

Sorting Function Analysis

I comprised a list of the most critical outputs below. From the data, it's easy to see that many things are fairly consistent between the three tests that have been completed. The estimated subtractions per division is fairly consistent. In my functions, I counted actual subtractions. If I had to do a division for a result, I would let the function try again on the next value. I assume that I'd be closer to Levy's calculations if I hadn't done that.

The estimated put percentage is vague as it was calculated based on the native divisions rather than an actual output; however, its estimate does show that the ability of the subtraction to fail increases a little with a large change in random number length.

The most notable value change occurs with the largest random numbers used with input three. There appears to be a 13.6% savings on disk write using subtraction, while the time doesn't vary a fraction of a percentage point.

Parameters	Input 1	Input 2	Input 3
Low Random Number	0	10^4	10^7
High Random Number	10^2	2^{16}	2^{31}
Naive Divisions	346	89,200	176,743,269
Divisions by Subtraction	251	62,209	121,342,624
Subtractions	1,025	258,837	509,123,374
Estimated Subtractions per Divide	4	4	4
Subtraction Fail Percentage	27	30	31
Disk Write Advantage	--	--	13
Memory Difference	--	--	--
Time Difference	--	--	--

INPUT 1 Estimated Random Number Range: 0 : 10^2

346 Naive Divisions
 251 Divisions by Subtraction
 1,025 Subtractions
 4 Estimated Subtractions per Division
 27% Estimated Punt Percentage
 0 Disk Write Difference
 0 Memory Difference

INPUT 2 Estimated Random Number Range: 10^4 : 2^{16}

89,200 Naive Divisions
 62,209 Divisions by Subtraction
 258,837 Subtractions
 4 Estimated Subtractions per Division
 30% Estimated Punt Percentage
 0 Disk Write Difference
 0 Memory Difference

INPUT 3 Estimated Random Number Range: 10^7 : 2^{31}

176,743,269 Naive Divisions
 121,342,624 Divisions by Subtraction
 509,123,374 Subtractions
 4 Estimated Subtractions per Division
 31% Estimated Punt Percentage
 13% Disk Write Gain by Subtraction

NAIVE DIVISIONS INPUT 3

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TIME*****
TIME CPU percent 100.00 100.00          Fri Sep 9 19:35:54 2016
TIME aft naive false      2.07 u          0.00 s  Res:      201532
TIME aft naive false      2.51 u_t        0.03 s_t
TIME*****
TIME CPU percent 100.00 100.00          Fri Sep 9 19:35:58 2016
TIME aft naive true       2.07 u          0.00 s  Res:      201532
TIME aft naive true       6.30 u_t        0.03 s_t
TIME*****
  
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SUBTRACTION INPUT 3

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TIME*****
TIME CPU percent 86.30 100.00          Fri Sep 9 19:35:56 2016
TIME aft subtract false    1.73 u          0.00 s  Res:      201532
TIME aft subtract false    4.23 u_t        0.03 s_t
TIME*****
TIME CPU percent 86.39 100.00          Fri Sep 9 19:36:00 2016
TIME aft subtract true     1.73 u          0.00 s  Res:      201532
TIME aft subtract true     8.03 u_t        0.03 s_t
TIME*****
  
```