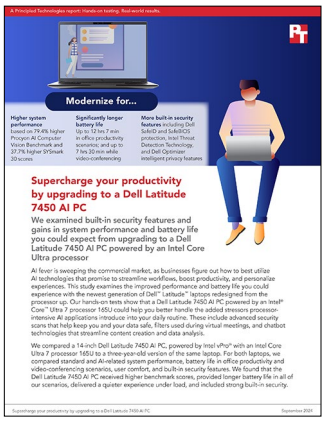

The science behind the report:

Supercharge your productivity by upgrading to a Dell Latitude 7450 AI PC

This document describes what we tested, how we tested, and what we found. To learn how these facts translate into real-world benefits, read the report Supercharge your productivity by upgrading to a Dell Latitude 7450 AI PC.

We concluded our hands-on testing on August 26, 2024. During testing, we determined the appropriate hardware and software configurations and applied updates as they became available. The results in this report reflect configurations that we finalized on May 17, 2024 or earlier. Unavoidably, these configurations may not represent the latest versions available when this report appears.

Our results

To learn more about how we have calculated the wins in this report, go to http://facts.pt/calculating-and-highlighting-wins. Unless we state otherwise, we have followed the rules and principles we outline in that document.

Table 1: Median results of our general system responsiveness benchmark testing. We ran each test three times. Higher benchmark scores are better.

	Dell Latitude™ 7450 AI PC	Dell Latitude 7420 laptop	Percentage difference
CrossMark®			
Overall rating	**1,569**	**1,368**	**14.69**
Productivity	1,490	1,417	5.15
Creativity	1,759	1,348	30.49
Responsiveness	1,306	1,294	0.93
Procyon® Office Productivity Benchmark			
Overall rating	**6,287**	**5,165**	**21.72**
Word score	6,666	5,469	21.89
Excel score	6,381	5,081	25.59
PowerPoint score	6,570	5,599	17.34
Outlook score	4,974	4,054	22.69

	Dell Latitude™ 7450 AI PC	Dell Latitude 7420 laptop	Percentage difference
SYSmark® 30			
Overall rating	**1,718**	**1,247**	**37.77**
Office Applications	1,479	1,066	38.74
General Productivity	1,462	1,276	14.58
Photo Editing	1,534	1,201	27.73
Adv. Content Creation	2,625	1,481	77.25
WebXPRT 4 (Chrome web browser)			
Overall score	**315**	**256**	**23.05**
Photo Enhancement (ms) lower is better	265	282	6.03
Organize Album using AI (ms) lower is better	1,131	1,764	35.88
Stock Option Pricing (ms) lower is better	71	83	14.46
Encrypt Notes and OCR Scan (ms) lower is better	693	833	16.81
Sales Graph (ms) lower is better	180	223	19.28
Online Homework (ms) lower is better	1,498	1,823	17.83
PugetBench for Premiere Pro			
Overall rating	**2,399**	**1,530**	**56.80**

Table 2: Median results of our AI benchmark testing. We ran each test three times. Higher benchmark scores and lower times are better.

	Dell Latitude 7450 AI PC	Dell Latitude 7420 laptop	Percentage difference
Procyon AI Computer Vision (Intel® OpenVINO™)			
Overall score	**497**	**277**	**79.42**
Stable Diffusion benchmark			
Overall score	**57**	**37**	**54.05**
Overall time taken	1,736.77	2,685.31	35.32
Overall image generation speed s/image	108.55	167.83	35.32
PugetBench for DaVinci Resolve			
Overall score	**390.00**	**285.00**	**36.84**

Table 3: Median results of our battery life testing. We ran each test three times. Time reported in minutes. Higher numbers are better.

	Dell Latitude 7450 AI PC	Dell Latitude 7420 laptop	Percentage difference
MobileMark benchmark			
Time	609	292	108.56
Normalized efficiency	10.68	4.63	130.52
Procyon Battery Life Benchmark			
Time	727	327	122.32
Normalized efficiency	12.75	5.19	145.73
Microsoft Teams			
Time	272	108	151.85
Normalized efficiency	4.77	1.71	178.36
Zoom			
Time	278	113	146.02
Normalized efficiency	4.88	1.79	171.91

Table 4: Median results of our general workflow testing. We completed each workflow three times. Time reported in seconds. Lower times are better.

