



### Better portability

Over 6 oz. (.19 kg) lighter



### Better performance

Faster Adobe Premiere® Pro video project export times

Higher Cinebench R23, Geekbench 5, Redshift 3D, Blender, and Onshape benchmark scores

Higher Shadow of Tomb Raider in-game benchmark numbers



### Better online collaboration

Faster upload and download speeds on Speedtest®



## Lenovo ThinkPad X1 Extreme Gen 4: Empower productivity with better portability, performance, and online collaboration capabilities

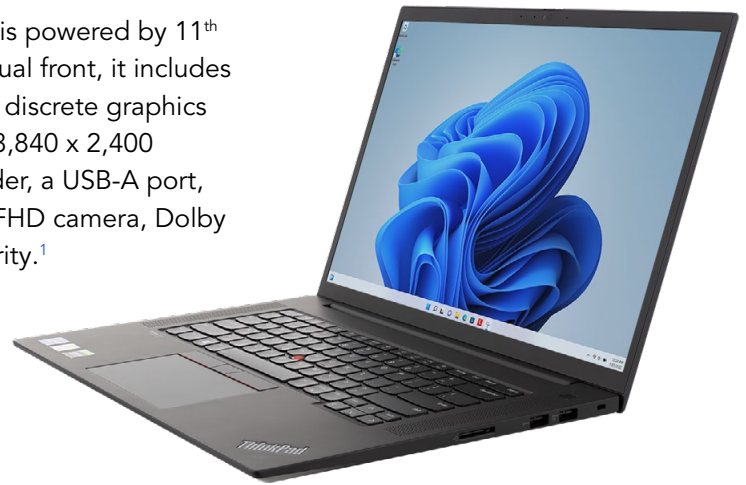
### Compared to a 16-inch Apple MacBook Pro

Whether your existing laptop is getting slow or you're responsible for providing computers for your entire company, big screens and desktop-caliber processors give power users more room to work and the ability to fly through tasks.

In our hands-on evaluation of two 16-inch professional laptops, a Lenovo® ThinkPad® X1 Extreme Gen 4 powered by an 11<sup>th</sup> Gen Intel® Core™ i9 vPro® H Series processor was lighter, delivered overall better performance, and achieved faster internet connection speeds than a 16-inch Apple® MacBook Pro® powered by an Apple M1 Max chip. Read on for an in-depth look at our one-on-one 16-inch professional laptop comparison.

## Lenovo ThinkPad X1 Extreme Gen 4

This 16-inch touchscreen-capable professional laptop is powered by 11<sup>th</sup> Gen Intel Core i9 vPro H Series processors. On the visual front, it includes Intel UHD Graphics as well as NVIDIA® GeForce RTX™ discrete graphics on a UHD+ or QHD+ display with Dolby Vision™ and 3,840 x 2,400 resolution. It also has Wi-Fi 6E capabilities, an SD reader, a USB-A port, and 2 USB-C Thunderbolt 4 ports. It also contains an FHD camera, Dolby Atmos® speaker system, and ThinkShield built-in security.<sup>1</sup> Learn more at <http://lenovo.com/thinkpad>.








 Touch screen	✓	✗
 Surface area	142.00 sq. in. (916.12 sq. cm.)	136.64 sq. in. (881.54 sq. cm.)
 Weight	4.31 lbs. (1.95 kg)	4.74 lbs. (2.15 kg)
 Connectivity	Wi-Fi 6E	Wi-Fi 6
 Bluetooth	5.2	5.0

Figure 1: Lenovo ThinkPad X1 Extreme Gen 4 vs. Apple MacBook Pro 16-inch.  
Source: Principled Technologies.

## Why is ThinkPad popular with professionals?

While we found many web sites extolling the design and serviceability advantages Lenovo ThinkPad brings to the business table, *Management Weekly* made the broadest claim: "In the end, it is the combination of unique no-nonsense design, reliability, and functionality that makes these laptops the best business laptops."<sup>4</sup>

## Optimize your technology spending

Like Goldilocks helping herself to the bears' porridge in "Goldilocks and the Three Bears," it's sometimes hard for buyers to know which professional laptop is going to provide what they want and need without first trying it out. While both professional laptops we tested contain powerful processors, we were unable to get our hands on a ThinkPad X1 Extreme with the same amount of RAM that was in the MacBook Pro. Because of its greater memory and a higher number of CPU cores, the 16-inch MacBook Pro, on paper, looks like it should blow the ThinkPad X1 Extreme Gen 4 out of the water when it comes to performance. It didn't. Lesson learned: Hands-on performance tests are as informative as taste tests.

