Lenovo ThinkPad P1 Gen 6 mobile workstation: Get more bang for your buck

We compared processing and graphics performance between a ThinkPad P1 Gen 6 with a 13th Gen Intel Core processor and a 16-inch Apple MacBook Pro (2023) with an M2 Max chip

Elevate design and rendering output

Higher Cinebench R23 and PugetBench for Adobe Creative Cloud® benchmark scores

Elevate AI processing strength

More ResNet-50 samples per second and Topaz Video AI frames per second

Elevate remote collaboration experiences

Better mic noise reduction and louder speaker volume with less CPU usage during Zoom meetings

Technical professionals, data scientists, and creators need extreme processing and graphics power to tackle big projects. **Hint:** You might want to invest in the Lenovo® ThinkPad® P1 Gen 6 mobile workstation—especially once you see our hands-on test results. **Spoiler:** This mobile workstation cost less than a MacBook Pro and readily handled CPU- and GPU-intensive workflows. **Bonus content:** The Lenovo ThinkPad P1 Gen 6, unlike the MacBook Pro (2023), included Independent Software Vendor (ISV) certifications for critical Adobe® and Autodesk® applications and connected quickly and easily with both Android and iOS phones through Intel Unison™.[1,2]

In a nutshell: The Lenovo ThinkPad P1 Gen 6 mobile workstation with a 13th Gen Intel® Core™ H-Series processor and NVIDIA® GeForce RTX™ 5000 Ada-generation discrete graphics was $240.07 less expensive and received higher productivity, digital content creation, and machine learning performance benchmark scores than a 16-inch Apple® MacBook Pro® (2023) with an M2 Max chip. The ThinkPad P1 Gen 6 mobile workstation also completed Microsoft 365 and digital content creation tasks in less time and consumed fewer CPU resources during Zoom meetings than its competitor.

About the Lenovo ThinkPad P1 Gen 6

This 16-inch mobile workstation combines form and function and "makes light work of heavy workloads."[3] The ThinkPad P1 Gen 6 comes with a 13th Generation Intel Core H-Series processor, optional NVIDIA GeForce RTX 5000 Ada-generation discrete graphics, and DDR5 memory.[4] It is also ISV-certified to "ensure your most critical applications will run reliably on your chosen hardware."[5]
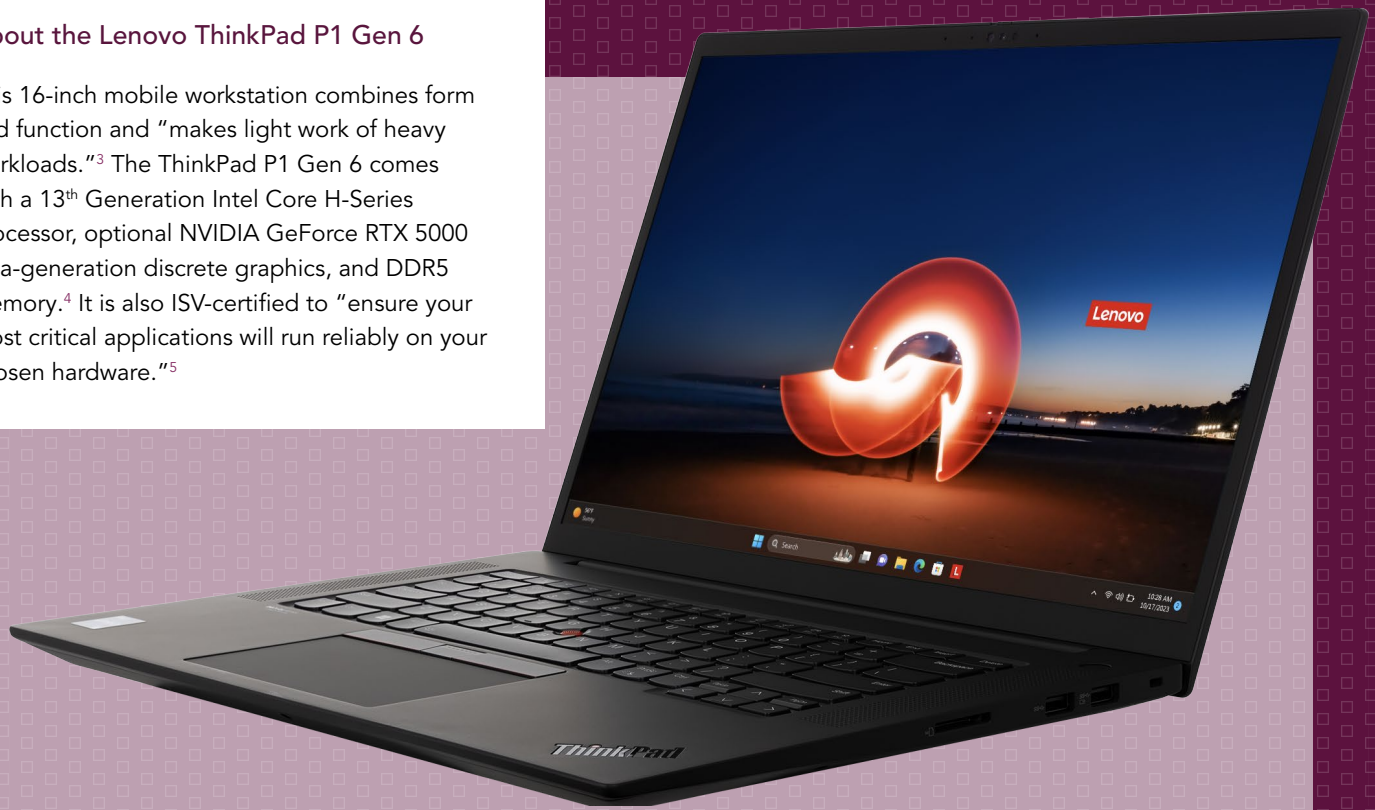
Lenovo ThinkPad P1 Gen 6 *vs. 16-inch Apple MacBook Pro (2023)*

Eco-friendly certifications

ENERGY STAR™
EPEAT® Gold

Forest Stewardship Council (FSC) certified packaging materials

vs.