	Dell Latitude 7450 AI PC	Dell Latitude 7420 laptop	Percentage difference
Productivity workflow			
Microsoft 365 PowerPoint tasks			
Time to launch	1.43	1.88	23.94
Time to start slide show	0.78	0.97	19.59
Time to export 180MB PPTX to PDF	8.43	9.63	12.46
Microsoft 365 Excel tasks			
Time to launch	1.81	1.94	6.70
Time to open 92MB Excel spreadsheet containing macro	15.98	15.6	-2.44
Time to open 650KB 10K row Excel spreadsheet	1.05	0.96	-9.38
Time to insert 3-D 100% stacked column chart	16.84	23.97	29.75
Microsoft 365 Word tasks			
Time to launch	1.49	2.12	29.72
Time to open 90MB Word document	1.56	1.7	8.24
Time to perform word Find/Replace	1.29	1.63	20.86
Time to export to PDF	5.5	6.27	12.28
Web-browsing task			
Time to navigate to webpage and launch 20 tabs	30.65	32.11	4.55
Total time			
Time to complete all tasks	**86.81**	**98.78**	**12.12**

	Dell Latitude 7450 AI PC	Dell Latitude 7420 laptop	Percentage difference
Content creation workflow			
Adobe® Lightroom® Classic tasks			
Time to launch	7.3	9.82	25.66
Time to create photomerge panorama	42.95	53.71	20.03
Adobe Photoshop® tasks			
Time to launch - Median (Lower is better)	8.22	10.72	23.32
Time to image process 50 RAW .NEF file and save image to JPEG	80.76	97.49	17.16
HDR preview	15.51	17.71	12.42
HDR image creation	4.9	6.09	19.54
Create Panorama	66.1	82.53	19.91
Adobe Premiere Pro tasks			
Time to launch	11.91	16.05	25.79
Time to image process 50 RAW .NEF file and save image to JPEG	52.87	102.6	48.47
Total time			
Time to complete all tasks	**290.52**	**396.72**	**26.77**

Table 5: Median results of our AI workflow testing. We completed each workflow three times. Time reported in seconds. Lower times are better.

	Dell Latitude 7450 AI PC	Dell Latitude 7420 laptop	Percentage difference
Content creation workflow			
Audacity task			
Time to generate audio track from text prompt	67.31	99.55	32.39
Adobe Photoshop task			
Time to generate photo fill from text prompt	57.89	84.86	31.78
GIMP task			
Time to generate image from text prompt	37.03	47.70	22.37
Total time			
Time to complete all tasks	**162.23**	**232.11**	**30.11**

Table 6: Median results of our user comfort testing. We completed each measurement three times. Higher benchmark scores and lower temperatures and decibels are better.

	Dell Latitude 7450 AI PC	Dell Latitude 7420 laptop	Differences
Thermal testing			
Cinebench 2024 sustained Performance			
CPU multi-core score	548	222	147%
Temperatures in Celsius (°C)			
Ambient Room	21.5	21.3	-0.2°C
Keyboard deck	39.6	37.8	-1.8°C
Underside of chassis	40.3	40.5	0.2°C
Temperatures in Fahrenheit (°F)			
Ambient room	70.7	70.3	-0.4°F
Keyboard deck	103.3	100.0	-3.3°F
Underside of chassis	104.6	105.1	0.5°F
Acoustic testing			
PT custom audio booth acoustic test			
Average decibel level during 20-minute Cinebench 2024 load	33.09	28.50	-4.59dB

System configuration information

Table 7: Detailed information on the systems we tested.

System configuration information	Dell Latitude 7450 AI PC	Dell Latitude 7420 laptop
Processor		
Vendor	Intel®	Intel
Model number	Core™ Ultra 7 165U	Core i7-1185G7
Core frequency (GHz)	2.10	3.00
Number of cores	12	4
Logical processors	14	8
Memory		
Amount (GB)	32	32
Type	DDR-5	DDR-4
Graphics #1		
Vendor	Intel	Intel
Model number	Intel Graphics	Intel Iris™ Xe Graphics
Storage		
Amount (GB)	512	512
Type (SSD)	NVMe®	NVMe
Connectivity/expansion		
Wireless internet	Intel Wi-Fi 6 AX201	Intel Wi-Fi 6 AX201
Bluetooth	5.4	5.2
USB	2 x USB 3.2 2 x USB-C	1 x USB 3.2 2 x USB-C
Battery		
Type	Integrated Lithium-polymer	Integrated Lithium-polymer
Rated capacity (WHr)	57	63
Display		
Size (in.)	14	14
Resolution	1,920 x 1,080	1,920 x 1,080
Operating system		
Vendor	Microsoft	Microsoft
Name	Windows 11 Pro	Windows 11 Pro
Version	10.0.22631 Build 22631	10.0.22631 Build 22631
BIOS		
BIOS name and version	Dell Inc 1.3.0	Dell Inc 1.34.2

System configuration information	Dell Latitude 7450 AI PC	Dell Latitude 7420 laptop
Dimensions		
Height (in.)	0.72	0.74
Width (in.)	12.32	12.65
Depth (in.)	8.77	8.22
Weight (lbs.)	2.92	2.7

How we tested

Setting up the system

Setting up and updating the OEM image

1. Boot the system.
2. To complete installation, follow the on-screen instructions. Use the default selections when appropriate.
3. Set the Windows (plugged in) Power Mode to Best Performance.
4. Set Screen and Sleep options to Never:
   - Right-click the desktop, and select Display settings.
   - From the left-hand column, select System.
   - Click Power & Battery.
   - For all power options listed under Screen and Sleep, select Never.
5. Disable User Account Control notifications:
   - Select Windows Start, type `UAC`, and press Enter.
   - Move the slider control to Never notify, and click OK.
6. Run Windows Update, and install all updates available.
7. Verify the date and time are correct, and synchronize the system clock with the time server.
8. Pause Automatic Windows Updates:
   - Click Windows Start.
   - Type `Windows Update settings`, and press the Enter key.
   - From the Pause updates drop-down menu, select Pause for 5 weeks.

