La Pila in Java

```
package strutture;
public class Pila {
  final int DEFAULTGROWTHSIZE=5;
  private int size;
  private int marker;
  private int contenuto[];

  Pila(int initialSize) {
     size=initialSize;
     marker=0;
     contenuto=new int[initialSize];
  }
```

```
class Pila {
   private:
      const int DEFAULTGROWTHSIZE=5
      int size;
      int marker;
      int * contenuto;
//oppure int[] contenuto;}
```

in C++

in C++

```
Pila::Pila(int initialSize) {
  size=initialSize;
  marker=0;
  contenuto=new int[initialSize];
}
```

La Pila in Java - 2

```
   private void cresci(int inc){
      this.size+=inc;
      int temp[]=new int[size];
      for (int k=0;k<marker;k++)
            temp[k]=contenuto[k];
      this.contenuto=temp;
}
```

in C++

```
void cresci(int inc){;
   this->size+=inc;
   int * temp=new int[size];
   //int temp[]=new int[size];
   for (int k=0; k<s->marker;k++) {
      temp[k]=contenuto[k];
   }
   delete [](this->contenuto);
   this->contenuto=temp;
}
```

La Pila in Java - 3

```
void inserisci(int k) {
     if (marker==size)
          cresci(DEFAULTGROWTHSIZE);
     contenuto[marker]=k;
     marker++;
  }
```

in C++

```
     void inserisci(int k) {
         if (marker==size)
       cresci(DEFAULTGROWTHSIZE);
        contenuto[marker]=k;
             marker++;
                }
```

La Pila in Java - 4

```
int estrai() {
   assert(marker>0) : "Estrazione da un pila vuota!";
   return contenuto[--marker];
  }
```

in C++

```
int estrai() {
   assert(marker>0);
   return contenuto[--(marker)];
}
```

java –ea Pila

```
java.lang.AssertionError: Estrazione da un pila vuota!
        at pila.Pila.estrai(Pila.java:22)
        at pila.Pila.main(Pila.java:39)
```

```
int estrai() {
    if (marker==0) {
      System.out.println(
          "Non posso estrarre da una pila vuota");
        System.exit(1);
    }
    return contenuto[--marker];
  }
```

La Pila in Java - 5

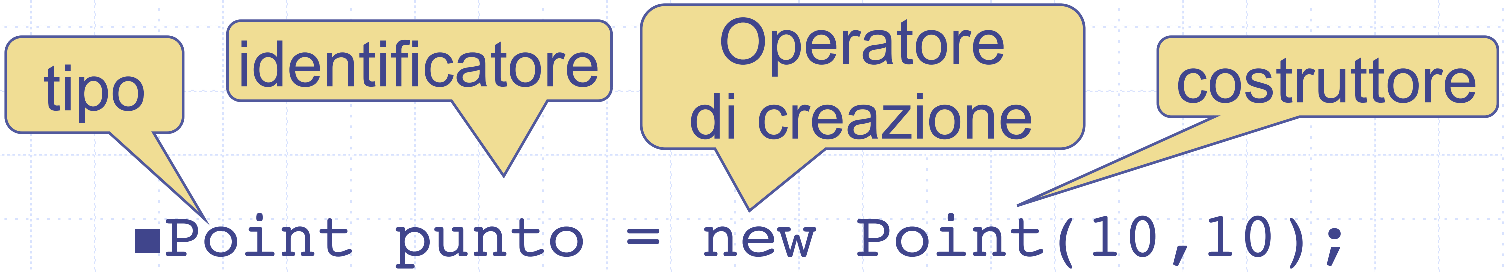
```
public static void main(String args[]) {
      Pila s=new Pila(5);
      for (int k=0;k<10;k++)
           s.inserisci(k);
      for (int k=0;k<12;k++)
         System.out.println(s.estrai());
  }
}
```

```
int main() {
  Pila  * s=new Pila(5);
   for (int k=0; k<10;k++)
      s->inserisci(k);
   for (int k=0; k<12;k++)
      cout<<s->estrai()<<endl;
}
```

Tipi di dato derivati (reference data)

- Java, come tutti i linguaggi OO, permette di definire NUOVI TIPI DI DATO (classi).

- Alcuni tipi di dato (classi) sono predefinite:
  - ad esempio le stringhe. (String)



- `Point punto = new Point(10,10);`

- **No Structures or Unions**

◆Java does not support C struct or union types. Note, however, that a class is essentially the same thing as a struct, but with more features. And you can simulate the important features of a union by subclassing.