ENERGY STAR
EPEAT Gold
Responsible packaging*

*According to Apple, 97 percent of the 16-inch MacBook Pro packaging is fiber-based with 100 percent of the wood fiber coming from "recycled and responsible sources."[8]
**USB-A is a common connection type for wired and wireless connections to office essentials such as printers, scanners, mice, and external hard drives.[9]

Connects with Android or iOS phones

Intel Unison connects PCs to Android and/or iOS phones[6]

Apple Continuity connects only macOS devices to iOS phones[7]

More business-focused connections

1x Thunderbolt™ 4 port
1x USB-C™ port
2x USB-A ports
1x SD Express card reader
1x HDMI® port
1x headphone/mic combo
1x Kensington Nano Security Slot™

vs.

3x Thunderbolt 4 ports
1x SDXC card slot
1x HDMI port
1x headphone jack
No security slots
No USB-A ports**

About the Intel Core i9-13900H processor

13th Generation Intel Core H-Series mobile processors provide "the latest platform technologies for data-intensive applications, ultra-fast connectivity, accelerated AI workloads, and power-performance optimization."[10] The Intel Core i9-13900H processor we tested has a 24MB Intel Smart Cache, a max turbo frequency of 5.4 GHz, 14 cores (6 Performance-cores and 8 Efficient-cores), 20 threads, an Intel Thread Director controller, and Intel Hyper-threading Technology.[11]

Lenovo ThinkPad P1 Gen 6 sustainability

More and more, consumers are considering the environmental impact of their purchases. The 2023 Buying Green Report shows that, despite rising consumer prices, 82 percent of consumers of all ages are willing to pay more for sustainable packaging—up from 78 percent in 2022 and 74 percent in 2021.[12] One of the ways Lenovo is committed to reaching net-zero emissions by 2050 is by providing environmentally conscious products that arrive in minimal recycled or biodegradable packaging materials.[13] To this end, Lenovo says that the Lenovo ThinkPad P1 Gen 6 is designed with these sustainability specs:

- The keyboard surround is 90 percent recycled magnesium

- The bottom cover is 55 percent recycled aluminum

- The speaker enclosure is 90 percent post-consumer content recycled plastic

- The battery pack enclosure is 90 percent recycled plastic

- The 170W AC adapter is 30 percent recycled plastic

- Motherboard, SSD, TrackPad, and fingerprint reader module components are attached with low-temperature solder

- The laptops ship in plastic-free packaging with 90 percent recycled or sustainable content—Packaging composed of recycled, bio-based, or sustainable forested content[14]

Lenovo ThinkPad P1 Gen 6 packaging

We took pictures during our unboxing process so you can see the sustainable packaging for yourself.

Figure 1: Lenovo ThinkPad P1 Gen 6 packaging. Source: Principled Technologies.

How we tested

Before we started our hands-on evaluation, we set the Windows power mode on the Lenovo ThinkPad P1 Gen 6 to Best performance. We also set the 16-inch MacBook Pro (2023) to High-Power Mode. What we tested:

- **Lenovo ThinkPad P1 Gen 6** running Windows 11 Pro, powered by a 14-core 13th generation Intel Core i9-13900H processor (4.1 – 5.4 GHz), NVIDIA GeForce RTX 5000 Ada-generation graphics, 96 GB of DDR5 memory, and 2 TB of SSD storage. Cost on July 12, 2023: $4,458.93.

- **16-inch Apple MacBook Pro** running macOS Ventura, powered by an M2 Max processor (3.68 GHz) with a 12-core CPU and a 38-core GPU, 96 GB of unified memory, and 2 TB of SSD storage. Cost on July 12, 2023: $4,699.00.

Even with the optional NVIDIA graphics card included, the Lenovo ThinkPad P1 Gen 6 cost $240.07 less than the fastest 16-inch MacBook Pro (2023) available at the time of testing.

Gameplan: We ran a battery of processing- and graphics-intensive benchmarks to assess general digital content creation capabilities and AI processing strength on the two systems:

- **Blender** is a content creation benchmark that measures rendering performance and speed by evaluating how many samples per minute systems can handle.[15]

- **Cinebench R23** is a content creation benchmark that evaluates CPU and GPU capabilities using Redshift, a Cinema 4D rendering engine, and reports system performance under a heavy load.[16]

- **CrossMark** is a productivity benchmark that evaluates how well devices handle diverse tasks such as application and file launches; web browsing; document, photo, and video editing; scientific simulation forecast modeling within a spreadsheet application; and multitasking.[17]

- **HandBrake** is a content creation benchmark that measures the time it takes to encode a predefined video and records the number of frames per second (FPS) each system processes.[18]

- **Maxon Redshift 3D Renderer** is a content creation benchmark that measures how long systems take to load and render a 3D scene.[19]

- **MLPerf™ ResNet-50** is a computer vision machine learning model that measures how many samples per second systems can process.[20]

- **Procyon Office Productivity Benchmark** is a productivity benchmark that measures how well devices handle real-world Microsoft 365 tasks.[21]

- **PugetBench for Adobe Creative Cloud** is a content creation benchmark that measures how well devices handle real-world Adobe Creative Cloud tasks.[22]

- **Topaz Video AI** is a content creation benchmark that evaluates how well systems handle algorithm-fueled video enhancement tasks.[23]

- **WebXPRT 4** is a browser benchmark that runs a series of tests that include HTML and JavaScript handling as well as online homework, photo manipulation, and face detection tasks.[24]

But that's not all: We also hand-timed how long it took to complete common Microsoft 365 tasks. Then, because remote collaboration is ubiquitous in today's work-from-anywhere environments, we completed a collaboration workflow using Zoom and compared CPU usage during Zoom meetings. We also conducted custom speaker and microphone comparisons on both systems.

All of the results we report reflect the specific configurations we tested. Any difference in the configurations you test, as well as browsers, screen brightness, network traffic, or software additions, can affect results. For more information on these 16-inch systems as well as our testing parameters and procedures, see the science behind the report.

System performance evaluation

As the following results show, the Lenovo ThinkPad P1 Gen 6 mobile workstation powered by an Intel Core i9-13900H processor and NVIDIA GeForce RTX 5000 Ada-generation graphics packs a hefty processing- and graphics-power punch—without sucker-punching your wallet.

