# Lenovo ThinkBook 16p Gen 4: Spend wisely and be a pacesetter

## The new ThinkBook 16p Gen 4 cost significantly less, performed better, and included innovations a 16-inch Apple MacBook Pro (2023) couldn't match

High-powered professionals and creatives understand that how you present yourself is as important as being prepared. So, investing in a powerful business laptop that ticks both style and productivity boxes is top priority. Let's look at the 16-inch Lenovo® ThinkBook™ 16p Gen 4, which was, at the time we ordered both laptops for this appraisal, $1,759.54 less expensive than a corresponding 16-inch Apple® MacBook Pro® (2023).

Self-motivated individuals used to meeting deadlines quickly and leading by example might be interested to know the following. In our hands-on tests, the redesigned Lenovo ThinkBook 16p Gen 4 with a 13th Gen Intel® Core™ H-Series processor and NVIDIA® GeForce RTX™ 4060 discrete graphics received higher performance benchmark scores in the areas of productivity, content creation, and machine learning; completed Microsoft 365 and content creation tasks in less time; and consumed fewer CPU resources during Zoom meetings than a 16-inch Apple MacBook Pro (2023) with an M2 Max chip. Additionally, the Lenovo ThinkBook 16p Gen 4 has an innovative connector for modular Lenovo Magic Bay accessories that is purpose-built to improve video conferencing and transform the powerful laptop into a video-streaming mobile studio.[1]

Read on to see how both systems fared in our real-world performance and user experience evaluations.

### Speed content creation and web browsing

Higher Cinebench R23, PugetBench for Photoshop, and WebXPRT 4 benchmark scores

### Supercharge video production and accelerate machine learning workflows

More Blender samples per minute and more MLPerf™ ResNet-50 samples per second

### Put your best foot forward

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


## About the Lenovo ThinkBook 16p Gen 4

Lenovo redesigned the ThinkBook 16p Gen 4 for creative professionals and businesses. This sleek and frameless business laptop comes with a 13th Generation Intel Core H-Series processor, optional NVIDIA GeForce RTX 4060 graphics, DDR5 memory, and 512GB dual SSD storage for speed and efficiency. This experience-focused model also comes with user-facing harman/kardon® speakers, a magnetic pogo-pin connection on the top of the screen for optional Lenovo Magic Bay accessories, and user-comfort features that include TÜV Eyesafe® and TÜV Low Blue Light certifications.[2]

**Lenovo ThinkBook 16p Gen 4** *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**

### Connects with Android or iOS phones

Intel Unison™ connects Windows-based PCs to Android and iOS phones and tablets**

*Apple Continuity connects only macOS devices to iOS phones*

### More business-focused connections

1x Thunderbolt™ 4 port
1x USB-C port
2x USB-A ports***
1x SD card reader
1x HDMI port
1x headphone/mic combo
1x pogo-pin connector (for Magic Bay accessories)
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****

*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."[5]
**Intel Unison is currently available on Windows-based PCs. Some premium features are only available on eligible designs. All devices must run a supported OS version. See intel.com/performance-wireless for details.
***USB-A is a common connection type for wired and wireless connections to office essentials such as printers, scanners, mice, and external hard drives.[6]

## 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."[7] 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.[8]

## How we tested

Before we started our hands-on evaluation, we set the Windows power mode on the Lenovo ThinkBook 16p Gen 4 to Best performance. We also set the 16-inch MacBook Pro (2023) to High-Power Mode. What we tested:

- **Lenovo ThinkBook 16p Gen 4** running Windows 11 Pro, powered by a 14-core 13th generation Intel Core i9-13900H processor (4.1 – 5.4 GHz), NVIDIA GeForce RTX 4060 graphics, 32 GB of DDR5-5200 memory, and 1 TB of PCIe® Gen 4 SSD storage. Cost on July 12, 2023: $1,739.46.
- **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, 32 GB of unified memory, and 1 TB of SSD storage. Cost on July 12, 2023: $3,499.00.

Even with the optional NVIDIA GeForce RTX 4060 discrete graphics included, the Lenovo ThinkBook 16p Gen 4 was still half as expensive as the 16-inch MacBook Pro (2023).

