**Submitted by Aravind Ravindranath**

Table 1 Runtime measurements of sort algorithms based on data files in Input Folder

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Size of Data** | **Runtime in nano secs** | **Sorting Algorithm( H, S or I )** | **GAP SEQUENCE for Shell Sort** | **File Name in Input Folder** |
| 10000 | 49921766157 | H |  | asc10K.dat |
| 10000 | 1025922 | S | {1, 4, 13, 40, 121, 364, 1093, 3280, 9841, 29524} | asc10K.dat |
| 10000 | 626978 | S | {1, 5, 17, 53, 149, 373, 1123, 3371, 10111, 30341} | asc10K.dat |
| 10000 | 226247 | S | {1, 10, 30, 60, 120, 360, 1080, 3240, 9720, 29160} | asc10K.dat |
| 10000 | 219553 | S | {1, 7, 19, 67, 131, 371, 1211, 3353, 9851, 29651} | asc10K.dat |
| 10000 | 121825 | S | {1, 3, 23, 71, 143, 379, 1237, 3413, 10433, 31001} | asc10K.dat |
| 10000 | 287830 | I |  | asc10K.dat |
| 1000 | 54925900 | H |  | asc1K.dat |
| 1000 | 12495 | S | {1, 4, 13, 40, 121, 364, 1093, 3280, 9841, 29524} | asc1K.dat |
| 1000 | 11603 | S | {1, 5, 17, 53, 149, 373, 1123, 3371, 10111, 30341} | asc1K.dat |
| 1000 | 12049 | S | {1, 10, 30, 60, 120, 360, 1080, 3240, 9720, 29160} | asc1K.dat |
| 1000 | 16958 | S | {1, 7, 19, 67, 131, 371, 1211, 3353, 9851, 29651} | asc1K.dat |
| 1000 | 12049 | S | {1, 3, 23, 71, 143, 379, 1237, 3413, 10433, 31001} | asc1K.dat |
| 1000 | 29452 | I |  | asc1K.dat |
| 20000 | 462838891343 | H |  | asc20K.dat |
| 20000 | 401623 | S | {1, 4, 13, 40, 121, 364, 1093, 3280, 9841, 29524} | asc20K.dat |
| 20000 | 379756 | S | {1, 5, 17, 53, 149, 373, 1123, 3371, 10111, 30341} | asc20K.dat |
| 20000 | 618052 | S | {1, 10, 30, 60, 120, 360, 1080, 3240, 9720, 29160} | asc20K.dat |
| 20000 | 623408 | S | {1, 7, 19, 67, 131, 371, 1211, 3353, 9851, 29651} | asc20K.dat |
| 20000 | 1458783 | S | {1, 3, 23, 71, 143, 379, 1237, 3413, 10433, 31001} | asc20K.dat |
| 20000 | 1266896 | I |  | asc20K.dat |
| 2000 | 754771053 | H |  | asc2K.dat |
| 2000 | 62029 | S | {1, 4, 13, 40, 121, 364, 1093, 3280, 9841, 29524} | asc2K.dat |
| 2000 | 67830 | S | {1, 5, 17, 53, 149, 373, 1123, 3371, 10111, 30341} | asc2K.dat |
| 2000 | 66491 | S | {1, 10, 30, 60, 120, 360, 1080, 3240, 9720, 29160} | asc2K.dat |
| 2000 | 68276 | S | {1, 7, 19, 67, 131, 371, 1211, 3353, 9851, 29651} | asc2K.dat |
| 2000 | 418580 | S | {1, 3, 23, 71, 143, 379, 1237, 3413, 10433, 31001} | asc2K.dat |
| 2000 | 102637 | I |  | asc2K.dat |
| 50 | 37485 | H |  | asc50.dat |