Measuring system performance with benchmarks

CrossMark testing

Setting up the test

1. Download and install CrossMark from the Microsoft Store.

Running the test

1. Launch CrossMark.
2. Click Settings.
3. For Number of Iterations, choose 1.
4. Enter a valid email address, and click Back.
5. Click Run Benchmark.
6. Record the result.
7. Repeat steps 1 though 6 two more times, and record the median results.

Procyon AI Computer Vision Benchmark testing

Setting up the test

1. Purchase and download the Procyon AI Computer Vision benchmark from https://benchmarks.ul.com/procyon.
2. Install the Procyon benchmark.
3. Launch Procyon.
4. Select Settings, and input the Procyon AI Computer Vision license key.
5. Close Procyon.

Running the test

1. Launch Procyon.
2. Select the Computer Vision test.
3. Click Intel OpenVINO.
4. Select the hardware to run on and the precision to use. We used the following:
   - Legacy system: GPU & FP16
   - New system: NPU & FP16
5. Click Run.
6. When the test completes, record the results, and wait 15 minutes before re-running.
7. Reboot the system.
8. Repeat steps 1 through 7 two more times, and record the median results.

Procyon AI Stable Diffusion Benchmark testing

Setting up the test

1. Purchase and download the Procyon AI Stable Diffusion Benchmark from https://benchmarks.ul.com/procyon.
2. Install the Procyon benchmark.
3. Launch Procyon.
4. Select Settings, and input the Procyon AI Image Generation license key.
5. Close Procyon.

Running the test

1. Launch Procyon.
2. Select the Stable Diffusion test.
3. Click Run.
4. When the test completes, record the results, and wait 15 minutes before re-running.
5. Reboot the system.
6. Repeat steps 1 through 5 two more times, and record the median results.

Procyon Office Productivity Benchmark testing

Setting up the test

1. Install a licensed version of Microsoft 365, and verify the following apps are signed into properly; Excel, PowerPoint, and Word.
2. Purchase and download the Procyon Office Productivity benchmark from https://benchmarks.ul.com/procyon.
3. Install the Procyon benchmark.
4. Launch Procyon.
5. Select Settings, and input the Office Productivity license key.
6. Close Procyon.

Running the test

1. Launch Procyon.
2. Select Test Suite.
3. Select the Office Productivity test.
4. Click Run.
5. When the test completes, record the results, and wait 15 minutes before re-running.
6. Reboot the system.
7. Repeat steps 1 through 6 two more times, and record the median results.

SYSmark 30 testing

Avoiding antivirus software conflicts

SYSmark 30 is not compatible with any virus-scanning software, so we uninstalled any such software before we installed the benchmark.

Avoiding pre-installed software conflicts

SYSmark 30 installs the following applications, which its test scripts employ:

Office applications

- Microsoft Excel 2021
- Microsoft Outlook 2021
- Microsoft PowerPoint 2021
- Microsoft Word 2021

General productivity

- Adobe Acrobat® Pro DC
- Audacity (v 2.3.2)
- Corel WinZip 26.0
- Google Chrome (v 106.0.5249.103)

Photo editing

- Adobe Lightroom® Classic CC (version 11)
- Adobe Photoshop® CC (version 23)

Advanced content creation

- Adobe Photoshop CC (version 23)
- Adobe Premiere CC (version 22)

If any of these applications already exist on the system under test, they could cause problems with the benchmark due to software conflicts. To avoid any such issues, we uninstalled all conflicting pre-installed software applications—including different versions of any of the programs SYSmark 30 uses—before we installed the benchmark.

Using the SYSmark built-in configuration tool

This tool supports three levels of configuration:

1. Only makes changes that are REQUIRED for the benchmark to run.
2. Additionally, makes changes that are RECOMMENDED for repeatable results.
3. Additionally, makes OPTIONAL changes that help ensure best results.

The configuration tool makes the following configuration changes at each of the three levels:

Level 1 - Required

- Disables User Account Control (UAC)
- Set DPI Scaling to 100%
- Disables Low Battery Actions
- Disables Network Proxies
- Disables System Sleep and Hibernate
- Disables Windows Update
- Enable Windows Search
- Disables the WinSAT service

Level 2 - Recommended

- Disables User Account Control
- Set DPI Scaling to 100%
- Disables Low Battery Actions
- Disables Network Proxies
- Disables System Sleep and Hibernate
- Disables Windows Update
- Enables Windows Search
- Disable the WinSAT service
- Create BAPCo power scheme
- Set Power Plan Type to High Performance
- Set CPU High Performance
- Disables Disk Defrag
- Disables Windows Error Reporting
- Disables Windows Lock Screen
- Disables Windows Pop-ups
- Disables Screen Saver and Monitor Timeout
- Disables Windows Sidebar/Gadgets
- Disables Desktop Slideshow
- Set Font Smoothing
- Disables Windows Security Center

Level 3 - Optional

- Disables Hard Disk Timeout
- Disables System Restore
- Ignores Laptop Lid Close
- Enables Dark Mode

We chose the official BAPCo "Run Benchmark" default as outlined in the BAPCo SYSmark 30 User Guide (bapco_sysmark30_user_guide_v1.0.pdf), which runs the benchmark using the Required and Recommended options.

