PERFORMANCE
BENCHMARK

.TEAM 06

Executive Summary

 Comprehensive analysis of three distinct laptop computers.

- Apple MacBook Air (2022) with M2 chip
- MSI GF63 Thin 11SC
- HP Pavilion 15

Executive Summary

 Benchmarking Tools.

- Geekbench 6.3.0
- NovaBench
- PerformanceTest 11.0

MacBook Air (2022)

<Operating System> macOS 14.0
<Memory> 8.0 GB DDR4 SDRAM
<CPU> Apple M2
<Cores and threads> 1 Processor, 8 Cores, 8 Threads
<GPU> Apple M2 (10-core GPU)
<Battery> 52.6Wh lithium-polymer

HP Pavilion 15

<Operating System>
Microsoft Windows 11 Home Single Language (64-bit)
<Memory> 15.3 GB DDR4 SDRAM
<CPU> AMD Ryzen 7 5700U
<Cores and threads> 1 Processor, 8 Cores, 16 Threads
<GPU> AMD Radeon Graphics
<Battery> 41 Wh

MSI GF63 Thin 11SC

<Operating System>
Microsoft Windows 11 Home Single Language (64-bit)
<Memory> 16.0 GB DDR4 SDRAM
<CPU> intel Core i5-11400H
<Cores and threads> 1 Processor, 6 Cores, 12 Threads
<GPU> intel(R) UHD Graphics
<Battery> 51 Wh

Benchmarking Tools Used

Geekbench 6.3.0

Cross-platform benchmarking tool for modern computing workloads

CPU Testing: Single-core & Multi-core performance
Specialized tests: File Compression, Navigation, HTML5, PDF Rendering

GPU Testing:
Background Blur, Face Detection
Horizon & Edge Detection
Particle Physics

NovaBench

Comprehensive system benchmarking tool

Tests:

- CPU (SIMD, Scalar operations, Compression)
- Memory (Transfer Speed, Latency)
- GPU (Direct3D 11, Compute capabilities)
- Storage (Sequential & Random Read/Write)

PerformanceTest 11.0

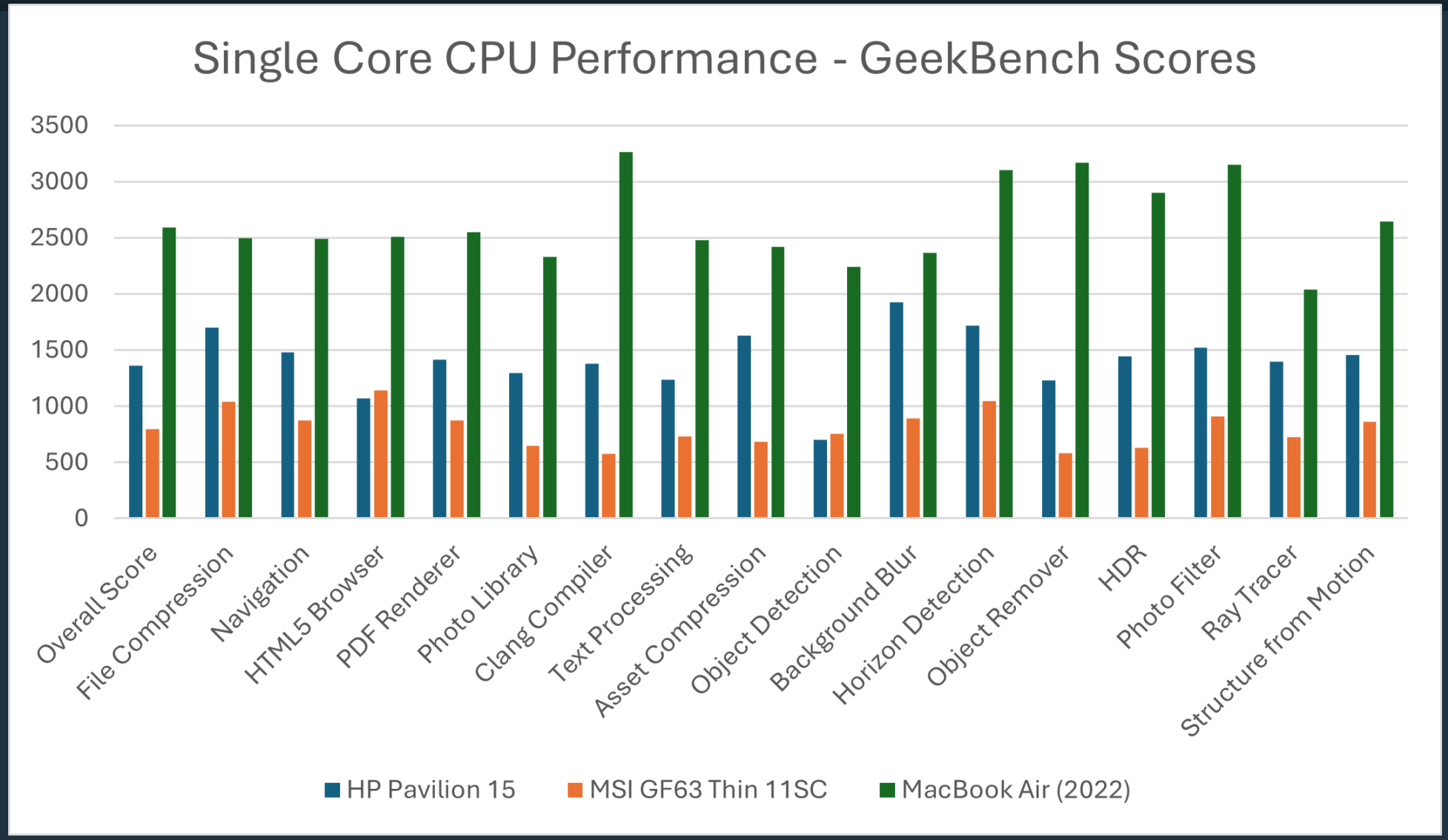
Detailed component analysis with real-world metrics

