



Wait less and stay unplugged longer with robust Microsoft Windows 10 laptops

Choose solid-state drives over hard disk drives to improve your Windows 10 laptop experience

Microsoft® Windows® 10 laptops are an extension of the people using them—with options that include touch screens, styluses, and form factors that fit many different needs and budgets. This flexibility and focus on the customer experience makes it easy to understand why people pick Windows 10 laptops.

So, what type of storage has the most impact on your day-to-day experience? And does the storage you choose affect battery life? Our hands-on testing and review of 14 mainstream (MSRP between \$300 and \$800) and 7 premium (MSRP over \$800) Windows 10 laptops[†] reveal a consistent story: Choosing a robust system with a solid-state drive (SSD) over a hard disk drive (HDD) reduces the amount of time it takes your laptop to boot up, shut down, launch programs, and get on the web. In fact, a solid-state drive can be the single most important contributor to the everyday feel of a laptop's performance. Plus, the battery life on laptops equipped with SSDs was longer than the battery life on most of the laptops with HDD storage.

Read on to see how choosing a Windows 10 laptop with SSD storage can make the difference between a great experience and a mediocre one.

[†] See a list of laptops we tested [on page 5](#)

Start up and shut down an average of up to

70% faster



Access the web an average of up to

52% faster



Stay unplugged an average of up to

35% longer



Jump to the next task an average of up to

59% faster

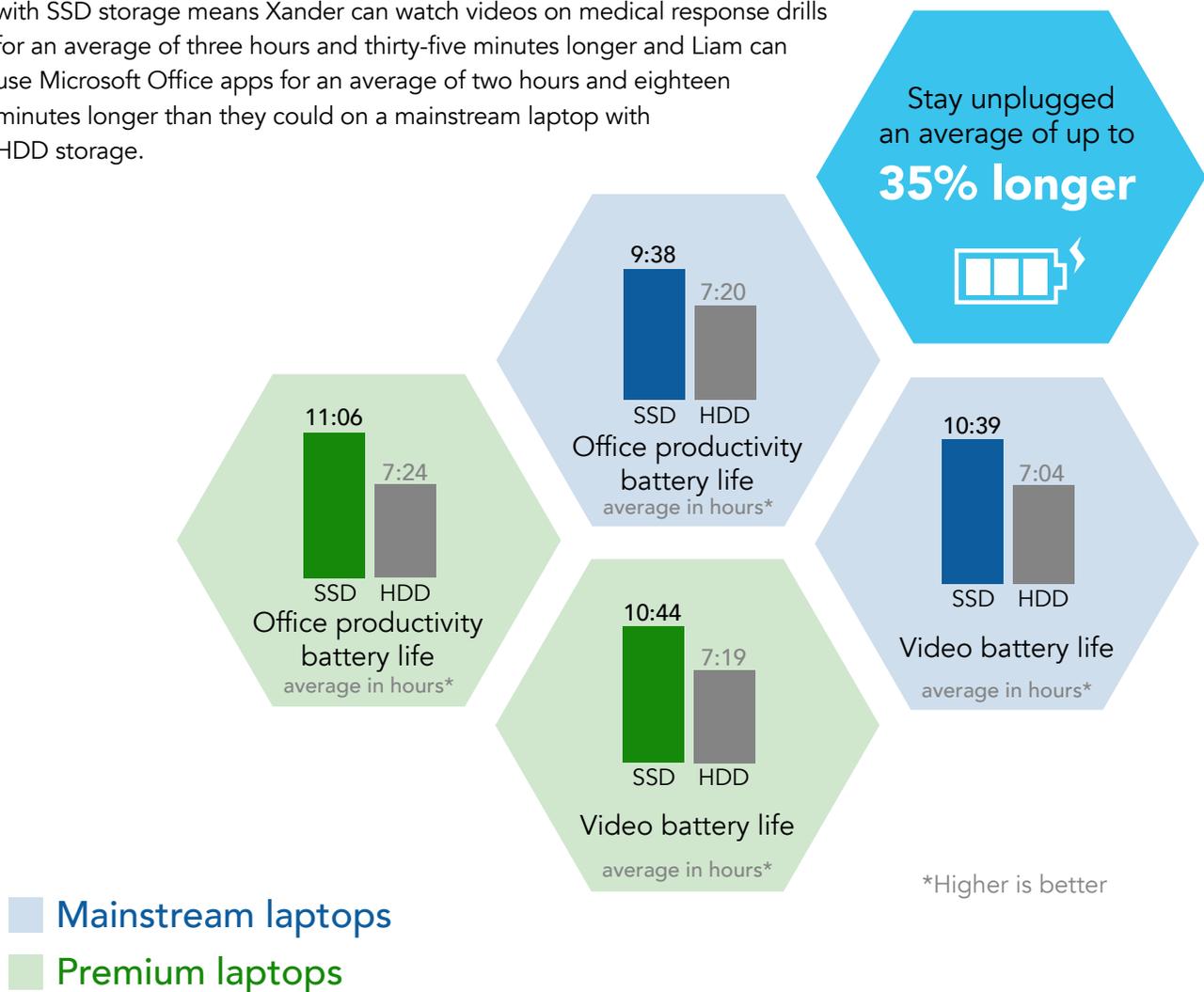


These scenarios are hypothetical, but the decisions the characters face are real. At Principled Technologies, we tested the performance of Microsoft Windows 10 laptops. Read on to see how choosing SSDs over HDDs can enhance your experience.