Setting up the test

1. Default options.

Running the test

1. Boot the system.
2. Select Windows Start.
3. Type `cmd`, and press Ctrl+Shift+Enter.
4. Type `Cmd.exe /c start /wait Rundll32.exe advapi32.dll,ProcessIdleTasks`. Do not interact with the system until the command completes.
5. After the command completes, wait five minutes before running the test.
6. Launch SYSmark 30.
7. Click Settings gear.
8. Verify that the iterations are set to the default 1.
9. Verify that Conditioning Run is enabled.
10. Enter a name for the benchmark run.
11. To return to the main menu, click Back.
12. Click Run Benchmark.
13. When the benchmark finishes, record the SYSmark 30 benchmark results.
14. Repeat steps 1 through 13 two more times, and record the median results.

PugetBench for Premiere Pro testing

We used the following application:

- Adobe Premiere Pro
- PugetBench for Creators

Setting up the test

1. Launch Adobe Premiere Pro.
2. Click through the Tutorial pop-up tips.
3. Close Adobe Premiere Pro.
4. Purchase a PugetBench for Premiere Pro license from https://www.pugetsystems.com/pugetbench/creators/.
5. Click Download PugetBench for Creators on Windows.
6. After the download completes, to Install PugetBench, double-click the installation file.
7. Enter the license key in the license field. Click Activate.
8. Click Download Assets.

Running the test

1. Boot the system.
2. Open PugetBench for Creators.
3. Select the Premiere Pro test on the left side of the app.
4. Click Start Test
5. When the benchmark finishes, record the overall score.
6. Close PugetBench for Creators, and restart the system under test.
7. Wait 30 minutes before performing the next run.
8. Repeat steps 1 through 7 two more times, and record the median results.

PugetBench for DaVinci Resolve testing

We used the following application:

- DaVinci Resolve 18 Studio

Setting up the test

1. Purchase, download, and install DaVinci Resolve 18 Studio from https://www.blackmagicdesign.com/products/davinciresolve.
2. Launch DaVinci Resolve Studio.
3. When prompted, enter the DaVinci Resolve Studio registration key.
4. Accept default configuration options and firewall permissions.
5. To confirm the Resolve configuration options, click DaVinci Resolve→Preferences.
6. In the Memory and GPU tab, ensure the GPU processing mode is set to Auto.
7. Close DaVinci Resolve Studio.
8. Purchase a PugetBench for DaVinci Resolve license from https://www.pugetsystems.com/labs/articles/pugetbench-for-davinci-resolve-1523/.
9. Download PugetBench for DaVinci Resolve.
10. When the download completes, unzip the benchmark.

Running the test

1. Boot the system.
2. From the extracted benchmark folder, extract the Run PugetBench for DaVinci Resolve program.
3. Click Run Benchmark.
4. When the benchmark finishes, record the overall score.
5. Wait 30 minutes before performing the next run.
6. Repeat steps 1 through 5 to more times, and record the median results.

WebXPRT 4 testing

Running the test

1. Open the Web browser under test, and go to https://www.principledtechnologies.com/benchmarkxprt/webxprt/.
2. Click Run WebXPRT 4.
3. At the Ready to test your browser screen, click Continue.
4. Click Start.
5. When the test completes, record the results.
6. Click Run Again, and click Start to rerun WebXPRT. Record the results.
7. Repeat step 6 one more time, and record the median results.

Hand-timed custom workflows testing

Productivity workflow

Microsoft 365 Word tasks

We recorded how long it took to launch Word, open a 90MB Word DOCX file, perform a find/replace task, and export a DOCX file to PDF.

A stopwatch is required for this test.

We used the following application:

- Microsoft Word (Windows v2404.17531.20120)

Running the test

1. Simultaneously start the timer and launch Word.
2. When Word has loaded, stop the timer.
3. Locate the test Word file.
4. Simultaneously start the timer and open the Word file.
5. When the Word document has fully loaded, stop the timer.
6. To bring up the Find/Replace dialog box, press CTRL + H/Control + H.

7. In the Find What field, type `I`
8. In the Replace With field, type `TEST`
9. Simultaneously start the timer and select Replace All.
10. When Word has replaced every I, stop the timer.
11. Click File→Export→Create PDF/XPS.
12. Simultaneously start the timer and click Publish.
13. When the Word has exported the document to PDF, stop the timer.
14. Close the Word document. Do not save changes.
15. Repeat steps 1 through 14 two more times, and record the median results..

