

COMPUTER SCIENCE FINAL PROJECT REPORT

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The average, even and the odd case is computed by taking the average of the sum of every result in each child configuration.

QUESTION 1

Even

Threshold 0.33

Linear probe : Collisions: 1196.6 | Probes is 648.8.

Quadratic probe: Collisions: 1109.3 | Probes is 542.4.

Threshold 0.50

Linear probe : Collisions: 3704.1 | Probes is 1615.2.

Quadratic probe: Collisions: 2968.8 | Probes is 1014.7.

Threshold 0.75

Linear probe : Collisions: 19450.0 | Probes is 11170.5.

Quadratic probe: Collisions: 9588.9 | Probes is 2653.9.

Odd

Threshold 0.33

Linear probe : Collisions: 1130.9 | Probes is 593.4.

Quadratic probe: Collisions: 1035.8 | Probes is 491.6.

Threshold 0.50

Linear probe : Collisions: 3478.8 | Probes is 1476.7.

Quadratic probe: Collisions: 2783.1 | Probes is 934.4.

Threshold 0.75

Linear probe : Collisions: 19222.6 | Probes is 10472.5.

Quadratic probe: Collisions: 9034.6 | Probes is 2449.2.

From the data, we could clearly see that in odd size tables the number of probes and collisions is slightly less than in even size tables in all cases.

QUESTION 2

Size 8192

Threshold 0.33

Linear probe : Collisions: 1176.6 | Probes is 620.0.

Quadratic probe: Collisions: 1099.4 | Probes is 550.3.

Threshold 0.50

Linear probe : Collisions: 3470.8 | Probes is 1419.2.

Quadratic probe: Collisions: 2967.0 | Probes is 1020.8.

Threshold 0.75

Linear probe : Collisions: 19368.5 | Probes is 10312.8.

Quadratic probe: Collisions: 9637.9 | Probes is 2740.5.

Average

Threshold 0.33

Linear probe : Collisions: 1163.8 | Probes is 621.1.

Quadratic probe: Collisions: 1072.6 | Probes is 517.0.

Threshold 0.50

Linear probe : Collisions: 3591.5 | Probes is 1546.0.

Quadratic probe: Collisions: 2876.0 | Probes is 974.6.

Threshold 0.75

Linear probe : Collisions: 19336.3 | Probes is 10821.5.

Quadratic probe: Collisions: 9311.8 | Probes is 2551.6.

From the data, we could clearly see that with the size of the perfect power of 2, the table with the size of 8192 has the number of probes and collisions slightly more than the average in most of the case (in 8 out of 12 cases). Thus, we could say with the size of perfect power of 2, the hash table performs a little bit worse than the average.

QUESTION 3

Size 8191

Threshold 0.33

Linear probe : Collisions: 1125.8 | Probes is 614.5.

Quadratic probe: Collisions: 1026.5 | Probes is 476.4.

Threshold 0.50

Linear probe : Collisions: 3413.6 | Probes is 1419.5.

Quadratic probe: Collisions: 2716.8 | Probes is 933.5.

Threshold 0.75

Linear probe : Collisions: 18514.2 | Probes is 10911.1.

Quadratic probe: Collisions: 8947.4 | Probes is 2439.7.

Size 8209

Threshold 0.33

Linear probe : Collisions: 1116.8 | Probes is 596.9.

Quadratic probe: Collisions: 1010.8 | Probes is 474.4.

Threshold 0.50

Linear probe : Collisions: 3330.8 | Probes is 1331.6.

Quadratic probe: Collisions: 2721.0 | Probes is 905.9.

Threshold 0.75

Linear probe : Collisions: 18690.5 | Probes is 9584.8.

Quadratic probe: Collisions: 8887.5 | Probes is 2406.4.

Average

Threshold 0.33

Linear probe : Collisions: 1163.8 | Probes is 621.1.

Quadratic probe: Collisions: 1072.6 | Probes is 517.0.

Threshold 0.50

Linear probe : Collisions: 3591.5 | Probes is 1546.0.

Quadratic probe: Collisions: 2876.0 | Probes is 974.6.

Threshold 0.75

Linear probe : Collisions: 19336.3 | Probes is 10821.5.

Quadratic probe: Collisions: 9311.8 | Probes is 2551.6.

From the data, we could clearly see that with the size of prime, the table with the size of 8191 and 8209 has the number of probes and collisions slightly less than the average in all of the cases. Thus, we could say with the size of prime, the hash table performs a little bit better than the average.

QUESTION 4

Size 8190

Threshold 0.33

Linear probe : Collisions: 1342.7 | Probes is 813.3.

Quadratic probe: Collisions: 1213.5 | Probes is 629.9.

Threshold 0.50

Linear probe : Collisions: 4139.1 | Probes is 1717.6.

Quadratic probe: Collisions: 3270.5 | Probes is 1174.7.

Threshold 0.75

Linear probe : Collisions: 21930.4 | Probes is 13284.9.

Quadratic probe: Collisions: 10376.0 | Probes is 2768.6.

