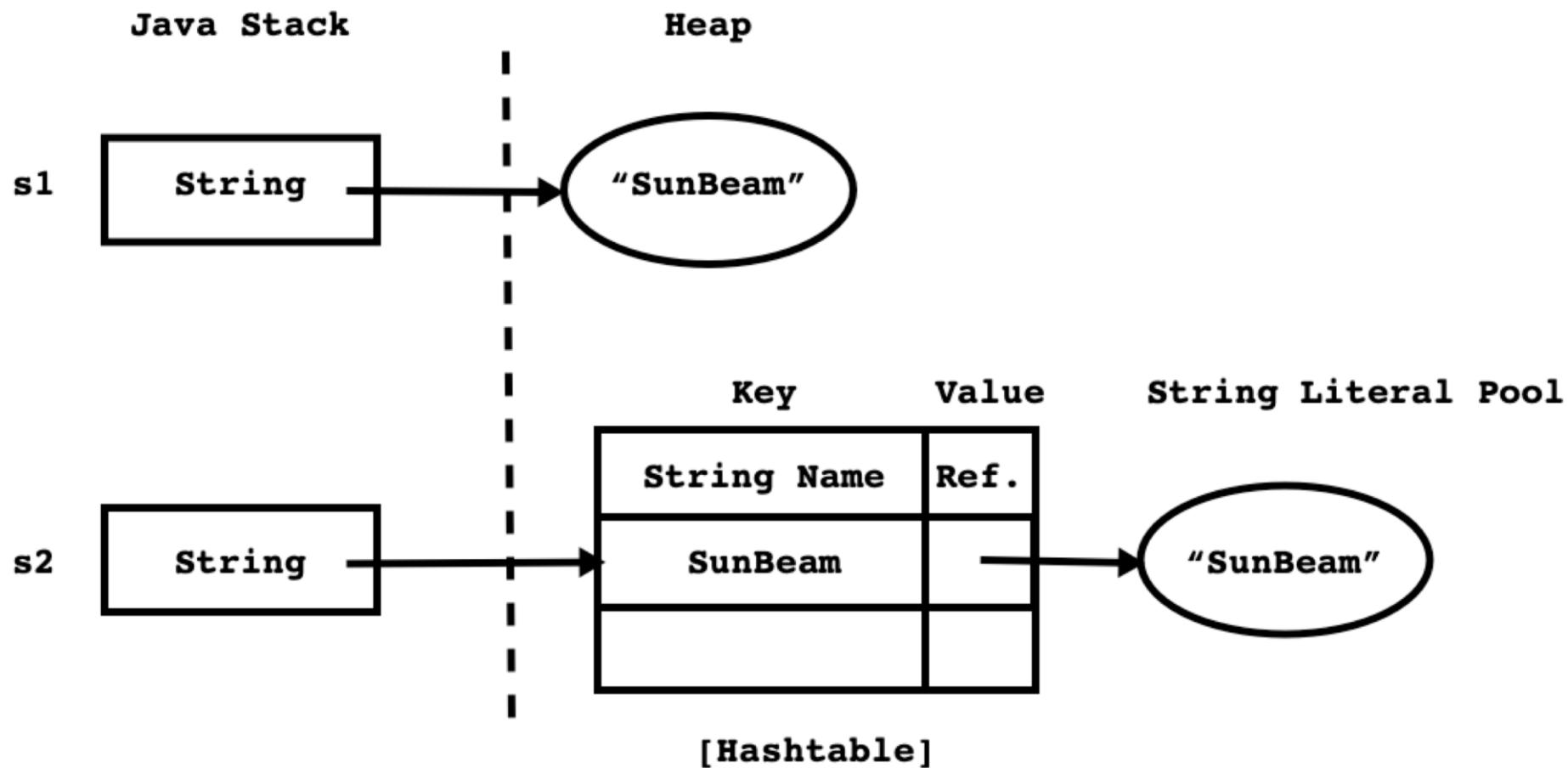


String Twister

```
public class Program {  
    public static void main(String[] args) {  
        String s1 = new String("SunBeam");  
        String s2 = "SunBeam";  
        if( s1 == s2 )  
            System.out.println("Equal");  
        else  
            System.out.println("Not Equal");  
        //Output : Not Equal  
    }  
}
```