Microsoft 365 Excel tasks

We recorded how long it took to launch Excel, open a 92MB macro Excel XLSX file, open a 650KB 10K row Excel XLSX and insert a 3D 100% stacked column chart into the 10K row spreadsheet.

A stopwatch is required for this test.

We used the following application:

- Microsoft Excel (Windows v 2404.17531.20120)

Running the test

1. Simultaneously start the timer and launch Excel.
2. When Excel has loaded, stop the timer.
3. Browse to where the test Excel macro file is located.
4. Simultaneously start the timer and open the Excel macro file.
5. When the Excel file has loaded, stop the timer.
6. Close the macro test file.
7. Browse to where the test Excel 10K row file is located.
8. Simultaneously start the timer and open the 10K row file.
9. When the Excel file has loaded, stop the timer.
10. Click Insert, and select the drop-down menu next to the Insert Column or Bar Chart icon.
11. At the bottom of the drop-down menu, select More Column Charts.
12. Under the Column section, choose 3-D 100% Stacked Column.
13. Simultaneously start the timer and click Ok.
14. When the 3-D 100% Stacked Column Chart appears, stop the timer.
15. Repeat steps 1 through 14 two more times, and record the median results.

Microsoft 365 PowerPoint tasks

We recorded how long it took to launch PowerPoint, open a 180MB PowerPoint PPTX file, start a slideshow task, and export a PPTX to PDF.

A stopwatch is required for this test.

We used the following application:

- Microsoft PowerPoint (Windows v16.0.17531.20120)

Running the test

1. Simultaneously start the timer and launch PowerPoint.
2. When PowerPoint has loaded, stop the timer.
3. Browse to where the test PowerPoint file is located.
4. Open the PowerPoint file.
5. Simultaneously start the timer and press F5 to start the slide show.
6. When the slide show starts to play, stop the timer.
7. Exit the slide show.
8. Click File→Export→Create PDF/XPS.
9. Simultaneously start the timer and click Publish.
10. When the PDF has been created, record the results, and stop the timer.
11. Repeat steps 1 through 11 two more times, and record the median results.

Web-browsing tasks

We recorded how long it took to launch Firefox, load the Lenovo web page, and load 20 duplicate tabs.

A stopwatch is required for this test.

Running the test

1. Simultaneously start the timer and launch Mozilla Firefox.
2. Browse to https://www.lenovo.com/us/en/pc/
3. To duplicate the web page in a new tab, when the web page fully loads, press CTRL/command, and click Refresh.
4. To duplicate the web page again in new tab, once the web page fully loads in a new tab, press CTRL/command and click Refresh.
5. Repeat step 4 until 20 tabs are open.
6. When the web page on the 20th tab fully loads, stop the timer.
7. Repeat steps 1 through 6 two more times, and record the median results.

Content creation workflow

Adobe Lightroom Classic tasks

We recorded how long it took to use photo merge panorama to create a 45MP image.

A stopwatch is required for this test.

We used the following application:

- Adobe Lightroom Classic v13.4

Running the test

1. Simultaneously start the timer and launch Lightroom.
2. When Lightroom has loaded, stop the timer.
3. Click Import.
4. Select the test file directory, and click Import.
5. To select all the imported photos, press Ctrl + A/CMD + A.
6. Click Photo→Photo Merge→Panorama.
7. Check the box next to Fill Edges.
8. Simultaneously start the timer and click Merge.
9. When the progress bar in the top left corner disappears, stop the timer.
10. Repeat steps 1 through 9 two more times, and record the median results.

Adobe Photoshop tasks

We recorded how long it took to launch Adobe Photoshop, process 50 RAW NEF images and convert to JPEG, use photo merge panorama to create a 45MP image, and use HDR Pro to merge five images to an HDR image.

A stopwatch is required for this test.

We used the following application:

- Adobe Photoshop v25.11

Running the test

1. Simultaneously start the timer and launch Photoshop.
2. When Photoshop has loaded, stop the timer.
3. Select File→Scripts→Image Processor.
4. Click Select Folder, and select the test file directory.
5. For JPEG Quality, select 10.
6. Simultaneously start the timer and click Run.
7. When the spinning circle disappears, stop the timer, and record the result.
8. Select File→Automate→Merge to HDR Pro.
9. Browse to the directory where the images are located, select them, and click OK.
10. Simultaneously start the timer and click OK.

11. When the preview merged file appears, stop the timer.
12. Simultaneously start the timer and click Ok.
13. When the HDR image has been created, stop the timer, and record the result.
14. Repeat steps 1 through 13 two more times.
15. Simultaneously start the timer and launch Photoshop.
16. Select File→Scripts→Image Processor.
17. Click Select Folder, and select the test file directory of RAW images.
18. For JPEG Quality, select 10.
19. Click Run.
20. When all the RAW images have been converted into JPEGs, as indicated by spinning circle disappearing, move to the next step.
21. Select File→Automate→Photomerge
22. Browse to the directory where the images are located, select them, and click OK.
23. To save the image, when the panoramic picture appears, close the panoramic picture file, and click Yes.
24. From the Format drop-down menu, select Large Document Format, and click Save.
25. Select File→Automate→Merge to HDR Pro.
26. Browse to the directory where the five HDR images are located, select them, and click OK.
27. When the preview merged file appears, click OK.
28. When the HDR image has been created, stop the timer, and record the median results.