The basics

CrossMark and Procyon Office Productivity Benchmark use models of real-world applications to measure responsiveness and performance, so higher overall scores here give an insight into how a system might perform common office productivity tasks.

Crossmark
Overall score | Higher is better

Lenovo ThinkPad P1 Gen 6
2,003

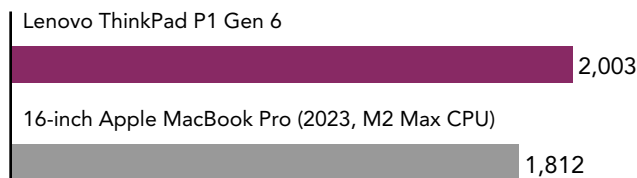16-inch Apple MacBook Pro (2023, M2 Max CPU)
1,812

Figure 2: CrossMark overall scores. Higher is better. Source: Principled Technologies.

Procyon Office Productivity Benchmark
Overall score | Higher is better

Lenovo ThinkPad P1 Gen 6
235,000

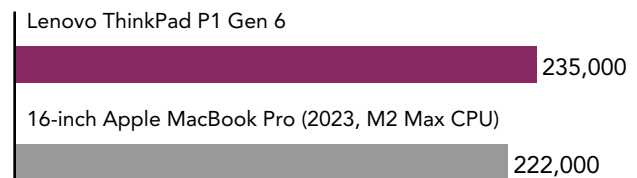16-inch Apple MacBook Pro (2023, M2 Max CPU)
222,000

Figure 3: Procyon Office Productivity Benchmark overall scores. Higher is better. Source: Principled Technologies.

About Intel Unison

Intel Unison enables users to sync their PCs with Android or iOS-based phones. With Intel Unison, users can transfer photos and videos on their phones to their PCs for storage and editing. Users have access to their phone's full contact list and can receive and manage phone notifications on their PC screens. They can also use their mouse or keyboard to receive or initiate voice calls and text messages.[25]

We tested this feature and found the ThinkPad P1 Gen 6, which is a non-macOS device, paired successfully with an iPhone. We were also able to easily share iPhone files to the ThinkPad and access them. Apple Continuity connects macOS devices to only iOS phones.
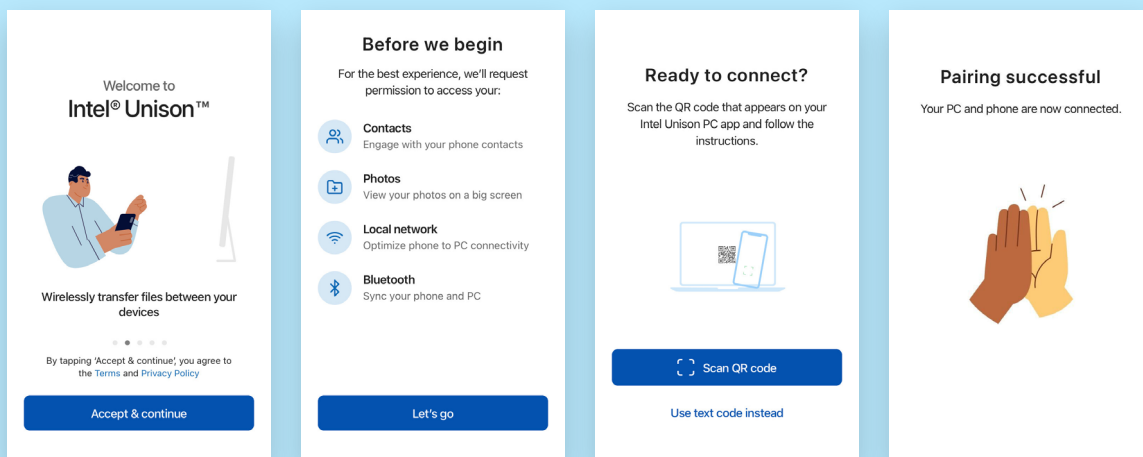

Figure 4: Screenshots of successful pairing of an Apple iPhone and a Lenovo ThinkPad X1 Carbon Gen 11 using Intel Unison. Source: Principled Technologies.

Just about everyone accesses web browsers and web-based applications every day. Higher WebXPRT scores indicate a better online experience.

WebXPRT 4
Overall score | Higher is better

Lenovo ThinkPad P1 Gen 6
329

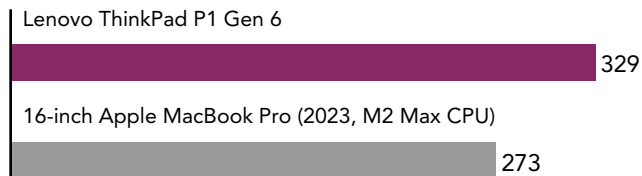16-inch Apple MacBook Pro (2023, M2 Max CPU)
273

Figure 5: WebXPRT 4 with Chrome browser overall scores. Higher is better. Source: Principled Technologies.

We also hand-timed how long it took to complete a range of Microsoft 365 tasks many office workers regularly tackle. The Lenovo ThinkPad P1 Gen 6 finished these common tasks in slightly less time than the Apple MacBook Pro (2023). While waiting a beat may not register as an annoyance, anyone switching between applications multiple times a day recognizes that these micro-frustrations can pile up over the course of a week or a month. The faster system has the potential to improve both your mood and your productivity.