We ran a variety of benchmarks to assess productivity, content creation, and machine learning performance on the two laptops:

- **Blender** is a content creation benchmark that measures rendering performance and speed by evaluating how many samples per minute systems can handle.[9]
- **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.[10]
- **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.[11]
- **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.[12]
- **Maxon Redshift 3D Renderer** is a content creation benchmark that measures how long systems take to load and render a 3D scene.[13]
- **MLPerf ResNet-50** is a computer vision machine learning (ML) model that measures how many samples per second systems can process.[14]
- **PugetBench for Photoshop** is a content creation benchmark that compares Adobe® Photoshop® performance.[15]
- **Speedtest®** by Ookla measures the upload and download speeds between each laptop and a test server, through the Google Chrome™ browser.[16]
- **Topaz Video AI** is a content creation benchmark that evaluates how well systems handle algorithm-fueled video enhancement tasks.[17]
- **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.[18]

To round out our user-focused testing, we hand-timed how long it took to complete Microsoft 365 and Adobe Photoshop tasks. We also compared CPU usage during Zoom meetings and conducted specialized 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 these results. For more information on these 16-inch laptops as well as our testing parameters and procedures, see the science behind the report.

# System performance evaluation

Whether you're in marketing, business automation, development, or content creation, a creative mindset is an asset. Another important asset is a powerful laptop that is as talented and multi-faceted as you are.

## Day-to-day tasks

CrossMark uses models of real-world applications to measure responsiveness and performance, so higher overall scores here provide insight into how a system might perform common office productivity tasks.

Most creatives and professionals access web browsers and web-based applications every day. Higher WebXPRT scores indicate a better online experience.

**Crossmark**

Overall score | Higher is better

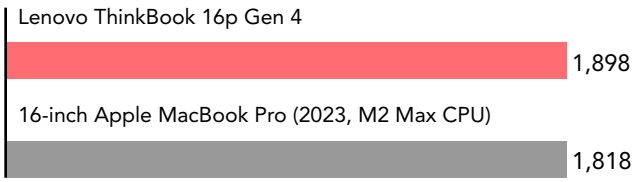



Figure 1: CrossMark overall scores. Higher is better. Source: Principled Technologies.

**WebXPRT 4**

Overall score | Higher is better

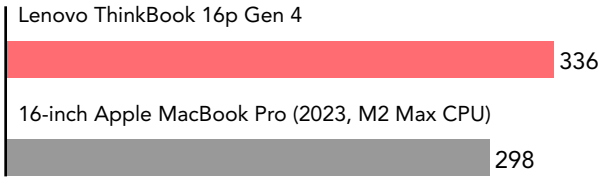



Figure 2: WebXPRT 4 with Chrome overall scores. Higher is better. Source: Principled Technologies.

### About Intel Unison

Intel Unison enables users to sync their PCs with Android or iOS-based phones. With Intel Unison, users can take photos and videos on their phones and transfer them 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.[19]

We tested this feature and found the ThinkBook 16p Gen 4, which is a non-macOS device, paired successfully with an iPhone. We were also able to easily share iPhone files to the ThinkBook and access those files. Apple Continuity connects macOS devices to only iOS phones.