Adobe Premiere Pro tasks

We recorded how long it took to export a 5K RED video file to H.264.

A stopwatch is required for this test.

We used the following application:

- Adobe Premiere Pro v24.5

Running the test

1. Launch Premiere.
2. Select New Project, name the project, and select the test media to import.
3. Click Create.
4. Press Ctrl + M to bring up the Export Media dialog.
5. From the Format drop-down menu, choose .MP4 and H.264.
6. Simultaneously start the timer and click Export.
7. When the file has been exported, stop the timer.
8. Repeat steps 1 through 7 two more times, and record the median results.

AI content creation workflow

Audacity AI task

We recorded how long it took to generate an audio track from a text prompt.

A stopwatch is required for this test.

We used the following application:

- Audacity v3.6.1

Setting up the test

1. Download and install Audacity 3.6.1.
2. Download the Intel OpenVINO AI Plugin from https://www.audacityteam.org/download/openvino/.
3. Launch the installer.
4. Click Next.
5. Click Next.
6. To accept the default install location, click Next.
7. Next to Small Stereo Model, click the check box, and click Next.
8. Click Install.

9. Click Finish.
10. Open Audacity.
11. Click Edit→Preferences.
12. Click Modules.
13. Next to the mod-openvino drop-down menu, select Enabled, and click OK.
14. Close Audacity.

Running the test

1. Launch Audacity.
2. Click Generate→OpenVINO Music Generation.
3. Next to the Model Selection drop-down, select musicgen-small-fp16-stereo.
4. In the Prompt field, type `90s hip hop track with flute, heavy drums, and synth.`
5. Next to MusicGen Decode Device 0 & 1, select GPU.
6. In the Seed field, enter 1.
7. Simultaneously start the timer and click Generate.
8. When the audio track has been generated, stop the timer.
9. Repeat steps 1 through 8 two more times, and record the median results.

Photoshop AI task

We recorded how long it took to use the generative fill AI feature with a text prompt. The base photo we used was a 27.6 MB NEF file originally sized at 6048px x 4032px (300 ppi).

A stopwatch is required for this test.

We used the following application:

- Photoshop v25.11

Running the test

1. Launch Photoshop.
2. Click Open, and navigate to the test photo.
3. Click Open.
4. In the bottom left-hand corner, change the zoom ratio to 5 percent.
5. In the left-hand navigation pane, click Crop tool.
6. In the Generative Expand tool bar drop-down, select Original Ratio.
7. Select the left side of the photo, and drag it left until the area is 25010px x 16674px (300 ppi).
8. Click Generative Expand.
9. In the text field, type `A dense forest with a large stone castle. The sky is dark grey and there is lightning coming from the clouds.`
10. Simultaneously start the timer and click Generate.
11. When the white space has been filled with the generated image, stop the timer.
12. Repeat steps 1 through 11 two more times, and record the median results.

GIMP AI task

We recorded how long it took to generate an image from a text prompt.

A stopwatch is required for this test.

We used the following application:

- GIMP v2.99.14

Setting up the test

1. Navigate to https://github.com/intel/openvino-ai-plugins-gimp/blob/main/Docs/user_guide_for_windows_users.md and follow the instructions to install GIMP v2.99.14 and it's prerequisites.
2. Open a command prompt, and download and install the Image Generation AI plugin:

```
cd C:\Users\Public
mkdir GIMP
cd GIMP
git clone -branch v2.99-R2 https://github.com/intel/openvino=ai-plugins-gimp.git
openvino-ai-plugins-gimp\install.bat
```

3. To download different models for the prompts, enter Y.
4. When prompted to install all models, select 12.
5. Launch GIMP.
6. Click Edit→Preferences.
7. In the left-hand pane, click Folders→Plug-ins.
8. To add a plug-in folder, click the page with the plus icon.
9. Navigate to C:\Users\Public\GIMP\gimpenv3\lib\site-packages\gimpopenvino\plugins, and click OK.
10. Restart GIMP.

Running the test

1. Launch GIMP.
2. Click File→New to create a blank layer.
3. Click OK.
4. Click Layer→OpenVINO-AI-Plugins→Stable diffusion.
5. Next to Advanced Settings, check the box.
6. In the drop-down menu next to Model Name, select SD_1.5_square_int8.
7. In the Enter text to generate image field, type `A cat in a tree beside a beach`.
8. In the Negative Prompt field, type `ugly, deformed, cartoon, bad quality`.
9. Change the number of inference steps to 50.
10. Set the Seed field to 1.
11. Make sure the Power Mode is set to Best performance, and click Load Models.
12. Simultaneously start the timer and click Generate.
13. When the image has generated, stop the timer.
14. Repeat steps 1 through 13 two more times, and record the median results.