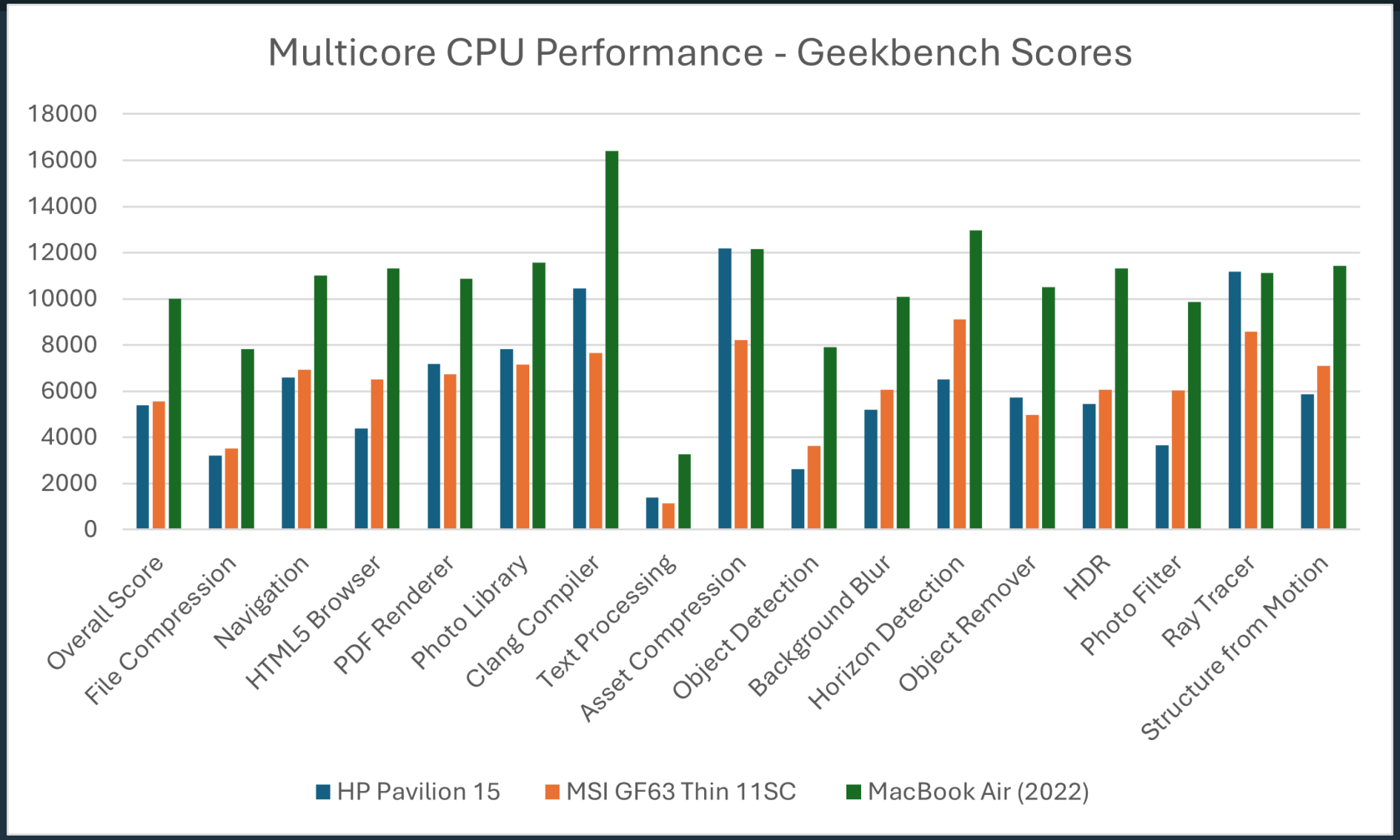
Key measures:

- CPU Mark (Integer Math, Floating Point, Single Threaded)
- Memory Mark (Read/Write, Latency)
- 3D Graphics Mark (DirectX 11/12)