Time to complete tasks in Microsoft 365
Seconds | Less time is better

■ Lenovo ThinkPad P1 Gen 6   ■ 16-inch Apple MacBook Pro (2023, M2 Max CPU)

Oopen a 90MB Word doc
0.8
1.1

Perform word find/replace in Word
1.0
1.2

Open 650KB 10K row Excel spreadsheet
0.7
0.9

Open 92MB Excel spreadsheet containing a macro
10.9
12.9

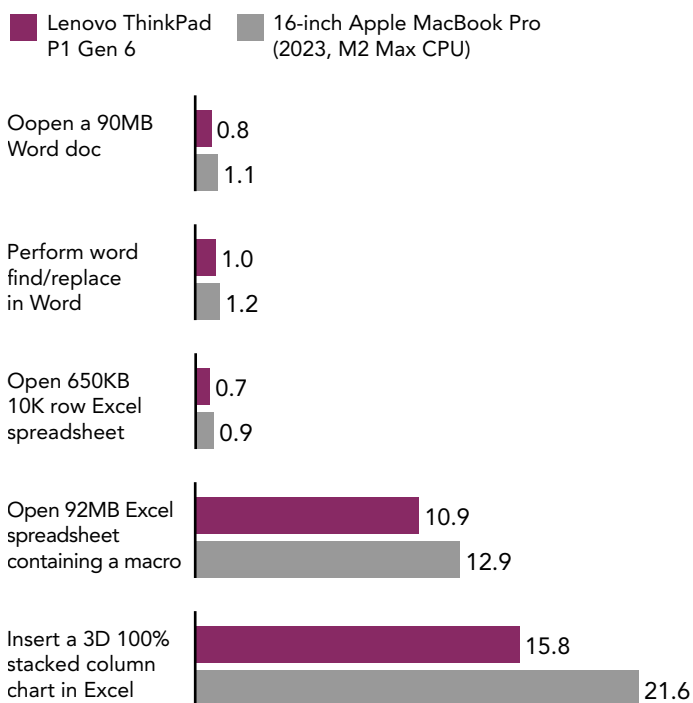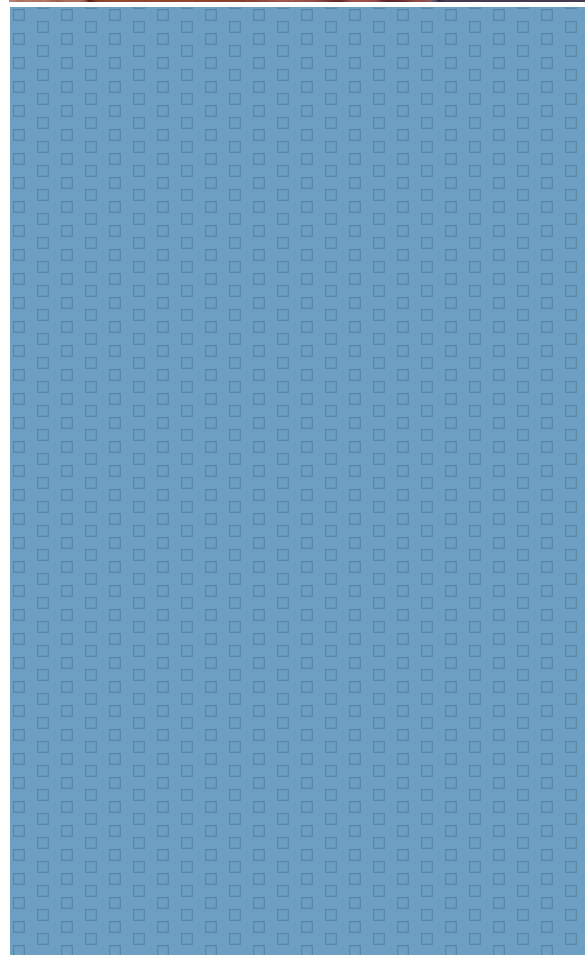Insert a 3D 100% stacked column chart in Excel
15.8
21.6

Figure 6: Time to complete tasks in Microsoft 365. Less time is better. Source: Principled Technologies.

Accelerate world building

Sustained workloads such as 3D project building or video rendering tax the CPU for extended periods of time. Higher Cinebench R23 scores indicate systems that have the power to better handle resource-intensive 3D image rendering tasks. Other resource-intensive use cases include engineers working with computer-aided design (CAD) applications, financial analysts assessing investments, and data scientists processing massive amounts of data.

Cinebench R23
Overall score | Higher is better

■ Lenovo ThinkPad P1 Gen 6 ■ 16-inch Apple MacBook Pro (2023, M2 Max CPU)

Single-core

Lenovo ThinkPad P1 Gen 6	2,053
16-inch Apple MacBook Pro	1,736

Multi-core

Lenovo ThinkPad P1 Gen 6	18,527
16-inch Apple MacBook Pro	14,900

Single-core sustained

Lenovo ThinkPad P1 Gen 6	2,058
16-inch Apple MacBook Pro	1,649

Multi-core sustained

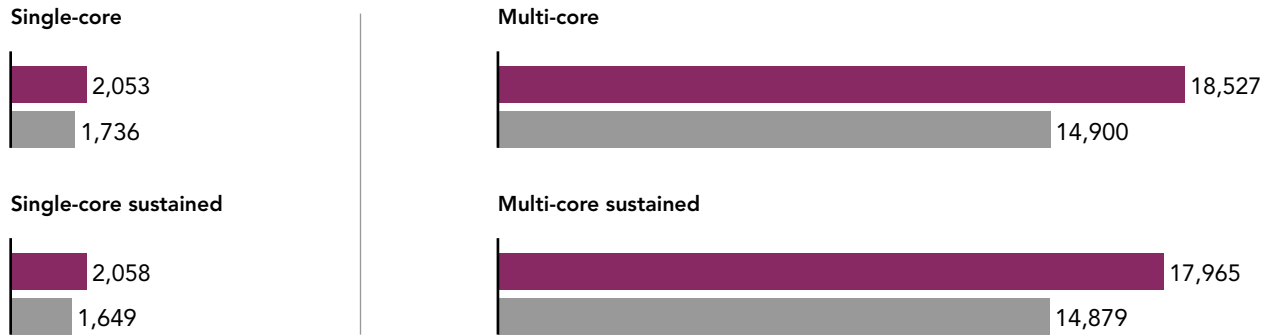|	
Lenovo ThinkPad P1 Gen 6	17,965
16-inch Apple MacBook Pro	14,879

Figure 7: Cinebench R23 scores. Higher is better. Source: Principled Technologies.

In our video rendering tests, there were noticeable difference in Blender samples per minute and Maxon Redshift render times between the two devices, showing that the Lenovo ThinkPad P1 Gen 6 may be better equipped to provide a more fluid experience for designers and engineers than the Apple MacBook Pro (2023) we tested.

