The science behind the report:

Workstation users can get increased performance and value with the Dell Precision 3640 Tower

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 Workstation users can get increased performance and value with the Dell Precision 3640 Tower.

We concluded our hands-on testing on February 3. 2021. 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 January 4, 2021 or earlier. Unavoidably, these configurations may not represent the latest versions available when this report appears.

Our results

Table 1: SPECworkstation® 3 - Product Development workload scores. Higher numbers are better.

	Score	Percentage win for Dell Precision 3640 Tower
Intel Core i7-10700		
Dell Precision 3640 Tower	2.01	
Lenovo ThinkStation P340	1.97	2.0
HP Z2 G5	1.72	16.8
Intel Core i9-10900		
Dell Precision 3640 Tower	2.63	
Lenovo ThinkStation P340	2.51	4.7
HP Z2 G5	2.25	16.8

Table 2: SPECworkstation 3 - Media and Entertainment workload scores. Higher numbers are better.

	Score	Percentage win for Dell Precision 3640 Tower
Intel Core i7-10700		
Dell Precision 3640 Tower	1.87	
Lenovo ThinkStation P340	1.83	2.1
HP Z2 G5	1.76	6.2
Intel Core i9-10900		
Dell Precision 3640 Tower	2.45	
Lenovo ThinkStation P340	2.39	2.5
HP Z2 G5	2.35	4.2

Table 3: SPECworkstation 3 - Life Sciences workload scores. Higher numbers are better.

	Score	Percentage win for Dell Precision 3640 Tower
Intel Core i7-10700		
Dell Precision 3640 Tower	1.73	
Lenovo ThinkStation P340	1.64	5.4
HP Z2 G5	1.39	24.4
Intel Core i9-10900		
Dell Precision 3640 Tower	2.29	
Lenovo ThinkStation P340	2.12	8.0
HP Z2 G5	1.86	23.1

Table 4: SPECworkstation 3 - Financial Services workload scores. Higher numbers are better.

	Score	Percentage win for Dell Precision 3640 Tower
Intel Core i7-10700		
Dell Precision 3640 Tower	2.00	
Lenovo ThinkStation P340	2.02	-0.9
HP Z2 G5	1.94	3.0
Intel Core i9-10900		
Dell Precision 3640 Tower	2.38	
Lenovo ThinkStation P340	2.32	2.5
HP Z2 G5	2.25	5.7

Table 5: SPECworkstation 3 - Energy workload scores. Higher numbers are better.

	Score	Percentage win for Dell Precision 3640 Tower
Intel Core i7-10700		
Dell Precision 3640 Tower	0.91	
Lenovo ThinkStation P340	0.92	-1.0
HP Z2 G5	0.88	3.4
Intel Core i9-10900		
Dell Precision 3640 Tower	1.55	
Lenovo ThinkStation P340	1.49	4.0
HP Z2 G5	1.45	6.8

Table 6: SPECworkstation 3 - General Operations workload scores. Higher numbers are better.

	Score	Percentage win for Dell Precision 3640 Tower
Intel Core i7-10700		
Dell Precision 3640 Tower	2.04	
Lenovo ThinkStation P340	1.85	10.2
HP Z2 G5	1.79	13.9
Intel Core i9-10900		
Dell Precision 3640 Tower	2.11	
Lenovo ThinkStation P340	1.95	8.2
HP Z2 G5	1.88	12.2

Table 7: BapCo® SYSmark® 2018 Overall Rating. Higher scores are better.

	Overall Rating	Percentage win for Dell Precision 3640 Tower
Intel® Core i7-10700		
Dell™ Precision™ 3640 Tower	1,940	
Lenovo® ThinkStation® P340	1,927	0.6
HP Z2 G5	1,791	8.3
Intel Core i9-10900		
Dell Precision 3640 Tower	2,003	
Lenovo ThinkStation P340	1,966	1.8
HP Z2 G5	1,820	10.0

Table 8: Cinebench® R20 Overall Rating. Higher numbers are better.

	Overall Rating	Percentage win for Dell Precision 3640 Tower
Intel Core i7-10700		
Dell Precision 3640 Tower	3,941	
Lenovo ThinkStation P340	3,782	4.2
HP Z2 G5	3,613	9.0
Intel Core i9-10900		
Dell Precision 3640 Tower	4,543	
Lenovo ThinkStation P340	4,315	5.2
HP Z2 G5	4,273	6.3

Table 9: Performance/USD (SPECworkstation 3 - Product Development). Higher numbers are better.

	Performance/USD ratio	Percentage win for Dell Precision 3640 Tower
Intel Core i7-10700		
Dell Precision 3640 Tower	1.31	
Lenovo ThinkStation P340	1.29	1.6
HP Z2 G5	1.11	17.8
Intel Core i9-10900		
Dell Precision 3640 Tower	1.11	
Lenovo ThinkStation P340	1.15	-3.3
HP Z2 G5	1.05	5.9

Table 10: Performance/USD (SPECworkstation 3 - General Operations). Higher numbers are better.