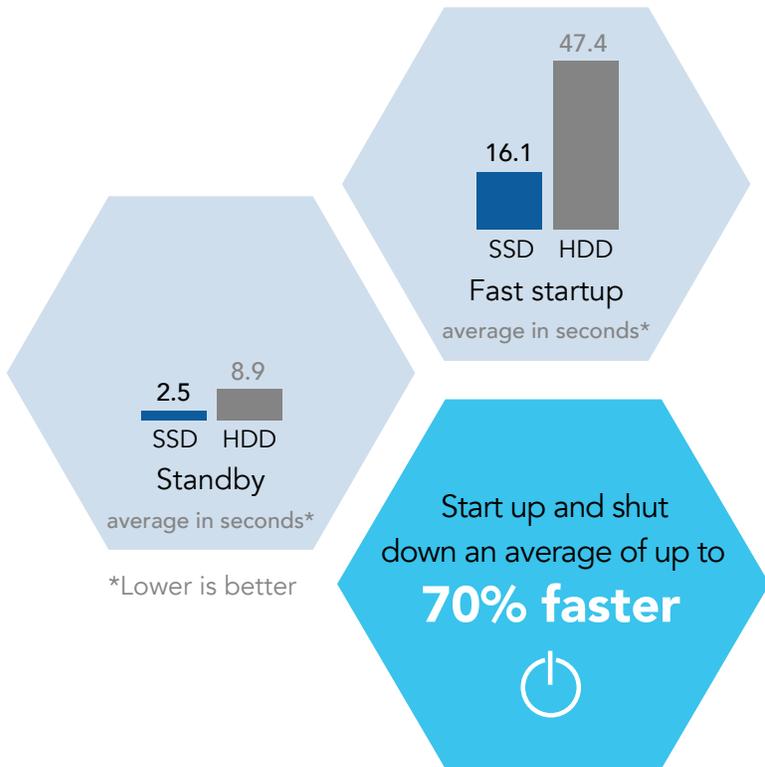
Benefit from longer battery life

Do what you want, where you want, for as long as you want

Xander and Liam are identical twins who want matching laptops with great battery life. But Xander watches EMT training videos and Liam uses productivity tools like Microsoft Office 365®, which affect battery life differently. Our tests show if Xander and Liam choose any of the Windows 10 laptops with SSD storage that we tested, they will get a full eight-hour workday's worth of battery life.† Going with a mainstream Windows 10 laptop with SSD storage means Xander can watch videos on medical response drills for an average of three hours and thirty-five minutes longer and Liam can use Microsoft Office apps for an average of two hours and eighteen minutes longer than they could on a mainstream laptop with HDD storage.



† [Link to mainstream and premium laptop results](#)



Avoid bumps in the road to success

Make a good impression with a laptop that's ready to go when you are

Stacey is one of ten sales people for a pharmaceutical group and her company doesn't want to spend a fortune on laptops. If Stacey's company chooses a mainstream laptop with a 500GB HDD, Stacey and her fellow sales associates will have to wait up to 83 seconds every time they power up their machines. Our tests show that Stacey may need to plug in a mainstream laptop with HDD storage after as few as four hours, whereas every laptop with SSD storage we tested ran unplugged a full eight-hour workday or longer. So, the salesforce will get a combination of better productivity and longer battery life if the company purchases laptops with SSD storage. They can waste less of their prospective clients' time during power up and launch Microsoft PowerPoint™ presentations in an average of two and a half seconds, instead of almost five seconds.† Because her laptop will start faster and has battery life to spare, Stacey has the freedom to really concentrate on the practice and its needs.