Size 8200

Threshold 0.33

Linear probe : Collisions: 1190.7 | Probes is 621.1.

Quadratic probe: Collisions: 1123.8 | Probes is 548.4.

Threshold 0.50

Linear probe : Collisions: 3678.3 | Probes is 1586.0.

Quadratic probe: Collisions: 3026.8 | Probes is 1026.9.

Threshold 0.75

Linear probe : Collisions: 17384.6 | Probes is 9743.8.

Quadratic probe: Collisions: 9779.4 | Probes is 2674.5.

Size 8208

Threshold 0.33

Linear probe : Collisions: 1415.8 | Probes is 848.8.

Quadratic probe: Collisions: 1297.1 | Probes is 683.7.

Threshold 0.50

Linear probe : Collisions: 4552.8 | Probes is 2253.0.

Quadratic probe: Collisions: 3425.1 | Probes is 1202.8.

Threshold 0.75

Linear probe : Collisions: 25210.5 | Probes is 14932.5.

Quadratic probe: Collisions: 11189.4 | Probes is 3291.3.

Average

Threshold 0.33

Linear probe : Collisions: 1163.8 | Probes is 621.1.

Quadratic probe: Collisions: 1072.6 | Probes is 517.0.

Threshold 0.50

Linear probe : Collisions: 3591.5 | Probes is 1546.0.

Quadratic probe: Collisions: 2876.0 | Probes is 974.6.

Threshold 0.75

Linear probe : Collisions: 19336.3 | Probes is 10821.5.

Quadratic probe: Collisions: 9311.8 | Probes is 2551.6.

From the data, we could clearly see that with the size of the number having lots of small divisors, the table with the size of 8190, 8200, and 8208 has the number of probes and collisions slightly more than the average in all of the cases. Thus, we could say with the size of the number having lots of small divisors, the hash table performs a little bit worse than the average.

QUESTION 5

Size 8201

Threshold 0.33

Linear probe : Collisions: 1135.6 | Probes is 617.1.

Quadratic probe: Collisions: 1055.8 | Probes is 505.7.

Threshold 0.50

Linear probe : Collisions: 3406.8 | Probes is 1460.3.

Quadratic probe: Collisions: 2849.1 | Probes is 953.0.

Threshold 0.75

Linear probe : Collisions: 19392.1 | Probes is 10704.4.

Quadratic probe: Collisions: 9112.3 | Probes is 2430.8.

Size 8203

Threshold 0.33

Linear probe : Collisions: 1109.1 | Probes is 577.2.

Quadratic probe: Collisions: 1038.2 | Probes is 465.4.

Threshold 0.50

Linear probe : Collisions: 3468.1 | Probes is 1499.2.

Quadratic probe: Collisions: 2758.4 | Probes is 923.6.

Threshold 0.75

Linear probe : Collisions: 22800.9 | Probes is 12242.5.

Quadratic probe: Collisions: 8928.4 | Probes is 2410.7.

Size 8207

Threshold 0.33

Linear probe : Collisions: 1158.2 | Probes is 588.4.

Quadratic probe: Collisions: 1037.4 | Probes is 498.9.

Threshold 0.50

Linear probe : Collisions: 3520.7 | Probes is 1449.2.

Quadratic probe: Collisions: 2786.9 | Probes is 947.4.

Threshold 0.75

Linear probe : Collisions: 19145.5 | Probes is 9545.4.

Quadratic probe: Collisions: 9129.0 | Probes is 2425.4.

Average

Threshold 0.33

Linear probe : Collisions: 1163.8 | Probes is 621.1.

Quadratic probe: Collisions: 1072.6 | Probes is 517.0.

Threshold 0.50

Linear probe : Collisions: 3591.5 | Probes is 1546.0.

Quadratic probe: Collisions: 2876.0 | Probes is 974.6.

Threshold 0.75

Linear probe : Collisions: 19336.3 | Probes is 10821.5.
Quadratic probe: Collisions: 9311.8 | Probes is 2551.6.

From the data, we could clearly see that with the size of moderately big prime, the table with the size of 8201, 8203 and 8207 has the number of probes and collisions slightly less than the average in all of the cases. Thus, we could say with the size of moderately big prime, the hash table performs a little bit better than the average.

QUESTION 6

Average

Threshold 0.33

Linear probe : Collisions: 1163.8 | Probes is 621.1.

Quadratic probe: Collisions: 1072.6 | Probes is 517.0.

Threshold 0.50

Linear probe : Collisions: 3591.5 | Probes is 1546.0.

Quadratic probe: Collisions: 2876.0 | Probes is 974.6.

Threshold 0.75

Linear probe : Collisions: 19336.3 | Probes is 10821.5.

Quadratic probe: Collisions: 9311.8 | Probes is 2551.6.

Comparing to 0.33 and 0.75 thresholds, 0.75 thresholds perform far worse than in all cases (it creates at least 9 times more collision and need at least 4 times more probes to search, comparing 0.33, in the experiment).

Comparing between 0.33 and 0.75 thresholds, it is worthwhile since you get almost half of the collision and probes in the searching and inserting process.