Assignment 1:
Macbook M1 Pro Benchmark

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Contents

1 Specs of The Machine

The machine we are going to run tests on in this experiment is the Macbook Pro with the Apple M1 Pro chip.

Specs:

- **Chip:** Apple M1 Pro @ 3.22 GHz
  - **Total Number of CPU Cores:** 10 (8 performance and 2 efficiency)
  - **Total Number of GPU Cores:** 16
  - **Total Number of Neural Engine Cores:** 16
- **Memory:** 16GB (LPDDR5 by Samsung)
  - **Memory Bandwidth:** 200GB/s

Model Indetifier for reference: **MacBookPro18,3**

More details can be found on the Apple website: https://support.apple.com/kb/SP854?locale=en_US

2 Benchmarking Tools

In this section, we will be examining the results of the benchamrking tools that stress both the CPU and the GPU.

2.1 Geekbench (CPU)

Figure 1: Geekbench CPU Single and Multi Core Test Results

The CPU stress test benchmarks the Apple M1 Pro chip. The results are shown in **Figure 1** and are as follows:

- **Single-Core Score:** 2242
- **Multi-Core Score:** 9750

2.2 Geekbench (GPU)

The GPU stress test performed by Geekbench on macOS supports two GPU APIs: Metal and OpenCL. We will be examining the results of both.

The results of this test on Geekbench: https://browser.geekbench.com/v6/cpu/5025983

2.2.1 Metal

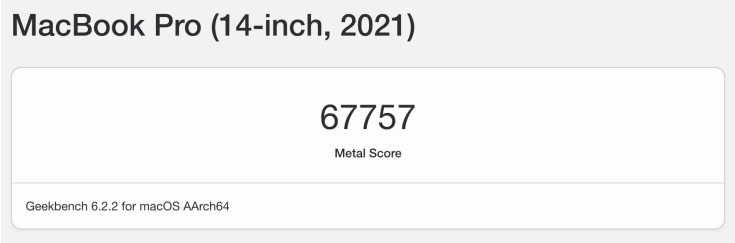

Figure 2: Geekbench GPU Metal Test Results

The GPU stress test benchmarks the Apple M1 Pro chip. The results are shown in **Figure 2** and are as follows:

- **Metal Score:** 67757

The results of this test on Geekbench: https://browser.geekbench.com/v6/compute/1805495

2.2.2 OpenCL

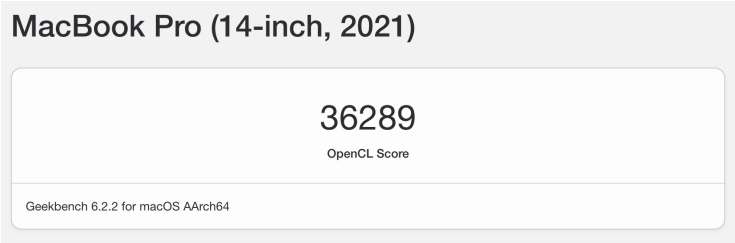

Figure 3: Geekbench GPU OpenCL Test Results

The GPU stress test benchmarks the Apple M1 Pro chip. The results are shown in **Figure 3** and are as follows:

- **OpenCL Score:** 36289

The results of this test on Geekbench: https://browser.geekbench.com/v6/compute/1805535

2.3 Blackmagic Disk Speed Test

The disk test by Blackmagic does the following:

1. Does the write test which lasts for 8 seconds.
2. Does the read test which also lasts for 8 seconds.

The total testing time is 16 seconds. The tool keeps on repeating this til you click the big start button in the middle of the guages again.

The tool's website: https://apps.apple.com/us/app/blackmagic-disk-speed-test/id425264550

