Indian Institute of Technology Mandi
February-June 2014 Semester

CS202: Advanced Data Structure and Algorithms

Programming Assignment 1

Last date of submission: 7th March, 2014

1. Implement the following sorting algorithms using object oriented C++ programing and sort the input sequence in ascending order.
   a) Insertion sort
   b) Selection Sort
   c) Rank Sort
   d) Buble sort
2. Data sets with different input sizes are given. Observe the running time for the above mentioned sorting algorithms for each of the data with different input sizes. Note down and compare the running time for each of the algorithms.
3. Sort the data points in each of the data files in **ascending order** and save them as separate files. Use the data files containing data points in ascending order as input to the programs of each of the above mentioned sorting algorithms for ascending order and observe the running time. This is the best case scenario. Compare the best case running time of each of the algorithms.
4. Sort the data points in each of the data files in **descending order** and save them as separate files. Use the data files containing data points in descending order as input to the programs of each of the above mentioned sorting algorithms for ascending order and observe the running time. This is the worst case scenario. Compare the worst case running time of each of the algorithms.
5. Write efficient algorithms for Rank sort and Buble sort. Analyse the running time of the new algorithms and give the actual and asymptotic running time. Use the given datasets to sort the data points. Observe and compate the actual running time.
6. Repeat (3) and (4) for the new algorithms.

Submit the report on the observations and resoning behind the obtained results on or before 7th March 2014. The report should be neat and clear. Use the uniform fonts for the different sections and main body of the report. The report should contain the pseudo-code of each of the algorithms, their analysis, the acutal and asymptotic best base, worst case and average case running time. Plot the graph showing the asymptotic running time for the different algorithms as a functon of input size (use the different input sizes provided to you). Plot the graph of observed running time of the different algorithms as a functon of input size. The should also contain comparision of different algorithms and the reasonings.