String Twister



String Twister

```
public class Program {  
    public static void main(String[] args) {  
        String s1 = new String("SunBeam");  
        String s2 = "SunBeam";  
        if( s1.equals(s2) )  
            System.out.println("Equal");  
        else  
            System.out.println("Not Equal");  
        //Output : Equal  
    }  
}
```

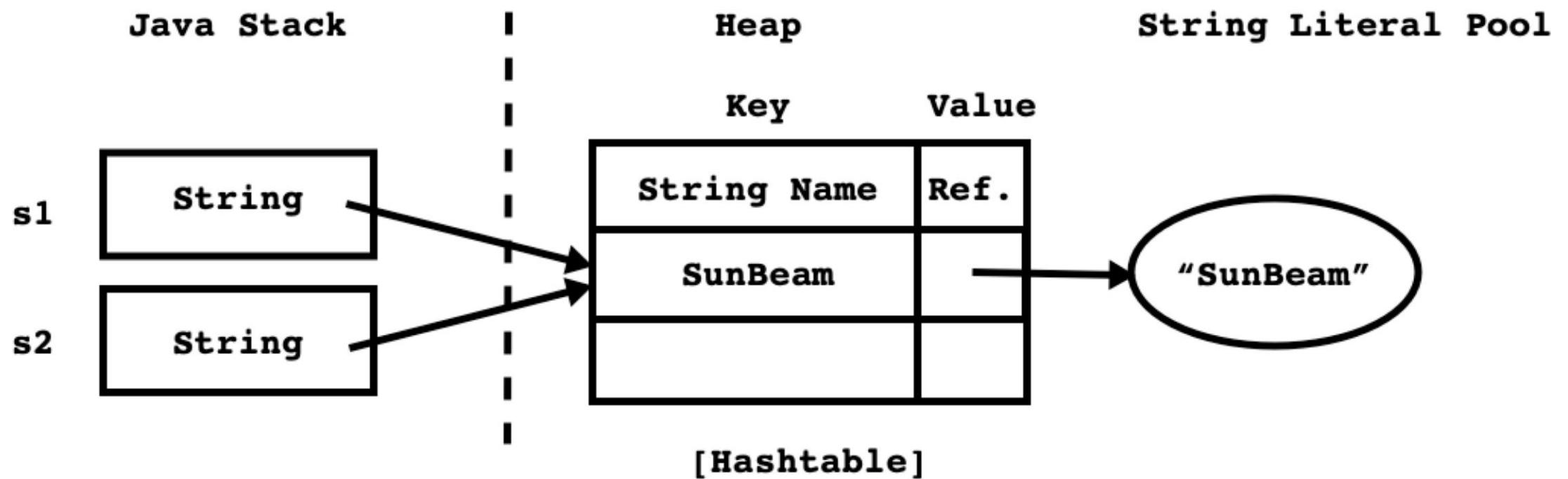


String Twister

```
public class Program {  
    public static void main(String[] args) {  
        String s1 = "SunBeam";  
        String s2 = "SunBeam";  
        if( s1 == s2 )  
            System.out.println("Equal");  
        else  
            System.out.println("Not Equal");  
        //Output : Equal  
    }  
}
```



String Twister



String Twister

```
public class Program {  
    public static void main(String[] args) {  
        String s1 = "SunBeam";  
        String s2 = "SunBeam";  
        if( s1.equals(s2) )  
            System.out.println("Equal");  
        else  
            System.out.println("Not Equal");  
        //Output : Equal  
    }  
}
```



