



String, String Buffer and String Builder

Rawlabs Academy

What is **String**?

- String is **non-primitive** data type and it is also class which is under `java.lang` package.
- String is collection of characters
- Immutable
- Can create object without new keyword

Why String is **Immutable**?

- String are **constants**, values can't be changed after they are created
- Because java uses the concept of **string literal**
- Suppose, if one reference variable changes the value of the object, it will be affected to all the reference variables. That is why string objects are immutable in java.

Example 1

```
public class Main {  
    public static void main(String[] args) {  
        String s = "Java";  
        s.concat(" Programming");  
        System.out.println(s);  
    }  
}
```

Output : Java

The `concat()` method is append the string at the end. So, `String` are immutable objects.

Java Heap Memory

String Constant Pool

Java

Java Programming

Example 2

```
public class Main {  
    public static void main(String[] args) {  
        String s = "Java";  
        s = s.concat(" Programming");  
        System.out.println(s);  
    }  
}
```

Output: `Java Programming`

So, it assign it into the **reference variable**.

Methods

- `charAt()`, `contains()`, `equals()`, `equalsIgnoreCase()`, `toUpperCase()`, `toLowerCase()`
- `length()`, `compareTo()`, `join()`, `isEmpty()`, `replaceAll()`, `replaceFirst()`
- `trim()`, `index()`, `lastIndexOf()`, `toString()`, `concat()`, `replace()`
- `hashCode()`, `compareToIgnoreCase()`
- `split()`
- `substring()`

Example 3 - `subString()`

- `subString(int index)` the parameter is start / begin index
- `subString(int start, int end)`

```
public class Main {  
    public static void main(String[] args) {  
        String s = new String();  
        s = "Java Programming";  
        System.out.println(s.subString(5));  
        System.out.println(s.subString(0, 5));  
    }  
}
```


Example 4 - equals()

The String `equals()` method overrides the `equals()` method of Object class

```
public class Main {  
    public static void main(String[] args) {  
        String s = "Python";  
        String s1 = "python";  
        if (s.equals(s1)) {  
            System.out.println("Both are equal");  
        } else {  
            System.out.println("Not equal");  
        }  
    }  
}
```

Example 5 - equalsIgnoreCase()

```
public class Main {  
  
    public static void main(String[] args) {  
        String s = "PYTHON";  
        String s1 = "python";  
        if (s.equalsIgnoreCase (s1)) {  
            System.out.println("Both are equal");  
        } else {  
            System.out.println("Not equal");  
        }  
    }  
}
```

Example 6 - trim()

```
public class Main {  
  
    public static void main(String[] args) {  
        String s = "Java Python";  
        String s1 = "python";  
        System.out.println(s);  
        System.out.println(s.trim());  
  
    }  
}
```

Example 7 - **replace()**

```
public class Main {  
    public static void main(String[] args) {  
        String s1 = "Java is a very good language";  
        String replaceString = s1.replace('v', 'w')  
        System.out.println(replaceString);  
        String replaceString1 = s1.replace("Java", "Python");  
        System.out.println(s.trim());  
    }  
}
```

Example 8 - **split()**

```
public class Main {  
    public static void main(String[] args) {  
        String str = "Learn java is fun, i will split here by comma, thank you!";  
        String[] strings = str.split(", ");  
        for (String s : strings) {  
            System.out.println(s);  
        }  
    }  
}
```

Example 9 - `split()`

```
public class Main {  
    public static void main(String[] args) {  
        String str = "Learn java is fun, i will split here by comma, thank you!";  
        for (String s : str.split(" ", 3)) {  
            System.out.println(s);  
        }  
    }  
}
```

Example 10 - `concat()`

It returns a `String` that represents the concatenation of this object's characters followed by the string argument's characters.

```
public class Main {  
  
    public static void main(String[] args) {  
        String s = "Java";  
        s.concat("Programming");  
        System.out.println(s);  
    }  
  
}
```

Example 11 - **contains()**

```
public class Main {  
    public static void main(String[] args) {  
        Scanner scan = new Scanner(System.in);  
        String s = new String();  
  
        System.out.println("Enter a sentences");  
        s = scan.nextLine();  
  
        System.out.println("Find a setences");  
  
        String find = scan.nextLine();  
        System.out.println(s.contains(find));  
    }  
}
```