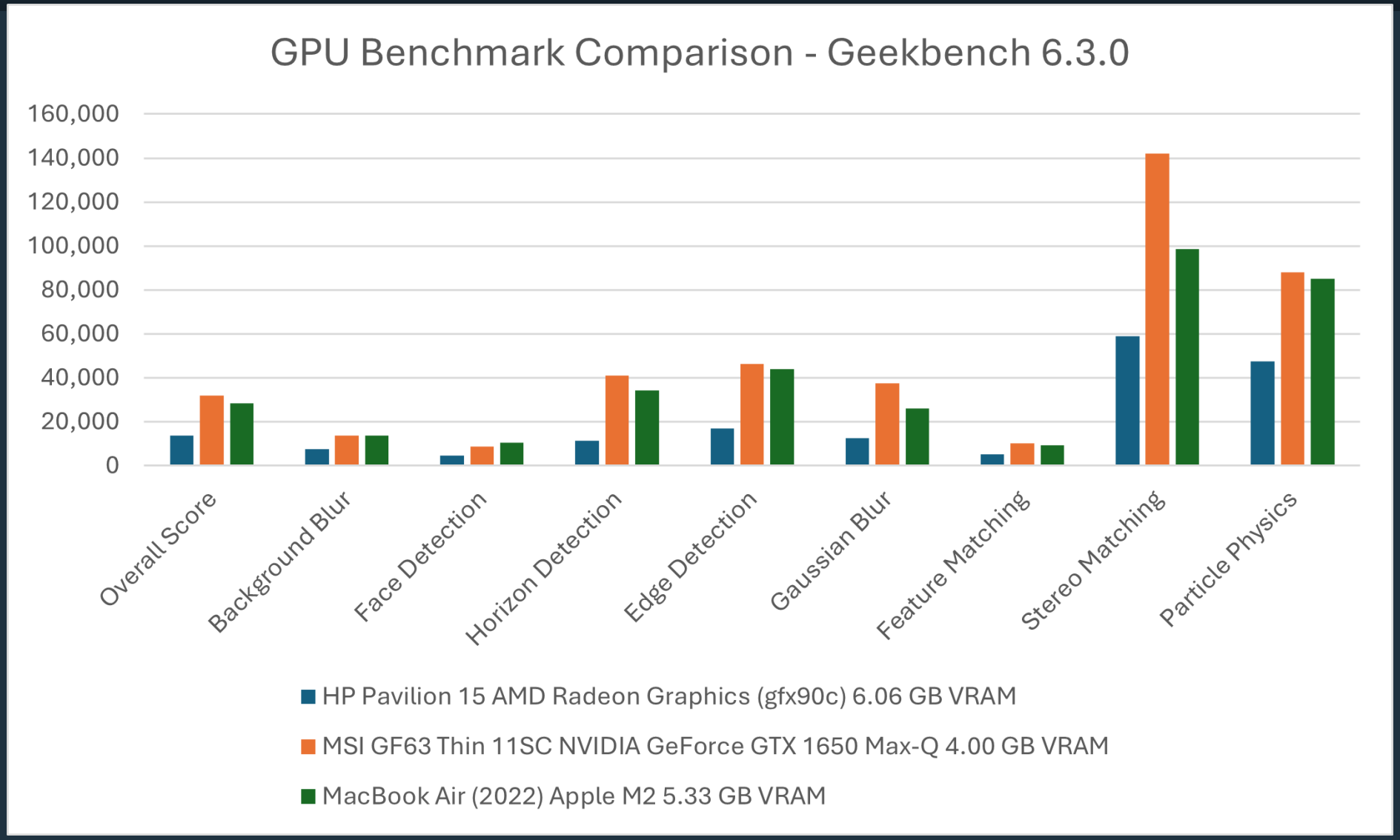
Geekbench Score
CPU

Single Core CPU Performance - GeekBench Scores



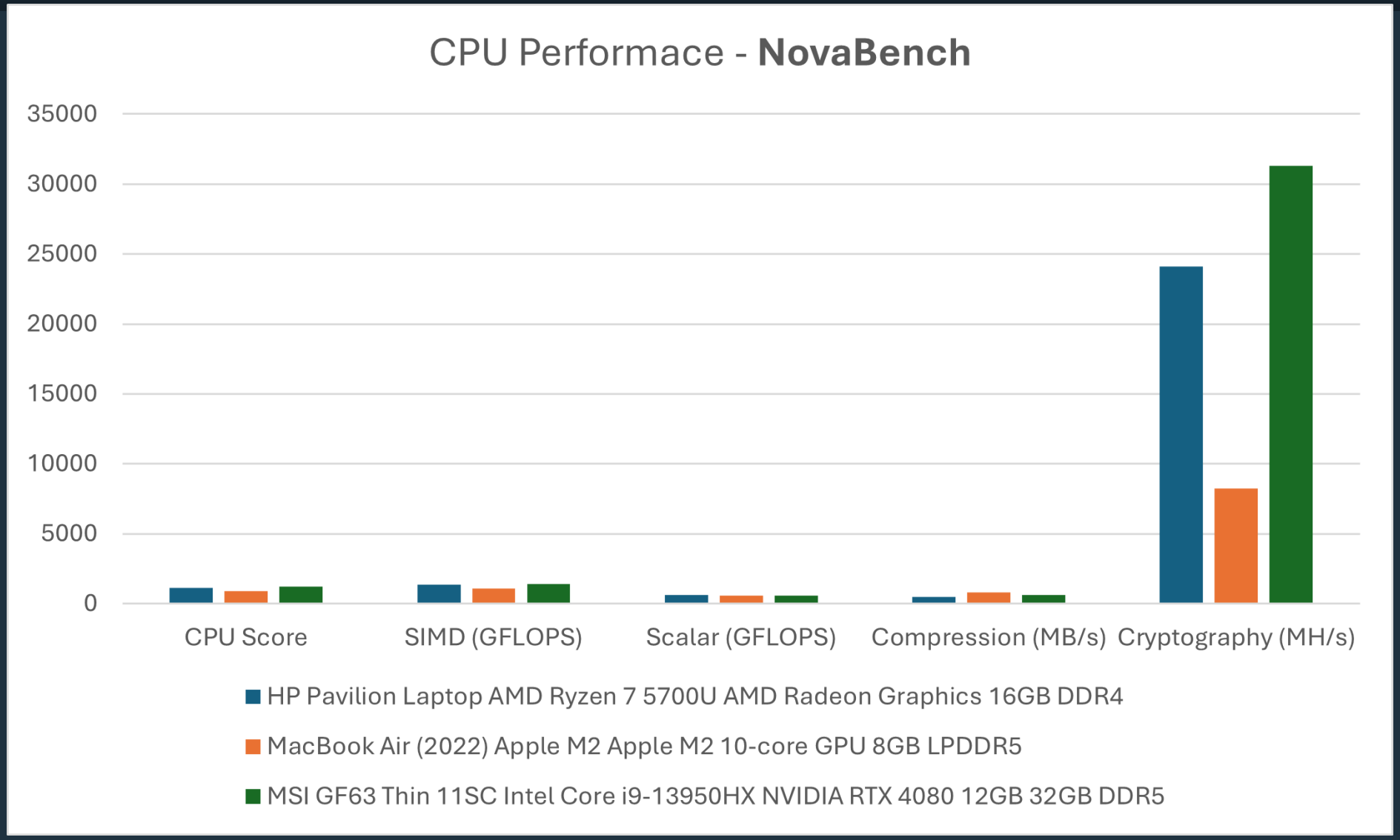


Geekbench Score
GPU



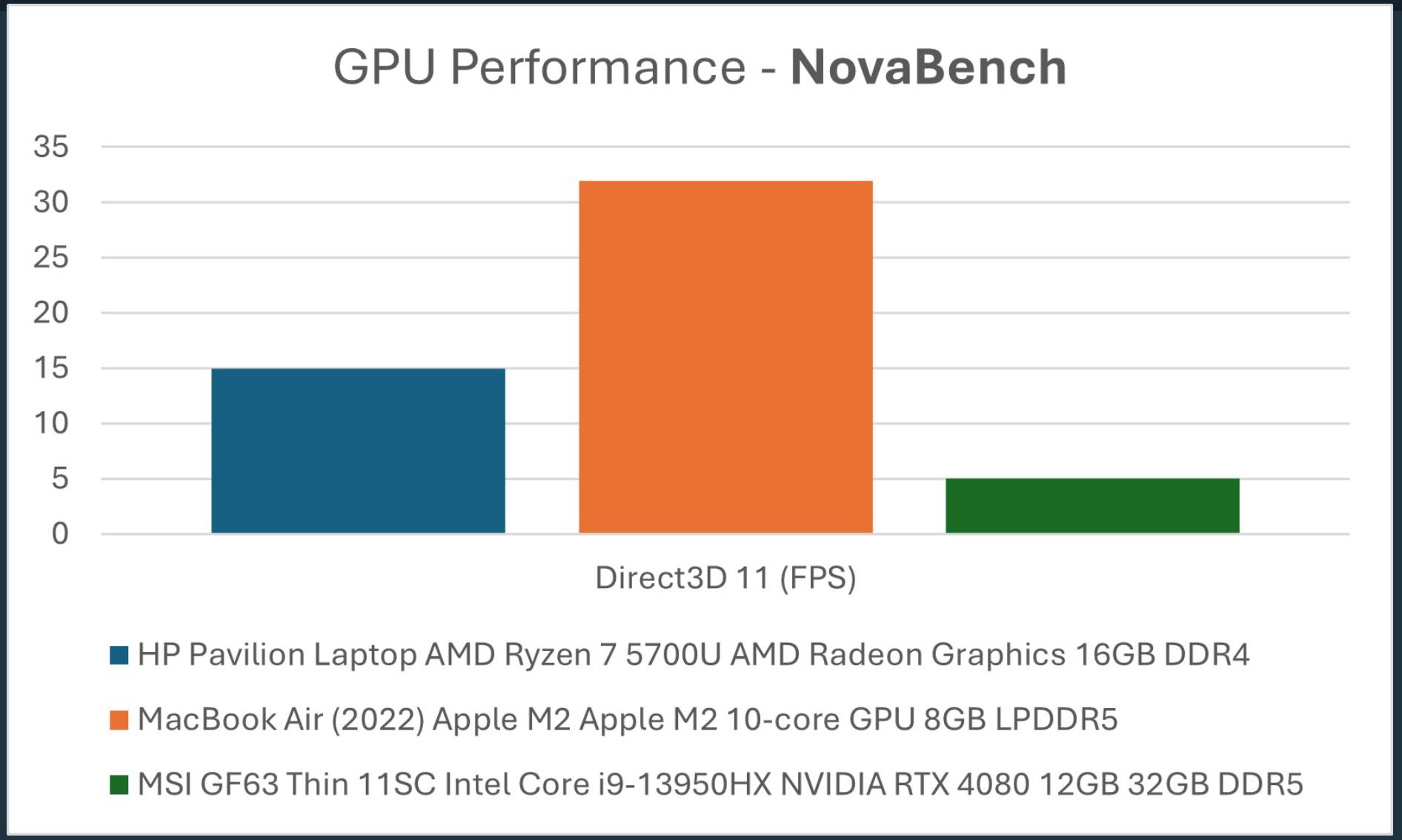
NovaBench Score
CPU

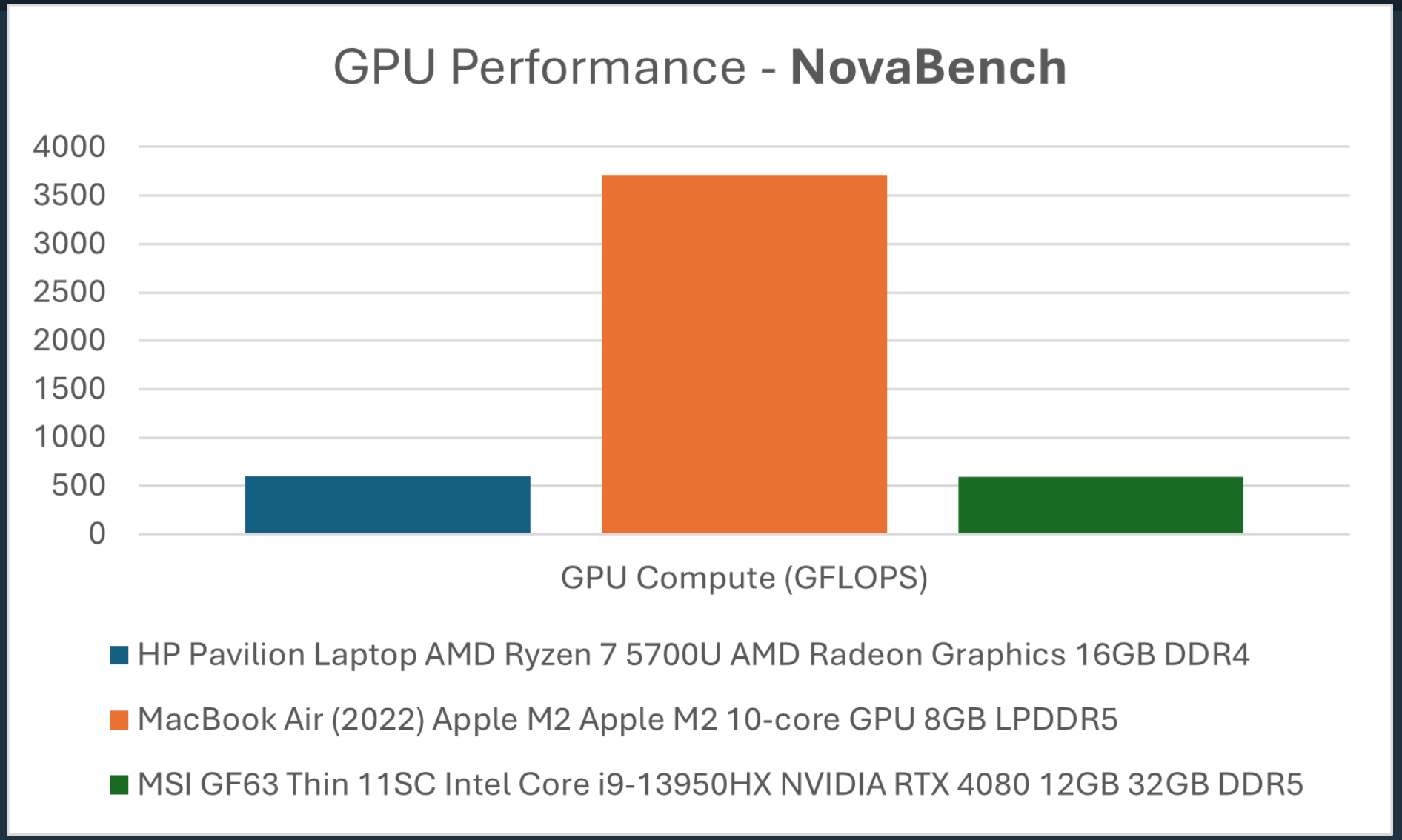
Category	HP Pavilion Laptop AMD Ryzen 7 5700U AMD Radeon Graphics 16GB DDR4	MacBook Air (2022) Apple M2 Apple M2 10-core GPU 8GB LPDDR5	MSI GF63 Thin 11SC Intel Core i9-13950HX NVIDIA RTX 4080 12GB 32GB DDR5
CPU Performance			
CPU Score	1133	895	1234
SIMD (GFLOPS)	1339	1064	1391
Scalar (GFLOPS)	630	572	549
Compression (MB/s)	497	786	613
Cryptography (MH/s)	24089	8238	31330



NovaBench Score
GPU

	HP Pavilion Laptop AMD Ryzen 7 5700U AMD Radeon Graphics 16GB DDR4	MacBook Air (2022) Apple M2 Apple M2 10-core GPU 8GB LPDDR5	MSI GF63 Thin 11SC Intel Core i9-13950HX NVIDIA RTX 4080 12GB 32GB DDR5
GPU Performance			
Direct3D 11 (FPS)	15	32	5
GPU Compute (GFLOPS)	601	3715	589
GPU Memory On-Device (MB/s)	27,212	84,608	Test Failed