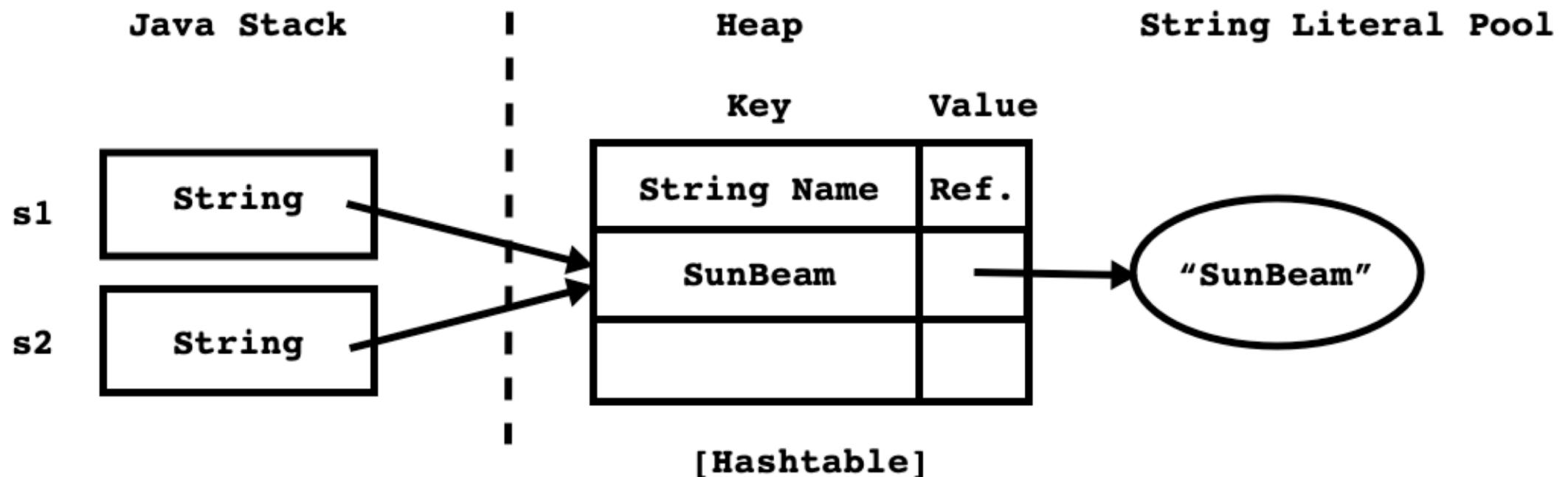
String Twister

```
public class Program {  
    public static void main(String[] args) {  
        String s1 = "SunBeam";  
        String s2 = "Sun"+"Beam";  
        if( s1 == s2 )  
            System.out.println("Equal");  
        else  
            System.out.println("Not Equal");  
        //Output : Equal  
    }  
}
```



String Twister

- Constant expression gets evaluated at compile time.
 - "int result = 2 + 3;" becomes "int result = 5;" at compile time
 - "String s2 = "Sun"+"Beam";" becomes "String s2="SunBeam";" at compile time.