	Performance/USD ratio	Percentage win for Dell Precision 3640 Tower
Intel Core i7-10700		
Dell Precision 3640 Tower	1.33	
Lenovo ThinkStation P340	1.21	9.8
HP Z2 G5	1.16	14.9
Intel Core i9-10900		
Dell Precision 3640 Tower	0.89	
Lenovo ThinkStation P340	0.89	-0.2
HP Z2 G5	0.88	1.7

System configuration information

Table 11: Detailed information on the Intel Core i7-10700 processor-powered systems we tested.

System configuration information	Dell Precision 3640 Tower	HP Z2 G5 Tower	Lenovo ThinkStation P340 Tower
Processor			
Vendor	Intel	Intel	Intel
Name	Core i7	Core i7	Core i7
Model number	10700	10700	10700
Core frequency (GHz)	2.9-4.8	2.9-4.8	2.9-4.8
Number of cores	8	8	8
Cache (MB)	16	16	16
Memory			
Amount (GB)	16	16	16
Number of DIMMS	2 x 8GB	2 x 8GB	2 x 8GB
Type	DDR4	DDR4	DDR4
Speed (MHz)	2,933	2,933	2,933
Graphics			
Vendor	NVIDIA®	NVIDIA	NVIDIA
Model number	NVIDIA Quadro® P620	NVIDIA Quadro P620	NVIDIA Quadro P620
Video RAM	2GB GDDR5	2GB GDDR5	2GB GDDR5
Storage			
Amount (GB)	512	512	256
Type	M.2 PCIe NVMe™	M.2 PCIe NVMe	M.2 PCIe NVMe
Connectivity/expansion			
Wired internet	Intel I219-LM	Intel I219-LM	Intel I219-LM
USB	Front: 2 USB 3.2 Gen 2 Type-A 1 USB 3.2 Gen 2 Type-A with Power Share 1 USB 3.2 Gen 2 Type-C Rear: 4 USB 3.2 Gen 2 Type-A 2 USB 2.0 Type-A	Front: 2 SuperSpeed USB Type-A 10Gbps 2 SuperSpeed USB Type-A 5Gbps Rear: 2 SuperSpeed USB Type-A 10Gbps 2 SuperSpeed USB Type-A 5Gbps 2 USB 2.0 Type-A	Front: 2 USB 3.2 Gen 2 Type-A 2 USB 3.2 Gen 1 Type-A 1 USB 3.2 Gen 1 Type-C Rear: 3 USB 3.2 Gen 1 Type-A 2 USB 2.0 Type-A
Video	2 DisplayPort 1.4 4 Mini DisplayPort™	2 DisplayPort 1.4 4 Mini DisplayPort	2 DisplayPort 1.4 4 Mini DisplayPort
Operating system			
Vendor	Microsoft	Microsoft	Microsoft
Name	Windows 10 Pro	Windows 10 Pro	Windows 10 Pro
Build number or version	10.0.19042	10.0.19042	10.0.19042

System configuration information	Dell Precision 3640 Tower	HP Z2 G5 Tower	Lenovo ThinkStation P340 Tower
BIOS			
BIOS name and version	Dell 1.3.2	HP S50 Ver. 01.00.05	LENOVO S08KT2DA
Dimensions			
Width (in)	6.95	6.7	6.7
Depth (in)	13.58	14	12.4
Height (in)	13.19	15.2	14.8

Table 12: Detailed information on the Intel Core i9-10900 processor-powered systems we tested.

System configuration information	Dell Precision 3640 Tower	HP Z2 G5 Tower	Lenovo ThinkStation P340 Tower
Processor			
Vendor	Intel	Intel	Intel
Name	Core i9	Core i9	Core i9
Model number	10900	10900	10900
Core frequency (GHz)	2.8-5.2	2.8-5.2	2.8-5.2
Number of cores	10	10	10
Cache (MB)	20	20	20
Memory			
Amount (GB)	32	32	32
Number of DIMMS	2 x 16GB	2 x 16GB	2 x 16GB
Type	DDR4	DDR4	DDR4
Speed (MHz)	2,933	2,933	2,933
Graphics			
Vendor	NVIDIA	NVIDIA	NVIDIA
Model number	NVIDIA Quadro P2200	NVIDIA Quadro P2200	NVIDIA Quadro P2200
Video RAM	5GB GDDR5	5GB GDDR5	5GB GDDR5
Storage			
Amount (GB)	512	512	256
Type	M.2 PCIe NVMe	M.2 PCIe NVMe	M.2 PCIe NVMe