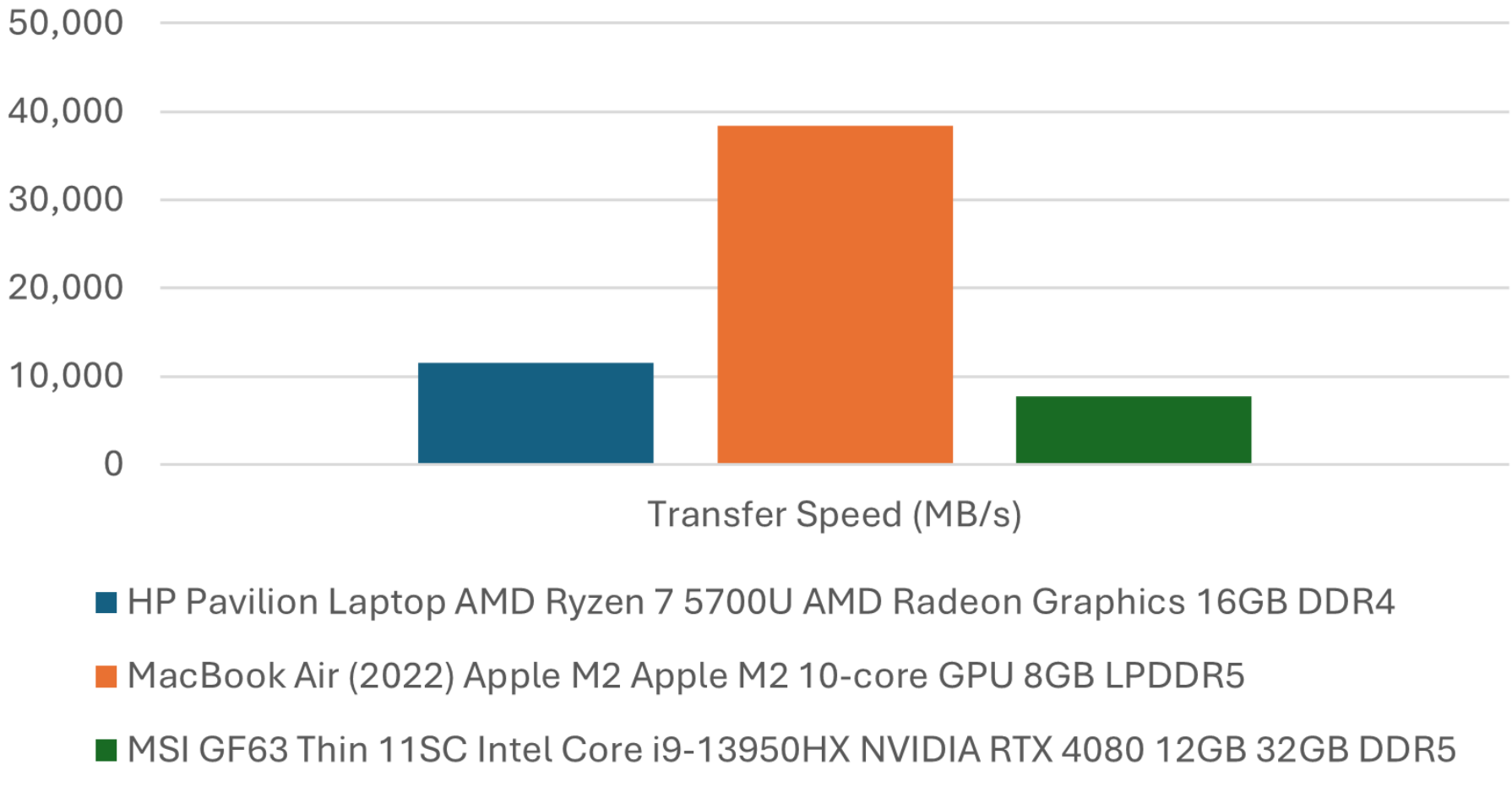


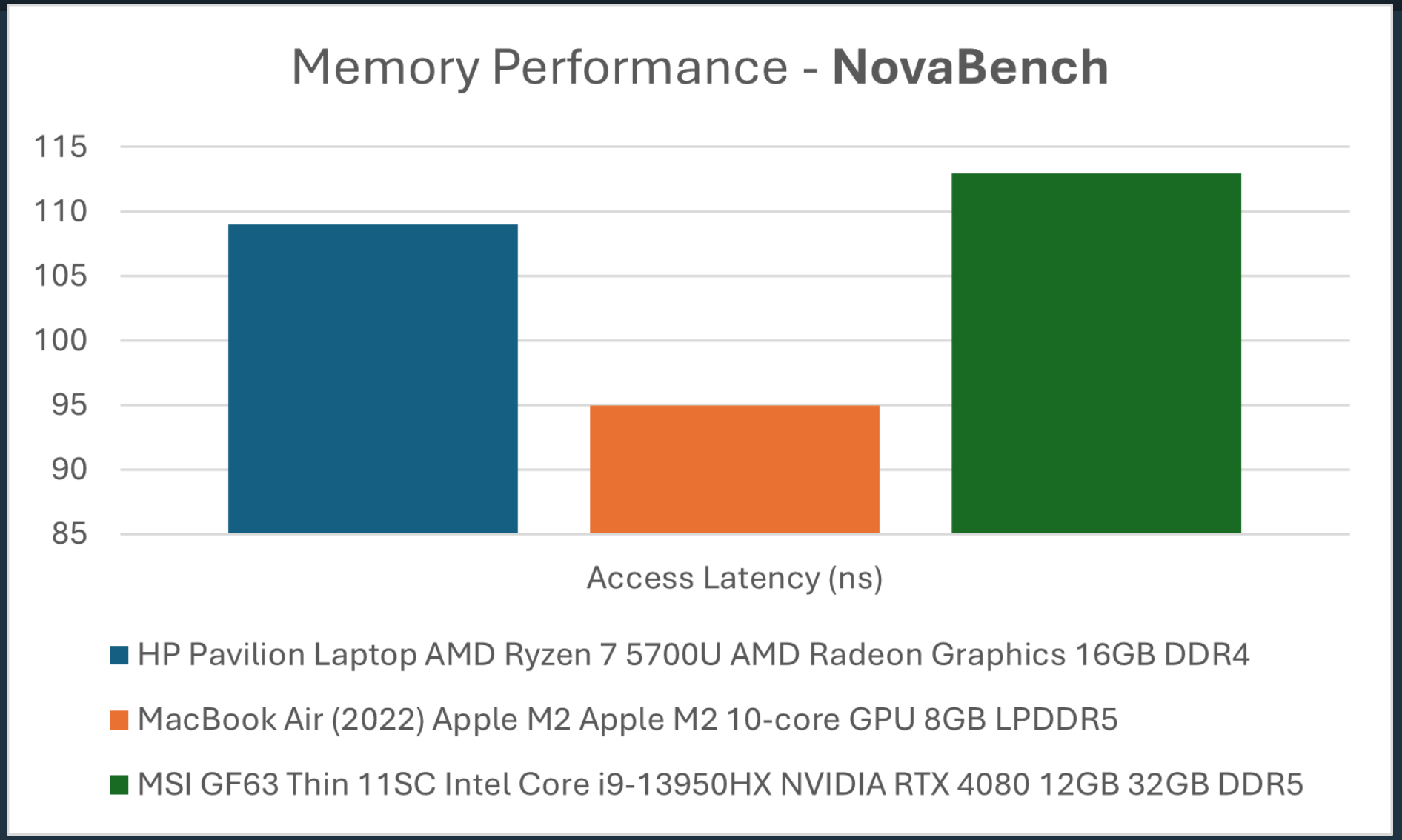


NovaBench Score
Memory & Storage

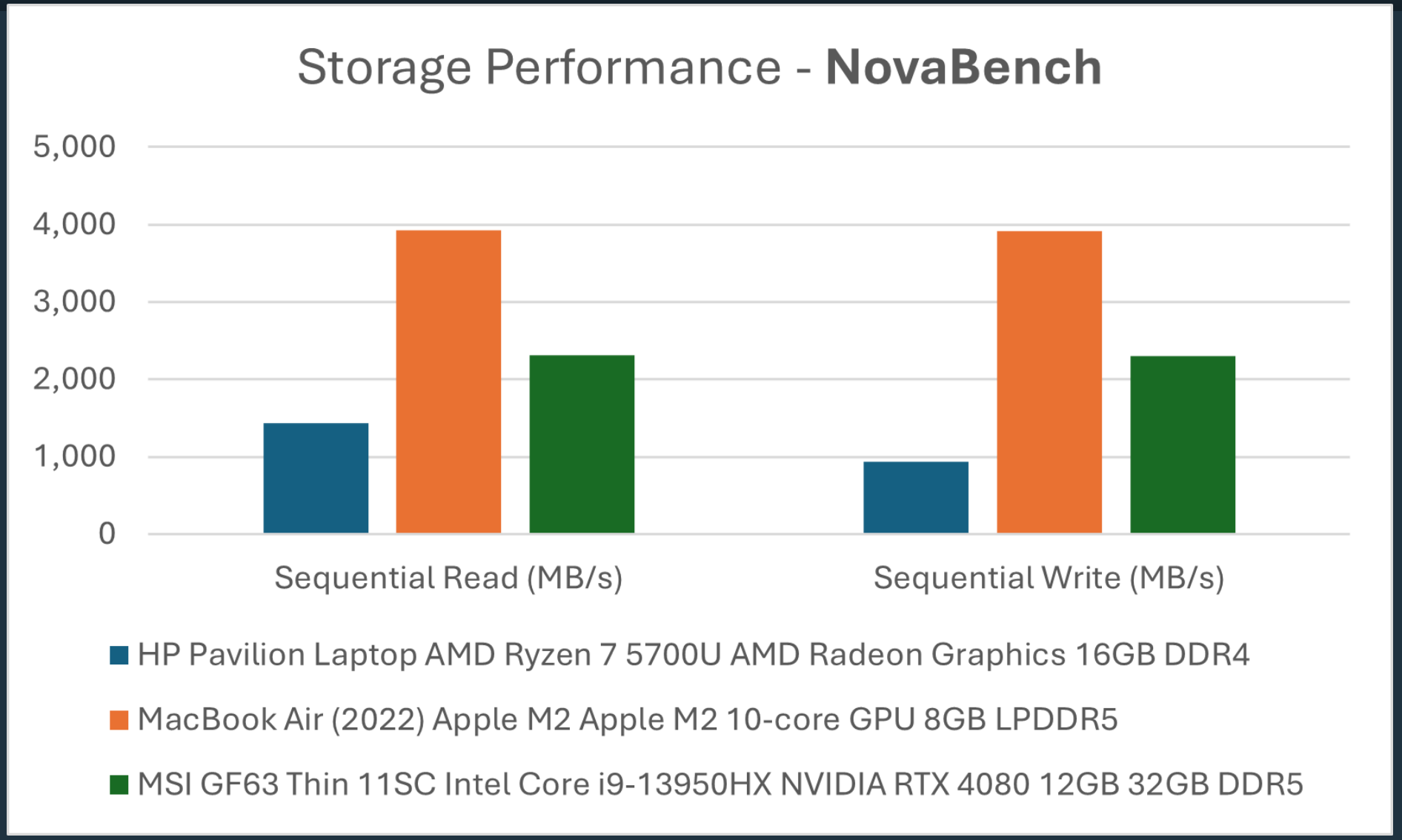
	HP Pavilion Laptop AMD Ryzen 7 5700U AMD Radeon Graphics 16GB DDR4	MacBook Air (2022) Apple M2 Apple M2 10-core GPU 8GB LPDDR5	MSI GF63 Thin 11SC Intel Core i9-13950HX NVIDIA RTX 4080 12GB 32GB DDR5
Memory Performance			
Transfer Speed (MB/s)	11,568	**38,414**	7,701
Access Latency (ns)	109	**95**	113