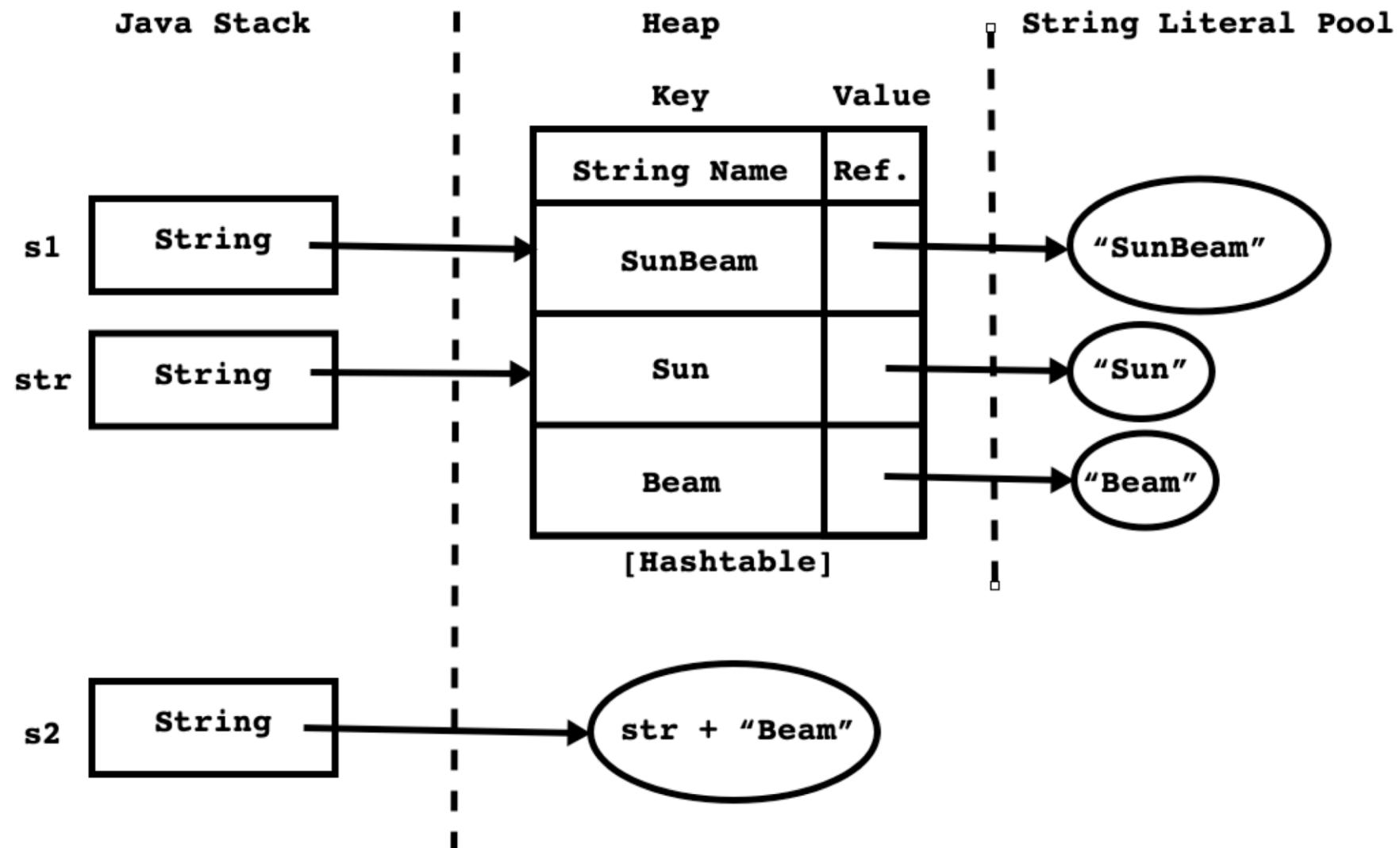


String Twister

```
public class Program {  
    public static void main(String[ ] args) {  
        String s1 = "SunBeam";  
        String str = "Sun";  
        String s2 = str + "Beam";  
        if( s1 == s2 )  
            System.out.println("Equal");  
        else  
            System.out.println("Not Equal");  
        //Output : Not Equal  
    }  
}
```



String Twister



String Twister

```
public class Program {  
    public static void main(String[] args) {  
        String s1 = "SunBeam";  
        String str = "Sun";  
        String s2 = ( str + "Beam" ).intern();  
        if( s1 == s2 )  
            System.out.println("Equal");  
        else  
            System.out.println("Not Equal");  
        //Output : Equal  
    }  
}
```