Blender
Samples per minute | Higher is better

■ Lenovo ThinkPad P1 Gen 6 ■ 16-inch Apple MacBook Pro (2023, M2 Max CPU)

Monster

Lenovo ThinkPad P1 Gen 6	3,120.14
16-inch Apple MacBook Pro	951.20

Junkshop

Lenovo ThinkPad P1 Gen 6	1,531.02
16-inch Apple MacBook Pro	512.98

Classroom

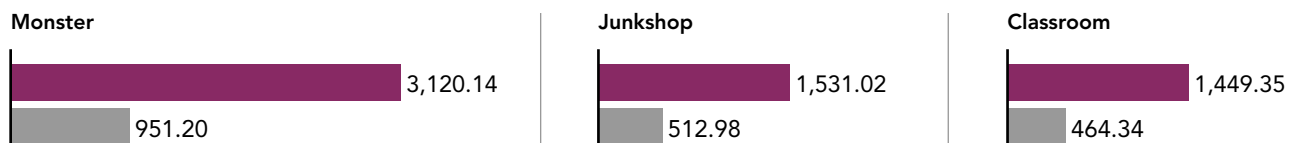|	
Lenovo ThinkPad P1 Gen 6	1,449.35
16-inch Apple MacBook Pro	464.34

Figure 8: Blender benchmark samples per minute. Higher is better. Source: Principled Technologies.

Maxon Redshift 3D renderer benchmark
Render times (seconds) | Less time is better

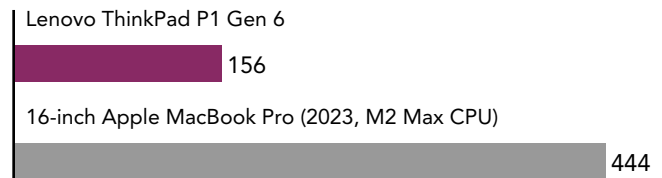|	
Lenovo ThinkPad P1 Gen 6	156
16-inch Apple MacBook Pro (2023, M2 Max CPU)	444

Figure 9: Maxon Redshift 3D renderer benchmark render time. Less time is better. Source: Principled Technologies.

Indulge in your creative side

PugetBench for Adobe Creative Cloud benchmarks evaluate a system's digital content creation performance while completing a broad range of common Adobe Creative Cloud tasks. Each benchmark then assigns an overall score to each system. Higher scores here indicate an aptitude for speedy digital content creation.

PugetBench

Samples per minute | Higher is better

■ Lenovo ThinkPad P1 Gen 6   ■ 16-inch Apple MacBook Pro (2023, M2 Max CPU)

PugetBench for Photoshop

Lenovo ThinkPad P1 Gen 6	1,225
16-inch Apple MacBook Pro	1,193

PugetBench for Premiere Pro

Lenovo ThinkPad P1 Gen 6	740
16-inch Apple MacBook Pro	720

PugetBench for After Affects

Lenovo ThinkPad P1 Gen 6	1,069
16-inch Apple MacBook Pro	904

Figure 10: PugetBench for Photoshop, PugetBench for Premiere Pro, and PugetBench for After Affects overall scores. Higher is better. Source: Principled Technologies.

Deliver quality content

Video encoding, used to compress video while maintaining quality, is a resource-intensive activity for any system.[26] The HandBrake Hardware 4K H.265 encoder stresses CPU, memory, and GPU, which makes this a helpful indicator of digital content creation performance.

HandBrake Fast 1,080p preset test

■ Lenovo ThinkPad P1 Gen 6   ■ 16-inch Apple MacBook Pro (2023, M2 Max CPU)

Encoding time (minutes:seconds)
Lower is better

Lenovo ThinkPad P1 Gen 6	1:53
16-inch Apple MacBook Pro	2:01

Encoding frames per second
Higher is better

Lenovo ThinkPad P1 Gen 6	66.34
16-inch Apple MacBook Pro	61.27

Figure 11: Handbrake Fast 1080p preset test results. Less time is better, and more FPS is better. Source: Principled Technologies.

HandBrake Hardware 4K H.265 encoder test

■ Lenovo ThinkPad P1 Gen 6   ■ 16-inch Apple MacBook Pro (2023, M2 Max CPU)

Encoding time (minutes:seconds)
Lower is better

Lenovo ThinkPad P1 Gen 6	0:59
16-inch Apple MacBook Pro	1:10

Encoding frames per second
Higher is better

Lenovo ThinkPad P1 Gen 6	131.63
16-inch Apple MacBook Pro	108.26

Figure 12: Handbrake Hardware 4K H.265 encoder test results. Less time is better, and more FPS is better. Source: Principled Technologies.

Video AI applications use algorithms to enhance the quality and resolution of videos. Higher Topaz Video AI benchmark scores for the Intel Core i9-13900H processor-powered Lenovo ThinkPad P1 Gen 6 in both 1080p (FHD) and 4K resolutions suggest that the M2 Max processor-powered Apple MacBook Pro (2023) had less compute power for this kind of work than the Lenovo system. Figures 13 and 14 show the frames per second (FPS) each device rendered in a wide variety of FHD and 4K Topaz Video AI video-upscaling scenarios.

