Program Structures and Algorithms Spring 2024

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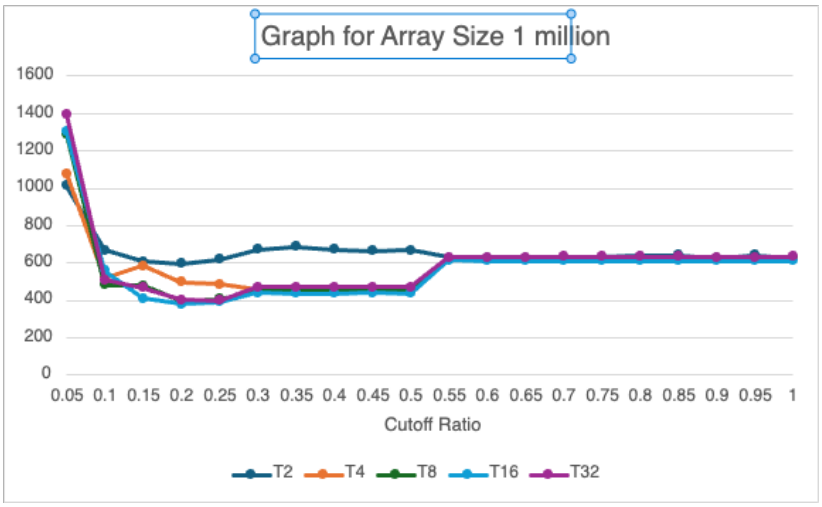
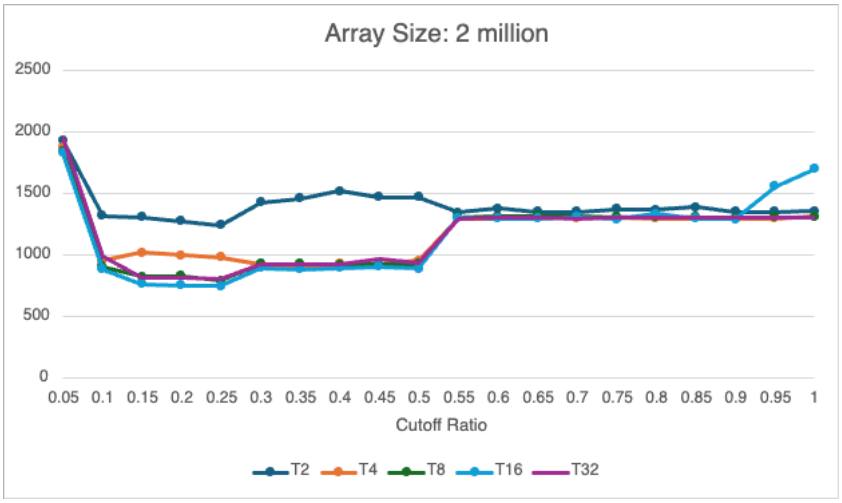
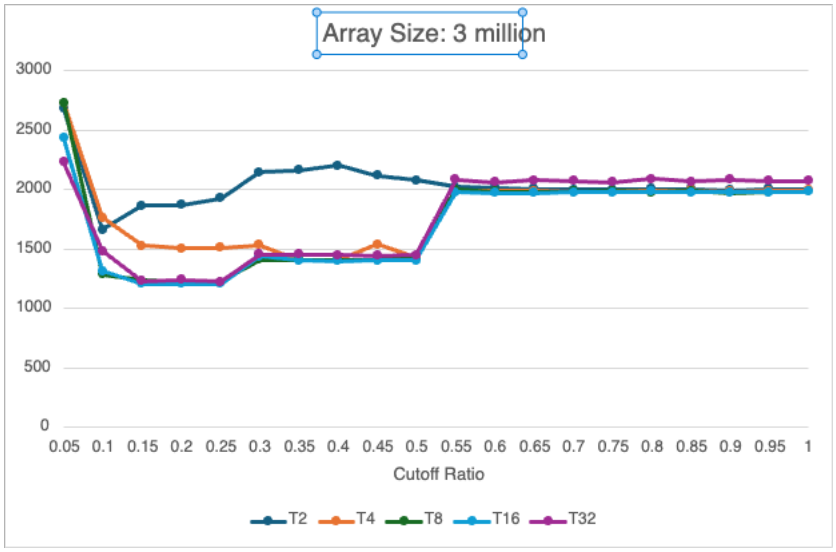
GITHUB LINK: https://github.com/ssaurabh760/INFO6205
Assignment: 5