String Twister

```
package p1;
public class A {
    public static final String str = "Hello";
}
```

```
package test;
class B {
    public static final String str = "Hello";
}
```

```
package test;
public class Program {
    public static final String str = "Hello";
    public static void main(String[] args) {
        String str = "Hello";
    }
}
```



String Twister

```
public class Program {  
    public static final String str = "Hello";  
    public static void main(String[] args) {  
        String str = "Hello";  
        System.out.println(A.str == B.str);          //true  
        System.out.println(A.str == Program.str);    //true  
        System.out.println(A.str == str);            //true  
        System.out.println(B.str == Program.str);    //true  
        System.out.println(B.str == str);            //true  
        System.out.println(Program.str == str);      //true  
    }  
}
```



String Twister

```
public class Program {  
    public static void main(String[] args) {  
        String str = "SunBeam";  
        //char ch = str.charAt( 0 ); //S  
        //char ch = str.charAt( 6 ); //m  
        //char ch = str.charAt(-1); //StringIndexOutOfBoundsException  
        char ch = str.charAt( str.length() ); //StringIndexOutOfBoundsException  
        System.out.println(ch);  
    }  
}
```



StringBuffer versus StringBuilder

- StringBuffer and StringBuilder are final classes.
- It is declared in `java.lang` package.
- It is used to create mutable string instance.
- `equals()` and `hashCode()` method is not overridden inside it.
- We can create instances of these classes using `new` operator only.
- Instances get space on Heap.
- **StringBuffer implementation is thread safe whereas StringBuilder is not.**
- **StringBuffer is introduced in JDK1.0 and StringBuilder is introduced in JDK 1.5.**



StringBuffer Twister

```
public class Program {  
    public static void main(String[] args) {  
        StringBuffer s1 = new StringBuffer("SunBeam");  
        StringBuffer s2 = new StringBuffer("SunBeam");  
        if( s1 == s2 )  
            System.out.println("Equal");  
        else  
            System.out.println("Not Equal");  
        //Output : Not Equal  
    }  
}
```



StringBuffer Twister

```
public class Program {  
    public static void main(String[] args) {  
        StringBuffer s1 = new StringBuffer("SunBeam");  
        StringBuffer s2 = new StringBuffer("SunBeam");  
        if( s1.equals(s2) )  
            System.out.println("Equal");  
        else  
            System.out.println("Not Equal");  
        //Output : Not Equal  
    }  
}
```



StringBuffer Twister

```
public class Program {  
    public static void main(String[] args) {  
        String s1 = new String("SunBeam");  
        StringBuffer s2 = new StringBuffer("SunBeam");  
        if( s1 == s2 )  
            System.out.println("Equal");  
        else  
            System.out.println("Not Equal");  
        //Output : Compiler Error  
    }  
}
```



StringBuffer Twister

```
public class Program {  
    public static void main(String[] args) {  
        String s1 = new String("SunBeam");  
        StringBuffer s2 = new StringBuffer("SunBeam");  
        if( s1.equals(s2) )  
            System.out.println("Equal");  
        else  
            System.out.println("Not Equal");  
        //Output : Not Equal  
    }  
}
```



StringBuffer Twister

```
public class Program {  
    public static void main(String[] args) {  
        StringBuffer s1 = new StringBuffer("SunBeam");  
        String s2 = new String("SunBeam");  
        if( s1.equals(s2) )  
            System.out.println("Equal");  
        else  
            System.out.println("Not Equal");  
        //Output : Not Equal  
    }  
}
```



StringBuilder Twister

```
public class Program {  
    public static void main(String[] args) {  
        StringBuilder s1 = new StringBuilder("SunBeam");  
        StringBuilder s2 = new StringBuilder("SunBeam");  
        if( s1 == s2)  
            System.out.println("Equal");  
        else  
            System.out.println("Not Equal");  
        //Output : Not Equal  
    }  
}
```

