



ITCS 209 Object Oriented Programming	Name:	Lab Score	Challenge Bonus	Peer Bonus
	ID:			
	Group:			

Lab13: Sorting

You are to create a program that will read a text file, sort the words (delimited by white space characters), then print out the sorted words. Your class should have at least 3 methods.

1. The read method: the **static** method will accept a file name as a parameter, read the textual content in a given file, and return these words in either an array or a list of strings.
2. The print method: the **static void** method will accept an array or a list of strings (as compatible with the first method) and print out all the words separated by comma in one line.
3. The sort method: the **static void** method should accept an array or a list of strings (as returned by the read method), then sort it in **descending** order (b comes before a) using one of the sorting algorithms discussed in class (i.e. Selection, Bubble, Insertion, MergeSort). **After each pass, call the second method to print out the immediate result.** You must implement the sorting algorithm from scratch (i.e. You may not use Arrays.sort() and Collections.sort()). Be prepared to explain (in English) how your sorting algorithm works from the output.

Example output (Insertion Sort):

```
Original: [ink, steak, shark, lunch, brick, cheque, software, ignore, start, wood]
Pass 1: [steak, ink, shark, lunch, brick, cheque, software, ignore, start, wood]
Pass 2: [steak, shark, ink, lunch, brick, cheque, software, ignore, start, wood]
Pass 3: [steak, shark, lunch, ink, brick, cheque, software, ignore, start, wood]
Pass 4: [steak, shark, lunch, ink, brick, cheque, software, ignore, start, wood]
Pass 5: [steak, shark, lunch, ink, cheque, brick, software, ignore, start, wood]
Pass 6: [steak, software, shark, lunch, ink, cheque, brick, ignore, start, wood]
Pass 7: [steak, software, shark, lunch, ink, ignore, cheque, brick, start, wood]
Pass 8: [steak, start, software, shark, lunch, ink, ignore, cheque, brick, wood]
Pass 9: [wood, steak, start, software, shark, lunch, ink, ignore, cheque, brick]
```

Hint: `str1.compareTo(str2)` returns **0** if `str1` is equal to `str2`; a **negative value** if `str1` is lexicographically less than `str2`; and a **positive value** if `str1` is lexicographically greater than `str2`.

Finally, your **main method** should demonstrate how the above three methods work. You can use the provided text file as an input or create your own text file (make sure it contains at least 10 words).

Challenge Bonus (Optional):

Option 1: Write a method that counts the frequency of each word in a file and prints out the top 10 most frequent words (along with their frequencies). Ties are broken by lexical ordering. You may NOT use an implementation of a Map. You have a freedom to create your own text file.

Option 2: Write another version of the second method that uses an $O(N \log N)$ or faster sorting algorithm. Be ready to present how it works. You may not use a Map nor pre-implemented sorting methods.

Option 3: Write a *recursive* method to check whether a string is a palindrome or not. A palindrome is a sequence of characters which reads the same backward or forward. Allowances may be made for adjustments to capital letters, punctuation, and word dividers. Examples of palindromes include "A man, a plan, a canal, Panama!", "Amor, Roma", "race car", "stack cats", "step on no pets", "taco cat", "put it up", "Was it a car or a cat I saw?", "No 'x' in Nixon", "Are we not drawn onward, we few, drawn onward to new era?".

Peer Bonus (Optional):

To claim this extra bonus, once you finish your program, help other friends and make sure they understand what's going on. You must stick to the following rules:

1. Do not write code for nor dictate your friend!
2. Make sure your friend understands and can reproduce the solution on his/her own if given a similar problem.
3. A friend can be helped by at most one friend.

To earn this peer bonus, after your friend finishes his/her lab, ask him/her to give you a sticker. You will earn the peer bonus for the first three stickers, but keep helping your friends still.