Topaz Video AI 3.3.4 FHD

Frames per second | Higher is better

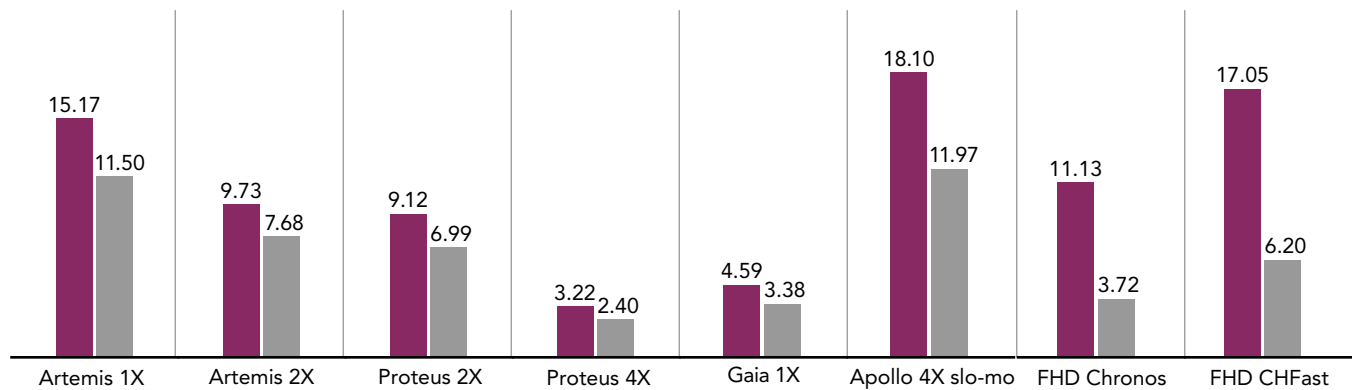■ Lenovo ThinkPad P1 Gen 6   ■ 16-inch Apple MacBook Pro (2023, M2 Max CPU)

	Artemis 1X	Artemis 2X	Proteus 2X	Proteus 4X	Gaia 1X	Apollo 4X slo-mo	FHD Chronos	FHD CHFast
Lenovo ThinkPad P1 Gen 6	15.17	9.73	9.12	3.22	4.59	18.10	11.13	17.05
16-inch Apple MacBook Pro	11.50	7.68	6.99	2.40	3.38	11.97	3.72	6.20

Figure 13: Topaz Video AI 3.3.4 FHD results. Higher is better. Source: Principled Technologies.

Topaz Video AI 3.3.4 4K

Frames per second | Higher is better

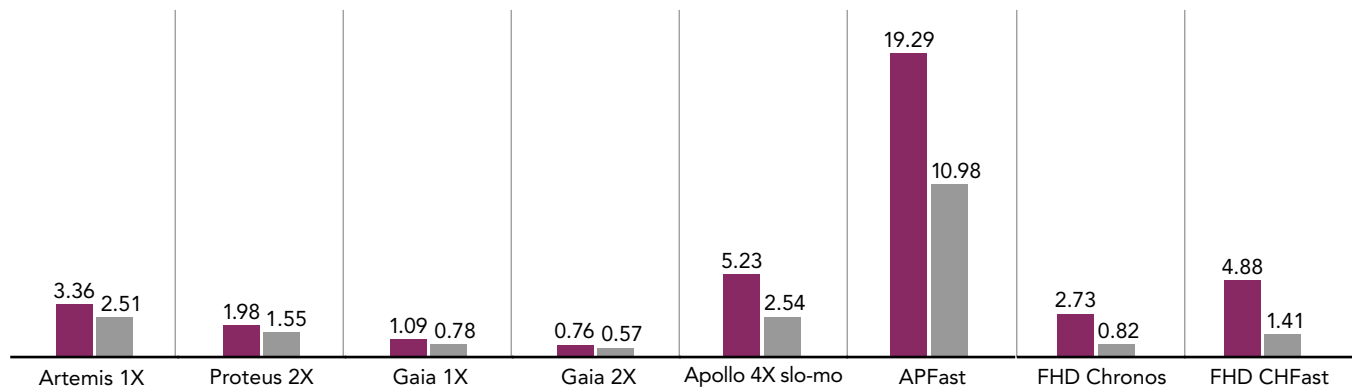■ Lenovo ThinkPad P1 Gen 6   ■ 16-inch Apple MacBook Pro (2023, M2 Max CPU)

	Artemis 1X	Proteus 2X	Gaia 1X	Gaia 2X	Apollo 4X slo-mo	APFast	FHD Chronos	FHD CHFast
Lenovo ThinkPad P1 Gen 6	3.36	1.98	1.09	0.76	5.23	19.29	2.73	4.88
16-inch Apple MacBook Pro	2.51	1.55	0.78	0.57	2.54	10.98	0.82	1.41

Figure 14: Topaz Video AI 3.3.4 4K results. Higher is better. Source: Principled Technologies.

Solve the big problems with AI

To see how quickly each system could identify and classify objects and people, we ran the MLPerf ResNet-50 machine learning model in the offline scenario. This model "[a]ssigns a label from a fixed set of categories to an input image, i.e., applies to computer vision problems."[27] The offline ResNet computer vision model measures image and object classification performance with all samples on the system under test. Examples of ResNet computer vision applications include robotic automation, facial recognition, medical anomaly detection, and self-driving cars.[28] A system that handles a higher number of samples per second has the potential to crunch through larger datasets.

The samples per second delta between the Intel Core i9-13900H processor- and NVIDIA GeForce RTX 5000 graphics-powered Lenovo ThinkPad P1 Gen 6 compared to the M2 Max processor-powered Apple MacBook Pro (2023) is enormous. **For context:** This demonstrates how having powerful CPU and GPU processors can boost a system's AI-processing strength.

ResNet-50
Samples per second | Higher is better

Lenovo ThinkPad P1 Gen 6
13,312.100

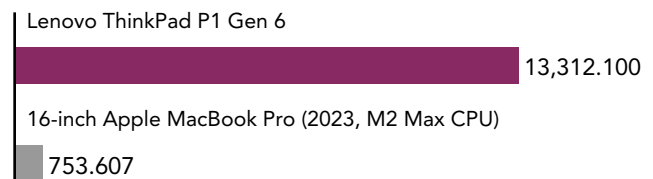16-inch Apple MacBook Pro (2023, M2 Max CPU)
753.607

Figure 15: Number of samples per second each system classified using the ResNet-50 model in the offline scenario. Higher numbers of samples are better. Source: Principled Technologies.