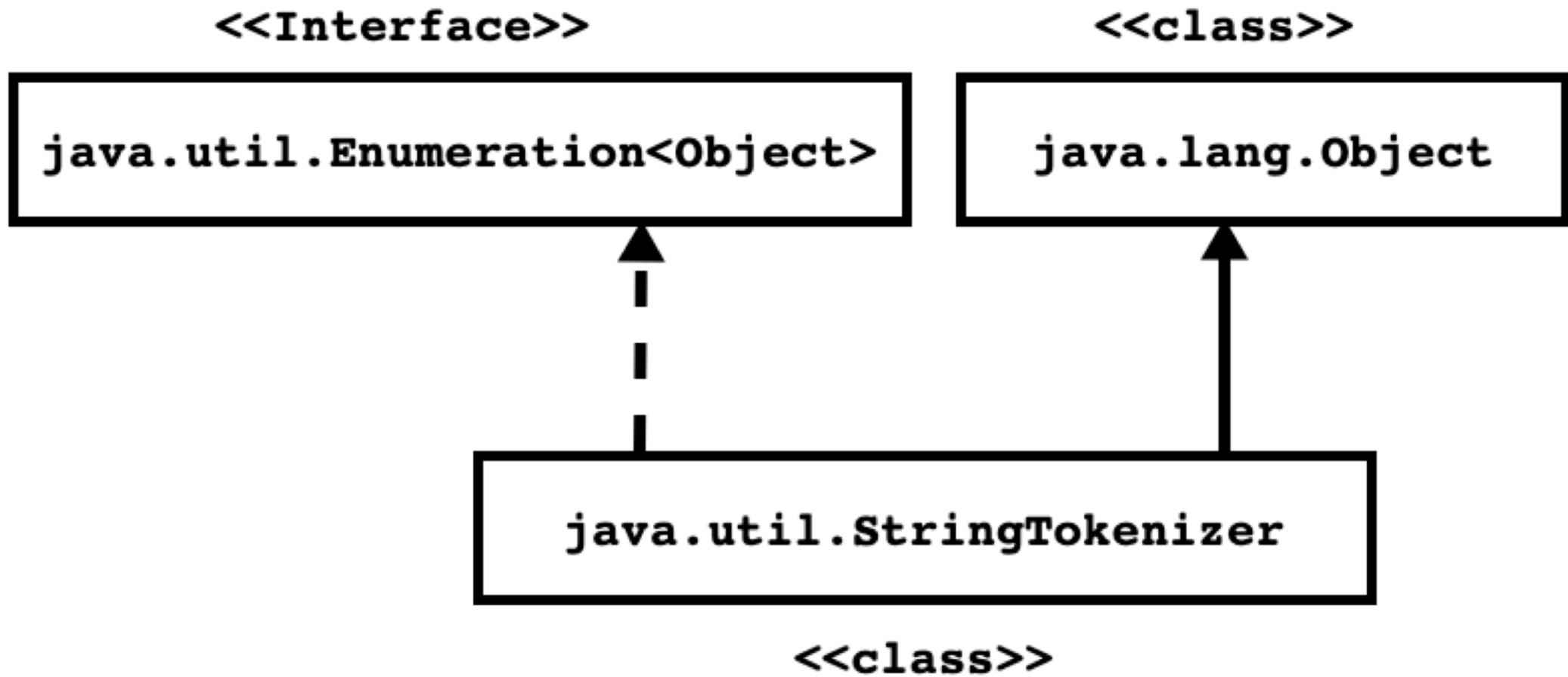


StringBuilder Twister

```
public class Program {  
    public static void main(String[] args) {  
        StringBuilder s1 = new StringBuilder("SunBeam");  
        StringBuilder s2 = new StringBuilder("SunBeam");  
        if( s1.equals(s2))  
            System.out.println("Equal");  
        else  
            System.out.println("Not Equal");  
        //Output : Not Equal  
    }  
}
```