| 50 | 4463 | S | {1, 4, 13, 40, 121, 364, 1093, 3280, 9841, 29524} | asc50.dat |
| 50 | 2231 | S | {1, 5, 17, 53, 149, 373, 1123, 3371, 10111, 30341} | asc50.dat |
| 50 | 2232 | S | {1, 10, 30, 60, 120, 360, 1080, 3240, 9720, 29160} | asc50.dat |
| 50 | 34361 | S | {1, 7, 19, 67, 131, 371, 1211, 3353, 9851, 29651} | asc50.dat |
| 50 | 9371 | S | {1, 3, 23, 71, 143, 379, 1237, 3413, 10433, 31001} | asc50.dat |
| 50 | 4462 | I |  | asc50.dat |
| 500 | 15390177 | H |  | asc500.dat |
| 500 | 18743 | S | {1, 4, 13, 40, 121, 364, 1093, 3280, 9841, 29524} | asc500.dat |
| 500 | 18296 | S | {1, 5, 17, 53, 149, 373, 1123, 3371, 10111, 30341} | asc500.dat |
| 500 | 18296 | S | {1, 10, 30, 60, 120, 360, 1080, 3240, 9720, 29160} | asc500.dat |
| 500 | 27221 | S | {1, 7, 19, 67, 131, 371, 1211, 3353, 9851, 29651} | asc500.dat |
| 500 | 18296 | S | {1, 3, 23, 71, 143, 379, 1237, 3413, 10433, 31001} | asc500.dat |
| 500 | 27667 | I |  | asc500.dat |
| 5000 | 8370637375 | H |  | asc5K.dat |
| 5000 | 91927 | S | {1, 4, 13, 40, 121, 364, 1093, 3280, 9841, 29524} | asc5K.dat |
| 5000 | 85233 | S | {1, 5, 17, 53, 149, 373, 1123, 3371, 10111, 30341} | asc5K.dat |
| 5000 | 84340 | S | {1, 10, 30, 60, 120, 360, 1080, 3240, 9720, 29160} | asc5K.dat |
| 5000 | 87465 | S | {1, 7, 19, 67, 131, 371, 1211, 3353, 9851, 29651} | asc5K.dat |
| 5000 | 93266 | S | {1, 3, 23, 71, 143, 379, 1237, 3413, 10433, 31001} | asc5K.dat |
| 5000 | 153509 | I |  | asc5K.dat |
| 10000 | 63316020278 | H |  | dup10K.dat |
| 10000 | 3415576 | S | {1, 4, 13, 40, 121, 364, 1093, 3280, 9841, 29524} | dup10K.dat |
| 10000 | 1104908 | S | {1, 5, 17, 53, 149, 373, 1123, 3371, 10111, 30341} | dup10K.dat |
| 10000 | 2339229 | S | {1, 10, 30, 60, 120, 360, 1080, 3240, 9720, 29160} | dup10K.dat |
| 10000 | 1080811 | S | {1, 7, 19, 67, 131, 371, 1211, 3353, 9851, 29651} | dup10K.dat |
| 10000 | 1024584 | S | {1, 3, 23, 71, 143, 379, 1237, 3413, 10433, 31001} | dup10K.dat |
| 10000 | 55029877 | I |  | dup10K.dat |
| 1000 | 56080342 | H |  | dup1K.dat |
| 1000 | 79432 | S | {1, 4, 13, 40, 121, 364, 1093, 3280, 9841, 29524} | dup1K.dat |
| 1000 | 67830 | S | {1, 5, 17, 53, 149, 373, 1123, 3371, 10111, 30341} | dup1K.dat |
| 1000 | 96836 | S | {1, 10, 30, 60, 120, 360, 1080, 3240, 9720, 29160} | dup1K.dat |
| 1000 | 69168 | S | {1, 7, 19, 67, 131, 371, 1211, 3353, 9851, 29651} | dup1K.dat |
| 1000 | 65599 | S | {1, 3, 23, 71, 143, 379, 1237, 3413, 10433, 31001} | dup1K.dat |