System configuration information	Dell Precision 3640 Tower	HP Z2 G5 Tower	Lenovo ThinkStation P340 Tower
Connectivity/expansion			
Wired internet	Intel I219-LM	Intel I219-LM	Intel I219-LM
USB	**Front:** 2 USB 3.2 Gen 2 Type-A 1 USB 3.2 Gen 2 Type-A with Power Share 1 USB 3.2 Gen 2 Type-C **Rear:** 4 USB 3.2 Gen 2 Type-A 2 USB 2.0 Type-A	**Front:** 2 SuperSpeed USB Type-A 10Gbps 2 SuperSpeed USB Type-A 5Gbps **Rear:** 2 SuperSpeed USB Type-A 10Gbps 2 SuperSpeed USB Type-A 5Gbps 2 USB 2.0 Type-A	**Front:** 2 USB 3.2 Gen 2 Type-A 2 USB 3.2 Gen 1 Type-A 1 USB 3.2 Gen 1 Type-C **Rear:** 3 USB 3.2 Gen 1 Type-A 2 USB 2.0 Type-A
Video	6 DisplayPort 1.4	6 DisplayPort 1.4	6 DisplayPort 1.4
Operating system			
Vendor	Microsoft	Microsoft	Microsoft
Name	Windows 10 Pro	Windows 10 Pro	Windows 10 Pro
Build number or version	10.0.19042	10.0.19042	10.0.19042
BIOS			
BIOS name and version	Dell 1.3.2	HP S50 Ver. 01.00.05	LENOVO S08KT2DA
Dimensions			
Width (in)	6.95	6.7	6.7
Depth (in)	13.58	14	12.4
Height (in)	13.19	15.2	14.8

Table 13: Pricing information for the systems we tested.

	Dell Precision 3640 Tower	Lenovo ThinkStation P340 Tower	HP Z2 G5 Tower
Intel Core i7-10700	$1,535.88	$1,530.62	$1,549.01
Intel Core i9-10900	$2,366.94	$2,183.12	$2,145.07

How we tested

Measuring performance: benchmarks

SYSmark 2018

Avoiding antivirus software conflicts

SYSmark 2018 is not compatible with any virus-scanning software, so we uninstalled any such software present on the systems before we installed the benchmark.

Avoiding pre-installed software conflicts

SYSmark 2018 installs the following applications, which its test scripts employ:

Productivity

- Adobe® Acrobat® Pro DC
- AutoIT 3.3.14.2
- BowPad64-2.3.3 installer
- Google® Chrome®
- Microsoft Excel 2016
- Microsoft OneNote 2016
- Microsoft Outlook 2016
- Microsoft PowerPoint 2016
- Microsoft Word 2016
- Windows Zip

Creativity

- Adobe Photoshop CC 2017
- Adobe Lightroom® Classic CC
- CyberLink PowerDirector® 2015

Responsiveness

- Adobe Acrobat Pro DC
- Adobe Lightroom Classic CC
- Adobe Photoshop CC 2017
- CyberLink PowerDirector 2015
- Google Chrome
- Microsoft Excel 2016
- Microsoft OneNote 2016
- Microsoft Outlook 2016
- Microsoft PowerPoint 2016
- Microsoft Word 2016

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 2018 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

Level 2 - Recommended

- 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
- 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
- Disables Windows Defender
- Disables Windows Firewall
- Set Font Smoothing

Level 3 - Optional

- Disables Hard Disk Timeout
- Disables System Restore
- Ignores Laptop Lid Close

We chose the official BAPCo 'Run Benchmark' default as outlined in the BAPCo SYSmark2018 User Guide http://bapco.com/wp-content/uploads/2018/10/BAPCo_SYSmark2018_user_guide.pdf which runs the benchmark using the Required and Recommended options.

Setting up the test

1. Install SYSmark 2018 with the default options.

Running the test

1. Launch SYSmark 2018.
2. Click the Settings Gear icon.
3. For iterations, enter 3.
4. Verify that Conditioning Run is enabled.
5. Enable Process Idle Tasks.
6. Enter a name for the benchmark run.
7. To return to the main menu, click Back.
8. Click Run Benchmark.
9. When the benchmark finishes, record the SYSmark 2018 benchmark results.

SPECworkstation 3

Setting up the test
1. Go to https://www.spec.org/gwpg/wpc.static/workstation3-info.html and purchase and download the vendor license of the benchmark.
2. Unzip the SPECworkstation_304.zip file to C:\.
3. Navigate to the extracted SPECworkstation_304 directory, and click SPECworkstation_304.exe to install.
4. Shut down the system.

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 SPECworkstation.
7. Change the iterations to 3, and check the box next to Official Run.
8. Click the OpenCL/CUDA Configuration button, select the discrete graphics card option, and select CUDA.
9. Click Run Benchmark.
10. When the test is complete, record the results.

Cinebench R20

Setting up the test
1. Download and install Cinebench from https://www.maxon.net/en-us/products/cinebench-r20-overview/.

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 Cinebench.
7. Click Run.
8. When the test is complete, record the results.
9. Repeat steps 1 through 8 twice more.

Read the report at http://facts.pt/eYRDMT7 ▶

This project was commissioned by Dell Technologies.

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