Measuring battery Life

MobileMark 30 testing

This test requires a Dr. Meter LX1330B Luxmeter.

Avoiding antivirus software conflicts

MobileMark 30 is not compatible with any virus-scanning software, so we uninstalled any such software before we installed the benchmark.

Avoiding pre-installed software conflicts

MobileMark 30 installs the following applications, which its test scripts employ:

Productivity

- Corel WinZip 26.0 Enterprise
- Microsoft Office LTSC Professional Plus 2021 (v16.0.14332.20493)
- Microsoft Word 2021 Professional Plus
- Microsoft PowerPoint 2021 Professional Plus
- Microsoft Excel 2021 Professional Plus
- Microsoft Outlook 2021 Professional Plus

Creativity

- Adobe Photoshop CC (v25.0)

If any of these applications already exist on the system under test, they could cause problems with the benchmark due to software conflicts. To avoid any such issues, we uninstalled all conflicting pre-installed software applications—including different versions of any of the programs MobileMark 30 uses—before we installed the benchmark.

Using the MobileMark built-in configuration tool

This tool supports three levels of configuration:

1. Only makes changes that are REQUIRED for the benchmark to run.
2. Additionally, makes changes that are RECOMMENDED for repeatable results.
3. Additionally, makes OPTIONAL changes that help ensure best results.

The configuration tool makes the following configuration changes at each of the three levels:

Level 1 - Required

- Disables User Account Control (UAC)
- Set DPI Scaling to 100%
- Disables Low Battery Actions
- Disables Network Proxies
- Disables System Sleep and Hibernate
- Disables Windows Update
- Enables Windows Search
- Disables WinSAT

Level 2 - Recommended

- Create BAPCo power scheme
- Set Power Plan Type to Balanced
- Set CPU Adaptive Mode
- Disables Battery Saver Dimming
- Verifies Battery Saver Threshold
- Disables Disk Defrag
- Disables Windows Error Reporting
- Disables Windows Lock Screen
- Disables Screen Saver and Monitor Timeout
- Disables Windows Security Center
- Set Font Smoothing

Level 3 - Optional

- Disable Battery Saver
- Disables Hard Disk Timeout
- Disables System Restore
- Ignores Laptop Lid Close
- Enables Dark Mode

We chose the official BAPCo "Run Benchmark" default as outlined in the BAPCo MobileMark30 User Guide (https://bapco.com/wp-content/uploads/2024/04/BAPCo-MobileMark30_User-Guide-v1.0.pdf) which runs the benchmark using the Required and Recommended options.

Setting up the performance-qualified battery life test

1. On the system under test, verify that the wireless adapter is disabled.
2. On the system under test, verify that the Lower screen brightness when using battery saver is turned off:
   - Select Windows Start, type `Battery saver`, and press Enter.
   - Next to Turns on at 20%, click the down arrow. Next to Lower screen brightness when using battery saver, toggle the button to Off.
3. On the system under test, verify that the volume is set to 50%.
4. Verify the system is no less than 250 nits.
5. On the system under test, install MobileMark 30 with the default options.

Running the performance-qualified battery life test

1. Boot the system.
2. Select Windows Start.
3. Type `cmd`, and press Ctrl+Shift+Enter.
4. Type `Cmd.exe /c start /wait Rundll32.exe advapi32.dll,ProcessIdleTasks`. Do not interact with the system until the command completes.
5. After the command completes, wait five minutes before running the test.
6. Launch MobileMark 30.
7. Click Run Benchmark.
8. Click Brightness Profiler:
   a. Allow the white screen to warm up for 30 minutes. After 30 minutes, click Skip.
   b. At the Panel Dark Luminance pop-up, to use the value that is queried from the display, select Yes.
   c. Place the X-Rite - i1Display Plus colorimeter in the outlined spot on the screen.
   d. On the system under test, toggle the F1 button to turn off the test overlay.
   e. On the colorimeter system, start i1Profiler program, and select Advanced.
   f. Click Display, and click Profiling.

g. Next to Luminance, click the drop-down menu, and select Measure.
h. In the drop-down menu that appears below, select Paper in booth.
i. In the box with the image that says, "Place your paper in the light booth," scroll down, and click Measure.
j. On the system under test, adjust the slider until the Target White luminance is met on the colorimeter system.
k. Once the correct Target White luminance is met on the test PC, click Done.
l. Click Continue.

9. The test will begin immediately. When prompted, unplug the AC power adapter.

The benchmark is complete when the notebook PC has fully depleted its battery and is no longer operational when running on battery power.

We executed the MobileMark 30 benchmark three times on each system and took the median battery life score run as the representative performance score result for that test.

Procyon Battery Life Benchmark testing

Setting up the test

1. Install a licensed version of Microsoft 365, and verify the following apps are signed in to properly; Excel, PowerPoint, and Word.
2. Purchase and download the Procyon Battery Life benchmark from https://benchmarks.ul.com/procyon.
3. Install the Procyon benchmark.
4. Launch Procyon.
5. Select Settings, and input the Battery Life Benchmark license key.
6. Close Procyon.