| 1000 | 905435 | I |  | dup1K.dat |
| 20000 | 588534034388 | H |  | dup20K.dat |
| 20000 | 2895698 | S | {1, 4, 13, 40, 121, 364, 1093, 3280, 9841, 29524} | dup20K.dat |
| 20000 | 2673468 | S | {1, 5, 17, 53, 149, 373, 1123, 3371, 10111, 30341} | dup20K.dat |
| 20000 | 7789246 | S | {1, 10, 30, 60, 120, 360, 1080, 3240, 9720, 29160} | dup20K.dat |
| 20000 | 2585111 | S | {1, 7, 19, 67, 131, 371, 1211, 3353, 9851, 29651} | dup20K.dat |
| 20000 | 2859999 | S | {1, 3, 23, 71, 143, 379, 1237, 3413, 10433, 31001} | dup20K.dat |
| 20000 | 297876309 | I |  | dup20K.dat |
| 2000 | 649443307 | H |  | dup2K.dat |
| 2000 | 847424 | S | {1, 4, 13, 40, 121, 364, 1093, 3280, 9841, 29524} | dup2K.dat |
| 2000 | 237850 | S | {1, 5, 17, 53, 149, 373, 1123, 3371, 10111, 30341} | dup2K.dat |
| 2000 | 372170 | S | {1, 10, 30, 60, 120, 360, 1080, 3240, 9720, 29160} | dup2K.dat |
| 2000 | 228925 | S | {1, 7, 19, 67, 131, 371, 1211, 3353, 9851, 29651} | dup2K.dat |
| 2000 | 240974 | S | {1, 3, 23, 71, 143, 379, 1237, 3413, 10433, 31001} | dup2K.dat |
| 2000 | 1459675 | I |  | dup2K.dat |
| 50 | 34362 | H |  | dup50.dat |
| 50 | 4463 | S | {1, 4, 13, 40, 121, 364, 1093, 3280, 9841, 29524} | dup50.dat |
| 50 | 2678 | S | {1, 5, 17, 53, 149, 373, 1123, 3371, 10111, 30341} | dup50.dat |
| 50 | 1785 | S | {1, 10, 30, 60, 120, 360, 1080, 3240, 9720, 29160} | dup50.dat |
| 50 | 2232 | S | {1, 7, 19, 67, 131, 371, 1211, 3353, 9851, 29651} | dup50.dat |
| 50 | 1785 | S | {1, 3, 23, 71, 143, 379, 1237, 3413, 10433, 31001} | dup50.dat |
| 50 | 1785 | I |  | dup50.dat |
| 500 | 11714884 | H |  | dup500.dat |
| 500 | 37484 | S | {1, 4, 13, 40, 121, 364, 1093, 3280, 9841, 29524} | dup500.dat |
| 500 | 36146 | S | {1, 5, 17, 53, 149, 373, 1123, 3371, 10111, 30341} | dup500.dat |
| 500 | 45071 | S | {1, 10, 30, 60, 120, 360, 1080, 3240, 9720, 29160} | dup500.dat |
| 500 | 35699 | S | {1, 7, 19, 67, 131, 371, 1211, 3353, 9851, 29651} | dup500.dat |
| 500 | 34808 | S | {1, 3, 23, 71, 143, 379, 1237, 3413, 10433, 31001} | dup500.dat |
| 500 | 64260 | I |  | dup500.dat |
| 5000 | 10393178664 | H |  | dup5K.dat |
| 5000 | 564502 | S | {1, 4, 13, 40, 121, 364, 1093, 3280, 9841, 29524} | dup5K.dat |
| 5000 | 5332655 | S | {1, 5, 17, 53, 149, 373, 1123, 3371, 10111, 30341} | dup5K.dat |
| 5000 | 5744541 | S | {1, 10, 30, 60, 120, 360, 1080, 3240, 9720, 29160} | dup5K.dat |
| 5000 | 696592 | S | {1, 7, 19, 67, 131, 371, 1211, 3353, 9851, 29651} | dup5K.dat |