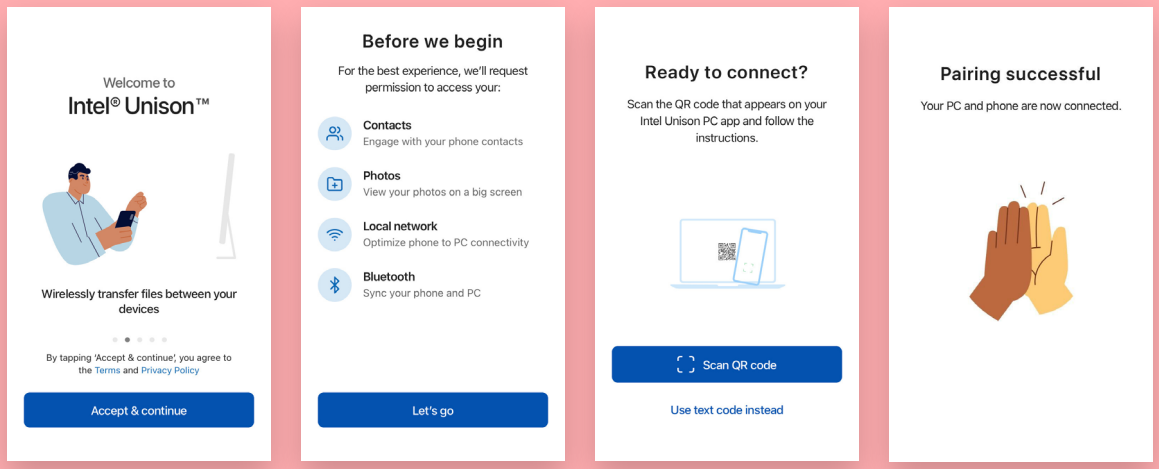



Figure 3: Screenshots of successful pairing of an Apple iPhone and a Lenovo ThinkBook 16p Gen 4 using Intel Unison. Source: Principled Technologies.

We also hand-timed how long it took to boot each system and complete a variety of Microsoft 365 tasks many office users regularly do. The Lenovo ThinkBook 16p Gen 4 finished these common tasks in slightly less time than the Apple MacBook Pro (2023). These tiny speed bumps may not seem like much on the surface—but anyone toggling between applications multiple times a day understands how these micro-frustrations can really add up over the course of a week or a month. The faster system has the potential to improve both your mood and your productivity.

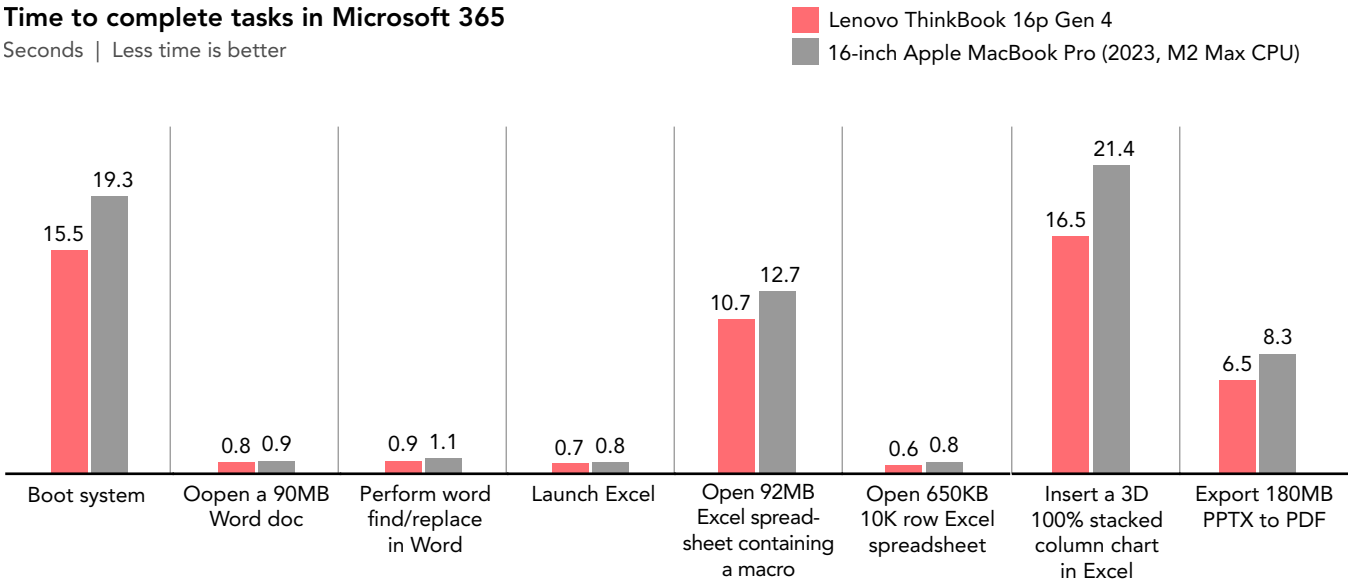



Figure 4: Time to boot the system and complete various tasks with Microsoft Office 365. Lower times are better. Source: Principled Technologies.

Bandwidth is measured in megabits per second (Mbps). The more data a laptop transfers per second, the smoother the web browsing experience.