Example 12 - toString()

```
public class StringCompareTo {  
  
    private int regno;  
    private String name;  
    public StringCompareTo() {  
        super();  
    }  
  
    public StringCompareTo(int regno, String name) {  
        super();  
        this.regno = regno;  
        this.name = name;  
    }  
  
    public String toString() {  
        return "Name" + name + "Regno" + regno+ "\n";  
    }  
  
    public static void main(String[] args) {  
        StringCompareTo sc = new StringCompareTo(123, "Dhivya");  
        StringCompareTo sc1 = new StringCompareTo(123, "Dhiya");  
        System.out.println(sc + " " + sc1);  
    }  
}
```

Example 13 - toUpperCase(), toLowerCase(), charAt()

```
public class Main {  
    public static void main(String[] args){  
        String s = new String("JAVA");  
        String c = "python";  
  
        System.out.println(s.charAt(2));  
        System.out.println("To lower case" + s.toLowerCase());  
        System.out.println("To upper case " + c.toUpperCase());  
    }  
}
```

Example 14 - **length(), join(), isEmpty()**

```
public class Main {  
    public static void main(String[] args){  
        StringJoinLengthIsEmpty n = new StringJoinLengthIsEmpty():  
        String s a new String();  
  
        System.out.println("Given String" + s.isEmpty());  
  
        s = "Java Programming";  
        s = s.join(".", "welcome", "to", "java");  
  
        System.out.println("Join a words : " + s);  
        System.out.println("The length is " + s.length());  
        System.out.println("Given String " + s.isEmpty());  
    }  
}
```

Example 15 - **replaceAll()**, **replaceFirst()**

```
public class Main {  
  
    public static void main(String[] args) {  
        String s = "Java Programming is super ";  
        System.out.println(s.replaceAll("Java", "Python"));  
        System.out.println(s.replaceFirst("super", "new"));  
    }  
  
}
```

Example 16 - `indexOf()`

```
public class Main {  
    public static void main(String[] args){  
        String s = new String("Java is a Object oriented programming");  
        System.out.println(s.indexOf("is"));  
        System.out.println(s.indexOf('j', 4));  
        System.out.println(s.indexOf('j', 16));  
        System.out.println(s.indexOf("Object"));  
        System.out.println(s.indexOf("Object", 8));  
        System.out.println(s.indexOf("Object", 18));  
    }  
}
```

Example 17 - `lastIndexOf()`

```
public class Main {  
  
    public static void main(String[] args) {  
        String s = "Java Programming is awesome, wonderful";  
        System.out.println(s.lastIndexOf("o"));  
        System.out.println(s.lastIndexOf("is"));  
        System.out.println(s.lastIndexOf("o", 28));  
        System.out.println(s.lastIndexOf("is", 28));  
    }  
  
}
```

Example 18 - **compareTo()**

```
public class StringCompareTo {  
    public static void main(String[] args) {  
        String[] s = {"guru", "divya", "anju", "ice", "Divya"};  
        for (int i = 0; i < s.length; i++) {  
            for (int j = i + 1; j < s.length; j++) {  
                if (s[i].compareTo(s[j]) > 0) {  
                    String temp=s[i];  
                    s[i] = s[j];  
                    s[j] = temp;  
                }  
            }  
            System.out.println(s[i]);  
        }  
    }  
}
```

Example 19 - `compareToIgnoreCase()`

```
package exercise30Aug19;
public class StringCompareTo {
    public static void main(String[] args) {
        String[]s = {"guru", "divya", "anju", "ice", "Divya"};
        for (int i = 0; i < s.length; i++) {
            for (int j = i + 1; j < s.length; j++) {
                if (s[i].compareToIgnoreCase(s[j]) > 0) {
                    String temp=s[i];
                    s[i] = s[j];
                    s[j] = temp;
                }
            }
            System.out.println(s[i]);
        }
    }
}
```


What is **String Buffer**?

- StringBuffer is **mutable** `String`
- JavaStringBuffer class is **synchronized** thread-safe i.e multiple threads cannot access it simultaneously
- So it is safe and will result in an order.