| | Array Size: 1 million | | | | | Array Size: 2 million | | | | | Array Size: 3 million | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cutoff Ratio | T2 (ms) | T4 (ms) | T8 (ms) | T16 (ms) | T32 (ms) | T2 (ms) | T4 (ms) | T8 (ms) | T16 (ms) | T32 (ms) | T2 (ms) | T4 (ms) | T8 (ms) | T16 (ms) | T32 (ms) |
| 0.05 | 1015 | 1078 | 1289 | 1301 | 1395 | 1936 | 1878 | 1848 | 1831 | 1957 | 2683 | 2735 | 2734 | 2433 | 2235 |
| 0.1 | 670 | 522 | 484 | 559 | 510 | 1321 | 958 | 912 | 887 | 989 | 1664 | 1766 | 1286 | 1317 | 1487 |
| 0.15 | 608 | 587 | 478 | 409 | 468 | 1313 | 1024 | 827 | 769 | 817 | 1867 | 1530 | 1240 | 1210 | 1235 |
| 0.2 | 598 | 498 | 395 | 380 | 403 | 1277 | 1004 | 831 | 758 | 817 | 1871 | 1508 | 1226 | 1207 | 1242 |
| 0.25 | 619 | 488 | 408 | 393 | 401 | 1248 | 983 | 796 | 753 | 810 | 1930 | 1515 | 1224 | 1211 | 1227 |
| 0.3 | 673 | 460 | 450 | 442 | 473 | 1430 | 932 | 931 | 896 | 933 | 2146 | 1536 | 1410 | 1438 | 1459 |
| 0.35 | 687 | 461 | 450 | 438 | 473 | 1462 | 921 | 931 | 890 | 928 | 2163 | 1408 | 1410 | 1406 | 1455 |
| 0.4 | 672 | 461 | 450 | 439 | 472 | 1523 | 930 | 928 | 900 | 927 | 2205 | 1405 | 1410 | 1402 | 1451 |
| 0.45 | 664 | 460 | 450 | 442 | 472 | 1477 | 930 | 928 | 912 | 972 | 2118 | 1539 | 1408 | 1404 | 1448 |
| 0.5 | 670 | 459 | 449 | 438 | 473 | 1475 | 956 | 932 | 893 | 934 | 2083 | 1436 | 1415 | 1404 | 1450 |
| 0.55 | 630 | 623 | 624 | 615 | 632 | 1348 | 1301 | 1314 | 1304 | 1303 | 2027 | 1990 | 2000 | 1981 | 2086 |
| 0.6 | 631 | 623 | 622 | 611 | 631 | 1382 | 1303 | 1318 | 1303 | 1304 | 2021 | 1993 | 1987 | 1975 | 2066 |
| 0.65 | 627 | 624 | 622 | 612 | 632 | 1354 | 1299 | 1321 | 1299 | 1305 | 2005 | 1990 | 1979 | 1973 | 2081 |
| 0.7 | 625 | 626 | 624 | 610 | 633 | 1356 | 1307 | 1318 | 1311 | 1301 | 2003 | 1980 | 1983 | 1980 | 2074 |
| 0.75 | 629 | 626 | 627 | 612 | 636 | 1377 | 1305 | 1313 | 1296 | 1313 | 2000 | 1992 | 1989 | 1981 | 2064 |
| 0.8 | 640 | 624 | 626 | 612 | 635 | 1371 | 1303 | 1316 | 1337 | 1304 | 2006 | 1989 | 1981 | 1984 | 2091 |
| 0.85 | 643 | 623 | 628 | 611 | 636 | 1391 | 1300 | 1312 | 1301 | 1314 | 2009 | 1994 | 1992 | 1979 | 2072 |
| 0.9 | 628 | 631 | 628 | 612 | 632 | 1353 | 1301 | 1308 | 1298 | 1308 | 1999 | 1987 | 1976 | 1977 | 2087 |
| 0.95 | 642 | 622 | 631 | 610 | 630 | 1357 | 1302 | 1312 | 1563 | 1304 | 2010 | 1991 | 1982 | 1978 | 2076 |
| 1 | 624 | 622 | 630 | 611 | 634 | 1359 | 1315 | 1312 | 1704 | 1306 | 2003 | 1997 | 1984 | 1985 | 2076 |