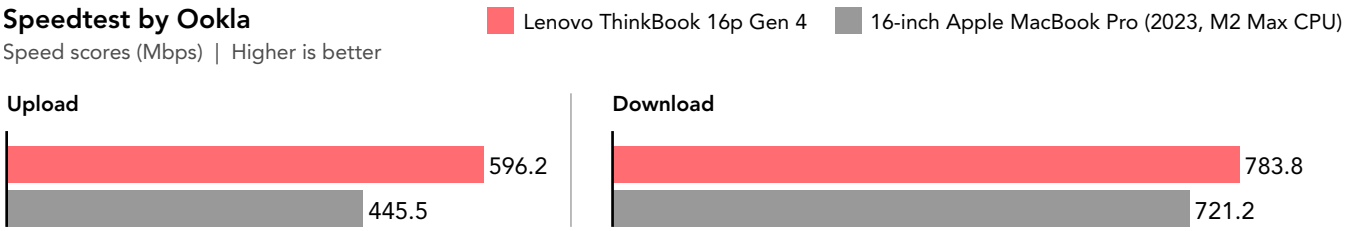



Figure 5: Speedtest by Ookla upload and download speed scores on Chrome. Higher is better. Source: Principled Technologies.

## ThinkBook 16p Gen 4 sustainability

New data shows that 82 percent of consumers are willing to pay more for sustainable packaging.[20] One of the ways Lenovo is committed to reaching net-zero emissions by 2050 is through providing environmentally conscious products. To this end, Lenovo states that the Lenovo ThinkBook 16p Gen 4 is ENERGY STAR, EPEAT Gold, and FSC certified with these eco-friendly specs:

- Various components are made from post-consumer (PCC) content
- The keyboard frame contains 50 percent recycled aluminum
- The AC adapter contains 30 percent recycled plastic[21]

## 3D modeling and rendering

Higher Cinebench R23 scores highlight systems that have the power to better handle resource-intensive tasks such as CAD programs, complex spreadsheets, and scientific simulations.

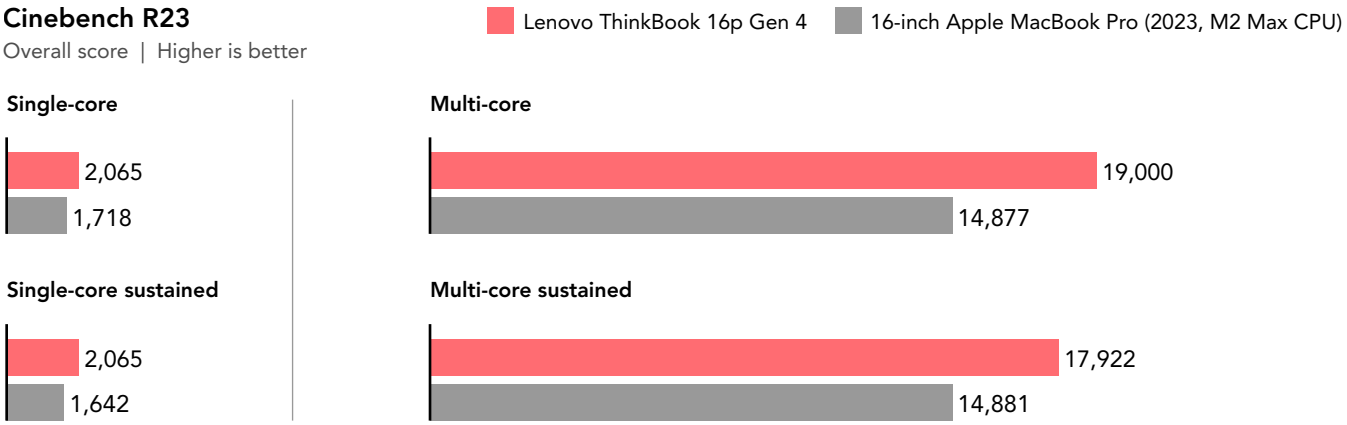



Figure 6: Cinebench R23 scores. Higher is better. Source: Principled Technologies.

The noticeable bump in Blender 3.5 samples per minute and decreased Maxon Redshift render time show how much better equipped the Lenovo ThinkBook 16p Gen 4 is to handle resource-intensive applications and complex workflows compared to the Apple MacBook Pro (2023).