“Java non ha i puntatori”

Ma è vero?

```
Point punto = new Point(10,10);
```

l’identificatore di un oggetto (“punto”) sembra proprio un puntatore!

Quel che Java non ha è l’aritmetica dei puntatori

▪.

Confronto dell’operatore new

```
in C++:   Point * punto = new Point(10,10);

in Java:   Point  punto = new Point(10,10);
```

punto.x di Java   equivale a   punto->x del C++

In Java gli oggetti sono accessibili
SOLO per referenza

- .

memory management

La gestione (dinamica) della memoria e’ automatica, tramite
la creazione (operatore new) e
la distruzione (garbage collection) di oggetti.

GC interviene quando serve memoria.

GC elimina gli oggetti per i quali non vi sono piu’ riferimenti attivi.

GC puo’ essere attivato su richiesta esplicita: System.gc()

memory management - costruttori

Operazioni da eseguirsi alla nascita di un oggetto vanno definite nel metodo “costruttore”.

Ogni classe deve avere uno (o più) costruttori.

I costruttori possono differire per numero e tipo di parametri.

Es.:

```
Pila() {
    size=100; …
}

Pila(int size) {
    this.size=size
}
```

memory management - distruttori

Operazioni da associarsi con l’eliminazione di un oggetto possono essere definite nel metodo “distruttore” finalize() (opzionale)

NOTA: il metodo finalize POTREBBE NON ESSERE CHIAMATO DAL SISTEMA (es. se il programma finisce prima…)

Per essere certi che vengano chiamati i metodi finalize, occorre chiamare la

System.runFinalization() subito DOPO la System.gc()

System agisce come libreria

```
System.out.println(…);
System.gc();
System.runFinalization();
System.exit(int status);
System.arraycopy(Object src, int srcPos, Object dest, int destPos, int length);
long System. currentTimeMillis();
```

Using System.arrayCopy()

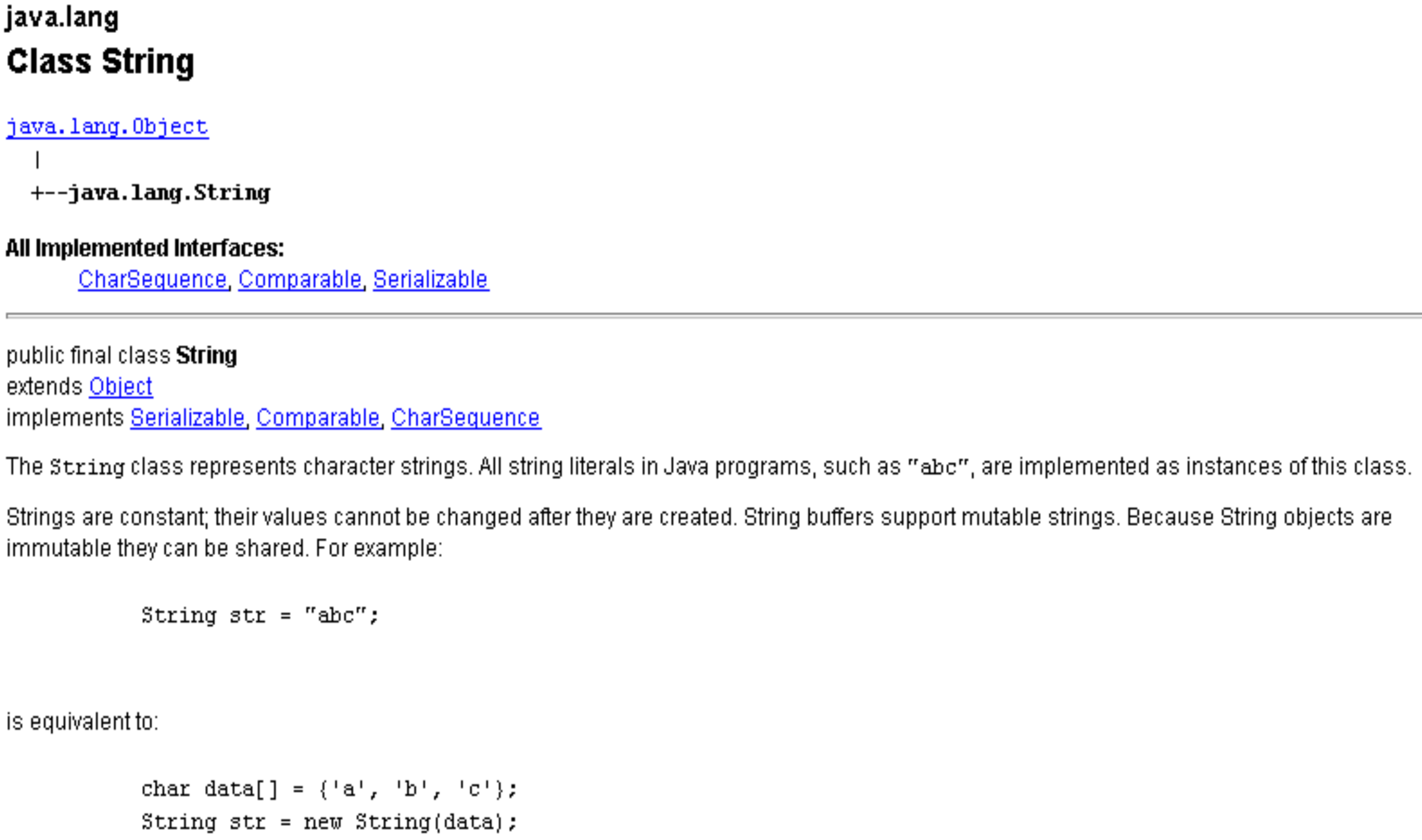
```
System.arraycopy(
   Object src, int src_position,
   Object dst, int dst_position, int length
);
```