Graph for Array Size 1 million
1600
1400
1200
1000
800
600
400
200
0
0.05 0.1 0.15 0.2 0.25 0.3 0.35 0.4 0.45 0.5 0.55 0.6 0.65 0.7 0.75 0.8 0.85 0.9 0.95 1
Cutoff Ratio
T2 T4 T8 T16 T32


Array Size: 2 million
2500
2000
1500
1000
500
0
0.05 0.1 0.15 0.2 0.25 0.3 0.35 0.4 0.45 0.5 0.55 0.6 0.65 0.7 0.75 0.8 0.85 0.9 0.95 1
Cutoff Ratio
T2 T4 T8 T16 T32


Array Size: 3 million
3000
2500
2000
1500
1000
500
0
0.05 0.1 0.15 0.2 0.25 0.3 0.35 0.4 0.45 0.5 0.55 0.6 0.65 0.7 0.75 0.8 0.85 0.9 0.95 1
Cutoff Ratio
T2 T4 T8 T16 T32

Conclusions:

- As the ratio of the cutoff size to the total array size increases, sorting times generally decrease across all array sizes. This suggests that higher cutoff ratios can lead to more effective sorting, resulting in shorter execution times.
- While increasing the cutoff size ratio tends to reduce sorting times, the rate of improvement diminishes as the ratio approaches 1. At extremely high ratios, there might even be instances where sorting times increase. This implies that there exists an optimal cutoff ratio beyond which further increases do not significantly enhance sorting performance.
- The impact of adjusting the cutoff size ratio varies among different array sizes. Larger arrays typically benefit more from higher cutoff ratios compared to smaller arrays. This suggests that the sensitivity to changes in the cutoff ratio depends on the size of the array being sorted.

Time for ArraySize of 1 million

AA31

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Degree of parallelism: 2 | | | | | Degree of parallelism: 4 | | | | | Degree of parallelism: 8 | | | |
| 2 | cutoff： 50000 | | 10times Time:1476ms | | | cutoff： 50000 | | 10times Time:1116ms | | | cutoff： 50000 | | 10times Time:1238ms | |
| 3 | cutoff： 100000 | | 10times Time:669ms | | | cutoff： 100000 | | 10times Time:649ms | | | cutoff： 100000 | | 10times Time:575ms | |
| 4 | cutoff： 150000 | | 10times Time:599ms | | | cutoff： 150000 | | 10times Time:535ms | | | cutoff： 150000 | | 10times Time:515ms | |
| 5 | cutoff： 200000 | | 10times Time:590ms | | | cutoff： 200000 | | 10times Time:499ms | | | cutoff： 200000 | | 10times Time:388ms | |
| 6 | cutoff： 250000 | | 10times Time:586ms | | | cutoff： 250000 | | 10times Time:498ms | | | cutoff： 250000 | | 10times Time:390ms | |
| 7 | cutoff： 300000 | | 10times Time:714ms | | | cutoff： 300000 | | 10times Time:474ms | | | cutoff： 300000 | | 10times Time:440ms | |
| 8 | cutoff： 350000 | | 10times Time:696ms | | | cutoff： 350000 | | 10times Time:472ms | | | cutoff： 350000 | | 10times Time:440ms | |
| 9 | cutoff： 400000 | | 10times Time:660ms | | | cutoff： 400000 | | 10times Time:476ms | | | cutoff： 400000 | | 10times Time:439ms | |
| 10 | cutoff： 450000 | | 10times Time:655ms | | | cutoff： 450000 | | 10times Time:475ms | | | cutoff： 450000 | | 10times Time:453ms | |
| 11 | cutoff： 500000 | | 10times Time:666ms | | | cutoff： 500000 | | 10times Time:474ms | | | cutoff： 500000 | | 10times Time:439ms | |
| 12 | cutoff： 550000 | | 10times Time:626ms | | | cutoff： 550000 | | 10times Time:634ms | | | cutoff： 550000 | | 10times Time:623ms | |
| 13 | cutoff： 600000 | | 10times Time:624ms | | | cutoff： 600000 | | 10times Time:634ms | | | cutoff： 600000 | | 10times Time:622ms | |
| 14 | cutoff： 650000 | | 10times Time:627ms | | | cutoff： 650000 | | 10times Time:633ms | | | cutoff： 650000 | | 10times Time:623ms | |
| 15 | cutoff： 700000 | | 10times Time:629ms | | | cutoff： 700000 | | 10times Time:633ms | | | cutoff： 700000 | | 10times Time:627ms | |
| 16 | cutoff： 750000 | | 10times Time:624ms | | | cutoff： 750000 | | 10times Time:633ms | | | cutoff： 750000 | | 10times Time:624ms | |
| 17 | cutoff： 800000 | | 10times Time:624ms | | | cutoff： 800000 | | 10times Time:637ms | | | cutoff： 800000 | | 10times Time:625ms | |
| 18 | cutoff： 850000 | | 10times Time:624ms | | | cutoff： 850000 | | 10times Time:633ms | | | cutoff： 850000 | | 10times Time:622ms | |
| 19 | cutoff： 900000 | | 10times Time:628ms | | | cutoff： 900000 | | 10times Time:637ms | | | cutoff： 900000 | | 10times Time:623ms | |
| 20 | cutoff： 950000 | | 10times Time:627ms | | | cutoff： 950000 | | 10times Time:633ms | | | cutoff： 950000 | | 10times Time:622ms | |
| 21 | | | | | | cutoff： 1000000 | | 10times Time:718ms | | | cutoff： 1000000 | | 10times Time:621ms | |

