

Divide & Conquer Coding

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Divide & Conquer Coding

For this coding question, you will be tasked with implementing **merge sort**. The structure of this coding question will be similar to that of the coding assignments in the course. In addition, you are provided with a scratchpad at the bottom of this page that you may use. Here are a few important differences between the coding assignments and this coding question:

- Rather than implementing multiple sorting algorithms, you will only need to implement merge sort.
- You do not need to worry about throwing certain exceptions (see the Javadoc for details).
- The cooldown period between submissions has been removed.

IMPORTANT:

- **You will be given unlimited attempts on this assignment, with no cooldown between submissions.**
- **Please run your code before each submission to ensure that there are no formatting errors! If there are formatting errors in your code, your code will not be graded and a submission attempt will be logged. For more information, please review the Vocareum overview below.**

Here are general assignment guidelines that should be followed.

- Do not include any package declarations in your classes.
- Do not change any existing class headers, constructors, instance/global variables, or method signatures. For example, do not add throws to the method headers since they are not necessary. Instead, exceptions should be thrown as follows: `throw new InsertExceptionHere("Error: some exception was thrown");`
- All helper methods you choose to write should be made private. Recall the idea of Encapsulation in Object-Oriented Programming!
- Do not use anything that would trivialize the assignment. (e.g. Don't import/use `java.util.ArrayList` for an `ArrayList` assignment.)
- Always be very conscious of efficiency. Even if your method is to be $O(n)$, traversing the structure multiple times is considered inefficient unless that is absolutely required (and that case is extremely rare).
- If applicable, use the generic type of the class; do not use the raw type of the class. For example, use `new LinkedList<Integer>()` instead of `new LinkedList()`.

Use of the following statements should be avoided at all times.

package	System.arraycopy()	clone()
assert()	Arrays class	Array class
Thread class	Collections class	Collection.toArray()
Reflection APIs	Inner or nested classes	Lambda Expressions

The Vocareum (code editor) interface has six main components:

- The **Drop-Down** in the top left. This lets you choose from multiple available files. Note that this drop-down will only be visible in assignments that require multiple files.
- The **Run** button. This will compile your code and run a file scan. Running your code will not count towards your total allowed submission attempts, therefore you are free to run as many times as needed.
- The **Submit** button. This will compile your code, run a file scan, grade your assignment, and output results to console. Note that for most assignments in this class, you will only be allowed a limited number of submissions. A

console. Note that for most assignments in this class, you will only be allowed a limited number of submissions. A submission is counted when the submit button is clicked, regardless of whether or not your code can compile or if there are any file issues. Therefore, we **highly recommend** that you run your code before submitting to ensure that there are no issues that will prevent your code from being graded and that every submission attempt will generate meaningful results.

- The **Reset** button. This will revert all your changes and reset your code to the default code template.
- The **Code Window**. This is where you will write your code. For large coding assignments, we highly recommend copying the starter code and working in your preferred IDE to have access to features such as code completion, auto-formatting, and much more!
- The **Output Window**. This window will appear whenever you run or submit your code and will display the output for you to view.

For additional help, please visit the [Vocareum information page](#) located in the course information module!

Divide & Conquer Coding (External resource)

SubmitRunGradesReset

```
28
29  * @param <T>      Data type to sort.
30  * @param arr      The array to be sorted.
31  * @param comparator The Comparator used to compare the data in arr.
32  */
33  public static <T> void mergeSort(T[] arr, Comparator<T> comparator) {
34      // WRITE YOUR CODE HERE (DO NOT MODIFY METHOD HEADER)!
35      if(arr.length <= 1){
36          return;
37      }
38      int length = arr.length;
39      int midIdx = length / 2;
40
41      T[] leftArray = (T[]) new Object[midIdx];
42      for(int i = 0; i < midIdx; i++){
43          leftArray[i] = arr[i];
44      }
45
46      T[] rightArray = (T[]) new Object[length - midIdx];
47      for(int i = 0; i < (length - midIdx); i++){
48          rightArray[i] = arr[midIdx + i];
49      }
50      mergeSort(leftArray, comparator);
51      mergeSort(rightArray, comparator);
52
53      int leftIdx = 0;
54      int rightIdx = 0;
55      int currIdx = 0;
56
57      while(leftIdx < midIdx && rightIdx < (length-midIdx)){
58          if(comparator.compare(leftArray[leftIdx], rightArray[rightIdx])<=0){
59              arr[currIdx] = leftArray[leftIdx];
60              leftIdx++;
61          }
```

Total score10/10

DivideAndConquerSorts10/10

[Executed at: Mon Oct 16 7:18:58 PDT 2023]

=====

Sorting.java successfully compiled.

=====

Success: All Tests Passed.

Score: 10.0 / 10.0

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Scratchpad

Below is a textbox you can use as a scratchpad while you work through this problem; you should be able to click in the bottom-right and drag to expand it for your use. No text in this box will be used by the grading script, but you can use it to take notes and work through the exercise. Note that text entered in this box **will not be saved** if you leave and return to this page.

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