Copies the specified source array, beginning at the specified position, to the specified position of the destination array.

La Pila in Java – 2-alt

```
  private void cresci(int inc){
    size+=inc;
    int temp[ ]=new int[size];
     System.arraycopy(contenuto, 0, temp, 0, marker-1);
    contenuto=temp;
}
```

Class String



java.lang

Class String

```
java.lang.Object
  |
  +--java.lang.String
```

All Implemented Interfaces:

CharSequence, Comparable, Serializable

public final class **String**
extends Object
implements Serializable, Comparable, CharSequence

The `String` class represents character strings. All string literals in Java programs, such as `"abc"`, are implemented as instances of this class.

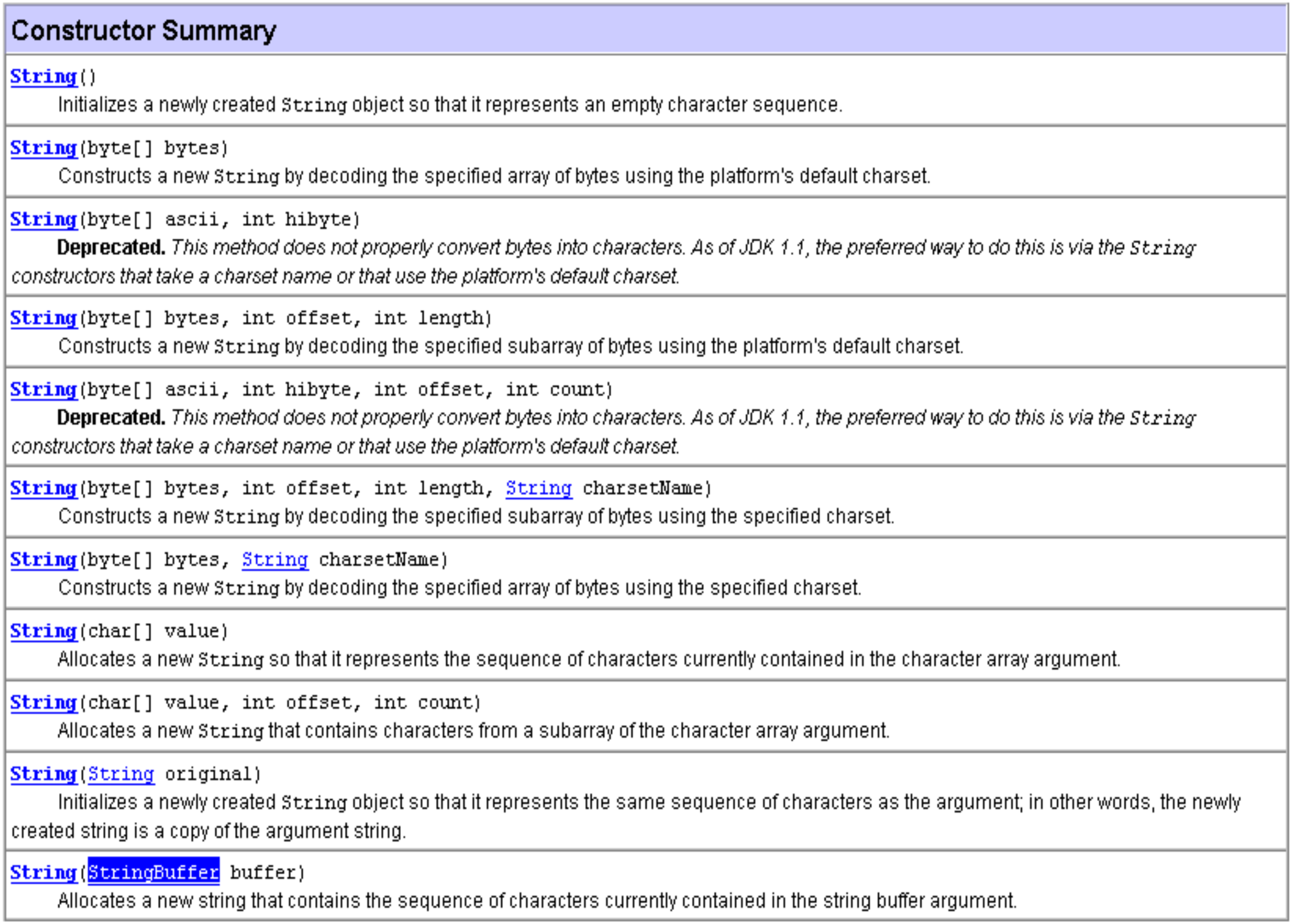
Strings are constant; their values cannot be changed after they are created. String buffers support mutable strings. Because String objects are immutable they can be shared. For example:

```
     String str = "abc";
```