Before we started performance testing, we set the Windows power mode on the Lenovo ThinkPad X1 Extreme Gen 4 to "Best performance" and the power mode on the Apple MacBook Pro to "High Performance." Otherwise, we used out-of-box OEM performance settings for both professional laptops:

- Lenovo ThinkPad X1 Extreme Gen 4 configured with Windows 11 Pro, an 8-core 11<sup>th</sup> Gen Intel Core i9-11950H vPro processor, Intel UHD Graphics, NVIDIA® GeForce RTX™ 3080 discrete graphics, 32 GB of memory, 512 GB of SSD storage, and a 90-Whr battery. MSRP on July 12, 2022: \$3,753.60.
- Apple MacBook Pro (16-inch) configured with macOS® Monterey, an Apple M1 Max chip (10-core CPU, 32-core GPU, 16-core neural engine), 64 GB of memory, 2 TB of SSD storage, and a 100-Whr battery. MSRP on July 12, 2022: \$4,299.00.

For a broad look at performance, we compared the professional laptops in multiple ways. First, we hand-timed how long it took to launch a browser and load 20 tabs in a multi-tasking scenario. Then, we hand-timed how long it took to complete an Adobe Premiere Pro app-based task. After that, we ran multiple benchmarks, performed speed tests, and took selfies with both webcams. The hand-timed task completions, benchmark scores, and webcam 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 professional laptops as well as our testing parameters and procedures, see the [science behind the report](#).





## Protect your back

One of the advantages of a high-end professional laptop is that you can use it both in the office and at home. That makes the size and weight of what you're carting matter. We found that the ThinkPad X1 Extreme Gen 4 was almost 7 ounces lighter than the 16-inch MacBook Pro. That's the weight of an adult hamster.<sup>5</sup>

Now think about how you move from cubicle to conference room or home office to couch—do you tuck the closed device under your arm as you scurry from one place to the other or do you carry it in front of you like Rafiki presenting Simba to the world in the opening musical number of *The Lion King*?<sup>6</sup> The bad posture behaviors we unconsciously adopt can have a negative effect on our bodies. In 2020, *The Journal of the American Medical Association (JAMA)* reported that insurance companies and individuals spend more on low back pain and neck pain treatments than they do on diabetes or heart disease treatments.<sup>7</sup> So, be conscious when you're walking to that team meeting or loading your work bag with "essentials"—your back (and your savings account) will thank you later.



## Empower productivity

Power users are typically knowledgeable computer, internet, and software consumers who rely on advanced software and resource-intensive apps to do their jobs. These applications can bog down lesser computers. So, we performed multiple hands-on and benchmark-based tests to see how each competitor handled resource-intensive tasks. Remember when you look at these results that the ThinkPad X1 Extreme Gen 4 we tested was equipped with half the RAM than its competitor—and, in many tests, it still came out ahead.

### Hand-timed performance metrics

Opening multiple tabs one after another—or leaving tabs open for easy reference during a video conference call—can tax even the most powerful computer. And, in cases where power users rely on resource-intensive apps to move projects along, multi-tasking can result in long wait times at the absolutely wrong moment.

#### Comparable time to execute a web-browsing multi-tasking scenario

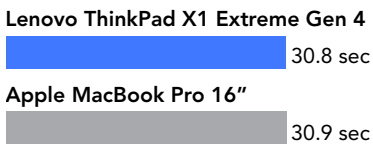


Figure 2: Time to launch the browser and load 20 tabs. Lower is better. Source: Principled Technologies.

#### 20.3% less time to render a 5K RED video project

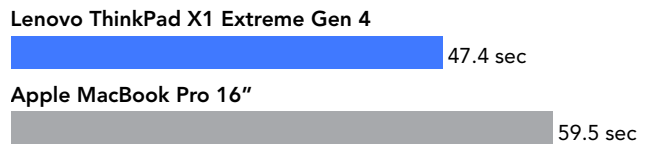


Figure 3: Time to complete a 5K RED render in Adobe Premiere Pro. Lower is better. Source: Principled Technologies.



