|  |  |  |  |
| --- | --- | --- | --- |
| **n** | **CPU** | **GPU** | **Speed-up (CPU/GPU)** |
| 128 | 1.31E-05 | 0.00255489 | 0.005132511 |
| 256 | 9.68E-05 | 0.00492215 | 0.019665776 |
| 512 | 0.000121117 | 0.00494409 | 0.024497329 |
| 1024 | 0.000178814 | 0.00496101 | 0.03604387 |
| 2048 | 0.000295877 | 0.00506306 | 0.058438375 |
| 4096 | 0.000552893 | 0.00513697 | 0.107630179 |
| 8192 | 0.00109696 | 0.0055871 | 0.196337993 |
| 16384 | 0.00227213 | 0.00665188 | 0.341577118 |
| 32768 | 0.00476503 | 0.0115521 | 0.412481713 |
| 65536 | 0.0100169 | 0.024091 | 0.41579428 |
| 131072 | 0.020997 | 0.0319879 | 0.656404453 |
| 262144 | 0.0442622 | 0.0485239 | 0.912173177 |
| 524288 | 0.0932498 | 0.0844591 | 1.104082331 |
| 1048576 | 0.195943 | 0.158831 | 1.233657158 |
| 2097152 | 0.413011 | 0.288534 | 1.431411896 |
| 4194304 | 0.86497 | 0.551512 | 1.56836116 |
| 8388608 | 1.8062 | 1.07787 | 1.675712284 |
| 16777216 | 3.76676 | 2.28211 | 1.650560227 |
| 33554432 | 7.85666 | 4.54696 | 1.727892922 |
| 67108864 | 16.4712 | 9.06419 | 1.817172853 |

A speed up on the GPU compared to a CPU sort algorithm occurs on array sizes approximately larger than 400000. This is an array size of about 1.5MB. The GPU speed up gradually increases as the array size gets larger. At smaller array sizes, the kernel execution overhead requires much more computational time compared to the sorting computation and takes up most of the time in the entire process. Compared to the CPU execution overhead, the GPU kernel execution overhead takes much more time. However for larger arrays, the GPU is able to do much more computation in a shorter amount of time due to having more SIMD vectors compared to the CPU. The amount of calculation for sorting takes over the overhead time and computation.