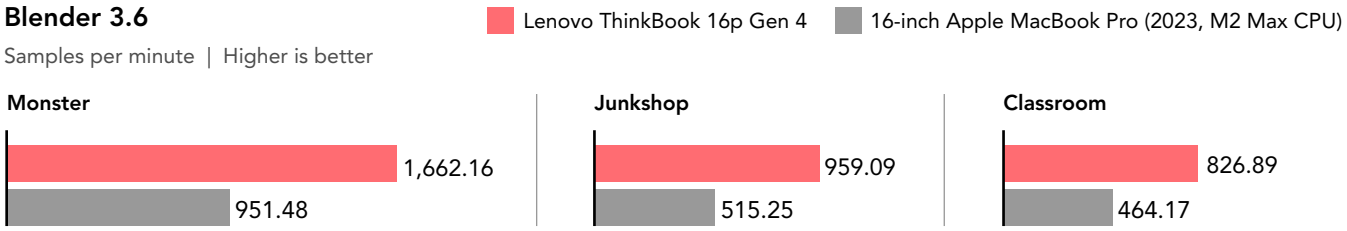



Figure 7: Blender benchmark samples per minute. Higher is better. Source: Principled Technologies.

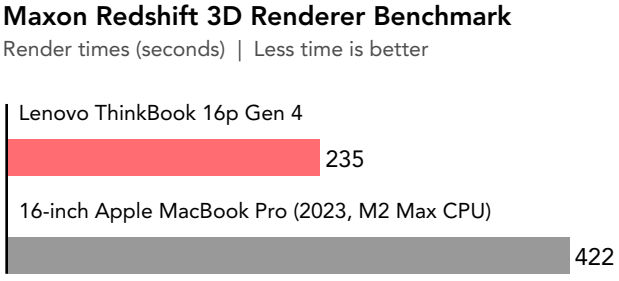



Figure 8: Maxon Redshift 3D renderer benchmark render time. Less time is better. Source: Principled Technologies.

## Video editing

Video encoding, used to compress video while maintaining quality, is a resource-intensive activity for any system.[22] The HandBrake Hardware 4K H.265 encoder stresses CPU, memory, and GPU, which makes this a helpful indicator of content creation performance.

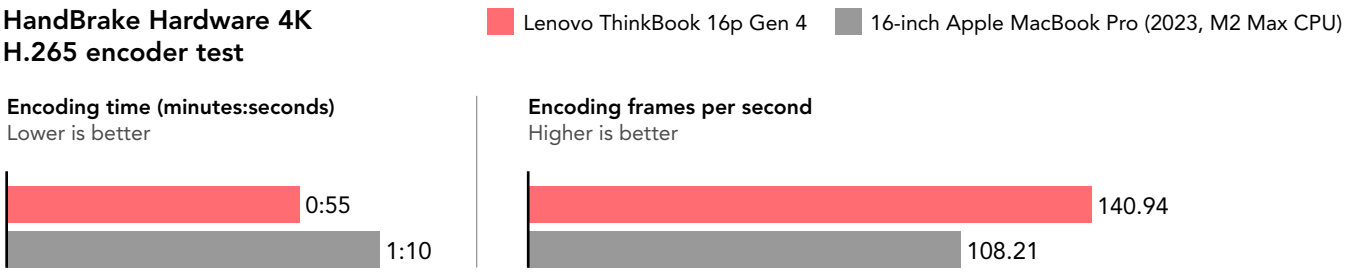



Figure 9: Handbrake Hardware 4K H.265 encoder test results. Less time is better, and more FPS is better. Source: Principled Technologies.

Video AI applications use algorithms to enhance the quality and resolution of videos. Higher Topaz Video AI frames per second in both 1,080p (FHD) and 4K resolutions suggest that the M2 Max processor-powered Apple MacBook Pro (2023) has less compute power for this kind of work than the Intel Core i9-13900H processor-powered Lenovo ThinkBook 16p Gen 4.

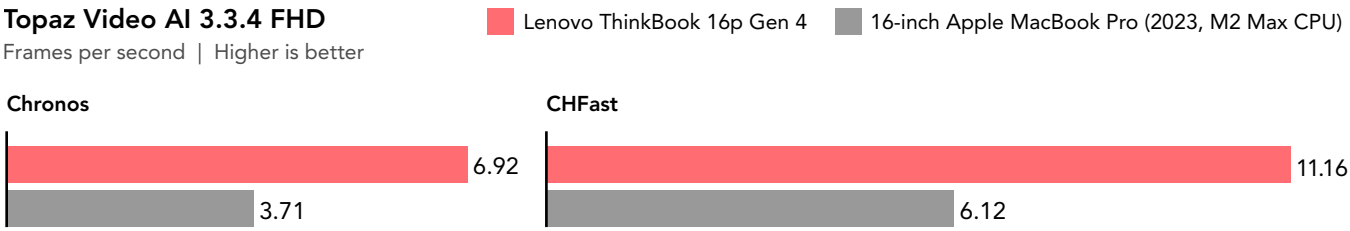



Figure 10: Frames per second each solution achieved on Topaz Video AI 3.3.4 FHD. Higher is better. Source: Principled Technologies.