### 3.7% higher Cinebench R23 initial performance single-core scores

#### Lenovo ThinkPad X1 Extreme Gen 4

1,589

#### Apple MacBook Pro 16"

1,532

Figure 4: Cinebench R23 initial performance single-core scores after a single run. Higher is better. Source: Principled Technologies.

### 2.8% higher Cinebench R23 initial performance multi-core scores

#### Lenovo ThinkPad X1 Extreme Gen 4

12,745

#### Apple MacBook Pro 16"

12,393

Figure 5: Cinebench R23 initial performance multi-core scores after a single run. Higher is better. Source: Principled Technologies.

### 2.3% higher Cinebench R23 sustained performance single-core scores

#### Lenovo ThinkPad X1 Extreme Gen 4

1,568

#### Apple MacBook Pro 16"

1,532

Figure 6: Cinebench R23 sustained performance single-core scores after 30 runs. Higher is better. Source: Principled Technologies.

### 86.3% higher Geekbench 5 GPU initial performance scores

#### Lenovo ThinkPad X1 Extreme Gen 4

117,565

#### Apple MacBook Pro 16"

63,103

Figure 7: Geekbench 5 Pro GPU initial performance scores after a single run. Higher is better. Source: Principled Technologies.

### 96.1% higher Geekbench 5 GPU sustained performance scores

#### Lenovo ThinkPad X1 Extreme Gen 4

121,967

#### Apple MacBook Pro 16"

62,193

Figure 8: Geekbench 5 Pro GPU sustained performance scores after 30 runs. Higher is better. Source: Principled Technologies.

## Benchmark performance metrics

You may not process images or edit videos—but the resource-intensive benchmarks we used are a controlled way to compare overall system performance. For example, higher multi-core scores can translate to speedier response times on 3D modeling and rendering programs, graphics-intensive games, scientific simulation software, demanding productivity apps, product development and design software, and financial analysis tools.

### About the benchmarks

- Maxon Cinebench evaluates computer hardware capabilities by running processor-intensive Cinema 4D software and capturing system performance results.<sup>8</sup>
- Geekbench 5 measures CPU and GPU performance capabilities “by performing tests that are representative of real-world tasks and applications.”<sup>9</sup>
- Maxon Redshift is a production-class render engine that evaluates GPU-intensive rendering performance.<sup>10</sup>
- Blender measures CPU and GPU performance through the “amount of sample per minute that a CPU or GPU can compute.”<sup>11</sup>
- Onshape online performance check provides the browser and GPU with an increasing workload and reports the device limits when the lines and triangles per second framerates start to drop.<sup>12</sup>



**37.7% less time to render a Maxon Redshift 3D project**

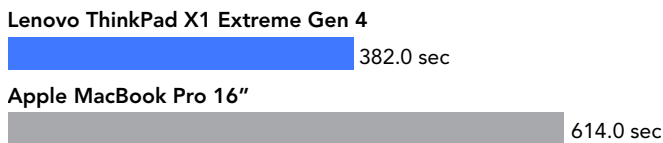


Figure 9: Time to render a Maxon Redshift 3D project. Lower is better. Source: Principled Technologies.

**3.22x more samples per minute when running a 3D monster workload on Blender**

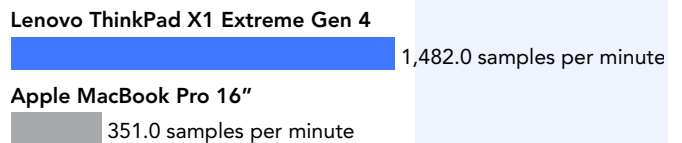


Figure 10: Samples per minute when running a 3D monster workload on Blender. Higher is better. Source: Principled Technologies.

**3.74x more samples per minute when running a 3D junkshop workload on Blender**

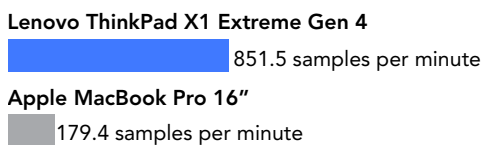


Figure 11: Samples per minute when running a 3D junkshop workload on Blender. Higher is better. Source: Principled Technologies.

**3.47x more samples per minute when running a 3D classroom workload on Blender**

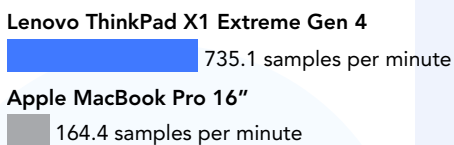


Figure 12: Samples per minute when running a 3D classroom workload on Blender. Higher is better. Source: Principled Technologies.