Stop spinning your wheels

Get closer to a near-instant connection to the web and apps with SSDs

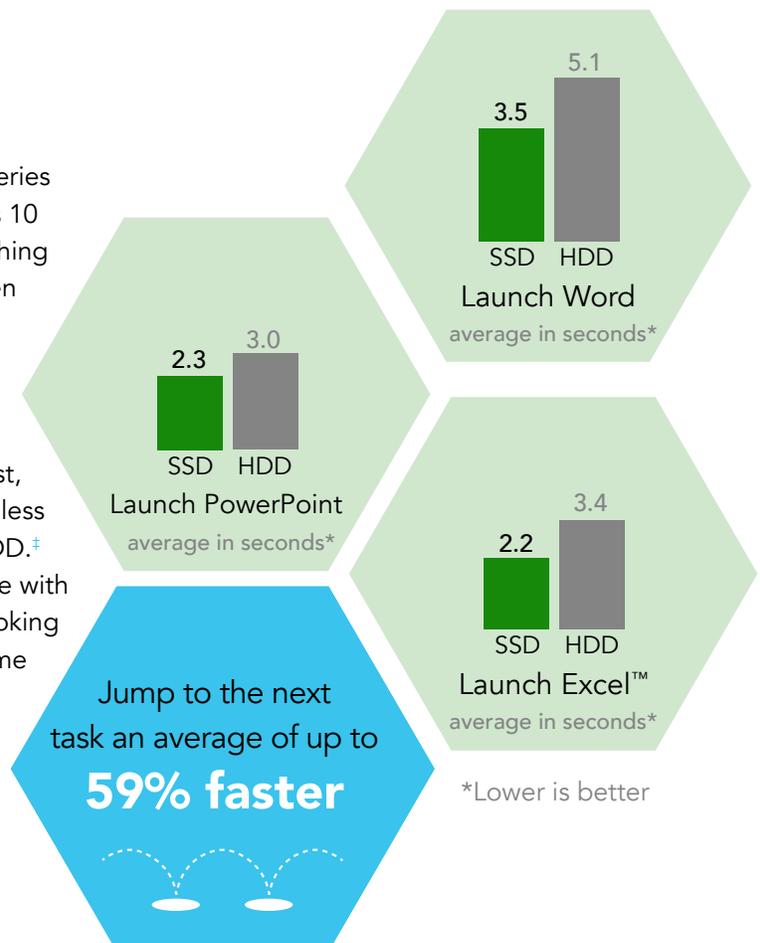
Janice and Alberto are the producers of a popular blog series that explores the local food scene. They need a Windows 10 laptop that does it all. This workhorse needs to be everything from a mobile office to an effective presentation tool when they pitch their graphic and layout ideas to potential interviewees, and they don't want to worry about the laptop dying while they're out and about. Our tests show that, if Janice and Alberto buy a premium Windows 10 laptop with a 256GB SSD, they could attack their to-do list, keep track of their finances, and write blog entry ideas in less time than they could on a system powered with a 1TB HDD.‡ And all of the premium laptops with SSDs we tested come with at least eight hours of battery life. Less time waiting or looking for a power plug means Janice and Alberto have more time to find the next big thing.

