Lecture 9: Strings and String Class

Based on Introduction to Java Programming, Y. Daniel Liang, Brief Version, 9/E

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String - a sequence of characters in Java represented as an object, in other languages might be represented as an array or characters.

Several classes in Java libraries to represent strings:

- String
- StringBuilder
- StringBuffer

1 The String class

For documentation see: http://docs.oracle.com/javase/7/docs/api/java/lang/String.html.

There are many different ways of constructing a String object, i.e., there are many constructors. For example:

```java
String s1 = "Hello world!";
String s2 = new String ("Hello NY!");
String s3 = new String (s2);
char [] letters = {'H', 'e', 'l', 'l', 'o', ' ', 'N', 'Y', 'U', '!'};
String s4 = new String (letters);
```

1.1 Immutable Objects

What happens when we execute the following lines of code?

1) String s1 = "I like C++";
2) String s2 = s1;
3) System.out.println(s1 + \n + s2);
4) s1 = "I like Java";
5) System.out.println(s1 + \n + s2);

String objects are examples of immutable objects. Immutable objects cannot be modified once they are created.

1.2 String comparison

Comparison methods:

- equals( ... )
- compareTo( ... )
- equalsIgnoreCase ( ... )
- compareToIgnoreCase ( ... )

See CompareStrings.java (all 4 versions)
1.3 Accessing parts of a string object and combining strings

Methods worth knowing:

- length ( ... )
- charAt ( ... )
- concat ( ... )
- toLowerCase ( ... )
- toUpperCase ( ... )
- split ( ... )
- replace ( ... )

1.4 Strings and Other Data Types

- toCharArray ( ) returns character array that contains all letters of the String objects
- valueOf ( TYPE v ) (used with class name String) returns a String object representing the variable v, TYPE can be: char, char [], double, float, int, long, boolean
- format ( FORMAT_SPECIFIER_AS_IN_PRINTF) (used with class name String) returns String object containing formatted string

See CheckPalindrome.java
See HexToDecimalConversion.java

2 Character Class

You can create an object for a character using Character class.

See http://docs.oracle.com/javase/7/docs/api/java/lang/Character.html

Selected methods worth knowing:

- isDigit ( ... )
- isLetter ( ... )
- isLetterOrDigit ( ... )
- isLowerCase ( ... )
- isUpperCase ( ... )
- toLowerCase ( ... )
- toUpperCase ( ... )

See CountEachLetter.java
3 Case Study: Parsing Strings

See StockQuote.java and StockQuoteApp.java
These program connect to Yahoo Finance to access the up to date stock prices.

4 Command Line Arguments:
the secret behind main(String [] args)

The arguments from the command line are passed to the main() method via the String array args.
See Echo.java

5 StringBuilder Class

StringBuilder class allows for more flexibility than the String class. Unlike String objects, StringBuilder objects are mutable.
So why use String instead of StringBuilder? SPACE! StringBuilder allocates extra space to make it possible to add things to the string. When the allocated object runs out of space, new space needs to be allocated.
See http://docs.oracle.com/javase/7/docs/api/java/lang/StringBuilder.html

Constructors:

StringBuilder() Constructs a string builder with no characters in it and an initial capacity of 16 characters.
StringBuilder(int capacity) Constructs a string builder with no characters in it and an initial capacity specified by the capacity argument.
StringBuilder(String str) Constructs a string builder initialized to the contents of the specified string.

Selected methods:

StringBuilder append(TYPE v) Appends the string representation of the variable/object v to the sequence.
int capacity() Returns the current capacity (NOTE: this is not the length of the stored string).
char charAt(int index) Returns the char value in this sequence at the specified index.
StringBuilder insert(int offset, char c) Inserts the string representation of the char argument into this sequence. (There are many other versions of the insert method.)
int length() Returns the length (character count).
StringBuilder replace(int start, int end, String str) Replaces the characters in a substring of this sequence with characters in the specified String.

StringBuilder reverse() Causes this character sequence to be replaced by the reverse of the sequence.

String substring(int start, int end) Returns a new String that contains a subsequence of characters currently contained in this sequence.

String toString() Returns a string representing the data in this sequence.

See PalindromeIgnoreNonAlphanumeric.java for an example of use of the StringBuilder class.