2.3.1 The Test Settings

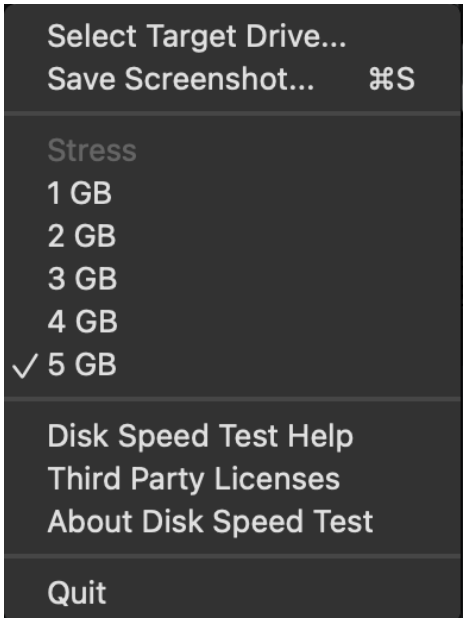

Figure 4: Blackmagic Disk Stress Test Settings

The test settings, shown in **Figure** 4, are stressing the disk with 5 GB. This is the highest available option in this tool and will show us clearly how the Macbook performs under pressure.

2.3.2 The Test Results

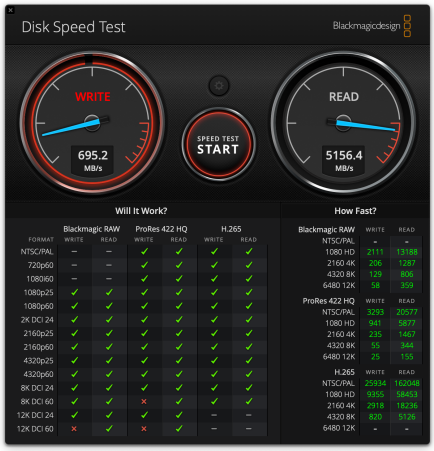

Figure 5: Blackmagic Disk Stress Result

The test results for this disk stress test has two panels:

1. **Will it Work?:** This panel shows which video formats can be supported by your disk storage

2. **How Fast?** This panel shows results in frames per second (fps)

The first panel, Will it Work?, is starightforward. It shows a checkmark if your disk supports running this video format.

But for the second panel, How Fast?, it might not be so clear at first. It tells how many frames of a video you can read per second from your disk. If you are editing a video that is 8K at 60fps but your disk can't keep up and maxes out its read of fps at 50, you will get a choppy playback. Also you will struggle to run more than one 8K video simultaneously. Now if you got frames per second that are way more than one video frames per second, then you are good to go. For example, the Macbook I ran the tests on can read 5126 frames per second of (4320 8K video) in the (H.265) format. That should be enough for almost every use case possible with this machine.

3 Analysis Tool (TG Pro)

TG Pro is a great companion for monitoring the heat of different components of your Macbook. The menu bar icon shows three customizable pieces of information.

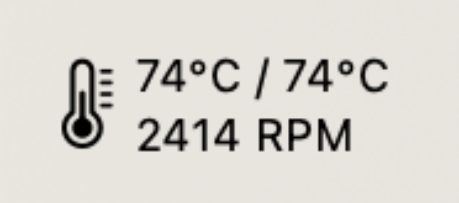

Figure 6: TG Pro Menu Bar Icon

They are show in **Figure 6**:

1. **Top Row Left:** Highest temperature of any sensor in the Macbook.

2. **Top Row Right:** Highest CPU core temperature.

3. **Bottom Row:** Average fan speed. (RPM stands for Revolutions Per Minute)

The app also has a window, as shown in **Figure 7** that shows all the sensors and their temperatures. It also shows the fan speed.

The app's website: https://www.tunabellysoftware.com/tgpro/

4 Conclusion

The Apple M1 Pro chip is a very powerful chip. It has a very high single-core score and a very high multi-core score. The GPU also performs very well in both Metal and OpenCL tests. The disk speed is also very high and can handle

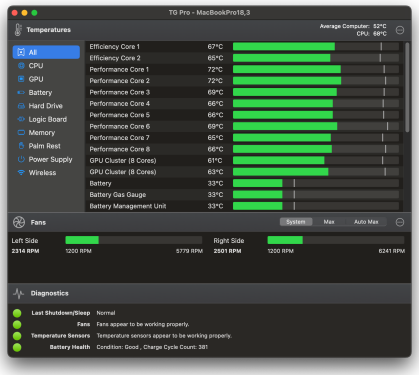

Figure 7: TG Pro Sensors Window

8K video editing with ease. The machine also stays cool under pressure and the fans are very quiet. I often find myself checking the TG Pro app to see if the fans are even running. And I even sometime turn them on manully just to make sure they still work. The machine is also very power efficient and can last a long time on battery.