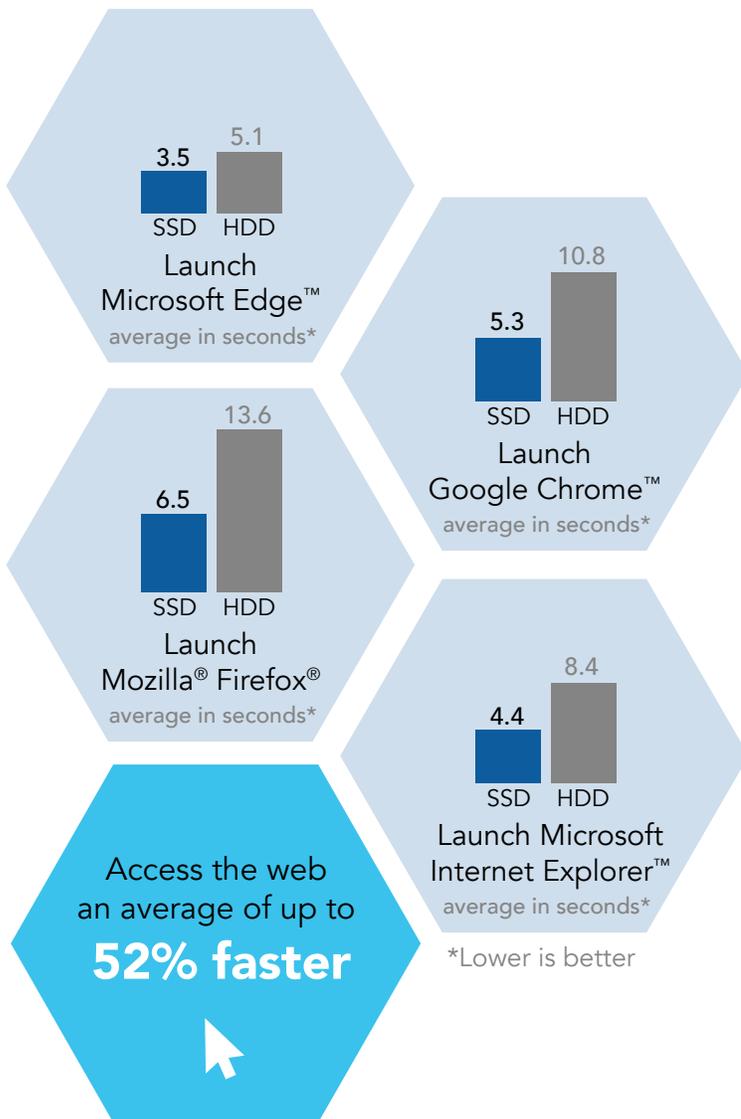
■ Mainstream laptops

■ Premium laptops

† [Link](#) to mainstream laptop results

‡ [Link](#) to premium laptop results





A hard lesson you can learn from

The amount of storage you get isn't as important as the type of storage you get

Johnny walks into a Best Buy to purchase a computer for college and sees a mainstream Windows 10 laptop with a 1TB HDD that's on sale. He thinks this laptop is better because it has the most storage, so he buys it, even though he will likely never use even half of that space. After he's used the computer for three months, he's looking longingly at the laptop his lab partner is using—Mei's Windows 10 laptop has the same specs as his, but has a 256GB SSD instead of a 1TB HDD, and the difference in responsiveness and battery life between the two systems makes Johnny very unhappy with his purchase.† Our tests show that by buying a Windows 10 laptop with SSD storage, Mei can watch YouTube videos on cell transport for her Bio 101 class out in the Quad for up to three and a half hours longer than Johnny, start researching the professor's question faster, and raise her hand with the correct answer while Johnny is still twiddling his thumbs and waiting for a response from his HDD-powered laptop.

■ Mainstream laptops

Conclusion

If our test results don't convince you that choosing a laptop that provides SSD storage over a HDD is a good idea, just think about how inconvenient it is to find a place to plug in your laptop while you're out and about. Even more convincing: do an experiment. Count the number of times you jump on your laptop daily, whether it's to research something or work on a project, and multiply that number by 1,095 (the number of days in three years). That lost time can add up quickly.

† [Link](#) to mainstream laptop results

On May 4, 2018, we finalized the hardware and software configurations we tested. Updates for current and recently released hardware and software appear often, so unavoidably these configurations may not represent the latest versions available when this report appears. We concluded hands-on testing on June 26, 2018.

What we tested

Laptops with an MSRP between \$300 and \$800 are mainstream laptops and premium laptops start at an MSRP of \$800.

Mainstream laptop model	MSRP	Processor	Memory	Drive
HP® Pavilion 15t	\$799.99	Intel Core i5	8 GB	1TB HDD
Acer® Aspire® 3 A315-51-31GK	\$349.99	Intel Core i3	4 GB	1TB HDD
Acer Aspire 3 A315-51-56GT	\$499.99	Intel Core i5	4 GB	1TB HDD
Lenovo™ IdeaPad® 110 14"	\$399.99	Intel Celeron	4 GB	500GB HDD
Dell™ Inspiron™ 15 3000	\$449.99	Intel Core i3	8 GB	1TB HDD
Lenovo ThinkPad® E580	\$699.99	Intel Core i5	4 GB	500GB HDD
HP ProBook 440 G5	\$866.00	Intel Celeron	4 GB	500GB HDD
Lenovo IdeaPad 320 15"	\$379.00	Intel Core i3	4 GB	500GB HDD
HP Laptop 15z	\$564.99	AMD A-Series	8 GB	1TB HDD
Lenovo IdeaPad 320S 14"	\$579.99	Intel Core i3	4 GB	1TB HDD
Lenovo IdeaPad 320 15"	\$449.99	Intel Pentium	4 GB	1TB HDD
Acer Aspire 5 A515-51G-515J	\$599.99	Intel Core i5	8 GB	256GB SSD
HP Laptop 15t	\$764.99	Intel Core i3	8 GB	256GB SSD
Lenovo Flex 6 14"	\$599.99	Intel Core i3	4 GB	128GB SSD

Premium laptop model	MSRP	Processor	Memory	Hard Drive
Dell Inspiron 15 5000	\$849.99	Core i7	8 GB	1TB HDD
Lenovo Legion Y520	\$849.99	Core i5	8 GB	1TB HDD
Toshiba Tecra Z50-E-BTO	\$1,454.00	Core i7	4 GB	1TB HDD
Lenovo IdeaPad 320 15"	\$849.99	Core i7	16 GB	1TB HDD
Dell Inspiron 15 5000	\$829.99	Core i7	8 GB	256GB SSD
Dell 15 7000 Gaming	\$1,049.99	Core i5	8 GB	256GB SSD
Lenovo Flex 5 15"	\$859.99	Core i5	8 GB	256GB SSD

Our results

Result averages

Mainstream laptops	Average of mainstream laptop times SSD	Average of mainstream laptop times HDD	Average mainstream laptop time difference	Average mainstream percentage difference
Local full-screen video playback				
Video battery life (minutes)	639	424	215	33.6%
MobileMark® 2014 v1.5				
Office productivity battery life (minutes)	578	440	138	23.9%
Boot performance (fast startup)				
Shutdown duration	6.17	16.42	10.25	62.4%
Bios initialization duration	1.94	5.47	3.53	64.5%
Total boot (no BIOS) duration	16.05	47.44	31.39	66.2%
Standby performance				
Suspend duration	1.90	4.04	2.14	53.0%
Bios initialization duration	0.58	0.56	-0.02	-3.6%
Total resume (no BIOS) duration	2.54	8.87	6.33	71.4%
Hand-timing tests average*				
Microsoft®Word	4.5	11.2	6.7	59.8%
Microsoft Excel™	2.5	4.9	2.4	49.0%
Microsoft PowerPoint™	2.5	4.4	1.9	43.2%
Microsoft Edge® Browser	3.5	5.1	1.6	31.4%
Google® Chrome® Browser	5.3	10.8	5.5	50.9%
Mozilla® FireFox® Browser	6.5	13.6	7.1	52.2%
Microsoft Internet Explorer® Browser	4.4	8.4	4.0	47.6%

*All timed results are in seconds.

