CSE 204: Data Structures and Algorithms

Assignment 7 (Divide and Conquer)

You are a software engineer working for a financial firm that provides investment advice to clients. Your firm has been approached by a hedge fund that wants to analyze stock prices to make better investment decisions. They have given you a large array of stock prices and they want you to determine the number of inverted pairs in the array.

An inverted pair is defined as two elements (a, b) such that a > b and the index of a is less than the index of b. In other words, if an element with a higher value is placed before an element with a lower value, this would result in an inverted pair.

Your task is to write a function that takes in an array of integers and returns the number of inverted pairs along with the pairs in the array. The solution must use a **divide and conquer** approach to solve this problem. You can use Standard Template Library(STL) if needed.

Intended time complexity: O(nlogn)

Input/Output
The first line denotes the total number of integers, n to take as input. The second line will have n integers. You have to output the total number of inverted pairs followed by the pairs in the specific format shown below.

Sample Input:
5
2 4 1 3 5

Sample Output:
3
The inverted pairs are (4,1), (2,1), (4,3)

Submission Guidelines:
1. Create a directory with your 7-digit student id as its name.
2. Put all the source files only into the directory.
3. Zip the directory (compress in .zip format. Any other form like .rar, .7z, etc. is not acceptable).
4. Upload the .zip file on Moodle in the designated assignment submission link. For example, if your student id is xx05xxx, create a directory named xx05xxx. Put only your

source files (.c, .cpp, .java, .h, etc.) into xx05xxx. Compress the directory xx05xxx into xx05xxx.zip and upload the xx05xxx.zip on Moodle. Failure to follow the submission mentioned above guideline may result in up to a 10% penalty.

Please DO NOT COPY solutions from anywhere (your friends, seniors, internet, etc.). Implement the algorithms with your style of coding. Any form of plagiarism (irrespective of source or destination), will result in getting -100% marks. You have to protect your code.

Submission Deadline:
The unmodifiable deadline for this assignment is on 3 February at 11:55 PM