

Monday, April 1, 2025

Benchmark Project

Report

The purpose of this project is to evaluate the performance of a computer system. The evaluation has been conducted in different memory and computation processes. There are five distinct designs to the benchmark to measure the system's capabilities.

- 32-bit integer operations
- 64-bit floating point operations
- Memory operations, and
- Hard Drive read/write operations for reading and writing 100 bytes and 10000 bytes.

Computer/System Specifications:

- The brand of CPU (Intel or AMD) = Apple
 - The model of CPU (e.g. Intel i7-9700K Coffee Lake) = M3 pro
 - The number of cores on CPU = **11-core configuration**: 5 performance cores and 6 efficiency cores
 - The clock rate of the CPU in GHz = **4.05 GHz**.
 - The amount of memory in GB = 18 GB unified memory
 - The speed of memory (for example: DDR4 3200) = LPDDR5
 - Memory Bandwidth: 150 GB/s
 - The capacity of hard drive = 512 GB
 - The type of hard drive = SSD
-
- Maximum Sequential Read Speed: 4872030020 bytes/sec = 4872.03002 MB/s

1073741824 bytes transferred in 0.220389 secs (4872030020 bytes/sec)
 - Max Sequential Write Speed: 3555542463 bytes/sec = 3555.5425 MB/s

1073741824 bytes transferred in 0.301991 secs (3555542463 bytes/sec)
 - Max Random Read & Write Speed:

- Random Read Speed= 689MB/s

```
Run status group 0 (all jobs):
  READ: bw=657MiB/s (689MB/s), 657MiB/s-657MiB/s (689MB/s-689MB/s), io=19.36iB (20.76B), run=30001-30001ms
```

- Random Write Speed = 423 MB/s

```
Run status group 0 (all jobs):
  WRITE: bw=403MiB/s (423MB/s), 403MiB/s-403MiB/s (423MB/s-423MB/s), io=11.86iB (12.76B), run=30001-30001msec
```

Benchmark Results:

- 32-bit Integer operation:

```
"/Users/sijanshrestha/CLionProjects/benchmark project/cmake-build-debug/benchmark_project"
Running Integer Benchmark...
Benchmark:
32-bit Integer Operation Benchmark
Which includes additions, multiplication, and division is:
14.2739 seconds

Process finished with exit code 0
```

- 64-bit Floating point Operation:

```
"/Users/sijanshrestha/CLionProjects/benchmark project/cmake-build-debug/benchmark_project"
Benchmark for Floating Point Operation
64-bit Floating point operation benchmark
For additions, multiplication, and division is:
13.8834 seconds

Process finished with exit code 0
```

- Memory Benchmark:

```
"/Users/sijanshrestha/CLionProjects/benchmark project/cmake-build-debug/benchmark_project"
```

```
Running Memory Benchmark...
```

```
Benchmark:
```

```
Memory Benchmark
```

```
Reading from, and writing to array, 4 bytes each time takes:
```

```
1.8997 seconds
```

```
Process finished with exit code 0
```

- Hard-drive Benchmark 1:

```
"/Users/sijanshrestha/CLionProjects/benchmark project/cmake-build-debug/benchmark_project"
```

```
Running Hard Drive Benchmark...
```

```
Benchmark for Hard Drive:
```

```
Hard Drive Performance Test
```

```
Time taken for reading and writing 100 bytes at a time:
```

```
1.42951 seconds
```

```
Process finished with exit code 0
```

- Hard-drive Benchmark 2:

```
"/Users/sijanshrestha/CLionProjects/benchmark project/cmake-build-debug/benchmark_project"
```

```
Running Hard Drive Benchmark...
```

```
Second Benchmark for HD Performance:
```

```
Hard Drive Performance Test 2
```

```
Time taken for reading and writing 10000 bytes at a time:
```

```
1.37137 seconds
```

```
Process finished with exit code 0
```

Benchmarking Table:

Benchmark	Recorded Times (seconds)	Reference Time (seconds)	Benchmark Ratio = (Reference Time/ Recorded Time)
32-bit Integer operation:	14.2739	100	7.00579379147
64-bit Floating point Operation:	13.8834	100	7.20284656496
Memory Benchmark:	1.8997	100	52.639890509

Benchmark	Recorded Times (seconds)	Reference Time (seconds)	Benchmark Ratio = (Reference Time/ Recorded Time)
Hard-drive Benchmark 1:	1.42951	100	69.9540401956
Hard-drive Benchmark 2:	1.37137	100	72.919780949

Calculation:

Geometric Mean of all Benchmarks

=

$$\sqrt[5]{(7.00579379147 * 7.20284656496 * 52.639890509 * 69.9540401956 * 72.919780949)}$$

$$= \sqrt[5]{13549855.02}$$

$$= 26.6923573$$

This value is my system's **aggregate benchmark score**.