Premium laptops	Average of premium laptop times SSD	Average of premium laptop times HDD	Average premium laptop time difference	Average premium percentage difference
Local full-screen video playback				
Video battery life (minutes)	644	439	205	31.8%
MobileMark 2014 v1.5				
Office productivity battery life (minutes)	686	444	242	35.3%
Boot performance (fast startup)				
Shutdown duration	5.59	18.63	13.04	70.0%
Bios initialization duration	4.56	5.46	0.90	16.5%
Total boot (no BIOS) duration	14.05	40.53	26.48	65.3%
Standby performance				
Suspend duration	2.62	3.77	1.15	30.5%
Bios initialization duration	0.75	0.74	-0.01	-1.4%
Total resume (no BIOS) duration	3.91	6.14	2.23	36.3%
Hand-timing tests average *				
Microsoft Word	3.5	5.1	1.6	31.4%
Microsoft Excel	2.2	3.4	1.2	35.3%
Microsoft Powerpoint	2.3	3.0	0.7	23.3%
Microsoft Edge Browser	3.0	3.0	0.0	0.0%
Google Chrome Browser	4.8	7.2	2.4	33.3%
Mozilla Firefox Browser	5.1	9.7	4.6	47.4%
Microsoft Internet Explorer Browser	3.0	4.5	1.5	33.3%

Results for "Stay unplugged an average of up to 35% longer" claim

Mainstream laptop findings*	HP Pavilion 15t HDD	Acer Aspire 3 A315-51-31GK HDD	Acer Aspire 3 A315-51-56GT HDD	Lenovo IdeaPad 110 HDD	Dell Inspiron 15 3000 HDD	Lenovo ThinkPad E580 HDD	HP ProBook 440 G5 HDD
Local full-screen video playback							
Battery Life (min.)	390	502	479	247	432	513	733
MobileMark 2014 v1.5							
Office productivity overall battery life (min.)	460	479	477	245	524	600	689

*All timed results are in seconds.

Mainstream laptop findings (cont.)*	Lenovo IdeaPad 320 Core i3 HDD	HP Laptop 15z HDD	Lenovo IdeaPad 320S HDD	Lenovo IdeaPad 320 Pentium HDD	Acer Aspire 5 A515-51G-515J SSD	HP Laptop 15t SSD	Lenovo Flex 6 SSD
Local full-screen video playback							
Battery Life (min.)	399	308	366	296	618	534	766
MobileMark 2014 v1.5							
Office productivity overall battery life (min.)	366	293	377	333	541	474	720

Premium laptop findings*	Dell Inspiron 15 5000 HDD	Lenovo Legion Y520 HDD	Toshiba Tecra Z50-E-BTO HDD	Lenovo IdeaPad 320 HDD	Dell Inspiron 15 5000 SSD	Dell 15 7000 Gaming SSD	Lenovo Flex 5 SSD
Local full-screen video playback							
Battery Life (min.)	362	364	581	447	469	581	882
MobileMark 2014 v1.5							
Office productivity overall battery life (min.)	408	417	573	377	527	818	714

Results for "Start up and shut down an average of up to 70% faster" claim

Mainstream laptop findings*	HP Pavilion 15t HDD	Acer Aspire 3 A315-51-31GK HDD	Acer Aspire 3 A315-51-56GT HDD	Lenovo IdeaPad 110 HDD	Dell Inspiron 15 3000 HDD	Lenovo ThinkPad E580 HDD	HP ProBook 440 G5 HDD
Boot performance (fast startup)							
Shutdown duration	20.050	14.044	14.739	14.166	31.305	13.878	13.281
BIOS initialization duration	2.975	4.908	4.840	4.575	10.513	7.077	5.389
Total boot (no BIOS) duration	43.455	41.578	45.564	83.017	48.765	34.100	43.679
Standby performance							
Suspend duration	9.650	3.327	2.984	2.944	6.870	2.434	2.060
BIOS initialization duration	0.381	0.345	0.350	0.327	0.891	0.719	0.749
Total resume (no BIOS) duration	5.629	6.675	7.373	17.677	6.786	6.272	12.628

*All timed results are in seconds.