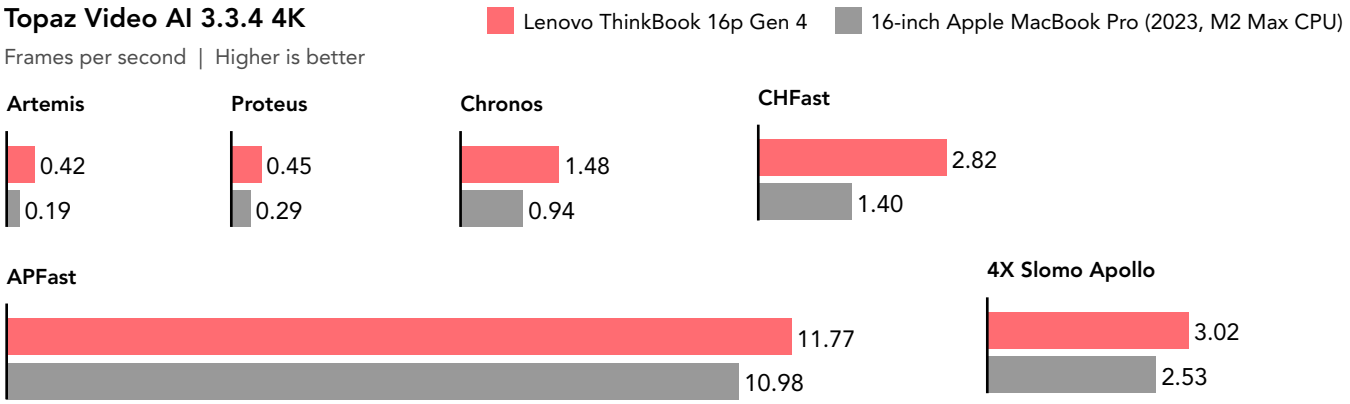



Figure 11: Frames per second each solution achieved on Topaz Video AI 3.3.4 4K. Higher is better. Source: Principled Technologies.

## Photo editing

PugetBench for Photoshop evaluates a system's photo-editing performance while completing a broad range of common Adobe Photoshop activities. The benchmark then assigns an overall score to each system. We also hand-timed how long it took to complete an Adobe Photoshop workflow. We found that the Lenovo ThinkBook 16p Gen 4 scored higher in the benchmark test and saved time in the content creation workflow.

**PugetBench for Photoshop**

Score | Higher is better

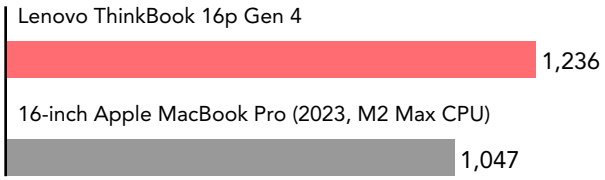



Figure 12: PugetBench for Photoshop overall scores. Higher is better. Source: Principled Technologies.

**Process a 50 RAW .NEF file and save to JPEG in Adobe Photoshop**

Time (seconds) | Less time is better

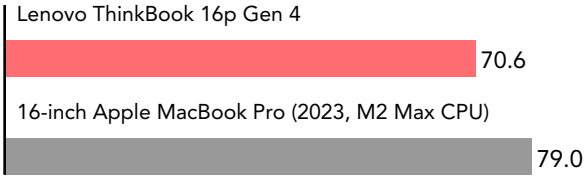



Figure 13: Time to image process a 50 RAW .NEF file and save image to JPEG in Adobe Photoshop. Less time is better. Source: Principled Technologies.