| 5000 | 808600 | S | {1, 3, 23, 71, 143, 379, 1237, 3413, 10433, 31001} | dup5K.dat |
| 5000 | 8622836 | I |  | dup5K.dat |
| 10000 | 67329968183 | H |  | ran10K.dat |
| 10000 | 1191926 | S | {1, 4, 13, 40, 121, 364, 1093, 3280, 9841, 29524} | ran10K.dat |
| 10000 | 1105801 | S | {1, 5, 17, 53, 149, 373, 1123, 3371, 10111, 30341} | ran10K.dat |
| 10000 | 2604299 | S | {1, 10, 30, 60, 120, 360, 1080, 3240, 9720, 29160} | ran10K.dat |
| 10000 | 2951034 | S | {1, 7, 19, 67, 131, 371, 1211, 3353, 9851, 29651} | ran10K.dat |
| 10000 | 1701095 | S | {1, 3, 23, 71, 143, 379, 1237, 3413, 10433, 31001} | ran10K.dat |
| 10000 | 44726027 | I |  | ran10K.dat |
| 1001 | 85040006 | H |  | ran1K.dat |
| 1001 | 77647 | S | {1, 4, 13, 40, 121, 364, 1093, 3280, 9841, 29524} | ran1K.dat |
| 1001 | 72738 | S | {1, 5, 17, 53, 149, 373, 1123, 3371, 10111, 30341} | ran1K.dat |
| 1001 | 89250 | S | {1, 10, 30, 60, 120, 360, 1080, 3240, 9720, 29160} | ran1K.dat |
| 1001 | 76308 | S | {1, 7, 19, 67, 131, 371, 1211, 3353, 9851, 29651} | ran1K.dat |
| 1001 | 72292 | S | {1, 3, 23, 71, 143, 379, 1237, 3413, 10433, 31001} | ran1K.dat |
| 1001 | 214199 | I |  | ran1K.dat |
| 20000 | 483910691192 | H |  | ran20K.dat |
| 20000 | 2537362 | S | {1, 4, 13, 40, 121, 364, 1093, 3280, 9841, 29524} | ran20K.dat |
| 20000 | 2384299 | S | {1, 5, 17, 53, 149, 373, 1123, 3371, 10111, 30341} | ran20K.dat |
| 20000 | 5499105 | S | {1, 10, 30, 60, 120, 360, 1080, 3240, 9720, 29160} | ran20K.dat |
| 20000 | 2890790 | S | {1, 7, 19, 67, 131, 371, 1211, 3353, 9851, 29651} | ran20K.dat |
| 20000 | 2878741 | S | {1, 3, 23, 71, 143, 379, 1237, 3413, 10433, 31001} | ran20K.dat |
| 20000 | 97193551 | I |  | ran20K.dat |
| 2000 | 453627767 | H |  | ran2K.dat |
| 2000 | 189655 | S | {1, 4, 13, 40, 121, 364, 1093, 3280, 9841, 29524} | ran2K.dat |
| 2000 | 172251 | S | {1, 5, 17, 53, 149, 373, 1123, 3371, 10111, 30341} | ran2K.dat |
| 2000 | 261501 | S | {1, 10, 30, 60, 120, 360, 1080, 3240, 9720, 29160} | ran2K.dat |
| 2000 | 171805 | S | {1, 7, 19, 67, 131, 371, 1211, 3353, 9851, 29651} | ran2K.dat |
| 2000 | 178052 | S | {1, 3, 23, 71, 143, 379, 1237, 3413, 10433, 31001} | ran2K.dat |
| 2000 | 900974 | I |  | ran2K.dat |
| 50 | 29898 | H |  | ran50.dat |
| 50 | 3570 | S | {1, 4, 13, 40, 121, 364, 1093, 3280, 9841, 29524} | ran50.dat |
| 50 | 2678 | S | {1, 5, 17, 53, 149, 373, 1123, 3371, 10111, 30341} | ran50.dat |
