**StringBuilder Class in Java**

The StringBuilder class in Java is used to create **mutable strings**, just like StringBuffer, but with **better performance in single-threaded environments** because it is **not synchronized**.

It is part of the java.lang package and is often preferred over String and StringBuffer when:

* You need to **modify** strings frequently (append, insert, delete, etc.)
* **Thread safety is not a concern**

**Key Features of StringBuilder**

* **Mutable**: The content of the string can be modified.
* **Not synchronized**: Faster than StringBuffer in single-threaded applications.
* **More efficient** than String when concatenating many strings in loops or heavy operations.

**Creating a StringBuilder**

StringBuilder sb = new StringBuilder(); // empty

StringBuilder sb2 = new StringBuilder("Hello"); // with initial value

**Common Methods**

| **Method** | **Description** | **Example** |
| --- | --- | --- |
| append(String s) | Adds string to the end | sb.append(" Java") |
| insert(int index, String s) | Inserts string at specified index | sb.insert(5, "World") |
| replace(int start, int end, String s) | Replaces characters from start to end | sb.replace(0, 5, "Hi") |
| delete(int start, int end) | Deletes characters from start to end | sb.delete(3, 6) |
| reverse() | Reverses the string | sb.reverse() |
| toString() | Converts StringBuilder to String | String s = sb.toString() |
| length() | Returns the length of the string | sb.length() |
| capacity() | Returns current capacity | sb.capacity() |

**Example Code**

public class StringBuilderDemo {

public static void main(String[] args) {

StringBuilder sb = new StringBuilder("Hello");

sb.append(" World");

sb.insert(5, ",");

sb.replace(0, 5, "Hi");

sb.delete(3, 5);

sb.reverse();

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

}

}

**🔹 String vs StringBuffer vs StringBuilder**

| **Feature** | **String** | **StringBuffer** | **StringBuilder** |
| --- | --- | --- | --- |
| Mutability | Immutable | Mutable | Mutable |
| Thread-safe | No | Yes | No |
| Performance | Slow | Moderate | Fastest (single-thread) |
| Use case | Constant strings | Multi-threaded | Single-threaded, high-performance apps |

**When to Use StringBuilder?**

Use StringBuilder when:

* You are **modifying strings frequently**
* You want **better performance** (e.g., inside loops)
* You don’t need **thread safety**

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