StringTokenizer



StringTokenizer

- The string tokenizer class allows an application to break a string into tokens.
- Methods of `java.util.Enumeration<E>` interface
 1. `boolean hasMoreElements()`
 2. `E nextElement()`
- Methods of `java.util.StringTokenizer` class
 1. `public int countTokens()`
 2. `public boolean hasMoreTokens()`
 3. `public String nextToken()`
 4. `public String nextToken(String delim)`



StringTokenizer

```
public class Program {  
    public static void main(String[ ] args) {  
        String str = "SunBeam Infotech Pune";  
        StringTokenizer stk = new StringTokenizer(str);  
        String token = null;  
        while( stk.hasMoreTokens() ) {  
            token = stk.nextToken();  
            System.out.println(token);  
        }  
    }  
}
```

Output

SunBeam
Infotech
Pune



StringTokenizer

```
public class Program {  
    public static void main(String[] args) {  
        String str = "www.sunbeaminfo.com";  
        String delim = ".";  
        StringTokenizer stk = new StringTokenizer(str, delim);  
        String token = null;  
        while( stk.hasMoreTokens() ) {  
            token = stk.nextToken();  
            System.out.println(token);  
        }  
    }  
}
```

Output

```
www  
sunbeaminfo  
com
```



StringTokenizer

```
import java.util.Scanner;
import java.util.StringTokenizer;

public class Day6_5
{
    static Scanner sc = new Scanner(System.in);
    public static void main(String[] args)
    {
        String str = "https://admission.sunbeaminfo.com/aspx/RegistrationForm.aspx?BatchID=J8BwSw7MbJHgHVtHZgIU1A==";

        String delim = "/:-.=/#";
        StringTokenizer stk = new StringTokenizer(str, delim, true);

        String token = null;
        while( stk.hasMoreTokens() ) {
            token = stk.nextToken();
            System.out.println(token);
        }
    }
}
```

OUTPUT

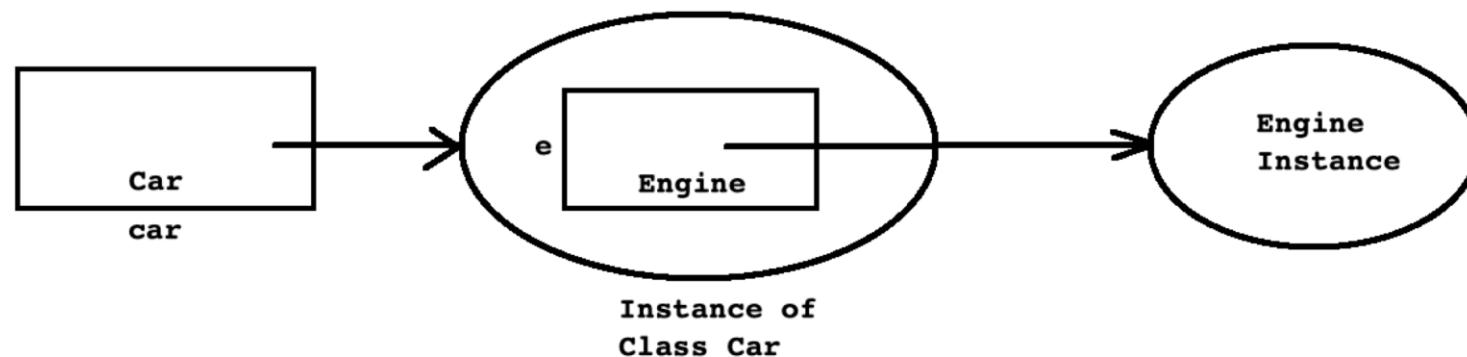
https
:
/
/
admission
.
sunbeaminfo
.
com
/
aspx
/
RegistrationForm
.
aspx?BatchID
=
J8BwSw7MbJHgHVtHZgIU1A
=
=