Mainstream laptop findings (cont.)*	Lenovo IdeaPad 320 Core i3 HDD	HP Laptop 15z HDD	Lenovo IdeaPad 320S HDD	Lenovo IdeaPad 320 Pentium HDD	Acer Aspire 5 A515-51G-515J SSD	HP Laptop 15t SSD	Lenovo Flex 6 SSD
Boot performance (fast startup)							
Shutdown duration	14.195	16.650	13.915	14.367	7.316	5.213	5.995
BIOS initialization duration	4.361	5.140	3.996	6.419	1.711	2.188	1.922
Total boot (no BIOS) duration	50.096	49.905	35.970	45.716	9.351	19.892	18.912
Standby performance							
Suspend duration	2.183	3.921	2.696	5.332	2.205	0.974	2.523
BIOS initialization duration	1.155	0.426	0.393	0.433	0.396	0.925	0.407
Total resume (no BIOS) duration	7.708	9.195	8.840	8.823	1.510	3.523	2.579

Premium laptop findings*	Dell Inspiron 15 5000 HDD	Lenovo Legion Y520 HDD	Toshiba Tecra Z50-E-BTO HDD	Lenovo IdeaPad 320 HDD	Dell Inspiron 15 5000 SSD	Dell 15 7000 Gaming SSD	Lenovo Flex 5 SSD
Boot performance (fast startup)							
Shutdown duration	28.957	17.421	14.080	14.053	5.968	7.104	3.687
BIOS initialization duration	7.755	4.607	5.385	4.082	6.142	5.287	2.248
Total boot (no BIOS) duration	43.122	42.031	34.664	42.311	11.191	21.544	9.402
Standby performance							
Suspend duration	6.926	3.233	2.910	2.003	3.003	3.888	0.955
BIOS initialization duration	1.239	0.363	0.340	1.003	0.823	1.028	0.389
Total resume (no BIOS) duration	7.527	5.820	5.701	5.512	1.890	8.200	1.636

Results for "Jump to the next task an average of up to 59% faster" claim

Mainstream laptop hand-timing findings*	HP Pavilion 15t HDD	Acer Aspire 3 A315-51-31GK HDD	Acer Aspire 3 A315-51-56GT HDD	Lenovo IdeaPad 110 HDD	Dell Inspiron 15 3000 HDD	Lenovo ThinkPad E580 HDD	HP ProBook 440 G5 HDD
Microsoft Word	5.1	5.8	5.4	10.7	16.6	9.1	15.0
Microsoft Excel	3.7	4.5	5.0	6.1	4.7	3.8	5.5
Microsoft PowerPoint	3.2	3.8	4.1	5.8	4.7	3.3	4.7

Mainstream laptop hand-timing findings (cont.)*	Lenovo IdeaPad 320 Core i3 HDD	HP Laptop 15z HDD	Lenovo IdeaPad 320S HDD	Lenovo IdeaPad 320 Pentium HDD	Acer Aspire 5 A515-51G-515J SSD	HP Laptop 15t SSD	Lenovo Flex 6 SSD
Microsoft Word	16.5	6.7	13.7	18.7	4.0	4.8	4.7
Microsoft Excel	4.8	4.9	4.8	5.6	2.1	2.8	2.7
Microsoft PowerPoint	4.6	4.0	4.6	5.4	2.1	2.7	2.8

*All timed results are in seconds.

Premium laptop hand-timing findings*	Dell Inspiron 15 5000 HDD	Lenovo Legion Y520 HDD	Toshiba Tecra Z50-E-BTO HDD	Lenovo IdeaPad 320 HDD	Dell Inspiron 15 5000 SSD	Dell 15 7000 Gaming SSD	Lenovo Flex 5 SSD
Microsoft Word	4.8	5.2	5.3	4.9	3.9	3.9	2.8
Microsoft Excel	3.4	3.5	3.7	2.8	2.0	2.3	2.4
Microsoft PowerPoint	3.0	3.1	3.0	2.8	2.3	2.2	2.4

Results for "Access the web an average of up to 52% faster" claim

Mainstream laptop hand-timing findings*	HP Pavilion 15t HDD	Acer Aspire 3 A315-51-31GK HDD	Acer Aspire 3 A315-51-56GT HDD	Lenovo IdeaPad 110 HDD	Dell Inspiron 15 3000 HDD	Lenovo ThinkPad E580 HDD	HP ProBook 440 G5 HDD
Google Chrome Browser	6.9	8.2	15.9	12.1	8.5	8.3	12.5
Mozilla Firefox Browser	11.1	8.7	15.6	17.7	13.0	12.5	14.6
Microsoft Internet Explorer Browser	6.6	6.8	8.7	12.9	9.8	6.8	8.6
Microsoft Edge Browser	3.6	4.5	3.8	6.2	3.7	6.5	4.8

Mainstream laptop hand-timing findings (cont.)*	Lenovo IdeaPad 320 Core i3 HDD	HP Laptop 15z HDD	Lenovo IdeaPad 320S HDD	Lenovo IdeaPad 320 Pentium HDD	Acer Aspire 5 A515-51G-515J SSD	HP Laptop 15t SSD	Lenovo Flex 6 SSD
Google Chrome Browser	8.8	11.6	9.3	16.8	4.4	5.6	5.8
Mozilla Firefox Browser	13.2	14.1	13.0	16.5	4.6	8.1	6.9
Microsoft Internet Explorer Browser	7.3	8.3	7.4	9.3	3.6	4.7	4.8
Microsoft Edge Browser	4.4	6.0	4.5	7.6	3.0	4.2	3.2