| 50 | 2677 | S | {1, 10, 30, 60, 120, 360, 1080, 3240, 9720, 29160} | ran50.dat |
| 50 | 2231 | S | {1, 7, 19, 67, 131, 371, 1211, 3353, 9851, 29651} | ran50.dat |
| 50 | 2677 | S | {1, 3, 23, 71, 143, 379, 1237, 3413, 10433, 31001} | ran50.dat |
| 50 | 2678 | I |  | ran50.dat |
| 500 | 9655453 | H |  | ran500.dat |
| 500 | 33915 | S | {1, 4, 13, 40, 121, 364, 1093, 3280, 9841, 29524} | ran500.dat |
| 500 | 34808 | S | {1, 5, 17, 53, 149, 373, 1123, 3371, 10111, 30341} | ran500.dat |
| 500 | 37931 | S | {1, 10, 30, 60, 120, 360, 1080, 3240, 9720, 29160} | ran500.dat |
| 500 | 34807 | S | {1, 7, 19, 67, 131, 371, 1211, 3353, 9851, 29651} | ran500.dat |
| 500 | 33022 | S | {1, 3, 23, 71, 143, 379, 1237, 3413, 10433, 31001} | ran500.dat |
| 500 | 58458 | I |  | ran500.dat |
| 5000 | 5453122616 | H |  | ran5K.dat |
| 5000 | 601095 | S | {1, 4, 13, 40, 121, 364, 1093, 3280, 9841, 29524} | ran5K.dat |
| 5000 | 572981 | S | {1, 5, 17, 53, 149, 373, 1123, 3371, 10111, 30341} | ran5K.dat |
| 5000 | 1069655 | S | {1, 10, 30, 60, 120, 360, 1080, 3240, 9720, 29160} | ran5K.dat |
| 5000 | 488640 | S | {1, 7, 19, 67, 131, 371, 1211, 3353, 9851, 29651} | ran5K.dat |
| 5000 | 481947 | S | {1, 3, 23, 71, 143, 379, 1237, 3413, 10433, 31001} | ran5K.dat |
| 5000 | 5686083 | I |  | ran5K.dat |
| 10000 | 41259011295 | H |  | rev10K.dat |
| 10000 | 297200 | S | {1, 4, 13, 40, 121, 364, 1093, 3280, 9841, 29524} | rev10K.dat |
| 10000 | 273550 | S | {1, 5, 17, 53, 149, 373, 1123, 3371, 10111, 30341} | rev10K.dat |
| 10000 | 269088 | S | {1, 10, 30, 60, 120, 360, 1080, 3240, 9720, 29160} | rev10K.dat |
| 10000 | 350305 | S | {1, 7, 19, 67, 131, 371, 1211, 3353, 9851, 29651} | rev10K.dat |
| 10000 | 299432 | S | {1, 3, 23, 71, 143, 379, 1237, 3413, 10433, 31001} | rev10K.dat |
| 10000 | 49322373 | I |  | rev10K.dat |
| 1000 | 43177548 | H |  | rev1K.dat |
| 1000 | 23651 | S | {1, 4, 13, 40, 121, 364, 1093, 3280, 9841, 29524} | rev1K.dat |
| 1000 | 24098 | S | {1, 5, 17, 53, 149, 373, 1123, 3371, 10111, 30341} | rev1K.dat |
| 1000 | 26328 | S | {1, 10, 30, 60, 120, 360, 1080, 3240, 9720, 29160} | rev1K.dat |
| 1000 | 23651 | S | {1, 7, 19, 67, 131, 371, 1211, 3353, 9851, 29651} | rev1K.dat |
| 1000 | 25882 | S | {1, 3, 23, 71, 143, 379, 1237, 3413, 10433, 31001} | rev1K.dat |
| 1000 | 449817 | I |  | rev1K.dat |
| 20000 | 367306954764 | H |  | rev20K.dat |
| 20000 | 1073225 | S | {1, 4, 13, 40, 121, 364, 1093, 3280, 9841, 29524} | rev20K.dat |
