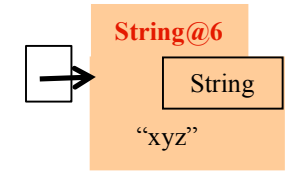
immutable

Immutable means not capable or susceptible to change, invariable, unalterable.

If an object is immutable, its contents cannot be changed once it has been created. The contents of a *mutable* object can be changed.

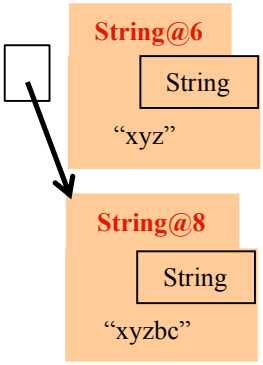
All objects of class String and the wrapper classes like Integer and Character and Boolean are immutable.

But consider this. Suppose String variable s points to a String object containing the characters "xyz", as shown to the right. Object s (i.e. the object pointed to by s) is immutable. The string of characters in s cannot be changed. But when an assignment statement



s= s + "bc";

is executed, evaluation of s + "bc" creates a new String object to hold the characters "xyzbc", and the value of the expression —the pointer to the new object— is stored in variable s. Thus, the situation after execution is as shown to the right below. Note that the old object is still there, but s points at the new object instead of the old.



Be careful with String functions. The tendency is to think that the code[1]

s.replace('x', '$');

will change s to contain the string "$yzbc". But replace is a function, not a procedure, and this code creates a new object that contains "$yzbc" and then throws it away —the pointer to the new object hasn't been saved. Use the following assignment to replace 'x' in s by '$':

s= s.replace('x', '$');

What about execution time?

You can see that a catenation like s + "b" can be costly: it takes time proportional to the length of s. Suppose the length of s is 1000. All 1000 characters have to be copied into the new object. In most of the programs you write, you don't have to worry about this issue. But a situation may arise in which the use of such a catenation within a loop drastically slows down a program.

Java does have a class java.lang.StringBuilder whose objects are mutable —they can be changed. A wise program faced with the slow String catenation will use StringBuilder. You can study the spec of StringBuilder yourself.

[1] s.replace(c1, c2) returns a new String that is like s except that all occurrences of character c1 have been replaced by character c2. Look up the spec of replace and other functions in the Java API documentation.