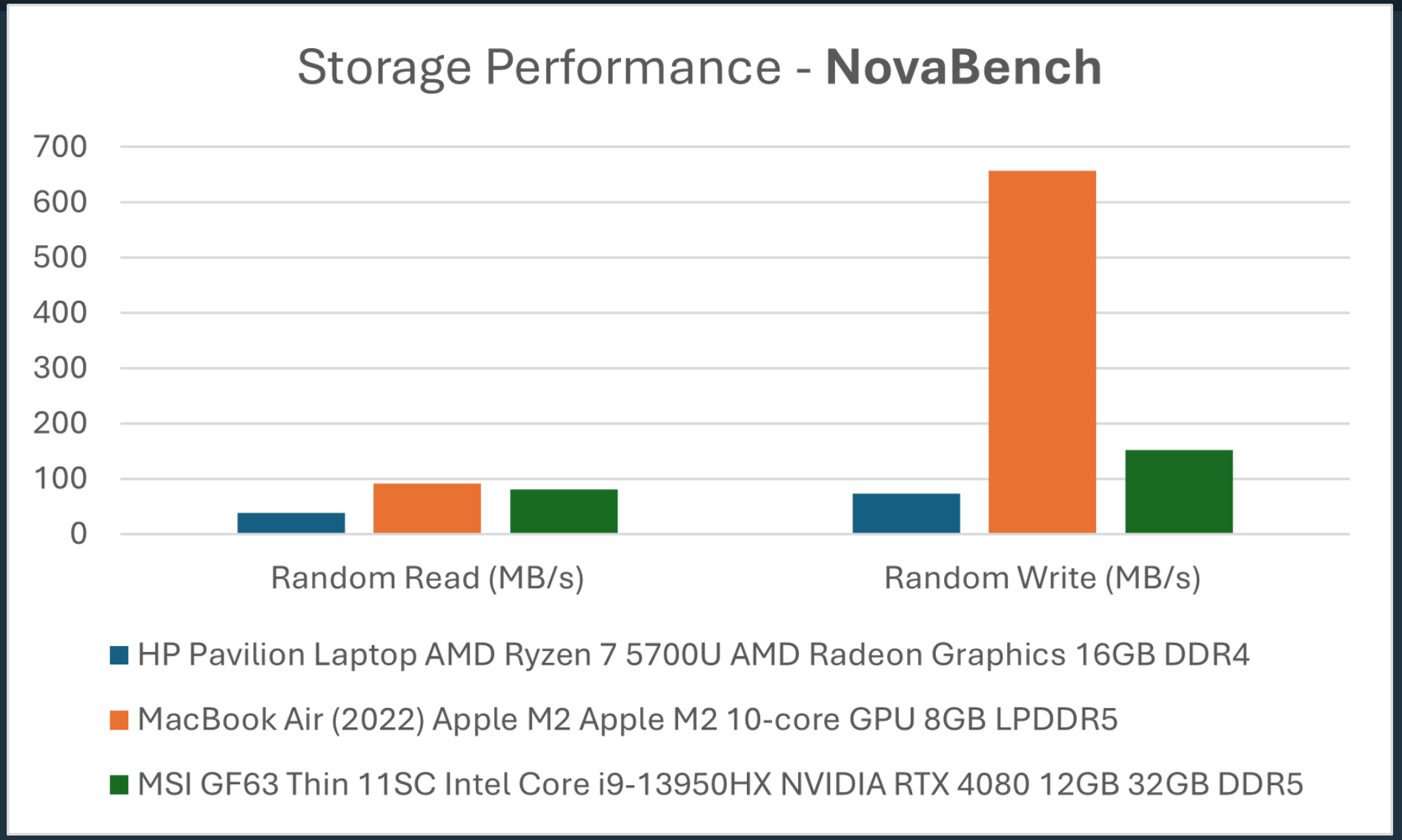
Memory Performance - **NovaBench**





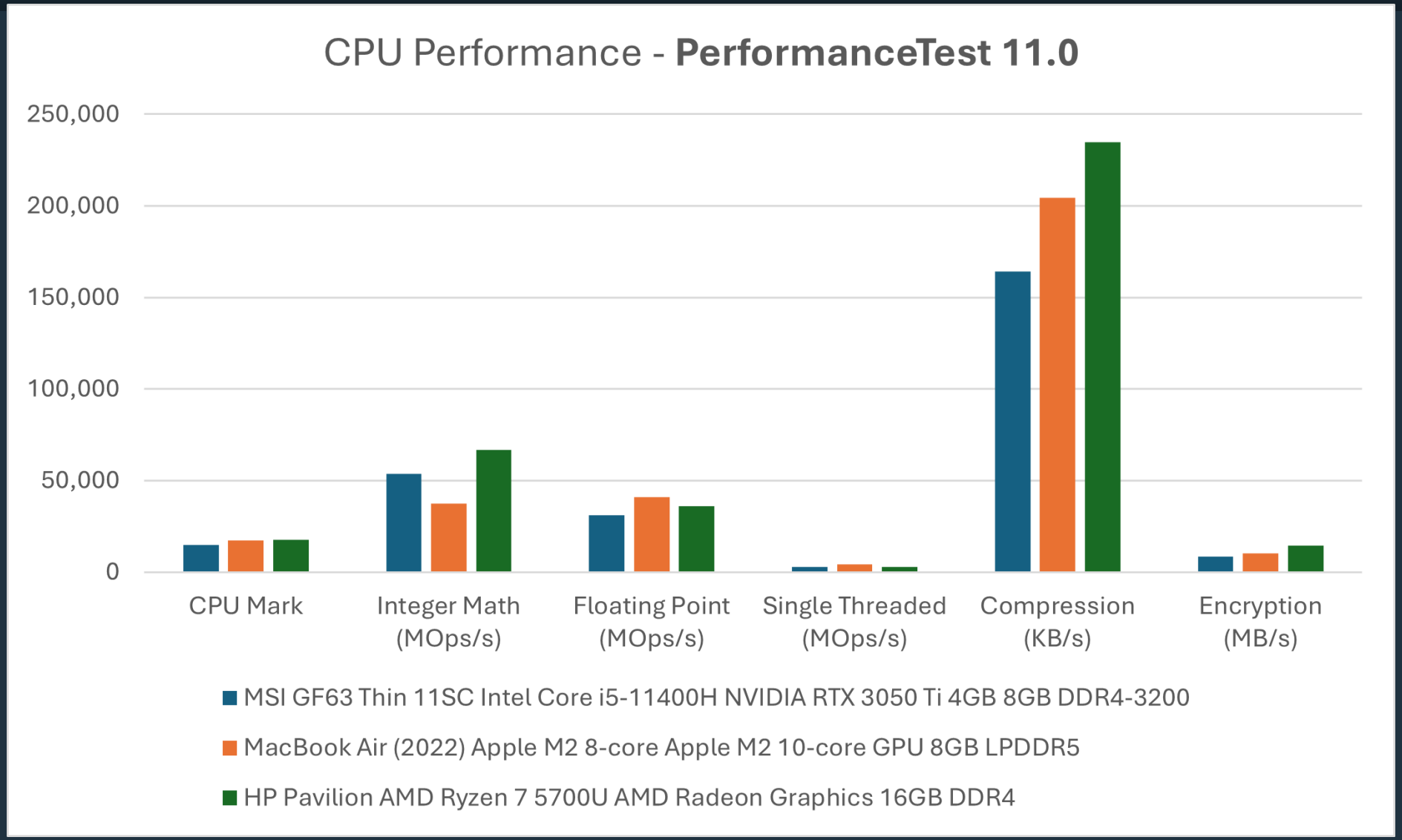
	HP Pavilion Laptop AMD Ryzen 7 5700U AMD Radeon Graphics 16GB DDR4	MacBook Air (2022) Apple M2 Apple M2 10-core GPU 8GB LPDDR5	MSI GF63 Thin 11SC Intel Core i9-13950HX NVIDIA RTX 4080 12GB 32GB DDR5
Storage Performance			
Sequential Read (MB/s)	1,432	**3,925**	2,314
Sequential Write (MB/s)	934	**3,920**	2,300
Random Read (MB/s)	39	**92**	81
Random Write (MB/s)	73	**657**	153