Premium laptop hand-timing findings*	Dell Inspiron 15 5000 HDD	Lenovo Legion Y520 HDD	Toshiba Tecra Z50-E-BTO HDD	Lenovo IdeaPad 320 HDD	Dell Inspiron 15 5000 SSD	Dell 15 7000 Gaming SSD	Lenovo Flex 5 SSD
Google Chrome Browser	7.7	6.9	6.4	7.9	4.7	5.0	4.7
Mozilla Firefox Browser	10.6	9.0	11.4	7.7	4.7	6.0	4.5
Microsoft Internet Explorer Browser	4.1	4.7	3.9	5.1	3.0	3.2	2.8
Microsoft Edge Browser	3.1	3.3	2.5	3.2	3.1	3.0	3.0

*All timed results are in seconds.

How we tested

This document details the methodologies we will follow in testing the systems

Setting up the system

1. Complete the OOBE on each system.
2. Run Windows Updates.
3. Uninstall any vendor provided applications. If anti-virus is on the system, leave it and update to latest version.
4. If no anti-virus is installed, install McAfee LiveSafe™.
5. Set the homepage to open to <https://www.amazon.com>, and install the following browsers:
 - a. Microsoft Edge
 - b. Google Chrome
 - c. Mozilla FireFox
 - d. Microsoft Internet Explorer
6. Install and launch the following applications:
 - a. Adobe® Acrobat® Reader
 - b. RARLAB WinRAR x64
 - c. Microsoft Office 365 Word
 - d. Microsoft Office 365 Excel
 - e. Microsoft Office 365 PowerPoint
 - f. Microsoft Windows® ADK Windows Assessment Toolkit
 - g. Microsoft Windows ADK Windows Performance Toolkit

Running the tests

Local Full Screen Video Playback (FSVP) assessment

1. Copy the Microsoft-provided Performance Assessment Toolkit directory (Perf2.4) to the C drive.

Running the Local Full Screen Video Playback assessment

You will use the Movies & TV app to play media clips locally, so verify that it is the default application to handle MP4 file extensions.

1. Press the Windows Key, and type Powershell.
2. To Run as Administrator, right-click the powershell.exe.
3. To access the Performance Assessment Toolkit directory, type `cd C:\Users\\Perf2.4`
4. To launch the script, type `.\performance_assessments.cmd`
5. To run the system preparation script, type P, and the system will reboot. (Note: Do this once per day or after making a configuration change.)
6. After the system reboots, repeat steps 1 through 4.
7. To execute the Battery Life assessment, type 5.
8. To analyze the performance result, after the Battery Life assessment is complete, type A, and record the result.
9. Repeat steps 1 through 8 two more times.

Measuring battery life with MobileMark 2014 v1.5

Avoiding antivirus software conflicts

MobileMark 2014 is not compatible with any virus-scanning software, so we uninstalled any such software present on the notebook PCs before we installed the benchmark.

Avoiding pre-installed software conflicts

MobileMark 2014 installs the following applications, which its test scripts employ:

- Adobe Acrobat Pro XI
- Google Chrome 32.0
- Microsoft Excel 2013
- Microsoft Outlook 2013
- Microsoft PowerPoint 2013
- Microsoft Word 2013
- WinZip® Pro 17.5

If any of these applications are already on the system under test, they could cause problems with the benchmark due to software conflicts. To avoid any such issues, before we installed the benchmark, we uninstalled all conflicting pre-installed software applications, including different versions of any of the programs MobileMark 2014 uses.

Adjusting display brightness and power settings

The brightness of a notebook's display affects its battery life. Therefore, BAPCo® requires that before you test with MobileMark 2014, you make sure the brightness of the notebook's monitor is greater than or equal to 150 nits on a completely white screen while the notebook is unplugged and running on battery power. The measurement follows the standards from the Video Electronics Standards Association (www.vesa.org).

We complied with this standard for all the tests we ran by setting the notebook PC's brightness as close to 150 nits as we could without going below that brightness level. Before we started each test, we used the following procedure (note: this procedure assumes we began with the notebook plugged into the power supply):

1. To create a completely blank white screen, open Microsoft Paint by clicking Start→All Programs→Accessories→Paint.
2. To open the Resize and Skew dialog, press Ctrl+W.
3. Under Horizontal and Vertical, enter 200, and click OK.
4. Click the View tab.
5. To view a white screen, click Full screen.
6. To allow the screen to warm, wait 45 minutes.
7. Unplug the notebook from the power supply, and using a luminance meter, measure the display's brightness in the center of the screen. (We used the Gossen Mavolux5032C.)
8. If the reading is below or significantly greater than 150 nits, adjust the screen brightness to as close to 150 nits, without going under, as possible. Then retest:
 - a. Click the Windows start button, and in the Windows Start Search box, type `power options`
 - b. Click Change plan settings.
 - c. Click Change advanced power settings.
 - d. Expand the Display option, and change the Display brightness on battery and plugged in to the correct percentage that produces no less than 150 nits.
9. Allow the notebook to run on battery power for 10 minutes, re-measure the display, and adjust the brightness up or down as necessary.
10. Verify that the notebook is using the correct brightness setting by plugging in the system, unplugging it, and taking another reading.