| | P | Q | R | S | T | U | V | W | X |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Degree of parallelism: 16 | | | | | Degree of parallelism: 32 | | | |
| 2 | cutoff： 50000 | | 10times Time:1287ms | | | cutoff： 50000 | | 10times Time:1497ms | |
| 3 | cutoff： 100000 | | 10times Time:498ms | | | cutoff： 100000 | | 10times Time:500ms | |
| 4 | cutoff： 150000 | | 10times Time:459ms | | | cutoff： 150000 | | 10times Time:489ms | |
| 5 | cutoff： 200000 | | 10times Time:393ms | | | cutoff： 200000 | | 10times Time:410ms | |
| 6 | cutoff： 250000 | | 10times Time:401ms | | | cutoff： 250000 | | 10times Time:403ms | |
| 7 | cutoff： 300000 | | 10times Time:429ms | | | cutoff： 300000 | | 10times Time:461ms | |
| 8 | cutoff： 350000 | | 10times Time:438ms | | | cutoff： 350000 | | 10times Time:458ms | |
| 9 | cutoff： 400000 | | 10times Time:455ms | | | cutoff： 400000 | | 10times Time:457ms | |
| 10 | cutoff： 450000 | | 10times Time:590ms | | | cutoff： 450000 | | 10times Time:457ms | |
| 11 | cutoff： 500000 | | 10times Time:468ms | | | cutoff： 500000 | | 10times Time:459ms | |
| 12 | cutoff： 550000 | | 10times Time:610ms | | | cutoff： 550000 | | 10times Time:631ms | |
| 13 | cutoff： 600000 | | 10times Time:607ms | | | cutoff： 600000 | | 10times Time:636ms | |
| 14 | cutoff： 650000 | | 10times Time:610ms | | | cutoff： 650000 | | 10times Time:689ms | |
| 15 | cutoff： 700000 | | 10times Time:609ms | | | cutoff： 700000 | | 10times Time:630ms | |
| 16 | cutoff： 750000 | | 10times Time:607ms | | | cutoff： 750000 | | 10times Time:637ms | |
| 17 | cutoff： 800000 | | 10times Time:606ms | | | cutoff： 800000 | | 10times Time:631ms | |
| 18 | cutoff： 850000 | | 10times Time:608ms | | | cutoff： 850000 | | 10times Time:633ms | |
| 19 | cutoff： 900000 | | 10times Time:615ms | | | cutoff： 900000 | | 10times Time:632ms | |
| 20 | cutoff： 950000 | | 10times Time:611ms | | | cutoff： 950000 | | 10times Time:637ms | |
| 21 | cutoff： 1000000 | | 10times Time:610ms | | | cutoff： 1000000 | | 10times Time:632ms | |

