# Project 4: Sort & Select

In this project, you have to implement three functions we mentioned in the class, randomized-quick sort, radix sort and selection. Also, there are some discussions we want you to take.

## --Programming--

(1) randomized-quick sort

input: (will be a file)

```
5       // size of array
5       // a[0]
4       // a[1]
3       // a[2]
2       // a[3]
1       // a[4]
```

Output: (need to be a file)

```
1
2
3
4
5
```

(2) radix sort

input: (will be a file)

```
5       // size of array
3       // number of digits
2       // number of digits sort in each pass
329     // a[0]
457     // a[1]
657     // a[2]
839     // a[3]
436     // a[4]
```

Output: (need to be a file)

329
436
457
657
839

(3) randomized selection

input: (will be a file)

5 // size of array
2 //ith largest
4 // a[0]
2 // a[1]
1 // a[2]
8 // a[3]
7 // a[4]

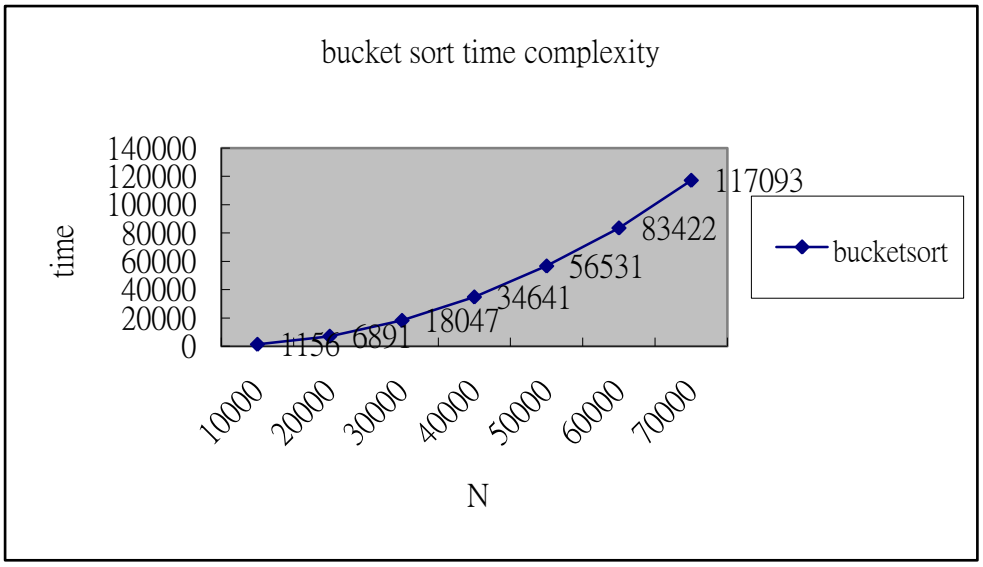
Output:

7

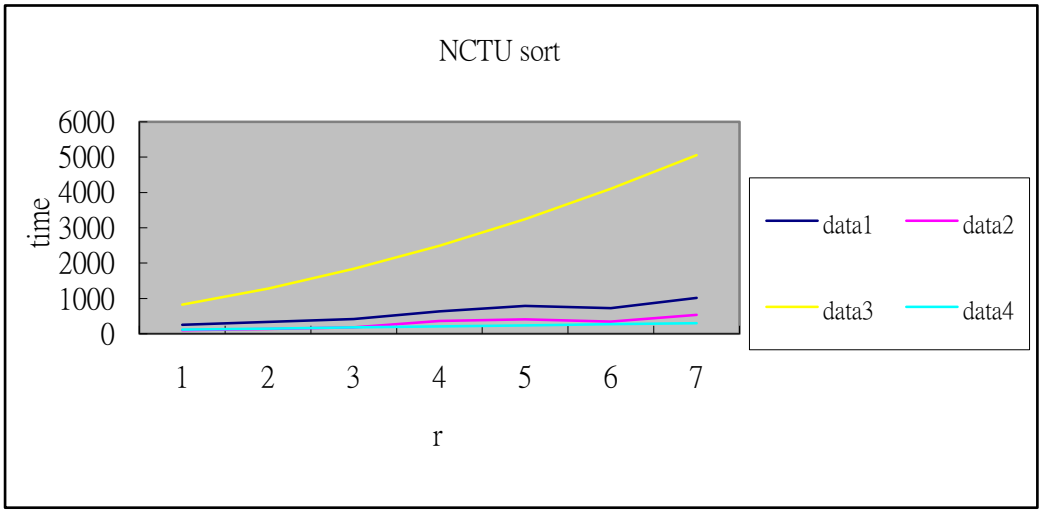
## --Discussion--

**You have to work on your discussion assignment electronically and turn in the print-out when you demo.

(1) Show each of your result as a figure like below. Random generate some test data, at least 5 different test data, each test data's size should be more than 20000 (that is, more than 20000 unordered number to be sorted). X-axis is the size of test data and Y-axis is execution time.




(2) Do some experiments with radix sort to find out how to determine a better $\gamma$ which means sort $\gamma$ -digits (the second input of radix sort we mentioned above) in a pass. First of all, you have to generate some fixed-digit numbers with random order (e.g. 152345, 547836, 123879, ……) . Then, change $\gamma$ from 1 to n (n is number of digits, the first input) and record the execution time of each of $\gamma$ . Show your result as a figure with X-axis represents $\gamma$ , Y-axis represents execution time, different lines represents different data size. Do more than 2 different size of data but less than 5.



Restrictions:

- c/c++ only
- The project will be personal.
- The inputs and outputs both will be files, except the outputs of randomized-selection.
- The paper will be accepted by electronic files and will be more than half of score on this project. So please do your best with it.
- Turn in the print-out paper when you demo.
- The due time will be 4/28 13:00 and the demo time is at 16:30-18:30 in the same day in EC324.
- Please upload both your codes and paper onto e3 system on time.

Please feel free to let me know if you have any questions.

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Or EC637

TA Joseph