Running the test

1. Launch Procyon.
2. Select My Suite.
3. Select the Battery Life test.
4. Click Run.
5. Disconnect the power when prompted.
6. When the test completes, record the results, and wait 15 minutes before re-running.
7. Reboot the system.
8. Repeat steps 1 through 6 two more times, and record the median results.

Microsoft Teams testing

This test requires a separate client system to host the meeting. We also used the client system to run a 4K video on a loop shared with the system under test. To further illustrate the advantage of a newer system and battery combined, we used Windows Studio Effects background blurring and eye tracking on the new system, offloading the responsibility from the CPU to the NPU. We used standard blurring in Teams for the legacy system as it did not have an NPU integrated. Finally, we set the display brightness to 200 nits for each system and the volume to 50%.

Setting up the test

1. Install Microsoft Teams on the system under test.
2. On the client system, start a Teams meeting.
3. On the client system, launch the 4K video and put it on a loop.
4. In Teams, click Share, and select the application window with the 4K video.

Running the test

1. On the system under test, launch Teams.
2. Click Join a meeting.
3. Enter the meeting ID and pass code.
4. To start the test, unplug the power, and record the time.
5. The test is complete when the laptop is powered off. Plug the laptop back in and power it on.
6. Open Event Viewer.
7. Click Windows Logs→System.
8. Click Find, enter System Shutdown, and click Find Next.
9. Record the time the laptop powered off.
10. Repeat steps 1 through 9 two more times, and record the median results.

Zoom testing

For this test you will need a separate client system to host the meeting. We also used the client system to run a 4K video on a loop shared with the system under test. To further illustrate the advantage of a newer system and battery combined, we used Windows Studio Effects background blurring and eye tracking on the new system, offloading the responsibility from the CPU to the NPU. We used standard blurring in Teams for the legacy system as it did not have an NPU integrated. Finally, we set the display brightness to 200 nits for each system and the volume to 50%.

Setting up the test

1. Install Zoom on the system under test.
2. On the client system, start a Zoom meeting.
3. On the client system, launch the 4K video and put it on a loop.
4. In Zoom, click Share, and select the application window with the 4K video.

Running the test

1. On the system under test, launch Zoom.
2. Click Join a meeting.
3. Enter the meeting ID and pass code.
4. To start the test, unplug the power, and record the time.
5. The test is complete when the laptop is powered off. Plug the laptop back in and power it on.
6. Open Event Viewer.
7. Click Windows Logs→System.
8. Click Find, enter System Shutdown, and click Find Next.
9. Record the time the laptop powered off.
10. Repeat steps 1 through 9 two more times, and record the median results.

Measuring acoustic and thermal output

Acoustics testing

Setting up the test

These tests require the following items:

- Extech SDL600 Sound Level Meter/Datalogger with SD card
- Cinebench 2024

1. Place the system under test in a sound-proofed professional sound booth.
2. Set the Extech SDL600 on a tripod so that it is 2 feet in front of, and 1 foot above the system under test.
3. Download and install Cinebench 2024.
4. Launch Cinebench 2024.
5. Select File→Advanced benchmark.
6. Select File→Preferences, and change the Custom Minimum Test Duration to 30 minutes, and click OK.
7. Exit Cinebench.

Running the test

1. Launch Cinebench 2024.
2. In the Minimum Test Duration field, select Custom (20 minutes).
3. Simultaneously start the Extech SDL600 Sound Level Meter/Datalogger and click Cinebench 2024 CPU (Multi Core) Start.
4. At the end of the 20-minute Cinebench 2024 run, stop the Extech SDL600, and record the average sound level (dB) while running Cinebench 2024.
5. Shut down the system for 40 minutes, and let it return to room temperature.
6. Repeat steps 1 through 5 two more times, and report the median results.

Thermal testing

Setting up the test

These tests require the following items:

- FLUKE 2680A Data Acquisition System
- FLUKE DAQ Software Version 4.0
- Omega surface thermocouples
- Cinebench 2024

On a separate client machine, we installed software to record the temperature of the areas underneath the thermocouples. We set up a separate probe to record the ambient room temperature during the Cinebench 2024 runs. We adhered the thermocouples to the top and bottom of the laptop, as well right above and to the left and right of the keyboard.

Running the test

1. Boot the laptop, and let it sit idle for 30 minutes.
2. Start the temperature measuring software, and let the laptops run idle for 5 minutes
3. Launch Cinebench 2024.
4. In the Minimum Test Duration field, select Custom (20 minutes).
5. At the end of the 20-minute Cinebench 2024 run, stop the temperature collection software, and record the average temperature of each thermocouple while running Cinebench 2024.
6. Shut down the system for 40 minutes, and let it return to room temperature.
7. Repeat steps 1 through 6 two more times, and report the median results.

Read the report at https://facts.pt/CT8umA5 ▶

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