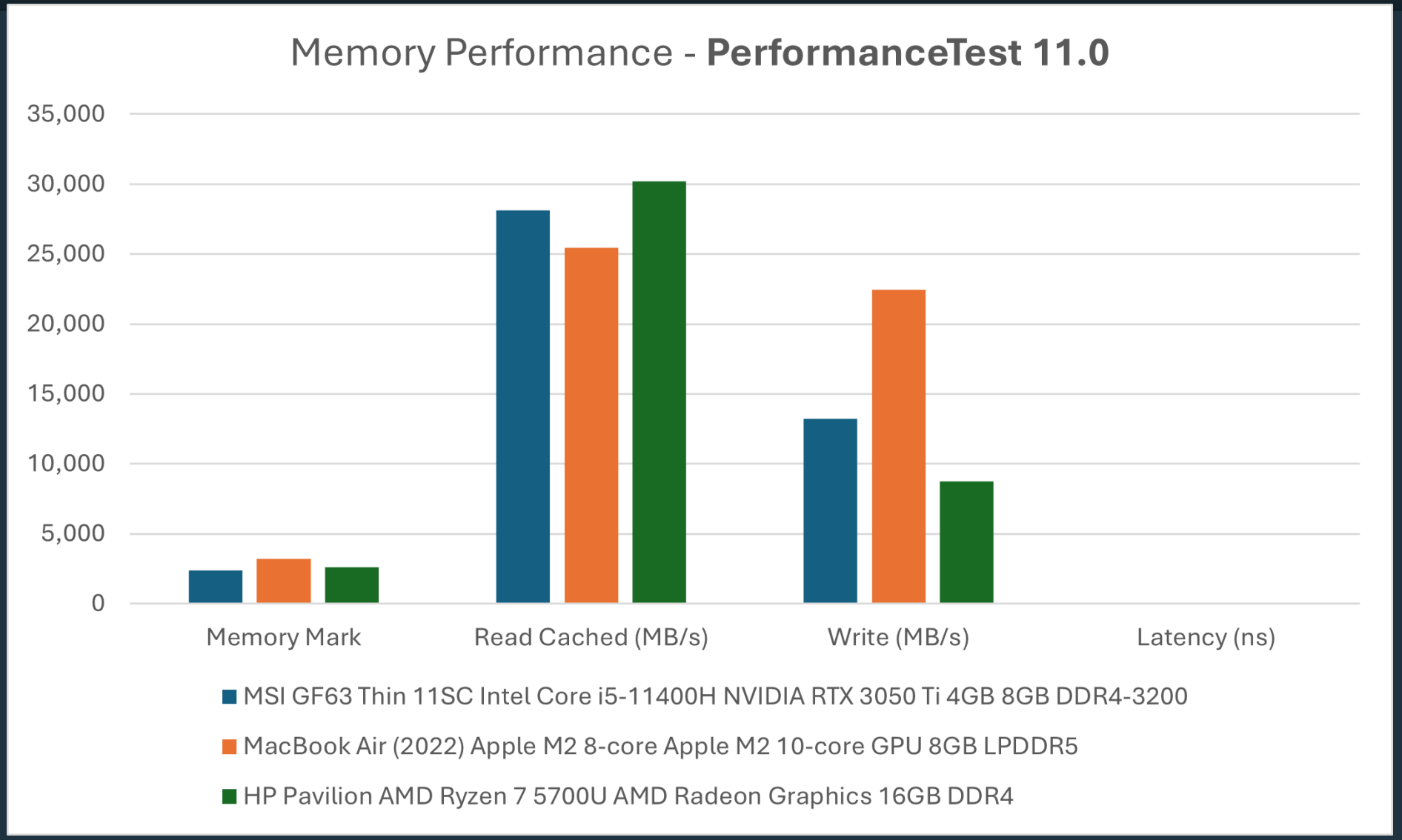
PerformanceTest Score CPU

Component/Test	MSI GF63 Thin 11SC Intel Core i5-11400H NVIDIA RTX 3050 Ti 4GB 8GB DDR4-3200	MacBook Air (2022) Apple M2 8-core Apple M2 10-core GPU 8GB LPDDR5	HP Pavilion AMD Ryzen 7 5700U AMD Radeon Graphics 16GB DDR4
CPU Performance			
CPU Mark	14,830	17,197	17,632
Integer Math (MOps/s)	53,700	37,444	66,851
Floating Point (MOps/s)	31,225	40,998	35,857
Single Threaded (MOps/s)	2,941	4,094	2,679
Compression (KB/s)	164,094	204,309	234,724
Encryption (MB/s)	8,326	10,208	14,309



PerformanceTest Score Memory

	HP Pavilion Laptop AMD Ryzen 7 5700U AMD Radeon Graphics 16GB DDR4	MacBook Air (2022) Apple M2 Apple M2 10-core GPU 8GB LPDDR5	MSI GF63 Thin 11SC Intel Core i9-13950HX NVIDIA RTX 4080 12GB 32GB DDR5
Memory Performance			
Memory Mark	2,392	**3,182**	2,595
Read Cached (MB/s)	28,135	25,442	**30,213**
Write (MB/s)	13,232	**22,439**	8,731
Latency (ns)	58	**25**	46



Key Performance Findings

CPU Performance

- MacBook Air M2 leads in single-core (2592) and multi-core (10003)
- HP Pavilion shows balanced performance
- MSI GF63 excels in specific gaming tasks

GPU Performance

- MSI GF63 (Best): 31,985
- MacBook Air: 28,556
- HP Pavilion: 13,697

Memory & Storage Performance

<Memory Transfer Speeds (MB/s)>
- MacBook Air: 38,414
- HP Pavilion: 11,568
- MSI GF63: 7,701

<Storage Performance (Sequential Read/Write)>
- MacBook Air: ~3,920 MB/s
- MSI GF63: ~2,300 MB/s
- HP Pavilion: ~1,200 MB/s

Device Strengths

MacBook Air (2022)

- Best overall CPU performance
- Superior memory and storage speeds
- Excellent for professional work

MSI GF 63

- Best gaming performance
- Strong GPU capabilities
- Good thermal design

HP Pavilion

- Balanced performance
- Cost-effective
- Good for general use

Price Evidence & Analysis

	Current Market Prices (As of October 2024)	Performance Scores (Normalized to 100-point scale)	Price/Performance Calculation (Performance Score / Price in hundreds)
MacBook Air M2	◦ Apple.com: $1,099 ◦ Amazon: $1,049 ◦ Best Buy: $1,099 ◦ B&H Photo: $1,049 **Average: $1,074**	◦ CPU Performance: 100 ◦ GPU Performance: 89 ◦ Storage Performance: 100 ◦ Battery Life: 100 **Average Score: 97.25**	97.25 / 10.74 = 9.05 points/$100 Best overall price/performance
MSI GF63 Thin 11SC	◦ Best Buy: $799 ◦ Amazon: $829 ◦ Newegg: $819 ◦ MSI.com: $849 **Average: $824**	◦ CPU Performance: 55 ◦ GPU Performance: 100 ◦ Storage Performance: 59 ◦ Battery Life: 39 **Average Score: 63.25**	63.25 / 8.24 = 7.68 points/$100 Best value for gaming
HP Pavilion 15	◦ HP.com: $699 ◦ Amazon: $729 ◦ Best Buy: $719 ◦ Walmart: $699 **Average: $712**	◦ CPU Performance: 54 ◦ GPU Performance: 43 ◦ Storage Performance: 37 ◦ Battery Life: 44 **Average Score: 44.5**	44.5 / 7.12 = 6.25 points/$100 Best value for general use

Price-Performance Analysis

MacBook Air M2

Best Overall Value!

MSI GF63

Best Gaming Value!

HP Pavilion

Best Budget Value!

Use Case Recommendations

Professional Work

- MacBook Air: Best for content creation, development
- HP Pavilion: Good for office work, students
- MSI GF63: Ideal for CAD, scientific computing

Gaming

- MSI GF63: Best for modern games
- HP Pavilion: Casual gaming
- MacBook Air: Limited gaming capabilities

Conclusion

Performance Leaders

- CPU: MacBook Air M2
- GPU: MSI GF63
- Value: HP Pavilion

Best Choice By Need

- Professional Work: MacBook Air
- Gaming: MSI GF63
- Budget/General Use: HP Pavilion

Contributions

HIMAN E.A.A.	220230C	• Conducted performance tests on the MSI laptop using the same benchmarking tools. • Analyzed and recorded results, focusing on performance strengths and weaknesses. • Documented findings in MSI GF63 specs and contributed to benchmark results comparison.
JAYASUNDARA J.W.K.B.R.	220271C	• Ran performance tests on the MacBook Air using Geekbench, NovaBench, and PerformanceTest. • Recorded data on CPU, GPU, memory, disk, and battery life. • Wrote sections on MacBook Air specs and benchmark tool details.
KAVINDA L. G. N.	220315R	• Performed benchmarking tests on the HP laptop. • Analyzed and wrote up results in the HP Pavilion 15 specs section. • Finalized the report, ensuring all sections were complete and accurate.
SHAMILA N.A.B.	220606K	• Compiled full specs (OS, CPU, GPU, etc.) for each device. • Write Executive Summary and Conclusion sections. • Created presentation slides to summarize the report findings.
WEERASIRI M.K.S.L.	220689N	• Compared group benchmarks with public data from sources. • Analyzed cost vs. performance for each laptop (gaming, content creation, etc.). • Wrote Public Benchmark Comparison Analysis and Cost-Performance Analysis.

THANK YOU!

Do you have any questions?