Using the MobileMark built-in Configuration Tool

This tool supports three levels of configuration:

1. For the benchmark to run, only make required changes.
2. Additionally, make recommended changes 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)
- Disables Windows Update
- Disables System Sleep and Hibernate
- Sets Screen Dimming Timeout (2 minutes)
- Disables Low Battery Actions
- Disables Network Proxies
- Disables Autorun for Optical Drive
- Sets DPI Scaling to 100%

Level 2—recommended

- Creates BAPCo power scheme
- Sets Power Plan Type to balanced
- Disables Windows Firewall
- Disables Windows Sidebar/Gadgets
- Disables Windows Pop-ups
- Disables Incoming Remote Desktop Connections
- Disables Windows Error Reporting
- Disables Screen Saver and Monitor Timeout
- Sets CPU Adaptive Mode
- Disables Desktop Slideshow
- Disables Disk Defrag

Level 3—optional

- Sets Hard Disk Timeout
- Disables Windows Defender
- Disables System Restore
- Ignores Laptop Lid Close
- Sets Maximum Display Brightness
- Disables Adaptive Brightness

Setup

1. Verify that the wireless adapter is enabled and connected to a wireless router that is not connected to the Internet.
2. Install MobileMark 2014 with the default options.

Measuring battery life with MobileMark 2014

To run the MobileMark 2014 Office Productivity benchmark, we performed the following steps:

1. Launch MobileMark 2014.
2. Click Configuration, and choose all the options except for the optional “Set Maximum Display Brightness.”
3. Click Save.
4. Select the Office Productivity test by clicking the Office Productivity icon.
5. Enter a name for this test in the Project Name field, and click Continue.
6. If MobileMark 2014 lists no problems or warnings, click Continue. If it does list any problems or warnings, close MobileMark 2014, and correct the problem(s) before proceeding.
7. When prompted, unplug the AC power adapter. The test begins immediately.
8. The Office Productivity test 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 2014 Office Productivity test three times on the system and took the average battery life run as the representative score for that test.

Getting the MobileMark 2014 results

After the completion of each MobileMark Productivity 2014 test, we plugged the AC power adapter into the notebook PC and turned on the system. After the system booted, MobileMark 2014 started automatically, analyzed the test scores, and displayed the results from the last test in the Test Results Viewer.

To submit these results to BAPCo, we saved the test results by performing the following steps:

1. Click Save.
2. Enter a name, and to save the results as an FDR file, select FDR.
3. Click Save again, and to save the results as a PDF file, select PDF.
4. Browse to the Documents directory where the result FDR and PDF files are located.

Windows ADK fast startup and standby performance assessments

1. Launch the Windows Assessment Console.
2. Click Options→New Job.
3. Click Create Custom Job.
4. Click Add Assessments, and add the following assessments:
 - a. Boot performance (fast startup).
 - b. Standby performance.
5. In the left-hand column, select each assessment, and uncheck the “Use recommended settings” box.
6. For each assessment, change the number of iterations to 10.
7. Click Run.
8. Click Start.
9. When the tests finish, record the results, and shutdown the system.

Browser and Office application launch times

1. Boot the system and bring up an administrative command prompt:
 - a. Type `CMD`
 - b. To open App options, right-click the Command Prompt app.
 - c. Click “Run as administrator” button.
2. Type `cmd.exe /c start /wait Rundll32.exe advapi32.dll,ProcessIdleTasks`
 - a. Do not interact with the system until the command completes.
3. After the command completes, wait 5 minutes before running the test.

4. Simultaneously start the timer and launch the Microsoft Edge browser.
5. When the browser page loads, stop the timer.
6. Record the result.
7. Simultaneously start the timer and launch the Google Chrome browser.
8. When the browser page loads, stop the timer.
9. Record the result.
10. Simultaneously start the timer and launch the Mozilla FireFox browser.
11. When the browser page loads, stop the timer.
12. Record the result.
13. Simultaneously start the timer and launch the Microsoft Internet Explorer browser.
14. When the browser page loads, stop the timer.
15. Record the result.
16. Simultaneously start the timer and launch Microsoft Office 365 Word.
17. When the template page loads, stop the timer.
18. Record the result.
19. Simultaneously start the timer and launch Microsoft Office 365 Excel.
20. When the template page loads, stop the timer.
21. Record the result.
22. Simultaneously start the timer and launch Microsoft Office 365 PowerPoint.
23. When the template page loads, stop the timer.
24. Record the result.
25. Shut down the system.
26. Repeat steps 1 through 25 two more times, and report the median of the three runs.

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