Algorithms

Homework 1 Report

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1. Compare the actual time usage of the two algorithms (unit : nano seconds)

|  |  |  |  |
| --- | --- | --- | --- |
| Input Size | Randomized Select | Deterministic Select | Ratio of Average |
| 101 | 14083  16042  19417  14959  15625 | 32583  84459  36292  32375  33208 | 2.73215935 |
| 102 | 38125  23542  44334  33834  33416 | 67708  64208  63084  83792  66666 | 1.99397406 |
| 103 | 118500  324000  138042  571959  205250 | 471291  263792  386625  480000  439375 | 1.50328227 |
| 104 | 1969416  1627708  991584  530916  1083583 | 2184917  1322333  1936833  2377667  2649792 | 1.68808521 |
| 105 | 9622208  7130625  3987500  5658583  5694667 | 23539083  14291125  11604667  17294625  12580042 | 2.47119625 |
| 106 | \*Each number is an average of 300 random input  10143173  10373174  10112779 | \*Each number is an average of 300 random input)  26473511  27898592  27700273 | 2.60998319  2.68949427  2.7391356  **Average of 900 input : 2.6795 (rounded)** |

Result : The hidden constant difference between two algorithms’ time complexity is around **2.6795** .

\*\* Code for comparing time is included in Main.java

1. Checker program

The checker program works by sorting the given array using java’s Arrays.sort function, and then getting the i-th element by simply getting Arr[i-1] element from the sorted array (Arr).

1. Environment of the program

Open jdk - 19