is equivalent to:

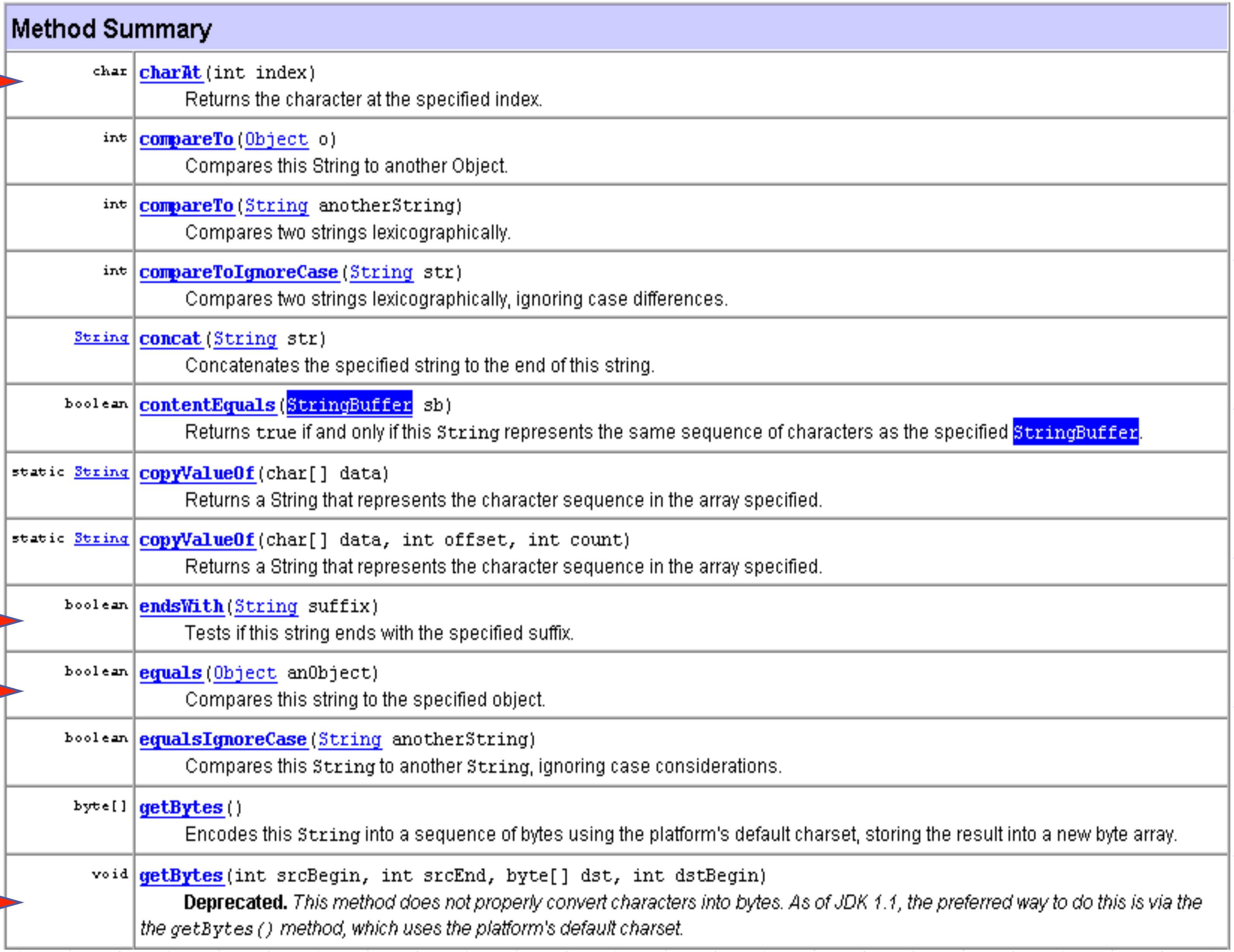
```
     char data[] = {'a', 'b', 'c'};
     String str = new String(data);
```