| 20000 | 1074118 | S | {1, 5, 17, 53, 149, 373, 1123, 3371, 10111, 30341} | rev20K.dat |
| 20000 | 1231196 | S | {1, 10, 30, 60, 120, 360, 1080, 3240, 9720, 29160} | rev20K.dat |
| 20000 | 1160689 | S | {1, 7, 19, 67, 131, 371, 1211, 3353, 9851, 29651} | rev20K.dat |
| 20000 | 1172738 | S | {1, 3, 23, 71, 143, 379, 1237, 3413, 10433, 31001} | rev20K.dat |
| 20000 | 206778496 | I |  | rev20K.dat |
| 2000 | 421883521 | H |  | rev2K.dat |
| 2000 | 44625 | S | {1, 4, 13, 40, 121, 364, 1093, 3280, 9841, 29524} | rev2K.dat |
| 2000 | 53549 | S | {1, 5, 17, 53, 149, 373, 1123, 3371, 10111, 30341} | rev2K.dat |
| 2000 | 53549 | S | {1, 10, 30, 60, 120, 360, 1080, 3240, 9720, 29160} | rev2K.dat |
| 2000 | 49534 | S | {1, 7, 19, 67, 131, 371, 1211, 3353, 9851, 29651} | rev2K.dat |
| 2000 | 48641 | S | {1, 3, 23, 71, 143, 379, 1237, 3413, 10433, 31001} | rev2K.dat |
| 2000 | 1690384 | I |  | rev2K.dat |
| 50 | 17850 | H |  | rev50.dat |
| 50 | 1339 | S | {1, 4, 13, 40, 121, 364, 1093, 3280, 9841, 29524} | rev50.dat |
| 50 | 1339 | S | {1, 5, 17, 53, 149, 373, 1123, 3371, 10111, 30341} | rev50.dat |
| 50 | 1338 | S | {1, 10, 30, 60, 120, 360, 1080, 3240, 9720, 29160} | rev50.dat |
| 50 | 893 | S | {1, 7, 19, 67, 131, 371, 1211, 3353, 9851, 29651} | rev50.dat |
| 50 | 1339 | S | {1, 3, 23, 71, 143, 379, 1237, 3413, 10433, 31001} | rev50.dat |
| 50 | 2231 | I |  | rev50.dat |
| 500 | 5470099 | H |  | rev500.dat |
| 500 | 11602 | S | {1, 4, 13, 40, 121, 364, 1093, 3280, 9841, 29524} | rev500.dat |
| 500 | 12049 | S | {1, 5, 17, 53, 149, 373, 1123, 3371, 10111, 30341} | rev500.dat |
| 500 | 12049 | S | {1, 10, 30, 60, 120, 360, 1080, 3240, 9720, 29160} | rev500.dat |
| 500 | 11157 | S | {1, 7, 19, 67, 131, 371, 1211, 3353, 9851, 29651} | rev500.dat |
| 500 | 11603 | S | {1, 3, 23, 71, 143, 379, 1237, 3413, 10433, 31001} | rev500.dat |
| 500 | 107992 | I |  | rev500.dat |
| 5000 | 6340627691 | H |  | rev5K.dat |
| 5000 | 417242 | S | {1, 4, 13, 40, 121, 364, 1093, 3280, 9841, 29524} | rev5K.dat |
| 5000 | 228925 | S | {1, 5, 17, 53, 149, 373, 1123, 3371, 10111, 30341} | rev5K.dat |
| 5000 | 374848 | S | {1, 10, 30, 60, 120, 360, 1080, 3240, 9720, 29160} | rev5K.dat |
| 5000 | 229371 | S | {1, 7, 19, 67, 131, 371, 1211, 3353, 9851, 29651} | rev5K.dat |
| 5000 | 236958 | S | {1, 3, 23, 71, 143, 379, 1237, 3413, 10433, 31001} | rev5K.dat |
| 5000 | 15519588 | I |  | rev5K.dat |