ArraySize: 2 million

| | | | | | | |
|---|---|---|---|---|---|---|
| 2m size | | | | | | |
| Degree of parallelism: 2 | | Degree of parallelism: 4 | | Degree of parallelism: 8 | | |
| cutoff： 100000 | 10times Time:1736ms | cutoff： 100000 | 10times Time:2129ms | cutoff： 100000 | 10times Time:2216ms | |
| cutoff： 200000 | 10times Time:1126ms | cutoff： 200000 | 10times Time:1015ms | cutoff： 200000 | 10times Time:1035ms | |
| cutoff： 300000 | 10times Time:1264ms | cutoff： 300000 | 10times Time:1337ms | cutoff： 300000 | 10times Time:832ms | |
| cutoff： 400000 | 10times Time:1310ms | cutoff： 400000 | 10times Time:1436ms | cutoff： 400000 | 10times Time:844ms | |
| cutoff： 500000 | 10times Time:1283ms | cutoff： 500000 | 10times Time:1439ms | cutoff： 500000 | 10times Time:844ms | |
| cutoff： 600000 | 10times Time:1454ms | cutoff： 600000 | 10times Time:956ms | cutoff： 600000 | 10times Time:937ms | |
| cutoff： 700000 | 10times Time:1428ms | cutoff： 700000 | 10times Time:933ms | cutoff： 700000 | 10times Time:930ms | |
| cutoff： 800000 | 10times Time:1417ms | cutoff： 800000 | 10times Time:938ms | cutoff： 800000 | 10times Time:916ms | |
| cutoff： 900000 | 10times Time:1437ms | cutoff： 900000 | 10times Time:933ms | cutoff： 900000 | 10times Time:920ms | |
| cutoff： 1000000 | 10times Time:1408ms | cutoff： 1000000 | 10times Time:1017ms | cutoff： 1000000 | 10times Time:921ms | |
| cutoff： 1100000 | 10times Time:1314ms | cutoff： 1100000 | 10times Time:1972ms | cutoff： 1100000 | 10times Time:1295ms | |
| cutoff： 1200000 | 10times Time:1337ms | cutoff： 1200000 | 10times Time:1535ms | cutoff： 1200000 | 10times Time:1289ms | |
| cutoff： 1300000 | 10times Time:1327ms | cutoff： 1300000 | 10times Time:1445ms | cutoff： 1300000 | 10times Time:1307ms | |
| cutoff： 1400000 | 10times Time:1321ms | cutoff： 1400000 | 10times Time:1311ms | cutoff： 1400000 | 10times Time:1290ms | |
| cutoff： 1500000 | 10times Time:1313ms | cutoff： 1500000 | 10times Time:1309ms | cutoff： 1500000 | 10times Time:1289ms | |
| cutoff： 1600000 | 10times Time:1326ms | cutoff： 1600000 | 10times Time:1314ms | cutoff： 1600000 | 10times Time:1292ms | |
| cutoff： 1700000 | 10times Time:1321ms | cutoff： 1700000 | 10times Time:1339ms | cutoff： 1700000 | 10times Time:1288ms | |
| cutoff： 1800000 | 10times Time:1317ms | cutoff： 1800000 | 10times Time:1303ms | cutoff： 1800000 | 10times Time:1295ms | |
| cutoff： 1900000 | 10times Time:1335ms | cutoff： 1900000 | 10times Time:1364ms | cutoff： 1900000 | 10times Tir | |
| cutoff： 2000000 | 10times Time:1325ms | cutoff： 2000000 | 10times Time:1378ms | cutoff： 2000000 | 10times Tir | |