Class String



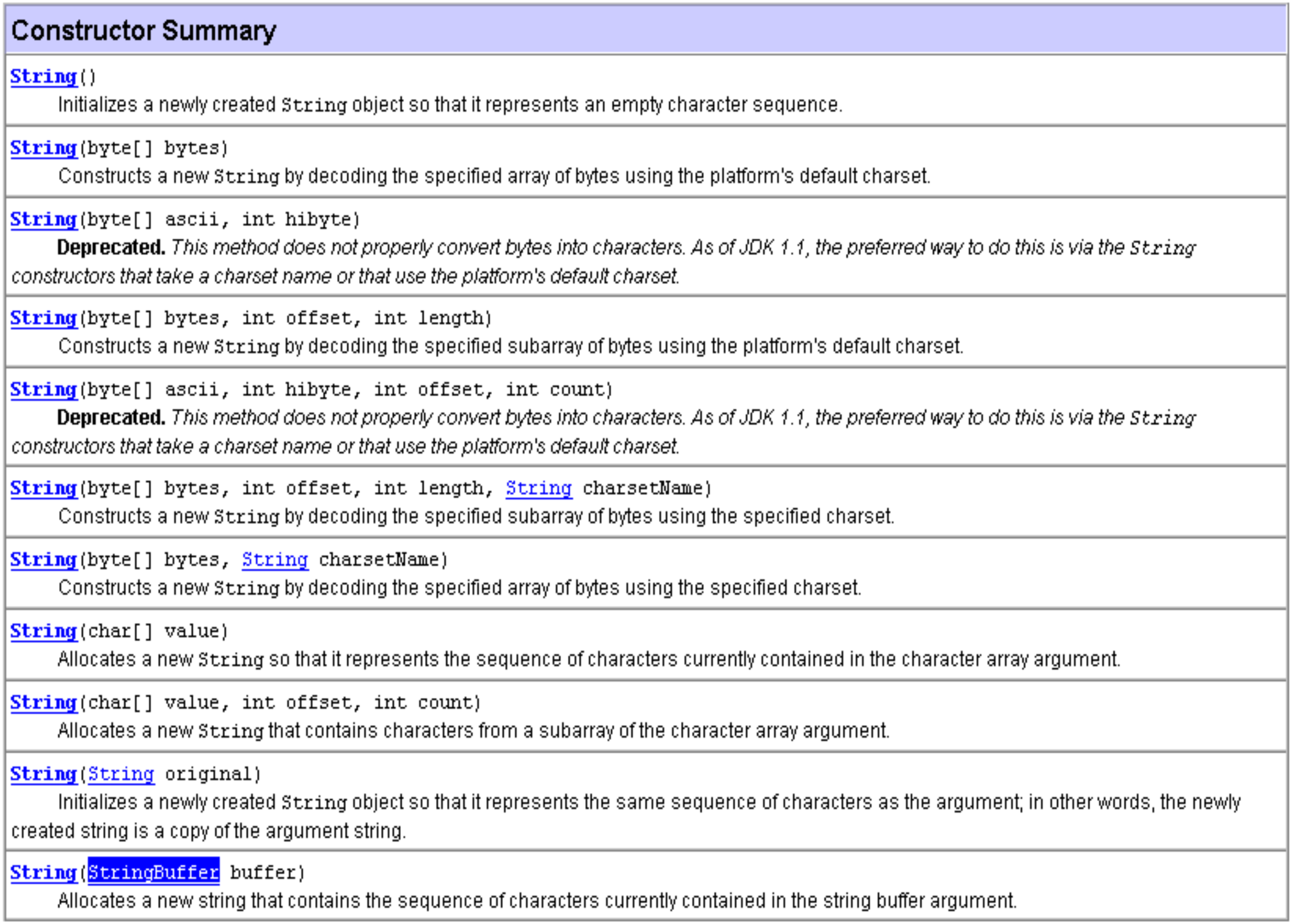
Constructor Summary
`String()` Initializes a newly created `String` object so that it represents an empty character sequence.
`String(byte[] bytes)` Constructs a new `String` by decoding the specified array of bytes using the platform's default charset.
`String(byte[] ascii, int hibyte)` **Deprecated.** *This method does not properly convert bytes into characters. As of JDK 1.1, the preferred way to do this is via the `String` constructors that take a charset name or that use the platform's default charset.*
`String(byte[] bytes, int offset, int length)` Constructs a new `String` by decoding the specified subarray of bytes using the platform's default charset.
`String(byte[] ascii, int hibyte, int offset, int count)` **Deprecated.** *This method does not properly convert bytes into characters. As of JDK 1.1, the preferred way to do this is via the `String` constructors that take a charset name or that use the platform's default charset.*
`String(byte[] bytes, int offset, int length, String charsetName)` Constructs a new `String` by decoding the specified subarray of bytes using the specified charset.
`String(byte[] bytes, String charsetName)` Constructs a new `String` by decoding the specified array of bytes using the specified charset.
`String(char[] value)` Allocates a new `String` so that it represents the sequence of characters currently contained in the character array argument.
`String(char[] value, int offset, int count)` Allocates a new `String` that contains characters from a subarray of the character array argument.
`String(String original)` Initializes a newly created `String` object so that it represents the same sequence of characters as the argument; in other words, the newly created string is a copy of the argument string.
`String(StringBuffer buffer)` Allocates a new string that contains the sequence of characters currently contained in the string buffer argument.