## Machine learning comparison

To see how competently each system could identify and classify objects and people, we ran the MLPerf ResNet-50 machine learning model in the offline scenario. This ML model '[a]ssigns a label from a fixed set of categories to an input image, i.e., applies to computer vision problems."[23] The ResNet computer vision model measures speech recognition performance. Examples of computer vision applications include robotic automation, facial recognition, medical anomaly detection, and self-driving cars.[24] The samples per second delta between the Intel Core i9-13900H processor- and NVIDIA GeForce RTX 4060 graphics-powered Lenovo ThinkBook 16p Gen 4 compared to the M2 Max processor-powered Apple MacBook Pro (2023) is huge. This shows the AI-processing strength of having both a powerful CPU and a powerful GPU.

**ResNet 50**

Samples per second | Higher is better

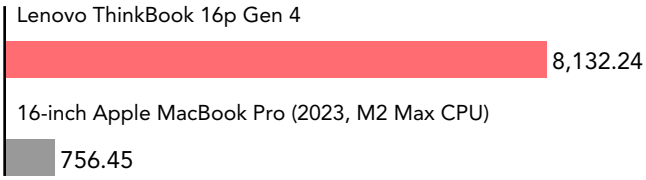



Figure 14: Number of samples per second each laptop classified using the ResNet-50 model in the offline scenario. Higher numbers of samples are better. Source: Principled Technologies.

# Remote collaboration experiences

With many companies embracing remote and hybrid work environments, the video-conferencing tools and audio components we rely on to connect and engage widespread participants are more important than ever. In addition to the performances wins we outline in this section, the Lenovo ThinkBook 16p Gen 4 provides a unique opportunity to shine with Magic Bay accessories: Lenovo Magic Bay Light, Lenovo Magic Bay 4K Webcam, and Lenovo Magic Bay LTE. These modular components are only available with the Lenovo ThinkBook 16p Gen 4. Lenovo Magic Bay accessories are designed to help professionals put their best foot forward and provide 4G hotspot internet access for spotty Wi-Fi areas.[25]

## Zoom video conferencing

Video meetings are pivotal in remote and hybrid work environments—but can tax the CPU. When Zoom hogs too much CPU, users 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.

Lower Zoom CPU usage is pivotal 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.

**System maximum CPU utilization while using Zoom**

Percent utilization | Lower is better

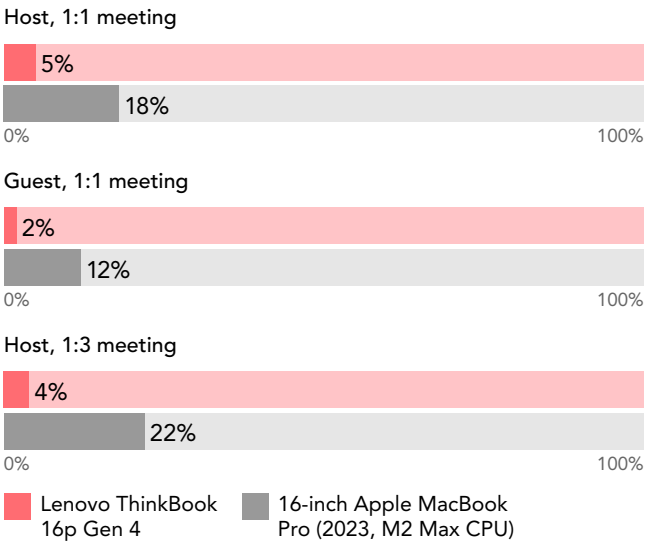



Figure 15: Zoom CPU usage, as reported by Zoom. Lower usage is better. Source: Principled Technologies.

### 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.[26] 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.[27]

## Background noise reduction

A useful remote collaboration component is effective background noise reduction. We found that the Lenovo ThinkBook 16p Gen 4 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.[28,29] 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.

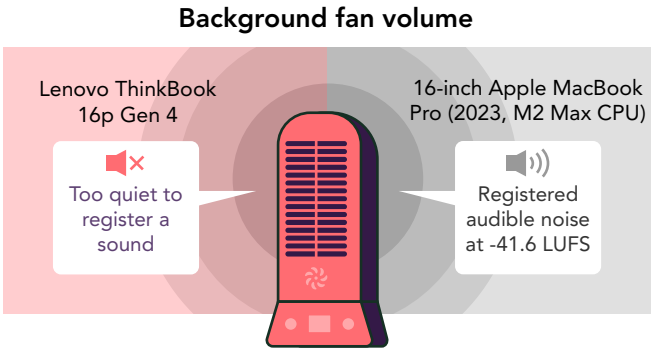



Figure 16: Microphone test background fan volume results. Lower LUFS, which is a standard loudness measurement, are better. Source: Principled Technologies.

