

# Computer Organization II

## Benchmarking Project

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# COMPUTER SPECIFICATIONS

1. The brand of CPU (Intel or AMD): **Apple Silicon**
2. The model of CPU: **Apple M1**
3. The number of cores on CPU: **8 (4 performance cores and 4 efficiency cores)**
4. The clock rate of CPU in GHz: **3.2 GHz**
5. The amount of memory in GB: **8 GB**
6. The speed of memory: **128-bit LPDDR4X SDRAM**
7. The capacity of hard drive: **256 GB**
8. The type of hard drive: **SSD**
  - a. Max sequential read speed: **2900 MB/s**
  - b. Max sequential write speed: **2215 MB/s**
  - c. Max random read speed: **3400 MB/s**
  - d. Max random write speed: **2715 MB/s**

\* The official Apple website didn't mention any data for Max Sequential Read/Write, and Max Random Read/Write, therefore I had to find this data through other sources.

# SCREENSHOTS FOR BENCHMARK TIMES

- 1) First Benchmark (32-bit Integer operation benchmark):

```
birajdahal@Macbook---Kryptonite Comp Org II Final Project % ./integerBenchmark.out
Benchmark 1:
32-bit Integer operation benchmark
Which includes additions, multiplication, and division' is: 16.0643 seconds
```

- 2) Second Benchmark (64-bit Floating point operation benchmark):

```
birajdahal@Macbook---Kryptonite Comp Org II Final Project % ./floatingBenchmark.out
Benchmark 2:
64-bit Floating point operation benchmark
Which includes additions, multiplication, and division' is: 15.9751 seconds
```

- 3) Third Benchmark (Memory benchmark):

```
birajdahal@Macbook---Kryptonite Comp Org II Final Project % ./memoryBenchmark.out
Benchmark 3:
Memory benchmark
Which includes reading from, and writing to array, 4 bytes each time' is: 64.7572 seconds
```

- 4) Fourth Benchmark (Hard drive benchmark 1):

```
birajdahal@Macbook---Kryptonite Comp Org II Final Project % ./hardDriveBenchmarkOne.out
Benchmark 4:
Hard Drive benchmark 1
Which includes reading from, and writing to file, 100 bytes each time' is: 1.88298 seconds
```

- 5) Fifth Benchmark (Hard drive benchmark 2):

```
birajdahal@Macbook---Kryptonite Comp Org II Final Project % ./hardDriveBenchmarkTwo.out
Benchmark 5:
Hard Drive benchmark 2
Which includes reading from, and writing to file, 10000 bytes each time' is: 0.835161 seconds
```

## RESULTS FOR BENCHMARKS

Benchmark	Benchmark Recorded Time	Benchmark Ratio (Reference Time/Benchmark Recorded Time)
First Benchmark	16.0643	6.22498
Second Benchmark	15.9751	6.25974
Third Benchmark	64.7572	1.54423
Fourth Benchmark	1.88298	132.768
Fifth Benchmark	0.835161	11.9737

## FINAL BENCHMARK (Combined)

### Geometric mean of all the benchmarks

$$= \sqrt[5]{(\text{Benchmark 1} * \text{Benchmark 2} * \text{Benchmark 3} * \text{Benchmark 4} * \text{Benchmark 5})}$$

$$= \sqrt[5]{(16.0643 * 15.9751 * 64.7572 * 1.88298 * 0.835161)}$$

$$= 7.646133$$