Class String



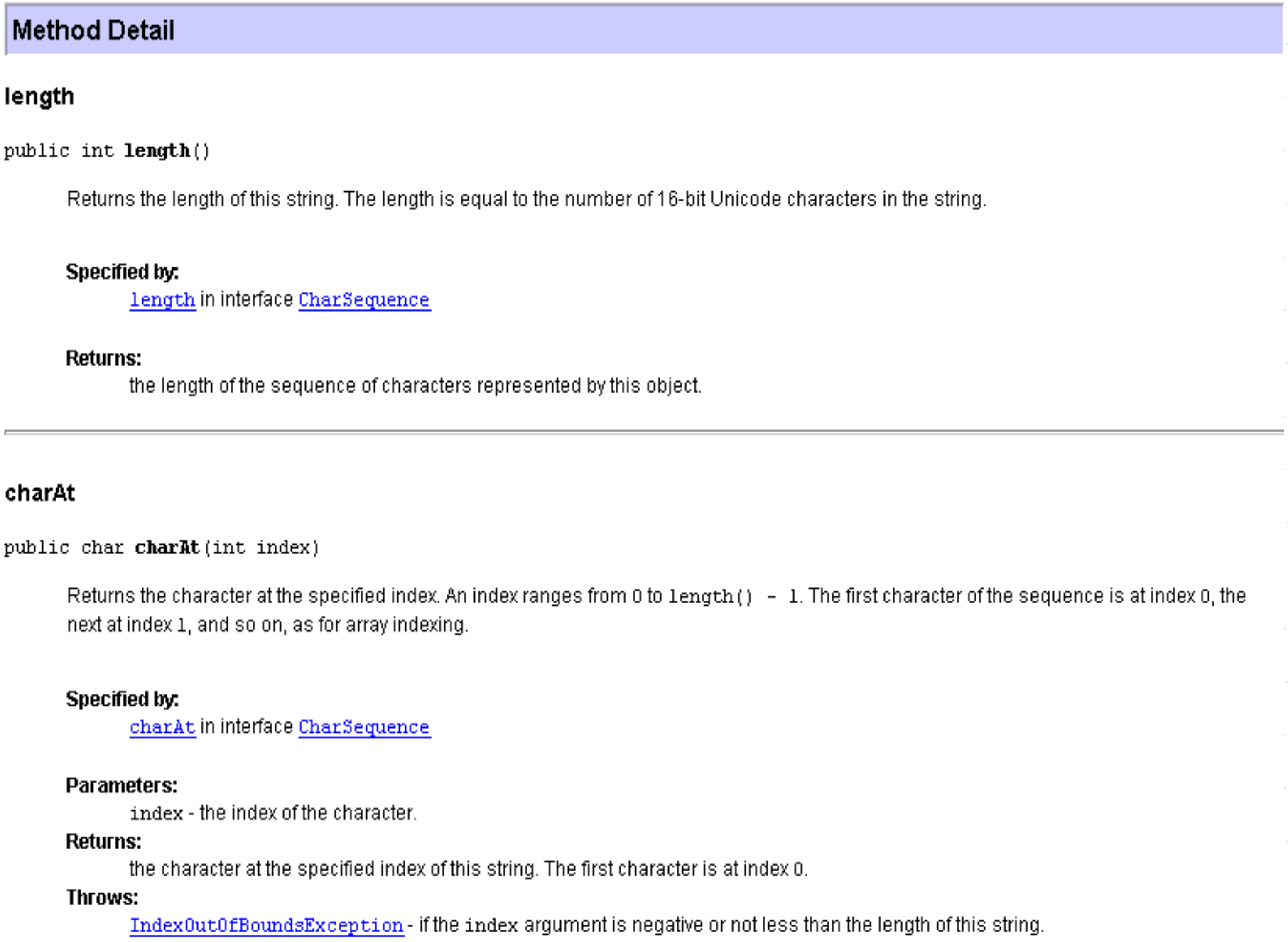
Method Summary	
char	**charAt**(int index) Returns the character at the specified index.
int	**compareTo**(Object o) Compares this String to another Object.
int	**compareTo**(String anotherString) Compares two strings lexicographically.
int	**compareToIgnoreCase**(String str) Compares two strings lexicographically, ignoring case differences.
String	**concat**(String str) Concatenates the specified string to the end of this string.
boolean	**contentEquals**(StringBuffer sb) Returns `true` if and only if this `String` represents the same sequence of characters as the specified StringBuffer.
static String	**copyValueOf**(char[] data) Returns a String that represents the character sequence in the array specified.
static String	**copyValueOf**(char[] data, int offset, int count) Returns a String that represents the character sequence in the array specified.
boolean	**endsWith**(String suffix) Tests if this string ends with the specified suffix.
boolean	**equals**(Object anObject) Compares this string to the specified object.
boolean	**equalsIgnoreCase**(String anotherString) Compares this `String` to another `String`, ignoring case considerations.
byte[]	**getBytes**() Encodes this `String` into a sequence of bytes using the platform's default charset, storing the result into a new byte array.
void	**getBytes**(int srcBegin, int srcEnd, byte[] dst, int dstBegin) **Deprecated.** *This method does not properly convert characters into bytes. As of JDK 1.1, the preferred way to do this is via the the `getBytes()` method, which uses the platform's default charset.*

Class String



Constructor Summary
`String()` Initializes a newly created `String` object so that it represents an empty character sequence.
`String(byte[] bytes)` Constructs a new `String` by decoding the specified array of bytes using the platform's default charset.