Why String Buffer is mutable?

```
public class Main {  
    public static void main(String[] args) {  
        StringBuffer sb = new StringBuffer("Ajith");  
        sb.append("Kumar");  
        System.out.println(sb);  
    }  
}
```

Methods

- `append()`, `replace()`, `setCharAt()`
- `insert()`
- `delete()`
- `reverse()`
- `length()`
- `charAt()`
- `deleteCharAt()`
- `setLength()`

Example 1 - delete(), deleteCharAt()

```
public class StringBufferDelete {  
    public static void main(String[] args){  
        StringBuffer sb = new StringBuffer("Java Programming is awesome");  
  
        System.out.println(sb.delete(5,10));  
        StringBuffer sb1 = new StringBuffer("Python is super");  
        System.out.println(sb1.deleteCharAt(10));  
    }  
}
```

Example 2 - **reverse()**, **replace()**

```
public class StringBufferReplace {  
    public static void main(String[] args){  
        StringBuffer sb = new StringBuffer("Java Programming is awesome");  
  
        System.out.println(sb.replace(5, 15, "Python"));  
        System.out.println(sb.reverse());  
    }  
}
```

Example 3 - `setLength()`

```
public class StringBufferTrim {  
  
    public static void main(String[] args) {  
        StringBuffer sb = new StringBuffer ("Java Programming is awesome");  
        sb.setLength(8);  
        System.out.println(sb);  
    }  
}
```

Example 4 - charAt(), setCharAt()

```
public class StringBufferChar {  
  
    public static void main(String[] args) {  
        StringBuffer sb = new StringBuffer ("Java Programming is awesome");  
  
        System.out.println(sb.charAt(5));  
        sb.setCharAt(10, 'p');  
        System.out.println(sb);  
    }  
}
```

Example 5 - insert()

```
public class StringBufferInsert {  
    public static void main(String[] args) {  
        StringBuffer sb = new StringBuffer ("Java Programming is awesome");  
  
        sb.insert(17, "nice");  
        System.out.println(sb);  
    }  
}
```


What is **String Builder**?

- StringBuffer is **mutable** `String`
- The Java StringBuilder class is same as StringBuffer class except that it is **non-synchronized** (not thread-safe).
- It is available since JDK 1.5.

Methods

- `append()`, `replace()`, `subsequence()`, `substring()`, `charAt()`, `trimToSize()`
- `insert()`, `delete()`, `capacity()`, `ensureCapacity()`, `reverse()`, `length()`
- StringBuffer methods is similar to StringBuilder

Example 1 - reverse()

```
public class StringDemo6 {  
  
    public static void main(String[] args) {  
        StringBuilder sb = new StringBuilder ("Hello");  
        sb.reverse();  
        System.out.println(sb);  
    }  
}
```

Example 2 - **subsequence()**

```
public class StringBuilderSubSeq {  
  
    public static void main(String[] args) {  
        StringBuilder sb = new StringBuilder ("Java is high level language");  
        CharSequence cs = sb.subSequece(2, 10);  
        System.out.println(cs);  
    }  
}
```

Example 3 - trimToSize

```
public class StringBuilderTrim {
    public static void main(String[] args) {
        StringBuilder sb = new StringBuilder ("programming");
        System.out.println("String = " + sb);

        int length = sb.length();
        int capacity = sb.capacity() ;

        System.out.println("Length = " + length);
        System.out.println("Capacity = " + capacity);

        sb.trimToSize();
        length = sb.length();
        capacity = sb.capacity();

        System.out.println("Length after trimToSize = " + length);
        System.out.println("Capacity after trimToSize = " + capacity);
    }
}
```

Difference

String	String Buffer
It is immutable	It is mutable
String is slow and consumes more memory	String is fast and consumes less memory
When you concat too many strings because every time it creates new instance	When you concat strings
<code>java.lang</code> package	<code>java.lang</code> package

Difference

StringBuffer	String Builder
It is mutable	It is mutable
It is synchronized	It is non-synchronized
It means two thread can't call the methods of StringBuffer simultancously	It means two thread can call the methods of StringBuilder simultancously
It is less efficient	It is more efficient

Task

Create method to print log like following below using string builder.

```
===== RAWLABS ID =====  
> Learning Java is Fun  
> We will learn spring boot soon  
> Today is 2023-02-13T10:30:00.000  
> My name is Calvin, I have learn String Builder in Java  
> My Hobbies is Coding and Learning  
=====
```

Also, make a summary of what is learned in the `StringBuilder` on your `git`.