Write Up

Machine used:

I used a virtual environment to execute the script. The environment was Ubuntu 14.04 LTS with the default version of g++ installed into the environment.

Chart:

See above

Explanation of results:

The results seem very clear once executing, at first glance you can immediately tell that on a bubble sort, the complexity of the function is easily O(n2). Selection sort on the other hand looks to have a very linear complexity, possible O(n) on an unsorted list. There is a small spike but this seems to rather be a computer deviation than related to the algorithm. Finally quicksort is extremely fast compared to the other two function, and seems to have a complexity of O(log n).

Regarding the use of recursion:

Recursion is very powerful when used right in the instance of quicksort. One must watch their use of recursion however, it can easily create useless complexity and make debugging a very difficult task. In the right places, the functional programming style has major advantages.

Extra Execution:

When running these algorithms on an already sorted list and slightly modifying quicksort, there are some drastic changes. Bubblesort now ***immediately*** executes in no time at all, while quicksort becomes extremely slow. This is because bubble sort Is very sorted on partially sorted / sorted lists, arguably the best algorithm when dealing with these sets of data. Quick sort is suddenly terrible inefficient because the pivot is no longer a median value, making the recursion chain much larger.