Security from supply chain trust through end of life

According to Help Net Security, supply chain attacks in 2022 caused more data compromises than malware—and impacted more than 10 million people.[29] Lenovo and Intel have partnered to provide deeper and broader protections from the point of manufacture through transport and until the end user has the device in their hands. The first step in this secure supply chain is Intel Trusted Device Setup and Intel Transparent Supply Chain. These services fall under the Lenovo ThinkShield umbrella, which, in addition to the device protection services mentioned above, provides end-to-end protection of sensitive data with secure hardware, software, and services. With Lenovo ThinkShield and the Intel vPro® platform, companies can fortify their business and protect their assets from manufacturing floor to final disposal.[30]
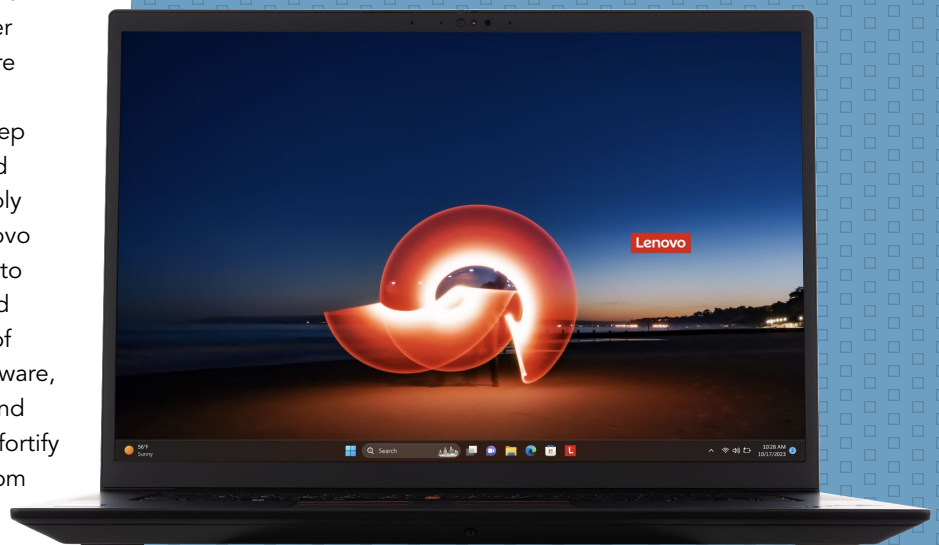
Facilitate work from anywhere

With many companies embracing remote and hybrid work models, the video-conferencing tools and audio components we rely on to connect and engage widespread participants are more important than ever.

The new normal

Video meetings are crucial in remote and hybrid work environments—but can tax the CPU. When Zoom or other video conferencing apps hog too much CPU, attendees might notice deteriorating video quality, out-of-sync video playback, or screen-sharing not working. For this test, we configured Zoom to enter full-screen automatically when starting or joining a meeting, chose the audio and video on options when joining a meeting, and chose side-by-side mode when screen-sharing. This last adjustment was to ensure the cameras were always on-screen with the screenshare. For repeatable audio evaluations, we played a YouTube video on the host device.

For context: Lower Zoom CPU usage is important because high-powered individuals and creatives need their computers to multitask during meetings. Multitasking examples include employing virtual backgrounds and filters, delivering interactive presentations that include polls and word clouds, and running large events with multiple breakout rooms.

Meeting attendees often task-switch during remote brainstorming sessions and team check-ins, which puts added stress on the system's CPU. So, we simulated a collaboration workflow using Zoom. After launching a new Zoom meeting, we 1) created and sent an Outlook email with a video attachment; 2) started a PowerPoint slideshow in presenter mode; 3) opened 10 browser tabs on Google Chrome; and 4) inserted a 3D 100 percent stacked column into a 10K row macro Excel file. Figure 17 shows how long it took each system to complete this workflow.

System maximum CPU utilization while using Zoom
Percent utilization | Lower is better

Host, 1:1 meeting

Lenovo ThinkPad P1 Gen 6: 2%
16-inch Apple MacBook Pro (2023, M2 Max CPU): 17%
0% — 100%

Guest, 1:1 meeting

Lenovo ThinkPad P1 Gen 6: 3%
16-inch Apple MacBook Pro (2023, M2 Max CPU): 10%
0% — 100%

Host, 1:3 meeting

Lenovo ThinkPad P1 Gen 6: 2%
16-inch Apple MacBook Pro (2023, M2 Max CPU): 19%
0% — 100%

Legend:
■ Lenovo ThinkPad P1 Gen 6
■ 16-inch Apple MacBook Pro (2023, M2 Max CPU)
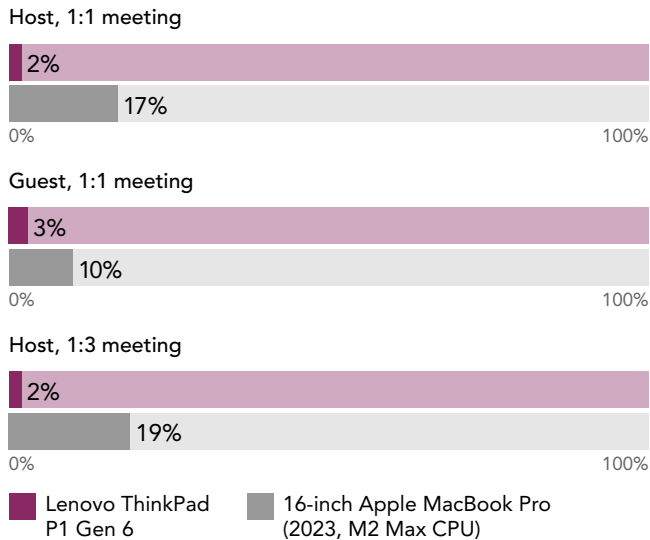
Figure 16: Zoom CPU usage, as reported by Zoom. Lower usage is better. Source: Principled Technologies.

Zoom workflow
Time (seconds) | Less time is better

Lenovo ThinkPad P1 Gen 6: 1:47
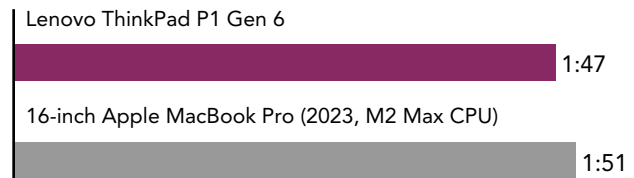16-inch Apple MacBook Pro (2023, M2 Max CPU): 1:51

Figure 17: Time it took each system to complete a collaboration workflow using Zoom. Less time is better.
Source: Principled Technologies.