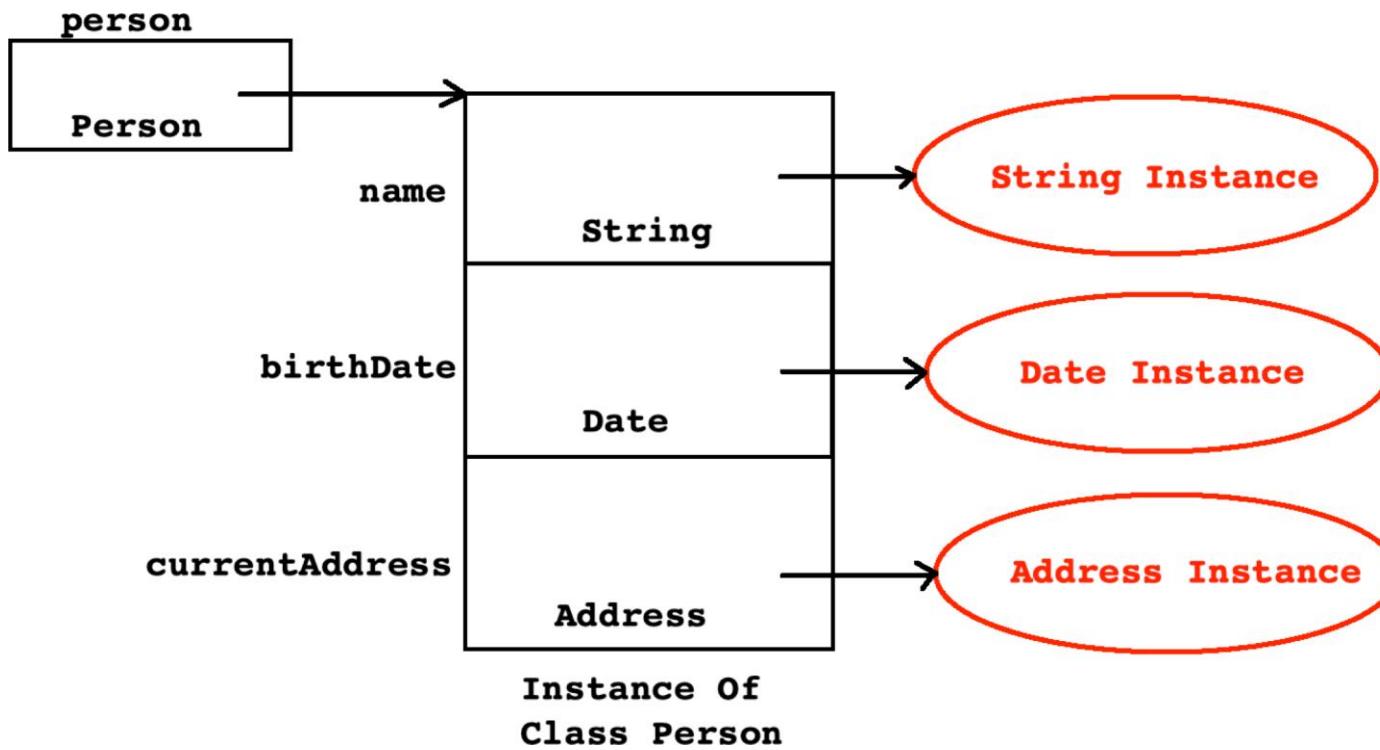
Association In Java

- Engine is part of Car

```
class Engine{  
    //TODO  
}  
class Car{  
    Engine e = new Engine( ); //Association  
}  
Car c = new Car( );
```



Association In Java



Inheritance

- If "is-a" relationship is exist between the types then we should use inheritance.
- Inheritance is also called as generalization.
- Example
 - 1. Manager is a employee
 - 2. Book is a product
 - 3. Triangle is a shape
 - 4. SavingAccount is a account.

```
class Employee{ //Parent class
    //TODO
}

class Manager extends Employee{ //Child class
    //TODO
}
//Here class Manager is extended from class Employee.
```





Thank you.

Rohan . paramane@sunbeaminfo . com