Ctrl

| Degree of parallelism: 16 | | Degree of parallelism: 32 | |
|---|---|---|---|
| cutoff： 100000 | 10times Time:2148ms | cutoff： 100000 | 10times Time:2299ms |
| cutoff： 200000 | 10times Time:939ms | cutoff： 200000 | 10times Time:1018ms |
| cutoff： 300000 | 10times Time:918ms | cutoff： 300000 | 10times Time:924ms |
| cutoff： 400000 | 10times Time:888ms | cutoff： 400000 | 10times Time:960ms |
| cutoff： 500000 | 10times Time:855ms | cutoff： 500000 | 10times Time:888ms |
| cutoff： 600000 | 10times Time:1010ms | cutoff： 600000 | 10times Time:988ms |
| cutoff： 700000 | 10times Time:1010ms | cutoff： 700000 | 10times Time:988ms |
| cutoff： 800000 | 10times Time:1012ms | cutoff： 800000 | 10times Time:985ms |
| cutoff： 900000 | 10times Time:1061ms | cutoff： 900000 | 10times Time:986ms |
| cutoff： 1000000 | 10times Time:1078ms | cutoff： 1000000 | 10times Time:1007ms |
| cutoff： 1100000 | 10times Time:1480ms | cutoff： 1100000 | 10times Time:1451ms |
| cutoff： 1200000 | 10times Time:1503ms | cutoff： 1200000 | 10times Time:1347ms |
| cutoff： 1300000 | 10times Time:1551ms | cutoff： 1300000 | 10times Time:1410ms |
| cutoff： 1400000 | 10times Time:1559ms | cutoff： 1400000 | 10times Time:1358ms |
| cutoff： 1500000 | 10times Time:1484ms | cutoff： 1500000 | 10times Time:1351ms |
| cutoff： 1600000 | 10times Time:1489ms | cutoff： 1600000 | 10times Time:1346ms |
| cutoff： 1700000 | 10times Time:1482ms | cutoff： 1700000 | 10times Time:1344ms |
| cutoff： 1800000 | 10times Time:1487ms | cutoff： 1800000 | 10times Time:1338ms |
| cutoff： 1900000 | 10times Time:1485ms | cutoff： 1900000 | 10times Time:1348ms |
| cutoff： 2000000 | 10times Time:1479ms | cutoff： 2000000 | 10times Time:1353ms |

ArraySize: 3 million

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 47 | | | | | | | | | | | | | | |
| 48 | Degree of parallelism: 2 | | | | | Degree of parallelism: 4 | | | | | Degree of parallelism: 8 | | | |
| 49 | cutoff： 150000 | | 10times Time:2981ms | | | cutoff： 150000 | | 10times Time:2746ms | | | cutoff： 150000 | | 10times Time:3179ms | |
| 50 | cutoff： 300000 | | 10times Time:1729ms | | | cutoff： 300000 | | 10times Time:1620ms | | | cutoff： 300000 | | 10times Time:1298ms | |
| 51 | cutoff： 450000 | | 10times Time:1918ms | | | cutoff： 450000 | | 10times Time:1547ms | | | cutoff： 450000 | | 10times Time:1360ms | |
| 52 | cutoff： 600000 | | 10times Time:2018ms | | | cutoff： 600000 | | 10times Time:1562ms | | | cutoff： 600000 | | 10times Time:1270ms | |
| 53 | cutoff： 750000 | | 10times Time:1968ms | | | cutoff： 750000 | | 10times Time:1525ms | | | cutoff： 750000 | | 10times Time:1246ms | |
| 54 | cutoff： 900000 | | 10times Time:2256ms | | | cutoff： 900000 | | 10times Time:1420ms | | | cutoff： 900000 | | 10times Time:1457ms | |
| 55 | cutoff： 1050000 | | 10times Time:2175ms | | | cutoff： 1050000 | | 10times Time:1444ms | | | cutoff： 1050000 | | 10times Time:1424ms | |
| 56 | cutoff： 1200000 | | 10times Time:2266ms | | | cutoff： 1200000 | | 10times Time:1517ms | | | cutoff： 1200000 | | 10times Time:1456ms | |
| 57 | cutoff： 1350000 | | 10times Time:2164ms | | | cutoff： 1350000 | | 10times Time:1449ms | | | cutoff： 1350000 | | 10times Time:1428ms | |
| 58 | cutoff： 1500000 | | 10times Time:2215ms | | | cutoff： 1500000 | | 10times Time:1653ms | | | cutoff： 1500000 | | 10times Time:1479ms | |
| 59 | cutoff： 1650000 | | 10times Time:2152ms | | | cutoff： 1650000 | | 10times Time:2045ms | | | cutoff： 1650000 | | 10times Time:2006ms | |
| 60 | cutoff： 1800000 | | 10times Time:2025ms | | | cutoff： 1800000 | | 10times Time:2007ms | | | cutoff： 1800000 | | 10times Time:2068ms | |
| 61 | cutoff： 1950000 | | 10times Time:2019ms | | | cutoff： 1950000 | | 10times Time:2021ms | | | cutoff： 1950000 | | 10times Time:2035ms | |
| 62 | cutoff： 2100000 | | 10times Time:2023ms | | | cutoff： 2100000 | | 10times Time:2262ms | | | cutoff： 2100000 | | 10times Time:2003ms | |
| 63 | cutoff： 2250000 | | 10times Time:2038ms | | | cutoff： 2250000 | | 10times Time:2058ms | | | cutoff： 2250000 | | 10times Time:1993ms | |
| 64 | cutoff： 2400000 | | 10times Time:2036ms | | | cutoff： 2400000 | | 10times Time:2019ms | | | cutoff： 2400000 | | 10times Time:2012ms | |
| 65 | cutoff： 2550000 | | 10times Time:2025ms | | | cutoff： 2550000 | | 10times Time:2005ms | | | cutoff： 2550000 | | 10times Time:1989ms | |
| 66 | cutoff： 2700000 | | 10times Time:2028ms | | | cutoff： 2700000 | | 10times Time:2007ms | | | cutoff： 2700000 | | 10times Time:1990ms | |
| 67 | cutoff： 2850000 | | 10times Time:2034ms | | | cutoff： 2850000 | | 10times Time:2034ms | | | cutoff： 2850000 | | 10times Time:2011ms | |
| 68 | cutoff： 3000000 | | 10times Time:2040ms | | | cutoff： 3000000 | | 10times Time:2019ms | | | cutoff： 3000000 | | 10times Time:1994ms | |