## Speaker volume output

Whether you need to step away from your laptop 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 laptop. To reach our 64dB target, the four harman/Kardon speakers on the ThinkBook 16p Gen 4 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.[30] To account for variances in speech patterns and voice modulation, we set the target dB to 64.

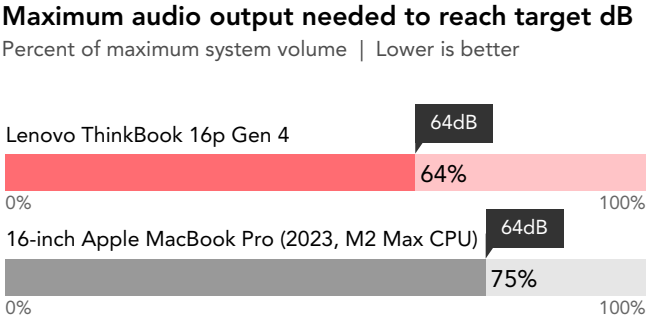
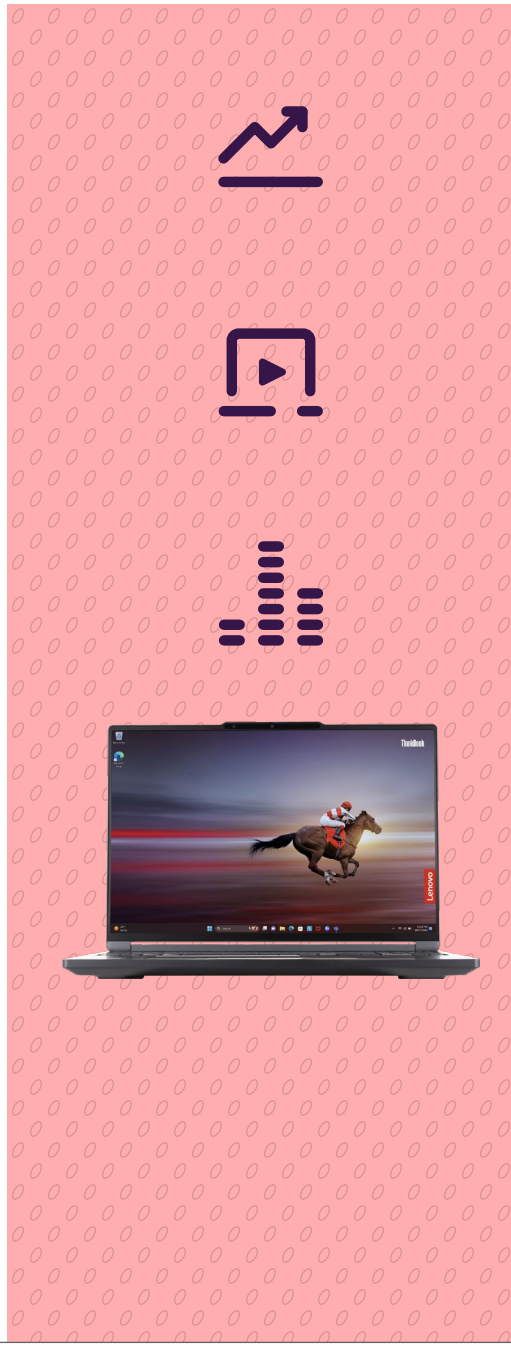



Figure 17: Speaker volume output level results. Lower is better. Source: Principled Technologies.

## Conclusion

The redesigned Lenovo ThinkBook 16p Gen 4, which delivered on performance and cutting-edge innovation, was $1,759.54 less expensive than a 16-inch Apple MacBook Pro (2023) when we ordered systems for this appraisal. In addition to receiving higher productivity, content creation, and ML benchmarks scores and completing Microsoft 365 and Adobe Photoshop tasks in less time, the Lenovo ThinkBook 16p Gen 4 also provided better video conferencing user experiences than the Apple MacBook Pro (2023).

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