

Project - sorting

Implement, test and compare array sorting methods.

Group I methods:

- Insertion sort
- Selection sort
- Bubble sort

Group II methods:

- Quicksort
- Shellsort
- Heapsort

Arrays with values of type int in the range $\langle -100; 100 \rangle$ are the subject of. Perform three types of sorting tests in ascending order for each method, depending on the preparation of the input data.

- Test1 - For randomly generated data
- Test2 - For data sorted in reverse order (descending)
- Test3 - For data sorted properly (ascending)

We load the sorted data from a file named **data** (we obtain it with our own sorting program, which writes the results to it).

Analysis of the results for each test (Test1 - Test3) should include graphs of the dependence of sorting time on array size

- One summary chart for the 3 primary methods,
 - One summary chart for the second group of methods,
 - One chart comparing all Group I and Group II methods
- ✓ A total of 9 charts - 3 for each data set.

To study the times, you can use the system function *time* or *gettimeofday*. We call it in the program just before and just after sorting and take into account the difference of the obtained times.

We choose the maximum size of the array and the length of the list so that the sorting time does not exceed 15 minutes. **The program asks the user for the size of the array to be sorted.**

An electronic report (pdf file) should present the algorithms (pseudo-codes or block diagrams of the methods) and their computational complexity compared with the results obtained (an attempt to approximate the obtained diagrams with appropriate complexity functions).

The programme should include sorting functions and a minimal main function in which the user enters the size of the array and the programme reads the data from the file 'data' and calls all the sorting functions. Please organise the way in which all the tests are to be carried out as you wish (preparing the data file, collecting the times, processing the results).