| | Degree of parallelism: 16 | | Degree of parallelism: 32 | |
|---|---|---|---|---|
| | cutoff： 150000 | 10times Time:3002ms | cutoff： 150000 | 10times Time:2908ms |
| | cutoff： 300000 | 10times Time:1389ms | cutoff： 300000 | 10times Time:1424ms |
| | cutoff： 450000 | 10times Time:1288ms | cutoff： 450000 | 10times Time:1218ms |
| | cutoff： 600000 | 10times Time:1376ms | cutoff： 600000 | 10times Time:1225ms |
| | cutoff： 750000 | 10times Time:1291ms | cutoff： 750000 | 10times Time:1229ms |
| | cutoff： 900000 | 10times Time:1527ms | cutoff： 900000 | 10times Time:1404ms |
| | cutoff： 1050000 | 10times Time:2052ms | cutoff： 1050000 | 10times Time:1398ms |
| | cutoff： 1200000 | 10times Time:1518ms | cutoff： 1200000 | 10times Time:1621ms |
| | cutoff： 1350000 | 10times Time:1486ms | cutoff： 1350000 | 10times Time:1398ms |
| | cutoff： 1500000 | 10times Time:1513ms | cutoff： 1500000 | 10times Time:1602ms |
| | cutoff： 1650000 | 10times Time:2154ms | cutoff： 1650000 | 10times Time:2000ms |
| | cutoff： 1800000 | 10times Time:2152ms | cutoff： 1800000 | 10times Time:1979ms |
| | cutoff： 1950000 | 10times Time:2156ms | cutoff： 1950000 | 10times Time:1990ms |
| | cutoff： 2100000 | 10times Time:2160ms | cutoff： 2100000 | 10times Time:2053ms |
| | cutoff： 2250000 | 10times Time:2155ms | cutoff： 2250000 | 10times Time:2010ms |
| | cutoff： 2400000 | 10times Time:2180ms | cutoff： 2400000 | 10times Time:1991ms |
| | cutoff： 2550000 | 10times Time:2150ms | cutoff： 2550000 | 10times Time:1991ms |
| | cutoff： 2700000 | 10times Time:2158ms | cutoff： 2700000 | 10times Time:1978ms |
| | cutoff： 2850000 | 10times Time:2232ms | cutoff： 2850000 | 10times Time:1988ms |
| | cutoff： 3000000 | 10times Time:2203ms | cutoff： 3000000 | 10times Time:1992ms |