# Student Info

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**Date**: 2023-11-25  
**Description**: Testing the performance of different sorting algorithms

## System and Compiler Info

### General System Info

*Info retrieved on 2023-11-25 15:50 through neofetch*

* **OS**: macOS 14.1 23B74 arm64
* **Host**: MacBookPro18, 3
* **Kernel**: 23.1.0
* **Memory**: 12687MiB / 16384MiB
* **Uptime**: 24 days, 57 min

### Frequency of CPU 0 - 7

*Info retrieved on 2023-11-25 15:50 through sudo /usr/bin/powermetrics -s cpu\_power -n 1 | grep CPU*

* **CPU 0**: 1315 MHz
* **CPU 1**: 1307 MHz
* **CPU 2**: 2185 MHz
* **CPU 3**: 1695 MHz
* **CPU 4**: 1873 MHz
* **CPU 5**: 2118 MHz
* **CPU 6**: 1252 MHz
* **CPU 7**: 1284 MHz

### Compiler Info

*Info retrieved on 2023-11-25 15:50 through gcc -v*

* **Version**: Apple clang version 15.0.0 (clang-1500.0.40.1)
* **Target**: arm64-apple-darwin23.1.0
* **Thread model**: posix
* **InstalledDir**: /Applications/Xcode.app/Contents/Developer/Toolchains/XcodeDefault.xctoolchain/usr/bin

## Benchmark Info

### About Test Data

* The following python script was used to generate the test data:
* import random  
    
  rounds = [  
   100,  
   500,  
   1000,  
   5000,  
   10000,  
   50000,  
   100000,  
   500000,  
  ]  
    
    
  with open("input.txt", "a") as f:  
   for round in rounds:  
   f.write(str(round) + "\n")  
   for i in range(round):  
   f.write(str(random.randint(1, round + 1)) + "\n")

### Results

*The program was compiled with g++ -std=c++20 -O3 -o main main.cpp*

#### Algorithms Table:

| Data | Selection Sort | Heap Sort | Quick Sort | qsort (c) | sort (c++) |
| --- | --- | --- | --- | --- | --- |
| 100 | 0.000027 s | 0.000015 s | 0.000014 s | 0.000016 s | 0.000005 s |
| 500 | 0.000748 s | 0.000110 s | 0.000120 s | 0.000110 s | 0.000025 s |
| 1000 | 0.003034 s | 0.000216 s | 0.000200 s | 0.000214 s | 0.000043 s |
| 5000 | 0.060168 s | 0.000814 s | 0.000791 s | 0.000814 s | 0.000160 s |
| 10000 | 0.185903 s | 0.001763 s | 0.001668 s | 0.001889 s | 0.000366 s |
| 50000 | 4.288537 s | 0.010398 s | 0.009998 s | 0.010919 s | 0.002122 s |
| 100000 | 17.086272 s | 0.022201 s | 0.021739 s | 0.022248 s | 0.004127 s |
| 500000 | TLE | 0.127051 s | 0.115117 s | 0.128890 s | 0.025860 s |