**StringBuffer Class in Java**

The StringBuffer class in Java is a part of the java.lang package and is used to create **mutable strings**. Unlike the String class, which is **immutable**, StringBuffer allows you to **modify the contents** of a string without creating a new object every time.

**Key Features of StringBuffer**

* **Mutable**: You can change the content (e.g., append, insert, delete).
* **Thread-safe**: All methods are **synchronized**, making it **safe for use in multi-threaded environments**.
* **More efficient** than String for repeated string manipulation (in single-threaded code, StringBuilder is faster).

**Creating a StringBuffer Object**

StringBuffer sb = new StringBuffer(); // empty buffer

StringBuffer sb2 = new StringBuffer("Hello"); // with initial string

**Common Methods of StringBuffer**

| **Method** | **Description** | **Example** |
| --- | --- | --- |
| append(String s) | Adds string to the end | sb.append(" World") |
| insert(int offset, String s) | Inserts string at a position | sb.insert(1, "Java") |
| replace(int start, int end, String s) | Replaces part of the string | sb.replace(0, 5, "Hi") |
| delete(int start, int end) | Deletes characters from start to end | sb.delete(0, 2) |
| reverse() | Reverses the string | sb.reverse() |
| toString() | Converts buffer to regular String | sb.toString() |
| length() | Returns current length | sb.length() |
| capacity() | Shows the current capacity (not length) | sb.capacity() |
| setCharAt(int index, char ch) | Changes a character at given index | sb.setCharAt(0, 'Y') |

**Example Code**

public class StringBufferDemo {

public static void main(String[] args) {

StringBuffer sb = new StringBuffer("Hello");

sb.append(" World"); // Adds to end

sb.insert(5, ","); // Inserts at index 5

sb.replace(0, 5, "Hi"); // Replaces "Hello" with "Hi"

sb.delete(3, 5); // Deletes characters

sb.reverse(); // Reverses string

System.out.println(sb); // Output: "dlroW ,iH"

}

}

**String vs StringBuffer vs StringBuilder**

| **Feature** | **String** | **StringBuffer** | **StringBuilder** |
| --- | --- | --- | --- |
| Mutability | Immutable | Mutable | Mutable |
| Thread-safe | No | Yes (synchronized) | No |
| Performance | Slower | Slower (thread-safe) | Faster (no sync) |
| Use case | When string never changes | Multi-threaded env | Single-threaded, fast changes |