`String(byte[] ascii, int hibyte)` **Deprecated.** *This method does not properly convert bytes into characters. As of JDK 1.1, the preferred way to do this is via the `String` constructors that take a charset name or that use the platform's default charset.*
`String(byte[] bytes, int offset, int length)` Constructs a new `String` by decoding the specified subarray of bytes using the platform's default charset.
`String(byte[] ascii, int hibyte, int offset, int count)` **Deprecated.** *This method does not properly convert bytes into characters. As of JDK 1.1, the preferred way to do this is via the `String` constructors that take a charset name or that use the platform's default charset.*
`String(byte[] bytes, int offset, int length, String charsetName)` Constructs a new `String` by decoding the specified subarray of bytes using the specified charset.
`String(byte[] bytes, String charsetName)` Constructs a new `String` by decoding the specified array of bytes using the specified charset.
`String(char[] value)` Allocates a new `String` so that it represents the sequence of characters currently contained in the character array argument.
`String(char[] value, int offset, int count)` Allocates a new `String` that contains characters from a subarray of the character array argument.
`String(String original)` Initializes a newly created `String` object so that it represents the same sequence of characters as the argument; in other words, the newly created string is a copy of the argument string.
`String(StringBuffer buffer)` Allocates a new string that contains the sequence of characters currently contained in the string buffer argument.

Class String



Method Detail

length

```
public int length()
```

Returns the length of this string. The length is equal to the number of 16-bit Unicode characters in the string.

Specified by:

`length` in interface `CharSequence`

Returns:

the length of the sequence of characters represented by this object.