**3.2% more lines per second**

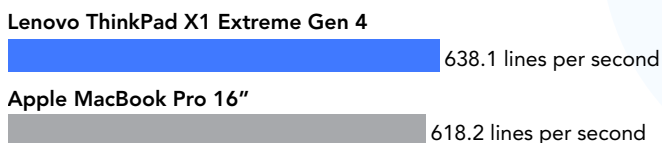


Figure 13: Onshape online performance check benchmark measured in lines per second. Higher is better. Source: Principled Technologies.

**Comparable triangles per second**

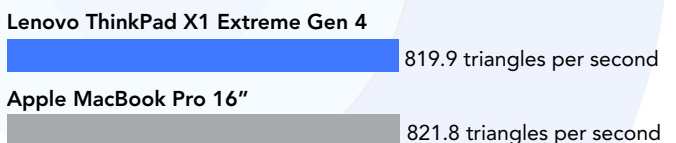


Figure 14: Onshape online performance check benchmark measured in triangles per second. Higher is better. Source: Principled Technologies.

## In-game performance metrics

The benchmark built into Shadow of the Tomb Raider measures the in-game frames rendered and frame rate (expressed in FPS, or frames per second). The ThinkPad X1 Extreme Gen 4 received higher marks in both comparisons.

### 23.8% higher Shadow of the Tomb Raider in-game benchmark frames rendered

**Lenovo ThinkPad X1 Extreme Gen 4**



**Apple MacBook Pro 16"**



Figure 15: Shadow of the Tomb Raider in-game benchmark frames rendered. Higher is better. Source: Principled Technologies.

### 22.8% higher Shadow of the Tomb Raider in-game benchmark FPS

**Lenovo ThinkPad X1 Extreme Gen 4**



**Apple MacBook Pro 16"**



Figure 16: Shadow of the Tomb Raider in-game benchmark frame rate. Higher is better. Source: Principled Technologies.





## Empower online collaboration

Filling a swimming pool with water takes less time with a fire hose than it does with a garden hose. Sure, both will do the job—but one will be much faster. It's the same with bandwidth, which is measured in megabits per second (Mbps). We used Speedtest by Ookla® to measure the upload and download speeds between each professional laptops and the test server, through the Chrome web browser.<sup>13</sup> Downloading activities include downloading work files from the cloud, streaming videos, and doing online research. Uploading activities include sharing content with colleagues and clients, sending email, and video conferencing.<sup>14</sup> The more data a device transfers per second, the smoother your browsing experience. While internet connection quality is the primary determining factor for online speed, it is not the only factor. We controlled internet connection speed during our speed tests—so we can attribute these time differences to the devices themselves.

### 13.2% faster download speeds

Lenovo ThinkPad X1 Extreme Gen 4



Apple MacBook Pro 16"



Figure 17: Speedtest by Ookla download speed scores on Chrome. Higher is better. Source: Principled Technologies.

### 9.4% faster upload speeds

Lenovo ThinkPad X1 Extreme Gen 4



Apple MacBook Pro 16"



Figure 18: Speedtest by Ookla upload speed scores on Chrome. Higher is better. Source: Principled Technologies.

## Stay connected

When you can't be in the same room as clients and coworkers, video calls and virtual meetings are one way to connect. The ability to see facial expressions and body language goes a long way to making people feel more connected, productive, and engaged. See for yourself—which webcam provided the better-quality image?



Figure 19: Unedited selfie taken in dim light on the Lenovo ThinkPad X1 Extreme Gen 4 (15.2 lux). Source: Principled Technologies.



Figure 20: Unedited selfie taken in dim light on the 16-inch Apple MacBook Pro (15.2 lux). Source: Principled Technologies.



## Conclusion

An important tool for anyone who relies on advanced software is a powerful laptop that can handle resource-intensive applications. We found that a Lenovo ThinkPad X1 Extreme Gen 4 powered by an 11<sup>th</sup> Gen Intel Core i9 vPro H Series processor and equipped with half the RAM of its competitor, completed multi-tasking and Adobe Premiere Pro scenarios faster, achieved faster internet connections speeds, and received higher performance-based scores in multiple resource-intensive benchmark tests than a 16-inch Apple MacBook Pro powered by an Apple M1 Max chip.

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Read the science behind this report at <https://facts.pt/hFF3YMw> ►



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