Background noise reduction

A useful remote collaboration component is effective background noise reduction. We found that the Lenovo ThinkPad P1 Gen 6 with dual noise-canceling microphones was better at reducing background noise than a 16-inch MacBook Pro (2023) with its three-mic array with high signal-to-noise ratio and directional beamforming.[31,32] **For context:** It's easier for teammates and clients to hear you, focus on the subject at hand, and be part of the conversation when there are fewer audio distractions.

Background fan volume

Background fan volume

Lenovo ThinkPad P1 Gen 6 — Too quiet to register a sound

16-inch Apple MacBook Pro (2023, M2 Max CPU) — Registered audible noise at -42.5 LUFS
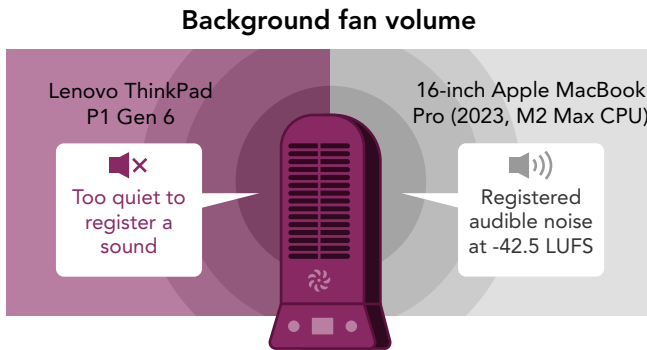
Figure 18: Microphone test background fan volume results. Lower LUFS, which is a standard loudness measurement, are better. Source: Principled Technologies.

Speaker volume output

Whether you need to step away from your system to refill your water bottle or grab a snack during a long video-conferencing session, the louder the volume output, the further you can stray from your system. To reach a 64dB target, the four harman/Kardon speakers on the ThinkPad P1 Gen 6 used lower levels of maximum speaker volume output than the six-speaker sound system on the 16-inch MacBook Pro (2023). **For context:** 60 dB Is the volume of normal conversation.[33] To account for variances in speech patterns and voice modulation, we set the target dB level to 64.

Maximum audio output needed to reach target dB
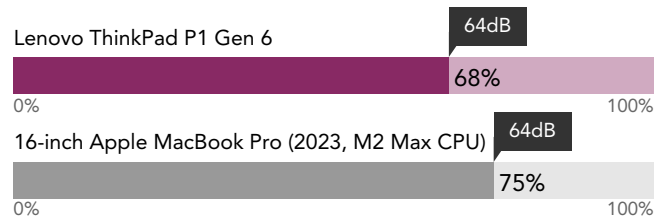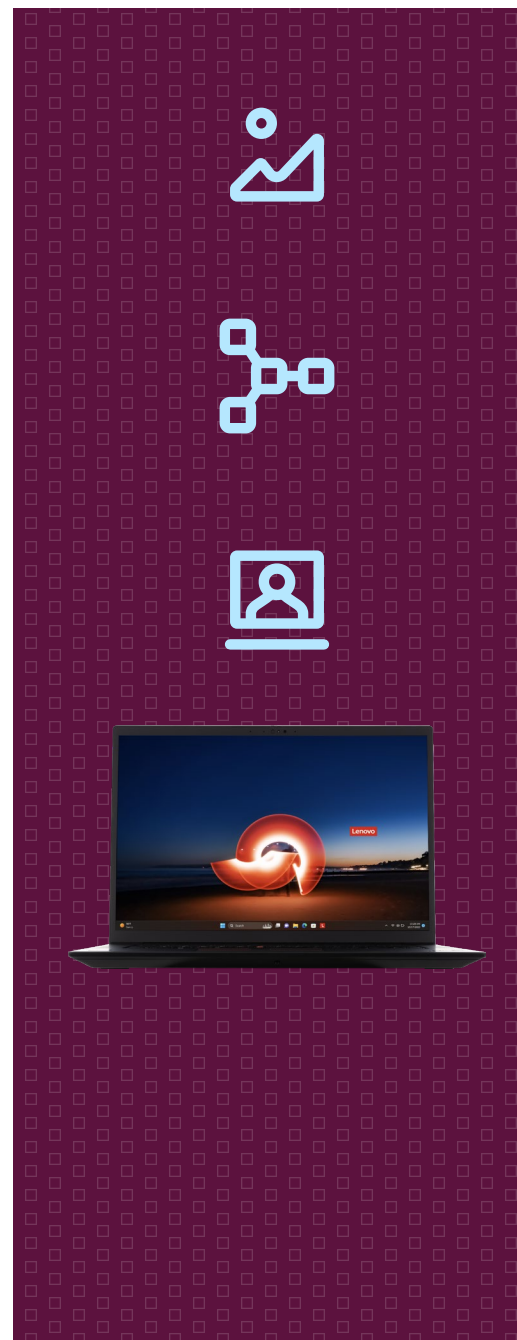Percent of maximum system volume | Lower is better

Lenovo ThinkPad P1 Gen 6 — 64dB — 68%
0% — 100%

16-inch Apple MacBook Pro (2023, M2 Max CPU) — 64dB — 75%
0% — 100%

Figure 19: Speaker volume output level results. Lower is better. Source: Principled Technologies.

Conclusion

In a nutshell: The Lenovo ThinkPad P1 Gen 6 mobile workstation delivered on price, processing power, and workload performance. When we ordered systems for this price and performance comparison, the Lenovo ThinkPad P1 Gen 6 with an Intel Core i9-13900H processor and (optional) NVIDIA GeForce RTX 5000 Ada-generation discrete graphics cost $240.07 less than a 16-inch Apple MacBook Pro (2023) with an M2 Max processor. **Bonus content:** In addition to receiving higher productivity, digital content creation, AI-based processing, and machine learning benchmark scores, the Intel Core i9-13900H processor-powered Lenovo ThinkPad P1 Gen 6 also elevated remote collaboration experiences with lower CPU consumption, better background noise reduction, and greater speaker volume output during Zoom meetings than the M2 Max processor-powered Apple MacBook Pro (2023).

1. Lenovo, "Lenovo ThinkPad," accessed November 17, 2023, https://www.lenovo.com/eg/en/laptops/thinkpad/p-series/c/p-series.

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