---

charAt

```
public char charAt(int index)
```

Returns the character at the specified index. An index ranges from `0` to `length() - 1`. The first character of the sequence is at index `0`, the next at index `1`, and so on, as for array indexing.

Specified by:

`charAt` in interface `CharSequence`

Parameters:

`index` - the index of the character.

Returns:

the character at the specified index of this string. The first character is at index `0`.

Throws:

`IndexOutOfBoundsException` - if the `index` argument is negative or not less than the length of this string.

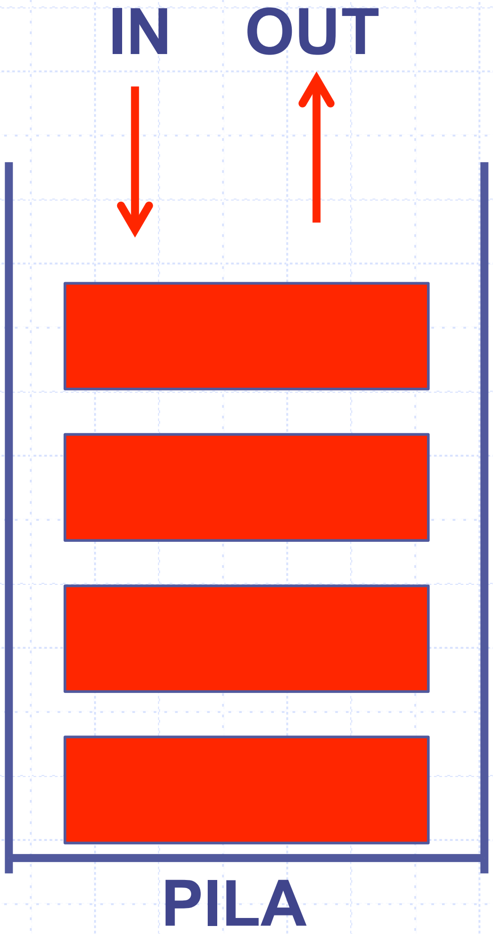
String

- Per trasformare il contenuto di una stringa in un intero:
- int Integer.parseInt(String s)

- Per trasformare il contenuto di una stringa in un float:
- float Float.parseFloat(String s)

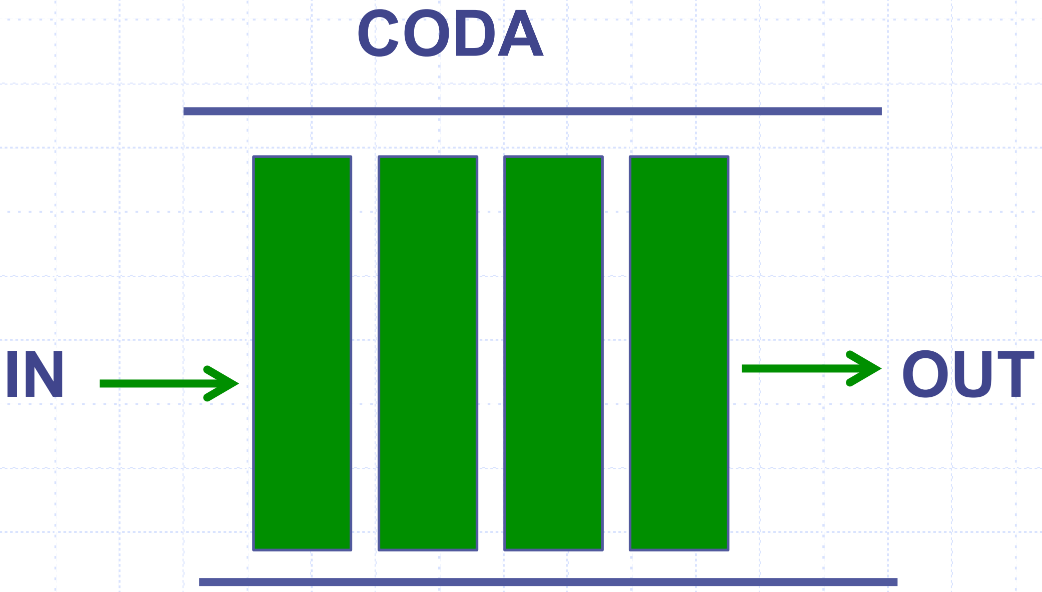
Esercizio:
Costruite una Coda analoga alla Pila

Pila e Coda



IN OUT

PILA



CODA

IN

OUT